



# CALCULATION PACKAGE

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November 12, 2021

## Architectural Innovations

### Pratt Plat Lot 5

Mercer Island,  
Washington

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#### MULHERN & KULP STRUCTURAL ENGINEERING, INC.

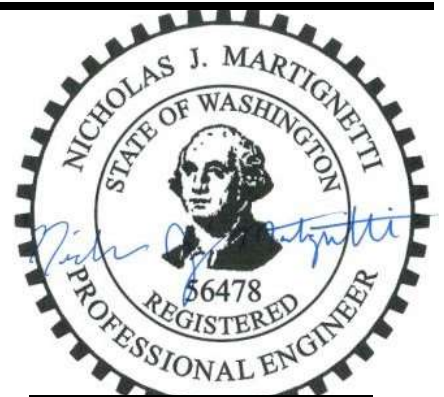
Prepared By:

Riley J. Denis, E.I.T.

*Staff Engineer*

Nick J. Martignetti, P.E.

*Associate Owner + San Diego Office Director*



*Signature, Seal & Date*



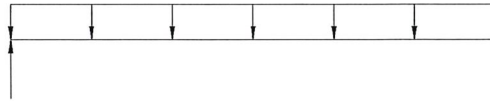
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: ROOF FRAMING- TYP. HDR

B1

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

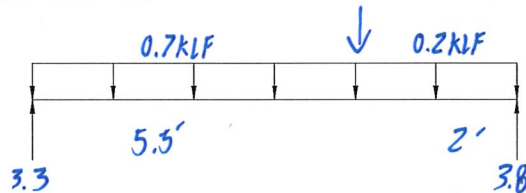
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING - FRONT BED HDR @ G.T. ABOVE

B2

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

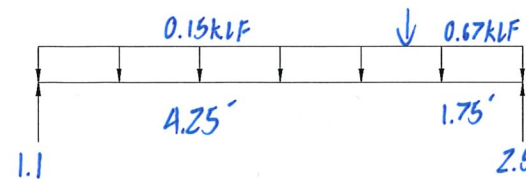
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

BEAM DESCRIPTION: ROOF FRAMING- TYP. HDR @ G.T. ABOVE

B3

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

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



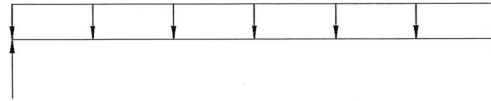
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: UPPER FLOOR FRAMING - TYP. HDR

B4

PARAMETERS:

L = 6.5 FT  
W = 1.0 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 3.3$  K       $V_D = -$  K       $< V_{ALL} = 9.5$  K       ADEQUATE  
 $M_{MAX} = 5.2$  K-FT       $< M_{ALL} = 5.2$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.11$  IN.       $L/709 < L/240$        ADEQUATE

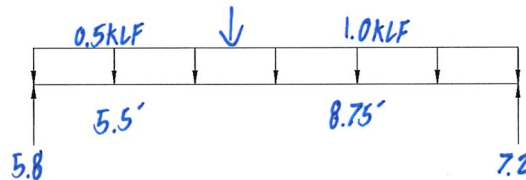
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM @ REAR PATIO

B5

PARAMETERS:

L = 19.25 FT  
W = 7 KLF  
P = 1.5 K



ANALYSIS:

$R_{MAX} = 7.2$  K       $V_D = -$  K       $< V_{ALL} = 16.8$  K       ADEQUATE  
 $M_{MAX} = 25.9$  K-FT       $< M_{ALL} = 47.5$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.39$  IN.       $L/503 < L/240$        ADEQUATE

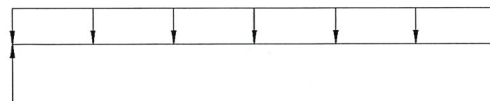
5 1/2" x 15" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - REAR LIVING SLIDER HDR

B6

PARAMETERS:

L = 12 FT  
W = 0.8 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 4.8$  K       $V_D = -$  K       $< V_{ALL} = 13.1$  K       ADEQUATE  
 $M_{MAX} = 14.4$  K-FT       $< M_{ALL} = 33.4$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.18$  IN.       $L/800 < L/240$        ADEQUATE

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



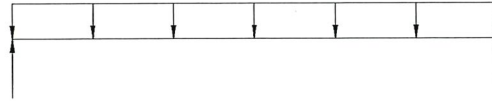
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: UPPER FLOOR FRAMING - SIDE KITCHEN SLIDER HDR

B7

PARAMETERS:

L = 12 FT  
W = 0.1 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 0.6$  K      $V_D = -$  K      $< V_{ALL} = 3.9$  K      ADEQUATE  
 $M_{MAX} = 1.8$  K-FT      $< M_{ALL} = 4.5$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.13$  IN.      $L/1000+$       $< L/240$       ADEQUATE

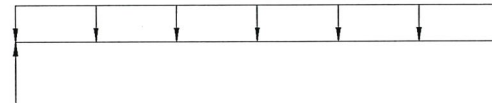
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - FRONT PORCH BMS

B8

PARAMETERS:

L = 14.75 FT  
W = 0.13 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 1.0$  K      $V_D = -$  K      $< V_{ALL} = 4.5$  K      ADEQUATE  
 $M_{MAX} = 3.5$  K-FT      $< M_{ALL} = 5.2$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.37$  IN.      $L/478$       $< L/240$       ADEQUATE

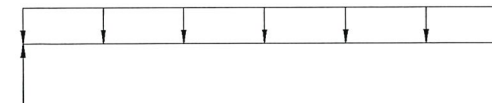
4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM @ TYP. INT. BRG

B9

PARAMETERS:

L = 3.5 FT  
W = 0.8 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 1.4$  K      $V_D = -$  K      $< V_{ALL} = 3.9$  K      ADEQUATE  
 $M_{MAX} = 1.2$  K-FT      $< M_{ALL} = 4.5$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.007$  IN.      $L/1000+$       $< L/240$       ADEQUATE

4x10 DF#2



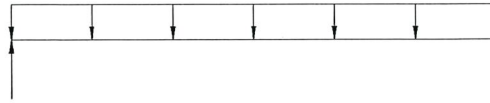
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: UPPER FLOOR FRAMING - BM @ TOP OF STAIRS

B10

PARAMETERS:

L = 4 FT  
W = 0.35 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 0.7$  K      $V_D = -$  K      $< V_{ALL} = 11.1$  K      ADEQUATE  
 $M_{MAX} = 0.7$  K-FT      $< M_{ALL} = 37.8$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.0007$  IN.      $L/1000+$       $< L/240$       ADEQUATE

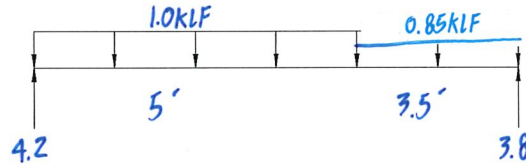
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - MUD BM @ WALL ABOVE

B11

PARAMETERS:

L = 8.5 FT  
W = -7 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 4.2$  K      $V_D = -$  K      $< V_{ALL} = 12.8$  K      ADEQUATE  
 $M_{MAX} = 8.7$  K-FT      $< M_{ALL} = 43.5$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.04$  IN.      $L/1000+$       $< L/240$       ADEQUATE

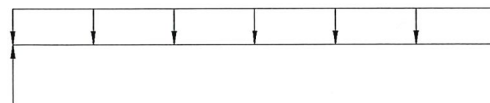
3 1/2" x 18" GLB

BEAM DESCRIPTION: UPPER FLOOR FRAMING - GARAGE BM @ WALL ABOVE @ EXT.

B12

PARAMETERS:

L = 15 FT  
W = 0.85 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 6.4$  K      $V_D = -$  K      $< V_{ALL} = 12.8$  K      ADEQUATE  
 $M_{MAX} = 23.9$  K-FT      $< M_{ALL} = 43.5$  K-FT      ADEQUATE  
 $\Delta_{TL} = 0.32$  IN.      $L/563$       $< L/240$       ADEQUATE

3 1/2" x 18" GLB



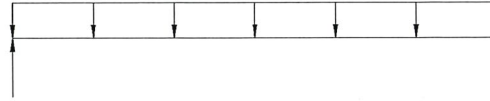
**BEAM & HEADER CALCULATIONS**

**BEAM DESCRIPTION:** UPPER FLOOR FRAMING - GARAGE BM @ WALL ABOVE @ INT.

B13

PARAMETERS:

L = 14 FT  
W = 0.62 KLF  
P = - K



ANALYSIS:

R<sub>MAX</sub> = 4.3 K      V<sub>D</sub> = - K < V<sub>ALL</sub> = 12.8 K       ADEQUATE  
M<sub>MAX</sub> = 15.2 K-FT < M<sub>ALL</sub> = 43.5 K-FT       ADEQUATE  
Δ<sub>TL</sub> = 0.18 IN.      L/933 < L/240       ADEQUATE

3 1/2" x 18" GLB

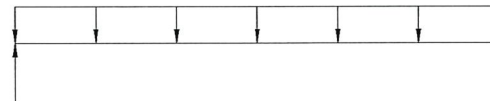
**BEAM DESCRIPTION:** UPPER FLOOR FRAMING - GARAGE BM FRONT TO BACK EXT.

B14

PARAMETERS:

L = 22 FT  
W =      KLF  
P =      K

SEE ENERCAK  
OUTPUT



ANALYSIS:

R<sub>MAX</sub> =      K      V<sub>D</sub> =      K < V<sub>ALL</sub> =      K       ADEQUATE  
M<sub>MAX</sub> =      K-FT < M<sub>ALL</sub> =      K-FT       ADEQUATE  
Δ<sub>TL</sub> =      IN.      L/      < L/240       ADEQUATE

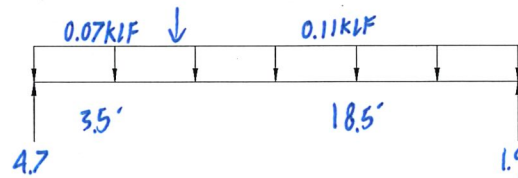
(4) 1 3/4" x 18" LVL

**BEAM DESCRIPTION:** UPPER FLOOR FRAMING - GARAGE BM FRONT TO BACK INT.

B15

PARAMETERS:

L = 22 FT  
W = 7 KLF  
P = 4.3 K



ANALYSIS:

R<sub>MAX</sub> = 4.7 K      V<sub>D</sub> = - K < V<sub>ALL</sub> = 13.8 K       ADEQUATE  
M<sub>MAX</sub> = 16.4 K-FT < M<sub>ALL</sub> = 44.6 K-FT       ADEQUATE  
Δ<sub>TL</sub> = 0.42 IN.      L/629 < L/240       ADEQUATE

(2) 1 3/4" x 18" LVL



**BEAM & HEADER CALCULATIONS**

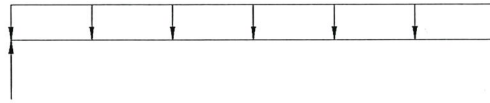
BEAM DESCRIPTION: UPPER FLOOR FRAMING- REAR GARAGE HDR

B16

PARAMETERS:

L =  FT  
W =  KLF  
P =  K

SEE ENERCALC  
OUTPUT



ANALYSIS:

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

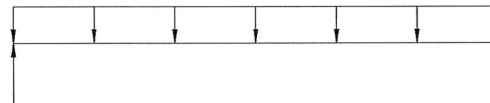
BEAM DESCRIPTION: UPPER FLOOR FRAMING- GARAGE HDRS CONT.

B17

PARAMETERS:

L =  FT  
W =  KLF  
P =  K

SEE ENERCALC  
OUTPUT



ANALYSIS:

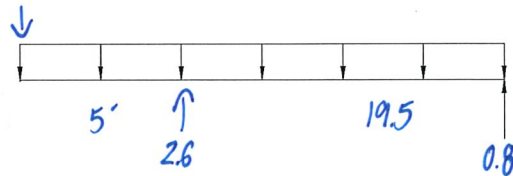
$R_{MAX} =$   K       $V_D =$   K       $< V_{ALL} =$   K       ADEQUATE  
 $M_{MAX} =$   K-FT       $< M_{ALL} =$   K-FT       ADEQUATE  
 $\Delta_{TL} =$   IN.       $L/$    $< L/240$        ADEQUATE

BEAM DESCRIPTION: UPPER FLOOR FRAMING- CANT'D BM @ STAIRS

B18

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

$R_{MAX} =$   K       $V_D =$   K       $< V_{ALL} =$   K       ADEQUATE  
 $M_{MAX} =$   K-FT       $< M_{ALL} =$   K-FT       ADEQUATE  
 $\Delta_{TL} =$   IN.       $2 L/$    $< L/240$        ADEQUATE

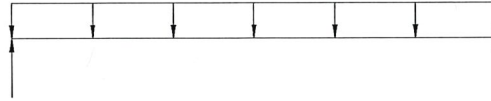


**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: UPPER FLOOR FRAMING- PORCH BM @ WALL ABOVE SIDE TO SIDE B19

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

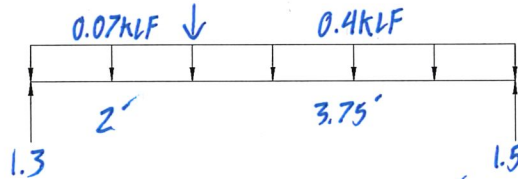
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

4x10 DF#2

BEAM DESCRIPTION: UPPER FLOOR FRAMING- PORCH BM @ WALL ABOVE FRONT TO BACK B20

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

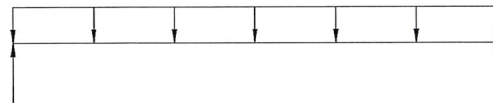
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

4x10 DF#2

BEAM DESCRIPTION: MAIN FLOOR FRAMING- CRAWL BM @ BRG B21

PARAMETERS:

L =  FT  
W =  KLF  
P =  K

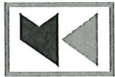


ANALYSIS:

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

4x10 DF#2





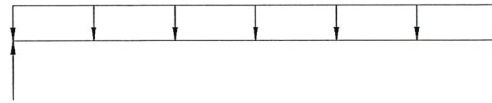
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. CRAWL BMS

B22

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

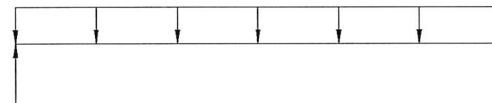
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. HDR

B23

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

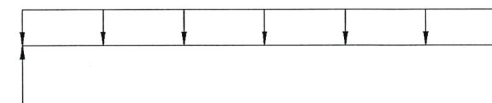
$R_{MAX} =$  K      $V_D =$  K      $< V_{ALL} =$  K      ADEQUATE  
 $M_{MAX} =$  K-FT      $< M_{ALL} =$  K-FT      ADEQUATE  
 $\Delta_{TL} =$  IN.      $L/$   $< L/240$       ADEQUATE

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. INT. BM

B24

PARAMETERS:

L =  FT  
W =  KLF  
P =  K



ANALYSIS:

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



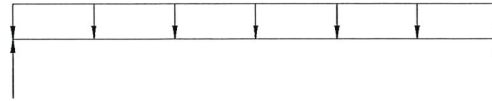
**BEAM & HEADER CALCULATIONS**

BEAM DESCRIPTION: MAIN FLOOR FRAMING - TYP. BM @ STAIR

B25

PARAMETERS:

L = 4 FT  
W = 0.7 KLF  
P = - K



ANALYSIS:

$R_{MAX} = 1.4$  K       $V_D = -$  K       $< V_{ALL} = 11.1$  K       ADEQUATE  
 $M_{MAX} = 1.4$  K-FT       $< M_{ALL} = 37.8$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.001$  IN.       $L/1000+$        $< L/240$        ADEQUATE

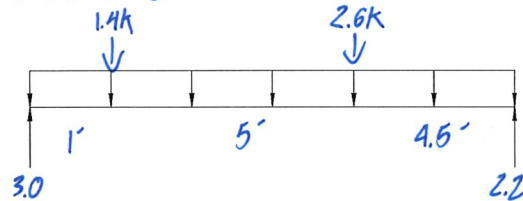
3 1/2" x 18" GLB

BEAM DESCRIPTION: MAIN FLOOR FRAMING - BM @ P.A. @ STAIRS

B26

PARAMETERS:

L = 10.9 FT  
W = 0.11 KLF  
P = -> K



ANALYSIS:

$R_{MAX} = 3.0$  K       $V_D = -$  K       $< V_{ALL} = 11.1$  K       ADEQUATE  
 $M_{MAX} = 8.8$  K-FT       $< M_{ALL} = 37.8$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.06$  IN.       $L/1000+$        $< L/240$        ADEQUATE

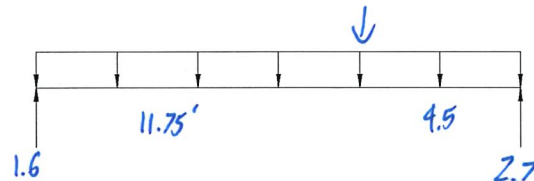
3 1/2" x 18" GLB

BEAM DESCRIPTION: MAIN FLOOR FRAMING - BASEMENT BM @ P.A.

B27

PARAMETERS:

L = 16.25 FT  
W = 0.11 KLF  
P = 2.5 K



ANALYSIS:

$R_{MAX} = 2.7$  K       $V_D = -$  K       $< V_{ALL} = 11.1$  K       ADEQUATE  
 $M_{MAX} = 11.2$  K-FT       $< M_{ALL} = 37.8$  K-FT       ADEQUATE  
 $\Delta_{TL} = 0.17$  IN.       $L/1000+$        $< L/240$        ADEQUATE

3 1/2" x 18" GLB



**BEAM & HEADER CALCULATIONS**

**BEAM DESCRIPTION:** MAIN FLOOR FRAMING - CRAWL BM @ P.A.

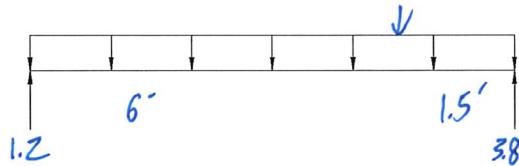
B28

PARAMETERS:

L = 7.5 FT

W = 0.11 KLF

P = 4.2 K



ANALYSIS:

$R_{MAX} = 3.8$  K       $V_D = -$  K       $< V_{ALL} = 11.1$  K       ADEQUATE

$M_{MAX} = 5.2$  K-FT       $< M_{ALL} = 32.8$  K-FT       ADEQUATE

$\Delta_{TL} = 0.02$  IN.       $L/10001 < L/240$        ADEQUATE

3 1/2" x 18" GLB

**BEAM DESCRIPTION:** MAIN FLOOR FRAMING - DECK JOISTS

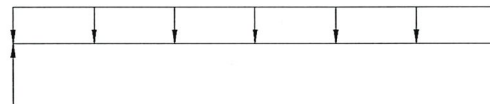
B29

PARAMETERS:

L = 14.25 FT

W = 0.09 KLF

P = - K



ANALYSIS:

$R_{MAX} = 0.64$  K       $V_D = -$  K       $< V_{ALL} = 1.7$  K       ADEQUATE

$M_{MAX} = 2.3$  K-FT       $< M_{ALL} = 2.6$  K-FT       ADEQUATE

$\Delta_{TL} = 0.36$  IN.       $L/475 < L/240$        ADEQUATE

2x12 HF#Z @ 16" O.C.

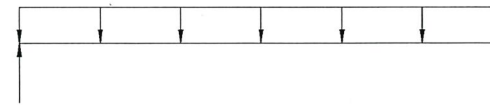
**BEAM DESCRIPTION:**

PARAMETERS:

L = [ ] FT

W = [ ] KLF

P = [ ] K



ANALYSIS:

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

$M_{MAX} = [ ]$  K-FT       $< M_{ALL} = [ ]$  K-FT       ADEQUATE

$\Delta_{TL} = [ ]$  IN.       $L/[ ] < L/240$        ADEQUATE

[ ]



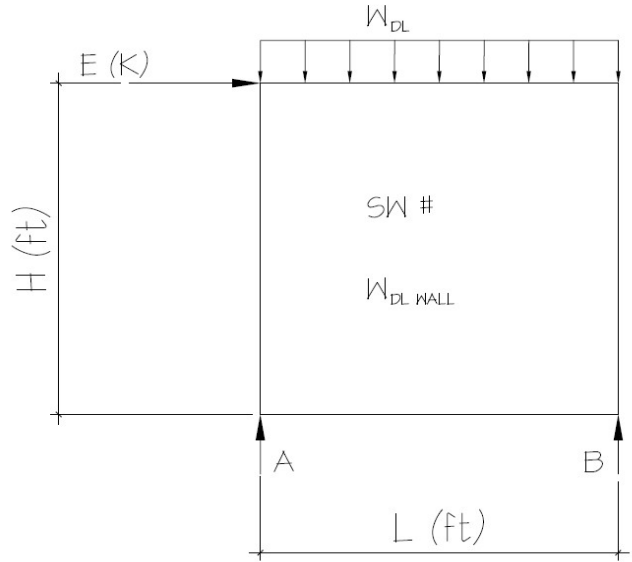
**OVERSTRENGTH CALCULATIONS**

WALL DESCRIPTION/SW #:

209

PARAMETERS:

L = 15.5 FT  
H = 9.0 FT  
E = 1.75 K  
W<sub>DL WALL</sub> = 0.10 KLF  
W<sub>DL</sub> = 0.170 KLF  
Ω<sub>0</sub> = 2.5 (ASCE TABLE 12.2.1 FOOTNOTE G)  
SDS = 1.176



ANALYSIS:

$E_{MH} = \Omega_0 * E = 4.38$  K  
 $E_v = 0.2 * SDS * DL = 0.984$  K  
 $E_M = E_{MH} + E_v = 5.359$  K  
 $E_M = E_{MH} - E_v = 3.391$  K

$E_M (MAX) = \sum M_A = 0 = 5.36(9.0) + 0.27(15.5)(7.75) - R_B(15.5)$        $R_B = 2.1DL + 3.1E$   
 $R_A = 2.1DL - 3.1E$

$E_M (MIN) = \sum M_A = 0 = 3.39(9.0) + 0.27(15.5)(7.75) - R_B(15.5)$        $R_B = 2.1DL + 2.0E$   
 $R_A = 2.1DL - 2.0E$

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

ALLOWABLE STRESS PERMITTED TO BE INCREASED BY 1.2

SEE FOLLOWING BEAM  
CALCS FOR LOAD  
APPLICATION

## Wood Beam

Lic. #: KW-06004787

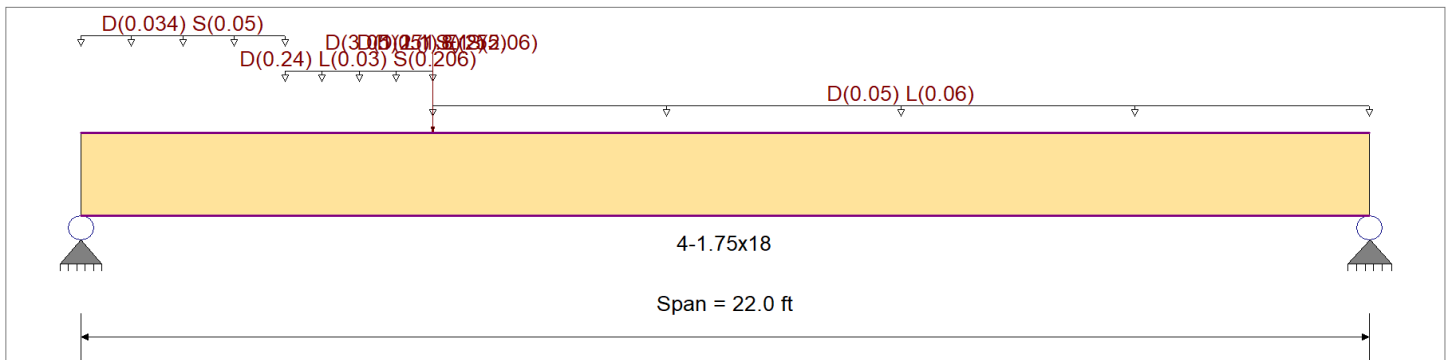
DESCRIPTION: B14

### CODE REFERENCES

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

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	3,120.0 psi	E : Modulus of Elasticity
Load Combination : ASCE 7-16	Fb -	3,120.0 psi	Ebend- xx
Wood Species : iLevel Truss Joist	Fc - Prll	3,012.0 psi	Eminbend - xx
Wood Grade : MicroLam LVL 2.0 E	Fc - Perp	900.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	342.0 psi	
	Ft	1,866.0 psi	



### 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 = 0.050, L = 0.060 k/ft, Extent = 6.0 --> 22.0 ft, Tributary Width = 1.0 ft
- Point Load : D = 3.050, L = 1.80, S = 2.060 k @ 6.0 ft, (B12)
- Point Load : D = 2.10, E = 2.0 k @ 6.0 ft, (SW 209)
- Uniform Load : D = 0.240, L = 0.030, S = 0.2060 k/ft, Extent = 3.50 --> 6.0 ft, Tributary Width = 1.0 ft
- Uniform Load : D = 0.0340, S = 0.050 k/ft, Extent = 0.0 --> 3.50 ft, Tributary Width = 1.0 ft
- Point Load : D = 1.050, S = 1.550 k @ 6.0 ft, (P.A.)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.475</b>	1	Maximum Shear Stress Ratio	=	<b>0.282</b>	: 1
Section used for this span		<b>4-1.75x18</b>		Section used for this span		<b>4-1.75x18</b>	
fb: Actual	=	1,705.08 psi		fv: Actual	=	110.81 psi	
Fb: Allowable	=	3,588.00 psi		Fv: Allowable	=	393.30 psi	
Load Combination		+D+0.750L+0.750S+H		Load Combination		+D+0.750L+0.750S+H	
Location of maximum on span	=	6.022ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.173 in	Ratio =	1521	>=	360	
Max Upward Transient Deflection		0.000 in	Ratio =	0	<	360	
Max Downward Total Deflection		0.563 in	Ratio =	468	>=	300	
Max Upward Total Deflection		0.000 in	Ratio =	0	<	300	

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W+H	1	0.5635	10.036		0.0000	0.000

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	10.228	4.700
Overall MINimum	1.455	0.545
+D+H	5.784	2.743
+D+L+H	7.501	3.861

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203-21004  
RJD  
11-03-21

## Wood Beam

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DESCRIPTION: B14

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+Lr+H	5.784	2.743
+D+S+H	8.975	3.853
+D+0.750Lr+0.750L+H	7.072	3.582
+D+0.750L+0.750S+H	9.465	4.414
+D+0.60W+H	5.784	2.743
+D+0.750Lr+0.750L+0.450W+H	7.072	3.582
+D+0.750L+0.750S+0.450W+H	9.465	4.414
+0.60D+0.60W+0.60H	3.471	1.646
+D+0.70E+0.60H	6.803	3.125
+D+0.750L+0.750S+0.5250E+H	10.228	4.700
+0.60D+0.70E+H	4.489	2.028
D Only	5.784	2.743
L Only	1.717	1.118
S Only	3.190	1.110
E Only	1.455	0.545
H Only		

## Wood Beam

Lic. # : KW-06004787

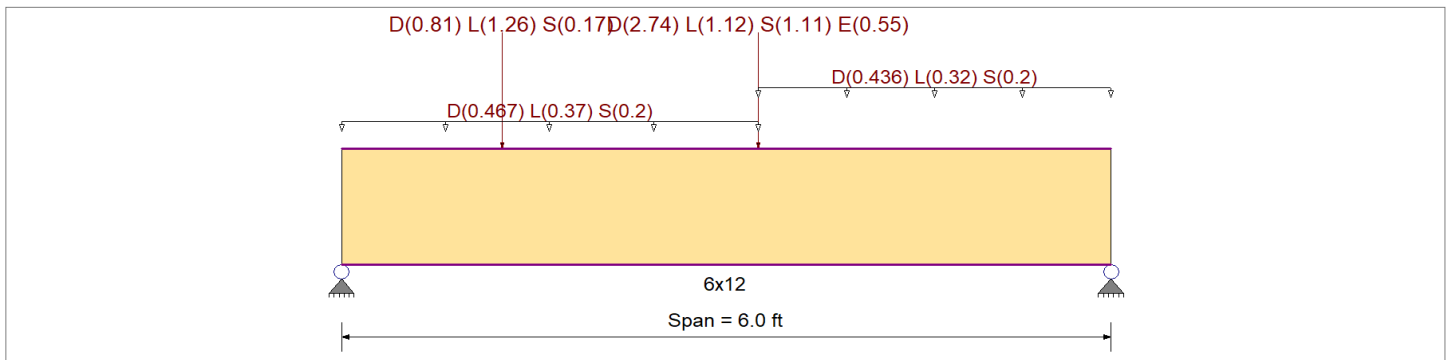
DESCRIPTION: B16

### CODE REFERENCES

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

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,050.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	1,050.0 psi	Ebend- xx	1300ksi
Wood Species : Douglas Fir-Larch	Fc - Prll	720.0 psi	Eminbend - xx	470ksi
Wood Grade : No.2	Fc - Perp	750.0 psi		
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	204.0 psi	Density	31.21pcf
	Ft	510.0 psi		



### Applied Loads

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

Beam self weight calculated and added to loads

Point Load : D = 0.810, L = 1.260, S = 0.170 k @ 1.250 ft

Point Load : D = 2.740, L = 1.120, S = 1.110, E = 0.550 k @ 3.250 ft

Uniform Load : D = 0.4670, L = 0.370, S = 0.20 k/ft, Extent = 0.0 -->> 3.250 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.4360, L = 0.320, S = 0.20 k/ft, Extent = 3.250 -->> 6.0 ft, Tributary Width = 1.0 ft

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.996</b>	1	Maximum Shear Stress Ratio	=	<b>0.594</b>	: 1
Section used for this span		<b>6x12</b>		Section used for this span		<b>6x12</b>	
fb: Actual	=	1,045.45	psi	fv: Actual	=	121.14	psi
Fb: Allowable	=	1,050.00	psi	Fv: Allowable	=	204.00	psi
Load Combination		+D+L+H		Load Combination		+D+L+H	
Location of maximum on span	=	3.241	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.027	in	Ratio =		2640	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		0.076	in	Ratio =		951	>=300
Max Upward Total Deflection		0.000	in	Ratio =		0	<300

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W+H	1	0.0757	3.000		0.0000	0.000

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.327	5.518
Overall MINimum	0.252	0.298
+D+H	3.320	3.029
+D+L+H	5.909	4.903
+D+Lr+H	3.320	3.029
+D+S+H	4.563	4.266
+D+0.750Lr+0.750L+H	5.262	4.434

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11-03-21

## Wood Beam

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DESCRIPTION: B16

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	6.194	5.362
+D+0.60W+H	3.320	3.029
+D+0.750Lr+0.750L+0.450W+H	5.262	4.434
+D+0.750L+0.750S+0.450W+H	6.194	5.362
+0.60D+0.60W+0.60H	1.992	1.818
+D+0.70E+0.60H	3.496	3.238
+D+0.750L+0.750S+0.5250E+H	6.327	5.518
+0.60D+0.70E+H	2.168	2.026
D Only	3.320	3.029
L Only	2.589	1.873
S Only	1.243	1.237
E Only	0.252	0.298
H Only		



## Wood Beam

Lic. #: KW-06004787

DESCRIPTION: B17

### CODE REFERENCES

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

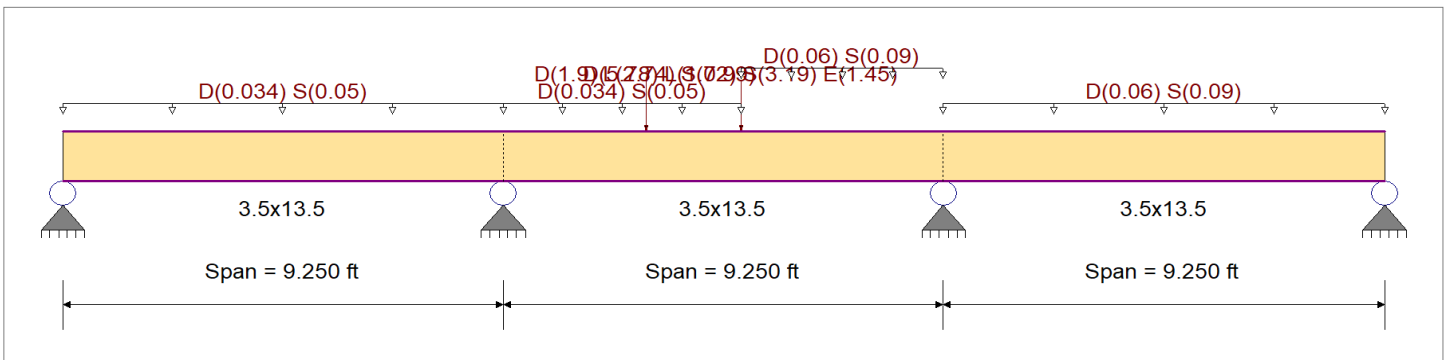
### Material Properties

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

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

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

Fb +	2,880.0 psi	E : Modulus of Elasticity	
Fb -	2,220.0 psi	Ebend- xx	1,800.0ksi
Fc - Prll	1,980.0 psi	Eminbend - xx	950.0ksi
Fc - Perp	780.0 psi	Ebend- yy	1,600.0ksi
Fv	318.0 psi	Eminbend - yy	850.0ksi
Ft	1,320.0 psi	Density	31.210pcf



### Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0340, S = 0.050, Tributary Width = 1.0 ft

Load for Span Number 2

Point Load : D = 1.90, L = 2.740, S = 0.990 k @ 3.0 ft

Point Load : D = 5.780, L = 1.720, S = 3.190, E = 1.450 k @ 5.0 ft

Uniform Load : D = 0.0340, S = 0.050 k/ft, Extent = 0.0 --> 5.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.060, S = 0.090 k/ft, Extent = 5.0 --> 9.250 ft, Tributary Width = 1.0 ft

Load for Span Number 3

Uniform Load : D = 0.060, S = 0.090, Tributary Width = 1.0 ft

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.647</b> : 1	Maximum Shear Stress Ratio	=	<b>0.684</b> : 1
Section used for this span		<b>3.5x13.5</b>	Section used for this span		<b>3.5x13.5</b>
fb: Actual	=	2,142.78psi	fv: Actual	=	249.97 psi
Fb: Allowable	=	3,312.00psi	Fv: Allowable	=	365.70 psi
Load Combination		+D+0.750L+0.750S+H, LL Comb Run (*)	Load Combination		+D+0.750L+0.750S+H, LL Comb Run (*)
Location of maximum on span	=	4.975 ft	Location of maximum on span	=	9.250 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.048 in	Ratio =		2288 >=360
Max Upward Transient Deflection		-0.023 in	Ratio =		4787 >=360
Max Downward Total Deflection		0.170 in	Ratio =		651 >=300
Max Upward Total Deflection		-0.070 in	Ratio =		1579 >=300

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+0.750L+0.750S+0.5250E+H, LL C	-0.0703	5.519
+D+0.750L+0.750S+0.5250E+H, LL C	2	0.1703	4.664		0.0000	5.519
	3	0.0000	4.664	+D+0.750L+0.750S+0.5250E+H, LL C	-0.0640	3.731

**Wood Beam**

Lic. # : KW-06004787

DESCRIPTION: B17

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	-0.794	9.858	9.414	-0.568
Overall MINimum	-0.397	0.760	0.906	-0.289
+D+H	-0.397	4.963	4.982	-0.289
+D+L+H, LL Comb Run (**L)	-0.397	4.963	4.982	-0.289
+D+L+H, LL Comb Run (*L*)	-0.735	8.001	7.020	-0.568
+D+L+H, LL Comb Run (*LL)	-0.735	8.001	7.020	-0.568
+D+L+H, LL Comb Run (L**)	-0.397	4.963	4.982	-0.289
+D+L+H, LL Comb Run (L*L)	-0.397	4.963	4.982	-0.289
+D+L+H, LL Comb Run (LL*)	-0.735	8.001	7.020	-0.568
+D+L+H, LL Comb Run (LLL)	-0.735	8.001	7.020	-0.568
+D+Lr+H, LL Comb Run (**L)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (*L*)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (*LL)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (L**)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (L*L)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (LL*)	-0.397	4.963	4.982	-0.289
+D+Lr+H, LL Comb Run (LLL)	-0.397	4.963	4.982	-0.289
+D+S+H	-0.517	7.920	8.218	-0.255
+D+0.750Lr+0.750L+H, LL Comb Run (*	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+H, LL Comb Run (*	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+H, LL Comb Run (*	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+H, LL Comb Run (L	-0.650	7.242	6.511	-0.498
+D+0.750L+0.750S+H, LL Comb Run (**	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+H, LL Comb Run (*L	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+H, LL Comb Run (L*	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+H, LL Comb Run (L*	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+H, LL Comb Run (LL	-0.740	9.459	8.938	-0.472
+D+0.60W+H	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.397	4.963	4.982	-0.289
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.650	7.242	6.511	-0.498
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.650	7.242	6.511	-0.498
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.487	7.180	7.409	-0.263
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+D+0.750L+0.750S+0.450W+H, LL Comb	-0.740	9.459	8.938	-0.472
+0.60D+0.60W+0.60H	-0.238	2.978	2.989	-0.174
+D+0.70E+0.60H	-0.469	5.495	5.616	-0.368
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.541	7.579	7.885	-0.323
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.794	9.858	9.414	-0.532
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.794	9.858	9.414	-0.532
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.541	7.579	7.885	-0.323
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.541	7.579	7.885	-0.323
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.794	9.858	9.414	-0.532
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.794	9.858	9.414	-0.532
+0.60D+0.70E+H	-0.310	3.510	3.624	-0.253
D Only	-0.397	4.963	4.982	-0.289
L Only, LL Comb Run (*L*)	-0.338	3.038	2.038	-0.279
L Only, LL Comb Run (*LL)	-0.338	3.038	2.038	-0.279

Pratt Plat Lot 5  
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RJD  
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## Wood Beam

Lic. # : KW-06004787

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MULHERN & KULP STRUCTURAL ENGINEERING INC

DESCRIPTION: B17

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
L Only, LL Comb Run (LL*)	-0.338	3.038	2.038	-0.279
L Only, LL Comb Run (LLL)	-0.338	3.038	2.038	-0.279
S Only	-0.120	2.957	3.236	0.035
E Only	-0.103	0.760	0.906	-0.113
H Only				

# ARCHITECTURAL INNOVATIONS

## PRATT PLAT LOT 5

MERCER ISLAND, WA

### SHEAR WALL CALCULATIONS - WIND

*REVIEWED BY: RJZ*

*NOVEMBER 4, 2021*

***PARAMETERS:***

***SINGLE FAMILY HOME***

***DESIGN WIND SPEED: 100 MPH***

***WIND EXPOSURE CATEGORY: B***

***SEISMIC DESIGN CATEGORY: D***

***CODE & DESIGN STANDARD: 2018 IBC CH. 1609, ASCE 7-16 CH. 26-30***



**MULHERN+KULP**  
RESIDENTIAL STRUCTURAL ENGINEERING

**WIND DESIGN SUMMARY PER ASCE 7-16**

PARAMETERS:				ROOF GEOMETRY:				BUILDING GEOMETRY:			
WIND SPEED	100	TRANS. ROOF PITCH	4.5 : 12	LENGTH	98	FT					
EXPOSURE CATEGORY	B	LONG. ROOF PITCH	8.0 : 12	WIDTH	37	FT					
RISK CATEGORY	II	MEAN ROOF HEIGHT, H	30.00	FT							
WIND DIRECTIONALITY FACTOR, $K_D$	0.85										
TOPOGRAPHIC FACTOR, $K_{ZT}$	1.60										
GUST FACTOR, G	0.85										
GROUND ELEV. ABOVE SEA LEVEL (FT)	0										
DESIGN TYPE	ASD										
	0.60										

<b>TRANSVERSE DIRECTION (PERPENDICULAR TO MAIN RIDGE LINE)</b>											
		TRIBUTARY DESIGN AREAS:				TRIBUTARY DESIGN LOADS: (0.6W)					
DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION			SECTION					
			A	O	B	A	O	B	A	O	B
2	9 FT	Roof Surface	0	458	0	sq ft	Story Shear	0.00	11.65	0.00	kips
		Wall surface	0	545	0	sq ft		Total Shear	0.00	11.65	0.00
1	10 FT	Roof Surface	0	287	0	sq ft	Story Shear	0.00	12.44	0.00	kips
		Wall surface	0	712	0	sq ft		Total Shear	0.00	24.09	0.00
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	24.09	0.00	kips

<b>LONGITUDINAL DIRECTION (PARALLEL TO MAIN RIDGE LINE)</b>											
		TRIBUTARY DESIGN AREAS:				TRIBUTARY DESIGN LOADS: (0.6W)					
DIAPHRAGM LEVEL	FLOOR-TO-FLOOR HEIGHT		SECTION			SECTION					
			A	O	B	A	O	B	A	O	B
2	9 FT	Roof Surface	0	202	0	sq ft	Story Shear	0.00	4.34	0.00	kips
		Wall surface	0	160	0	sq ft		Total Shear	0.00	4.34	0.00
1	10 FT	Roof Surface	0	0	0	sq ft	Story Shear	0.00	4.44	0.00	kips
		Wall surface	0	386	0	sq ft		Total Shear	0.00	8.77	0.00
FND		Roof Surface	0	0	0	sq ft	Story Shear	0.00	2.95	0.00	kips
	Wall surface	0	257	0	sq ft	Total Shear		0.00	11.73	0.00	kips

**FLOOR PLAN KEY NOTES**

- P-1 OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01022.6 SHEET A-1.
- P-2 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01022.6 SHEET A-1.
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 3/4" 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 1 1/4" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER 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 R302.1.  
E. COVER USABLE SPACE UNDER STAIR W/ 1/2" G.W.B. PER I.R.C. SECTION R302.1.  
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. 01022.1 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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 01022 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 01022 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS. HANDRAIL REQUIRED PER I.R.C. SECTION R311.2. SEE DIV. 01022.1 SHEET A-1
- P-10 18"x24" CRAIL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01022.1 SHEET A-1

- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01022.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:  
A. DIRECT VENT GAS FIREPLACES MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHEET A-1  
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHT A-1  
C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01022.2  
D. FIREBLOCK OPENINGS AROUND PENETRATIONS  
• EACH FLOOR PER I.R.C. SECTION R1003.13.  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING

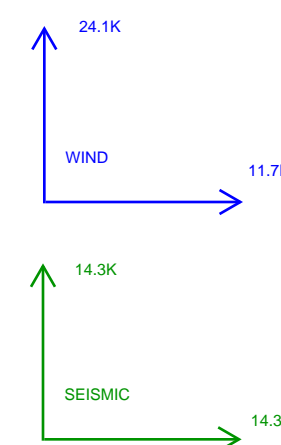
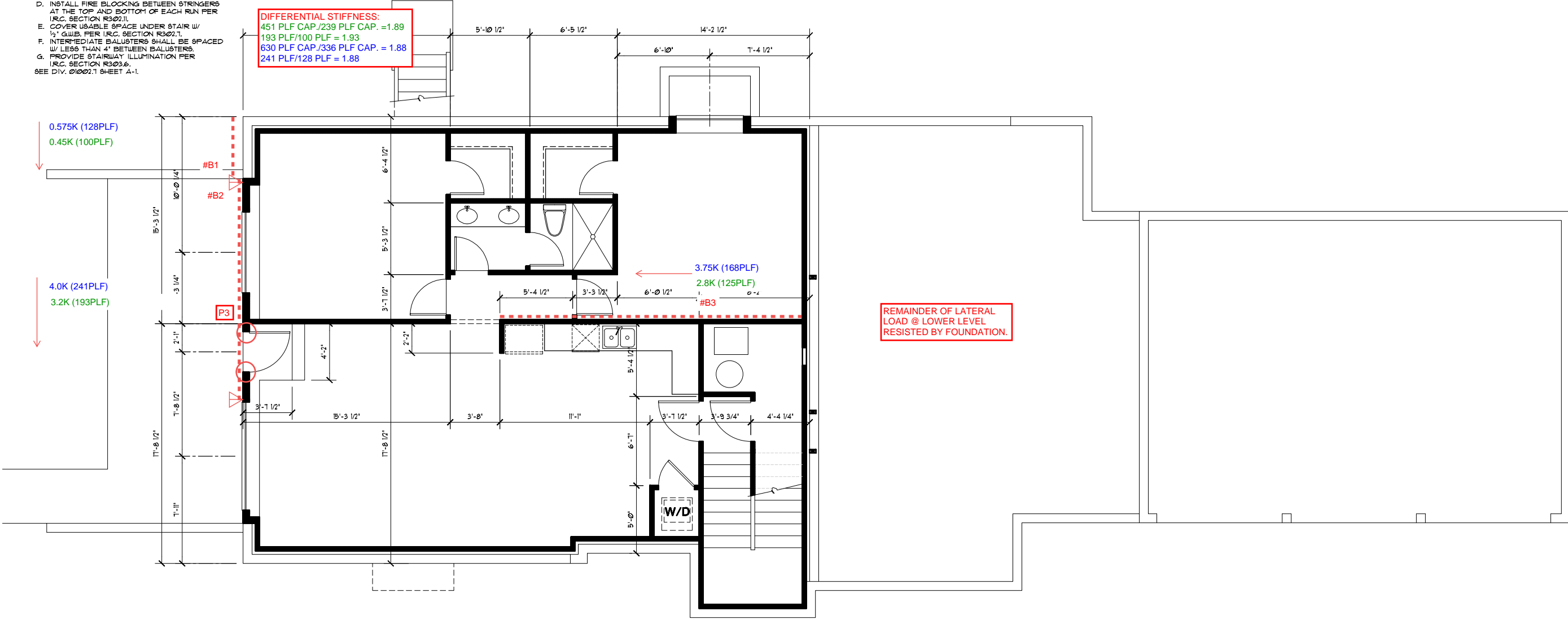
- P-16 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION. SEE DETAIL 8/D1.
- P-19 1" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.1. SEE DIV. 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.

**SYMBOLS AND LEGEND**

- FAN - DIRECT VENT TO OUTSIDE  
- BATHROOM/LAUNDRY 50 CFM MIN.  
- KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1505.6.
  - WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1505.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE
  - THERMOSTAT @ 50" ABOVE FLOOR
  - 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1
- FURN UH
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
  - B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
  - C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
  - D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

**GENERAL PLAN NOTES**

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 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.



Date	By	Description
09/02/21	SM	PRELIMINARY DESIGN
10/02/21	SM	FINAL DESIGN

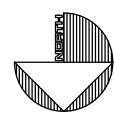
**Pratt Plat**  
 Lot 5  
 7920 SE 72nd PL Mercer Island, WA 98040  
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 Bellevue, WA 98007  
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TITLE	
JOB NO. :	190303
STARTING NO. :	

SHEET  
**A2.1**

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



### FLOOR PLAN KEY NOTES

- P-1** OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01002.6 SHEET A-1.
- P-2** 1 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01002.6 SHEET A-1.
- P-3** STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D1.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 3/4" 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 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER 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/ 1/2" G.W.B. PER I.R.C. SECTION R302.1.  
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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 01002.6 SHEET A-1
- P-5** EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 01002.6 SHEET A-1
- P-6** IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7** COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8** (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9** 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS. HANDRAIL REQUIRED PER I.R.C. SECTION R311.13. SEE DIV. 01002.1 SHEET A-1
- P-10** 18"x24" CRAIL 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. 01002.2 SHEET A-1  
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01002.2 SHT A-1  
C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01002.2  
D. FIREBLOCK OPENINGS AROUND PENETRATIONS  
• EACH FLOOR PER I.R.C. SECTION R1003.13  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16** SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17** 3" DIAMETER STEEL POST

- P-18** 36" GUARDRAIL PER 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. SEE DETAIL 8/D1.
- P-19** 1" 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.

### SYMBOLS AND LEGEND

- F** FAN- DIRECT VENT TO OUTSIDE  
-BATHROOMS/LAUNDRY 50 CFM MIN.  
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
  - WH** WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1505.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE
  - T** THERMOSTAT @ 50" ABOVE FLOOR
  - SA** 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED PER SECTION M1503.6.
  - FURN** FURN
  - WH** WH
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS. PER DIV. 15.16 SEE SHEET A1
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
  - B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
  - C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
  - D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

### GENERAL PLAN NOTES

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



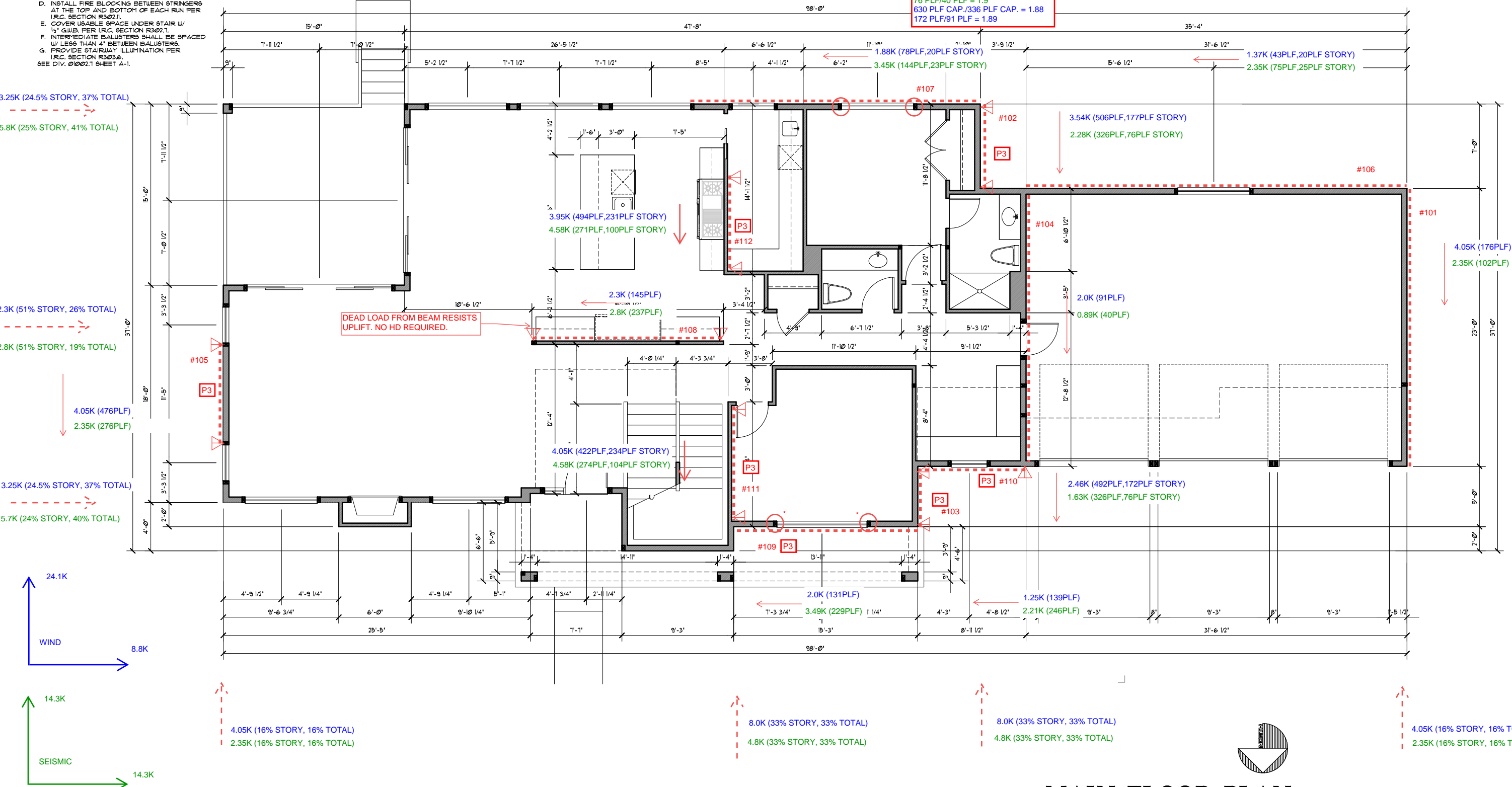
Date	By	Description
03/08/21	SM	PRELIMINARY DESIGN
10/08/21	SM	FINAL DESIGN

**Pratt Plat**  
Lot 5  
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www.kapplerhomeplans.com

TITLE	
JOB NO. :	1903803
STARTING NO. :	
SHEET	<b>A3</b>

**DIFFERENTIAL STIFFNESS:**  
451 PLF CAP./239 PLF CAP. = 1.89  
76 PLF/40 PLF = 1.9  
630 PLF CAP./336 PLF CAP. = 1.88  
172 PLF/91 PLF = 1.89



## MAIN FLOOR PLAN

Scale 1/4"=1'-0"

### FLOOR PLAN KEY NOTES

- P-1** OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01002.6 SHEET A-1.
- P-2** 1 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01002.6 SHEET A-1.
- P-3** STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7 1/4" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.  
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER 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/ 1/2" G.W.B. PER I.R.C. SECTION R302.7.  
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.  
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6. 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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 02000 SHEET A-1.
- P-5** EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 02000 SHEET A-1.
- P-6** IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1.
- P-7** COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 02000 SHEET A-1.
- P-8** (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9** 7/8" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS, HANDRAIL REQUIRED PER I.R.C. SECTION R311.12. SEE DIV. 01002.1 SHEET A-1.
- P-10** 18"x24" CRAIL 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 R1003.13.  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16** SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17** 3" DIAMETER STEEL POST

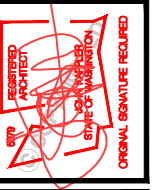
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- P-19** 1" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 15 SHEET A-1
- P-20** PLANT SHELF
- P-21** UPPER AND LOWER LINEN CABINETS
- P-22** SOFFIT AREA
- P-23** INTEGRATED MAKE UP AIR
- P-24** 2x6 STUDS W/ R-21 INSULATION MIN.

### SYMBOLS AND LEGEND

- F** FAN- DIRECT VENT TO OUTSIDE  
-BATHROOMS/LAUNDRY 50 CFM MIN.  
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
  - WH** WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1503.4. FAN SIZE PER PLAN, FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM, FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE.
  - T** THERMOSTAT @ 50" ABOVE FLOOR
  - SA** 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED PER SECTION M1503.6.
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15.16 SEE SHEET A1
- FURN** FURN
  - WH** WH
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.  
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.  
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.  
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

### GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 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.



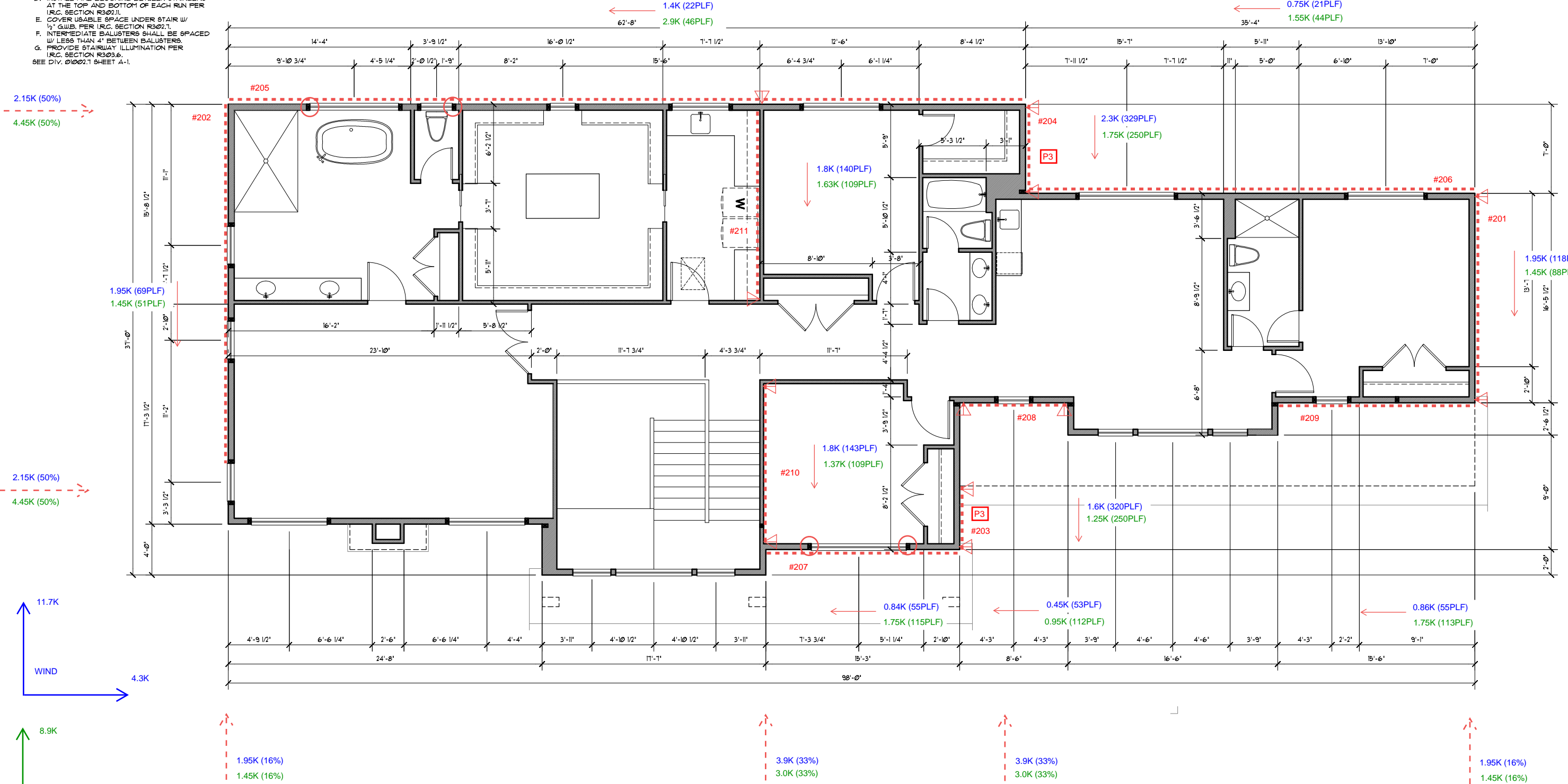
Date	By	Description
03/08/21	SM	PRELIMINARY DESIGN
10/08/21	SM	FINAL DESIGN

**Pratt Plat**  
 Lot 5  
 7920 SE 72nd PL Mercer Island, WA 98040  
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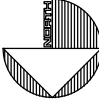
TITLE	
JOB NO. :	190303
STARTING NO. :	

SHEET  
**A5**



## UPPER FLOOR PLAN

Scale 1/4"=1'-0"







***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 201: 2ND - SIDE EXTERIOR BED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON CS16 STRAP TIE (14" END LENGTH)**

**SHEARWALL 202: 2ND - SIDE EXTERIOR MASTER BED/BATH**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 203:** 2ND - SIDE EXTERIOR CLOSET

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1600"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="1680"/>	LBS
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**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	<input type="text" value="180"/>	PLF	OVERTURNING MOMENT	<input type="text" value="14.4"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="2489"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="2.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="2655"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC40 STRAP TIE (12" END LENGTH)**

**SHEARWALL 204:** 2ND - SIDE EXTERIOR CLOSET/BATH

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="2300"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="2352"/>	LBS
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**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	<input type="text" value="180"/>	PLF	OVERTURNING MOMENT	<input type="text" value="20.7"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="2483"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="3.3"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="2655"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC40 STRAP TIE (12" END LENGTH)**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED

**SHEARWALL 205: 2ND - REAR EXTERIOR MASTER BATH TO CLOSET**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 206:** 2ND - REAR EXTERIOR BED/GATHER

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 207:** 2ND - FRONT EXTERIOR BED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 208:** 2ND - FRONT EXTERIOR GATHER

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 209:** 2ND - FRONT EXTERIOR BED (ABOVE GARAGE)

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 101:** 1ST - SIDE EXTERIOR GARAGE

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 102:** 1ST - SIDE EXTERIOR CLOSET

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="3540"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="4410"/>	LBS
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**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	<input type="text" value="300"/>	PLF	OVERTURNING MOMENT	<input type="text" value="52.8"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="6689"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="6.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="8030"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON HDU11-SDS2.5 HOLDOWN**

**SHEARWALL 103:** 1ST - SIDE EXT/INT MUD

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="2460"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3150"/>	LBS
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**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	<input type="text" value="300"/>	PLF	OVERTURNING MOMENT	<input type="text" value="37.0"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="6696"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="3.6"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="8030"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON HDU11-SDS2.5 HOLDOWN**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 104:** 1ST - SIDE INTERIOR GARAGE

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 105:** 1ST - SIDE EXTERIOR LIVING

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC66 STRAP TIE (24" END LENGTH)**





***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 106: 1ST - REAR EXTERIOR GARAGE**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 107:** 1ST - REAR EXTERIOR BED/KITCHEN

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 108:** 1ST - FRONT INTERIOR KITCHEN

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 109:** 1ST - FRONT EXTERIOR STUDY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="5.5"/>	FT.		
WALL LENGTH, L	<input type="text" value="15.3"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="7.8"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="2000"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="4883"/>	LBS
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**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	<input type="text" value="637"/>	PLF	OVERTURNING MOMENT	<input type="text" value="20.0"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="39.7"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

**HOLD-DOWN SPECIFICATION**

**NO HOLDDOWN REQUIRED**

**SHEARWALL 110:** 1ST - FRONT EXTERIOR MUD

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="4.5"/>	FT.		
WALL LENGTH, L	<input type="text" value="9.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="6.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1250"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3780"/>	LBS
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**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	<input type="text" value="185"/>	PLF	OVERTURNING MOMENT	<input type="text" value="12.5"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="638"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="6.8"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="4935"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON STHD14RJ HOLDOWN**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED

**SHEARWALL B1: - SIDE EXTERIOR BED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL B2:** - SIDE EXTERIOR BED/REC

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STDH14RJ HOLDOWN**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 210:** 2ND - SIDE INTERIOR BED @ STAIR

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**

**SHEARWALL 211:** 2ND - SIDE INTERIOR LAUNDRY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED

**SHEARWALL 111: 1ST - SIDE INTERIOR STUDY**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

SIMPSON STHD14RJ HOLDOWN



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 112:** 1ST - SIDE INTERIOR PANTRY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STD14RJ HOLDOWN**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**





***SHEARWALL DESIGN SUMMARY***

**SHEARWALL B3:** - FRONT INTERIOR BED/HALL

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

ARCHITECTURAL INNOVATIONS

PRATT PLAT LOT 5

MERCER ISLAND, WA

SHEAR WALL CALCULATIONS - SEISMIC

*REVIEWED BY: RJZ*

*NOVEMBER 4, 2021*

*PARAMETERS:*

*SINGLE FAMILY HOME*

*DESIGN WIND SPEED: 100 MPH*

*WIND EXPOSURE CATEGORY: B*

*SEISMIC DESIGN CATEGORY: D*

*CODE & DESIGN STANDARD: 2018 IBC CH. 1609, ASCE 7-16 CH. 26-30*



**MULHERN+KULP**  
RESIDENTIAL STRUCTURAL ENGINEERING

**SEISMIC CALCULATION - ASCE 7-16**

**SEISMIC DESIGN CATEGORY:**

USER INPUTS:

SITE CLASS	C
SPECTRAL RESPONSE ACCELERATION 0.2 SEC, <b>S<sub>B</sub></b>	1.470
SPECTRAL RESPONSE ACCELERATION 1.0 SEC, <b>S<sub>1</sub></b>	0.508
OCCUPANCY CATEGORY	II

VARIABLES:

SITE COEFFICIENT, F <sub>A</sub>	1.20
SITE COEFFICIENT, F <sub>V</sub>	1.49

CALCULATED VALUES:

MAXIMUM SPECTRAL RESPONSE ACCELERATION, <b>S<sub>MS</sub></b>	1.764
MAXIMUM SPECTRAL RESPONSE ACCELERATION, <b>S<sub>M1</sub></b>	0.758
DESIGN SPECTRAL RESPONSE ACCELERATION, <b>S<sub>DS</sub></b>	1.176
DESIGN SPECTRAL RESPONSE ACCELERATION, <b>S<sub>D1</sub></b>	0.505
SEISMIC DESIGN CATEGORY (SHORT TERM)	D
SEISMIC DESIGN CATEGORY (1.0 SECOND TERM)	D

**BUILDING PERIOD DETERMINATION:**

USER INPUTS:

BUILDING PERIOD COEFFICIENT, C <sub>T</sub>	0.020
LONG-PERIOD TRANS PERIOD, T <sub>L</sub> (SEC)	6
HT. ABV BASE TO HIGHEST LEVEL, h <sub>N</sub>	19

CALCULATED VALUES:

APPROXIMATE FUNDAMENTAL PERIOD, T <sub>A</sub>	0.182
T <sub>0</sub>	0.086
T <sub>B</sub>	0.430
SPECTRAL RESPONSE ACC., S <sub>A</sub> (G)	1.176

**SITE CLASS ASSUMPTION**

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

**EQUIVALENT LATERAL FORCE PROCEDURE**

DEAD LOAD CALCULATION:

LEVEL	STORY HT. (FT.)	AREA (FT <sup>2</sup> )	DEAD LOAD (PSF)	DL OF EXT WALL TRIB. TO LEVEL (KIPS)	TOTAL LEVEL DL
1	10.0	2702	15	19.6	60 K
2	9.0	2510	17	9.8	52 K
3	0.0	0	0	0.0	0 K
4	0.0	0	0	0.0	0 K
5	0.0	0	0	0.0	0 K
6	0.0	0	0	0.0	0 K
7	0.0	0	0	0.0	0 K
8	0.0	0	0	0.0	0 K
9	0.0	0	0	0.0	0 K
10	0.0	0	0	0.0	0 K
11	0.0	0	0	0.0	0 K
12	0.0	0	0	0.0	0 K
13	0.0	0	0	0.0	0 K
14	0.0	0	0	0.0	0 K
15	0.0	0	0	0.0	0 K
16	0.0	0	0	0.0	0 K
17	0.0	0	0	0.0	0 K
18	0.0	0	0	0.0	0 K
19	0.0	0	0	0.0	0 K
20	0.0	0	0	0.0	0 K

**TOTAL DEAD LOAD OF STRUCTURE** 113 KIPS

SEISMIC RESPONSE COEFFICIENT:

	TRANSVERSE	LONGITUDINAL
RESPONSE MODIFICATION FACTOR, R	6.5	6.5
OCCUPANCY IMPORTANCE FACTOR, I <sub>e</sub>	1.00	1.00
SEISMIC RESPONSE COEFFICIENT, C <sub>s</sub>	0.181	0.181

BASE SHEARS:

**ULTIMATE LOADS**

x 0.7 =

**ALLOWABLE LOADS**

TRANSVERSE	LONGITUDINAL	TRANSVERSE	LONGITUDINAL
20 K	20 K	14.3 K	14.3 K

STORY SHEAR CALCULATION:

DISTRIBUTION EXPONENT, **1.00**

**ULTIMATE LOADS**

x 0.7 =

**ALLOWABLE LOADS**

LEVEL	VERT. DIST. FACTOR, C <sub>vk</sub>	TRANSVERSE		LONGITUDINAL		TRANSVERSE		LONGITUDINAL	
		STORY SHEAR, F <sub>v</sub>	STORY SHEAR, F <sub>v</sub>	STORY SHEAR, F <sub>v</sub>	STORY SHEAR, F <sub>v</sub>	STORY SHEAR, F <sub>v</sub>	STORY SHEAR, F <sub>v</sub>		
1	0.376	7.7 K	7.7 K	5.4 K	14.3 K	5.4 K	14.3 K		
2	0.624	12.7 K	12.7 K	8.9 K	8.9 K	8.9 K	8.9 K		
3	0.000	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
4	0.000	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
5	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
6	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
7	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
8	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
9	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
10	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
11	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
12	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
13	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
14	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
15	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
16	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
17	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
18	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
19	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		
20	0.00	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K	0.0 K		

**FLOOR PLAN KEY NOTES**

- P-1 OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01022.6 SHEET A-1.
- P-2 1 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01022.6 SHEET A-1.
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D1.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7 1/4" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.  
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/4" MIN. TO 2" MAX. 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/ 1/2" G.W.B. PER I.R.C. SECTION R302.1.  
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. 01022.1 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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 01022 SHEET A-1
- P-5 EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 01022 SHEET A-1
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 09250 SHEET A-1
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 7/8" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS. HANDRAIL REQUIRED PER I.R.C. SECTION R311.2. SEE DIV. 01022.1 SHEET A-1
- P-10 18"x24" CRAIL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01022.1 SHEET A-1

- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01022.2 SHEET A-1
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:  
A. DIRECT VENT GAS FIREPLACES MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHEET A-1  
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHT A-1  
C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01022.2  
D. FIREBLOCK OPENINGS AROUND PENETRATIONS  
• EACH FLOOR PER I.R.C. SECTION R1003.13.  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST

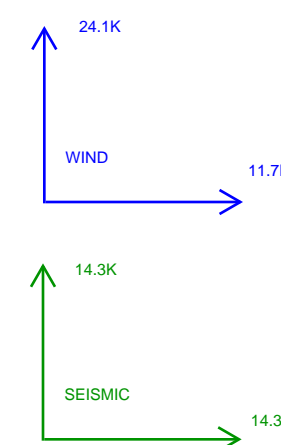
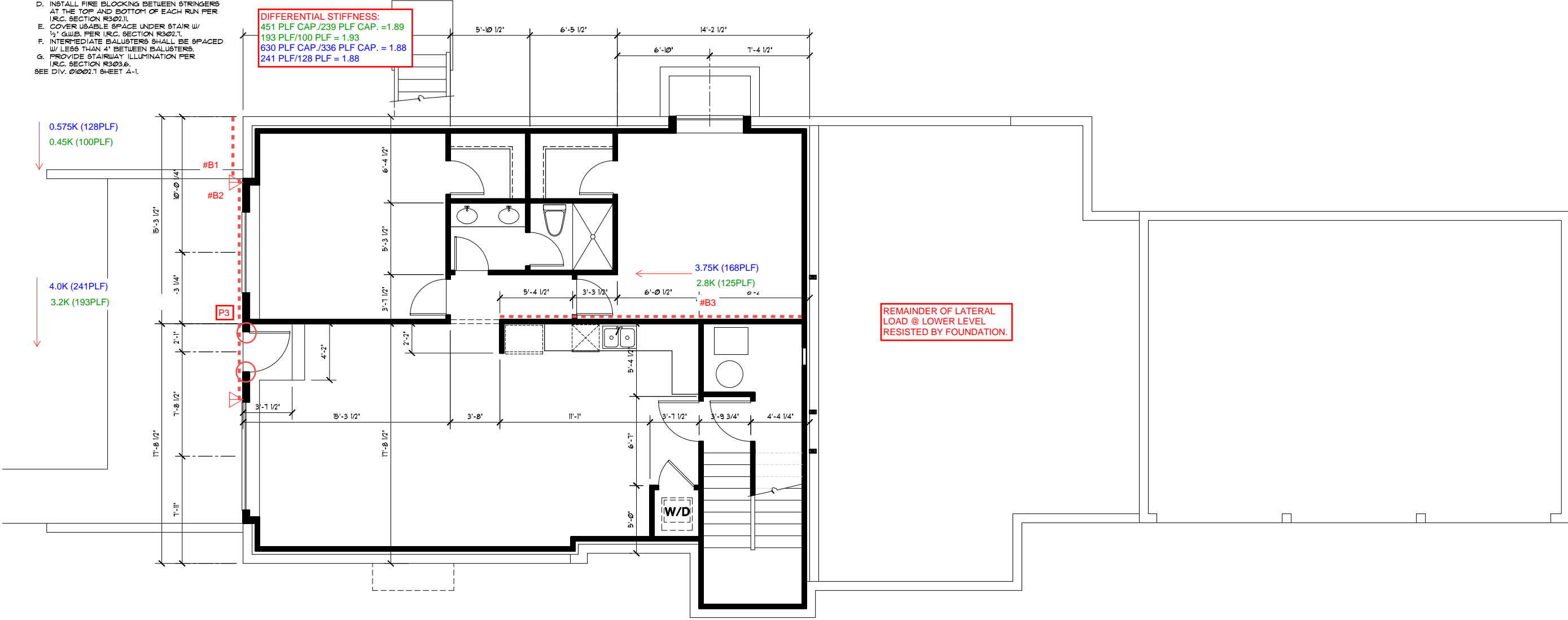
- P-18 36" GUARDRAIL PER I.R.C. SECTION R312 & TABLE R301.5 CONTRACTOR TO VERIFY TO INSPECTOR THAT ALL GUARDS & RAILINGS ARE CAPABLE OF RESISTING 200LB LOAD ON TOP RAIL ACTING IN ANY DIRECTION. SEE DETAIL 8/D1.
- P-19 1" VENT FOR MECHANICAL, 1" CLEARANCE ALL SIDES PER I.R.C. SECTION R302.11. SEE DIV. 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.

**SYMBOLS AND LEGEND**

- FAN- DIRECT VENT TO OUTSIDE  
- BATHROOMS/LAUNDRY 50 CFM MIN.  
- KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1505.6.
  - WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1505.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON BALANCED NON DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE
  - THERMOSTAT @ 50" ABOVE FLOOR
  - 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15,16 SEE SHEET A1
- FURN UH
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
  - B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
  - C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
  - D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

**GENERAL PLAN NOTES**

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 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.



Date	By	Description
09/02/21	SM	PRELIMINARY DESIGN
10/02/21	SM	FINAL DESIGN

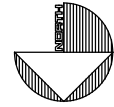
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TITLE	
JOB NO. :	190303
STARTING NO. :	

SHEET  
**A2.1**

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



**FLOOR PLAN KEY NOTES**

- P-1 OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01022.6 SHEET A-1.
- P-2 1 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01022.6 SHEET A-1.
- P-3 STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 3/4" 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 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER 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/ 1/2" G.W.B. PER I.R.C. SECTION R302.1.  
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. 01022.1 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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 01022.6 SHEET A-1.
- P-5 EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 01022.6 SHEET A-1.
- P-6 IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1.
- P-7 COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 01022.6 SHEET A-1.
- P-8 (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9 3/4" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS. HANDRAIL REQUIRED PER I.R.C. SECTION R311.12. SEE DIV. 01022.1 SHEET A-1.
- P-10 18"x24" CRAIL SPACE ACCESS, INSULATE AND WEATHER STRIP. SEE DIV. 01022.1 SHEET A-1.

- P-11 22"x30" ATTIC SPACE ACCESS W/ 30" HEAD CLEARANCE. INSULATE AND WEATHER STRIP. SEE DIV. 01022.2 SHEET A-1.
- P-12 FLOOR MATERIAL BREAK LINE
- P-13 WALL LINE ABOVE
- P-14 WALL LINE BELOW
- P-15 FIREPLACE ASSEMBLY NOTES:  
A. DIRECT VENT GAS FIREPLACES MUST BE LISTED, LABELED & INSTALLED PER MFG. SPECIFICATIONS, SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHEET A-1.  
B. ZERO CLEARANCE FIREPLACES SHALL CONFORM TO I.R.C. REQUIREMENTS. SEE DIV. 01022.2 SHT A-1  
C. HEARTH SHALL CONFORM TO I.R.C. REQUIREMENT SEE DIV. 01022.2  
D. FIREBLOCK OPENINGS AROUND PENETRATIONS  
• EACH FLOOR PER I.R.C. SECTION R1003.13.  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16 SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17 3" DIAMETER STEEL POST

- P-18 36" GUARDRAIL PER 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. SEE DETAIL 8/D1.
- P-19 1" 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.

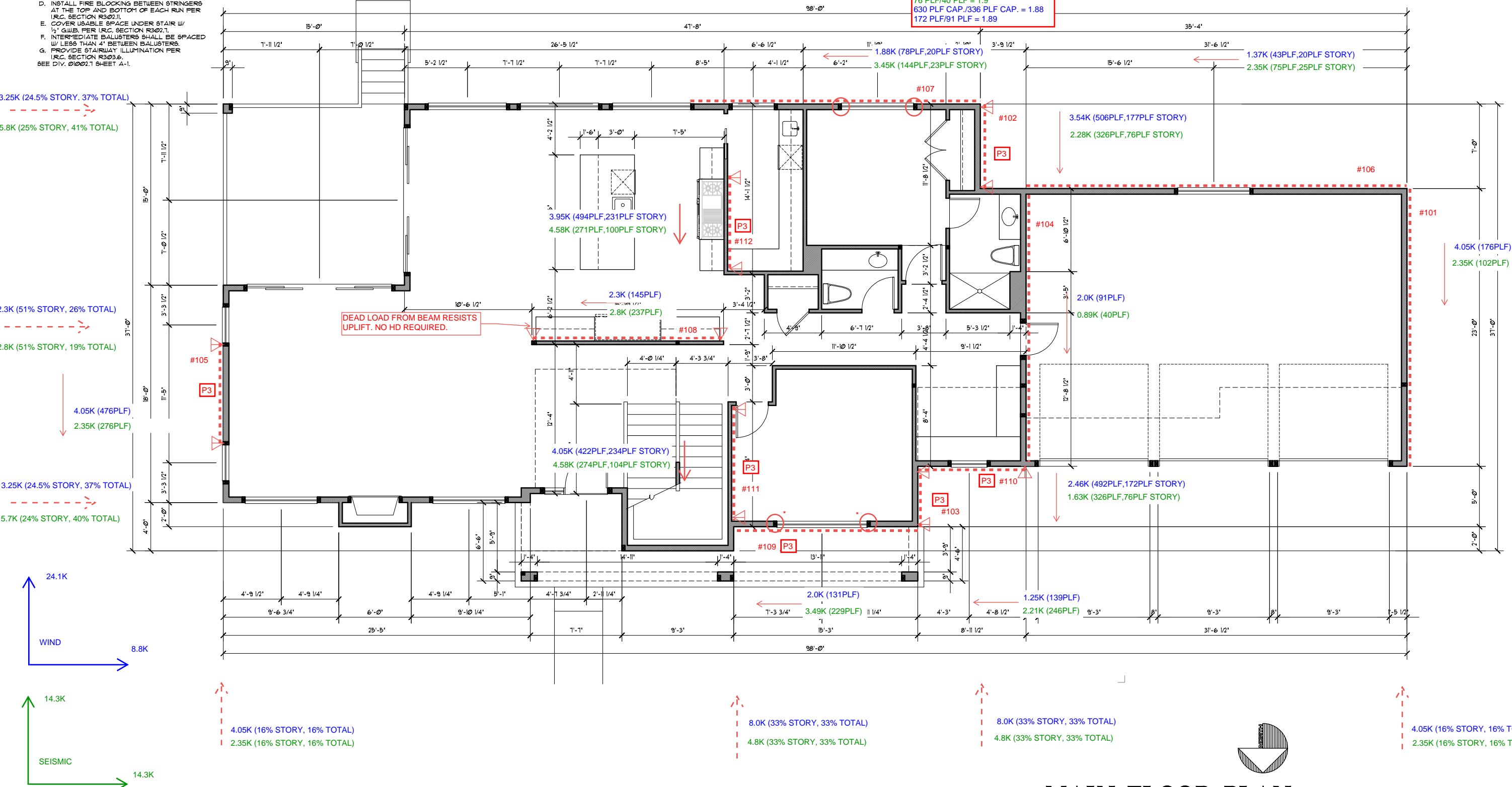
**SYMBOLS AND LEGEND**

- FAN- DIRECT VENT TO OUTSIDE  
-BATHROOMS/LAUNDRY 50 CFM MIN.  
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
- WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1505.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE.
- THERMOSTAT 5'0" ABOVE FLOOR
- 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED. USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED PER SECTION M1503.6.
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS. PER DIV. 15.16 SEE SHEET A1
- FURN
- W.H.
- A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR PLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.  
B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.  
C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.  
D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

**GENERAL PLAN NOTES**

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 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.

**DIFFERENTIAL STIFFNESS:**  
451 PLF CAP./239 PLF CAP. = 1.89  
76 PLF/40 PLF = 1.9  
630 PLF CAP./336 PLF CAP. = 1.88  
172 PLF/91 PLF = 1.89



Date	By	Description
03/08/21	SM	PRELIMINARY DESIGN
10/06/21	SM	FINAL DESIGN

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TITLE	
JOB NO.:	1903803
STARTING NO.:	

SHEET  
**A3**

**MAIN FLOOR PLAN**

Scale 1/4"=1'-0"

### FLOOR PLAN KEY NOTES

- P-1** OCCUPANCY SEPARATION:  
APPLY (1) LAYER OF 1/2" G.W.B. TO GARAGE SIDE OF RESIDENCE, ATTIC SPACES, AND TO ALL BEAMS AND POSTS SUPPORTING A FLOOR-CEILING ASSEMBLY.  
APPLY (1) LAYER OF 1/2" TYPE 'X' G.W.B. TO GARAGE CEILING WHEN UNDER HABITABLE ROOMS.  
DUCTS THROUGH WALL OR CEILING COMMON TO HOUSE SHALL HAVE MINIMUM 26 GAUGE STEEL. SEE DIV. 01002.6 SHEET A-1.
- P-2** 1 1/4" MIN. SELF CLOSING SOLID WOOD CORE, HONEY-COMB CORE STEEL, OR 20-MINUTE FIRE RATED DOOR. SEE DIV. 01002.6 SHEET A-1.
- P-3** STAIR ASSEMBLY NOTES: PER I.R.C. SECTION R313 AND DETAIL 4/D.  
A. HEADROOM MIN. 6'-8", WIDTH MIN. 3'-0".  
B. TREADS 10" MIN. DEPTH AND MIN. WIDTH OF 36" ABOVE HANDRAIL HEIGHT. RISERS 7 1/4" MAX. HT. TREAD NOSING TO BE MINIMUM 3/4" AND A MAXIMUM OF 1 1/4" ON STAIRS WITH SOLID RISERS.  
C. HANDRAIL MIN. 34" TO MAX 38" ABOVE TREAD NOSING. HANDRAIL TYPE 1 CIRCULAR TO HAVE 1 1/2" MIN. TO 2" MAX. CROSS SECTION DIMENSION AND 1 1/2" MIN. CLEAR FROM WALL, RETURN RAIL ENDS. HANDRAILS SHALL BE STRONG ENOUGH TO RESIST A 200 POUND POINT LOAD IN ANY DIRECTION PER 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/ 1/2" G.W.B. PER I.R.C. SECTION R302.7.  
F. INTERMEDIATE BALUSTERS SHALL BE SPACED W/ LESS THAN 4" BETWEEN BALUSTERS.  
G. PROVIDE STAIRWAY ILLUMINATION PER I.R.C. SECTION R303.6. 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, 4 BOT. EDGE OF GLAZING IS LESS THAN 36" ABV. LANDING/WALKING SURFACE. SEE DIV. 01000 SHEET A-1.
- P-5** EGRESS WINDOW PER I.R.C. SECTION R310 SEE DIV. 01000 SHEET A-1.
- P-6** IGNITERS FOR GAS FIRED APPLIANCES IN GARAGE TO BE 18" MIN. ABOVE TOP OF SLAB. SEE DIV. 15 SHEET A-1.
- P-7** COVER WALLS ADJACENT TO TUBS AND SHOWERS WITH NON-ABSORBENT MATERIAL TO 12" ABOVE DRAIN INLETS. PER I.R.C. SECTION 3012. SEE DIV. 02250 SHEET A-1.
- P-8** (2) LAYERS OF FLOOR SHEATHING OVER FRAMING.
- P-9** 7/8" MAX. RISER WITH 10" MIN. RUN, IF MORE THAN (3) RISERS. HANDRAIL REQUIRED PER I.R.C. SECTION R311.12. SEE DIV. 01002.1 SHEET A-1.
- P-10** 18"x24" CRAIL 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 R1003.13  
E. FIREPLACE MUST COMPLY WITH UL 121 TESTING
- P-16** SEE SITE PLAN FOR EXTENT OF WALKS & DRIVEWAYS
- P-17** 3" DIAMETER STEEL POST

- P-18** 36" GUARDRAIL PER 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. SEE DETAIL 8/D1.
- P-19** 1" 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.

### SYMBOLS AND LEGEND

- F** FAN- DIRECT VENT TO OUTSIDE  
-BATHROOMS/LAUNDRY 50 CFM MIN.  
-KITCHEN EXHAUST HOOD TO BE MIN. OF 100CFM. IF EXHAUST HOOD EXCEEDS 400 CFM MAKE UP AIR MUST BE PROVIDED PER SECTION M1503.6.
  - WH** WHOLE-HOUSE FAN TO RUN CONTINUOUS & CONFORM TO I.R.C. M1503.4. FAN SIZE PER PLAN. FAN RATE TO BE ADJUSTED BY A FACTOR OF 15 FOR A NON-BALANCED NON-DISTRIBUTED SYSTEM. FRESH AIR TO BE PROVIDED BY THE FORCED AIR SYSTEM DUCTS PER SECTION M1505.4.1. FAN TO HAVE A SONE RATING OF 10 OR LESS MEASURED AT 0.1 INCHES WATER GAUGE.
  - T** THERMOSTAT @ 50" ABOVE FLOOR
  - SA** 100% SMOKE ALARM PER I.R.C. R314 WITH BATTERY BACKUP INTERCONNECTED USE A COMBINATION SMOKE/CARBON MONOXIDE ALARM WHEN NOTED PER SECTION M1503.6.
- MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEM FOR UNITS: PER DIV. 15.16 SEE SHEET A1
- FURN** A. PROVIDE 6" DIAMETER FRESH AIR INTAKE FROM OUTSIDE TO RETURN AIR FLENUM AT FURNACE WITH MOTORIZED FLOW DAMPERS.
  - WH** B. PROVIDE THERMAL EXPANSION TANK AT WATER HEATER.
  - C. STRAP WATER HEATER TO FRAMING TOP AND BOTTOM.
  - D. PROVIDE PRESSURE RELIEF LINE PLUMBED TO OUTSIDE.

### GENERAL PLAN NOTES

1. SEE SHEET A-1 FOR ALL GENERAL NOTES AND REQUIREMENTS.
2. ENERGY AND AIR QUALITY INFORMATION SEE DIV. 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.



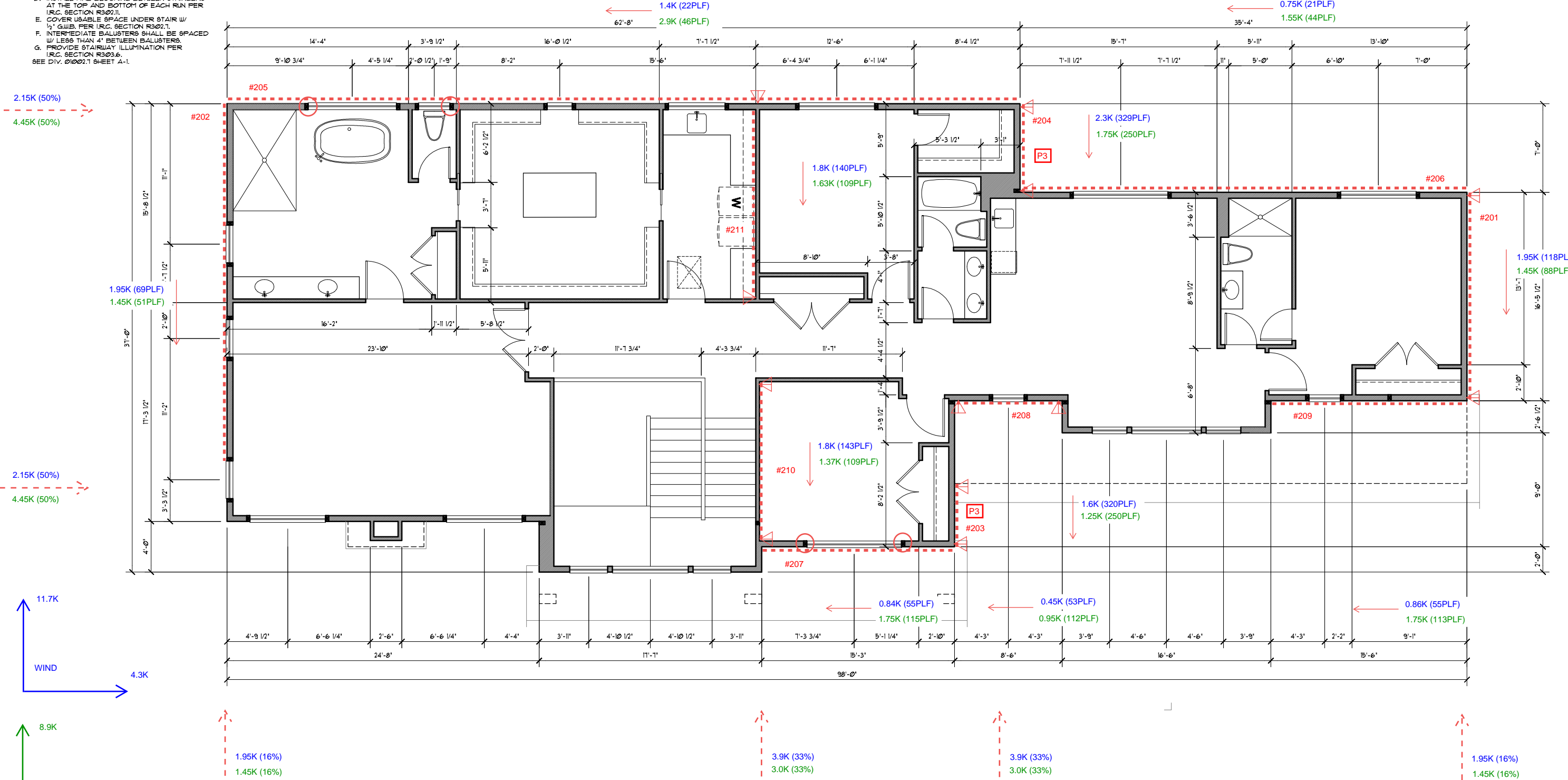
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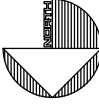
TITLE	
JOB NO.:	190303
STARTING NO.:	

SHEET  
**A5**



## UPPER FLOOR PLAN

Scale 1/4"=1'-0"





***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 201: 2ND - SIDE EXTERIOR BED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 202: 2ND - SIDE EXTERIOR MASTER BED/BATH**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 203:** 2ND - SIDE EXTERIOR CLOSET

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H <sub>c</sub>	0.0	FT.		
WALL LENGTH, L	5.0	FT.	QUALIFYING WALL LENGTH, L	5.0	FT.	SHEARWALL ASSEMBLY	P3

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL      ALLOWABLE SHEARWALL CAPACITY  
1250 LBS      <      2255 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	180	PLF	OVERTURNING MOMENT	11.3	K-FT	HOLD DOWN DESIGN LOAD	1859	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	2.0	K-FT	HOLD DOWN CAPACITY	2655	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC40 STRAP TIE (12" END LENGTH)**

**SHEARWALL 204:** 2ND - SIDE EXTERIOR CLOSET/BATH

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	9.0	FT.	MAX WALL OPENING HT, H <sub>c</sub>	0.0	FT.		
WALL LENGTH, L	7.0	FT.	QUALIFYING WALL LENGTH, L	7.0	FT.	SHEARWALL ASSEMBLY	P3

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL      ALLOWABLE SHEARWALL CAPACITY  
1750 LBS      <      3157 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	180	PLF	OVERTURNING MOMENT	15.8	K-FT	HOLD DOWN DESIGN LOAD	1776	LBS
DL AT ENDS OF WALL	400	LBS	RESISTIVE MOMENT	3.3	K-FT	HOLD DOWN CAPACITY	2655	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC40 STRAP TIE (12" END LENGTH)**





***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 205: 2ND - REAR EXTERIOR MASTER BATH TO CLOSET**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 206:** 2ND - REAR EXTERIOR BED/GATHER

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 207:** 2ND - FRONT EXTERIOR BED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 208:** 2ND - FRONT EXTERIOR GATHER

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="4.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="8.5"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="6.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="950"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="1434"/>	LBS
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**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	<input type="text" value="270"/>	PLF	OVERTURNING MOMENT	<input type="text" value="8.6"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="294"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="6.1"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="1705"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**

**SHEARWALL 209:** 2ND - FRONT EXTERIOR BED (ABOVE GARAGE)

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="4.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="15.5"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="13.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1750"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3107"/>	LBS
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**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	<input type="text" value="270"/>	PLF	OVERTURNING MOMENT	<input type="text" value="15.8"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="0"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="17.8"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="0"/>	LBS

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED

**SHEARWALL 101: 1ST - SIDE EXTERIOR GARAGE**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

NO HOLDOWN REQUIRED



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 102:** 1ST - SIDE EXTERIOR CLOSET

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="7.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="2280"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3157"/>	LBS
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**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	<input type="text" value="300"/>	PLF	OVERTURNING MOMENT	<input type="text" value="35.2"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="4182"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="6.0"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="8030"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON HDU11-SDS2.5 HOLDOWN**

**SHEARWALL 103:** 1ST - SIDE EXT/INT MUD

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="10.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="5.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P3"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1630"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="2255"/>	LBS
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**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	<input type="text" value="300"/>	PLF	OVERTURNING MOMENT	<input type="text" value="25.6"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="4406"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="800"/>	LBS	RESISTIVE MOMENT	<input type="text" value="3.6"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="8030"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON HDU11-SDS2.5 HOLDOWN**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 104:** 1ST - SIDE INTERIOR GARAGE

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 105:** 1ST - SIDE EXTERIOR LIVING

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON MSTC66 STRAP TIE (24" END LENGTH)**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 106:** 1ST - REAR EXTERIOR GARAGE

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 107:** 1ST - REAR EXTERIOR BED/KITCHEN

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 108:** 1ST - FRONT INTERIOR KITCHEN

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT.    MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT.    QUALIFYING WALL LENGTH, L  FT.    SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**





***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 109:** 1ST - FRONT EXTERIOR STUDY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 110:** 1ST - FRONT EXTERIOR MUD

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STHD14RJ HOLDOWN**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL B1: - SIDE EXTERIOR BED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL B2:** - SIDE EXTERIOR BED/REC

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STDH14RJ HOLDOWN**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 210:** 2ND - SIDE INTERIOR BED @ STAIR

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="12.6"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="12.6"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1370"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3011"/>	LBS
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**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	<input type="text" value="135"/>	PLF	OVERTURNING MOMENT	<input type="text" value="12.3"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="403"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="7.2"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="1705"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**

**SHEARWALL 211:** 2ND - SIDE INTERIOR LAUNDRY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H	<input type="text" value="9.0"/>	FT.	MAX WALL OPENING HT, H <sub>c</sub>	<input type="text" value="0.0"/>	FT.		
WALL LENGTH, L	<input type="text" value="15.0"/>	FT.	QUALIFYING WALL LENGTH, L	<input type="text" value="15.0"/>	FT.	SHEARWALL ASSEMBLY	<input type="text" value="P1"/>

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL	<input type="text" value="1630"/>	LBS	<	ALLOWABLE SHEARWALL CAPACITY	<input type="text" value="3585"/>	LBS
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**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	<input type="text" value="135"/>	PLF	OVERTURNING MOMENT	<input type="text" value="14.7"/>	K-FT	HOLD DOWN DESIGN LOAD	<input type="text" value="328"/>	LBS
DL AT ENDS OF WALL	<input type="text" value="400"/>	LBS	RESISTIVE MOMENT	<input type="text" value="9.7"/>	K-FT	HOLD DOWN CAPACITY	<input type="text" value="1705"/>	LBS

**HOLD-DOWN SPECIFICATION**

**SIMPSON GS16 STRAP TIE (14" END LENGTH)**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL XXX: - NOT USED**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL 111: 1ST - SIDE INTERIOR STUDY**

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STHD14RJ HOLDOWN**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL 112:** 1ST - SIDE INTERIOR PANTRY

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**SIMPSON STD14RJ HOLDOWN**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**



***SHEARWALL DESIGN SUMMARY***

**SHEARWALL B3:** - FRONT INTERIOR BED/HALL

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

TOTAL SHEAR LOAD ON WALL  LBS < ALLOWABLE SHEARWALL CAPACITY  LBS

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

**SHEARWALL XXX:** - NOT USED

**SHEARWALL PROPERTIES:**

WALL HEIGHT, H  FT. MAX WALL OPENING HT, H<sub>c</sub>  FT.  
WALL LENGTH, L  FT. QUALIFYING WALL LENGTH, L  FT. SHEARWALL ASSEMBLY

**CAPACITY EVALUATION:**

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

**SHEARWALL ASSEMBLY SPECIFICATION**

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

**OVERTURNING EVALUATION:**

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

**HOLD-DOWN SPECIFICATION**

**NO HOLDOWN REQUIRED**

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### Restrained Retaining Wall

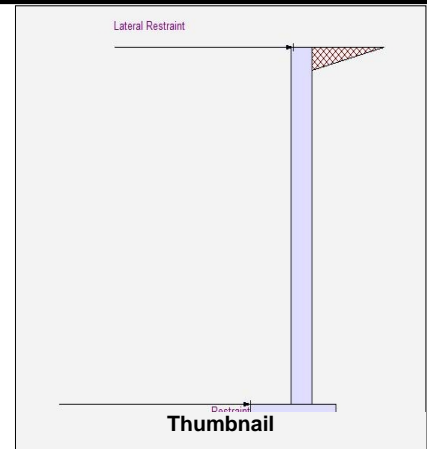
Code: IBC 2018, ACI 318-14, TMS 402-16

#### Criteria

Retained Height	=	10.50 ft
Wall height above soil	=	0.00 ft
Total Wall Height	=	10.50 ft
Top Support Height	=	10.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in

#### Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density	=	110.00 pcf
Footing  Soil Frictior	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



#### Surcharge Loads

Surcharge Over Heel	=	0.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

#### Axial Load Applied to Stem

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

#### Earth Pressure Seismic Load

#### Uniform 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) (Strength Level)
Wind on Exposed Stem	=	0.0 psf

$K_h$  Soil Density Multiplier = 0.091 g Added seismic per unit area = 73.6 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

#### Design Summary

Total Bearing Load	=	2,463 lbs
...resultant ecc.	=	0.00 in
Soil Pressure @ Toe	=	821 psf OK
Soil Pressure @ Heel	=	821 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	985 psf
ACI Factored @ Heel	=	985 psf
Footing Shear @ Toe	=	6.2 psi OK
Footing Shear @ Heel	=	4.2 psi OK
Allowable	=	75.0 psi
Reaction at Top	=	836.8 lbs
Reaction at Bottom	=	3,237.8 lbs

#### Sliding Calcs

Lateral Sliding Force	=	3,237.8 lbs
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#### Concrete Stem Construction

Thickness	=	8.00 in	Fy	=	60,000 psi
Wall Weight	=	100.0 psf	f'c	=	2,500 psi
Stem is FIXED to top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 10.50 ft	6.03 ft	0.00 ft
Rebar Size	= # 5	# 5	# 5
Rebar Spacing	= 16.00 in	16.00 in	8.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 5.50 in	6.00 in	5.50 in
<b>Design Data</b>			
fb/FB + fa/Fa	= 0.000	0.593	0.736
Mu....Actual	= 0.0 ft-#	3,552.3 ft-#	7,622.6 ft-#
Mn * Phi....Allowable	= 5,467.3 ft-#	5,990.5 ft-#	10,360.6 ft-#
Shear Force @ this height	= 1,295.8 lbs		4,217.8 lbs
Shear.....Actual	= 19.63 psi		63.91 psi
Shear.....Allowable	= 75.00 psi		75.00 psi

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

#### Load Factors

Building Code	IBC 2018, ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000



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**Restrained Retaining Wall**

Code: IBC 2018,ACI 318-14,TMS 402-16

**Concrete Stem Rebar Area Details**

Top Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0 in2/ft	
(4/3) * As :	0 in2/ft	Min Stem T&S Reinf Area 2.016 in2
200bd/fy : 200(12)(5.5)/60000 :	0.22 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 :	0.7451 in2/ft	#6@ 27.50 in      #6@ 55.00 in

Mmax Between Ends	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.1389 in2/ft	
(4/3) * As :	0.1853 in2/ft	Min Stem T&S Reinf Area 0.858 in2
200bd/fy : 200(12)(6)/60000 :	0.24 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 :	0.1853 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 :	0.8128 in2/ft	#6@ 27.50 in      #6@ 55.00 in

Base Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.3269 in2/ft	
(4/3) * As :	0.4359 in2/ft	Min Stem T&S Reinf Area 1.158 in2
200bd/fy : 200(12)(5.5)/60000 :	0.22 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 :	0.3269 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 :	0.7451 in2/ft	#6@ 27.50 in      #6@ 55.00 in

**Footing Strengths & Dimensions**

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
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 in @ Btm.= 3.00 in

**Footing Design Results**

	Toe	Heel
Factored Pressure	= 985	985 psf
Mu' : Upward	= 1,108	342 ft-#
Mu' : Downward	= 203	544 ft-#
Mu: Design	= 906	202 ft-#
Actual 1-Way Shear	= 6.25	4.25 psi
Allow 1-Way Shear	= 75.00	75.00 psi

**Other Acceptable Sizes & Spacings:**

Toe: None Spec'd	-or-	phiMn = phi'5'lambda'sqrt(fc)'Sm
Heel: None Spec'd	-or-	phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined	-or-	No key defined
Min footing T&S reinf Area		0.78 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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**Restrained Retaining Wall**

Code: IBC 2018,ACI 318-14,TMS 402-16

**Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing**

**Forces acting on footing for soil pressure**

>>> Sliding Forces are restrained by the adjacent slab

**Load & Moment Summary For Footing : For Soil Pressure Calcs**

Moment @ Top of Footing Applied from Stem	=		=	-4,872.8 ft-#
Surcharge Over Heel	=	lbs	ft	ft-#
Adjacent Footing Load	=	lbs	ft	ft-#
Axial Dead Load on Stem	=	lbs	ft	ft-#
Soil Over Toe	=	lbs	ft	ft-#
Surcharge Over Toe	=	lbs	ft	ft-#
Stem Weight	=	1,050.0 lbs	1.83 ft	1,925.0 ft-#
Soil Over Heel	=	962.5 lbs	2.58 ft	2,486.5 ft-#
Footing Weight	=	450.0 lbs	1.50 ft	675.0 ft-#
<b>Total Vertical Force</b>	=	2,462.5 lbs	Base Moment =	213.7 ft-#

**Soil Pressure Resulting Moment = 0.0ft-#**

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

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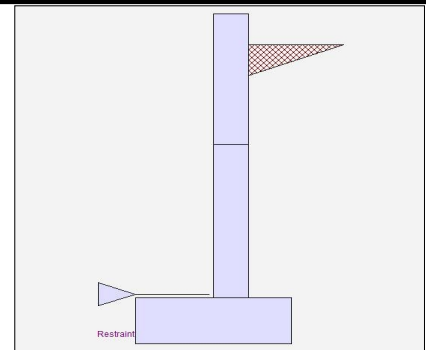
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**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

**Criteria**

Retained Height	=	5.50 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	=	350.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing  Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



**Surcharge Loads**

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

**Lateral Load Applied to Stem**

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

**Adjacent Footing Load**

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

**Axial Load Applied to Stem**

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

**Earth Pressure Seismic Load**

Method : Uniform		
Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	45.500
Total Seismic Force	=	295.750

**Design Summary**

**Wall Stability Ratios**

Overturning	=	1.80 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,898 lbs
...resultant ecc.	=	4.15 in
Soil Pressure @ Toe	=	886 psf OK
Soil Pressure @ Heel	=	161 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,241 psf
ACI Factored @ Heel	=	226 psf
Footing Shear @ Toe	=	6.1 psi OK
Footing Shear @ Heel	=	8.1 psi OK
Allowable	=	75.0 psi

**Sliding Calcs**

Lateral Sliding Force	=	946.4 lbs
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**Stem Construction**

	2nd	Bottom
Design Height Above Ftg	ft = 3.33	ft = 0.00
Wall Material Above "Ht"	= Concrete	= Concrete
Design Method	= LRFD	= LRFD
Thickness	= 8.00	= 8.00
Rebar Size	= # 5	= # 5
Rebar Spacing	= 16.00	= 16.00
Rebar Placed at	= Edge	= Edge

**Design Data**

fb/FB + fa/Fa	=	0.032	0.362
<b>Total Force @ Section</b>			
Service Level	lbs =		
Strength Level	lbs =	230.6	1,097.3
<b>Moment....Actual</b>			
Service Level	ft-# =		
Strength Level	ft-# =	202.5	2,241.0
Moment....Allowable	ft-# =	6,186.6	6,186.6
<b>Shear.....Actual</b>			
Service Level	psi =		
Strength Level	psi =	3.1	14.8
Shear.....Allowable	psi =	75.0	75.0
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 =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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

**Load Factors**

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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### Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

#### Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0077 in <sup>2</sup> /ft		
(4/3) * As :	0.0102 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.545 in <sup>2</sup>	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0849 in <sup>2</sup> /ft		
(4/3) * As :	0.1131 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.639 in <sup>2</sup>	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in	#6@ 55.00 in

#### Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

#### Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	1,241	226 psf
Mu' : Upward	=	14,467	111 ft-#
Mu' : Downward	=	2,430	750 ft-#
Mu: Design	=	1,003	639 ft-#
Actual 1-Way Shear	=	6.11	8.10 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

#### Other Acceptable Sizes & Spacings

Toe:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Heel:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Key: No key defined

Min footing T&S reinf Area	0.78	in <sup>2</sup>
Min footing T&S reinf Area per foot	0.26	in <sup>2</sup> /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 2018, ACI 318-14, TMS 402-16

#### Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	739.4	2.17	1,602.0	Soil Over HL (ab. water tbl)	504.2	2.58	1,302.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,302.4
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	207.0	3.25	672.8	Surcharge Over Toe =			
=				Stem Weight(s) =	617.0	1.83	1,131.2
<b>Total</b> =	<b>946.4</b>	<b>O.T.M.</b>	<b>= 2,274.8</b>	Earth @ Stem Transitions =			
				Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =	326.4	3.00	979.1
				<b>Total =</b>	<b>1,897.5 lbs</b>	<b>R.M.=</b>	<b>4,087.7</b>

**Resisting/Overturing Ratio**

= **1.80**  
Vertical Loads used for Soil Pressure = 1,897.5 lbs

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

#### Tilt

##### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci  
Horizontal Defl @ Top of Wall (approximate only) 0.051 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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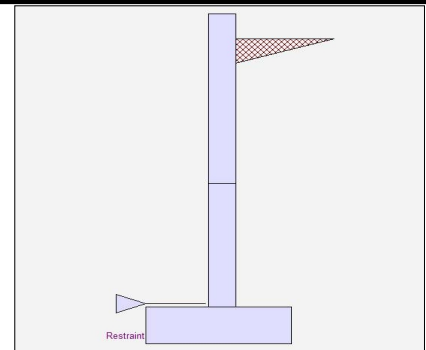
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**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

**Criteria**

Retained Height	=	7.25 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	=	350.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footings  Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



**Surcharge Loads**

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

**Lateral Load Applied to Stem**

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

**Adjacent Footing Load**

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

**Axial Load Applied to Stem**

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

**Earth Pressure Seismic Load**

Method : Uniform		
Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	57.750
Total Seismic Force	=	476.438

**Design Summary**

**Wall Stability Ratios**

Overturning	=	1.55 OK
Slab Resists All Sliding !		
Total Bearing Load	=	2,906 lbs
...resultant ecc.	=	8.03 in
Soil Pressure @ Toe	=	1,468 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,056 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	10.7 psi OK
Footing Shear @ Heel	=	16.6 psi OK
Allowable	=	75.0 psi

**Sliding Calcs**

Lateral Sliding Force	=	1,524.6 lbs
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**Stem Construction**

	2nd	Bottom
Design Height Above Ftg	ft = 3.33	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	=	0.162	0.430
<b>Total Force @ Section</b>			
Service Level	lbs =		
Strength Level	lbs =	656.6	1,890.4
<b>Moment....Actual</b>			
Service Level	ft-# =		
Strength Level	ft-# =	1,005.9	5,074.5
Moment....Allowable	ft-# =	6,186.6	11,799.2
<b>Shear.....Actual</b>			
Service Level	psi =		
Strength Level	psi =	8.8	25.5
Shear.....Allowable	psi =	75.0	75.0
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 =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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

**Load Factors**

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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### Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

#### Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0381 in2/ft		
(4/3) * As :	0.0508 in2/ft	Min Stem T&S Reinf Area 0.881 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 :	0.8382 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1921 in2/ft		
(4/3) * As :	0.2562 in2/ft	Min Stem T&S Reinf Area 0.639 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 :	0.2475 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 :	0.8382 in2/ft	#6@ 27.50 in	#6@ 55.00 in

#### Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

#### Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	2,056	0 psf
Mu' : Upward	=	23,472	131 ft-#
Mu' : Downward	=	2,430	2,132 ft-#
Mu: Design	=	1,753	2,001 ft-#
Actual 1-Way Shear	=	10.72	16.59 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

#### Other Acceptable Sizes & Spacings

Toe:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Heel:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Key: No key defined

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 9.26 in	#4@ 18.52 in	
#5@ 14.35 in	#5@ 28.70 in	
#6@ 20.37 in	#6@ 40.74 in	

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## Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

### Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,191.1	2.75	3,275.5	Soil Over HL (ab. water tbl)	1,063.3	2.83	3,012.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.83	3,012.8
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	333.5	4.13	1,375.7	Surcharge Over Toe =			
				Stem Weight(s) =	792.0	1.83	1,452.0
				Earth @ Stem Transitions =			
<b>Total</b>	<b>= 1,524.6</b>	<b>O.T.M. =</b>	<b>4,651.2</b>	Footing Weight =	525.0	1.75	918.8
				Key Weight =			
				Vert. Component =	525.8	3.50	1,840.2
<b>Resisting/Overturning Ratio</b>		<b>= 1.55</b>		<b>Total =</b>	<b>2,906.1 lbs</b>	<b>R.M.=</b>	<b>7,223.7</b>
Vertical Loads used for Soil Pressure =		2,906.1 lbs					

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

### Tilt

#### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.092 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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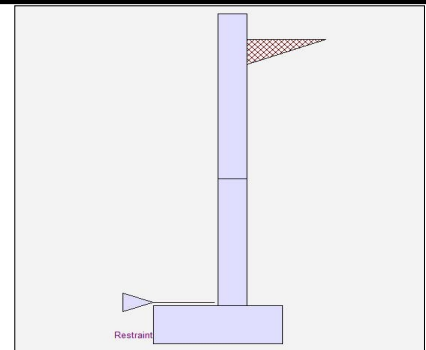
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**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

**Criteria**

Retained Height	=	7.00 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	=	350.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footings  Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



**Surcharge Loads**

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

**Lateral Load Applied to Stem**

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

**Adjacent Footing Load**

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

**Axial Load Applied to Stem**

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

**Earth Pressure Seismic Load**

Method : Uniform		
Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	56.000
Total Seismic Force	=	448.000

**Design Summary**

**Wall Stability Ratios**

Overturning	=	1.23 Ratio < 1.5!
Slab Resists All Sliding !		
<b>F.O.S. 1.1 ACCEPTABLE w/ SEISMIC LOAD APPLIED</b>		
Total Bearing Load	=	2,353 lbs
...resultant ecc.	=	11.67 in
Soil Pressure @ Toe	=	2,348 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	3,287 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	15.1 psi OK
Footing Shear @ Heel	=	14.3 psi OK
Allowable	=	75.0 psi

**Sliding Calcs**

Lateral Sliding Force	=	1,433.6 lbs
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**Stem Construction**

	2nd	Bottom
Design Height Above Ftg	ft = 3.33	ft = 0.00
Wall Material Above "Ht"	Concrete	Concrete
Design Method	LRFD	LRFD
Thickness	= 8.00	= 8.00
Rebar Size	= # 5	= # 5
Rebar Spacing	= 16.00	= 16.00
Rebar Placed at	= Edge	= Edge
<b>Design Data</b>		
fb/FB + fa/Fa	= 0.135	= 0.739
<b>Total Force @ Section</b>		
Service Level	lbs =	
Strength Level	lbs = 582.6	1,764.0
<b>Moment....Actual</b>		
Service Level	ft-# =	
Strength Level	ft-# = 838.5	4,573.3
Moment....Allowable	ft-# = 6,186.6	6,186.6
<b>Shear.....Actual</b>		
Service Level	psi =	
Strength Level	psi = 7.8	23.8
Shear.....Allowable	psi = 75.0	75.0
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 = 2,500.0	2,500.0
Fy	psi = 60,000.0	60,000.0

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

**Load Factors**

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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### Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

#### Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0317 in2/ft		
(4/3) * As :	0.0423 in2/ft	Min Stem T&S Reinf Area 0.833 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 :	0.8382 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1732 in2/ft		
(4/3) * As :	0.2309 in2/ft	Min Stem T&S Reinf Area 0.639 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 :	0.2309 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 :	0.8382 in2/ft	#6@ 27.50 in	#6@ 55.00 in

#### Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

#### Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	3,287	0 psf
Mu' : Upward	=	30,362	0 ft-#
Mu' : Downward	=	2,430	1,043 ft-#
Mu: Design	=	2,328	1,043 ft-#
Actual 1-Way Shear	=	15.08	14.26 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

#### Other Acceptable Sizes & Spacings

Toe:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Heel:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Key: No key defined

Min footing T&S reinf Area	0.78	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 2018,ACI 318-14,TMS 402-16

#### Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,120.0	2.67	2,986.7	Soil Over HL (ab. water tbl)	641.7	2.58	1,657.6
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,657.6
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	313.6	4.00	1,254.4	Surcharge Over Toe =			
				Stem Weight(s) =	767.0	1.83	1,406.2
				Earth @ Stem Transitions =			
<b>Total</b>	<b>= 1,433.6</b>	<b>O.T.M. =</b>	<b>4,241.1</b>	Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =	494.4	3.00	1,483.2
<b>Resisting/Overturning Ratio</b>		<b>= 1.23</b>		<b>Total =</b>	<b>2,353.1 lbs</b>	<b>R.M.=</b>	<b>5,222.0</b>
Vertical Loads used for Soil Pressure =		2,353.1 lbs					

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

#### Tilt

##### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci  
Horizontal Defl @ Top of Wall (approximate only) 0.167 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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### Restrained Retaining Wall

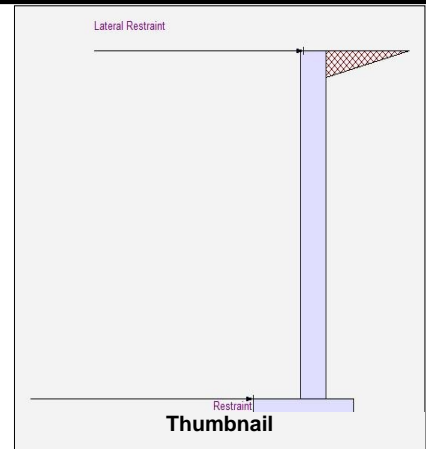
Code: IBC 2018,ACI 318-14,TMS 402-16

#### Criteria

Retained Height	=	8.75 ft
Wall height above soil	=	0.00 ft
Total Wall Height	=	8.75 ft
Top Support Height	=	8.75 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in

#### Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density	=	110.00 pcf
Footing  Soil Frictior	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



#### Surcharge Loads

Surcharge Over Heel	=	0.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

#### Axial Load Applied to Stem

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

#### Earth Pressure Seismic Load

#### Uniform 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) (Strength Level)

Wind on Exposed Stem = 0.0 psf

$K_h$  Soil Density Multiplier = 0.091 g Added seismic per unit area = 61.3 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

#### Design Summary

Total Bearing Load	=	2,127 lbs
...resultant ecc.	=	0.00 in
Soil Pressure @ Toe	=	709 psf OK
Soil Pressure @ Heel	=	709 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	851 psf
ACI Factored @ Heel	=	851 psf
Footing Shear @ Toe	=	5.2 psi OK
Footing Shear @ Heel	=	3.5 psi OK
Allowable	=	75.0 psi
Reaction at Top	=	580.8 lbs
Reaction at Bottom	=	2,329.1 lbs

#### Sliding Calcs

Lateral Sliding Force = 2,329.1 lbs

#### Concrete Stem Construction

Thickness	=	8.00 in	$F_y$	=	60,000 psi
Wall Weight	=	100.0 psf	$f'_c$	=	2,500 psi
Stem is FIXED to top of footing					

#### Design Height Above Ftg

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
Design Height Above Ftg	Stem OK = 8.75 ft	Stem OK = 5.03 ft	Stem OK = 0.00 ft
Rebar Size	# 5	# 5	# 5
Rebar Spacing	16.00 in	16.00 in	16.00 in
Rebar Placed at	Edge	Edge	Edge
Rebar Depth 'd'	5.50 in	6.00 in	5.50 in

#### Design Data

fb/FB + fa/Fa	=	0.000	0.343	0.807
Mu....Actual	=	0.0 ft-#	2,055.7 ft-#	4,411.2 ft-#
Mn * Phi.....Allowable	=	5,467.3 ft-#	5,990.5 ft-#	5,467.3 ft-#
Shear Force @ this height	=	899.9 lbs		2,929.0 lbs
Shear.....Actual	=	13.63 psi		44.38 psi
Shear.....Allowable	=	75.00 psi		75.00 psi

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

#### Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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**Restrained Retaining Wall**

Code: IBC 2018,ACI 318-14,TMS 402-16

**Concrete Stem Rebar Area Details**

Top Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0 in2/ft	
(4/3) * As :	0 in2/ft	Min Stem T&S Reinf Area 1.680 in2
200bd/fy : 200(12)(5.5)/60000 :	0.22 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 :	0.7451 in2/ft	#6@ 27.50 in      #6@ 55.00 in

Mmax Between Ends	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0804 in2/ft	
(4/3) * As :	0.1072 in2/ft	Min Stem T&S Reinf Area 0.715 in2
200bd/fy : 200(12)(6)/60000 :	0.24 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 :	0.8128 in2/ft	#6@ 27.50 in      #6@ 55.00 in

Base Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.1892 in2/ft	
(4/3) * As :	0.2523 in2/ft	Min Stem T&S Reinf Area 0.965 in2
200bd/fy : 200(12)(5.5)/60000 :	0.22 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 :	0.22 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 :	0.7451 in2/ft	#6@ 27.50 in      #6@ 55.00 in

**Footing Strengths & Dimensions**

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
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 in	@ Btm.= 3.00 in

**Footing Design Results**

	Toe	Heel
Factored Pressure	= 851	851 psf
Mu' : Upward	= 957	295 ft-#
Mu' : Downward	= 203	464 ft-#
Mu: Design	= 755	168 ft-#
Actual 1-Way Shear	= 5.21	3.54 psi
Allow 1-Way Shear	= 75.00	75.00 psi

**Other Acceptable Sizes & Spacings:**

Toe: None Spec'd	-or-	phiMn = phi'5'lambda'sqrt(fc)'Sm
Heel: None Spec'd	-or-	phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined	-or-	No key defined
Min footing T&S reinf Area	0.78	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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**Restrained Retaining Wall**

Code: IBC 2018,ACI 318-14,TMS 402-16

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**Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing**

**Forces acting on footing for soil pressure**

>>> Sliding Forces are restrained by the adjacent slab

**Load & Moment Summary For Footing : For Soil Pressure Calcs**

Moment @ Top of Footing Applied from Stem	=		=	-2,819.9 ft-#
Surcharge Over Heel	=	lbs	ft	ft-#
Adjacent Footing Load	=	lbs	ft	ft-#
Axial Dead Load on Stem	=	lbs	ft	ft-#
Soil Over Toe	=	lbs	ft	ft-#
Surcharge Over Toe	=	lbs	ft	ft-#
Stem Weight	=	875.0 lbs	1.83 ft	1,604.2 ft-#
Soil Over Heel	=	802.1 lbs	2.58 ft	2,072.0 ft-#
Footing Weight	=	450.0 lbs	1.50 ft	675.0 ft-#
<b>Total Vertical Force</b>	=	2,127.1 lbs	Base Moment =	1,531.3 ft-#

**Soil Pressure Resulting Moment = 0.0ft-#**

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

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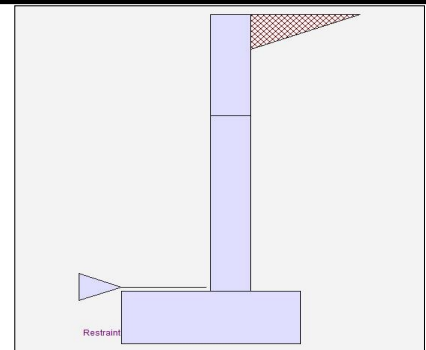
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**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

**Criteria**

Retained Height	=	5.25 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	=	350.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footings  Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



**Surcharge Loads**

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

**Lateral Load Applied to Stem**

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

**Adjacent Footing Load**

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

**Axial Load Applied to Stem**

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

**Earth Pressure Seismic Load**

Method : Uniform		
Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	43.750
Total Seismic Force	=	273.438

**Design Summary**

**Wall Stability Ratios**

Overturning	=	1.87 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,758 lbs
...resultant ecc.	=	3.47 in
Soil Pressure @ Toe	=	766 psf OK
Soil Pressure @ Heel	=	205 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,072 psf
ACI Factored @ Heel	=	287 psf
Footing Shear @ Toe	=	5.2 psi OK
Footing Shear @ Heel	=	7.3 psi OK
Allowable	=	75.0 psi

**Sliding Calcs**

Lateral Sliding Force	=	875.0 lbs
-----------------------	---	-----------

**Stem Construction**

	2nd	Bottom
Design Height Above Ftg	ft = 3.33	ft = 0.00
Wall Material Above "Ht"	= Concrete	= Concrete
Design Method	= LRFD	= LRFD
Thickness	= 8.00	= 8.00
Rebar Size	= # 5	= # 5
Rebar Spacing	= 16.00	= 16.00
Rebar Placed at	= Edge	= Edge

**Design Data**

fb/FB + fa/Fa	=	0.023	0.315
<b>Total Force @ Section</b>			
Service Level	lbs =		
Strength Level	lbs =	187.2	1,001.4
<b>Moment....Actual</b>			
Service Level	ft-# =		
Strength Level	ft-# =	146.7	1,953.5
Moment....Allowable	ft-# =	6,186.6	6,186.6
<b>Shear.....Actual</b>			
Service Level	psi =		
Strength Level	psi =	2.5	13.5
Shear.....Allowable	psi =	75.0	75.0
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 =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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

**Load Factors**

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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**Cantilevered Retaining Wall**

Code: IBC 2018, ACI 318-14, TMS 402-16

**Concrete Stem Rebar Area Details**

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0056 in <sup>2</sup> /ft	
(4/3) * As :	0.0074 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.369 in <sup>2</sup>
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :
	=====	One layer of :      Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in      #4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in      #5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in      #6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.074 in <sup>2</sup> /ft	
(4/3) * As :	0.0986 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.639 in <sup>2</sup>
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :
	=====	One layer of :      Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in      #4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in      #5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in      #6@ 55.00 in

**Footing Data**

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
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	= 1,072	287 psf
Mu' : Upward	= 12,708	125 ft-#
Mu' : Downward	= 2,430	705 ft-#
Mu: Design	= 857	581 ft-#
Actual 1-Way Shear	= 5.20	7.34 psi
Allow 1-Way Shear	= 40.00	40.00 psi
Toe Reinforcing	= None Spec'd	
Heel Reinforcing	= None Spec'd	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs

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

**Other Acceptable Sizes & Spacings**Toe:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$ Heel:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$ 

Key: No key defined

Min footing T&S reinf Area	0.78 in <sup>2</sup>
Min footing T&S reinf Area per foot	0.26 in <sup>2</sup> /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 2018, ACI 318-14, TMS 402-16

#### Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	683.6	2.08	1,424.2	Soil Over HL (ab. water tbl)	481.3	2.58	1,243.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,243.2
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 =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	191.4	3.13	598.1	Surcharge Over Toe =			
				Stem Weight(s) =	525.0	1.83	962.5
				Earth @ Stem Transitions =			
<b>Total</b>	<b>= 875.0</b>	<b>O.T.M. =</b>	<b>2,022.3</b>	Footing Weight =	450.0	1.50	675.0
				Key Weight =			
				Vert. Component =	301.8	3.00	905.3
<b>Resisting/Overturning Ratio</b>		<b>= 1.87</b>		<b>Total =</b>	<b>1,758.0 lbs</b>	<b>R.M.=</b>	<b>3,786.0</b>
Vertical Loads used for Soil Pressure =		1,758.0 lbs					

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

#### Tilt

##### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.037 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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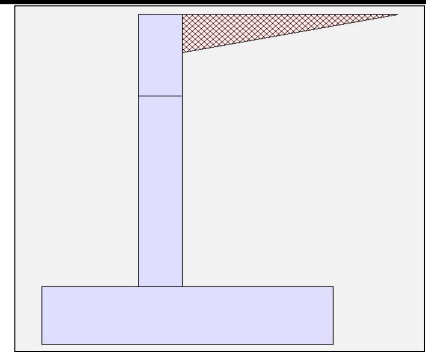
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**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

**Criteria**

Retained Height	=	4.75 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	=	350.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing  Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



**Surcharge Loads**

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

**Lateral Load Applied to Stem**

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

**Adjacent Footing Load**

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

**Axial Load Applied to Stem**

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

**Earth Pressure Seismic Load**

Method : Uniform		
Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	40.250
Total Seismic Force	=	231.438

**Design Summary**

**Wall Stability Ratios**

Overturning	=	4.83 OK
Sliding	=	1.24 Ratio < 1.5!
F.O.S. 1.1 ACCEPTABLE w/ SEISMIC LOAD APPLIED		
Total Bearing Load	=	2,625 lbs
...resultant ecc.	=	3.53 in

Soil Pressure @ Toe	=	320 psf OK
Soil Pressure @ Heel	=	733 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	448 psf
ACI Factored @ Heel	=	1,026 psf
Footing Shear @ Toe	=	2.1 psi OK
Footing Shear @ Heel	=	2.1 psi OK
Allowable	=	75.0 psi

**Sliding Calcs**

Lateral Sliding Force	=	740.6 lbs
less 100% Passive Force	= -	0.0 lbs
less 100% Friction Force	= -	918.6 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	192.3 lbs NG

**Stem Construction**

	2nd	Bottom
Design Height Above Ftg	ft = 3.33	ft = 0.00
Wall Material Above "Ht"	= Concrete	= Concrete
Design Method	= LRFD	= LRFD
Thickness	= 8.00	= 8.00
Rebar Size	= # 5	= # 5
Rebar Spacing	= 16.00	= 16.00
Rebar Placed at	= Edge	= Edge

**Design Data**

fb/FB + fa/Fa	=	0.010	0.235
<b>Total Force @ Section</b>			
Service Level	lbs =		
Strength Level	lbs =	113.6	822.9
<b>Moment....Actual</b>			
Service Level	ft-# =		
Strength Level	ft-# =	67.3	1,454.3
Moment....Allowable	ft-# =	6,186.6	6,186.6
<b>Shear.....Actual</b>			
Service Level	psi =		
Strength Level	psi =	1.5	11.1
Shear.....Allowable	psi =	75.0	75.0
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 =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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

**Load Factors**

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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### Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

#### Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0025 in <sup>2</sup> /ft		
(4/3) * As :	0.0034 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.273 in <sup>2</sup>	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0551 in <sup>2</sup> /ft		
(4/3) * As :	0.0734 in <sup>2</sup> /ft	Min Stem T&S Reinf Area 0.639 in <sup>2</sup>	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in <sup>2</sup> /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in <sup>2</sup> /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in <sup>2</sup> /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in <sup>2</sup> /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2325 in <sup>2</sup> /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8382 in <sup>2</sup> /ft	#6@ 27.50 in	#6@ 55.00 in

#### Footing Data

Toe Width	=	1.50 ft
Heel Width	=	3.00
Total Footing Width	=	4.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

#### Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	448	1,026 psf
Mu' : Upward	=	6,913	2,327 ft-#
Mu' : Downward	=	2,430	3,150 ft-#
Mu: Design	=	374	823 ft-#
Actual 1-Way Shear	=	2.10	2.06 psi
Allow 1-Way Shear	=	40.00	40.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

#### Other Acceptable Sizes & Spacings

Toe:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Heel:  $\phi I M_n = \phi I' 5' \lambda \sqrt{f_c} S_m$   
 Key: No key defined

Min footing T&S reinf Area	1.17	in <sup>2</sup>
Min footing T&S reinf Area per foot	0.26	in <sup>2</sup> /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 2018, ACI 318-14, TMS 402-16

#### Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	578.6	1.92	1,109.0	Soil Over HL (ab. water tbl)	1,219.2	3.33	4,063.9
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.33	4,063.9
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	162.0	2.88	465.8	Surcharge Over Toe =			
=				Stem Weight(s) =	475.0	1.83	870.8
<b>Total</b> =	<b>740.6</b>	<b>O.T.M.</b>	<b>= 1,574.7</b>	Earth @ Stem Transitions =			
				Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =	255.4	4.50	1,149.3
				<b>Total =</b>	<b>2,624.6 lbs</b>	<b>R.M.=</b>	<b>7,602.8</b>

**Resisting/Overturning Ratio**

= **4.83**  
Vertical Loads used for Soil Pressure = 2,624.6 lbs

\* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

#### Tilt

##### Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci  
Horizontal Defl @ Top of Wall (approximate only) 0.037 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

## Concrete Beam

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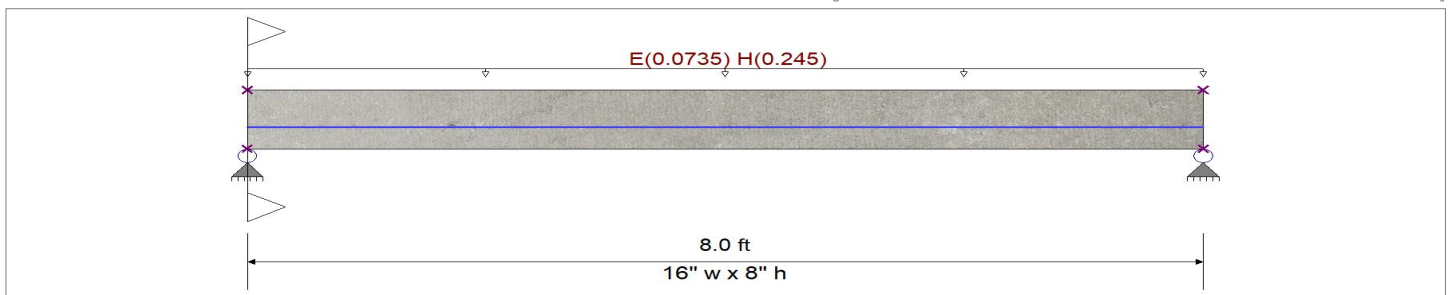
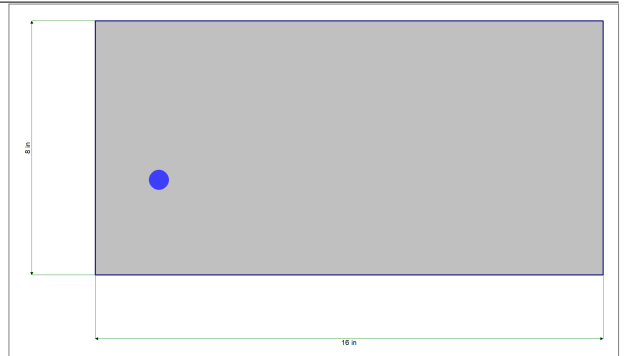
DESCRIPTION: SPANNING FOUNDATION WALL @ STAIRS

### CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combination Set : ASCE 7-16

### Material Properties

$f'_c$	=	2.50 ksi	$\phi$ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
$\psi$ Density	=	145.0 pcf	$\beta_1$	=	0.850
$\lambda$ 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 3.0 in from Bottom, from 0.0 to 8.0 ft in this span

Load for Span Number 1  
 Uniform Load : E = 0.07350, H = 0.2450 k/ft, Tributary Width = 1.0 ft

### DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	<b>0.565</b> : 1	Maximum Deflection	
Section used for this span	<b>Typical Section</b>	Max Downward Transient Deflection	0.011 in Ratio = 9064 >=360.
Mu : Applied	3.724 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 <360.0
Mn * Phi : Allowable	6.593 k-ft	Max Downward Total Deflection	0.013 in Ratio = 7491 >=180.
Location of maximum on span	4.007 ft	Max Upward Total Deflection	0.000 in Ratio = 0 <180.0
Span # where maximum occurs	Span # 1		

### Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.186	1.186
Overall MINimum	0.294	0.294
+D+H	0.980	0.980
+D+L+H	0.980	0.980
+D+Lr+H	0.980	0.980
+D+S+H	0.980	0.980
+D+0.750Lr+0.750L+H	0.980	0.980
+D+0.750L+0.750S+H	0.980	0.980
+D+0.60W+H	0.980	0.980
+D+0.750Lr+0.750L+0.450W+H	0.980	0.980
+D+0.750L+0.750S+0.450W+H	0.980	0.980
+0.60D+0.60W+0.60H	0.588	0.588
+D+0.70E+0.60H	0.794	0.794
+D+0.750L+0.750S+0.5250E+H	1.134	1.134

**Concrete Beam**

Lic. # : KW-06004787

DESCRIPTION: SPANNING FOUNDATION WALL @ STAIRS

**Vertical Reactions**

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D+0.70E+H	1.186	1.186
E Only	0.294	0.294
H Only	0.980	0.980

**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	5.00	1.86	1.86	0.00	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.09	5.00	1.82	1.82	0.16	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.17	5.00	1.78	1.78	0.32	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.26	5.00	1.74	1.74	0.47	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.35	5.00	1.70	1.70	0.62	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.44	5.00	1.66	1.66	0.77	0.90	6.22	Vu < PhiVc/2	lot Reqd 9.6.	6.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.52	5.00	1.62	1.62	0.91	0.74	6.13	Vu < PhiVc/2	lot Reqd 9.6.	6.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.61	5.00	1.58	1.58	1.05	0.62	6.06	Vu < PhiVc/2	lot Reqd 9.6.	6.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.70	5.00	1.54	1.54	1.19	0.54	6.01	Vu < PhiVc/2	lot Reqd 9.6.	6.0	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.79	5.00	1.50	1.50	1.32	0.47	5.97	Vu < PhiVc/2	lot Reqd 9.6.	6.0	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.87	5.00	1.46	1.46	1.45	0.42	5.94	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	0.96	5.00	1.41	1.41	1.58	0.37	5.92	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.05	5.00	1.37	1.37	1.70	0.34	5.90	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.14	5.00	1.33	1.33	1.82	0.31	5.88	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.22	5.00	1.29	1.29	1.93	0.28	5.86	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.31	5.00	1.25	1.25	2.04	0.26	5.85	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.40	5.00	1.21	1.21	2.15	0.23	5.84	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.49	5.00	1.17	1.17	2.25	0.22	5.83	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.57	5.00	1.13	1.13	2.35	0.20	5.82	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.66	5.00	1.09	1.09	2.45	0.19	5.81	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.75	5.00	1.05	1.05	2.54	0.17	5.80	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.84	5.00	1.01	1.01	2.63	0.16	5.79	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	1.92	5.00	0.97	0.97	2.72	0.15	5.79	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.01	5.00	0.93	0.93	2.80	0.14	5.78	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.10	5.00	0.89	0.89	2.88	0.13	5.77	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.19	5.00	0.84	0.84	2.96	0.12	5.77	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.27	5.00	0.80	0.80	3.03	0.11	5.76	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.36	5.00	0.76	0.76	3.10	0.10	5.76	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.45	5.00	0.72	0.72	3.16	0.10	5.76	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.54	5.00	0.68	0.68	3.22	0.09	5.75	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.62	5.00	0.64	0.64	3.28	0.08	5.75	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.71	5.00	0.60	0.60	3.34	0.07	5.74	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.80	5.00	0.56	0.56	3.39	0.07	5.74	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.89	5.00	0.52	0.52	3.43	0.06	5.74	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	2.97	5.00	0.48	0.48	3.48	0.06	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.06	5.00	0.44	0.44	3.52	0.05	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.15	5.00	0.40	0.40	3.55	0.05	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.23	5.00	0.36	0.36	3.59	0.04	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.32	5.00	0.32	0.32	3.62	0.04	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.41	5.00	0.27	0.27	3.64	0.03	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.50	5.00	0.23	0.23	3.67	0.03	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.58	5.00	0.19	0.19	3.68	0.02	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.67	5.00	0.15	0.15	3.70	0.02	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.76	5.00	0.11	0.11	3.71	0.01	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.85	5.00	0.07	0.07	3.72	0.01	5.70	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	3.93	5.00	0.03	0.03	3.72	0.00	5.70	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.02	5.00	-0.01	0.01	3.72	0.00	5.70	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.11	5.00	-0.05	0.05	3.72	0.01	5.70	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.20	5.00	-0.09	0.09	3.71	0.01	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0

**Concrete Beam**

Lic. # : KW-06004787

DESCRIPTION: SPANNING FOUNDATION WALL @ STAIRS

**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 Suggest	
+1.20D+L+0.20S+E+1.60H	1	4.28	5.00	-0.13	0.13	3.71	0.01	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.37	5.00	-0.17	0.17	3.69	0.02	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.46	5.00	-0.21	0.21	3.67	0.02	5.71	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.55	5.00	-0.25	0.25	3.65	0.03	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.63	5.00	-0.30	0.30	3.63	0.03	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.72	5.00	-0.34	0.34	3.60	0.04	5.72	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.81	5.00	-0.38	0.38	3.57	0.04	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.90	5.00	-0.42	0.42	3.54	0.05	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	4.98	5.00	-0.46	0.46	3.50	0.05	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.07	5.00	-0.50	0.50	3.46	0.06	5.73	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.16	5.00	-0.54	0.54	3.41	0.07	5.74	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.25	5.00	-0.58	0.58	3.36	0.07	5.74	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.33	5.00	-0.62	0.62	3.31	0.08	5.75	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.42	5.00	-0.66	0.66	3.25	0.08	5.75	Vu < PhiVc/2	lot Reqd 9.6.	5.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.51	5.00	-0.70	0.70	3.19	0.09	5.75	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.60	5.00	-0.74	0.74	3.13	0.10	5.76	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.68	5.00	-0.78	0.78	3.06	0.11	5.76	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.77	5.00	-0.82	0.82	2.99	0.11	5.77	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.86	5.00	-0.86	0.86	2.92	0.12	5.77	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	5.95	5.00	-0.91	0.91	2.84	0.13	5.78	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.03	5.00	-0.95	0.95	2.76	0.14	5.78	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.12	5.00	-0.99	0.99	2.68	0.15	5.79	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.21	5.00	-1.03	1.03	2.59	0.17	5.80	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.30	5.00	-1.07	1.07	2.50	0.18	5.80	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.38	5.00	-1.11	1.11	2.40	0.19	5.81	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.47	5.00	-1.15	1.15	2.30	0.21	5.82	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.56	5.00	-1.19	1.19	2.20	0.23	5.83	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.64	5.00	-1.23	1.23	2.10	0.24	5.84	Vu < PhiVc/2	lot Reqd 9.6.	5.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.73	5.00	-1.27	1.27	1.99	0.27	5.86	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.82	5.00	-1.31	1.31	1.87	0.29	5.87	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.91	5.00	-1.35	1.35	1.76	0.32	5.89	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	6.99	5.00	-1.39	1.39	1.64	0.35	5.91	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.08	5.00	-1.43	1.43	1.51	0.40	5.93	Vu < PhiVc/2	lot Reqd 9.6.	5.9	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.17	5.00	-1.48	1.48	1.39	0.44	5.96	Vu < PhiVc/2	lot Reqd 9.6.	6.0	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.26	5.00	-1.52	1.52	1.26	0.50	5.99	Vu < PhiVc/2	lot Reqd 9.6.	6.0	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.34	5.00	-1.56	1.56	1.12	0.58	6.04	Vu < PhiVc/2	lot Reqd 9.6.	6.0	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.43	5.00	-1.60	1.60	0.98	0.68	6.09	Vu < PhiVc/2	lot Reqd 9.6.	6.1	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.52	5.00	-1.64	1.64	0.84	0.81	6.17	Vu < PhiVc/2	lot Reqd 9.6.	6.2	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.61	5.00	-1.68	1.68	0.70	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.69	5.00	-1.72	1.72	0.55	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.78	5.00	-1.76	1.76	0.40	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.87	5.00	-1.80	1.80	0.24	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	7.96	5.00	-1.84	1.84	0.08	1.00	6.28	Vu < PhiVc/2	lot Reqd 9.6.	6.3	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	3.72	6.59	0.56
+1.40D+1.60H	1	8.000	3.14	6.59	0.48
+1.20D+0.50Lr+1.60L+1.60H	1	8.000	3.14	6.59	0.48
+1.20D+1.60L+0.50S+1.60H	1	8.000	3.14	6.59	0.48
+1.20D+1.60Lr+L+1.60H	1	8.000	3.14	6.59	0.48

Pratt Plat Lot 5  
 Architectural Innovations  
 203-21004  
 RJD  
 11-03-21

**Concrete Beam**

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**MULHERN & KULP STRUCTURAL ENGINEERING INC**

DESCRIPTION: **SPANNING FOUNDATION WALL @ STAIRS**

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	3.14	6.59	0.48
+1.20D+L+1.60S+1.60H Span # 1	1	8.000	3.14	6.59	0.48
+1.20D+1.60S+0.50W+1.60H Span # 1	1	8.000	3.14	6.59	0.48
+1.20D+0.50Lr+L+W+1.60H Span # 1	1	8.000	3.14	6.59	0.48
+1.20D+L+0.50S+W+1.60H Span # 1	1	8.000	3.14	6.59	0.48
+0.90D+W+1.60H Span # 1	1	8.000	3.14	6.59	0.48
+1.20D+L+0.20S+E+1.60H Span # 1	1	8.000	3.72	6.59	0.56
+0.90D+E+0.90H Span # 1	1	8.000	2.35	6.59	0.36

**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	0.0128	4.000		0.0000	0.000