CORRECTIONS

Mercer Residence

6950 SE Maker Street
Mercer Island, WA 98040

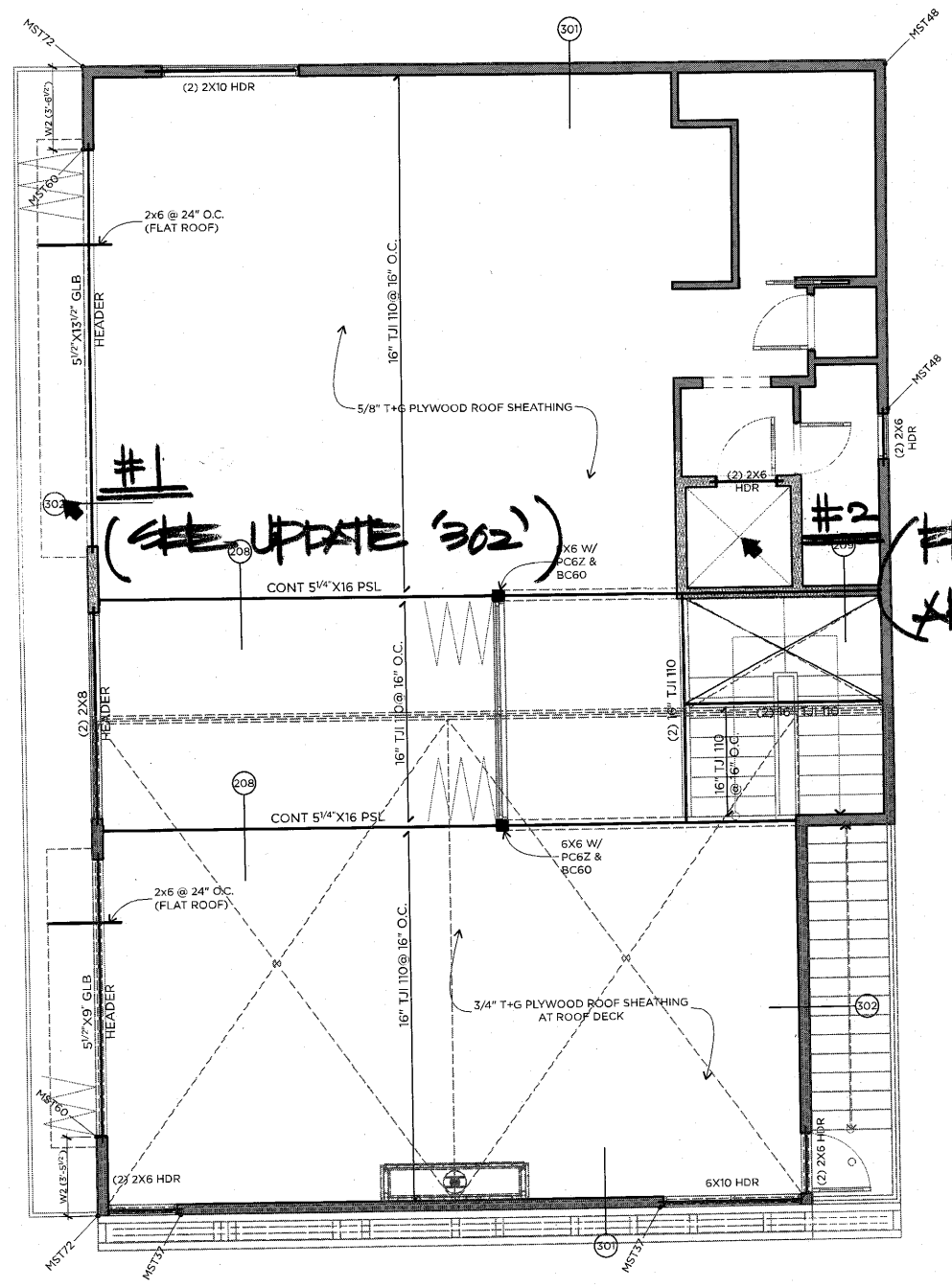
PROJECT NO.: 2207-19
DATE: January 25, 2023

D. S. Engineering
Consulting Structural Engineers

3121 147th Place SE
Mill Creek, WA 98012
T: 425-338-4776

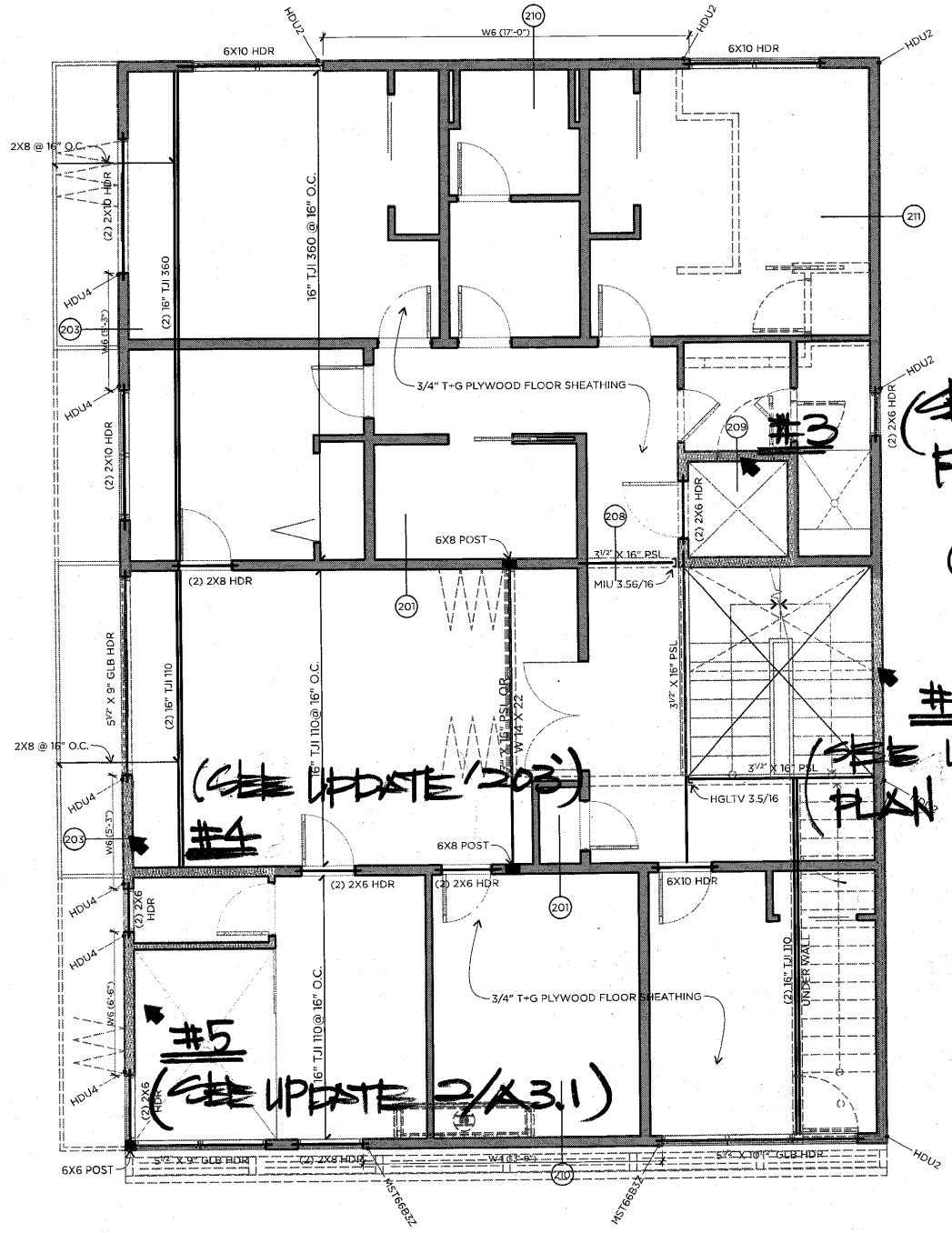
01/25/2023

00466



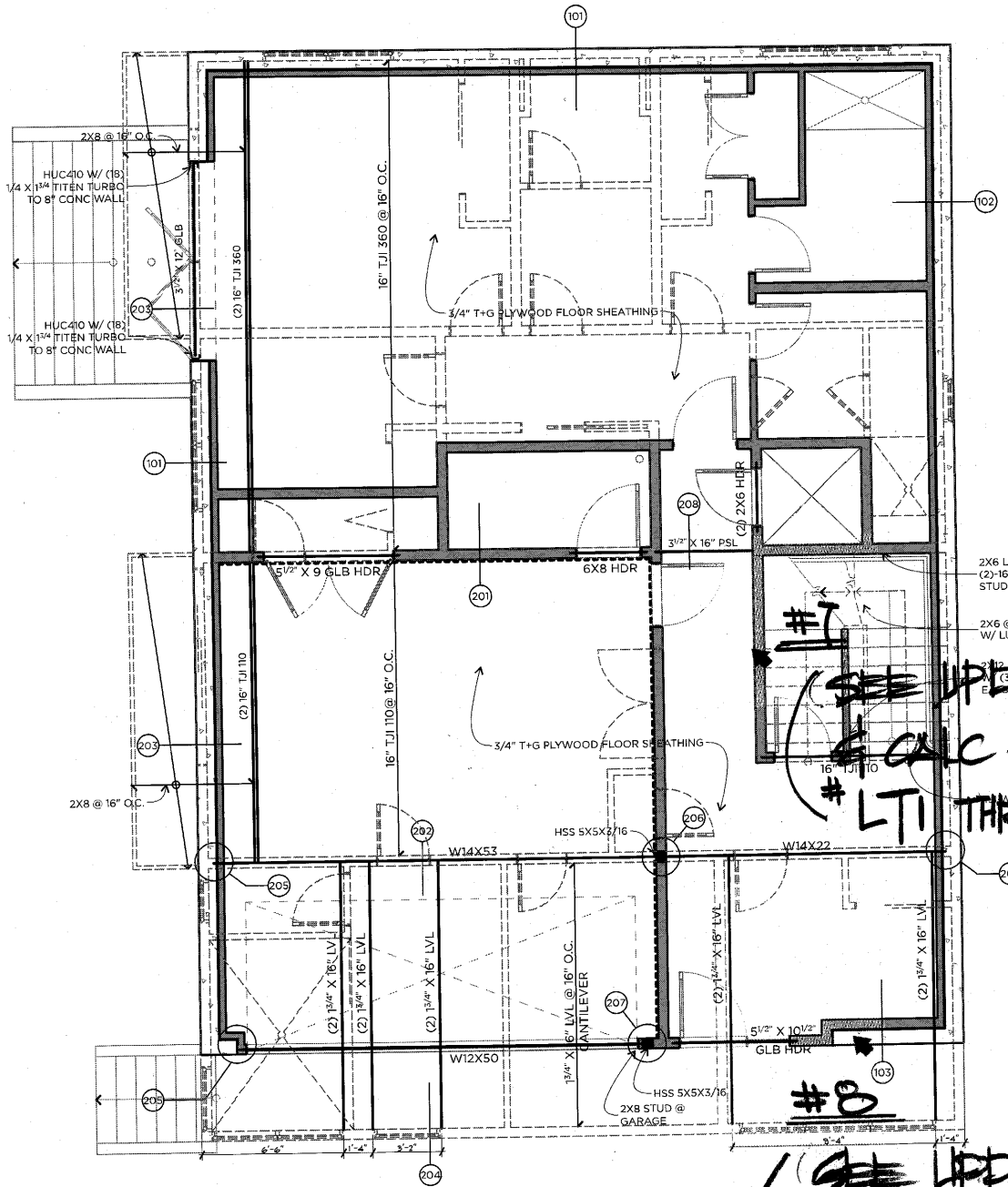
ROOF FRAMING

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



SECOND FLOOR FRAMING

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

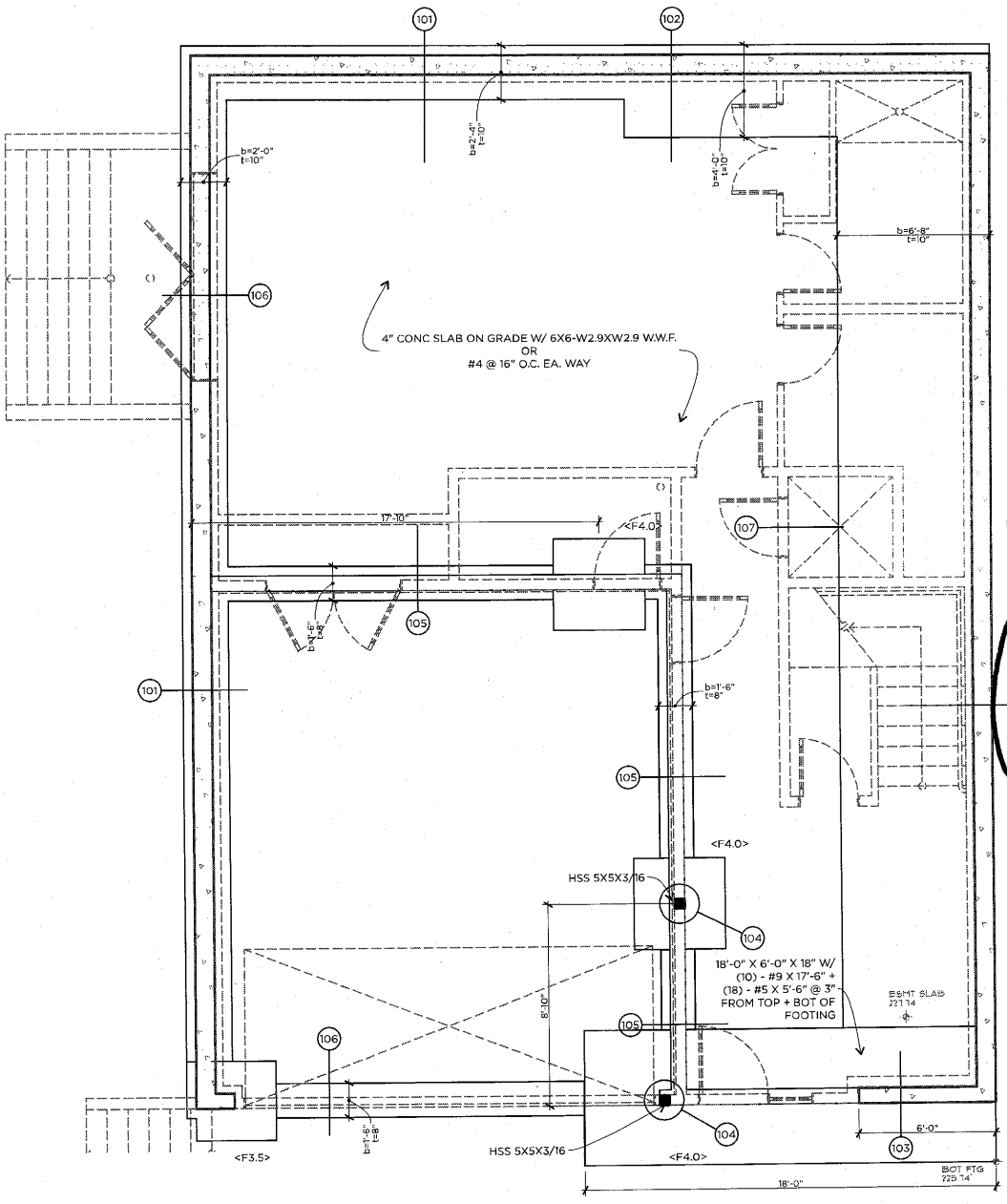


FIRST FLOOR FRAMING

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

#7 (SEE UPDATE PLAN & CALC SHT #LT1 THRU #LT9

#8 (SEE UPDATE PLAN & DETAIL '20' & CALC SHT. #LT11 & #LT12

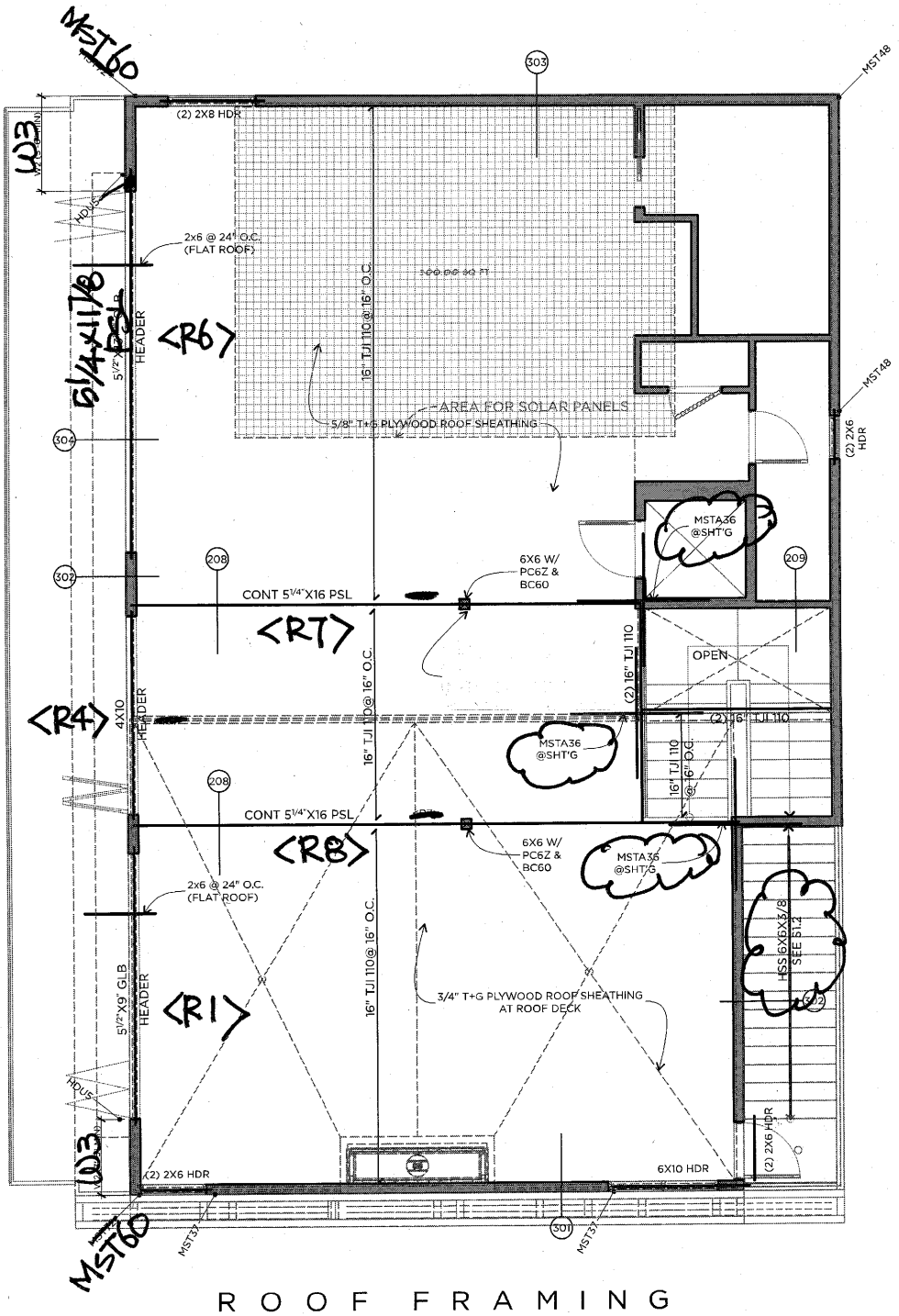


#9
SEE UPDATE
EAST WALL
@ S1.1

FOUNDATION PLAN

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

Design Analysis



ROOF FRAMING

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

00472

R1

Wood Beam

Project File: ENERCALC_20

LIC# : KW-06015335, Build:20.22.12.28 D.S. ENGINEERING PC (c) ENERCALC INC 1983-2022

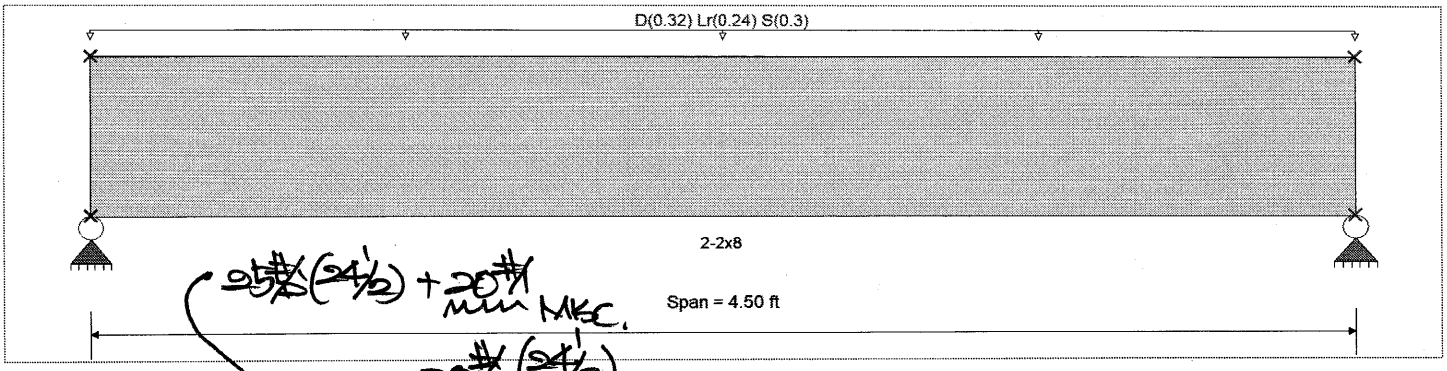
DESCRIPTION: header

CODE REFERENCES (@ NORTH WALL)

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	850 psi	Ebend- xx	1300ksi
		Fc - Prll	1300 psi	Eminbend - xx	470ksi
Wood Species :	Hem-Fir	Fc - Perp	405 psi		
Wood Grade :	No.2	Fv	150 psi		
		Ft	525 psi	Density	26.84pcf
Beam Bracing :	Completely Unbraced				



25#/ft (24'/2) + 20#/ft MISC.
20#/ft (24'/2)
25#/ft (24'/2)

Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.320, Lr = 0.240, S = 0.30 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.622 1	Maximum Shear Stress Ratio	=	0.414 : 1
Section used for this span		**2-2x8**	Section used for this span		**2-2x8**
fb: Actual	=	721.26psi	fv: Actual	=	71.39 psi
F'b	=	1,160.10psi	F'v	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.250ft	Location of maximum on span	=	3.909ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.022 in	Ratio =	2402 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.047 in	Ratio =	1154 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0468	2.266		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.404	1.404
Max Upward from Load Combinations	1.404	1.404
Max Upward from Load Cases	0.729	0.729
D Only	0.729	0.729
+D+Lr	1.269	1.269
+D+S	1.404	1.404
+D+0.750Lr	1.134	1.134
+D+0.750S	1.235	1.235
+0.60D	0.437	0.437
Lr Only	0.540	0.540

DESCRIPTION: header

Vertical Reactions (@ NORTH WALL) Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
S Only	0.675	0.675

DESCRIPTION: header <R1>

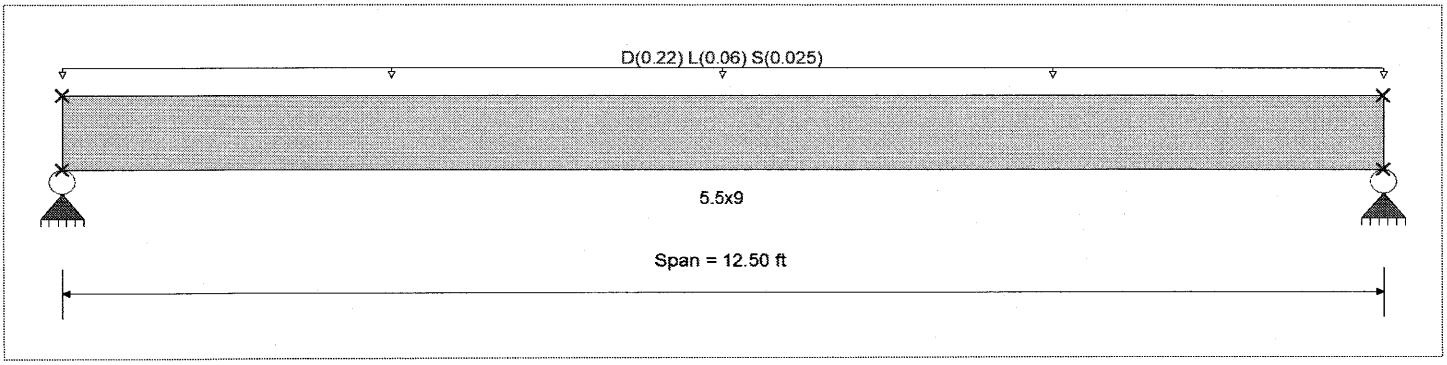
CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design
Load Combination :	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Completely Unbraced

		E : Modulus of Elasticity	
Fb +	2400 psi	Ebend- xx	1800 ksi
Fb -	1850 psi	Eminbend - xx	950 ksi
Fc - Prll	1650 psi	Ebend- yy	1600 ksi
Fc - Perp	650 psi	Eminbend - yy	850 ksi
Fv	265 psi	Density	31.21 pcf
Ft	1100 psi		



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.220, L = 0.060, S = 0.0250 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.386 : 1	Maximum Shear Stress Ratio	=	0.184 : 1
Section used for this span		**5.5x9**	Section used for this span		**5.5x9**
fb: Actual	=	917.70 psi	fv: Actual	=	48.63 psi
F'b	=	2,375.48 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.250 ft	Location of maximum on span	=	11.770 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.055 in	Ratio =	2721 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.271 in	Ratio =	554 >=180	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.2705	6.296		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.840	1.840
Max Upward from Load Combinations	1.840	1.840
Max Upward from Load Cases	1.442	1.442
D Only	1.442	1.442
+D+L	1.817	1.817
+D+Lr	1.442	1.442
+D+S	1.598	1.598
+D+0.750Lr+0.750L	1.723	1.723
+D+0.750L+0.750S	1.840	1.840
+0.60D	0.865	0.865

R4

DESCRIPTION: header <R1>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
L Only	0.375	0.375
S Only	0.156	0.156

DESCRIPTION: header <R4>

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

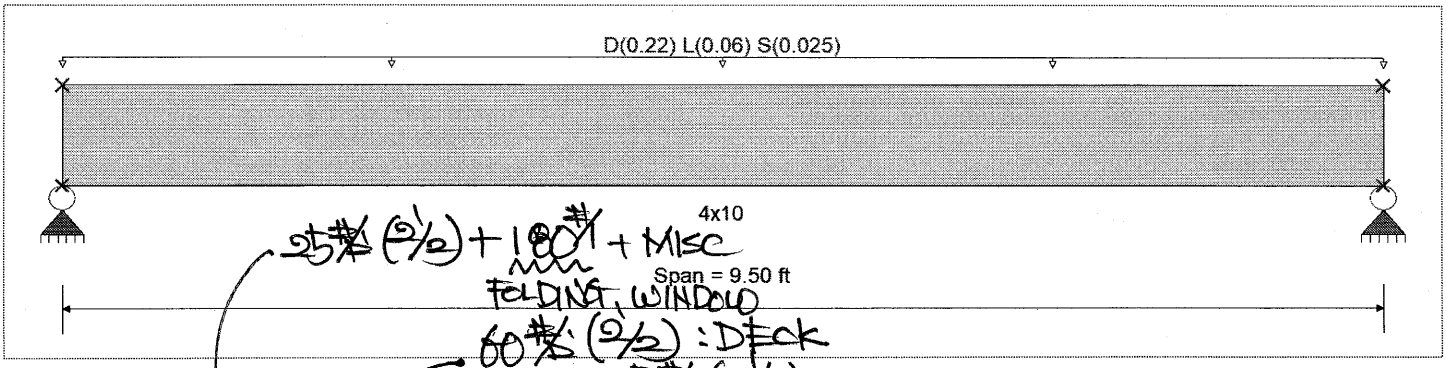
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

Wood Species : Hem-Fir
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb +	850 psi	*E : Modulus of Elasticity*	
Fb -	850 psi	Ebend- xx	1300 ksi
Fc - Prll	1300 psi	Eminbend - xx	470 ksi
Fc - Perp	405 psi		
Fv	150 psi		
Ft	525 psi	Density	26.84 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.220, L = 0.060, S = 0.0250 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.776 : 1	Maximum Shear Stress Ratio	=	0.352 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	775.81 psi	fv: Actual	=	52.84 psi
Fb: Allowable	=	999.98 psi	Fv: Allowable	=	150.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.750 ft	Location of maximum on span	=	8.737 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.037 in	Ratio =	3093 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.178 in	Ratio =	640 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1780	4.785		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.503	1.503
Overall MINimum	0.119	0.119
+1.40D	1.503	1.503
+D+L	1.359	1.359
+D+Lr	1.074	1.074
+D+S	1.192	1.192
+D+0.750Lr+0.750L	1.287	1.287
+D+0.750L+0.750S	1.376	1.376
D Only	1.074	1.074
+0.60D	0.644	0.644

DESCRIPTION: header <R4>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
L Only	0.285	0.285
S Only	0.119	0.119

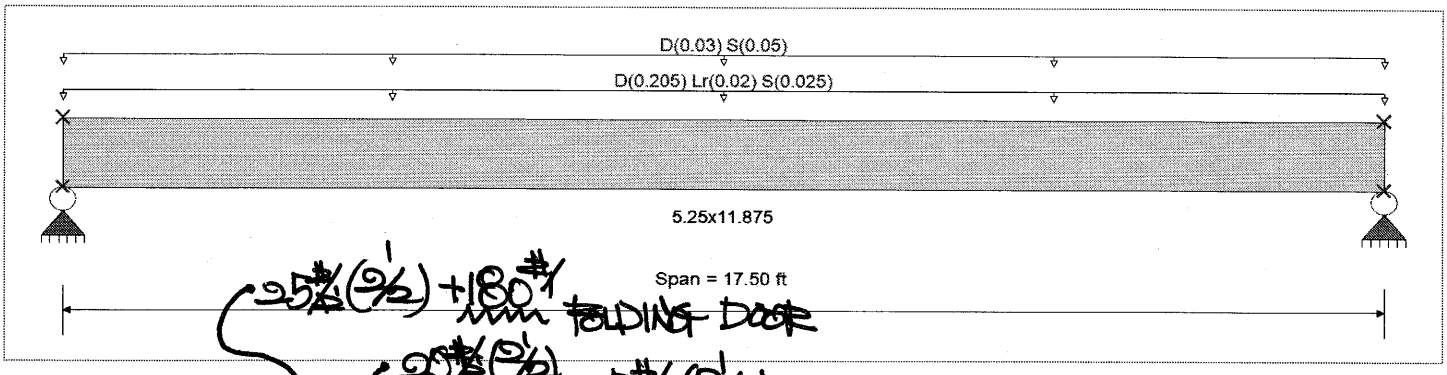
DESCRIPTION: header <R6>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	2900 psi	Ebend- xx	2200 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1118.19 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.2E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.2050, Lr = 0.020, S = 0.0250 , Tributary Width = 1.0 ft
Uniform Load : D = 0.030, S = 0.050 , Tributary Width = 1.0 ft, (from flat roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.380 : 1	Maximum Shear Stress Ratio	=	0.185 : 1	
Section used for this span		**5.25x11.875**	Section used for this span		**5.25x11.875**	
fb: Actual	=	1,226.77 psi	fv: Actual	=	61.78 psi	
F'b	=	3,230.81 psi	F'v	=	333.50 psi	
Load Combination		+D+S	Load Combination		+D+S	
Location of maximum on span	=	8.750 ft	Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.099 in	Ratio =	2126 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.434 in	Ratio =	483 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4339	8.814		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.883	2.883
Max Upward from Load Combinations	2.883	2.883
Max Upward from Load Cases	2.227	2.227
D Only	2.227	2.227
+D+Lr	2.402	2.402
+D+S	2.883	2.883
+D+0.750Lr	2.358	2.358
+D+0.750S	2.719	2.719
+0.60D	1.336	1.336

DESCRIPTION: header <R6>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Lr Only	0.175	0.175
S Only	0.656	0.656

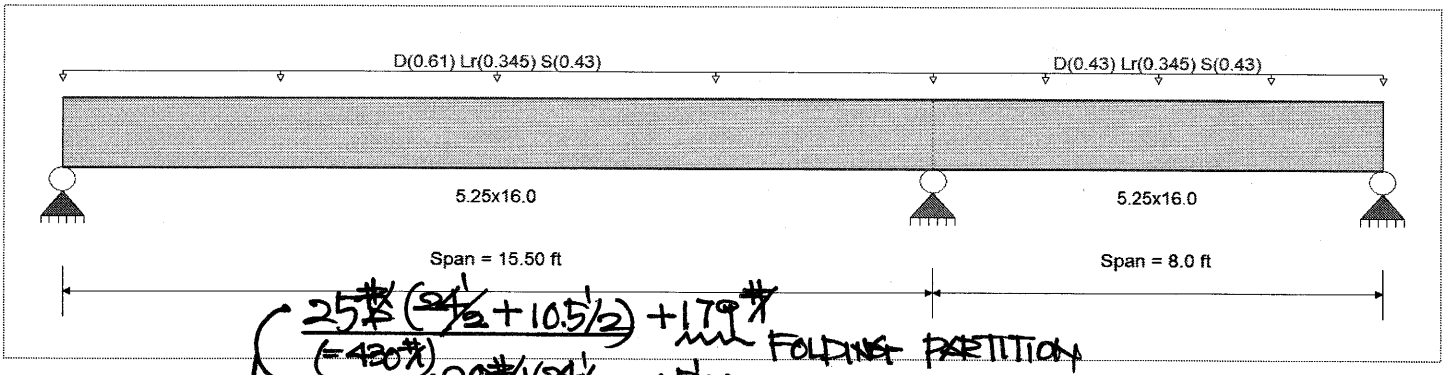
DESCRIPTION: <R7>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	2900 psi	Ebend- xx	2200 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1118.19 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.2E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.610, Lr = 0.3450, S = 0.430 , Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.430, Lr = 0.3450, S = 0.430 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.390 : 1	Maximum Shear Stress Ratio	=	0.450 : 1
Section used for this span		**5.25x16.0**	Section used for this span		**5.25x16.0**
fb: Actual	=	1,260.78 psi	fv: Actual	=	149.95 psi
F'b	=	3,230.19 psi	F'v	=	333.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	15.500 ft	Location of maximum on span	=	14.201 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.080 in	Ratio =	2333 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.008 in	Ratio =	11701 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.201 in	Ratio =	926 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.023 in	Ratio =	4134 >=180	Span: 2 : +D+S

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2008	7.101		0.0000	0.000
	2	0.0000	7.101	+D+S	-0.0232	2.860

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	6.745	16.269	0.603
Max Upward from Load Combinations	6.745	16.269	0.603
Max Upward from Load Cases	4.038	9.380	0.509
D Only	4.038	9.380	0.094
+D+Lr	6.210	14.907	0.503
+D+S	6.745	16.269	0.603

DESCRIPTION: <R7>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr	5.667	13.526	0.401
+D+0.750S	6.069	14.547	0.476
+0.60D	2.423	5.628	0.057
Lr Only	2.172	5.527	0.408
S Only	2.707	6.889	0.509

DESCRIPTION: beam <R8>

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

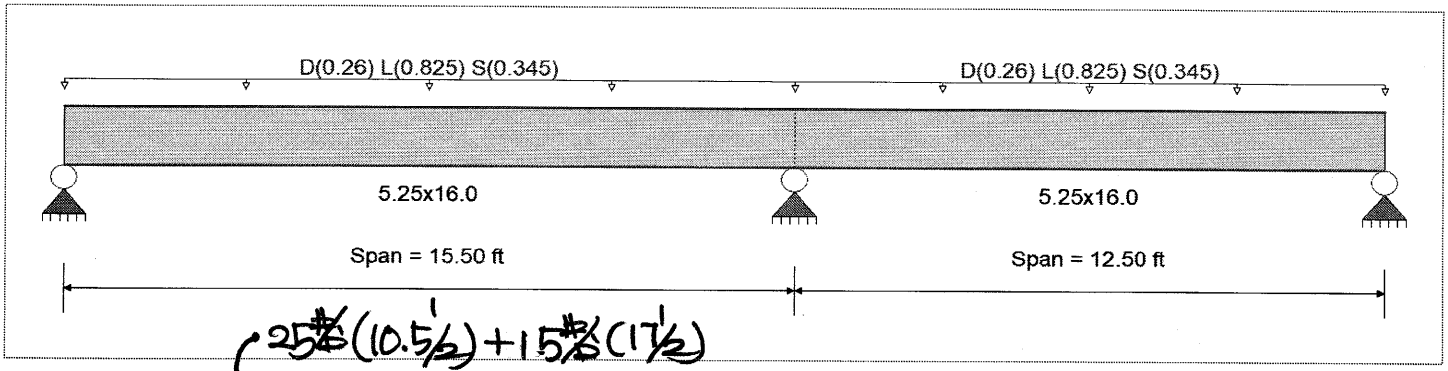
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.2E

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

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	750 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2200 ksi
Eminbend - xx	1118.19 ksi
Density	45.07 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.260, L = 0.8250, S = 0.3450 , Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.260, L = 0.8250, S = 0.3450 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.537 : 1	Maximum Shear Stress Ratio	=	0.553 : 1
Section used for this span		**5.25x16.0**	Section used for this span		**5.25x16.0**
fb: Actual	=	1,508.80 psi	fv: Actual	=	160.47 psi
Fb: Allowable	=	2,808.86 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	15.500 ft	Location of maximum on span	=	14.201 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.138 in	Ratio =	1345 >=360
Max Upward Transient Deflection	-0.005 in	Ratio =	29676 >=360
Max Downward Total Deflection	0.195 in	Ratio =	953 >=240
Max Upward Total Deflection	-0.007 in	Ratio =	21037 >=240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1951	6.841		0.0000	0.000
+D+0.750L+0.750S	2	0.0412	7.891	+D+0.750L+0.750S	-0.0071	1.187

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	7.116	20.556	4.914
Overall MINimum	2.110	6.094	1.457
+1.40D	2.451	7.079	1.692
+D+L	6.795	19.628	4.692
+D+Lr	1.751	5.057	1.209
+D+S	3.860	11.150	2.666

DESCRIPTION: beam <R8>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+0.750Lr+0.750L	5.534	15.985	3.822
+D+0.750L+0.750S	7.116	20.556	4.914
D Only	1.751	5.057	1.209
+0.60D	1.050	3.034	0.725
L Only	5.045	14.572	3.484
S Only	2.110	6.094	1.457

DESCRIPTION: under <R8>

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	750 psi	Fv	170 psi
Fb -	750 psi	Ft	475 psi
Fc - Prll	700 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	470	470	

Wood Section Name	**6x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**5.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.0
Area	30.250 in^2	Cf or Cv for Compressio	1.0
Ix	76.255 in^4	Cf or Cv for Tension	1.0
Iy	76.255 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Fully braced against buckling ABOUT X-X Axis

Applied Loads

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

Column self weight included : 65.563 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 5.057, L = 14.572, S = 6.094 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9301 : 1**

Load Combination	+D+L
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	19.695 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	700.0 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	1.000	0.2688	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	1.000	0.9301	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.4606	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L	1.250	1.000	0.6064	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S	1.150	1.000	0.8469	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D	1.600	1.000	0.09072	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					5.123				

DESCRIPTION: under <R8>

Maximum Reactions

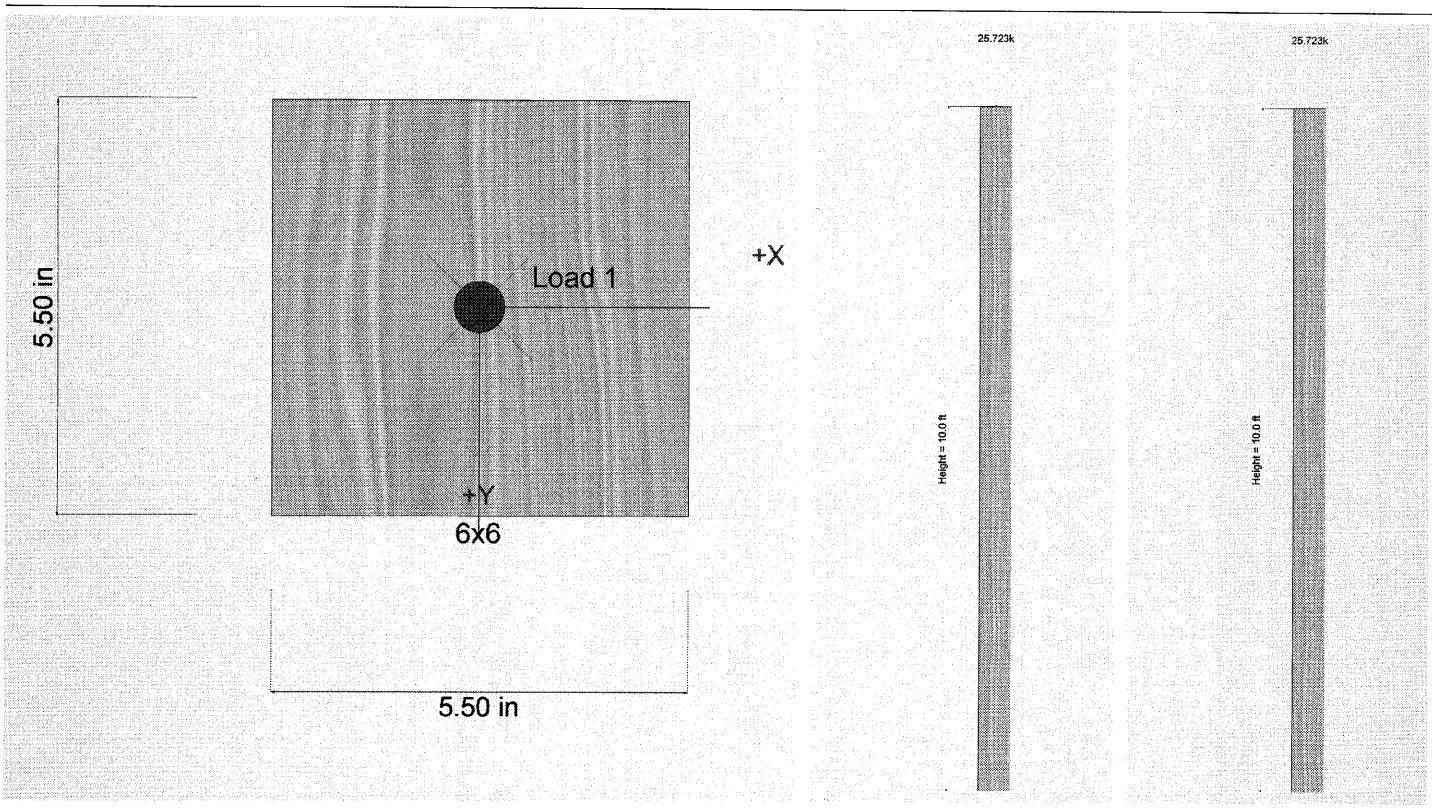
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+L						19.695				
+D+S						11.217				
+D+0.750L						16.052				
+D+0.750L+0.750S						20.622				
+0.60D						3.074				
L Only						14.572				
S Only						6.094				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000ft
+D+0.750L+0.750S	0.0000 in	0.000ft	0.000 in	0.000ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000ft
L Only	0.0000 in	0.000ft	0.000 in	0.000ft
S Only	0.0000 in	0.000ft	0.000 in	0.000ft

Sketches



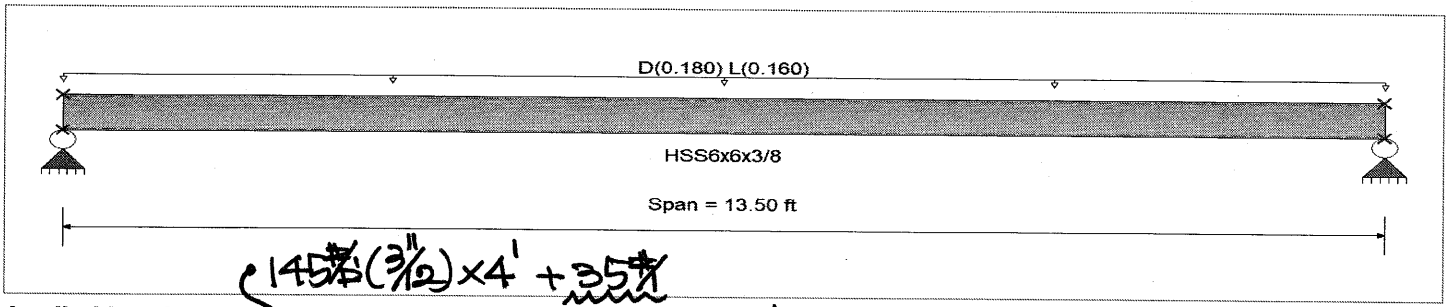
DESCRIPTION: stair (outside)

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.180, L = 0.160 k/ft, Tributary Width = 1.0 ft, (3" max. concrete tread)

40#/ft x4'

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.231 : 1	Maximum Shear Stress Ratio =	0.043 : 1
Section used for this span	HSS6x6x3/8	Section used for this span	HSS6x6x3/8
Ma : Applied	8.372 k-ft	Va : Applied	2.480 k
Mn / Omega : Allowable	36.267 k-ft	Vn/Omega : Allowable	57.137 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.105 in	Ratio =	1,544	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.241 in	Ratio =	673	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2408	6.789		0.0000	0.000

Vertical Reactions

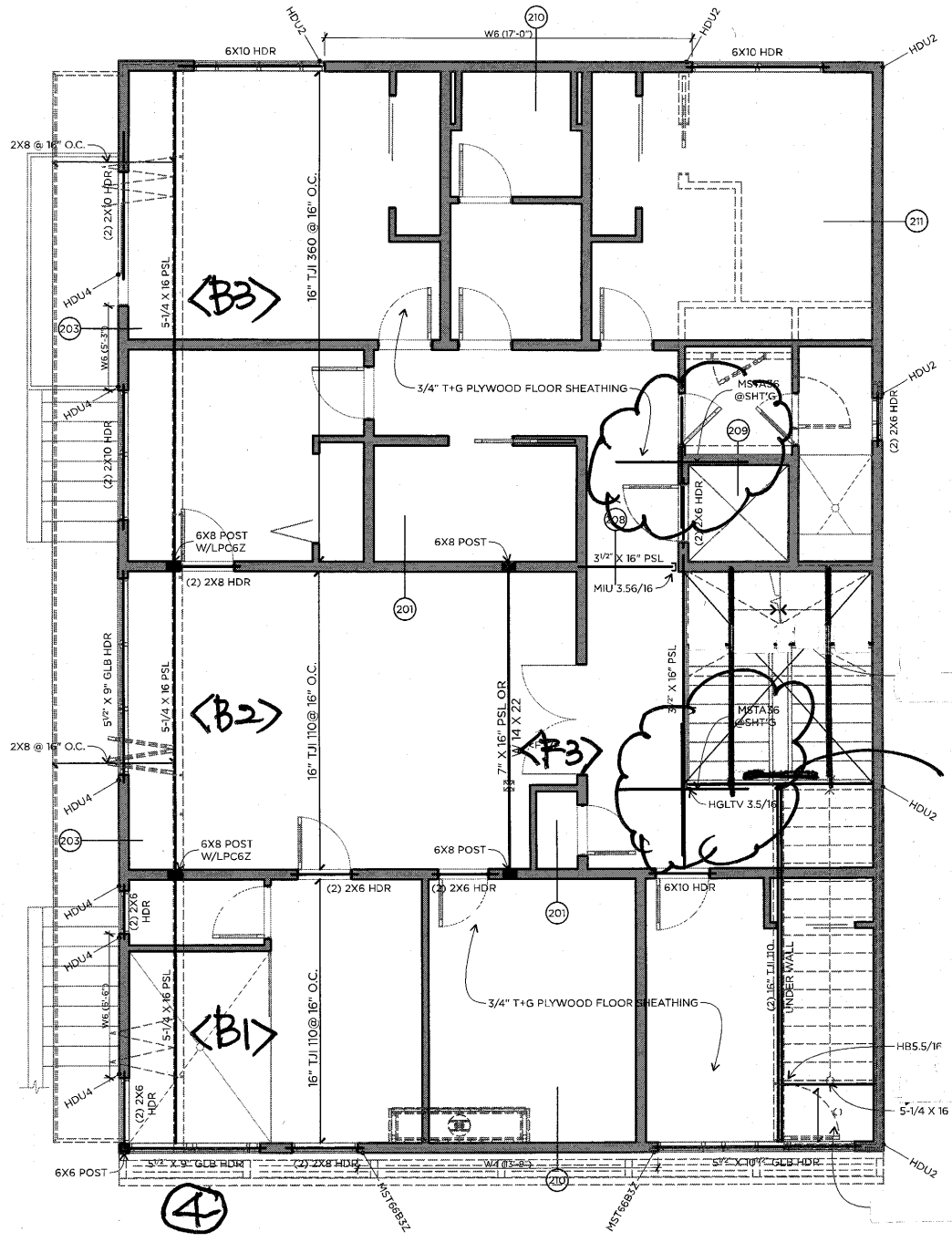
Support notation : Far left is # Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.480	2.480
Max Upward from Load Combinations	2.480	2.480
Max Upward from Load Cases	1.400	1.400
D Only	1.400	1.400
+D+L	2.480	2.480
+D+0.750L	2.210	2.210
+0.60D	0.840	0.840
L Only	1.080	1.080

DESCRIPTION: stair (outside)

Steel Section Properties : HSS6x6x3/8

Depth	=	6.000 in	I xx	=	39.50 in^4	J	=	64.600 in^4
			S xx		13.20 in^3			
Width	=	6.000 in	R xx	=	2.280 in			
Wall Thick	=	0.349 in	Zx	=	15.800 in^3			
Area	=	7.580 in^2	I yy	=	39.500 in^4	C	=	0.000 in^3
Weight	=	27.480 plf	S yy	=	13.200 in^3			
			R yy	=	2.280 in			
Ycg	=	3.000 in						



SECOND FLOOR FRAMING

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

00489 FL 1

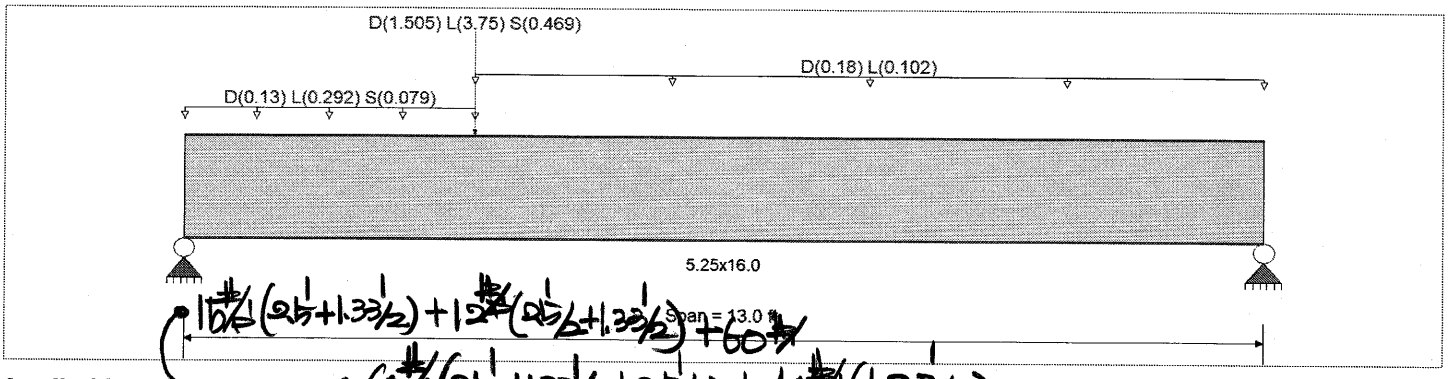
DESCRIPTION: 2nd floor <B1>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	2900 psi	Ebend- xx	2000 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16, Load Factors will be applied for calculations.
Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.130, L = 0.2920, S = 0.0790 k/ft, Extent = 0.0 -->> 3.50 ft, Tributary Width = 1.0 ft
Point Load : D = 1.505, L = 3.750, S = 0.4690 k @ 3.50 ft, (from <R5>)
Uniform Load : D = 0.180, L = 0.1020 k/ft, Extent = 3.50 -->> 13.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.358 : 1	Maximum Shear Stress Ratio	=	0.341 : 1
Section used for this span		**5.25x16.0**	Section used for this span		**5.25x16.0**
fb: Actual	=	1,004.39 psi	fv: Actual	=	98.87 psi
F'b	=	2,808.86 psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.511 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.086 in	Ratio =	1821 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.141 in	Ratio =	1105 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1411	6.073		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.097	3.314
Max Upward from Load Combinations	6.097	3.314
Max Upward from Load Cases	3.979	1.762
D Only	2.118	1.552
+D+L	6.097	3.314
+D+Lr	2.118	1.552
+D+S	2.700	1.715

DESCRIPTION: 2nd floor <B1>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L	5.103	2.873
+D+0.750L+0.750S	5.539	2.996
+0.60D	1.271	0.931
L Only	3.979	1.762
S Only	0.582	0.163

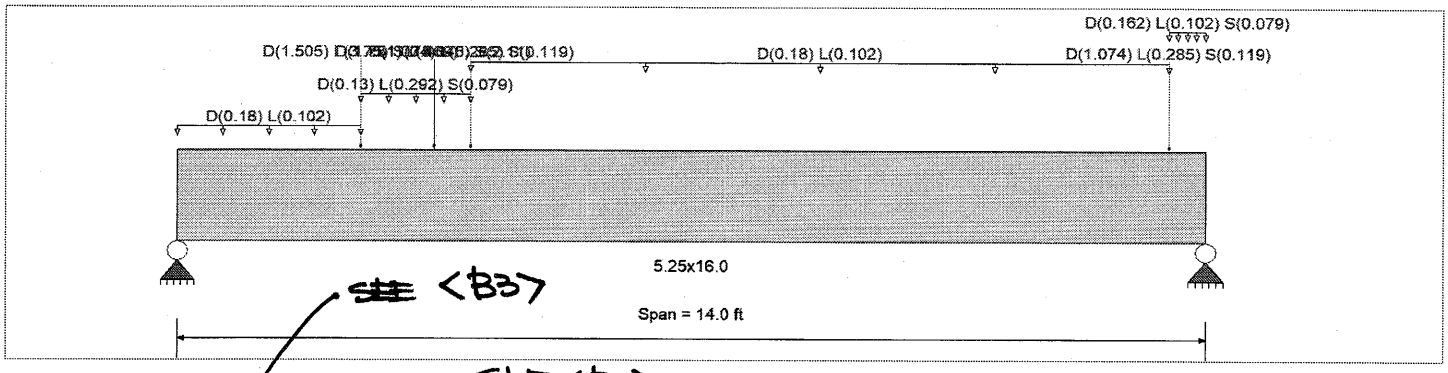
DESCRIPTION: 2nd floor <B2>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	2900 psi	Ebend- xx	2000 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.180, L = 0.1020 k/ft, Extent = 0.0 -->> 2.50 ft, Tributary Width = 1.0 ft, (folding window)
Uniform Load : D = 0.130, L = 0.2920, S = 0.0790 k/ft, Extent = 2.50 -->> 4.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.180, L = 0.1020 k/ft, Extent = 4.0 -->> 13.50 ft, Tributary Width = 1.0 ft, (folding window)
Uniform Load : D = 0.1620, L = 0.1020, S = 0.0790 k/ft, Extent = 13.50 -->> 14.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.505, L = 3.750, S = 0.4690 k @ 2.50 ft, (from <R5>)
Point Load : D = 1.751, L = 5.045, S = 2.110 k @ 3.50 ft, (from <R8>)
Point Load : D = 1.074, L = 0.2850, S = 0.1190 k @ 4.0 ft, (from <R4>)
Point Load : D = 1.074, L = 0.2850, S = 0.1190 k @ 13.50 ft, (from <R4>)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.713 : 1	Maximum Shear Stress Ratio	=	0.760 : 1
Section used for this span		**5.25x16.0**	Section used for this span		**5.25x16.0**
fb: Actual	=	2,003.85 psi	fv: Actual	=	220.40 psi
F'b	=	2,808.86 psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.526 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.189 in	Ratio =	889 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.319 in	Ratio =	526 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3188	6.387		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	12.752	6.534
Max Upward from Load Combinations	12.752	6.534

DESCRIPTION: 2nd floor <B2>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Cases	8.011	3.467
D Only	4.741	3.467
+D+L	12.752	6.534
+D+Lr	4.741	3.467
+D+S	6.890	4.293
+D+0.750Lr+0.750L	10.749	5.767
+D+0.750L+0.750S	12.361	6.387
+0.60D	2.845	2.080
L Only	8.011	3.067
S Only	2.149	0.826

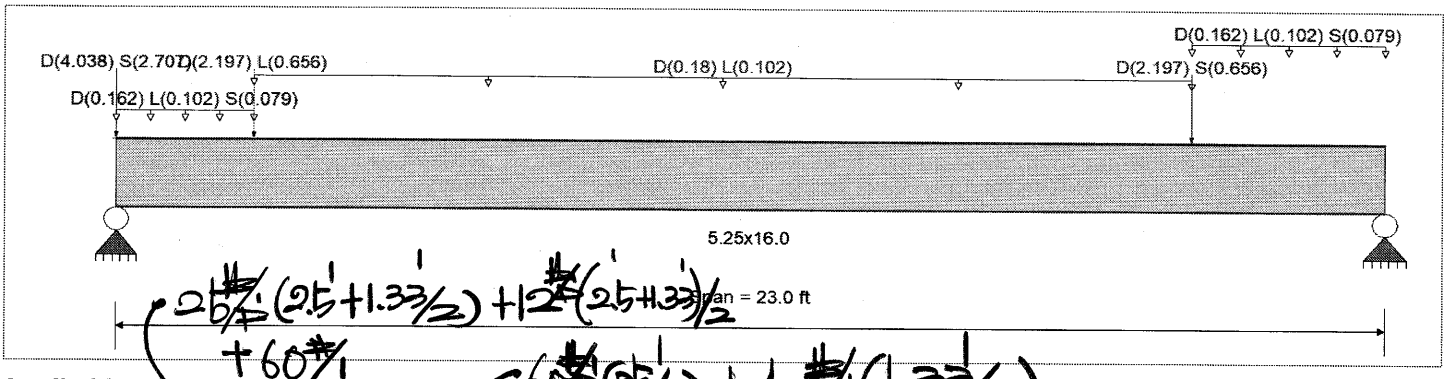
DESCRIPTION: 2nd floor <B3>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	2900 psi	Ebend- xx	2000 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Point Load : D = 4.038, S = 2.707 k @ 0.0 ft, (from <R7>)
Uniform Load : D = 0.1620, L = 0.1020, S = 0.0790 k/ft, Extent = 0.0 -->> 2.50 ft, Tributary Width = 1.0 ft
Point Load : D = 2.197, L = 0.6560 k @ 2.50 ft, (from <R6>)
Uniform Load : D = 0.180, L = 0.1020 k/ft, Extent = 2.50 -->> 19.50 ft, Tributary Width = 1.0 ft, (folding window)
Point Load : D = 2.197, S = 0.6560 k @ 19.50 ft, (from <R6>)
Uniform Load : D = 0.1620, L = 0.1020, S = 0.0790 k/ft, Extent = 19.50 -->> 23.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.495 : 1	Maximum Shear Stress Ratio	=	0.353 : 1
Section used for this span		**5.25x16.0**	Section used for this span		**5.25x16.0**
fb: Actual	=	1,391.56 psi	fv: Actual	=	102.51 psi
F'b	=	2,808.86 psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	11.584 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.206 in	Ratio =	1338 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.728 in	Ratio =	379 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.7279	11.584		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.932	5.661
Max Upward from Load Combinations	11.932	5.661
Max Upward from Load Cases	8.353	4.111
D Only	8.353	4.111
+D+L	10.111	5.355

DESCRIPTION: 2nd floor <B3>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+Lr	8.353	4.111
+D+S	11.368	4.933
+D+0.750Lr+0.750L	9.671	5.044
+D+0.750L+0.750S	11.932	5.661
+0.60D	5.012	2.466
L Only	1.758	1.244
S Only	3.015	0.822

DESCRIPTION: header (south wall @ 2nd floor)

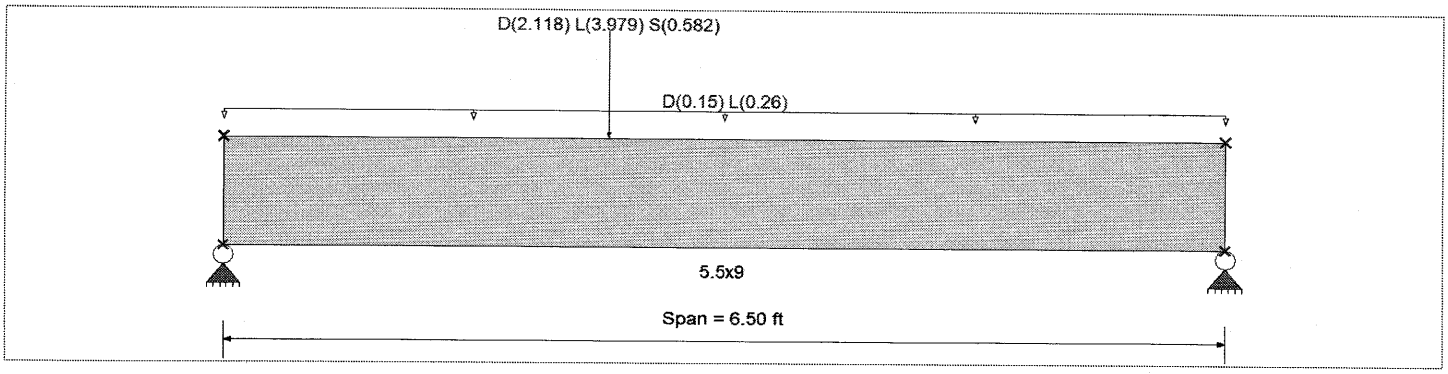
4

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2400 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	1850 psi	Ebend- xx	1800 ksi
		Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Wood Species :	DF/DF	Fc - Perp	650 psi	Ebend- yy	1600 ksi
Wood Grade :	24F-V4	Fv	265 psi	Eminbend - yy	850 ksi
		Ft	1100 psi	Density	31.21 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.150, L = 0.260 , Tributary Width = 1.0 ft
Point Load : D = 2.118, L = 3.979, S = 0.5820 k @ 2.50 ft, (from <B1>)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.775 : 1	Maximum Shear Stress Ratio	=	0.550 : 1
Section used for this span		**5.5x9**	Section used for this span		**5.5x9**
fb: Actual	=	1,851.15 psi	fv: Actual	=	145.76 psi
F'b	=	2,387.32 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.515 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.079 in	Ratio =	991 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.122 in	Ratio =	639 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1221	3.084		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.119	3.712
Max Upward from Load Combinations	5.119	3.712
Max Upward from Load Cases	3.294	2.375
D Only	1.826	1.337
+D+L	5.119	3.712
+D+Lr	1.826	1.337
+D+S	2.184	1.561
+D+0.750Lr+0.750L	4.296	3.119
+D+0.750L+0.750S	4.565	3.286

DESCRIPTION: header (south wall @ 2nd floor)

4

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D	1.095	0.802
L Only	3.294	2.375
S Only	0.358	0.224

Wood Column

Project File: ENERCALC_20

LIC# : KW-06015335, Build:20.22.12.28 D.S. ENGINEERING PC (c) ENERCALC INC 1983-2022

DESCRIPTION: under <R7>, <B2>, <B3>

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

(ALT. 6x8)

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	750 psi	Fv	170 psi
Fb -	750 psi	Ft	475 psi
Fc - Prll	700 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	470	470	

Wood Section Name	**4-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**6.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	33.0 in^2	Cf or Cv for Compressio	1.10
Ix	83.188 in^4	Cf or Cv for Tension	1.30
Iy	99.0 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Fully braced against buckling ABOUT X-X Axis

Applied Loads

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

Column self weight included : 71.523 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 15.858, L = 4.825, S = 6.548 k

	DL	LL	SL
<B2>	3467	3067	826
<B3>	8358	1758	3015
<R7>	4038	0	2707
	15858	4825	6548

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8370 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	24.459 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	885.50 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	1.000	0.6966	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L	1.000	1.000	0.8168	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.7692	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L	1.250	1.000	0.6155	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S	1.150	1.000	0.8370	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D	1.600	1.000	0.2351	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					15.930				

DESCRIPTION: under <R7>, <B2>, <B3>

Maximum Reactions

Note: Only non-zero reactions are listed.

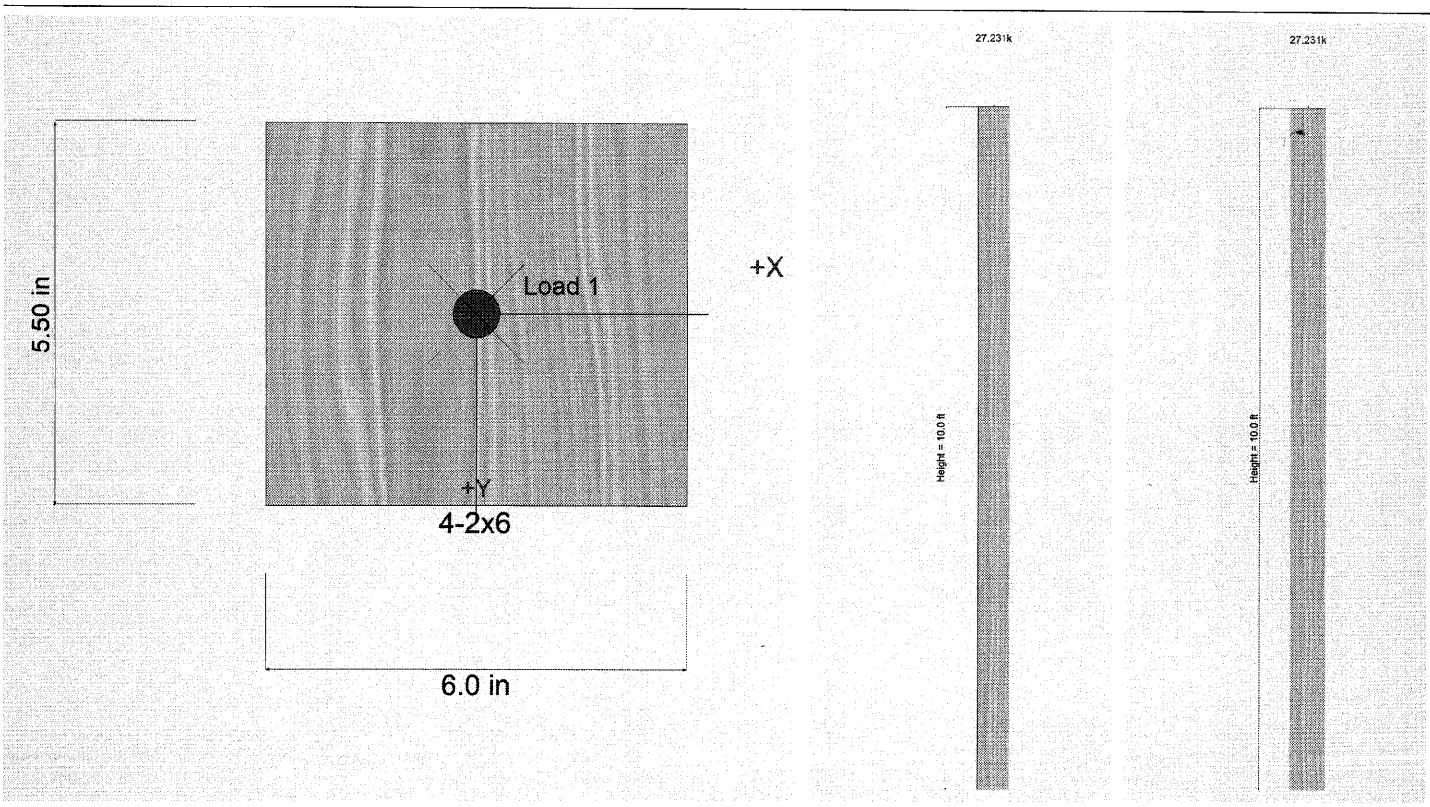
Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+L					20.755				
+D+S					22.478				
+D+0.750L					19.548				
+D+0.750L+0.750S					24.459				
+0.60D					9.558				
L Only					4.825				
S Only					6.548				

$A_{req} = (24.459^k + 6.031^k)/3$ (F16)
$= 10.2$ D'
<F3.5>

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches



DESCRIPTION: beam <F3> update

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

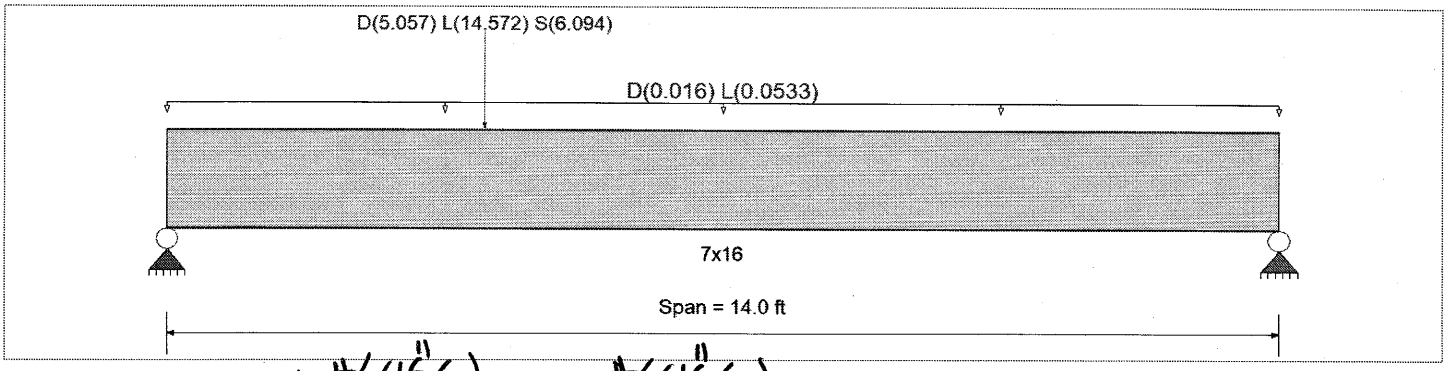
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.2E

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,200.0 ksi
Eminbend - xx	1,118.19 ksi
Density	45.070 pcf

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



Applied Loads

12#/(16/12) 40#/(16/12) Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0160, L = 0.05330, Tributary Width = 1.0 ft
Point Load : D = 5.057, L = 14.572, S = 6.094 k @ 4.0 ft, (from <R8>)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.829 : 1	Maximum Shear Stress Ratio	=	0.675 : 1
Section used for this span		7x16	Section used for this span		7x16
fb: Actual	=	2,329.42 psi	fv: Actual	=	195.70 psi
Fb: Allowable	=	2,808.86 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.036 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.222 in	Ratio =	756 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.316 in	Ratio =	531 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.3159	6.336		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

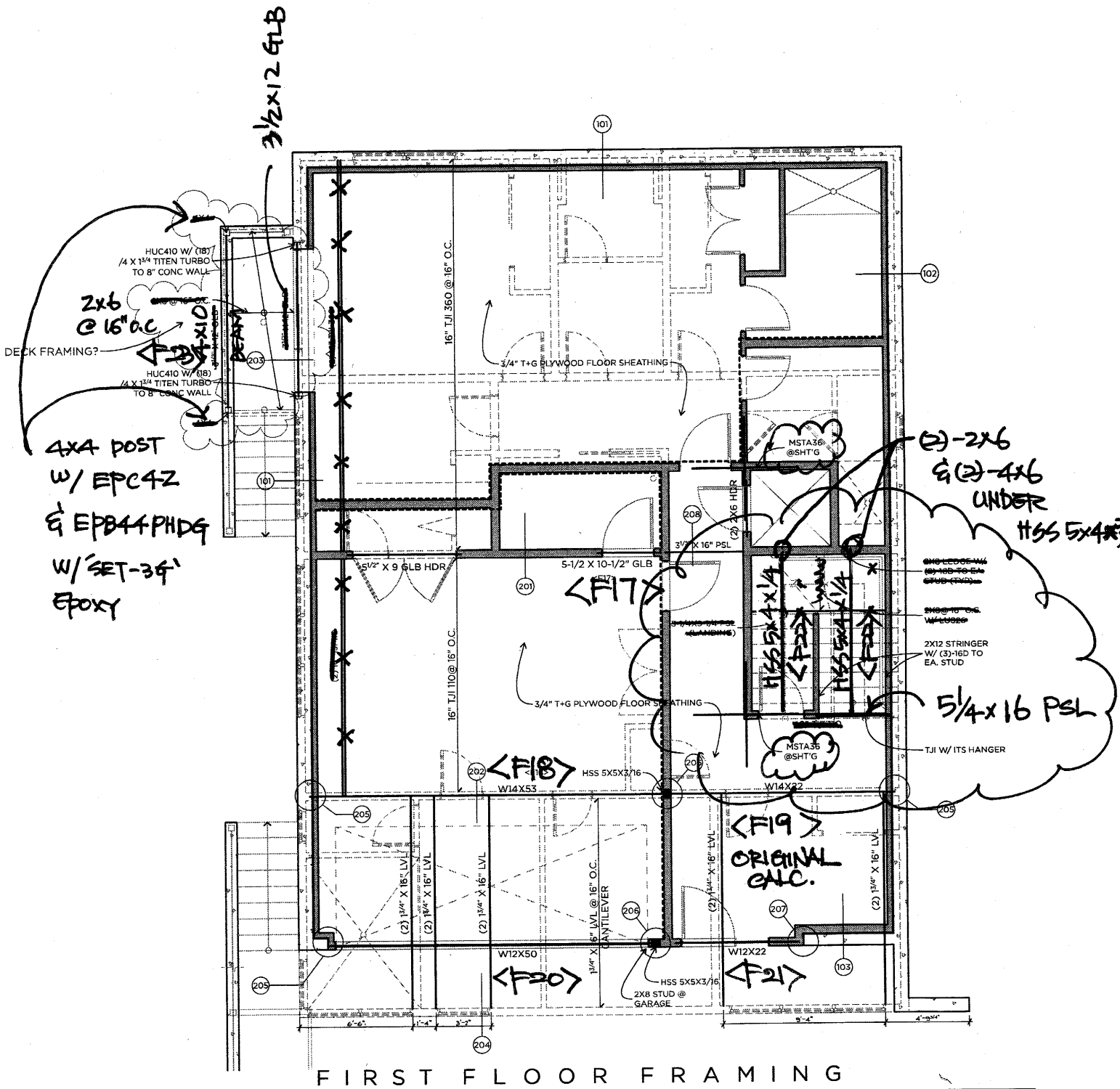
Load Combination	Support 1	Support 2
Overall MAXimum	15.320	6.510
Overall MINimum	4.353	1.741
+1.40D	5.557	2.523
+D+L	14.751	6.339
+D+Lr	3.970	1.802
+D+S	8.322	3.543
+D+0.750Lr+0.750L	12.056	5.205
+D+0.750L+0.750S	15.320	6.510
D Only	3.970	1.802

DESCRIPTION: beam <F3> update

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

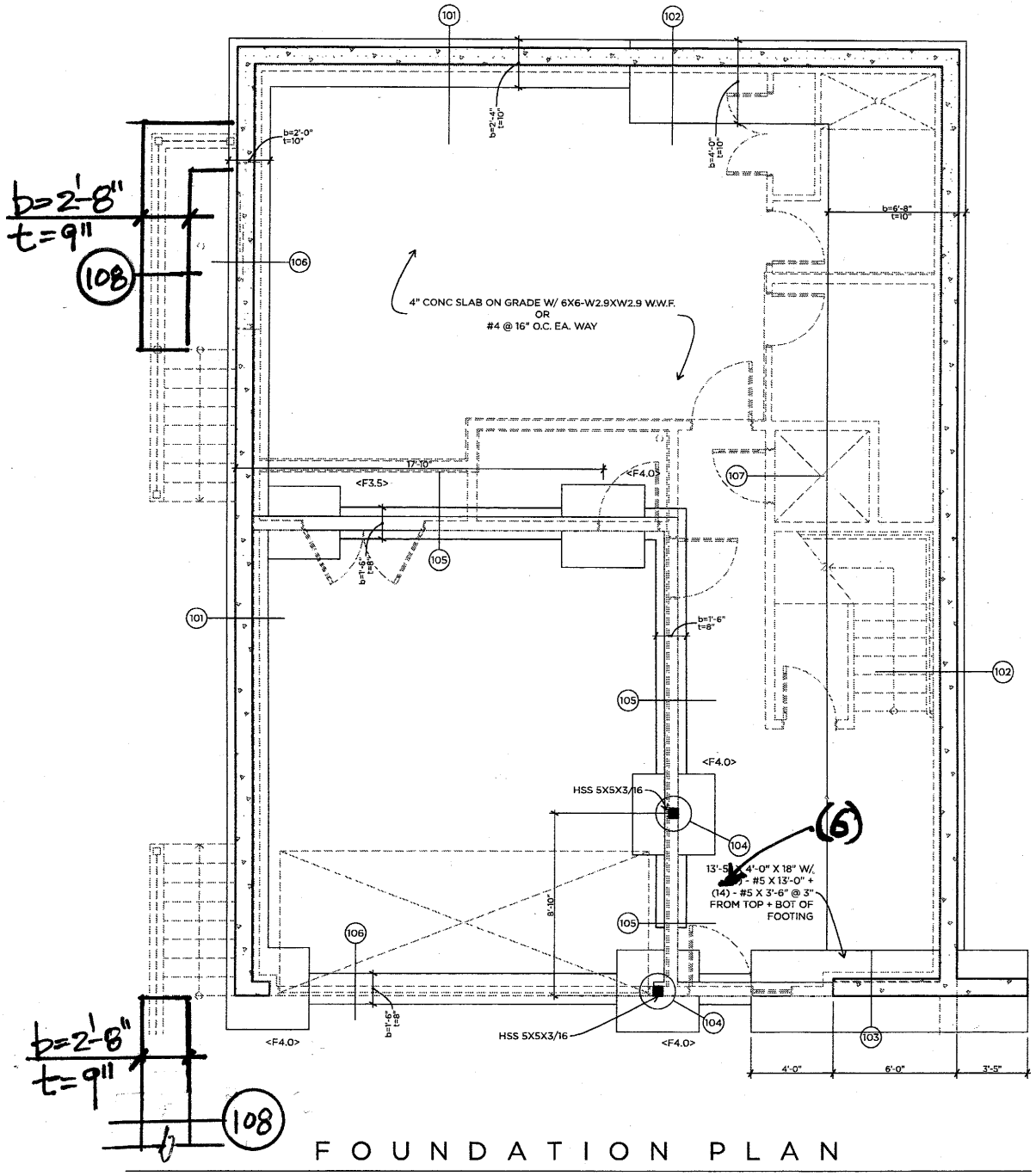
Load Combination	Support 1	Support 2
+0.60D	2.382	1.081
L Only	10.782	4.537
S Only	4.353	1.741



FIRST FLOOR FRAMING

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

00502 FL14



FOUNDATION PLAN

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

00503 FL15

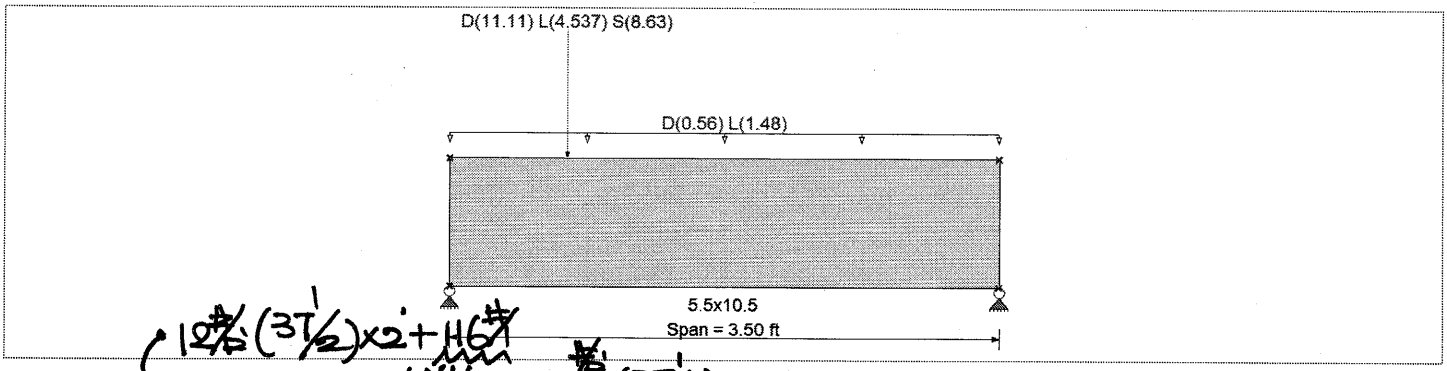
DESCRIPTION: header <F17> update

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2400 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	1850 psi	Ebend- xx	1800 ksi
		Fc - Prll	1650 psi	Eminbend - xx	950 ksi
Wood Species :	DF/DF	Fc - Perp	650 psi	Ebend- yy	1600 ksi
Wood Grade :	24F-V4	Fv	265 psi	Eminbend - yy	850 ksi
		Ft	1100 psi	Density	31.21 pcf
Beam Bracing :	Completely Unbraced				



12#/ft (3 1/2)x2 + 116# LL
40#/ft (3 1/2)x2

Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.560, L = 1.480 , Tributary Width = 1.0 ft
Point Load : D = 11.110, L = 4.537, S = 8.630 k @ 0.750 ft, (from <F3> & <R7>)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.609 : 1	Maximum Shear Stress Ratio	=	0.510 : 1
Section used for this span		**5.5x10.5**	Section used for this span		**5.5x10.5**
fb: Actual	=	1,673.16 psi	fv: Actual	=	155.32 psi
F'b	=	2,749.27 psi	F'v	=	304.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	0.754 ft	Location of maximum on span	=	2.631 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.010 in	Ratio =	4304 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.027 in	Ratio =	1561 >=180	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0269	1.584		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	19.433	7.441
Max Upward from Load Combinations	19.433	7.441
Max Upward from Load Cases	9.731	3.562
D Only	9.731	3.383
+D+L	15.886	6.945
+D+Lr	9.731	3.383
+D+S	16.512	5.232
+D+0.750Lr+0.750L	14.347	6.054
+D+0.750L+0.750S	19.433	7.441

	DL	LL	SL
<F3>	1802#	453#	1741#
<R7>	9308#	0	6889#

DESCRIPTION: header <F17> update

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D	5.839	2.030
L Only	6.155	3.562
S Only	6.781	1.849

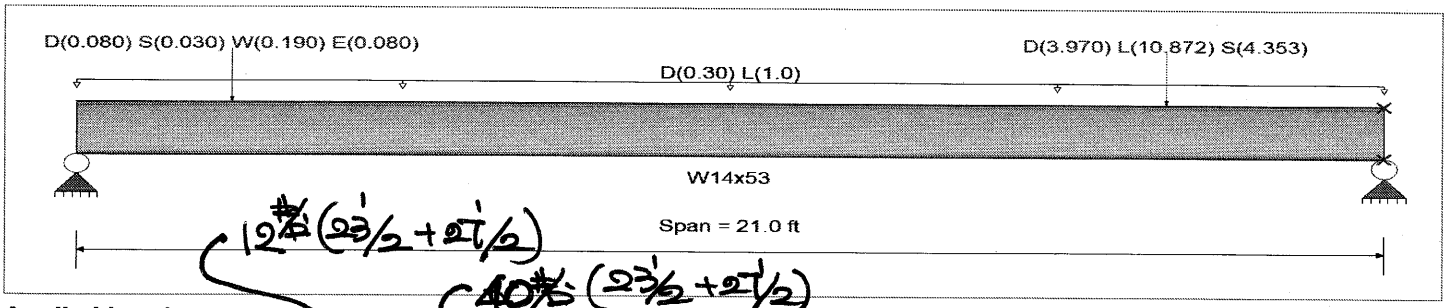
DESCRIPTION: update beam (F18)

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.30, L = 1.0 k/ft, Tributary Width = 1.0 ft

Point Load : D = 0.080, S = 0.030, W = 0.190, E = 0.080 k @ 2.50 ft, (from <B1> & <B2>)

Point Load : D = 3.970, L = 10.872, S = 4.353 k @ 17.50 ft, (from <F3>)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.474 : 1	Maximum Shear Stress Ratio =	0.258 : 1
Section used for this span	**W14x53**	Section used for this span	**W14x53**
Ma : Applied	102.901 k-ft	Va : Applied	26.584 k
Mn / Omega : Allowable	217.315 k-ft	Vn/Omega : Allowable	102.860 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	21.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.392 in	Ratio =	642	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.533 in	Ratio =	473	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.5330	10.920		0.0000	0.000

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	16.751	26.584
Max Upward from Load Combinations	16.751	26.584
Max Upward from Load Cases	12.312	19.560
D Only	4.439	7.024
+D+L	16.751	26.584
+D+S	5.191	10.655
+D+0.750L	13.673	21.694
+D+0.750L+0.750S	14.237	24.418
+D+0.60W	4.539	7.038
+D+0.70E	4.488	7.031
+D+0.750L+0.450W	13.748	21.705
+D+0.750L+0.750S+0.450W	14.312	24.428
+D+0.750L+0.750S+0.5250E	14.274	24.423
+0.60D+0.60W	2.764	4.228

W14x22
P = 26.584k + 9.256k <F19>
= 35.84k
Area = 35.84k/3 = 11.9 in² <F4.0>
FL18

DESCRIPTION: update beam (F18)

Vertical Reactions

Support notation : Far left is # Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.70E	2.713	4.221
L Only	12.312	19.560
S Only	0.752	3.631
W Only	0.167	0.023
E Only	0.070	0.010

Steel Section Properties : W14x53

Depth	=	13.900 in	I xx	=	541.00 in^4	J	=	1.940 in^4
Web Thick	=	0.370 in	S xx		77.80 in^3	Cw	=	2,540.00 in^6
Flange Width	=	8.060 in	R xx	=	5.890 in			
Flange Thick	=	0.660 in	Zx	=	87.100 in^3			
Area	=	15.600 in^2	I yy	=	57.700 in^4			
Weight	=	53.000 plf	S yy	=	14.300 in^3	Wno	=	26.700 in^2
Kdesign	=	1.250 in	R yy	=	1.920 in	Sw	=	35.500 in^4
K1	=	1.000 in	Zy	=	22.000 in^3	Qf	=	16.800 in^3
rts	=	2.220 in				Qw	=	42.500 in^3
Ycg	=	6.950 in						

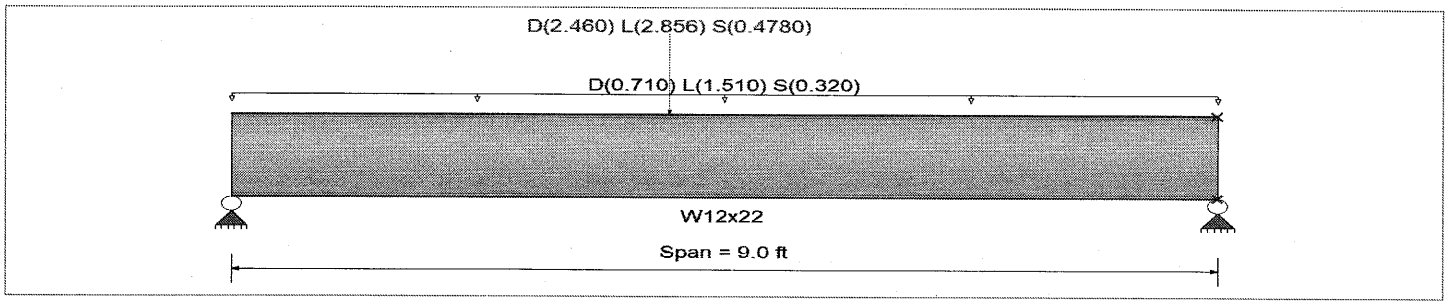
DESCRIPTION: beam <F21>

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.710, L = 1.510, S = 0.320 k/ft, Tributary Width = 1.0 ft, (from 1.75x16 LVL joist (see <F20>))

Point Load : D = 2.460, L = 2.856, S = 0.4780 k @ 4.0 ft, (from <F11>)

(SEE ORIGINAL CALC SHT # 1-16)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.468 : 1	Maximum Shear Stress Ratio =	0.204 : 1
Section used for this span	**W12x22**	Section used for this span	**W12x22**
Ma : Applied	34.219 k-ft	Va : Applied	13.042 k
Mn / Omega : Allowable	73.104 k-ft	Vn/Omega : Allowable	63.960 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.066 in	Ratio =	1,640	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.104 in	Ratio =	1039	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1039	4.474		0.0000	0.000

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.042	12.452
Max Upward from Load Combinations	13.042	12.452
Max Upward from Load Cases	8.382	8.064
D Only	4.661	4.387
+D+L	13.042	12.452
+D+S	6.366	6.040
+D+0.750L	10.947	10.436
+D+0.750L+0.750S	12.226	11.675
+0.60D	2.796	2.632
L Only	8.382	8.064
S Only	1.706	1.652

→ TO CONC. WALL

<F4.0>

W12x50

P = 13.042k + 20.998k = 34.04k

<F30>

DESCRIPTION: beam

Steel Section Properties : W12x22

Depth	=	12.300 in	I xx	=	156.00 in^4	J	=	0.293 in^4
Web Thick	=	0.260 in	S xx		25.40 in^3	Cw	=	164.00 in^6
Flange Width	=	4.030 in	R xx	=	4.910 in			
Flange Thick	=	0.425 in	Zx	=	29.300 in^3			
Area	=	6.480 in^2	I yy	=	4.660 in^4			
Weight	=	22.000 plf	S yy	=	2.310 in^3	Wno	=	12.000 in^2
Kdesign	=	0.725 in	R yy	=	0.848 in	Sw	=	5.120 in^4
K1	=	0.625 in	Zy	=	3.660 in^3	Qf	=	4.760 in^3
rts	=	1.040 in				Qw	=	14.400 in^3
Ycg	=	6.150 in						

6.92K (SEIS) HER 'L10'
OR
10.76K (WIND)

OF 3/4" ϕ BOLT REQD = 10.76K (WIND) / 7.51K

= 1.43 < 4 PROVIDED

(206/S1.1)

(2) @ PL 1/4 x 6 x 6

& (2) @ BEARING PL

00509 FL 24

Steel Beam

Project File: ENERCALC_20

LIC# : KW-06015335, Build:20.22.12.28 D.S. ENGINEERING PC (c) ENERCALC INC 1983-2022

DESCRIPTION: beam (stair)

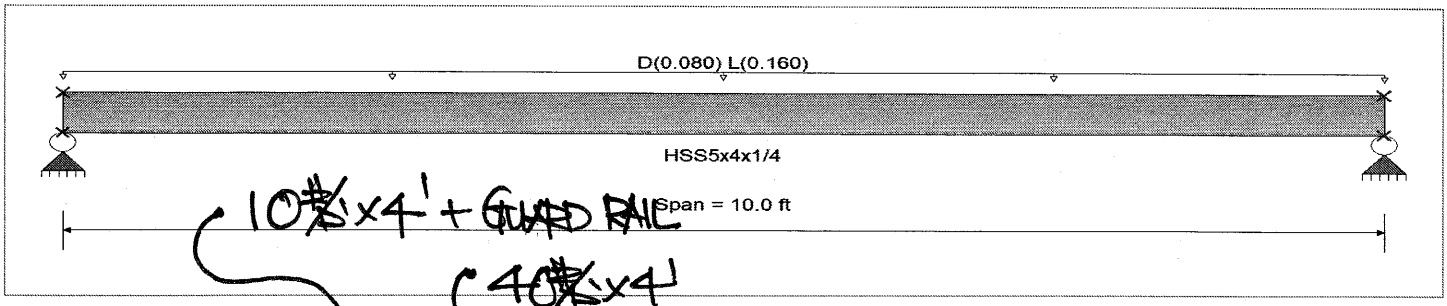
<F22>

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	46.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.080, L = 0.160 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.213 : 1	Maximum Shear Stress Ratio =	0.038 : 1
Section used for this span	HSS5x4x1/4	Section used for this span	HSS5x4x1/4
Ma : Applied	3.174 k-ft	Va : Applied	1.270 k
Mn / Omega : Allowable	14.897 k-ft	Vn/Omega : Allowable	33.124 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.093 in	Ratio =	1,289	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.148 in	Ratio =	813	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections

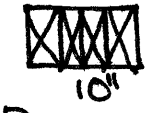
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1477	5.029		0.0000	0.000

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.270	1.270
Max Upward from Load Combinations	1.270	1.270
Max Upward from Load Cases	0.800	0.800
D Only	0.470	0.470
+D+L	1.270	1.270
+D+0.750L	1.070	1.070
+0.60D	0.282	0.282
L Only	0.800	0.800

(2)-2x6 & (2)-4x6



$P_{allow} = (10" + 4"x2)(5.5" + 4"x2)/144 \times 3000\ psf = 5060\# \gg 1270\#$

4" CONC SLAB ON GRADE UNDER (2)-2x6 & (2)-4x6 O.K. FOR P=1240#

DESCRIPTION: beam (stair) <P22>

Steel Section Properties : HSS5x4x1/4

Depth	=	5.000 in	I xx	=	13.40 in^4	J	=	18.000 in^4
			S xx		5.35 in^3	Cw	=	8.32 in^6
Width	=	4.000 in	R xx	=	1.870 in			
Wall Thick	=	0.233 in	Zx	=	6.490 in^3			
Area	=	3.840 in^2	I yy	=	9.460 in^4	C	=	0.000 in^3
Weight	=	13.910 plf	S yy	=	4.730 in^3			
			R yy	=	1.570 in			
			Zy	=	5.570 in^3			
Ycg	=	2.500 in						

FL23

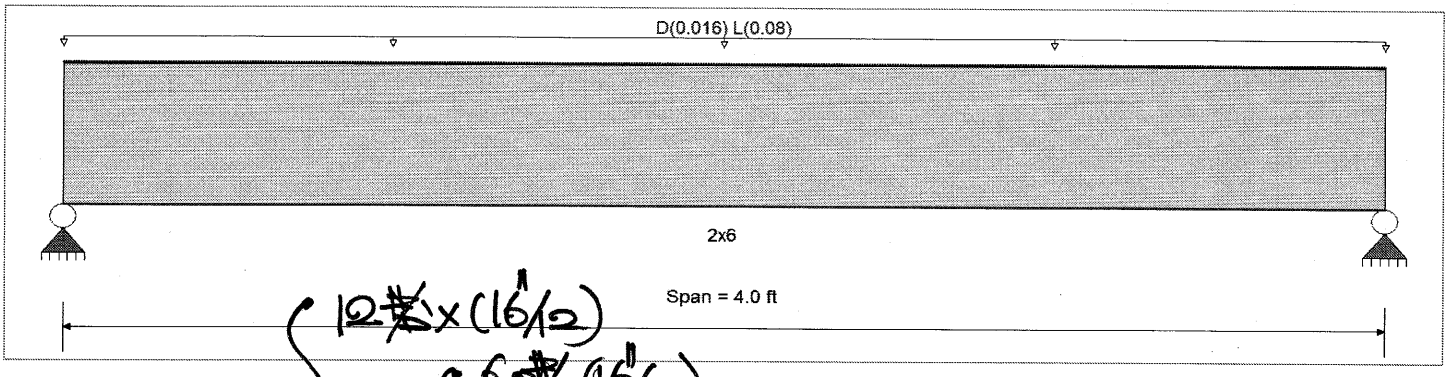
DESCRIPTION: deck

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	850 psi	Ebend- xx	1300 ksi
		Fc - Prll	1300 psi	Eminbend - xx	470 ksi
Wood Species :	Hem-Fir	Fc - Perp	405 psi		
Wood Grade :	No.2	Fv	150 psi		
		Ft	525 psi	Density	26.84 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0160, L = 0.080 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.240 : 1	Maximum Shear Stress Ratio	=	0.180 : 1
Section used for this span		**2x6**	Section used for this span		**2x6**
fb: Actual	=	304.66 psi	fv: Actual	=	27.01 psi
F'b	=	1,270.75 psi	F'v	=	150.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.547 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.017 in	Ratio =	2799 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.021 in	Ratio =	2333 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0206	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.192	0.192
Max Upward from Load Combinations	0.192	0.192
Max Upward from Load Cases	0.160	0.160
D Only	0.032	0.032
+D+L	0.192	0.192
+D+Lr	0.032	0.032
+D+S	0.032	0.032
+D+0.750Lr+0.750L	0.152	0.152
+D+0.750L+0.750S	0.152	0.152
+0.60D	0.019	0.019

DESCRIPTION: deck

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
L Only	0.160	0.160
S Only		

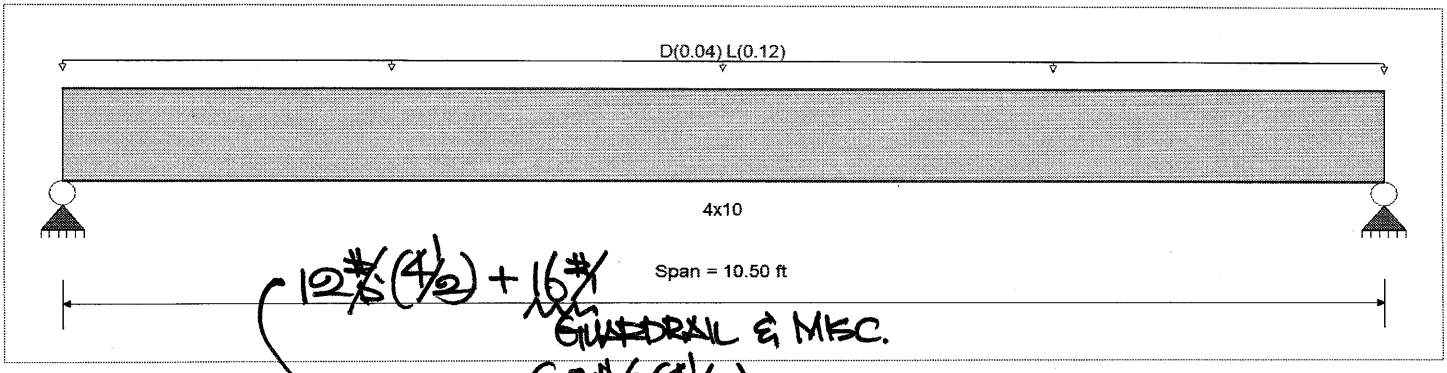
DESCRIPTION: deck <F-23>

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850 psi	*E : Modulus of Elasticity*	
Load Combination :	IBC 2018	Fb -	850 psi	Ebend- xx	1300 ksi
		Fc - Prll	1300 psi	Eminbend - xx	470 ksi
Wood Species :	Hem-Fir	Fc - Perp	405 psi		
Wood Grade :	No.2	Fv	150 psi		
		Ft	525 psi	Density	26.84 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.
Beam self weight calculated and added to loading
Uniform Load : D = 0.040, L = 0.120 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.539 : 1	Maximum Shear Stress Ratio	=	0.230 : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
fb: Actual	=	550.13 psi	fv: Actual	=	34.49 psi
F'b	=	1,020.00 psi	F'v	=	150.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.250 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.110 in	Ratio =	1145 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.152 in	Ratio =	827 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1522	5.288		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.872	0.872
Max Upward from Load Combinations	0.872	0.872
Max Upward from Load Cases	0.630	0.630
D Only	0.242	0.242
+D+L	0.872	0.872
+D+Lr	0.242	0.242
+D+S	0.242	0.242
+D+0.750Lr+0.750L	0.714	0.714
+D+0.750L+0.750S	0.714	0.714
+0.60D	0.145	0.145

4x4 POST W/ EPC42 & EPB44PHDG W/ 'SET-3G' EPOXY " 3/25# & 1265# (UPLIFT)"

00514

FL-26

DESCRIPTION: deck <F23>

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
L Only	0.630	0.630
S Only		

Project Name/Number :

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Cantilevered Retaining Wall

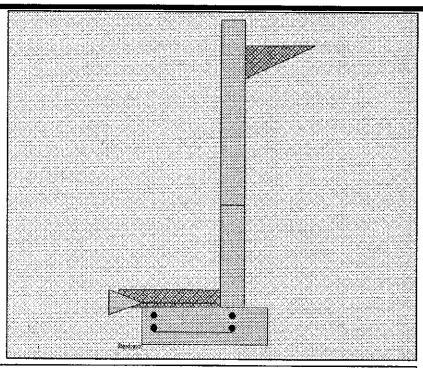
Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	5.17 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	300.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.250
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
NOT Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	15.0 psf

Wind acts left-to-right toward retention side.

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	1.750

(Multiplier used on soil density)

Uniform Seismic Force	=	10.360
Total Seismic Force	=	61.331

Design Summary

Wall Stability Ratios

Overturning	=	1.52 OK

Slab Resists All Sliding !

Total Bearing Load	=	1,071 lbs
...resultant ecc.	=	8.56 in
Soil Pressure @ Toe	=	1,149 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,609 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	15.9 psi OK
Footing Shear @ Heel	=	5.7 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	648.7 lbs

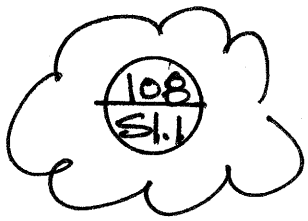
Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.400
Live Load	1.700
Earth, H	1.700
Wind, W	1.300
Seismic, E	1.000

Stem Construction

		2nd	Bottom
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Design Method	=	LRFD	LRFD
Thickness	=	6.00	6.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	18.00	12.00
Rebar Placed at	=	Center	Center
Design Data			
fb/FB + fa/Fa	=	**0.196**	**0.585**
Total Force @ Section			
Service Level	lbs =		
Strength Level	lbs =	322.0	839.0
Moment....Actual			
Service Level	ft-# =		
Strength Level	ft-# =	334.6	1,456.0
Moment.....Allowable	ft-# =	1,705.6	2,487.6
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	8.9	23.3
Shear.....Allowable	psi =	75.0	75.0
Anet (Masonry)	in2 =		
Rebar Depth 'd'	in =	3.00	3.00
Masonry Data			
f'm	psi =		
Fs	psi =		
Solid Grouting	=		
Modular Ratio 'n'	=		
Wall Weight	psf =	75.0	75.0
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Masonry Design Method	=	ASD	
Concrete Data			
f'c	psi =	2,500.0	2,500.0
Fy	psi =	60,000.0	60,000.0



00516

FL28

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Cantilevered Retaining Wall

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

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0277 in2/ft	
(4/3) * As :	0.037 in2/ft	Min Stem T&S Reinf Area 0.528 in2
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	==========	One layer of : Two layers of :
Required Area :	0.1296 in2/ft	#4@ 16.67 in #4@ 33.33 in
Provided Area :	0.1333 in2/ft	#5@ 25.83 in #5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in #6@ 73.33 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.1207 in2/ft	
(4/3) * As :	0.1609 in2/ft	Min Stem T&S Reinf Area 0.288 in2
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	==========	One layer of : Two layers of :
Required Area :	0.1207 in2/ft	#4@ 16.67 in #4@ 33.33 in
Provided Area :	0.2 in2/ft	#5@ 25.83 in #5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in #6@ 73.33 in

Footing Data

Toe Width	=	1.67 ft
Heel Width	=	1.00
Total Footing Width	=	2.67
Footing Thickness	=	9.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,609	0 psf
Mu' : Upward	=	18,883	0 ft-#
Mu' : Downward	=	3,494	119 ft-#
Mu: Design	=	1,282	119 ft-#
Actual 1-Way Shear	=	15.90	5.68 psi
Allow 1-Way Shear	=	75.00	40.00 psi

Toe Reinforcing = # 4 @ 12.00 in
Heel Reinforcing = None Spec'd
Key Reinforcing = # 4 @ 18.00 in
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 19.13 in, #6@ 27.16 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 6
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area 0.52 in2
Min footing T&S reinf Area per foot 0.19 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 12.35 in	#4@ 24.69 in
#5@ 19.14 in	#5@ 38.27 in
#6@ 27.16 in	#6@ 54.32 in

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Cantilevered Retaining Wall

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

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		613.3	1.97	1,210.3	Soil Over HL (ab. water tbl)	284.4	2.42	688.1
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.42	688.1
Hydrostatic Force					Watre Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=	-7.5	6.17	-46.3	Soil Over Toe	=	61.2	0.84	51.1
Seismic Earth Load	=	42.9	2.96	127.1	Surcharge Over Toe	=			
	=				Stem Weight(s)	=	425.3	1.92	816.5
					Earth @ Stem Transitions	=			
Total	=	648.7	**O.T.M.** =	1,291.1	Footing Weight	=	300.4	1.34	401.0
					Key Weight	=			
					Vert. Component	=			
					Total =		1,071.2 lbs	**R.M.**=	1,956.7

Resisting/Overturning Ratio = **1.52**
Vertical Loads used for Soil Pressure = 1,071.2 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.068	in

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

Design Lateral Seismic Load per "IBC 2018' & 'ASCE/SEI 7-16":

The total design lateral seiamic force is determined from:

$V = C_s \times W =$ **0.1015** x W = **8670** lb. **: ASD**

From:

S_s =	**1.414** g (=0.2 sec response)	Seismic Design Category :	**D**	
S_1 =	**0.492** g (=1.0 sec response)	Occupancy Category :	**II**	
F_a =	**1.000** (=site Coefficients: site classification 'D')	Seismic Use Group :	**I**	
F_v =	**1.808** (=site Coefficients: site classification 'D')			
S_{MS} =	**1.414** (= $F_a \times S_s$)			
S_{M1} =	**0.890** (= $F_v \times S_1$)			
S_{DS} =	**0.943** [= S_{MS} x (2/3)]			
S_{D1} =	**0.593** [= S_{M1} x (2/3)]			
C_t =	**0.020**	T_L =	**6.00**	sec.
h_n =	**21.00** ft.(=Mean Height of Roof)	T =	**0.20**	sec.
I_e =	**1.00**			
R =	**6.50**			
C_s =	**0.1015** (=$S_{DS}/(R/I_e)$x0.7) **: ASD**			
W =	**85400** lb. (=Included Exterior & Interior Partition Wall)			

ASCE/SEI 7-16' Section 12.8.1 has a requirement that V be not less than 0.01 W

BUT not more than $\{(S_{D1} \times I)/(R \times T)\} \times W$

Check: $(0.01) \times W < V < \{(S_{D1} \times I_e)/(R \times T)\} \times W$

598 lb.< **V <** 27798 lb. : **O. K.**

Ditribution of Base Shear (ASD):

Level	W_i(lb)	h_i(ft)	$(W_i)(h_i)$	$(Wihi)/Sum(W_ih_i)$	F_x	Sum (F_x)	
Roof	**46900**	**21.00**	984900	0.709	6147	6147	**lb.**
2nd Floor	**38500**	**10.50**	404250	0.291	2523	8670	**lb.**
	85400		1389150	1.000			

From **Roof** : $(25+4)^{\#} \times 35' \times 28' + (20+4)^{\#} \times 35' \times 22' = 46900^{\#}$

2nd Floor : $(12+10)^{\#} \times 35' \times 60' = 38500^{\#}$

Diaphragm Load (ASD):

Level	F_i(lb)	sum:F_i	W_i	sum:F_i/sum:W_i	Adjust	F_{px}	
Roof	6147	6147	46900	0.131	**0.132**	6191	**lb.**
2nd Floor	2523	8670	38500	0.102	**0.132**	5082	**lb.**
			85400				

$F_x(max) = 0.4\ S_{DS}\ I_e\ W_{px}\ (0.7) =$ 0.264

$F_x(min) = 0.2\ S_{DS}\ I_e\ W_{px}\ (0.7) =$ 0.132

1ST FLOOR : $(12+15)^{\#} \times 35' \times 60' \times 0.1015 = 3020^{\#}$

(SUPPORT BY CONC. WALL)

LT1

L2

GRID (S)

$F_{ROOF} = 2230^{\#} + 1790^{\#} = 4020^{\#}$

$F_{2ND} = 4060^{\#}$ ($\Sigma 8080^{\#}$)

$F_{1ST} = 2680^{\#}$ ($\Sigma 10760^{\#}$)

Table 27.5-1 : 30'

$\left(\frac{19.6+16.9}{2}\right)^{\#} \times 2.25 \times 2.5' \times 21' = 2160^{\#} \times 1.38$ (FIG 27.5-2) $\times 0.6$ (ASD) $= 1790^{\#}$

(N) 50' (S)

$28.28^{\#/'} \times 50' \times (10.5'/2) = 7420^{\#}$

$26.39^{\#/'} \times 50' \times (10.5'/2) = 6930^{\#}$

$27.17^{\#/'} \times 10.5' \times 50' = 13210^{\#}$

$27.17^{\#/'} \times 4' \times 46' = 4630^{\#}$

10.5' 10.5'

WEST ELEVATION 04

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

GRID (N):

$F_{ROOF} = 7420^{\#}/2 = 3710^{\#} \times 0.6$ (ASD) $= 2230^{\#}$

$F_{2ND} = 6930^{\#}/2 + 13210^{\#}/4 = 6770^{\#} \times 0.6$ (ASD) $= 4060^{\#}$

$F_{1ST} = 13210^{\#}/4 + 4630^{\#}/4 = 4460^{\#} \times 0.6$ (ASD) $= 2680^{\#}$ ($\Sigma 6290^{\#}$) LT 2

($\Sigma 8970^{\#}$) LT 6

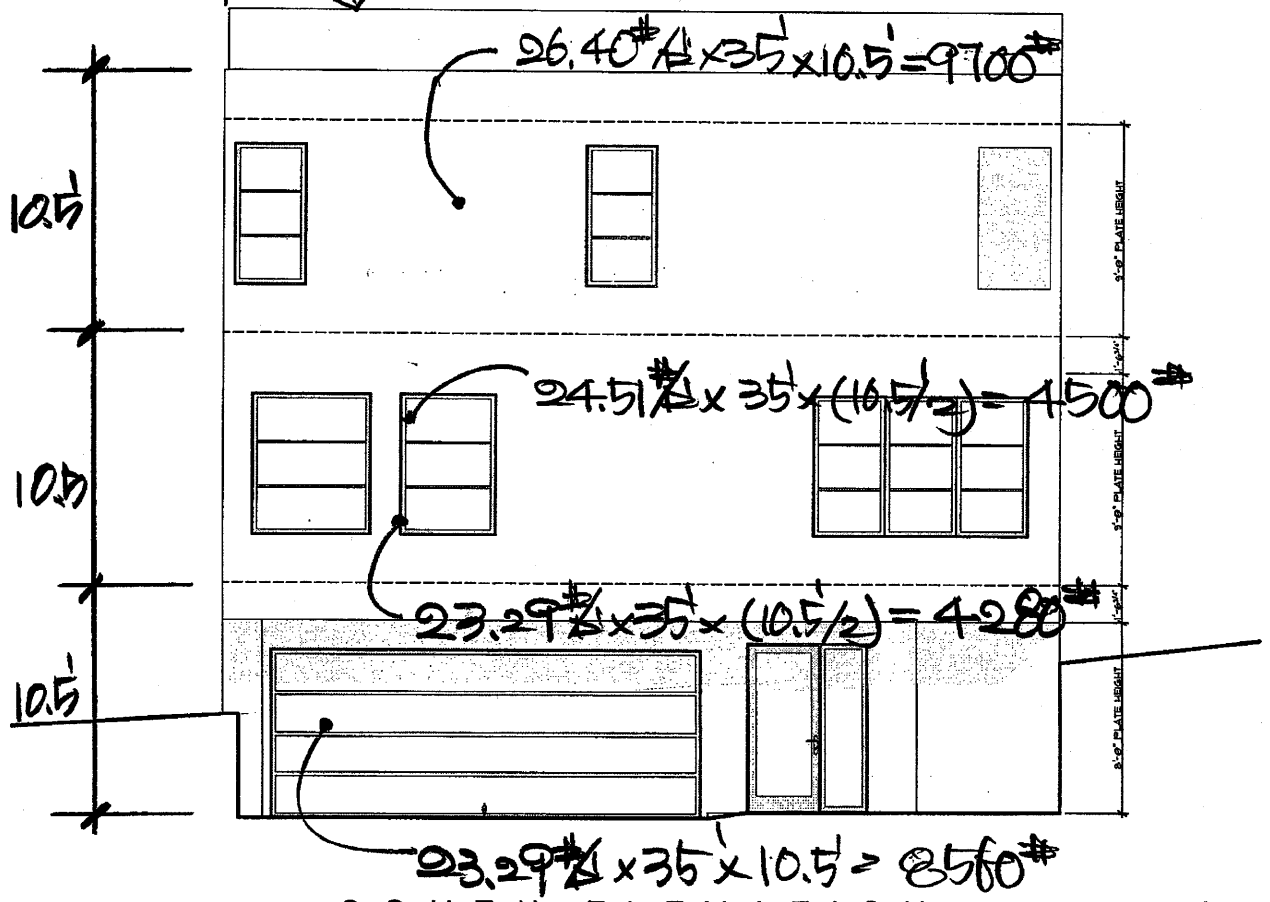
0520

Table 27.5-1

$\left(\frac{19.6+16.9}{2}\right)^{psf} \times 2.25 \times 0.5 \times 35' = 359^{plf} \times 1.38 \times 0.6$ (LRFD / ASD)

Fig 27.5-2

(W) 35' (E) = 2970#



SOUTH ELEVATION 01

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

- GRID (E) & (W):

$F_{ROOF} = 9700^{\#}/4 = 2425^{\#} \times 0.6_{ASD} = 1455^{\#} + 2910^{\#}/2 = 2940^{\#}$

$F_{2ND} = 9700^{\#}/4 + 4500^{\#}/2 = 4675^{\#} \times 0.6_{ASD} = 2805^{\#}$ (Σ 5745#)

$F_{1ST} = 4280^{\#}/4 + 8560^{\#}/4 = 3210^{\#} \times 0.6_{ASD} = 1926^{\#}$ (Σ 7670#)

LT3 ~~LT~~

DIAPHRAGM:

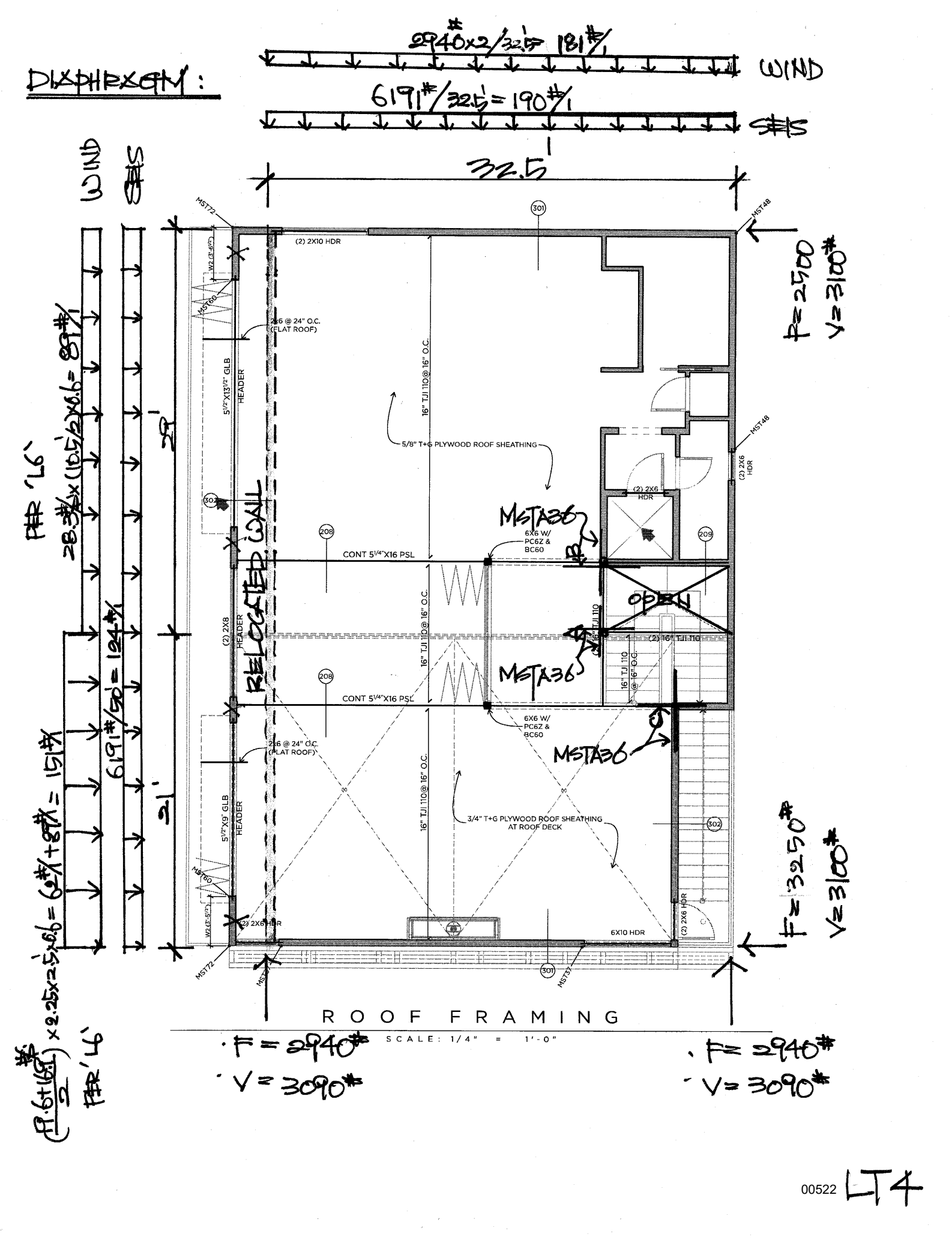
2940x2/32.5' = 181#/'

WIND

6191#/32.5' = 190#/'

SEIS

32.5'



ROOF FRAMING

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

P = 2500
V = 3100#

P = 3250#
V = 3100#

PER 'L'

28.3#/' x (10.5'/2)x6' = 83#/'

6191#/50' = 124#/'

21'

28'

PER 'L'

(8.6+16.8)/2 x 2.25x2.5'x6' = 69#/' + 82#/' = 151#/'

· F = 2940#
· V = 3090#

· F = 2940#
· V = 3090#

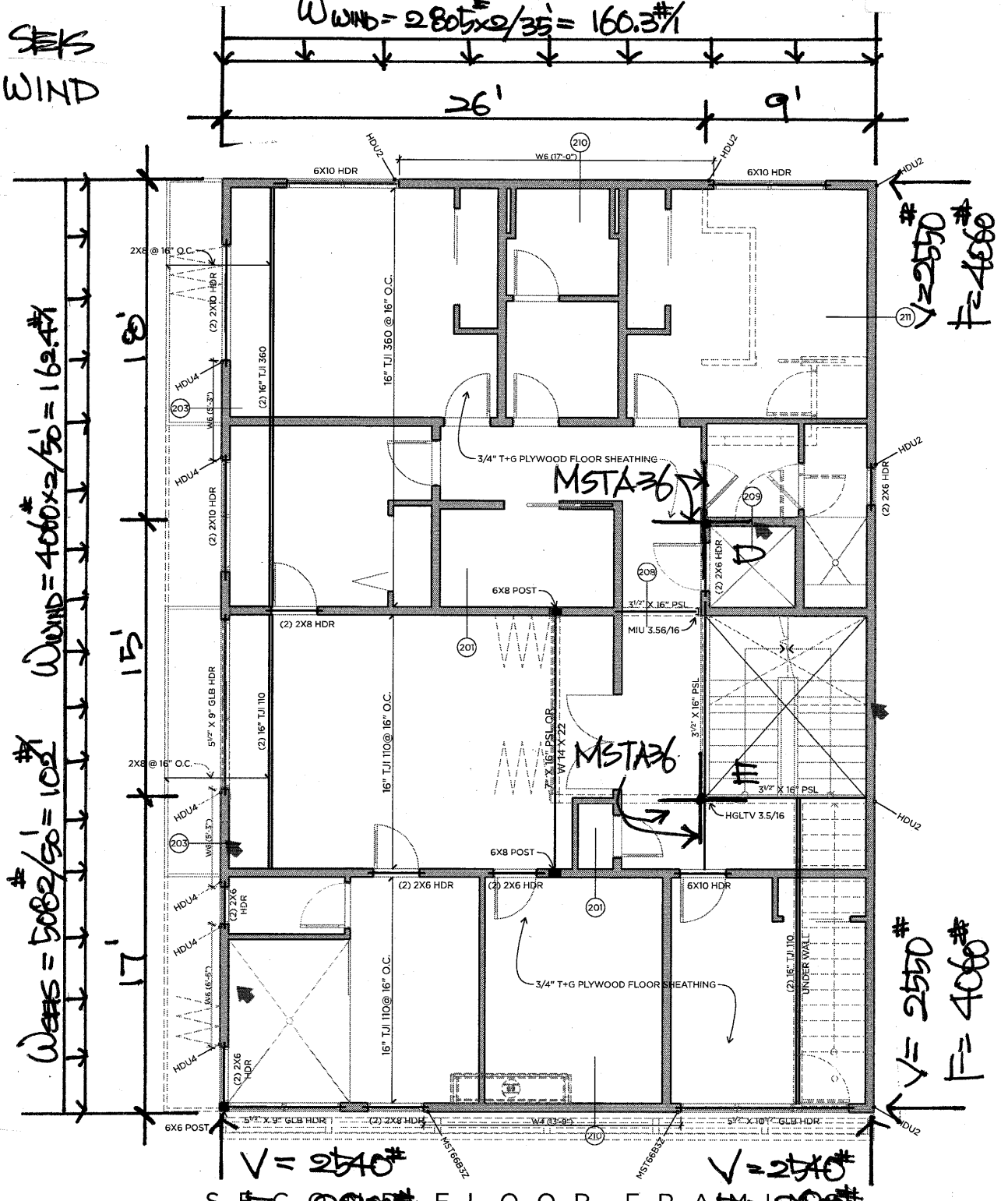
00522 LT4

DIAPHRAGM:

- V: SEIS
- F: WIND

$W_{SEIS} = 5082^{\#}/35' = 145^{\#}/1'$

$W_{WIND} = 2801^{\#} \times 2/35' = 160.3^{\#}/1'$



SECOND FLOOR FRAMING PLAN

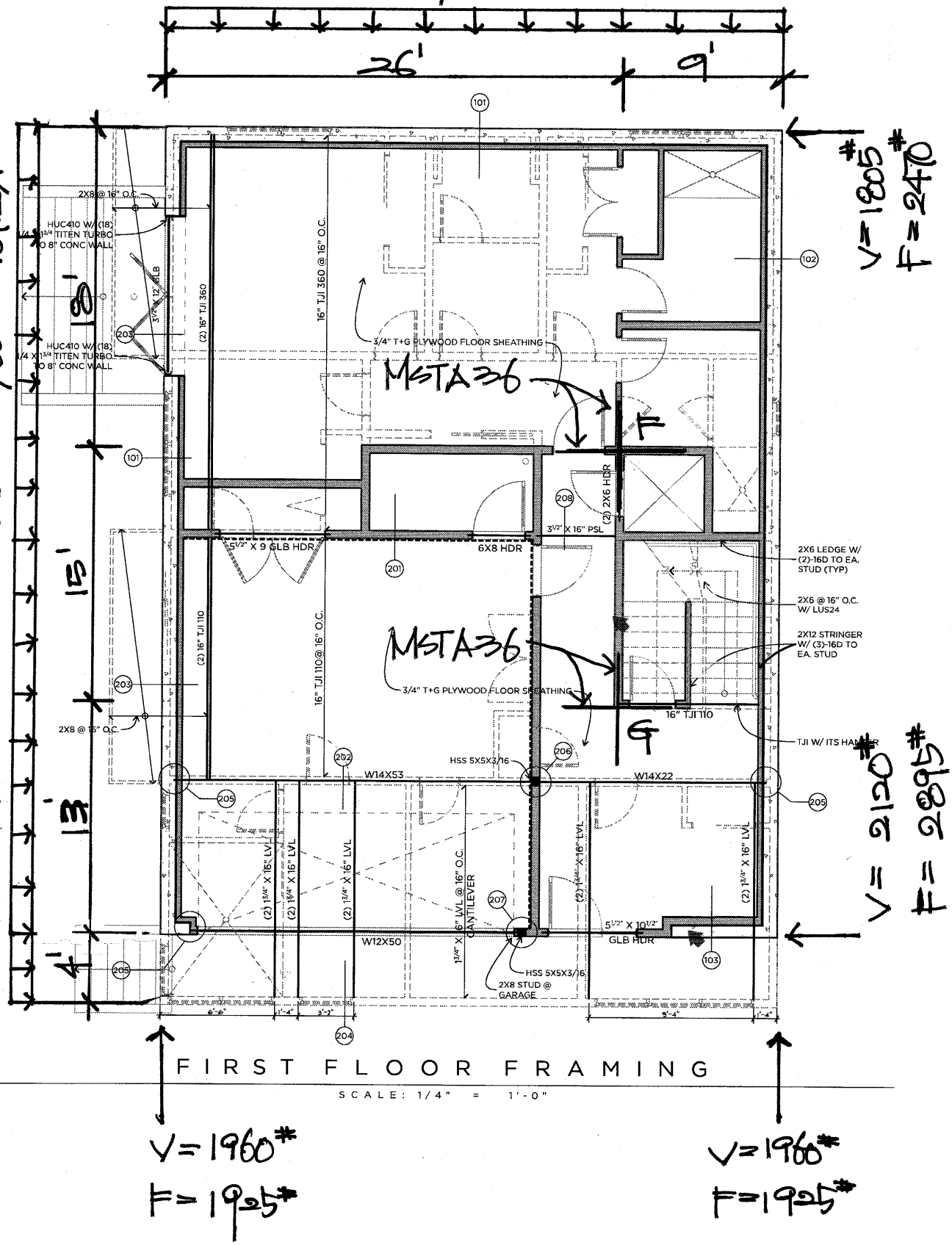
SCALE: 1/4" = 1'-0"

00523 LT5

DIAPHRAGM

$W_{SEIS} = 3020^{\#}/35' = 86.3^{\#}/1\ (6.5/5) = 112^{\#}/1$

$W_{WIND} = 1925^{\#}/35' = 55^{\#}/1 \times 2 = 110^{\#}/1$



FIRST FLOOR FRAMING

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

00524

LT6

E-W DIRECTION:

- @ A: $F_{WIND} = (3250^{\#} \times 22' - 151^{\#/'} \times 22^2/2)/23.5' = 1490^{\#}$

  $V_{SEIS} = (3100^{\#} \times 22' - 124^{\#/'} \times 22^2/2)/23.5' = 1630^{\#}$

- @ B: $F = (2500^{\#} \times 23' - 89^{\#/'} \times 23^2/2)/23.5' = 1450^{\#}$

  $V = (3150^{\#} \times 23' - 124^{\#/'} \times 23^2/2)/23.5' = 1640^{\#}$

- @ C: $F = (3250^{\#} \times 17' - 151^{\#/'} \times 17^2/2)/28.5' = 1170^{\#}$

  $V = (3100^{\#} \times 17' - 124^{\#/'} \times 17^2/2)/28.5' = 1220^{\#}$

N-S DIRECTION:

- @ A: $F = (2940^{\#} \times 9' - 181^{\#/'} \times 9^2/2)/22' = 870^{\#}$

  $V = (3090^{\#} \times 9' - 190^{\#/'} \times 9^2/2)/22' = 910^{\#}$

- @ B: $F =$ (11) $/23' = 830^{\#}$

  $V =$ (11) $/23' = 880^{\#}$

- @ C: $F = (2940^{\#} \times 4' - 181^{\#/'} \times 4^2/2)/17' = 610^{\#}$

  $V = (3090^{\#} \times 4' - 190^{\#/'} \times 4^2/2)/17' = 640^{\#}$

'MSTA36' (2050#) STRAP:

(BETWEEN STRUCTURAL MEMBERS & 1½" RIM BOARD)

00525 LT7

E-W DIRECTION:

@ D: $F = (4060^{\#} \times 18' - 162.4^{\#/'} \times 18^2/2)/26' = 1800^{\#}$

$V = (2550^{\#} \times 18' - 102^{\#/'} \times 18^2/2)/26' = 1130^{\#}$

@ E: $F = (4060^{\#} \times 17' - 162.4^{\#/'} \times 17^2/2)/26' = 1750^{\#}$

$V = (2550^{\#} \times 17' - 102^{\#/'} \times 17^2/2)/26' = 1100^{\#}$

$T=C_{CRITICAL} = 162.4 \times 50^2/(8 \times 26') = 1952^{\#}$

(2)-2x6 : $625 \times 1.5'' \times 5.5'' \times 2 \times 1.6_{LVL} = 16500^{\#}$ O.K.

N-S DIRECTION:

@ D: $F = (2800^{\#} \times 9' - 160.3 \times 9^2/2)/18' = 1040^{\#}$

$V = (2540^{\#} \times 9' - 145 \times 9^2/2)/18' = 940^{\#}$

@ E: $F = (2800^{\#} \times 9' - 160.3 \times 9^2/2)/17' = 1100^{\#}$

$V = (2540^{\#} \times 9' - 145 \times 9^2/2)/17' = 1000^{\#}$

'MSTA36' (2050#) STRAP:

(BETWEEN 2ND FLOOR STRUCTURAL MEMBERS & 1½" RIM BOARD)

00526 LT8

• E-W DIRECTION:

@ F: $F = (2470^{\#} \times 18' - 107.2^{\#/'} \times 18'^2/2)/26' = 1040^{\#}$

$V = (1805^{\#} \times 18' - 78.5^{\#/'} \times 18'^2/2)/26' = 760^{\#}$

@ G: $F = (2470^{\#} \times 33' - 107.2^{\#/'} \times 33'^2/2)/26' = 890^{\#}$

$V = (1805^{\#} \times 33' - 78.5^{\#/'} \times 33'^2/2)/26' = 650^{\#}$

• $FC = 107.2^{\#/'} \times 50'/(8 \times 26') = 1090^{\#}$

CRITICAL

(2)-2x6 : $625 \times 1.5'' \times 5.5'' \times 2 \times 1.6_{NDS} = 16500^{\#}$

• N-S DIRECTION:

@ F: $F = (1925^{\#} \times 9' - 110^{\#/'} \times 9'^2/2)/18' = 720^{\#}$

$V = (1960^{\#} \times 9' - 112^{\#/'} \times 9'^2/2)/18' = 730^{\#}$

@ G: $F = (1925^{\#} \times 9' - 110^{\#/'} \times 9'^2/2)/17' = 760^{\#}$

$V = (1960^{\#} \times 9' - 112^{\#/'} \times 9'^2/2)/17' = 770^{\#}$

'MSTA36' (2050#) STRAP:

(BETWEEN 1ST FLOOR STRUCTURAL MEMBERS & 1½" RIM BOARD)

Reliability/Redundancy Factor: SEISMIC

Use R.F. = 1.00 **S_{DS} = 0.943**

0.6D + 0.6W (Eq. 16-15)
0.6D + 0.7E (Eq. 16-16) & E = Q_E - 0.2 S_{DS} D
-----> 0.47 D + 0.7 Q_E

SEISMIC:
@ Grid 'N': Roof : V = 3070 #
L = 26.5'

V_{wall} =	3070	lb.
V_{wall}' =	3070	lb (V_{wall} x R.F.)
L =	26.50	ft.
H =	10.50	ft.
v_{shear} =	116	plf < TYP
T=C=	1240	lb.

WIND:
@ Grid 'N': Roof : F = 2230 #
L = 26.5'

F_{wall} =	2230	lb.
L =	26.50	ft.
H =	10.50	ft.
v_{shear} =	84	plf < TYP
T=C=	901	lb.

RFS: [15#/ft (23½) + 60#/ft WALL] (26.5½) = 4600# × 0.47 = 2162# > 1240#
× 0.60 = 2760# > 910#

NO UPLIFT

JAN 6, 2023

SEISMIC:
@ Grid 'N': 2nd Flr : V = 4330 #
L = 17'

V_{wall} =	4330	lb.
V_{wall}' =	4330	lb (V_{wall} x R.F.)
L =	17.00	ft.
H =	10.50	ft.
v_{shear} =	255	plf
T=C=	2755	lb.

WIND:
@ Grid 'N': 2nd Flr : F = 6290 #
L = 17'

F_{wall} =	6290	lb.
L =	17.00	ft.
H =	10.50	ft.
v_{shear} =	370	plf
T=C=	4003	lb.

SEISMIC:
@ Grid 'N': 1st Flr : V = 5840 #
L = 35' (8" Concrete Shearwall)

WIND:
@ Grid 'N': 1st Flr : F = 8970 #
L = 35' (8" Concrete Shearwall)

00528

LT10

SEISMIC:

@ Grid 'S': Roof : V = 3070 #

L = 18'

V_{wall} =	3070	lb.
V_{wall}' =	3070	lb (V_{wall} x R.F.)
L =	18.00	ft.
H =	10.50	ft.
v_{shear} =	171	plf <TYP
T=C=	1842	lb.

RES: $[20^{\#} \times (16\tfrac{1}{2}') + 60^{\#}/_{WALL}] (18\tfrac{1}{2}') = 1980^{\#} \times 0.47 = 930^{\#}$ $T_{NET} = 912^{\#}$

$\times 0.60 = 1188$ $T_{NET} = 1224^{\#}$

WIND:

@ Grid 'S': Roof : F = 4020 #

L = 18'

F_{wall} =	4020	lb.
L =	18.00	ft.
H =	10.50	ft.
v_{shear} =	223	plf <TYP
T=C=	2412	lb.

'MST37' (1720#)

JAN 25, 2023

SEISMIC:

@ Grid 'S': 2nd Flr : V = 4330 #

L = 13.75'

V_{wall} =	4330	lb.
V_{wall}' =	4330	lb (V_{wall} x R.F.)
L =	13.75	ft.
H =	10.50	ft.
v_{shear} =	315	plf
T=C=	3431	lb.

WIND:

@ Grid 'S': 2nd Flr : F = 8080 #

L = 13.75'

F_{wall} =	8080	lb.
L =	13.75	ft.
H =	10.50	ft.
v_{shear} =	588	plf
T=C=	6403	lb.

JAN 25, 2023

SEISMIC:

@ Grid 'S': 1st Flr : V = 6920 #

L = 6' (8" Concrete Shearwall)

MIN. CHANGE TO 9'-5"

$* 10760^{\#}/35' = 307^{\#}/'$

$930 \times 1.6 / 307^{\#}/' = 4.84'$ O.C (MAX) > 1.33 16" O.C.

TABLE 12E CD

WIND:

@ Grid 'S': 1st Flr : F = 10760 #

L = 6' (8" Concrete Shearwall)

MIN. CHANGE TO 9'-5"

00529

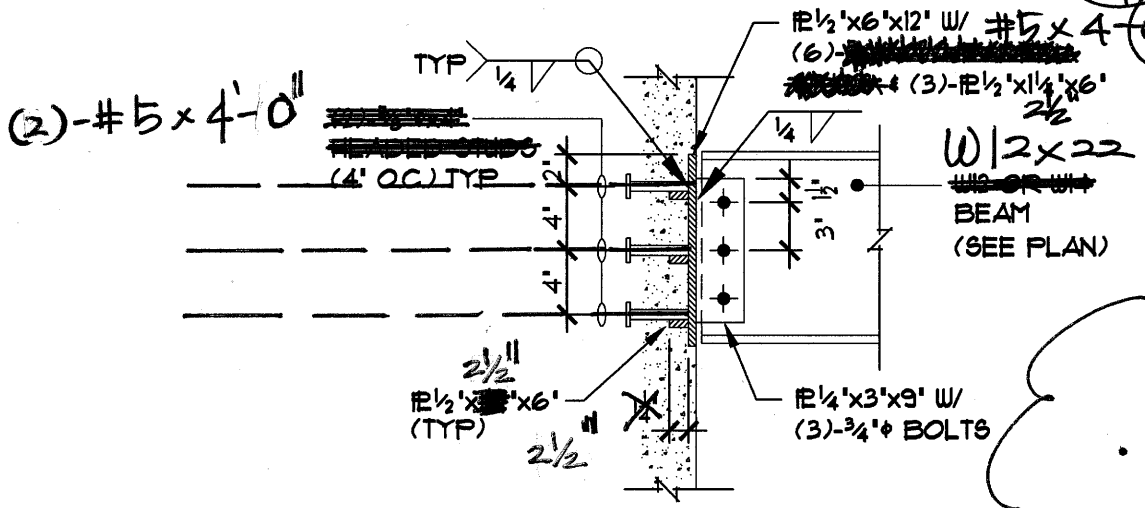
60000 → $\frac{3 f_y \psi_t \psi_e}{50 \lambda \sqrt{f'_c}} d_b$ ← 1.0, ← 5/8, ← 3000

$* \quad = 41''$ MIN.

- $F_{WIND_u} = 10.76^k / 0.6 = 17.93^k \times 2 = 35.9^k$ Ω
- $V_u = 9^k / 0.7 = 12.9^k \times 2 = 25.8^k$ Ω

- $A_{req'd} = 35.9^k / (0.9 \times 60)$
  $= 0.66 in^2$

(6)-#5 x 4'-0" (1.86 in²)



~~205~~ DETAIL

SCALE: 1" = 1'-0"

207

- $10.76^k \times 2 / 7.51^k$ Ω
  $= 2.9 < 3$ (¾" ø BOLTS PROVIDED)

00530

5 of 5

DESCRIPTION: Concrete Shear Wall (South)

Code References

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

General Information

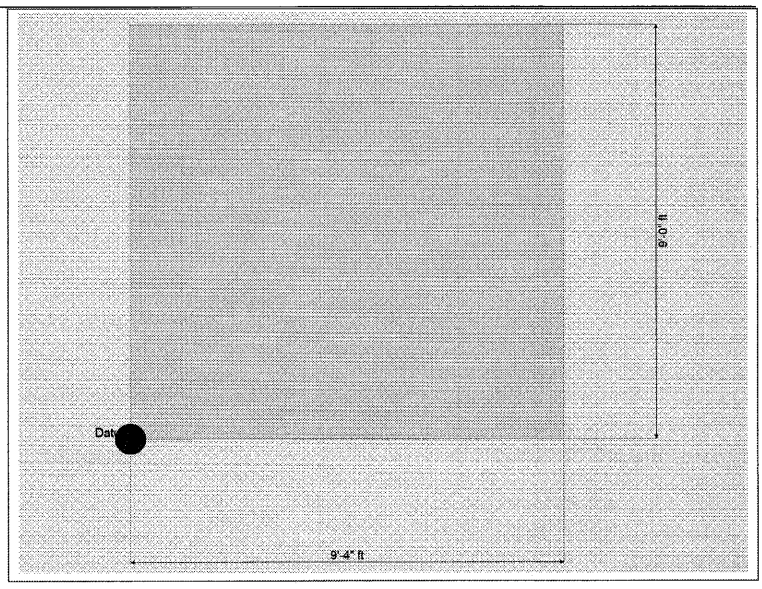
Wall Material CONCRETE
Sds 0.9430

Material Properties

f'c	3.0 ksi	Ec	3,120.0 ksi
fy	60.0 ksi	Ev	1,248.0 ksi
Density	150.0 pcf	Phi - Shear	0.650

Wall Data

	Bottom
Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	9.333 ft
Wall Thickness	8.0 in
Structural Depth	8.833 ft



Applied Concentrated Vertical Loads

Load Location (ft)		Load Magnitude (kips)				
X Location	Y Location	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
0.0	9.0	4.387	0.0	8.064	1.652	0.0

Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)				
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
0.0	6.0	9.0	0.710	0.0	1.510	0.320	0.0

Applied Concentrated Lateral Loads

	Load Magnitude (kips)					
Load "Y" Location (ft)	Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
9.0	0.0	0.0	0.0	10.760	9.0	0.0

DESCRIPTION: Concrete Shear Wall (South)

DESIGN SUMMARY

	Bottom Level
Vu : Story Shear	10.760 +1.20D+0.50L+
Mu : Story Moment	122.906 +1.20D+1.60L+
Nu : Axial	49.640 +1.20D+1.60L+
Uplift @ Left End	5.667 +0.90D+W
Uplift @ Right End	5.667 +0.90D+W
Phi * 10 * sqrt(f'c)*h*d	301.893 k
Phi * Vc	60.379 k
Phi * Vs Req'd	0.0 k
Horizontal As Req'd	0.1920 in^2
Vertical As Req'd	0.240 in^2
Bending As Req'd	1.526 in^2

Force Summary

Load Combination / Wall Level	Values for Wall section Vu (k)	Mu (k)	Pu (k)	Resultant Ecc (ft)	Overturning Ratio	Uplift (k) Left	Right
+1.40D							
Wall Level : 1		38.600	23.865	1.617			
+1.20D+1.60L							
Wall Level : 1		117.452	47.854	2.454			
+1.20D+1.60L+0.50S							
Wall Level : 1		122.906	49.640	2.476			
+1.20D+0.50L							
Wall Level : 1		59.450	29.018	2.049			
+1.20D+0.50W							
Wall Level : 1	5.380	15.335	20.456	0.750	2.655		
+1.20D+0.50L+1.60S							
Wall Level : 1		76.904	34.733	2.214			
+1.20D+1.60S+0.50W							
Wall Level : 1	5.380	2.119	26.171	0.081	3.566		
+1.20D+0.50L+W							
Wall Level : 1	10.760	37.390	29.018	1.289	2.012	2.364	2.364
+1.20D+0.50L+0.50S+W							
Wall Level : 1	10.760	31.936	30.804	1.037	2.155	2.038	2.038
+1.20D+0.50L+0.70S+E							
Wall Level : 1	9.000	13.914	31.518	0.441	2.644	0.114	0.114
+0.90D+W							
Wall Level : 1	10.760	72.026	15.342	4.695	0.996	5.667	5.667
+0.90D+E							
Wall Level : 1	9.000	56.186	15.342	3.662	1.190	3.874	3.874

LT14

DESCRIPTION: Concrete Shear Wall (South)

Footing Information

Footing Dimensions

Dist. Left	4.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	9.333 ft	Fy	60.0 ksi	Footing Thickness	18.0 in
Dist. Right	0.0 ft			Width	4.0 ft
Total Ftg Length	13.333 ft				

Max Factored Soil Pressures

@ Left Side of Footing 1,514.16 psf
.... governing load comb +1.20D+1.60L+0.50S

@ Right Side of Footing 2,385.84 psf
.... governing load comb +0.90D+W

Max UNfactored Soil Pressures

@ Left Side of Footing 1,007.84 psf
.... governing load comb +D+L

@ Right Side of Footing 1,253.03 psf
.... governing load comb +D+0.750L+0.750S+0.450W

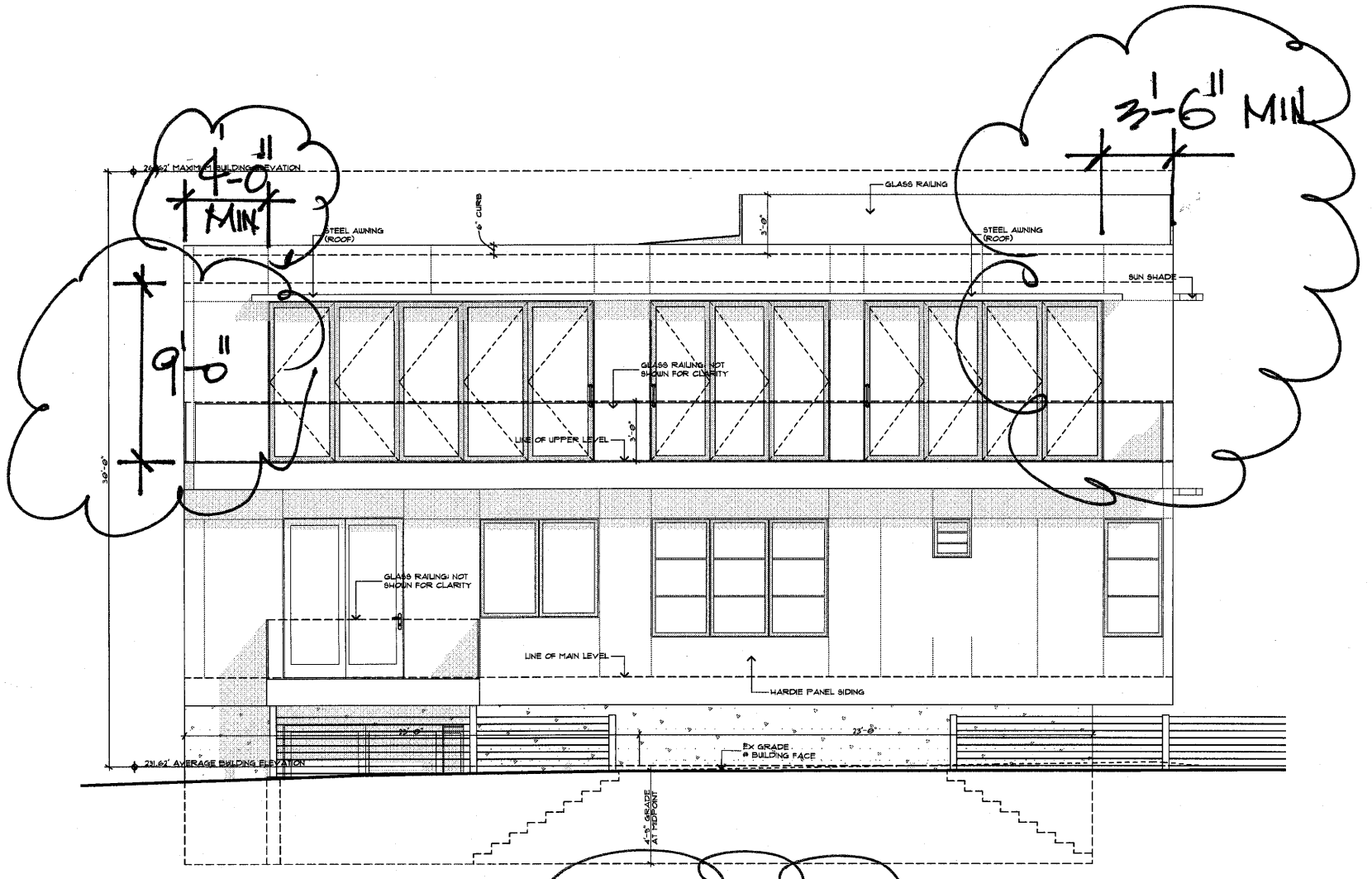
Footing One-Way Shear Check...

vu @ Left End of Footing	26.674 psi
vu @ Right End of Footing	0.0 psi
vn * phi : Allowable	93.113 psi

Overturning Stability...	**@ Left End of Ftg**	**@ Right End of Ftg**
Overturning Moment	66.528 k-ft	66.528 k-ft
Resisting Moment	163.774 k-ft	135.788 k-ft
Stability Ratio	2.462 : 1	2.041 : 1
.... governing load comb	+0.60D+0.70E	+0.60D+0.70E

Footing Bending Design...	**@ Left End**	**@ Right End**
Mu	47.519 k-ft	0.0 k-ft
Ru	58.666 psi	0.0 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	1.555 in^2	1.555 in^2

1.555 / 0.31 = 5
#5 BAR


4'-0" MIN
9'-0"
3'-6" MIN
GLASS RAILING
STEEL AWNING (ROOF)
6" CURB
3'-0"
STEEL AWNING (ROOF)
SUN SHADE
GLASS RAILING: NOT SHOWN FOR CLARITY
LINE OF UPPER LEVEL
3'-0"
GLASS RAILING: NOT SHOWN FOR CLARITY
LINE OF MAIN LEVEL
HARDIE PANEL SIDING
23'-8"
23'-8"
EX GRADE @ BUILDING FACE
231.62' AVERAGE BUILDING ELEVATION
4'-3" GRADE AT TOP POINT
WEST ELEV.
FEB 6, 2023

00534

916

FEB-6, 2023

SEISMIC:

@ Grid 'W': Roof : V = 3070 #
L = 3.5' + 4'

V_{wall} =	1433	lb.	V_{wall} =	1637	lb.
V_{wall}' =	1433	lb (V_{wall} x R.F.)	V_{wall}' =	1637	lb (V_{wall} x
L =	3.50	ft.	L =	4.00	ft.
H =	9.00	ft.	H =	9.00	ft.
v_{shear} =	409	plf <W3	v_{shear} =	409	plf <W3
T=C=	4299	lb.	T=C=	4209	lb.

'MST60' (5240#) OR 'HDU5' (5645#)

WIND:

@ Grid 'W': Roof : F = 2940 #
L = 3.5' + 4'

F_{wall} =	1372	lb.	F_{wall} =	1568	lb.
L =	3.50	ft.	L =	4.00	ft.
H =	9.00	ft.	H =	9.00	ft.
v_{shear} =	392	plf <W3	v_{shear} =	392	plf <W3
T=C=	4116	lb.	T=C=	4032	lb.

W3: $600^{\#/'} \times 2 \times 3.5'/9' = 467^{\#/'} > 409^{\#/'}$ O.K.

SEISMIC:

@ Grid 'W': 2nd Flr : V = 4330 #
L = 5.25' + 5.25' + 6.5'

V_{wall} =	1337	lb.	V_{wall} =	1656	lb.
V_{wall}' =	1337	lb (V_{wall} x R.F.)	V_{wall}' =	1656	lb (V_{wall} x R.F.)
L =	5.25	ft.	L =	6.50	ft.
H =	10.50	ft.	H =	10.50	ft.
v_{shear} =	255	plf	v_{shear} =	255	plf
T=C=	2955	lb.	T=C=	2898	lb.

WIND:

@ Grid 'W': 2nd Flr : F = 5745 #
L = 5.25' + 5.25' + 6.5'

F_{wall} =	1774	lb.	F_{wall} =	2197	lb.
L =	5.25	ft.	L =	6.50	ft.
H =	10.50	ft.	H =	10.50	ft.
v_{shear} =	338	plf	v_{shear} =	338	plf
T=C=	3921	lb.	T=C=	3845	lb.

• $4299^{\#} - 0.47 \times 1442^{\#} = 3621^{\#}$ PER CALC SHT #R4

: 5/8"Ø x 12" LAG SCREW

$447^{\#/"} \times 5.59" \times 1.6 = 3990^{\#}$

TABLE 12.2A | TABLE L2 | Ω

SEISMIC:

@ Grid 'W': 1st Flr : V = 5840 #
L = 32' (8" Concrete Shearwall)

678#

WIND:

@ Grid 'W': 1st Flr : F = 7670 #
L = 32' (8" Concrete Shearwall)

07/S1.0 O.K.

00535

2 of 4