CT ENGINEERING INC

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#21056
Structural Calculations For:

Sterba Mironova Residence Addition

9811 SE 40th St
Mercer Island, WA 98040

Architect: TAM Design

Design Criteria: IBC 2018 as adopted by Mercer Island
Wind: Wind Speed = 110 mph, Exposure 'B', Kzt = 1.0
Seismic: Site Class D [Default], SDC = D, R = 6.5, I=1.0
Roof Rain-on-Snow Load = 25 psf
Roof Future PV Load = 5psf
Deck Live Load = 60psf
Residential Floor Live Load = 40psf

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CALCULATION SECTION 1.0: **LOADING**

SHEET TITLE: **DEAD LOAD SUMMARY**

1.1) ESTIMATED DEADLOADS

FRAMED ROOF		
Roofing -	3.5	psf
5/8" plywood (O.S.B.)	2.2	psf
Rafters or Trusses at 24" o.c.	4.0	psf
Insulation	1.0	psf
(1) 5/8" gypsum ceiling	2.8	psf
Misc./Mech.	1.5	psf
ROOF DEAD LOAD	**15.0**	**PSF**
FUTURE P.V. AUX. LOAD	**5.0**	**PSF**

RESIDENTIAL FLOOR (NO GYPCRETE)		
floor finish	4.0	psf
3/4" plywood (O.S.B.)	2.7	psf
Joists @ 16" o.c.	2.5	psf
Insulation	1.0	psf
(1) 5/8" gypsum ceiling	2.8	psf
Misc.	2.0	psf
FLOOR DEAD LOAD	**15.0**	**PSF**

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CALCULATION SECTION 2.0: ROOF FRAMING

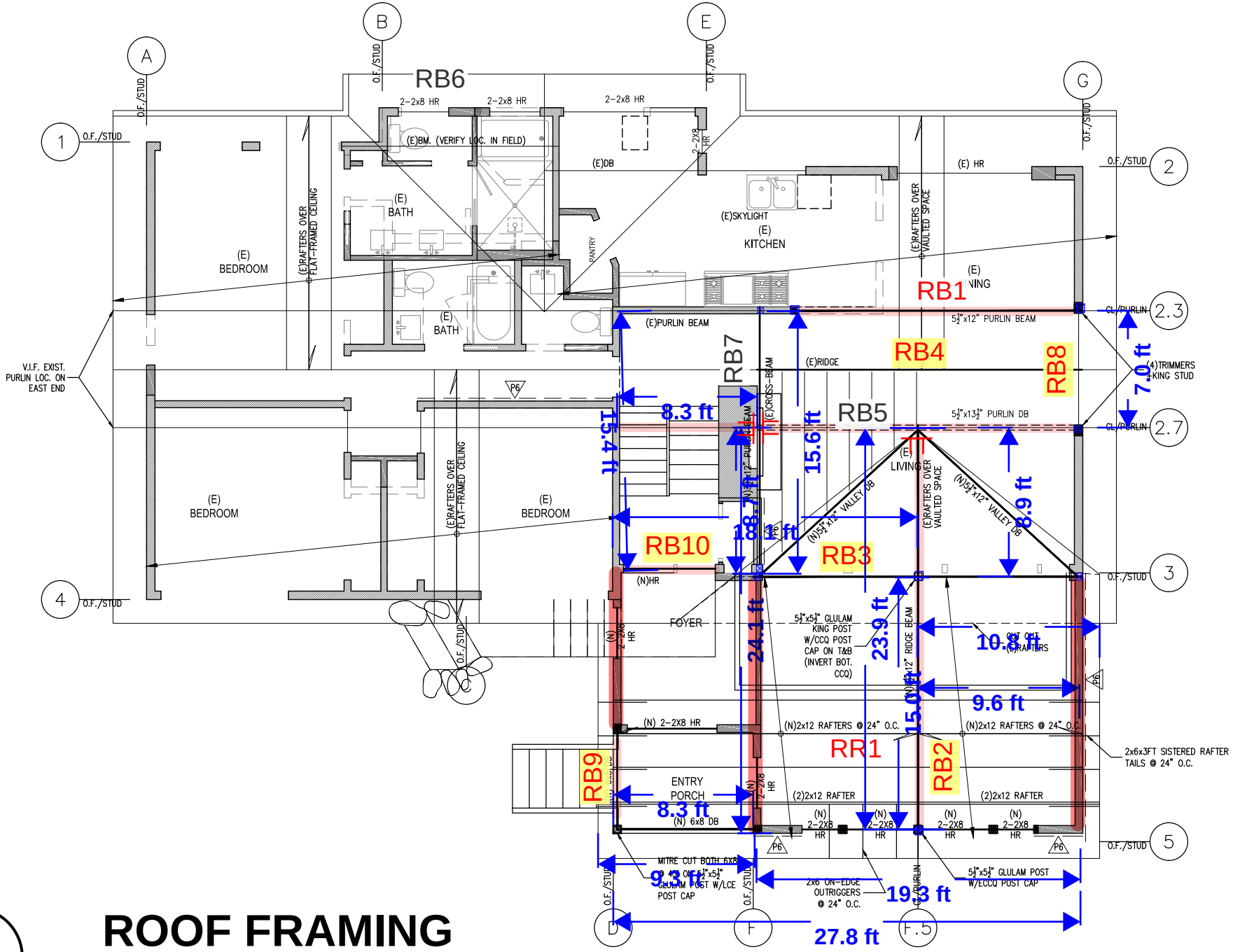
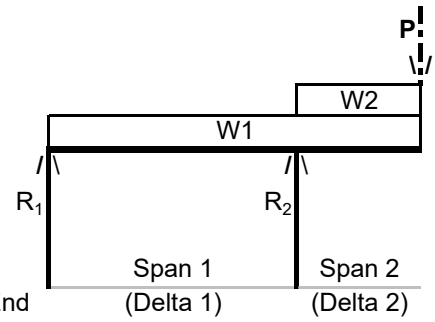


FIG. 2.0

ROOF FRAMING KEYPLAN

RR1) ROOF RAFTERS

OVERHANGING CANTILEVER



Span 1 =	9.75	ft
Span 2 =	1	ft
Spacing =	24	in o.c.
Uniform Load W1 =	90	lb/ft
Add'l. Uniform Load W2 =	0	lb/ft
Concentrated Load =	0	lb @ Cantilever End

V_{max} =	443 lb	R_{1Max} =	439 lb
M_{max} =	1069 lb-ft	R_{2Max} =	533 lb

Nominal Beam Size: b = 2 in. d= 8 in. Number of Sections = 1

b_{act} = 1.50 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- Y

POST?: NO

Design Stresses and Factors:

		C_L=	0.89	isture > 19%?	NO
Fv =	145 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	850 psi	Cr =	1.15	$C_{M(b)}$ =	1.00
Fc|| =	1,300 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	405 psi	$CF_{(B)}$ =	1.20	$C_{M(c\perp)}$ =	1.00
E =	1.3E+06 psi	Delta1=L/	360	$C_{M(E)}$ =	1.00
Emin =	.47E+06 psi	Delta2=L/	360	Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	53.7	**145**
Fb (psi)	977	**1049**
Delta1(in)	0.30	**0.33**
Delta2(in)	0.00	**0.03**

Section Properties		
	Required	Provided
A (in2)	4.0	10.9
Sx (in3)	12.2	13.1
I (1) (in4)	43.3	47.6
I (2) (in4)	6.3	47.6

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.88 inches

UNBAL. UPLIFT AT R1 = -5 LBS

NOTCH DEPTH = 0 inches

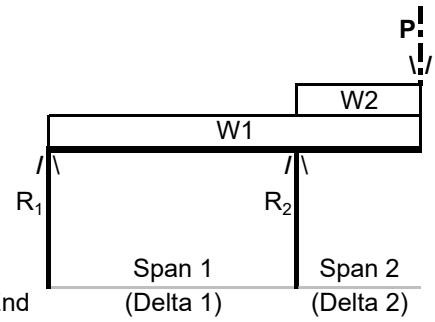
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 145 psi

USE: 2 x 8 HF2 @ 24 IN. O.C.

RB1) GRID 2.3 PURLIN FROM F.1 TO G

4/5/2021 SUBMITTAL

OVERHANGING CANTILEVER



Span 1 = 17 ft
Span 2 = 2.25 ft

Uniform Load W1 = 349 lb/ft
Add'l. Uniform Load W2 = 0 lb/ft
Concentrated Load = 0 lb @ Cantilever End

V_{max} = 3016 lb
M_{max} = 12599 lb-ft

R_{1Max} = 2964 lb
R_{2Max} = 3801 lb

Nominal Beam Size: b = 5.5 in. d= 12 in. Number of Sections = 1
b_{act} = 5.50 in. d_{act} = 12.00 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N
POST?: NO

Design Stresses and Factors:

		C_L=	0.98	Moisture > 19%?	NO
Fv =	240 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	2,400 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	1,650 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	650 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00
E =	1.8E+06 psi	Delta1=L/	360	$C_{M(E)}$ =	1.00
Emin =	.93E+06 psi	Delta2=L/	360	Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	60.6	**240**
Fb (psi)	1145	**2348**
Delta1(in)	0.46	**0.57**
Delta2(in)	0.01	**0.08**

Section Properties		
	Required	Provided
A (in2)	16.7	66.0
Sx (in3)	64.4	132.0
I (1) (in4)	642.5	792.0
I (2) (in4)	158.4	792.0

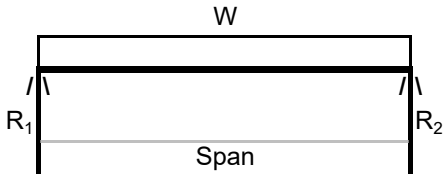
0 INCH ϕ HOLE SEC. REDUC.	
0.0	in3
0.0	in4

REQ'D END BEARING = 1.06 inches
UNBAL. UPLIFT AT R1 = -52 LBS
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 240 psi

USE: 5.5 x 12 IN. 24F-V4 GLB

RB2) GRID F.5 RIDGE BEAM

SIMPLE SPAN - UNIFORM LOAD



Span = 15 ft

Uniform Load (full span), W = 435 lb/ft

V_{max} = 3263 lb

M_{max} = 12234 lb-ft

Reactions

R_1 = 3263 lb

R_2 = 3263 lb

Nominal Beam Size: b = 5.5 in. d= 12 in. Number of Sections = 1

b_{act} = 5.50 in. d_{act} = 12.00 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N

Post?: NO

Design Stresses and Factors:

			C_L=	0.98	Moisture > 19%?	N	
Fv =	240	psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	2,400	psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	1,650	psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	650	psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00	
E =	1.8E+06	psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.93E+06	psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	64.3	**240**
Fb (psi)	1112	**2355**
Delta (in.)	0.35	**0.50**

Section Properties		
	Required	Provided
A (in2)	**17.67**	66.0
Sx (in3)	**62.34**	132.00
I (in4)	**550.55**	792.0

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.91 inches

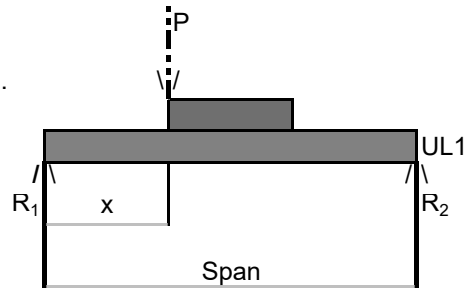
NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 240 psi

USE: 5.5 x 12 IN. 24F-V4 GLB

RB3) GRID 3.1 BETWEEN F TO G

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 19.3 ft

	Load		
Uniform Load 1 (full span) =	0 lb/ft		
Uniform Load 2 (lbs/ft) =	0	from x = 0	9.65 feet
Sum UL1 + UL2 =	0		
Concentrated Load (lbs) =	5200	@ x = 9.65 feet	

		Reactions	
V_{max} =	2600 lb	R_1 =	2600 lb
M_{max} =	25090 lb-ft	R_2 =	2600 lb

Nominal Beam Size: b = 5.5 in. d= 13.5 in. Number of Sections = 1
b_{act} = 5.50 in. d_{act} = 13.50 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N
POST?: NO
Design Stresses and Factors:

		C_L=	0.97	Moisture > 19%?	N
Fv =	240 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	2,400 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	1,650 psi	Cv =	0.99	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	650 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00
E =	1.8E+06 psi	Delta = L/	240	$C_{M(E)}$ =	1.00
Emin =	.93E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	52.53	**240**
Fb (psi)	1802	**2303**
Delta (in.)	0.66	**0.97**

Section Properties		
	Required	Provided
A (in2)	**16.3**	74.3
Sx (in3)	**130.7**	167.1
I (in4)	**769.7**	1127.7

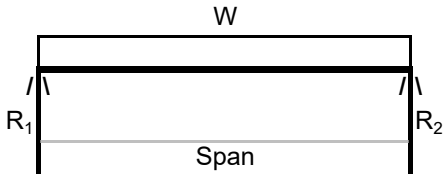
0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.73 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 240 psi

USE: 5.5 x 13-1/2 IN. 24F-V4 GLB

RB4) GRID 2.5 RIDGE BEAM BETWEEN F & G

SIMPLE SPAN - UNIFORM LOAD



Span = 19 ft

Uniform Load (full span), W = 157.5 lb/ft

V_{max} = 1496 lb
M_{max} = 7107 lb-ft

Reactions
R_1 = 1496 lb
R_2 = 1496 lb

Nominal Beam Size: b = 5.5 in. d= 10.5 in. Number of Sections = 1
b_{act} = 5.50 in. d_{act} = 10.50 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N
Post?: NO
Design Stresses and Factors:

			C_L=	0.98	Moisture > 19%?	N	
Fv =	240	psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	2,400	psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	1,650	psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	650	psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00	
E =	1.8E+06	psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.93E+06	psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	35.3	**240**
Fb (psi)	844	**2351**
Delta (in.)	0.48	**0.63**

Section Properties		
	Required	Provided
A (in2)	**8.49**	57.8
Sx (in3)	**36.28**	101.06
I (in4)	**405.11**	530.6

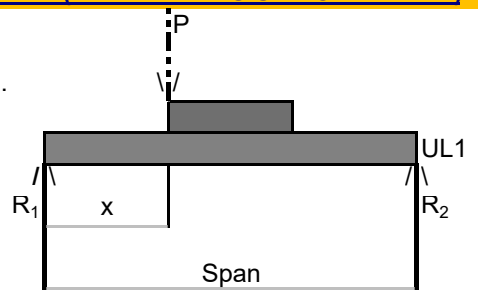
0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.42 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = < Fv' = 240 psi

USE: 5.5 x 10-1/2 IN. 24F-V4 GLB

RB5) GRID 2.7 PURLIN BEAM CARRYING RIDGE AND DBL. VAL. BM (IDEALIZED AS UNIFORM BEAM)

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 19 ft

	Load		
Uniform Load 1 (full span) =	158 lb/ft		
Uniform Load 2 (lbs/ft) =	0	from x = 0	9.5 feet
Sum UL1 + UL2 = 158			
Concentrated Load (lbs) =	2000	@ x = 9.5 feet	

		Reactions	
V_{max} =	2501 lb	R_1 =	2501 lb
M_{max} =	16630 lb-ft	R_2 =	2501 lb

Nominal Beam Size: b = 5.5 in. d= 13.5 in. Number of Sections = 1
b_{act} = 5.50 in. d_{act} = 13.50 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N
POST?: NO
Design Stresses and Factors:

		C_L=	0.97	Moisture > 19%?	N
Fv =	240 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	2,400 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	1,650 psi	Cv =	0.99	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	650 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00
E =	1.8E+06 psi	Delta = L/	360	$C_{M(E)}$ =	1.00
Emin =	.93E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	46.93	**240**
Fb (psi)	1195	**2308**
Delta (in.)	0.47	**0.63**

Section Properties		
	Required	Provided
A (in2)	**14.5**	74.3
Sx (in3)	**86.5**	167.1
I (in4)	**839.6**	1127.7

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

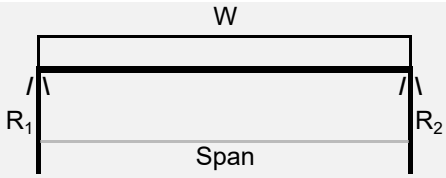
REQ'D END BEARING = 0.70 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 240 psi

USE: 5.5 x 13-1/2 IN. 24F-V4 GLB

RB6) GRID 0.5 HEADER

4/5/2021 Permit Part 1 Set

SIMPLE SPAN - UNIFORM LOAD



Span = 3.25 ft

Uniform Load (full span), W = 300 lb/ft

Reactions

V_{max} = 488 lb — R_1 = 488 lb

M_{max} = 396 lb-ft — R_2 = 488 lb

Nominal Beam Size: b = 2 in. d= 8 in. Number of Sections = 2

b_{act} = 1.50 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- N

Post?: NO

Design Stresses and Factors:

			C_L=	0.99	Moisture > 19%?	N	
Fv =	145	psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	850	psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	1,300	psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	405	psi	$CF_{(B)}$ =	1.20	$C_{M(c\perp)}$ =	1.00	
E =	1.3E+06	psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.47E+06	psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	21.1	**145**
Fb (psi)	181	**1013**
Delta (in.)	0.01	**0.11**

Section Properties		
	Required	Provided
A (in2)	**3.17**	21.8
Sx (in3)	**4.69**	26.28
I (in4)	**5.35**	95.3

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.40 inches

NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 145 psi

"PURLIN" TILT: 0:12 PITCH

Sec. Mod. Factor, $C_{TILT,Sx}$= 1.00

M.O.I. Factor, $C_{TILT,Ix}$= 1.00

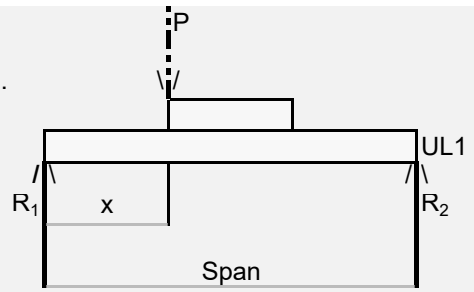
USE: (2) 2 x 8 HF2

MMER BTWN. SGL. CLEATS WITH (5)16d NAILS EA. SIDE &

MMER BTWN. SGL. CLEATS WITH (5)16d NAILS EA. SIDE;

RB7) REPLACEMENT BEAM OVER FIREPLACE

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 15.4 ft

	Load		
Uniform Load 1 (full span) =	0 lb/ft		
Uniform Load 2 (lbs/ft) =	0	from x = 0	8.75 feet
Sum UL1 + UL2 = 0			
Concentrated Load (lbs) =	3900	@ x = 8.75	feet

		Reactions	
V_{max} =	2216 lb	R_1 =	1684 lb
M_{max} =	14697 lb-ft	R_2 =	2216 lb

Nominal Beam Size: b = 3.5 in. d= 12 in. Number of Sections = 1
b_{act} = 3.50 in. d_{act} = 12.00 in.

Lumber Species/Type:---------- GLB REPETITIVE MEMBER?---------- N
POST?: NO
Design Stresses and Factors:

		C_L=	0.92	Moisture > 19%?	N
Fv =	240 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	2,400 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	1,650 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	650 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00
E =	1.8E+06 psi	Delta = L/	240	$C_{M(E)}$ =	1.00
Emin =	.93E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	79.14	**240**
Fb (psi)	2100	**2196**
Delta (in.)	0.54	**0.77**

Section Properties		
	Required	Provided
A (in2)	**13.8**	42.0
Sx (in3)	**80.3**	84.0
I (in4)	**356.6**	504.0

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.97 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 240 psi

"PURLIN" TILT: 0:12 PITCH
Sec. Mod. Factor, $C_{TILT,Sx}$= 1.00
M.O.I. Factor, $C_{TILT,Ix}$= 1.00

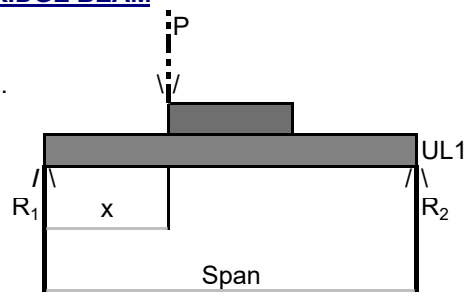
4/5/2021 Permit Part 1 Set

USE: 3.5 x 12 IN. 24F-V4 GLB

MMER BTWN. SGL. CLEATS WITH (5)16d NAILS EA. SIDE &
MMER BTWN. SGL. CLEATS WITH (5)16d NAILS EA. SIDE;

RB8) GRID G HEADER BTWN. GRID 2.3:2.7 CARRYING GRID 4 RIDGE BEAM

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 7 ft

	Load		
Uniform Load 1 (full span) =	0 lb/ft		
Uniform Load 2 (lbs/ft) =	0	from x = 0	3.5 feet
Sum UL1 + UL2 = 0			
Concentrated Load (lbs) =	1500	@ x = 3.5 feet	

		Reactions	
V_{max} =	750 lb	R_1 =	750 lb
M_{max} =	2625 lb-ft	R_2 =	750 lb

Nominal Beam Size: b = 2 in. d= 10 in. Number of Sections = 2
b_{act} = 1.50 in. d_{act} = 9.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- N
POST?: NO
Design Stresses and Factors:

		C_L=	0.98	Moisture > 19%?	N
Fv =	145 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	850 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	1,300 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	405 psi	$CF_{(B)}$ =	1.10	$C_{M(c\perp)}$ =	1.00
E =	1.3E+06 psi	Delta = L/	360	$C_{M(E)}$ =	1.00
Emin =	.47E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	40.54	**145**
Fb (psi)	736	**918**
Delta (in.)	0.06	**0.23**

Section Properties		
	Required	Provided
A (in2)	**7.8**	27.8
Sx (in3)	**34.3**	42.8
I (in4)	**52.0**	197.9

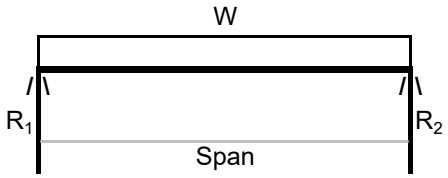
0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.62 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 145 psi

USE: (2) 2 x 10 HF2

RB9) GRID D BEAM BTWN. 4:5

SIMPLE SPAN - UNIFORM LOAD



Span = 6 ft

Uniform Load (full span), W = 235 lb/ft

Reactions

V_{max} = 705 lb — R_1 = 705 lb

M_{max} = 1058 lb-ft — R_2 = 705 lb

Nominal Beam Size: b = 6 in. d= 8 in. Number of Sections = 1

b_{act} = 5.50 in. d_{act} = 7.50 in.

Lumber Species/Type:---------- HF1 REPETITIVE MEMBER?---------- N

Post?: YES

Design Stresses and Factors:

		C_L=	1.00	Moisture > 19%?	N	
Fv =	135 psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	975 psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	850 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	405 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00	
E =	1.3E+06 psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.00E+00 psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	20.3	**135**
Fb (psi)	246	**975**
Delta (in.)	0.03	**0.20**

Section Properties		
	Required	Provided
A (in2)	**6.20**	41.3
Sx (in3)	**13.02**	51.56
I (in4)	**26.36**	193.4

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.32 inches

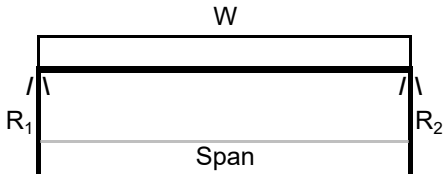
NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 135 psi

USE: (1) 6 x 8 HF1

RB10) GRID 3 BTWN. D & E

SIMPLE SPAN - UNIFORM LOAD



Span = 5.75 ft

Uniform Load (full span), W = 347 lb/ft

V_{max} = 998 lb

M_{max} = 1434 lb-ft

Reactions

R_1 = 998 lb

R_2 = 998 lb

Nominal Beam Size: b = 2 in. d= 8 in. Number of Sections = 2

b_{act} = 1.50 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- N

Post?: NO

Design Stresses and Factors:

			C_L=	0.99	Moisture > 19%?	N	
Fv =	145	psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	850	psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	1,300	psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	405	psi	$CF_{(B)}$ =	1.20	$C_{M(c\perp)}$ =	1.00	
E =	1.3E+06	psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.47E+06	psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	54.3	**145**
Fb (psi)	655	**1008**
Delta (in.)	0.07	**0.19**

Section Properties		
	Required	Provided
A (in2)	**8.15**	21.8
Sx (in3)	**17.07**	26.28
I (in4)	**34.25**	95.3

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.82 inches

NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 145 psi

USE: (2) 2 x 8 HF2

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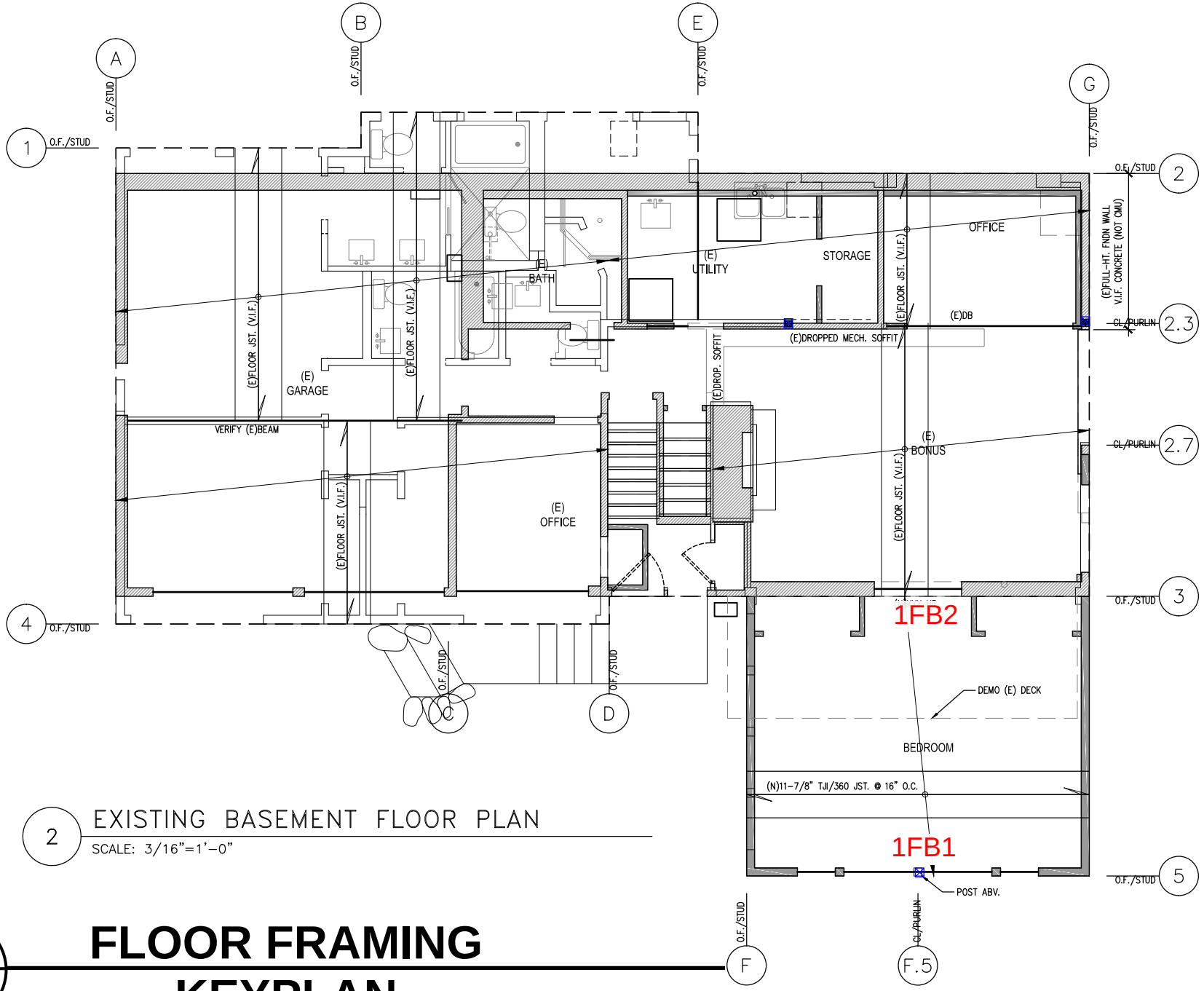
CALCULATION SECTION 3.0:

FLOOR FRAMING



2 EXISTING BASEMENT FLOOR PLAN

SCALE: 3/16"=1'-0"

FIG. 3.0

FLOOR FRAMING KEYPLAN

DESIGN CRITERIA

FLOOR DEFLECTION LIMITS

CODE	360	LL
CODE	240	TL
SUGGEST	480	LL
SUGGEST	240	TL

Main Floor Joists in Addition

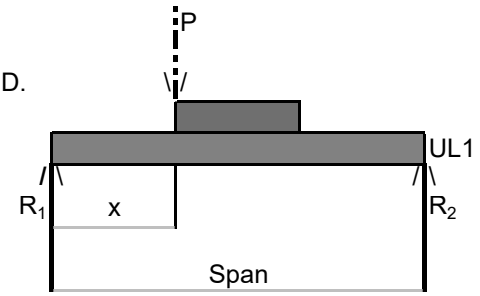
INPUT: 12 in | TJI 360 | @16in o.c.

19.2ft span
0.64 in Code LL
0.96 in Code TL
0.48 in Suggest LL
0.96 in Suggest TL

		d [in]	TJI	Label	w [plf]	Strength Limit Lmax [ft]	Δ_M	Δ_V	Δ_{M+V}		Deflect Check Suggest	Code
40 psf LL	LL	12 in	TJI 360	11.875TJI360	53.3	30.4	0.39	0.04	0.43	...ok	90.3%	67.7%
15 psf DL	TL Creep	12 in	TJI 360	11.875TJI360	83.3	24.4	0.61	0.07	0.68	...ok	70.5%	70.5%

1FB1) GRID 5 HEADER CARRYING POST ABOVE

SIMPLE SPAN - UNIFORM LOAD/PARTIAL LOAD/CONC. LD.



Span = 8.7 ft

	Load			
Uniform Load 1 (full span) =	100 lb/ft			
Uniform Load 2 (lbs/ft) =	0	from x =	0	4.35 feet
Sum UL1 + UL2 = 100				
Concentrated Load (lbs) =	3300	@ x =	4.35 feet	

		Reactions	
V_{max} =	2085 lb	R_1 =	2085 lb
M_{max} =	8124 lb-ft	R_2 =	2085 lb

Nominal Beam Size: b = 1.75 in. d= 7.25 in. Number of Sections = 3
b_{act} = 1.75 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- LVL REPETITIVE MEMBER?---------- N
POST?: NO
Design Stresses and Factors:

		C_L=	0.99	Moisture > 19%?	N
Fv =	285 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	2,600 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	2,310 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00
Fc⊥ =	750 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	1.00
E =	1.9E+06 psi	Delta = L/	350	$C_{M(E)}$ =	1.00
Emin =	.97E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	79.79	**285**
Fb (psi)	2120	**2584**
Delta (in.)	0.29	**0.30**

Section Properties		
	Required	Provided
A (in2)	**10.7**	38.1
Sx (in3)	**37.7**	46.0
I (in4)	**160.8**	166.7

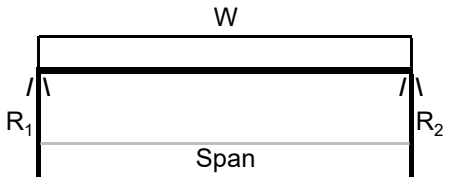
0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.53 inches
NOTCH DEPTH = 0 inches
$f_{V,NOTCH}$ (Tension Face) = N/A < Fv' = 285 psi

USE: (3) 1-3/4 IN. x 7.25 IN. 1.9E LVL

1FB2) GRID 3 HEADER @ GRID F.5

SIMPLE SPAN - UNIFORM LOAD



Span = 5.25 ft

Uniform Load (full span), W = 426.25 lb/ft

Reactions

V_{max} = 1119 lb — R_1 = 1119 lb

M_{max} = 1469 lb-ft — R_2 = 1119 lb

Nominal Beam Size: b = 2 in. d= 8 in. Number of Sections = 2

b_{act} = 1.50 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- N

Post?: NO

Design Stresses and Factors:

			C_L=	0.99	Moisture > 19%?	N	
Fv =	145	psi	LDF =	1.00	$C_{M(v)}$ =	1.00	
Fb =	850	psi	Cr =	1.00	$C_{M(b)}$ =	1.00	
Fc|| =	1,300	psi	Cv =	1.00	$C_{M(c\|\|)}$ =	1.00	
Fc⊥ =	405	psi	$CF_{(B)}$ =	1.20	$C_{M(c\perp)}$ =	1.00	
E =	1.3E+06	psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00	
Emin =	.47E+06	psi			Incise Ci=	1.00	

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	59.4	**145**
Fb (psi)	671	**1009**
Delta (in.)	0.06	**0.18**

Section Properties		
	Required	Provided
A (in2)	**8.91**	21.8
Sx (in3)	**17.47**	26.28
I (in4)	**32.03**	95.3

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.92 inches

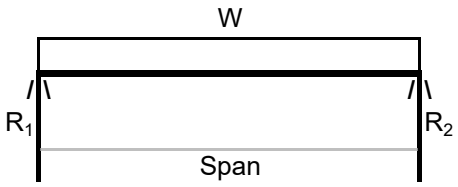
NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 145 psi

USE: (2) 2 x 8 HF2

DJ1) PORCH JOISTS

SIMPLE SPAN - UNIFORM LOAD



Span = 8.1 ft
Spacing = 16 in o.c.
Uniform Load (full span), W = 73 lb/ft

V_{max} = 297 lb
M_{max} = 601 lb-ft

Reactions
R_1 = 297 lb
R_2 = 297 lb

Nominal Beam Size: b = 2 in. d= 8 in. Number of Sections = 1
b_{act} = 1.50 in. d_{act} = 7.25 in.

Lumber Species/Type:---------- HF2 REPETITIVE MEMBER?---------- Y
Post?: NO
Design Stresses and Factors:

		C_L=	0.79	Moisture > 19%?	Y
Fv =	145 psi	LDF =	1.00	$C_{M(v)}$ =	0.97
Fb =	850 psi	Cr =	1.15	$C_{M(b)}$ =	1.00
Fc|| =	1,300 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	0.80
Fc⊥ =	405 psi	$CF_{(B)}$ =	1.20	$C_{M(c\perp)}$ =	0.67
0	1.3E+06 psi	δ_{TOTAL}=L/	480	$C_{M(E)}$ =	0.90
Emin =	.47E+06 psi			Incise Ci=	0.80

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	34.9	**112.52**
Fb (psi)	549	**738**
Delta (in.)	0.13	**0.20**

Section Properties		
	Required	Provided
A (in2)	**3.37**	10.9
Sx (in3)	**9.78**	13.14
I (in4)	**29.98**	47.6

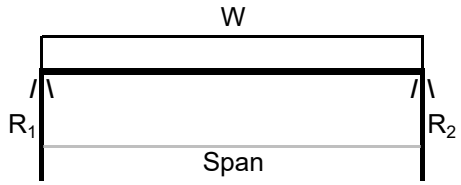
0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 0.73 inches
NOTCH DEPTH = 1.25 inches
$f_{V,NOTCH}$ (Tension Face) = 60 psi < Fv' = 113 psi

USE: 2 x 8 HF2 @ 16 IN. O.C.

DB1) DECK BEAM ON GRID D BTWN. 4:5

SIMPLE SPAN - UNIFORM LOAD



Span = 6 ft

Uniform Load (full span), W = 537.75 lb/ft

Reactions

V_{max} = 1613 lb — R_1 = 1613 lb

M_{max} = 2420 lb-ft — R_2 = 1613 lb

Nominal Beam Size: b = 6 in. d= 10 in. Number of Sections = 1

b_{act} = 5.50 in. d_{act} = 9.50 in.

Lumber Species/Type:---------- HF1 REPETITIVE MEMBER?---------- N

Post?: NO

Design Stresses and Factors:

		C_L=	1.00	Moisture > 19%?	Y
Fv =	140 psi	LDF =	1.00	$C_{M(v)}$ =	1.00
Fb =	1,050 psi	Cr =	1.00	$C_{M(b)}$ =	1.00
Fc|| =	750 psi	Cv =	1.00	$C_{M(c\|\|)}$ =	0.91
Fc⊥ =	405 psi	$CF_{(B)}$ =	1.00	$C_{M(c\perp)}$ =	0.67
E =	1.3E+06 psi	δ_{TOTAL}=L/	360	$C_{M(E)}$ =	1.00
Emin =	.47E+06 psi			Incise Ci=	1.00

Stresses and Deflections		
	Actual	Allowable
Fv (psi)	34.1	**140**
Fb (psi)	351	**1045**
Delta (in.)	0.03	**0.20**

Section Properties		
	Required	Provided
A (in2)	**12.72**	52.3
Sx (in3)	**27.78**	82.73
I (in4)	**60.31**	393.0

0 INCH ϕ HOLE SEC. REDUC.
0.0 in3
0.0 in4

REQ'D END BEARING = 1.08 inches

NOTCH DEPTH = 0 inches

$f_{V,NOTCH}$ (Tension Face) = < Fv' = 140 psi

USE: (1) 6 x 10 HF1

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CALCULATION SECTION 7.0: LATERAL ENGINEERING

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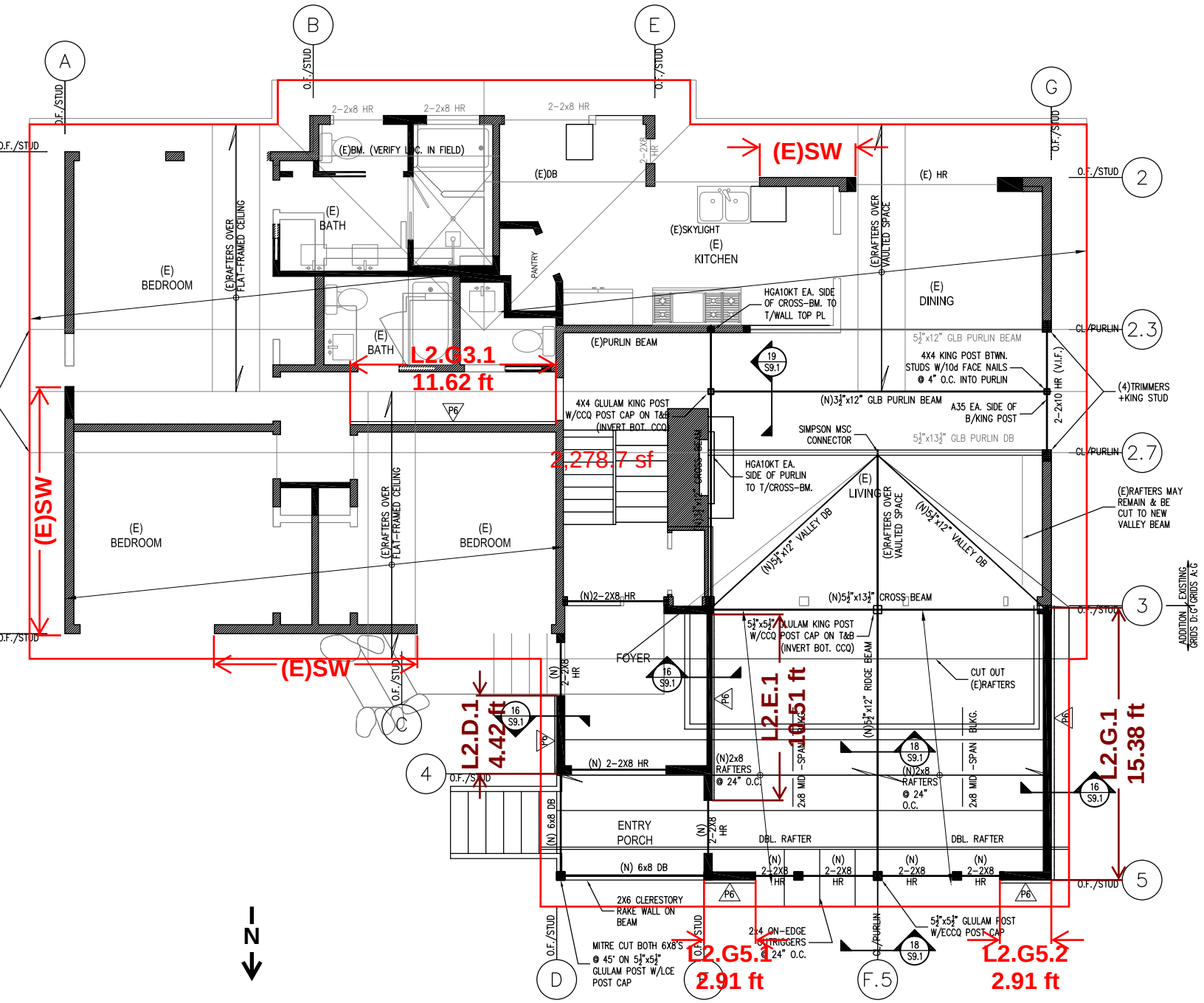

FIG. 7.0.A

UPPER LEVEL SHEARWALL KEYPLAN

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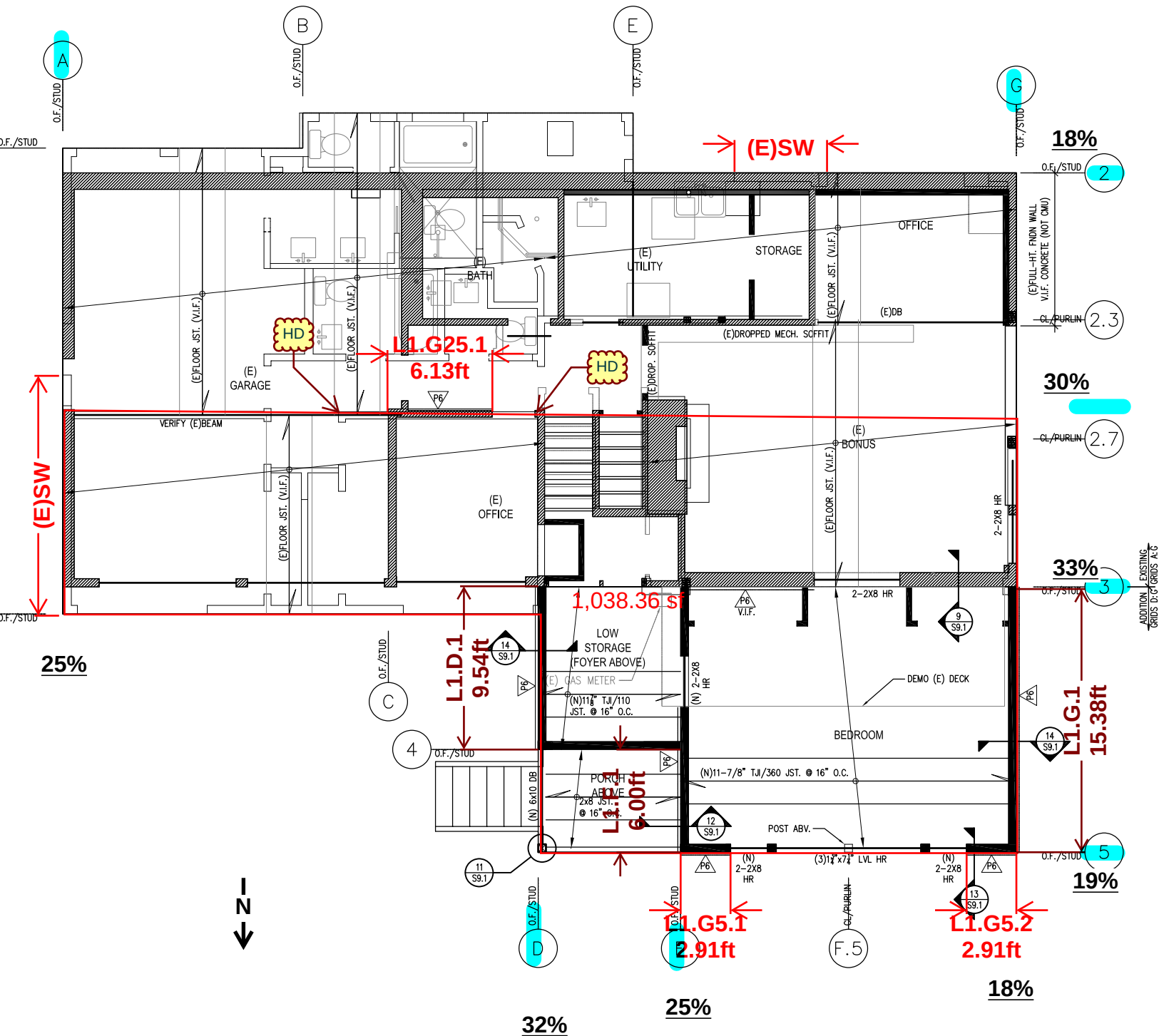
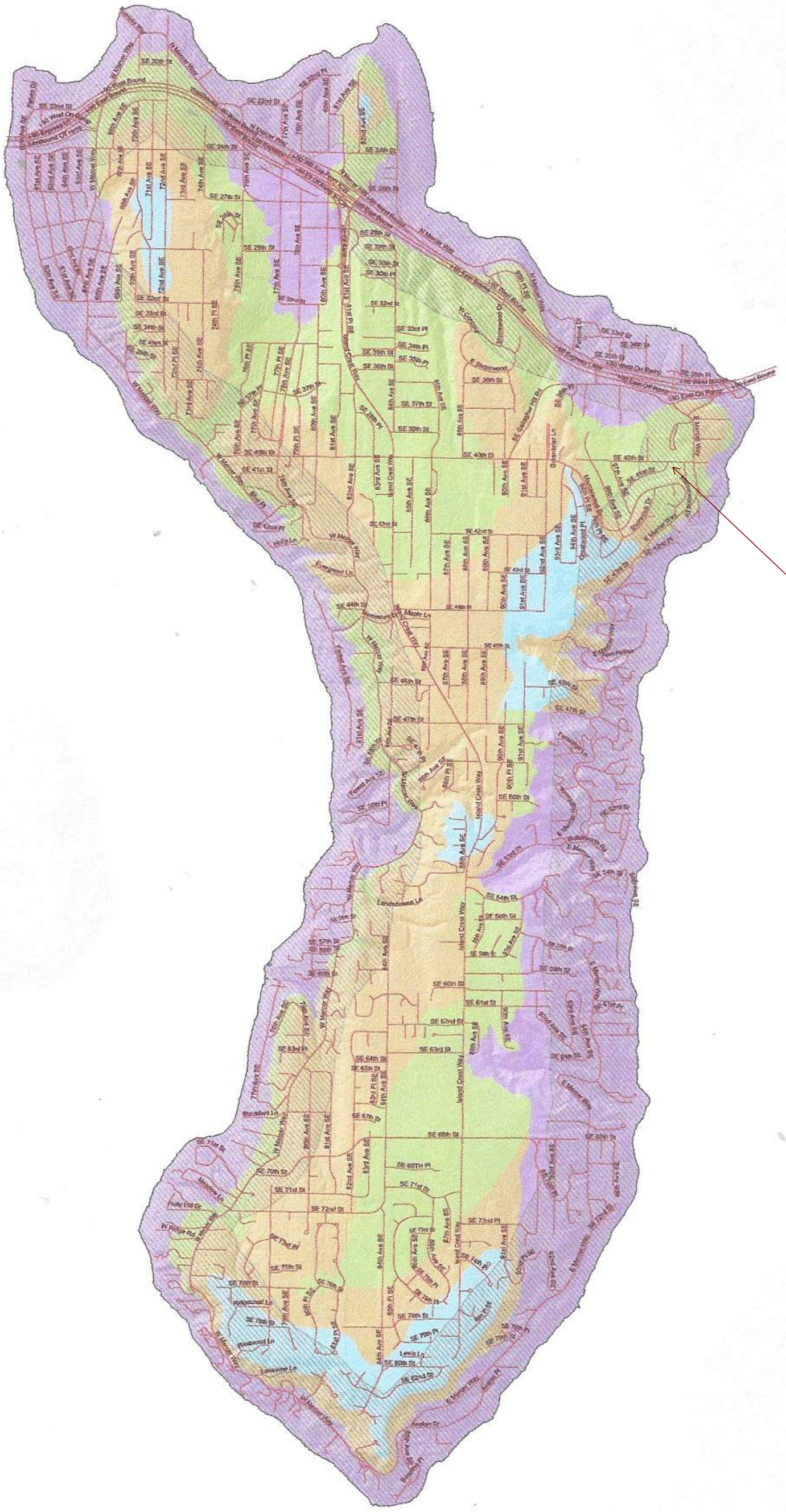


FIG. 7.0.B

MAIN LEVEL SHEARWALL KEYPLAN

Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009



0 0.5 1 Kilometers 1:12,000
0 0.5 1 Miles
T N

WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS
(ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the Kzt factor to be utilized for each specific project. The Kzt factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The Kzt values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

Wind Exposure Category	
	Exposure 'C' (1500 feet from Lake)
	Exposure 'B' (all other areas)

WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor	
	$K_zt = 1.0$
	$K_zt = 1.3$
	$K_zt = 1.6$
	$K_zt = 1.9$

GREEN, HATCHED ZONE:
EXP. C, Kzt=1.3

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer Island. This map shows the minimum wind exposure category and the minimum wind speed-up, "K_zt" factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically indentified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

DEFINITIONS:

K_zt factor:	The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.
Exposure B:	The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.
Exposure C:	The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.
Wind Speed:	Minimum 85 mph 3-second gust per IRC Figure R301.2(4)

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.6	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.72	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.402	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.553	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.633	Factored deterministic acceleration value. (0.2 second)
S1RT	0.488	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.543	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.452	Factored deterministic acceleration value. (1.0 second)
PGAd	1.238	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.903	Mapped value of the risk coefficient at short periods
C_{R1}	0.898	Mapped value of the risk coefficient at a period of 1 s

27 Directional Procedure, Part 1:Enclosed and Partially Enclosed Rigid Buildings. (All Heights)

27.4. MWFRS

Velocity pressure q_z = .00256 K_z K_{zt} K_d V^2 (27.3-1)

Exposure C Roof Height h = 20 feet

Roof Pitch = 3.00 :12

Exposure coefficient K_z = Section 27.3.1, shall be determined from Table 27.3-1

Topography factor K_{zt} = 1.30 26.8.2, Figure 26.8-1

Directionality factor K_d = 0.85 26.6, Table 26.6-1

Building & Structure Risk Category = II, standard IBC T-1604.5

Wind Speed V = 110 mph Fig. 26.5-1A, MRI = 700 yrs

q_z = 34.23 K_z psf

Internal Pressure Coefficient (GC_{pi}) = ± 0.18 Table 26.11-1, for Enclosed Building

Gust effect factor G = 0.85 26.9

Pressures for MWFRS p = $qGC_p - q_i (GC_{pi})$ (27.4-1)

Wall and Roof External pressure Coefficients C_p from Fig. 27.4-1

Wind Normal to Ridge (⊥ to 39) L/B = 0.71 h/L = 20/39 = 0.51 θ= 14.0

Windward wall C_p = 0.80 Windward roof C_p = -0.75

Leeward wall C_p = -0.50 for L/B = 0.71 Leeward roof C_p = -0.50

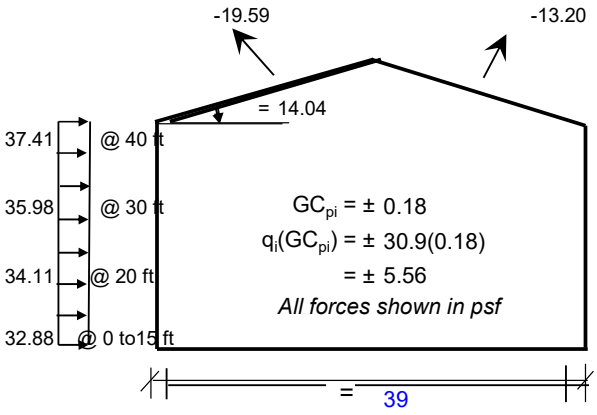
Side wall C_p = -0.70 or Roof C_p =

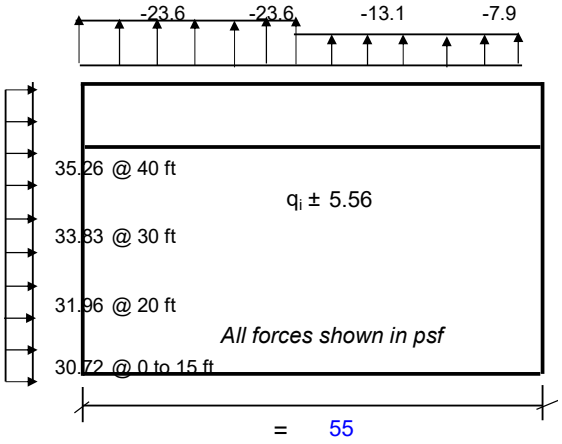
Wind Parallel to Ridge (⊥ to 55) L/B = 1.41

Windward wall C_p = 0.80 h/L = 20/55 = 0.36

Leeward wall C_p = -0.42 for L/B = 1.41 Roof C_p = -0.90 -0.90

Side wall C_p = -0.70 for dist 0 10





$p = qGC_p - q_i(GC_{pi})$ (27.4-1) For Exp C

where $q = q_z$ for windward at height z $z_g = 900$ $\propto = 9.5$

$q = q_h$ for leeward wall, side wall and roof @20 ft $K_z = 2.01(z/z_g)^{2/\propto}$

$q_i = q_h$ for enclosed building @20 ft K_z (min) $= 2.01(15/z_g)^{2/\propto}$

Roof Ht, h = 20 ft				Normal to Ridge ⊥ to 39			Parallel to ridge ⊥ to 55		
	Height	K_h	q_h	C_p	q_hGC_p		C_p	q_hGC_p	
Leeward wall	all	0.902	30.87	-0.5	-13.12		-0.42	-10.97	
Side wall	all	0.902	30.87	-0.70	-18.37		-0.70	-18.37	
Roof	ww	-0.747					-0.90	-23.62	fr 0 - 10
	Lw	-0.503					-0.90	-23.62	fr >10
							-0.50	-13.12	fr 20-40
							-0.30	-7.87	fr 40

				Normal to Ridge ⊥ to 39			Parallel to ridge ⊥ to 55		
	z, Ht. (ft)	K_z	q_z	C_p	$p = q_zGC_p$	WW+LW	C_p	$p = q_zGC_p$	WW+LW
Windward wall	0 to 15	0.849	29.06	0.80	19.76	32.88	0.80	19.76	30.72
	20.0	0.902	30.87	0.80	20.99	34.11	0.80	20.99	31.96
	30.0	0.982	33.62	0.80	22.86	35.98	0.80	22.86	33.83
	40.0	1.044	35.72	0.80	24.29	37.41	0.80	24.29	35.26

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Project: STEREA #21056 Date: 5/17/21

Client: WIND BASE SHEAR Page Number:

13.2 sin 14° ≈ 3.2

E-W

ROOF

R 100# (3.2sf) = 0.4^k

W 226# (0.6 · 30.72) = 4.2^k

L1

W 261# (18.43) = 4.8^k

9.4^k SERV.

N-S

R 179 (3.2) = 0.6^k

W 263# (0.6 · 32.88) = 5.2^k

5.8^k SERV.

Sterba Mironova

9811 SE 40th St, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5742886, -122.2070509

Date	5/17/2021, 1:24:36 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.402	MCE_R ground motion. (for 0.2 second period)
S_1	0.488	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.682	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.122	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description

SHEET TITLE: **7.1) IBC SEISMIC OVERVIEW**
CT PROJECT # : **Sterba Addition**

Step #				IBC	ASCE 7
1.	OCCUPANCY CATEGORY	TYPE =	II	Table 1604.5	Table 1.5-1
2.	IMPORTANCE FACTOR	I_E =	1.00	Section 1613.1 -> ASCE	Table 1.5-2
3.	Site Class - Per Geo. Engr.	S.C. =	D	Section 1613.3.5 Table 1613.3.3(2)	Section 11.4.2 / Ch. 20 Table 20.3-1
4.	0.2 Sec. Spectral Response	S_S =	1.4020	Figure 1613.3.1(1)	Figure 22-1
5.	1.0 Sec. Spectral Response	S_1 =	0.4880	Figure 1613.3.1(2)	Figure 22-2
6.	Site Coefficient (short period)	F_a =	1.20	Figure 1613.3.3(1)	Table 11.4-1
7.	Site Coefficient (1.0 second)	Fv =	0.00	Figure 1613.3.3(2)	Table 11.4-2
	$S_{MS} = F_a * S_S$	S_{MS} =	1.6820	EQ 16-37	EQ 11.4-1
	$S_{M1} = F_v * S_1$	S_{M1} =	0.0000	EQ 16-38	EQ 11.4-2
	$S_{DS} = 2/3 * S_{MS}$	S_{DS} =	**1.121**	EQ 16-39	EQ 11.4-3
	$S_{D1} = 2/3 * S_{M1}$	S_{D1} =	0.000	EQ 16-40	EQ 11.4-4
8.	Seismic Design Category 0.2s	SDC_S =	D	Table 1613.3.5(1)	Table 11.6-1
9.	Seismic Design Category 1.0s	SDC_1 =	C	Table 1613.3.5(2)	Table 11.6-2
10.	Seismic Design Category	SDC =	D	Max.	Max.
11.	Wood structural panels	---	---	N/A	Table 12.2-1
12.	Response Modification Coef.	R =	6.5	N/A	Table 12.2-1
13.	Overstrength Factor	Ω_0 =	2.5	N/A	Table 12.2-1
14.	Deflection Amplification Factor	C_D =	2.0	N/A	Table 12.2-1
15.	Horizontal Structural Irregularitie	---	NO	N/A	Table 12.3-1
16.	Vertical Structural Irregularities	---	NO	N/A	Table 12.3-2
17.	Permitted Procedure	Equiv. Lateral Force		---	Table 12.6-1

SHEET TITLE: **7.2) IBC EQUIVALENT LATERAL FORCE PROCEDURE PER ASCE 7**
CT PROJECT # : Sterba Addition

S_{DS} =	1.12	h_n =	18.00	(ft)	
S_{D1} =	0.00	x =	0.75	ASCE 7 (Table 12.8-2)	
R =	6.5	C_t =	0.020	ASCE 7 (Table 12.8-2)	
I_E =	1.0	T =	0.175	ASCE 7 (EQ 12.8-7)	
S_1 =	0.49	k =	1	ASCE 7 (Section 12.8.3)	
		T_L =	6	ASCE 7 (Section 11.4.5: Figure 22-15)	

$C_S = S_{DS} / (R/I_E)$		0.173 W	ASCE 7 (EQ 12.8-2)	
$C_S = S_{D1} / (T^*(R/I_E))$	*(for $T \leq T_L$)*	0.000 W	ASCE 7 (EQ 12.8-3) (MAX.)	
$C_S = (S_{D1} * T_L)/ (T^{2*}(R/I_E))$	*(for $T \geq T_L$)*	0.000 W	ASCE 7 (EQ 12.8-4) (MAX.)	
$C_S = 0.01$		0.010 W	ASCE 7 (EQ 12.8-5) (MIN.)	
$C_S = (0.5\ S_1)/(R/I_E)$		0.038 W	ASCE 7 (EQ 12.8-6) (MIN.if S1> 0.6g)	

CONTROLLING DESIGN BASE SHEAR = 0.038 W

VERTICAL DISTRIBUTION OF SEISMIC FORCES PER ASCE 7 SECTION 12.8.3

(EQ 12.8-11)
(EQ 12.8-12)

				Area #1		Area #2		Area #3				C_{vx} =				
DIAPHR.	Story	Elevation	Height	AREA	DL	AREA	DL	AREA	DL	w_i	$w_i * h_i^k$	$w_x * h_x^k$	DESIGN	SUM	V_{wind}	
LEVEL	Height	(ft)	h_i (ft)	(sqft)	(ksf)	(sqft)	(ksf)	(sqft)	(ksf)	(kips)	(kips)	$\sum w_i * h_i^k$	Vi	DESIGN V	N-S	E-W
Roof	---	18.00	18.00	2279	0.025					57.0	1025.6	0.82	**1.83**	1.83	5.80	4.60
2nd	---	8.50	8.50	1038	0.025					26.0	220.6	0.18	**0.39**	0.39	0.00	4.80
1st	---		0.00		0.030					0.0	0.0	0.00	**0.00**	0.00		
Ground	---	0.00														
										82.9	1246.1	1.00	**2.22**		**5.80**	**9.40**

E = V = 3.11
E/1.4 = 2.22

SHEET TITLE: **7.4) NDS SHEARWALL VALUES**
CT PROJECT # : Sterba Addition

SHEATHING THICKNESS	$t_{sheathing}$ =	**7/16**
NAIL SIZE	nail size =	8d Com.
STUD SPECIES	SPECIES =	**HF**
SPECIFIC GRAVITY	S.G. =	0.43
ANCOR BOLT DIAMETER	Anc. Bolt dia. =	0.625

SHEARWALL TYPE SDPW&S Table 4.3a	**Seismic**	**Wind**
$v_{nominal}$	$v_{s\ allowable}$	$v_{w\ allowable}$
(PER Table 4.3A)	modify per S. G.	modify per S. G.
0.3		inc. 40% per 2306.3

SHEARWALL TYPE SDPW&S Table 4.3a			**Seismic**	**Wind**
---	0	0	**1**	**1**
P6TN	150	2	**150**	**150**
P6	520	151	**242**	**339**
P4	760	243	**353**	**495**
P3	980	354	**456**	**638**
P2	1280	457	**595**	**833**
2P4	1520	596	**707**	**990**
2P3	1960	708	**911**	**1276**
2P2	2560	912	**1190**	**1667**
N.G.	10000	1191	**9300**	**13020**

SHEET TITLE: **7.5.1) LATERAL N-S (front to back - up/down)**
CT PROJECT # : Sterba Addition

Diaph. Level: **Roof**
Direction: **N-S**
Typ. Panel Height = **8** ft.

Seismic V i = 1.83 kips **Design Wind N-S V i = 5.80 kips**
Sum Seismic V i = 1.83 kips **Sum Wind N-S V i = 5.80 kips**

1) DISTRIBUTION TO SHEAR LINES

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
	Trib %		V level		Above Line Load				V abv.		V total		Line	orm Shear, v	
Line	E	W	E [k]	W [k]	1st Line	Trib	2nd Line	Trib.	E [k]	W [k]	E [k]	W [k]	L [ft]	E [plf]	W [plf]
A	25%	25%	0.457	1.45	-	100%	-	100%	-	0	0.46	1.45	0		
D	32%	32%	0.586	1.856	-	100%	-	100%	-	0	0.59	1.86	4.42	132	420
F	25%	25%	0.457	1.45	-	100%	-	100%	-	0	0.46	1.45	10.51	44	138
G	18%	18%	0.329	1.044	-	100%	-	100%	-	0	0.33	1.04	15.38	21	68
		Σ=	1.83	5.80				Σ=	0.00	0.00	1.83	5.80			
		Balance Check:	ok	ok				Balance Check:	ok	ok	ok	ok			

2) DISTRIBUTION TO SHEARWALLS

Line	ID	Lwall (ft)	C_0	Lwall' (ft)	H_{WALL} (ft)	E.Q. v (plf)	E.Q. V (k)	E.Q. Amplifiers ρ	E.Q. Amplifiers $2w/h^{(\perp)}$	E.Q. v' (plf)	E.Q. Type	Wind Type	Wind v (plf)	Wind V (k)
REF#...	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
D	L2.D.1	4.42	1.00	4.42	8.00	132	0.59		1.00	***132***	P6TN	P4	***420***	1.856
G	L2.G.1	15.38	1.00	15.38	8.00	21	0.33		1.00	***21***	P6TN	P6TN	***68***	1.044
F	L2.F.1	10.51	1.00	10.51	8.00	44	0.46		1.00	***44***	P6TN	P6TN	***138***	1.45

ρ = **1.00**

(1)Table 4.3.4 AF&PA SDPWS, Footnote 1

Flr. Thk. (Add to OTM arm): 0.0 ft **E.Q. DL Uplift Factor:* 44.3% *DL Uplift Factor w/Wind:* 60.0%

3) OVERTURNING RESISTANCE

				Resisted	Resisted		Seismic Uplift								Wind Uplift								
Line	ID	$L_{DL\ eff.}$ (ft)	w dl (klf)	ID (#1) Above	ID (#2) Above	L_{ARM} (ft)	OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Ω	Add'l U (k)	Add'l U_{sum} (kip)	OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Add'l U (k)	Add'l U_{sum} (kip)	**Max. U_{sum} (kip)**	HD
D	L2.D.1	6.4	0.15	-	-	4.17	4.68	2.36	2.32	0	2.32	1.00	0	**0.56**	14.85	2.70	12.15	0	12.15	0	**2.91**	**2.91**	MST48
G	L2.G.1	17.4	0.15	-	-	15.13	2.64	22.25	-19.61	0	-19.61	1.00	0	**-1.30**	8.35	25.39	-17.04	0	-17.04	0	**-1.13**	**-1.13**	NONE
F	L2.F.1	12.5	0.15	-	-	10.26	3.66	10.94	-7.28	0	-7.28	1.00	0	**-0.71**	11.60	12.49	-0.89	0	-0.89	0	**-0.09**	**-0.09**	NONE
									Σ=	0.00	-24.57												

Holdown Ctr. Offset from SW End: 3 in

SHEET TITLE: **7.5.2) LATERAL N-S (front to back - up/down)**
CT PROJECT # : Sterba Addition

Diaph. Level: **2nd**
Direction: **N-S**
Typ. Panel Height = 8 ft.

Seismic V i = 0.4 kips
Sum Seismic V i = 2.2 kips
Design Wind N-S V i = 0.0 kips
Sum Wind N-S V i = 5.8 kips

1) DISTRIBUTION TO SHEAR LINES

Line	Trib % E	W	V level E [k]	V level W [k]	Above Line Load 1st Line	Trib	2nd Line	Trib.	V abv. E [k]	V abv. W [k]	V total E [k]	V total W [k]	Line L [ft]	Uniform Shear, v E [plf]	Uniform Shear, v W [plf]
A	25%	25%	0.098	0	A	100%	-	100%	0.46	1.45	0.56	1.45	0		
D	32%	32%	0.126	0	D	100%	-	100%	0.59	1.86	0.71	1.86	9.54	75	195
F	25%	25%	0.098	0	F	100%	-	100%	0.46	1.45	0.56	1.45	6	93	242
G	18%	18%	0.071	0	G	100%	-	100%	0.33	1.04	0.40	1.04	15.38	26	68
		Σ=	0.39	0.00				Σ=	1.83	5.80	2.22	5.80			
		Balance Check:	ok	ok				Balance Check:	ok	ok	ok	ok			

2) DISTRIBUTION TO SHEARWALLS

Line	ID	Lwall (ft)	C_0	Lwall' (ft)	H_{WALL} (ft)	E.Q. v (plf)	E.Q. V (k)	E.Q. Amplifiers ρ	E.Q. Amplifiers 2w/h[1]	E.Q. v' (plf)	**E.Q. Type**	**Wind Type**	Wind v (plf)	Wind V (k)
D	L1.D.1	9.54	1.00	9.54	8.00	75	0.71		1.00	***75***	**P6TN**	**P6**	***195***	1.86
F	L1.F.1	6	1.00	6.00	8.00	93	0.56		1.00	***93***	**P6TN**	**P6**	***242***	1.45
G	L1.G.1	15.38	1.00	15.38	8.00	26	0.40		1.00	***26***	**P6TN**	**P6TN**	***68***	1.04
								ρ= 1.00						

[1] Table 4.3.4 AF&PA SDPWS, Footnote 1

Flr. Thk. (Add to OTM arm): 1.0 ft **E.Q. DL Uplift Factor:* 44.3% *DL Uplift Factor w/Wind:* 60.0%

3) OVERTURNING RESISTANCE

Line	ID	$L_{DL\ eff.}$ (ft)	w dl (klf)	Resisted ID (#1)	Resisted ID (#2)	L_{ARM} (ft)	**Seismic Uplift** OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Ω	Add'l U (k)	U_{sum} (kip)	**Wind Uplift** OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Add'l U (k)	U_{sum} (kip)	**Max. U_{sum} (kip)**	HD
D	L1.D.1	11.5	0.15	L2.D.1	-	9.29	6.40	9.16	-2.76	2.32	-0.44	1.00	0	**-0.05**	16.70	10.46	6.25	12.15	18.40	0	**1.98**	**1.98**	**STHD14**
F	L1.F.1	8.0	0.15	L2.F.1	-	5.75	5.00	3.99	1.01	-7.28	-6.27	1.00	0	**-1.09**	13.05	4.56	8.49	-0.89	7.60	0	**1.32**	**1.32**	**STHD14**
G	L1.G.1	17.4	0.15	L2.G.1	-	15.13	3.60	22.25	-18.64	-19.61	-38.26	1.00	0	**-2.53**	9.40	25.39	-16.00	-17.04	-33.04	0	**-2.18**	**-2.18**	**NONE**
									Σ=	-24.57	-44.97												

Holdown Ctr. Offset from SW End: 3 in

SHEET TITLE: **7.6.1) LATERAL E-W (side to side - left/right)**
CT PROJECT # : Sterba Addition

Diaph. Level: **Roof**
Direction: **E-W**
Typ. Panel Height = **8** ft.

Seismic V i = 1.83 kips **Design Wind E-W V i = 4.60 kips**
Sum Seismic V i = 1.83 kips **Sum Wind E-W V i = 4.60 kips**

1) DISTRIBUTION TO SHEAR LINES

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
	Trib %		V level		Above Line Load				V abv.		V total		Line	Uniform Shear, v	
Line	E	W	E [k]	W [k]	1st Line	Trib	2nd Line	Trib.	E [k]	W [k]	E [k]	W [k]	L [ft]	E [plf]	W [plf]
2	18%	18%	0.329	0.828	-	100%	-	100%	-	0	0.33	0.83	0		
2.5	30%	30%	0.549	1.38	-	100%	-	100%	-	0	0.55	1.38	11.62	47	119
3	33%	33%	0.604	1.518	-	100%	-	100%	-	0	0.60	1.52	0		
5	19%	19%	0.348	0.874	-	100%	-	100%	-	0	0.35	0.87	5.82	60	150
		Σ=	1.83	4.60				Σ=	0.00	0.00	1.83	4.60			
		Balance Check:	ok	ok				Balance Check:	ok	ok	ok	ok			

2) DISTRIBUTION TO SHEARWALLS

Line	ID	Lwall (ft)	C_0	Lwall' (ft)	H_{WALL} (ft)	E.Q. v (plf)	E.Q. V (k)	E.Q. Amplifiers ρ	E.Q. Amplifiers $2w/h^{(\perp)}$	E.Q. v' (plf)	E.Q. Type	Wind Type	Wind v (plf)	Wind V (k)
5	L2.G5.2	2.91	1.00	2.91	8.66	60	0.17		1.49	***89***	P6TN	P6TN	***150***	0.437
5	L2.G5.1	2.91	1.00	2.91	8.66	60	0.17		1.49	***89***	P6TN	P6TN	***150***	0.437
2.5	L2.G25.1	11.62	1.00	11.62	8.00	47	0.55		1.00	***47***	P6TN	P6TN	***119***	1.38

ρ = 1.00

(⊥)Table 4.3.4 AF&PA SDPWS, Footnote 1

Flr. Thk. (Add to OTM arm): 0.0 ft **E.Q. DL Uplift Factor:* 44.3% *DL Uplift Factor w/Wind:* 60.0%

3) OVERTURNING RESISTANCE

							Seismic Uplift								Wind Uplift								
Line	ID	$L_{DL\ eff.}$ (ft)	w dl (klf)	Resisted Above (#1)	Resisted Above (#2)	L_{ARM} (ft)	OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Ω	Add'l U (k)	U_{sum} (kip)	OTM (kip-ft)	Reduced R_{OTM} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Add'l U (k)	U_{sum} (kip)	**Max. U_{sum} (kip)**	HD
5	L2.G5.2	4.9	0.20	-	-	2.66	1.51	1.35	0.16	0	0.16	1.00	0	**0.06**	3.78	1.57	2.21	0	2.21	0	**0.83**	**0.83**	**MST48**
5	L2.G5.1	4.9	0.20	-	-	2.66	1.51	1.35	0.16	0	0.16	1.00	0	**0.06**	3.78	1.57	2.21	0	2.21	0	**0.83**	**0.83**	**MST48**
2.5	L2.G25.1	13.6	0.20	-	-	11.37	4.39	14.92	-10.53	0	-10.53	1.00	0	**-0.93**	11.04	17.41	-6.37	0	-6.37	0	**-0.56**	**-0.56**	**NONE**
									Σ=	0.00	-10.22												

Holdown Ctr. Offset from SW End: 3 in

SHEET TITLE: **7.6.2) LATERAL E-W (side to side - left/right)**
CT PROJECT # : Sterba Addition

Diaph. Level: **2nd**
Direction: **E-W**
Typ. Panel Height = **8** ft.

Seismic V i = 0.4 kips **Design Wind E-W V i = 4.8 kips**
Sum Seismic V i = 2.2 kips **Sum Wind E-W V i = 9.4 kips**

1) DISTRIBUTION TO SHEAR LINES

Line	Trib % E	Trib % W	V level E [k]	V level W [k]	Above Line Load 1st Line	Trib	2nd Line	Trib.	V abv. E [k]	V abv. W [k]	V total E [k]	V total W [k]	Line L [ft]	Uniform Shear, v E [plf]	Uniform Shear, v W [plf]
2	18%	18%	0.071	0.864	2	100%	-	100%	0.33	0.83	0.40	1.69	0		
2.5	30%	30%	0.118	1.44	2.5	100%	-	100%	0.55	1.38	0.67	2.82	6.13	109	460
3	33%	33%	0.13	1.584	3	100%	-	100%	0.60	1.52	0.73	3.10	0		
5	19%	19%	0.075	0.912	5	100%	-	100%	0.35	0.87	0.42	1.79	5.82	73	307
		Σ=	0.39	4.80				Σ=	1.83	4.60	2.22	9.40			
		Balance Check:	ok	ok				Balance Check:	ok	ok	ok	ok			

2) DISTRIBUTION TO SHEARWALLS

Line	ID	Lwall (ft)	C_0	Lwall' (ft)	H_{WALL} (ft)	E.Q. v (plf)	E.Q. V (k)	E.Q. Amplifiers ρ	E.Q. Amplifiers $2w/h^{(\perp)}$	E.Q. v' (plf)	E.Q. Type	Wind Type	Wind v (plf)	Wind V (k)
5	L1.G5.1	2.91	1.00	2.91	8.00	73	0.21		1.37	***100***	P6TN	P6	***307***	0.89
5	L1.G5.2	2.91	1.00	2.91	8.00	73	0.21		1.37	***100***	P6TN	P6	***307***	0.89
2.5	L2.G25.1	6.13	1.00	6.13	8.00	109	0.67		1.00	***109***	P6TN	P4	***460***	2.82

ρ = **1.00**

(⊥)Table 4.3.4 AF&PA SDPWS, Footnote 1

Flr. Thk. (Add to OTM arm): 1.0 ft **E.Q. DL Uplift Factor:* 44.3% *DL Uplift Factor w/Wind:* 60.0%

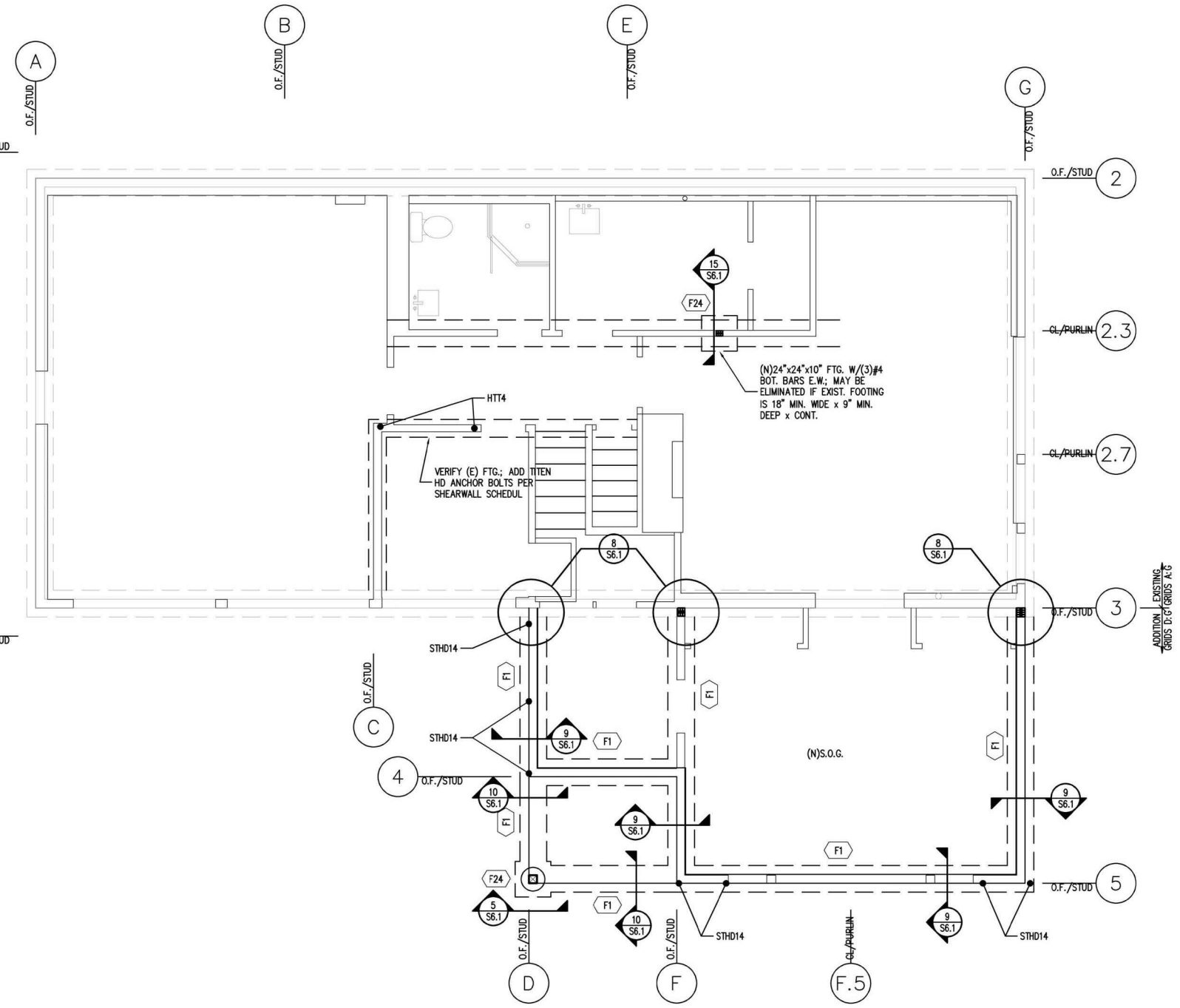
3) OVERTURNING RESISTANCE

							Seismic Uplift								Wind Uplift								
Line	ID	$L_{DL\ eff.}$ (ft)	w dl (klf)	Resisted ID (#1) Above	Resisted ID (#2) Above	L_{ARM} (ft)	OTM (kip-ft)	Reduced R_{OTN}* (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Ω	Add'l U (k)	U_{sum} (kip)	OTM (kip-ft)	Reduced R_{OTN} (kip-ft)	Net OTM Level (kip-ft)	Net OTM Abv. (kip-ft)	Net OTM Total (kip-ft)	Add'l U (k)	U_{sum} (kip)	**Max. U_{sum} (kip)**	HD
5	L1.G5.1	4.9	0.20	L2.G5.2	-	2.66	1.90	1.35	0.55	0.16	0.71	1.00	0	**0.27**	8.04	1.57	6.47	2.21	8.68	0	**3.26**	**3.26**	STHD14
5	L1.G5.2	4.9	0.20	L2.G5.1	-	2.66	1.90	1.35	0.55	0.16	0.71	1.00	0	**0.27**	8.04	1.57	6.47	2.21	8.68	0	**3.26**	**3.26**	STHD14
2.5	L2.G25.1	8.1	0.20	L2.G25.1	-	5.88	6.00	4.70	1.30	-10.53	-9.23	1.00	0	**-1.57**	25.38	5.48	19.90	-6.37	13.53	0	**2.30**	**2.30**	STHD14
									Σ=	-10.22	-7.81												

Holdown Ctr. Offset from SW End: 3 in

CT ENGINEERING INC.

CALCULATION SECTION 8.0: FOUNDATION ENGINEERING



Foundation Plan

SCALE: 1/4" = 1'-0"

PROJECT NORTH (REFERENCE ONLY)

FIG. 8.0

FOUNDATION KEYPLAN

CT ENGINEERING INC.

180 Nickerson St.
Suite 302
Seattle, WA
98109
(206) 285-4512
FAX:
(206) 285-0618

Project: STERBA 21056 Date: 5/13/21

Client: FNDN. Page Number:

FND. @ (3.1), LOC. (F&G)

RB3 RXN: 2.6^{K}

$A = \frac{2.6}{1.5} = 1.74^{\square}$ REQ

$\equiv 18" \times 14"$

OK ON 18" WIDE x CONT. FTG.

FTG @ (D.5)

ROOF: 705#

DECK: 1613#

2318#

$\frac{2,318}{1500} = 1.54$