b2 structural engineers
info@b2engineers.com
425-318-7047 (O)
425-318-0031 (C)

2906 74TH AVE SE RESIDENCE
2906 74TH AVE SE, MERCER ISLAND, WA 98040
STRUCTURAL CALCULATIONS

PROJECT NO: 20242 DATE:06/17/21
PREPARED BY: BASRI BASRI PE, SE

Design Criteria

International Building Code (IBC) 2018 American Society of Civil Engineers (ASCE) 7-16

Project Description

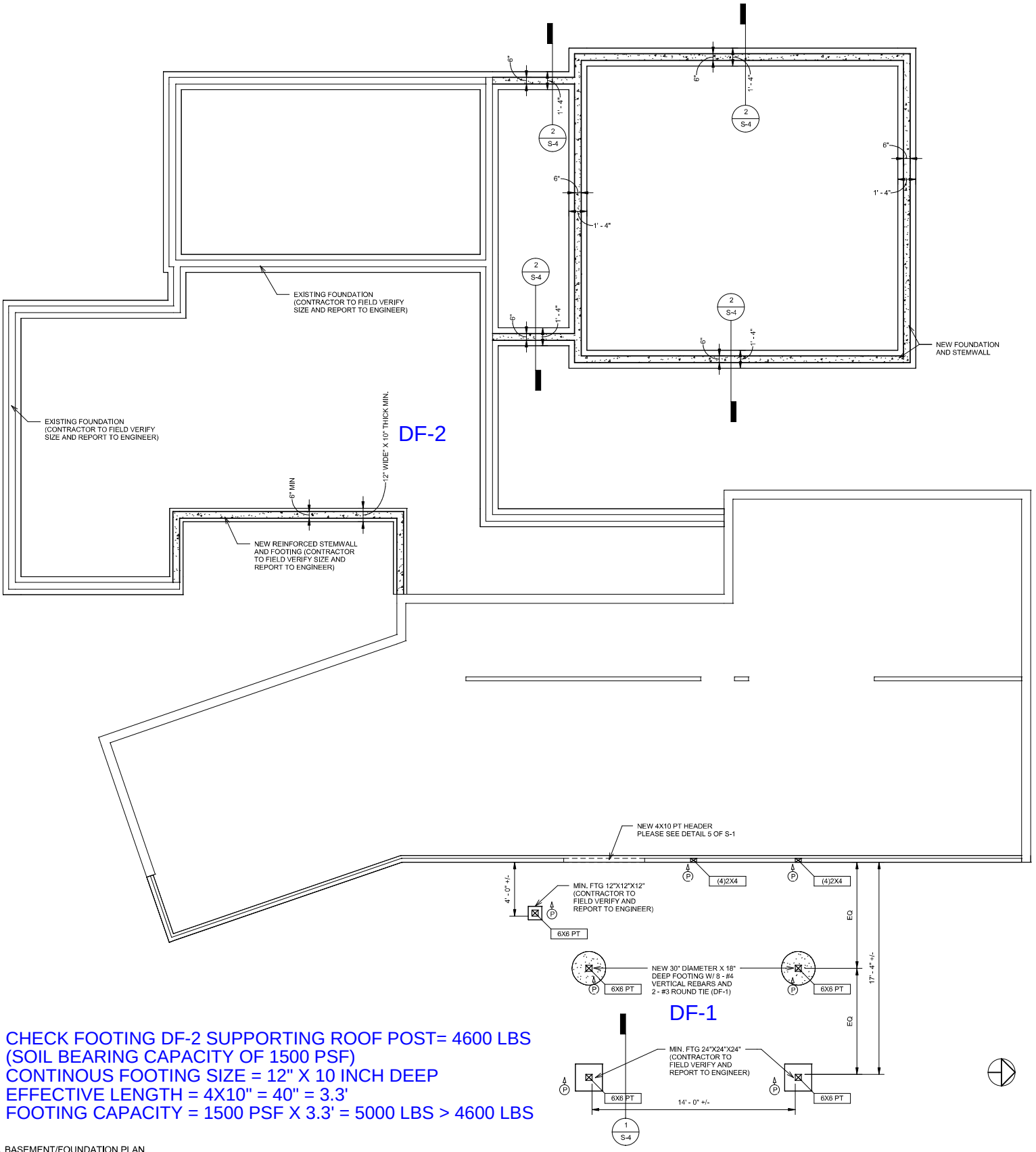
STRUCTURAL DESIGN OF REPAIR AND REPLACEMENT FRAMINGS OF EXISTING GARAGE, LIVING SPACE, AND NEW EXTERIOR DECK, UTILIZING CONVENTIONAL WOOD FRAMING ON SHALLOW CONCRETE FOUNDATION. SEISMIC ACCELERATIONS ARE OBTAINED FROM USGS WEBSITE. THE WIND TOPOGRAPHIC FACTOR IS OBTAINED FROM CITY OF MERCER ISLAND WIND MAP. PLEASE SEE ATTACHED CALCULATIONS. THERE ARE SOME STRUCTURAL ELEMENTS THAT THE CONTRACTORS NEED TO FIELD VERIFY AND REPORT ON THE SIZES AND CONDITIONS

S_s, %g	133
S_1, %g	50
Risk Category	II
Site Class	D
Ductility Factor, R	6.5
Seismic Performance Category	D

Wind Criteria

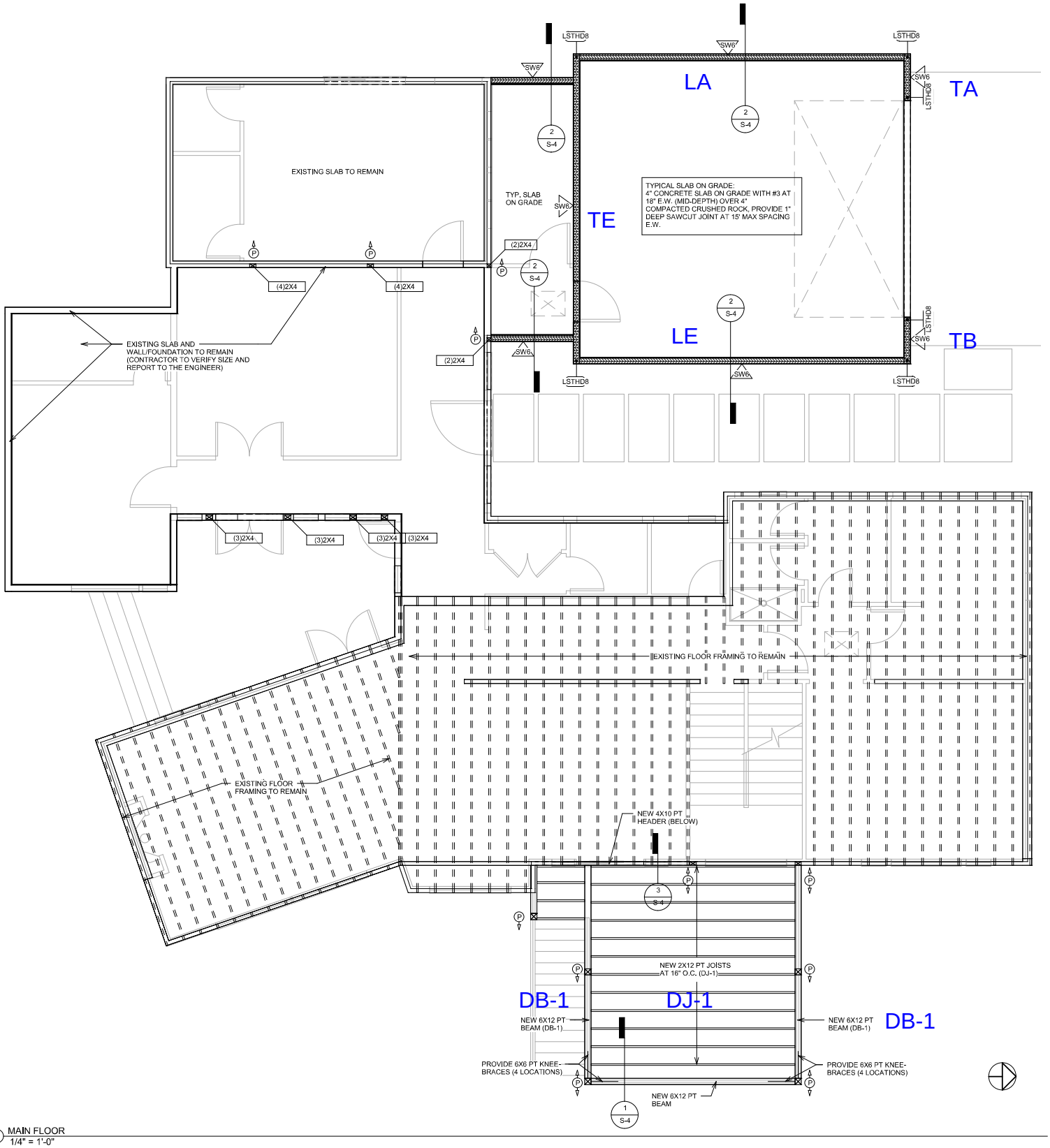
Ultimate Wind Speed, mph	110
Building Classifications	II
Wind Exposure Category	B
Topographic Effect, Kzt	1.6

74TH AVE SE-REMODEL
STRUCTURAL CALC



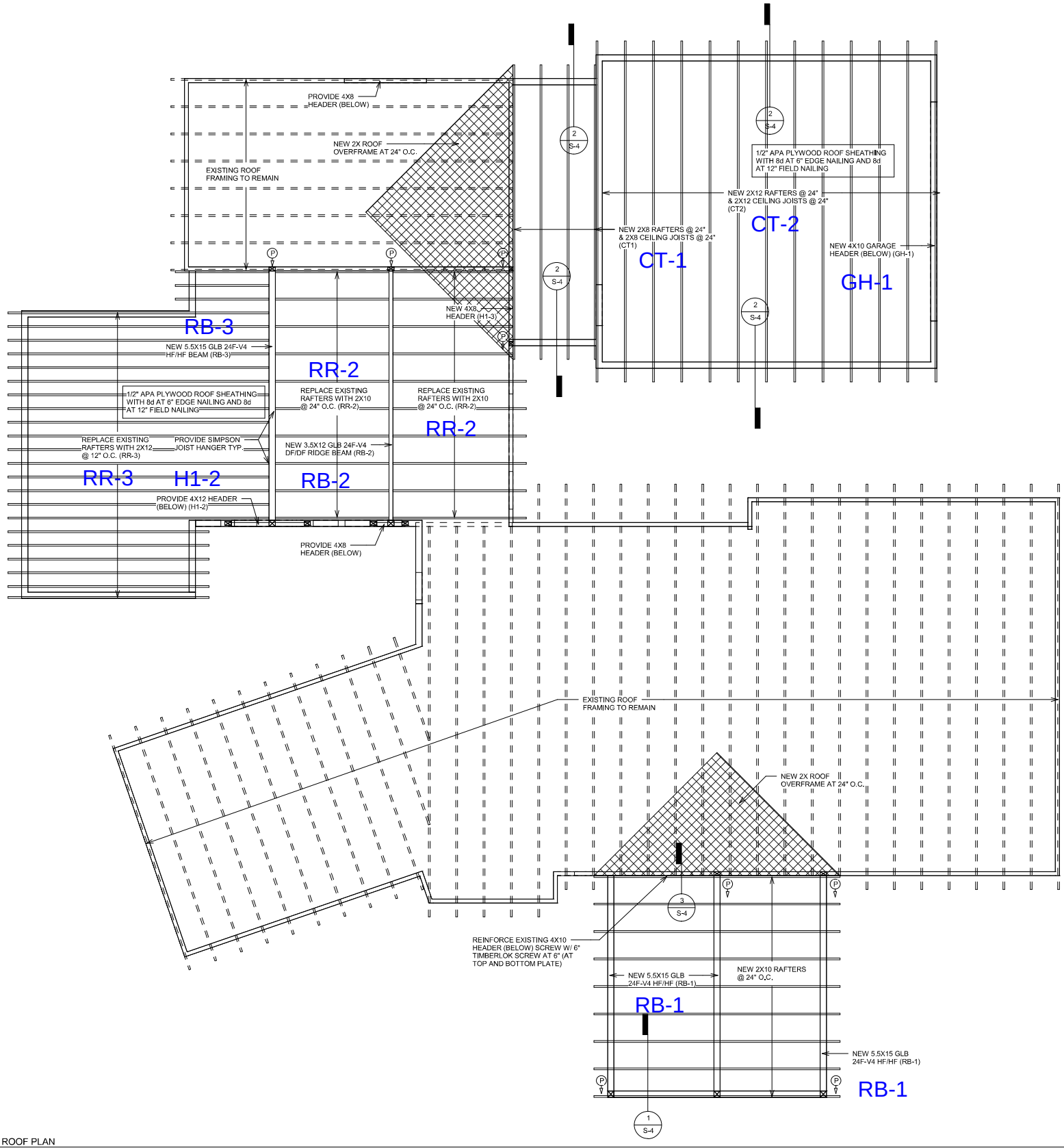
CHECK FOOTING DF-2 SUPPORTING ROOF POST= 4600 LBS
(SOIL BEARING CAPACITY OF 1500 PSF)
CONTINOUS FOOTING SIZE = 12" X 10 INCH DEEP
EFFECTIVE LENGTH = 4X10" = 40" = 3.3'
FOOTING CAPACITY = 1500 PSF X 3.3' = 5000 LBS > 4600 LBS

1 BASEMENT/FOUNDATION PLAN
1/4" = 1'-0"



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

LA, TA DENOTES SHEARWALL CALLOUT PER CALCULATIONS
DJ-1, DB-1 DENOTES DECK JOIST AND BEAM PER CALCULATIONS
RB-1 DENOTES ROOF BEAM CALLOUT PER CALCULATIONS



1 ROOF PLAN
1/4" = 1'-0"

Project: Mercer Island Home

Location: CJ-1
Floor Joist
[2015 International Building Code(2012 NDS)]
1.5 IN x 7.25 IN x 14.0 FT @ 24 O.C.
#2 - Hem-Fir - Dry Use
Section Adequate By: 0.3%
Controlling Factor: Deflection

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:57 AM

DEFLECTIONS Center

Live Load	0.42	IN L/401
Dead Load	0.28	in
Total Load	0.70	IN L/241

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

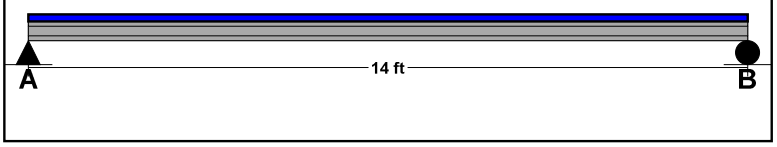
REACTIONS

	A	B
Live Load	210 lb	210 lb
Dead Load	140 lb	140 lb
Total Load	350 lb	350 lb
Bearing Length	0.58 in	0.58 in

SUPPORT LOADS

	A	B
Live Load	105 plf	105 plf
Dead Load	70 plf	70 plf
Total Load	175 plf	175 plf

LOADING DIAGRAM



MATERIAL PROPERTIES
#2 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi	Fb' = 1173 psi
	Cd=1.00 CF=1.20 Cr=1.15	
Shear Stress:	Fv = 150 psi	Fv' = 150 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1300 ksi	E' = 1300 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

JOIST DATA Center

Span Length	14 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Floor Duration Factor 1.00

JOIST LOADING
Uniform Floor Loading Center

Live Load	LL =	15 psf
Dead Load	DL =	10 psf
Total Load	TL =	25 psf
TL Adj. For Joist Spacing	wT =	50 plf

Controlling Moment: 1225 ft-lb
7.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -350 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	12.53 in3	13.14 in3
Area (Shear):	3.5 in2	10.88 in2
Moment of Inertia (deflection):	47.48 in4	47.63 in4
Moment:	1225 ft-lb	1284 ft-lb
Shear:	-350 lb	1088 lb

NOTES

Project: Mercer Island Home

Location: CT1
Collar Tie
[2015 International Building Code(2012 NDS)]
1.5 IN x 7.25 IN x 11.5 FT (9.5 + 2) @ 24 O.C.
#2 - Hem-Fir - Dry Use
1.5 x 7.25 Solid Sawn Lumber with minimum Ft = 575
Section Adequate By: 16.7%
Controlling Factor: Moment

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:57 AM

DEFLECTIONS

	Center		Right	
Live Load	0.15	IN L/820	-0.09	IN 2L/584
Dead Load	0.06	in	-0.04	in
Total Load	0.21	IN L/577	-0.12	IN 2L/412

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/240

RAFTER REACTIONS

	LOADS	REACTIONS
Lower Live Load @ B	288 plf	575 lb
Lower Dead Load @ B	121 plf	242 lb
Lower Total Load @ B	409 plf	817 lb
Collar Tie Tension		904 lb

RAFTER SUPPORT DATA

	B
Bearing Length	1.35 in

RAFTER DATA

	Interior	Eave
Span Length	9.5 ft	2 ft
Unbraced Length-Bottom	0 ft	0 ft
Rafter Pitch	4 :12	
Collar Tie Location	3.5 ft	
Roof Duration Factor	1.15	
Peak Notch Depth	0.00	
Base Notch Depth	0.00	

RAFTER LOADING

Uniform Floor Loading

Roof Live Load:	LL =	25 psf
Roof Dead Load:	DL =	10 psf

Slope Adjusted Spans And Loads

Interior Span:	L-adj =	10.01 ft
Eave Span:	L-Eave-adj =	2.11 ft
Rafter Live Load:	wL-adj =	45 plf
Eave Live Load:	wL-Eave-adj =	45 plf
Rafter Dead Load:	wD-adj =	19 plf
Rafter Total Load:	wT-adj =	64 plf
Eave Total Load:	wT-Eave-adj =	64 plf

MATERIAL PROPERTIES

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi	Fb' = 681 psi
	Cd=1.15 Cl=0.51 CF=1.20 Cr=1.15	
Shear Stress:	Fv = 150 psi	Fv' = 173 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1300 ksi	E' = 1300 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

Controlling Moment: -639 ft-lb
4.279 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -364 lb
9.487 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

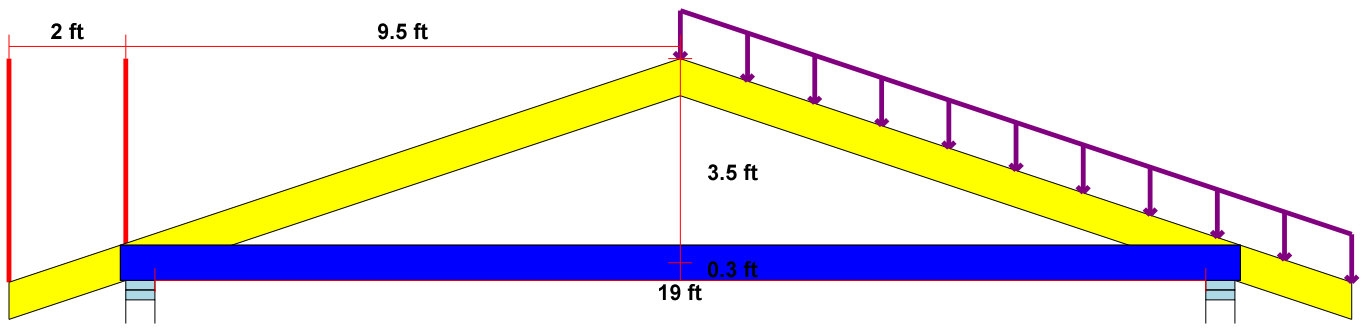
Comparisons with required sections:	Req'd	Provided
Section Modulus:	11.26 in3	13.14 in3
Area (Shear):	3.16 in2	10.88 in2
Moment of Inertia (deflection):	27.81 in4	47.63 in4
Moment:	-639 ft-lb	746 ft-lb
Shear:	-364 lb	1251 lb

COLLAR TIE DESIGN

1.5 x 7.25 Solid Sawn Lumber with minimum Ft = 575

	Base Values	Adjusted
Tension Parallel to Grain	Ft = 575 psi	Ft' = 992 psi
	Cd=1.15 Cf=0.00	
Collar Tie Location	3.5 ft	
Collar Tie Tension	904 lb	
Collar Tie Capacity	10787 lb	
Nailing Required @ Both Ends		
16d Common	6 Nails	
16d Sinker	7 Nails	
16d Box	8 Nails	

LOADING DIAGRAM



NOTES

Project: Mercer Island Home

Location: DB-1
Multi-Span Floor Beam
[2015 International Building Code(2012 NDS)]
5.5 IN x 11.5 IN x 17.4 FT (8.7 + 8.7)
#2 - Hem-Fir - Wet Use
Section Adequate By: 46.9%
Controlling Factor: Moment

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:58 AM

DEFLECTIONS	Center		Right	
Live Load	0.05	IN L/2105	0.05	IN L/2105
Dead Load	0.00	in	0.00	in
Total Load	0.05	IN L/1924	0.05	IN L/1924

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS	A	B	C
Live Load	1599 lb	4568 lb	1599 lb
Dead Load	221 lb	737 lb	221 lb
Total Load	1820 lb	5305 lb	1820 lb
Uplift (1.5 F.S)	**-81 lb**	**0 lb**	**-81 lb**
Bearing Length	1.22 in	3.55 in	1.22 in

BEAM DATA	Center	Right
Span Length	8.7 ft	8.7 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	8.7 ft	8.7 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

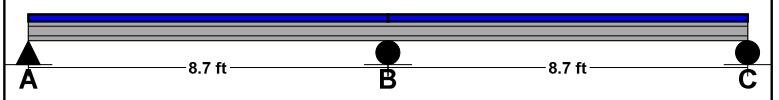
#2 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 675 psi	Fb' = 671 psi
	Cd=1.00 Cl=0.99 CF=1.00	
Shear Stress:	Fv = 140 psi	Fv' = 140 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1100 ksi	E' = 1100 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 271 psi
	Cm=0.67	

Controlling Moment: -4615 ft-lb
8.7 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3
Controlling Shear: -2652 lb
9.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	82.55 in3	121.23 in3
Area (Shear):	28.42 in2	63.25 in2
Moment of Inertia (deflection):	158.97 in4	697.07 in4
Moment:	-4615 ft-lb	6778 ft-lb
Shear:	-2652 lb	5903 lb

LOADING DIAGRAM



FLOOR LOADING		Center	Right
Floor Live Load	FLL =	60 psf	60 psf
Floor Dead Load	FDL =	8 psf	8 psf
Floor Tributary Width Side One	TW1 =	7 ft	7 ft
Floor Tributary Width Side Two	TW2 =	0 ft	0 ft
Wall Load	WALL =	0 plf	0 plf

BEAM LOADING	Center	Right
Reduced Floor Live Load	60 psf	60 psf
Total Live Load	420 plf	420 plf
Total Dead Load	56 plf	56 plf
Beam Self Weight	12 plf	12 plf
Total Load	488 plf	488 plf

NOTES

Project: Mercer Island Home

Location: DF-1
Footing
[2015 International Building Code(2012 NDS)]
Footing Size: 2.5 FT Round Diameter X 18.00 IN Deep
Reinforcement: #4 Bars @ 5.02 IN. O.C. E/W / (5) min.
Section Footing Design Adequate

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:58 AM

FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Diameter:	Dia. =	2.5	ft
Effective Depth to Top Layer of Steel:	d =	14.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	6	in
Column Depth:	n =	6	in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1081	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1275	psf
Required Footing Area:	Areq =	4.16	sf
Area Provided:	A =	4.91	sf

Baseplate Bearing:

Bearing Required:	Bear =	8193	lb
Allowable Bearing:	Bear-A =	99450	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	0	lb
Allowable Beam Shear:	Vc1 =	28415	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	81	in
Punching Shear:	Vu2 =	3440	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	259706	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	391163	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	173138	lb
Controlling Allowable Punching Shear:	vc2 =	173138	lb

Bending Calculations:

Factored Moment:	Mu =	27229	in-lb
Nominal Moment Strength:	Mn =	491111	in-lb

Reinforcement Calculations:

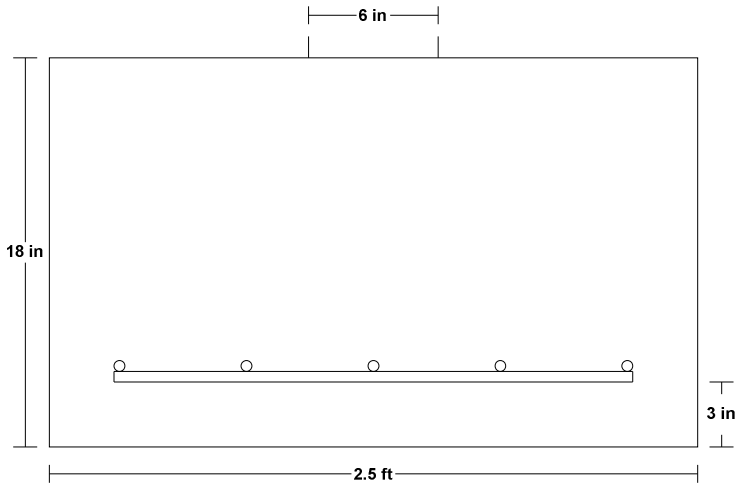
Concrete Compressive Block Depth:	a =	0.69	in
Steel Required Based on Moment:	As(1) =	0.05	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.96	in2
Controlling Reinforcing Steel:	As-reqd =	0.96	in2
Selected Reinforcement:	#4's @ 5.0 in. o.c. e/w (5) Min.		
Reinforcement Area Provided:	As =	0.98	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	10.29	in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load:	PL =	4568	lb
Dead Load:	PD =	737	lb
Total Load:	PT =	5305	lb
Ultimate Factored Load:	Pu =	8193	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	712	lb

NOTES

Project: Mercer Island Home

Location: DP-1
Column
[2015 International Building Code(2012 NDS)]
5.5 IN x 5.5 IN x 8.0 FT
#2 - Hem-Fir - Wet Use
Section Adequate By: 61.2%

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page
of

StruCalc Version 9.0.2.5 1/29/2021 10:46:58 AM

VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	4568	lb
Dead Load:	Vert-DL-Rxn =	782	lb
Total Load:	Vert-TL-Rxn =	5350	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Hem-Fir

	Base Values		Adjusted	
Compressive Stress:	Fc = 575	psi	Fc' = 456	psi
	Cm=0.91 Cp=0.87			
Bending Stress (X-X Axis):	Fbx = 575	psi	Fbx' = 575	psi
	Cd=1.00 CF=1.00			
Bending Stress (Y-Y Axis):	Fby = 575	psi	Fby' = 575	psi
	Cd=1.00 CF=1.00			
Modulus of Elasticity:	E = 1100	ksi	E' = 1100	ksi

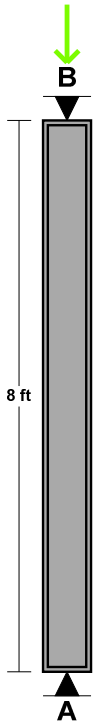
Column Section (X-X Axis):	dx =	5.5	in
Column Section (Y-Y Axis):	dy =	5.5	in
Area:	A =	30.25	in2
Section Modulus (X-X Axis):	Sx =	27.73	in3
Section Modulus (Y-Y Axis):	Sy =	27.73	in3
Slenderness Ratio:	Lex/dx =	17.45	
	Ley/dy =	17.45	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	177	psi
Allowable Compressive Stress:	Fc' =	456	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	575	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	575	psi
Combined Stress Factor:	**CSF =**	**0.39**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	4568	lb
Dead Load:	PD =	737	lb
Column Self Weight:	CSW =	45	lb
Total Load:	PT =	5350	lb

NOTES

Project: Mercer Island Home

Location: RB-1
Roof Beam
[2015 International Building Code(2012 NDS)]
5.5 IN x 15.0 IN x 17.4 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 309.6%
Controlling Factor: Deflection

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:58 AM

DEFLECTIONS Center

Live Load	0.13	IN L/1611
Dead Load	0.08	in
Total Load	0.21	IN L/983

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1523	lb	1523	lb
Dead Load	973	lb	973	lb
Total Load	2496	lb	2496	lb
Bearing Length	0.70	in	0.70	in

BEAM DATA

Span Length	17.4	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Roof Pitch	6	:12
Roof Duration Factor	1.15	

MATERIAL PROPERTIES

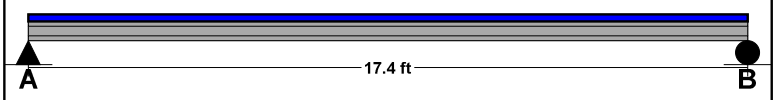
24F-V4 - Visually Graded Western Species

		Base Values		Adjusted	
Bending Stress:	Fb =	2400	psi	*Controlled by:*	
	Fb_cmpr =	1850	psi	Fb' =	2731 psi
	Cd=1.15 Cv=0.99				
Shear Stress:	Fv =	265	psi	Fv' =	305 psi
	Cd=1.15				
Modulus of Elasticity:	E =	1800	ksi	E' =	1800 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650 psi

Controlling Moment: 10854 ft-lb
8.7 ft from left support
Created by combining all dead and live loads.
Controlling Shear: -2495 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	47.69 in3	206.25 in3
Area (Shear):	12.28 in2	82.5 in2
Moment of Inertia (deflection):	377.66 in4	1546.88 in4
Moment:	10854 ft-lb	46939 ft-lb
Shear:	-2495 lb	16761 lb

LOADING DIAGRAM



ROOF LOADING

Side One:			
Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	12	psf
Tributary Width:	TW =	7	ft
Side Two:			
Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	15	psf
Tributary Width:	TW =	0	ft
Wall Load:	WALL =	0	plf

SLOPE/PITCH ADJUSTED LENGTHS AND LOADS

Adjusted Beam Length:	Ladj =	17.4	ft
Beam Self Weight:	BSW =	18	plf
Beam Uniform Live Load:	wL =	175	plf
Beam Uniform Dead Load:	wD_adj =	112	plf
Total Uniform Load:	wT =	287	plf

NOTES

Project: Mercer Island Home

Location: H1-1
Multi-Span Floor Beam
[2015 International Building Code(2012 NDS)]
3.5 IN x 13.75 IN x 12.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 0.9%
Controlling Factor: Moment

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:59 AM

DEFLECTIONS	Center	
Live Load	0.14	IN L/1031
Dead Load	0.05	in
Total Load	0.19	IN L/765

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	1997	lb	1833	lb
Dead Load	701	lb	649	lb
Total Load	2698	lb	2482	lb
Bearing Length	1.23	in	1.13	in

BEAM DATA	Center	
Span Length	12	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	12	ft
Floor Duration Factor	1.15	
Notch Depth	0.00	

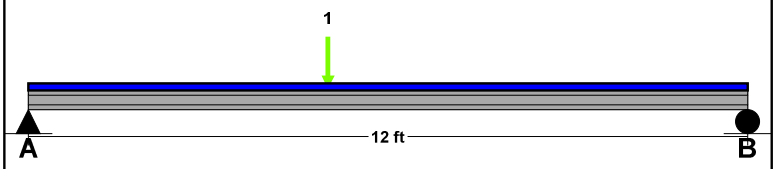
MATERIAL PROPERTIES
#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb = 900	psi	Fb' = 1035	psi
	Cd=1.15 CF=1.00			
Shear Stress:	Fv = 180	psi	Fv' = 207	psi
	Cd=1.15			
Modulus of Elasticity:	E = 1600	ksi	E' = 1600	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625	psi	Fc - ⊥' = 625	psi

Controlling Moment: 9431 ft-lb
5.04 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 2698 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	109.35 in3	110.29 in3
Area (Shear):	19.55 in2	48.13 in2
Moment of Inertia (deflection):	264.71 in4	758.22 in4
Moment:	9431 ft-lb	9512 ft-lb
Shear:	2698 lb	6641 lb

LOADING DIAGRAM



FLOOR LOADING		Center	
Floor Live Load	FLL =	25	psf
Floor Dead Load	FDL =	8	psf
Floor Tributary Width Side One	TW1 =	9.5	ft
Floor Tributary Width Side Two	TW2 =	0	ft
Wall Load	WALL =	0	plf

POINT LOADS - CENTER SPAN	
Load Number	One
Live Load	980 lb
Dead Load	313 lb
Location	5 ft

BEAM LOADING	Center	
Reduced Floor Live Load	25	psf
Total Live Load	238	plf
Total Dead Load	76	plf
Beam Self Weight	10	plf
Total Load	324	plf

NOTES

Project: Mercer Island Home

Location: CT2
Collar Tie
[2015 International Building Code(2012 NDS)]
1.5 IN x 11.25 IN x 12.25 FT (11.2 + 1) @ 24 O.C.
#2 - Hem-Fir - Dry Use
1.5 x 7.25 Solid Sawn Lumber with minimum Ft = 575
Section Adequate By: 10.3%
Controlling Factor: Moment

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:59 AM

DEFLECTIONS

	Center		Right
Live Load	0.07 IN	L/2233	-0.01 IN 2L/2600
Dead Load	0.03 in		0.00 in
Total Load	0.09 IN	L/1558	-0.01 IN 2L/1814

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/240

RAFTER REACTIONS

	LOADS	REACTIONS
Lower Live Load @ B	306 plf	612 lb
Lower Dead Load @ B	133 plf	265 lb
Lower Total Load @ B	439 plf	877 lb
Collar Tie Tension		838 lb

RAFTER SUPPORT DATA

	B
Bearing Length	1.45 in

RAFTER DATA

		Interior	Eave
Span Length		11.25 ft	1 ft
Unbraced Length-Bottom		0 ft	0 ft
Rafter Pitch	5 :12		
Collar Tie Location	5.4 ft		
Roof Duration Factor	1.15		
Peak Notch Depth	0.00		
Base Notch Depth	0.00		

RAFTER LOADING

Uniform Floor Loading

Roof Live Load:	LL =	25 psf
Roof Dead Load:	DL =	10 psf

Slope Adjusted Spans And Loads

Interior Span:	L-adj =	12.19 ft
Eave Span:	L-Eave-adj =	1.08 ft
Rafter Live Load:	wL-adj =	43 plf
Eave Live Load:	wL-Eave-adj =	43 plf
Rafter Dead Load:	wD-adj =	18 plf
Rafter Total Load:	wT-adj =	61 plf
Eave Total Load:	wT-Eave-adj =	61 plf

MATERIAL PROPERTIES

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi	Fb' = 356 psi
	Cd=1.15 Cl=0.32 CF=1.00 Cr=1.15	
Shear Stress:	Fv = 150 psi	Fv' = 173 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1300 ksi	E' = 1300 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

Controlling Moment: -850 ft-lb
4.837 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -424 lb
11.077 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

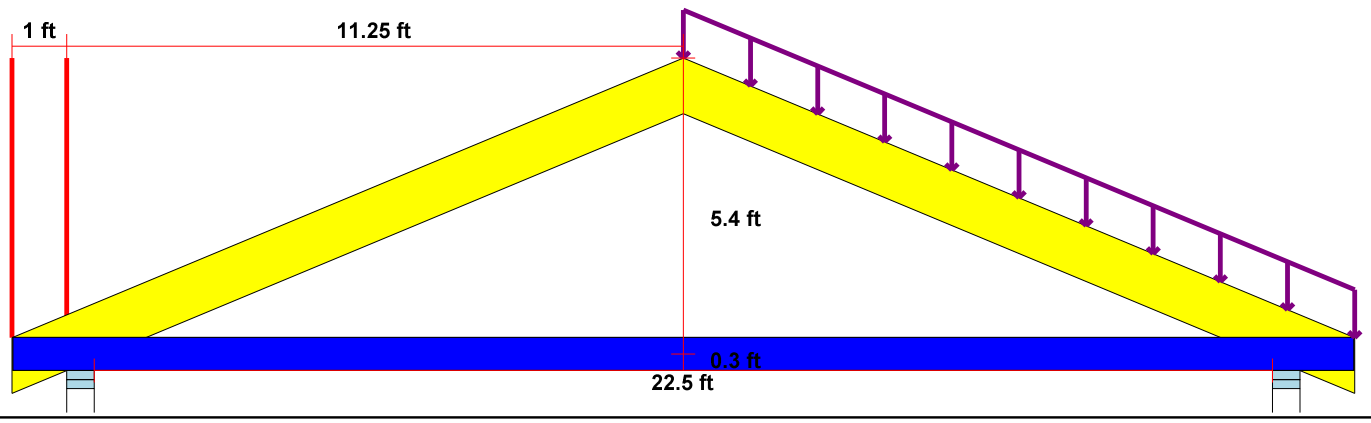
Comparisons with required sections:	Req'd	Provided
Section Modulus:	28.69 in3	31.64 in3
Area (Shear):	3.68 in2	16.88 in2
Moment of Inertia (deflection):	27.42 in4	177.98 in4
Moment:	-850 ft-lb	938 ft-lb
Shear:	-424 lb	1941 lb

COLLAR TIE DESIGN

1.5 x 7.25 Solid Sawn Lumber with minimum Ft = 575

	Base Values	Adjusted
Tension Parallel to Grain	Ft = 575 psi	Ft' = 992 psi
	Cd=1.15 Cf=0.00	
Collar Tie Location	5.4 ft	
Collar Tie Tension	838 lb	
Collar Tie Capacity	10787 lb	
Nailing Required @ Both Ends		
16d Common	6 Nails	
16d Sinker	7 Nails	
16d Box	8 Nails	

LOADING DIAGRAM



NOTES

Project: Mercer Island Home

Location: CJ-2
Floor Joist
[2015 International Building Code(2012 NDS)]
1.5 IN x 11.25 IN x 22.5 FT @ 24 O.C.
#2 - Hem-Fir - Dry Use
Section Adequate By: 1.8%
Controlling Factor: Moment

basri
b2 Engineers
15306 61st Place NE
Kenmore, WA 98028

page of

StruCalc Version 9.0.2.5 1/29/2021 10:46:59 AM

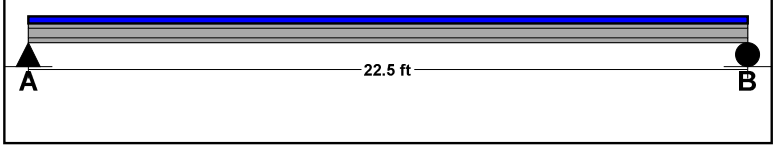
DEFLECTIONS	Center	
Live Load	0.50	IN L/542
Dead Load	0.50	in
Total Load	1.00	IN L/271

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS	A		B	
Live Load	225	lb	225	lb
Dead Load	225	lb	225	lb
Total Load	450	lb	450	lb
Bearing Length	0.74	in	0.74	in

SUPPORT LOADS	A		B	
Live Load	113	plf	113	plf
Dead Load	113	plf	113	plf
Total Load	225	plf	225	plf

LOADING DIAGRAM



MATERIAL PROPERTIES
#2 - Hem-Fir

	Base Values		Adjusted	
Bending Stress:	Fb = 850	psi	Fb' = 978	psi
	Cd=1.00 CF=1.00 Cr=1.15			
Shear Stress:	Fv = 150	psi	Fv' = 150	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1300	ksi	E' = 1300	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 405	psi	Fc - ⊥' = 405	psi

JOIST DATA	Center	
Span Length	22.5	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft

Floor sheathing applied to top of joists-top of joists fully braced.
Floor Duration Factor 1.00

JOIST LOADING

Uniform Floor Loading	Center	
Live Load	LL = 10	psf
Dead Load	DL = 10	psf
Total Load	TL = 20	psf
TL Adj. For Joist Spacing	wT = 40	plf

Controlling Moment: 2531 ft-lb
11.25 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 450 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	31.07 in3	31.64 in3
Area (Shear):	4.5 in2	16.88 in2
Moment of Inertia (deflection):	118.27 in4	177.98 in4
Moment:	2531 ft-lb	2577 ft-lb
Shear:	450 lb	1688 lb

NOTES

SEISMIC BASE SHEAR CALCULATIONS PER IBC 2018 (ASCE 7-16)

Response Spectral Acc. (0.2 sec) Ss =	130.00%g	= 1.300g	Figure 22-1 through 22-14
Response Spectral Acc.(1.0 sec) S_1 =	51.00%g	= 0.510g	Figure 22-1 through 22-14
Soil Site Class	D	Table 20-3-1, Default = D	
Site Coefficient F_a =	1.000		Table 11.4-1
Site Coefficient F_v =	1.500		Table 11.4-2
Max Considered Earthquake Acc. $S_{MS} = F_a.S_s$		= 1.300	(11.4-1)
Max Considered Earthquake Acc. $S_{M1} = F_v.S_1$		= 0.765	(11.4-2)
@ 5% Damped Design $S_{DS} = 2/3(S_{MS})$		= 0.867	(11.4-3)
$S_{D1} = 2/3(S_{M1})$		= 0.510	(11.4-4)
Building Occupancy Categories	II, Standard		Table 1-1
Design Category Consideration:	Flexible Diaphragm		with dist. between seismic resisting system >40ft
Seismic Design Category for 0.1sec	D		Table 11.6-1
Seismic Design Category for 1.0sec	D		Table 11.6-2
S1 < .75g	NA		Section 11.6
Since Ta < .8Ts (see below), SDC =	D	Control (exception of Section 11.6 does not apply)	
Comply with Seismic Design Category D		IRC, Seismic Design Category = D2	T-R301.2.2.1.1

12.8 Equivalent lateral force procedure

A. BEARING WALL SYSTEMS — T-12.2-

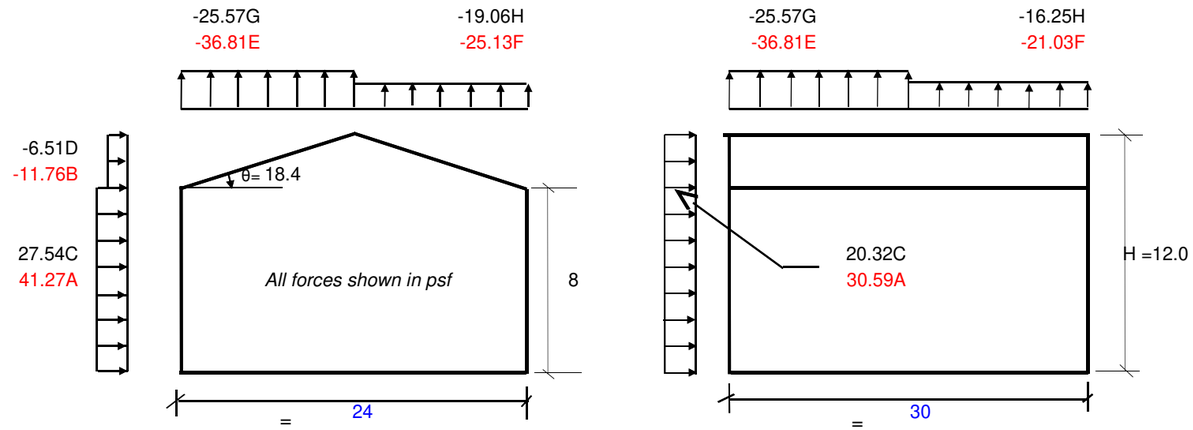
Seismic Force Resisting Systems: 13. Light-framed walls sheathed with wood structural panels rated for shear resistance or steel shee

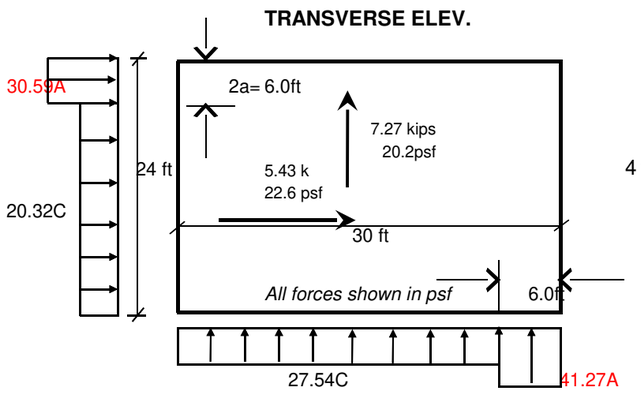
C_t =	0.02	x = 0.75		T-12.8-2
Building ht. H_n =	10 ft	Limited Building Height (ft) =	65	
C_u =	1.400	for S_{D1} of 0.510g	Table 12.8-1	
Approx Fundamental period, $T_a = C_t(h_n)^x$	= 0.112	12.8-7	T_L =	2.000 Sec
Calculated T shall not exceed ≤ Cu.Ta			Use T =	0.112 sec.
0.8Ts =	$0.8(S_{D1}/S_{DS})$ = 0.471	Control (exception of Section 11.6 does not apply)		
Is structure Regular & ≤ 5 stories ?	Yes			12.8.1.3
Response Spectral Acc.(0.2 sec) S_s =	1.300g			*Max Ss ≤ 1.5g*
F_a =	1.00			
@ 5% Damped Design $S_{DS} = ⅔(F_a.S_s)$	= 0.867g			(11.4-3)
Response Modification Coef. R =	6.5			Table-12.2-1
Over Strength Factor Ω_o =	2.5			foot note g
Importance factor I =	1			Table 11.5-1
Seismic Base Shear V =	C_sW			
$C_s = \frac{S_{DS}}{R/I}$	=0.133			(12.8-2)
or need not to exceed, $C_s = \frac{S_{D1}}{(R/I).T}$	= 0.698	For T≤ T_L		(12.8-3)
or $C_s = \frac{S_{D1}T_L}{T^2(R/I)}$	N/A	For T > T_L		(12.8-4)
C_s shall not be less than =	0.01			(12.8-5)
Min C_s =	$0.5S_1I/R$	N/A	For S_1 ≥ 0.6g	(12.8-6)
Use C_s =	0.133			
Design base shear V =	0.133 W	**Control**		

WIND FORCES CALCULATIONS PER IBC 2015 (ASCE 7-10)

Ultimate wind speed = 110 MPH
Bldg. Classification = II
Exposure B
K_{zt} = 1.60
Roof Pitch = 4.00 :12
Mean Roof Height h = 10 ft

CHAPTER 28-MWFRS (ENVELOPE PROCEDURE)





10 % of least dimension= 2.4 ft
40 % of the eave height = 3.2 ft
4 % of least dimension or 3 ft= 3.0 ft
therefore a = 3.0 ft

Example: $p_s = \lambda K_{zt} I p_{s30}$

FIGURE 28.4-1, Main Wind Force System

MWFRS

Load Direction	Roof Angle	Horizontal Loads				Vertical Loads					
		End Zone		Interior zone		End Zone		Interior zone		Overhang	
		Wall (A)	Roof (B)	Wall (C)	Roof (D)	WW (E)	LW (F)	WW (G)	LW (H)	E_{OH}	G_{OH}
Transverse	18.4	41.27	-11.76	27.54	-6.51	-36.81	-25.13	-25.57	-19.06	-51.63	-40.39
Longitudinal	All	30.59	-16.01	20.32	-9.56	-36.81	-21.03	-25.57	-16.25	-51.63	-40.39

* If roof pressure under horizontal loads is less than zero, use zero
Plus and minus signs signify pressures acting toward and away from projected surfaces, respectively.
For the design of the longitudinal MWFRS use Θ = 0°, and locate the zone E/F, G/H boundary at the mid-length of the building

b2 structural engineers
www.b2engineers.com
7516 NE 153rd Place NE
Kenmore, WA 98028
(425) 296-2993

	Job No.	Sheet No.
	Project No.	Sheet Title
	Checked By	Made By
	Date	Date

WIND FORCES:

LOCATION	WIDTH	HEIGHT	INTERIOR PRESSURE	END ZONE PRESSURE		FORCE	SUBTOT
Transverse Direction							
END ZONE WIDTH	6	FT					
ROOF							
T.O.Roof to Parapet	30	0.0	-6.51	-11.76	=	0	
T.O. Roof TO MID	30	5.0	27.54	41.27	=	4955	
4th FLOOR							4955
MID TO FLOOR	30		27.54	41.27	=	0	
FLOOR TO MID	30		27.54	41.27	=	0	
3rd FLOOR							0
MID TO FLOOR	30		27.54	41.27	=	0	
FLOOR TO MID	30		27.54	41.27	=	0	
2nd FLOOR							0
MID TO FLOOR	30		27.54	41.27	=	0	
FLOOR TO MID	30		27.54	41.27	=	0	
							0
TOTAL FOR WALL SHEAR:							**4.96** **Kips**

Longitudinal Direction

ROOF							
T.O.Roof to Parapet	24	0.0	20.32	30.59	=	0	
T.O. Roof TO MID	24	5.0	20.32	30.59	=	3055	
4th FLOOR							3055
MID TO FLOOR	24	0.0	20.32	30.59	=	0	
FLOOR TO MID	24	0.0	20.32	30.59	=	0	
3rd FLOOR							0
MID TO FLOOR	24	0.0	20.32	30.59	=	0	
FLOOR TO MID	24	0.0	20.32	30.59	=	0	
2nd FLOOR							0
MID TO FLOOR	24	0.0	20.32	30.59	=	0	
FLOOR TO MID	24	0.0	20.32	30.59	=	0	
							0
TOTAL FOR WALL SHEAR:							**3.06** **Kips**

b2 structural engineers
www.b2engineers.com
7516 NE 153rd Place NE
Kenmore, WA 98028
(425) 296-2993

	Job No.	Sheet No.
	Project No.	Sheet Title
	Checked By	Made By
	Date	Date

DEAD LOAD WEIGHTS FOR SEISMIC FORCE CALCULATIONS:

Unit Roof Weight:	12 psf
Unit Floor Weight:	12 psf
Unit Exterior Wall Weight :	11 psf
Unit Interior Corridor Wall Weight:	0 psf
Unit Interior Party Wall Weight:	0 psf
Unit Interior Partition Wall Weight:	7 psf

LOCATION	LENGTH	HEIGHT	UNIT WT.		TOTAL WEIGHT	SUB TOTAL	
ROOF LEVEL:							
Roof	580	1.00	12	=	6960		
Ext. Wall Below	96	5.0	11	=	5280		psf
Corridor Wall Below	0	5.0	0	=	0		21
Party Wall Below	0	5.0	0	=	0		
Partition Wall Below	0	5.0	7	=	0		
						12240	
FOURTH FLOOR LEVEL							
Floor	0	1	12	=	0		
Ext. Wall Above	0	0	11	=	0		
Corridor Wall Above	0	0	0	=	0		
Party Wall Above	0	0	0	=	0		
Partition Wall Above	0	0	7	=	0		
Ext. Wall Below	0	0	11	=	0		psf
Corridor Wall Below	0	0	0	=	0		#DIV/0!
Party Wall Below	0	0	0	=	0		
Partition Wall Below	0	0	7	=	0		
						0	
THIRD FLOOR LEVEL							
Floor	0	1	12	=	0		
Ext. Wall Above	0		11	=	0		
Corridor Wall Above	0		0	=	0		
Party Wall Above	0		0	=	0		
Partition Wall Above	0		7	=	0		
Ext. Wall Below	0		11	=	0		psf
Corridor Wall Below	0		0	=	0		#DIV/0!
Party Wall Below	0		0	=	0		
Partition Wall Below	0		7	=	0		
						0	
SECOND FLOOR LEVEL							
Floor	0	1	12	=	0		
Ext. Wall Above	0		11	=	0		
Corridor Wall Above	0		0	=	0		
Party Wall Above	0		0	=	0		
Partition Wall Above	0		7	=	0		
Ext. Wall Below	0		11	=	0		psf
Corridor Wall Below	0		0	=	0		#DIV/0!
Party Wall Below	0		0	=	0		
Partition Wall Below	0		7	=	0		
						0	
			STRUCTURE WEIGHT FOR SHEAR WALL TOTAL:			**12.2**	**Kips**
FOUNDATION LEVEL:							
Ext. Wall Above	0	0.0	11	=	0		
Corridor Wall Above	0	0.0	0	=	0		
Party Wall Above	0	0.0	0	=	0		
Partition Wall Above	0	0.0	7	=	0		
			STRUCTURE WEIGHT FOR BASE SHEAR TOTAL:			**12.2**	**Kips**

b2 structural engineers
www.b2engineers.com
7516 NE 153rd Place NE
Kenmore, WA 98028
(425) 296-2993

	Job No.	Sheet No.
	Project No.	Sheet Title
	Checked By	Made By
	Date	Date

Vertical Seismic Distribution

Cs =	0.13	W	
W =	12.2	kips	
V =	1.6	kips	Important: It is assumed that the R value is the same for both directions
Rho =	1		

					N/S Direction		E/W Direction		
Floor	Story Height Hi (ft)	Total Height Ht (ft)	Story Weight Wi (kips)	Wi*Ht (k-ft)	Story Force Fi (kips)	Story Shear E (kips)	Story Force Fi (kips)	Story Shear E (kips)	Mot E (kip-ft)
Roof	10.00	10.00	12.2	122	1.6	**1.6**	1.6	**1.6**	**16.32**
Fourth	0.00	0.00	0.0	0	0.0	**0.0**	0.0	**0.0**	**0**
Third	0.00	0.00	0.0	0	0.0	**0.0**	0.0	**0.0**	**0**
Second	0.00	0.00	0.0	0	0.0	**0.0**	0.0	**0.0**	**0**
Ground	0.00	0.00	0.0	0	0.0	**0.0**	0.0	**0.0**	**0**
			12.2	122	1.63	**1.63**		**1.63**	**16.32**

Diaphragm Seismic Distribution

Floor	Story Height Hi (ft)	Total Height Ht (ft)	Story Weight Wi (kips)	Force Distribution Fx (kips)	Calculated Fpx (kips)	Max Fpx (kips)	Min Fpx (kips)	Governing Fpx (kips)	Transverse Fpx (plf)	Longitudinal Fpx (plf)
Roof	10.00	10.00	12.2	1.6	1.6	4.2	2.1	**2.1**	**88**	**110**
Fourth	0.00	0.00	0.0	0.0	0.0	0.0	0.0	**0.0**	**#DIV/0!**	**#DIV/0!**
Third	0.00	0.00	0.0	0.0	0.0	0.0	0.0	**0.0**	**#DIV/0!**	**#DIV/0!**
Second	0.00	0.00	0.0	0.0	0.0	0.0	0.0	**0.0**	**#DIV/0!**	**#DIV/0!**
Ground	0.00	0.00	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**	**0.0**
			12.2	1.6						

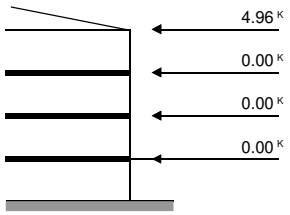
b2 structural engineers
www.b2engineers.com
7516 NE 153rd Place NE
Kenmore, WA 98028
(425) 296-2993

	Job No.	Sheet No.
	Project No.	Sheet Title
	Checked By	Made By
	Date	Date

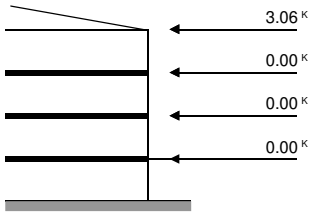
Lateral Forces Summary

Level	Wind (Trans.) (kips)	Wind (Long.) (kips)	Seismic (Trans.) (kips)	Seismic (Long.) (kips)
Roof	4.96	3.06	1.63	1.63
Fourth	0.00	0.00	0.00	0.00
Third	0.00	0.00	0.00	0.00
Second	0.00	0.00	0.00	0.00
Total	4.96	3.06	1.63	1.63

Controlling:
Transverse - Wind
Longitudinal - Wind



Transverse Direction



Longitudinal Direction

2nd story

Shearwall forces -Transverse Direction

Story shear(kips) = 0.00 Accumulated shear(kips)= 0.00

Story height (ft) = 9.00

Total Width(ft) = 1.00

Story	Wall	Wall D(ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Sheathing Ratio	Min Panel Width (ft)	Co	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Story DL(klf)	Sum DL(klf)	Panel Shear (plf)	Req. Panel Shear (plf)	Plate Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Force at Window (kips)
2	TA	0.0	0.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.08	0.08	**0**	**0**	**0**	0.00	0.00	**0.00**	**0.00**
2	TB	0.0	0.00	0.00	0.00	1.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00		0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**#DIV/0!**
2	TC	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TD	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TE	0.0	0.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.08	0.08	**0**	**0**	**0**	0.00	0.00	**0.00**	**0.00**
2	TF	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00		0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TG	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TH	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TI	0.0	0.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	0.25	0.00	0.00		0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**0.00**
2	TJ	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.25	0.00	0.00		0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**NA**
2	TK	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.25	0.00	0.00	0.00	0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**NA**
2	TL	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.25	0.00	0.00	0.00	0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**NA**
2	TM	0.0	0.00	0.00	0.00	1.00	1.00	0.01	1.00	0.00	1.00	0.00	0.00	0.00	0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**0.00**
2	TN	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TO	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
2	TP	0.0	0.00				#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
	Sum	0.0	0.00							0.00	4.00	0.00	0.00									

1st story

Shearwall forces -Transverse Direction

Story shear(kips) = 5.0 Accumulated shear(kips)= 4.96

Story height (ft) = 9.00

Total Width(Ft) = 30.00

Story	Wall	Wall D(ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Sheathing Ratio	Min Panel Width (ft)	Co	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Story DL(klf)	Sum DL(klf)	Panel Shear (plf)	Req. Panel Shear (plf)	Plate Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Force at Window (kips)
1	TA	3.5				1.00	1.00	3.50	1.00	12.00	0.50	0.99	0.99	0.08	0.16	**283**	**364**	**283**	8.93	0.99	**2.30**	**0.00**
1	TB	3.5	0.00	0.00	0.00	1.00	1.00	3.50	1.00	12.00	0.50	0.99	0.99	0.08	0.08	**283**	**364**	**283**	8.93	0.51	**2.42**	**0.00**
1	TC	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00		0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TD	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TE	22.0	3.00	0.00	0.00	1.00	0.86	0.00	0.90	18.00	1.00	2.98	2.98	0.08	0.16	**157**	**#DIV/0!**	**135**	26.78	38.96	**-0.48**	**0.00**
1	TF	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00		0.00	0.00	0.00		0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TG	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TH	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TI	0.0	0.00	0.00	0.00	1.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00		0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**#DIV/0!**
1	TJ	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00		0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**NA**
1	TK	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TL	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TM	0.0	0.00	0.00	0.00	0.00	1.00	0.01	1.00	0.00	1.00	0.00	0.00	0.00	0.00	**0**	**0**	**0**	0.00	0.00	**0.00**	**NA**
1	TN	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TO	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
1	TP	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	0.00	0.00	**#DIV/0!**	**NA**
	Sum	29.0	3.00							30.00	4.00	4.96	4.96									

SW6

LSTHD8

NO UPLIFT

2nd story

Shearwall Forces-Longitudinal Direction

Story shear(kips) = 0.0
Story height (ft) = 9.0
Total Width(ft) = 1.0

Accumulated shear(kips)= 0.00

Story	Wall	Wall D(ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Sheathing Ratio	Min Panel Width (ft)	Co	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Story DL(klf)	Sum DL(klf)	Panel Shear (plf)	Req. Panel Shear (plf)	Plate Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Force at Window (kips)
2	LA	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.08	0.08	0	0	0	0.00	0.00	0.00	NA
2	LB	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LC	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LD	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LE	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.08	0.08	0	0	0	0.00	0.00	0.00	NA
2	LF	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LG	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LH	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LI	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00	NA
2	LJ	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LK	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LL	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LM	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00	NA
2	LN	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LO	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
2	LP	0.0	0.00				#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
	Sum	0.0	0.00							0.00	4.00	0.00	0.00									

1st story

Shearwall Forces-Longitudinal Direction

Story shear(kips) = 3.1
Story height (ft) = 9.0
Total Width(Ft) = 24.0

Accumulated shear(kips)= 3.10

SW6

NO UPLIFT

Story	Wall	Wall D(ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Sheathing Ratio	Min Panel Width (ft)	Co	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Story DL(klf)	Sum DL(klf)	Panel Shear (plf)	Req. Panel Shear (plf)	Plate Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Force at Window (kips)
1	LA	22.0	0.00	0.00	0.00	0.00	1.00	22.00	1.00	12.00	1.00	1.55	1.55	0.21	0.29	70	70	70	13.95	68.97	-2.19	NA
1	LB	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LC	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LD	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LE	22.0	0.00	0.00	0.00	0.00	1.00	22.00	1.00	12.00	1.00	1.55	1.55	0.21	0.29	70	70	70	13.95	68.97	-2.19	NA
1	LF	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LG	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LH	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LI	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00	NA
1	LJ	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LK	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LL	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LM	0.0	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00	NA
1	LN	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LO	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
1	LP	0.0	0.00	0.00	0.00	0.00	#DIV/0!	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	NA
	Sum	44.0	0.00							24.00	4.00	3.10	3.10									

SHEARWALL, DIAPHRAGM, STRAP AND HOLDOWN CAPACITY TABLE PER IBC 2012

PLYWOOD SHEATHED SHEARWALL	LRFD CAPACITY (SEISMIC/WIND)	COMMENT
SW6 (15/32" PLYWOOD WITH 10d AT 6" AT EDGE, 10d AT 12" FIELD NAILING)	496 PLF/ 696 PLF	SDPWS TABLE 4.3A
SW4 (15/32" PLYWOOD WITH 10d AT 4" AT EDGE, 10d AT 12" FIELD NAILING)	736 PLF/ 1032 PLF	MULTIPLY VALUES BY TWO IF SHEATHING
SW3 (15/32" PLYWOOD WITH 10d AT 3" AT EDGE, 10d AT 12" FIELD NAILING)	960 PLF/ 1344PLF	APPLIED ON BOTH SIDES
SW2 (15/32" PLYWOOD WITH 10d AT 2" AT EDGE, 10d AT 12" FIELD NAILING)	1232 PLF/ 1724 PLF	

UNBLOCKED FLOOR DIAPHRAGM	LRFD CAPACITY (SEISMIC/WIND)	COMMENT
15/32" PLYWOOD WITH 8d AT 6" AT EDGE, 8d AT 12" FIELD NAILING	368 PLF/ 516 PLF	SPDWS TABLE 4.2B
15/32" PLYWOOD WITH 10d AT 6" AT EDGE, 10d AT 12" FIELD NAILING	408 PLF/ 572 PLF	
19/32" PLYWOOD WITH 10d AT 6" AT EDGE, 10d AT 12" FIELD NAILING	456 PLF/ 640 PLF	

SIMPSON'S FLOOR STRAP	LRFD CAPACITY (SEISMIC/WIND)	COMMENT
CS18	1916 LBS/ 2190 LBS	12" END LENGTH
CS16	2363 LBS/ 2700 LBS	14" END LENGTH
CS14	3487 LBS/ 3985 LBS	20" END LENGTH
CMSTC16	6236 LBS/ 7336 LBS	26" END LENGTH
CMSTC14	9086 LBS/ 10384 LBS	36" END LENGTH

SIMPSON'S HOLDOWN	LRFD CAPACITY (SEISMIC/WIND)	COMMENT
HDU2	4305 LBS/ 4920 LBS	
HDU4	6391 LBS/ 7304 LBS	
HDU5	7905 LBS/ 9032 LBS	
HDU8	8372 LBS/ 9568 LBS	
LSTHD8/ LSTHD8RJ AT 6" STEMWALL	2730 LBS/ 3120 LBS	CRACKED CONCRETE (CORNER CONDITION)
STHD10/ STH10RJ AT 6" STEMWALL	3700 LBS/ 4224 LBS	CRACKED CONCRETE (CORNER CONDITION)
STHD14/ STHD14RJ AT 6" STEMWALL	5173 LBS/ 5912 LBS	CRACKED CONCRETE (CORNER CONDITION)
LSTHD8/ LSTHD8RJ AT 8" STEMWALL	2730 LBS/ 3120 LBS	CRACKED CONCRETE (CORNER CONDITION)
STHD10/ STH10RJ AT AT 8" STEMWALL	4116 LBS/ 4700 LBS	CRACKED CONCRETE (CORNER CONDITION)
STHD14/ STHD14RJ AT AT 8" STEMWALL	5340 LBS/ 6100 LBS	CRACKED CONCRETE (CORNER CONDITION)

SIMPSON'S ANCHOR BOLT FOR SHEARWALL HOLDOWNS	LRFD CAPACITY (SEISMIC/WIND)	COMMENT
SSTB16 (5/8" DIAMETER, 12 5/8" MIN. EMBED., 6" STEMWALL)	3570 LBS/ 5776 LBS	2500 PSI MIN. CONCRETE (CORNER CONDITION)
SSTB20 (5/8" DIAMETER, 16 5/8" MIN. EMBED., 6" STEMWALL)	4403 LBS/ 6464 LBS	1 3/4" MIN. EDGE DISTANCE
SB 5/8"X24 (5/8" DIAMETER, 18" MIN. EMBED., 6" STEMWALL)	8022 LBS/ 10680 LBS	
SB 7/8"X24 (7/8" DIAMETER, 18" MIN. EMBED., 8" STEMWALL)	10997 LBS/ 14968 LBS	
SB 1"X30 (1" DIAMETER, 24" MIN. EMBED., 8" STEMWALL)	11640 LBS/ 15848 LBS	