

Vila Structural Consulting Engineers, Inc.

Structural Calculations for

***New Residence for
Eliges Investors Construction
at
9841 SW 73rd Court
Pinecrest, FL***

Pages Volume II

51 to 107

Project Number: 22CB006



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FL PE# 89027

June 21, 2022

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Concrete Beam

Lic. #: KW-06012775

File: New Residence.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24
CBenginfo

DESCRIPTION: Eyebrow

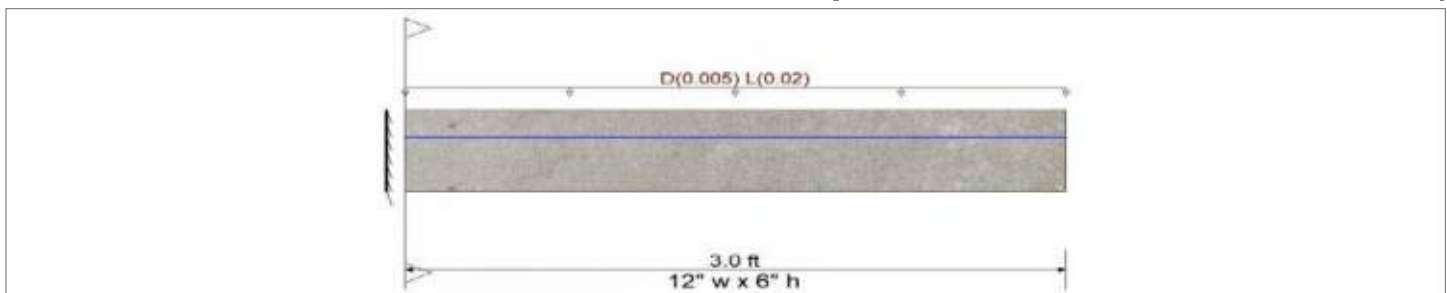
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 6.0 in

Span #1 Reinforcing....

1-#4 at 2.0 in from Top, from 0.0 to 3.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0050, L = 0.020 k/ft, Tributary Width = 1.0 ft, (Design)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.162 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.000 in	Ratio = 0 < 360.0
μ_u : Applied		-0.5625 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 < 360.0
$M_n * \phi$: Allowable		3.468 k-ft	Max Downward Total Deflection	0.002 in	Ratio = 33222 >= 240.0
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 < 240.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	ϕM_n (k-ft)		Moment of Inertia (in ⁴)		
		Bottom	Top	I gross	I cr - Bottom	I cr - Top
Section 1	1- #4 @ d=2",	0.00	3.47	216.00	3.98	18.21

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.293	
Overall MINimum	0.060	
+D+H	0.233	
+D+L+H	0.293	
+D+Lr+H	0.233	
+D+S+H	0.233	
+D+0.750Lr+0.750L+H	0.278	
+D+0.750L+0.750S+H	0.278	

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DESCRIPTION: Eyebrow

Vertical Reactions

Support notation : Far left is #1

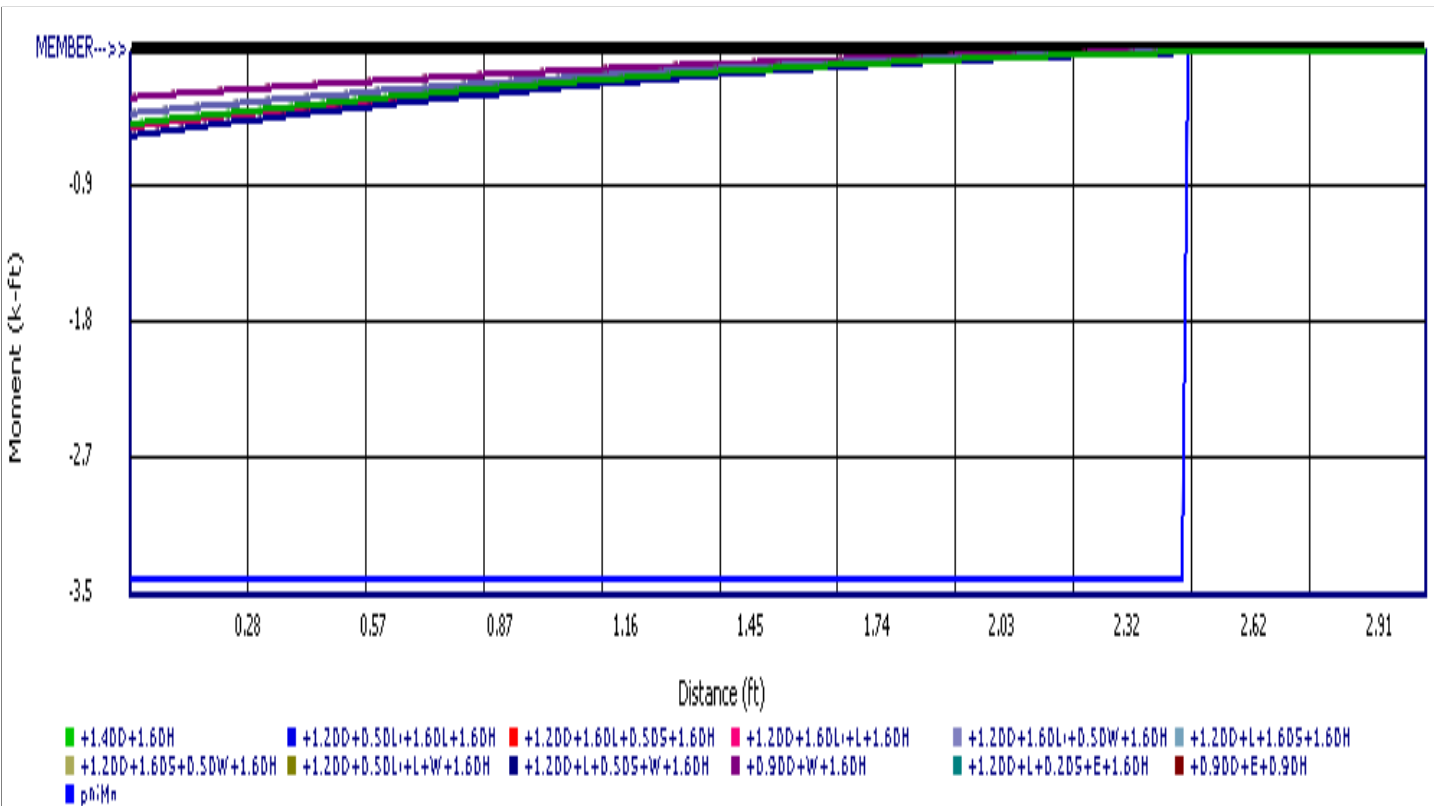
Load Combination	Support 1	Support 2
+D+0.60W+H	0.233	
+D+0.750Lr+0.750L+0.450W+H	0.278	
+D+0.750L+0.750S+0.450W+H	0.278	
+0.60D+0.60W+0.60H	0.140	
+D+0.70E+0.60H	0.233	
+D+0.750L+0.750S+0.5250E+H	0.278	
+0.60D+0.70E+H	0.140	
D Only	0.233	
L Only	0.060	
H Only		

Shear Stirrup Requirements

Entire Beam Span Length : $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.0022	3.000		0.0000	0.000

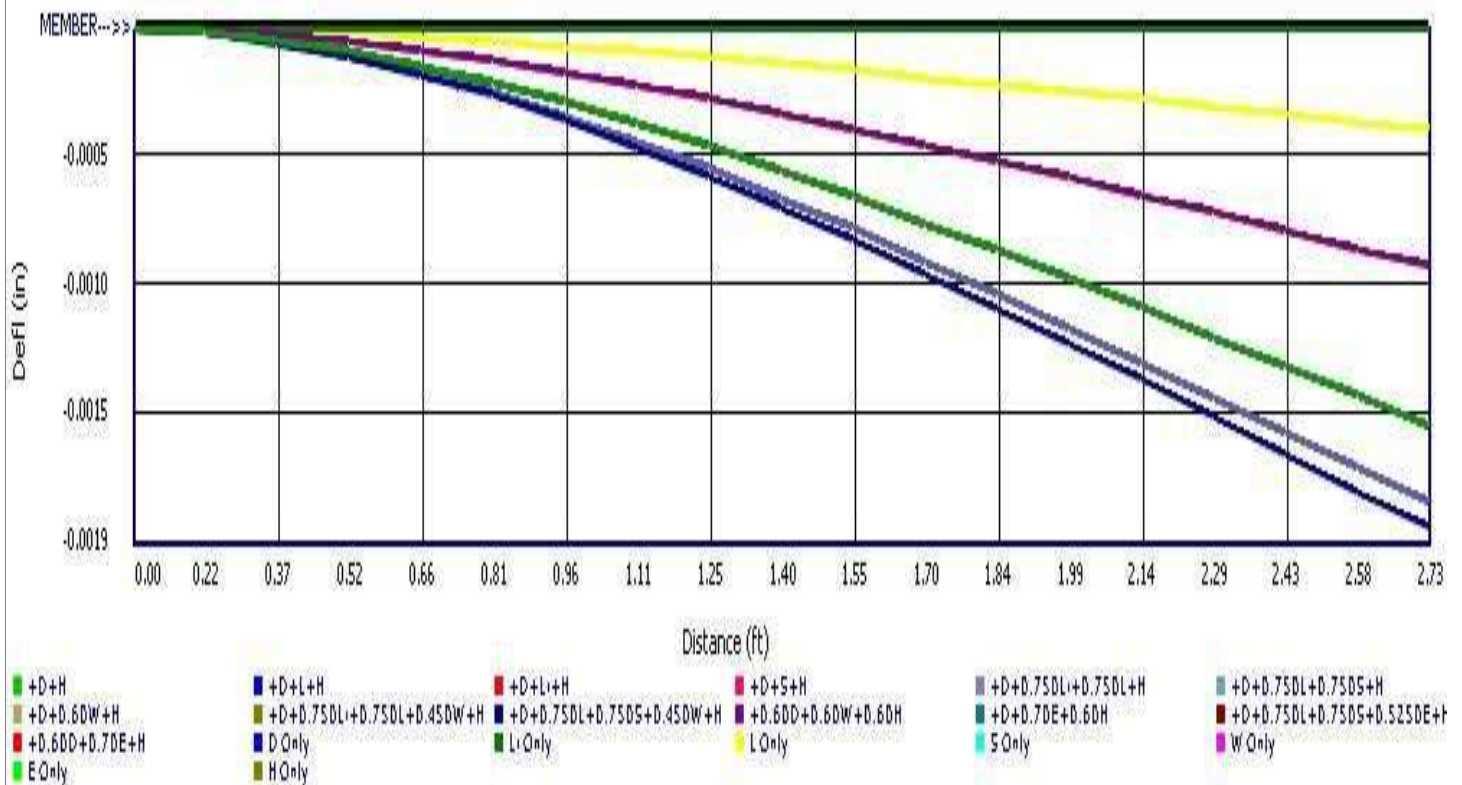
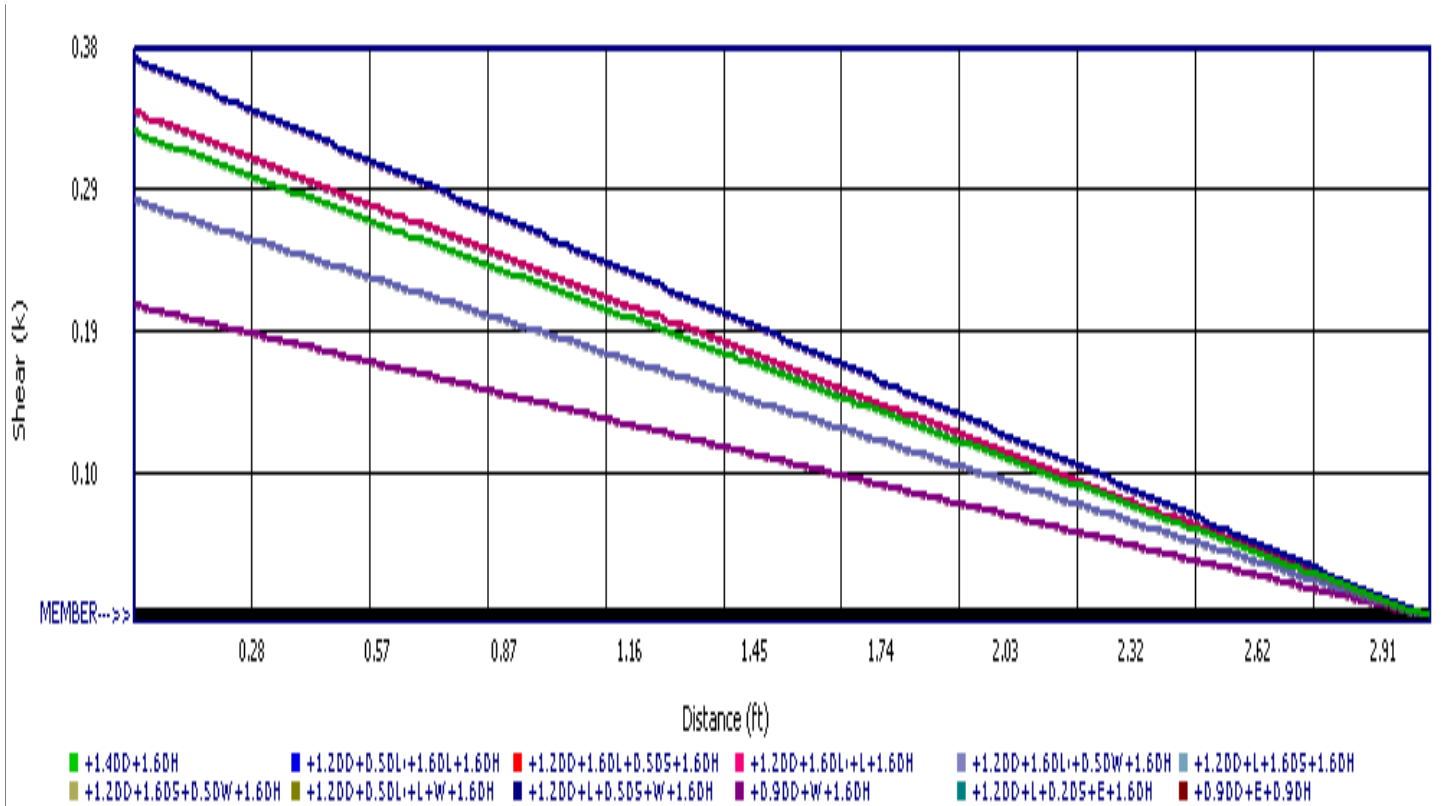


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DESCRIPTION: Eyebrow



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DESCRIPTION: Exterior Canopy

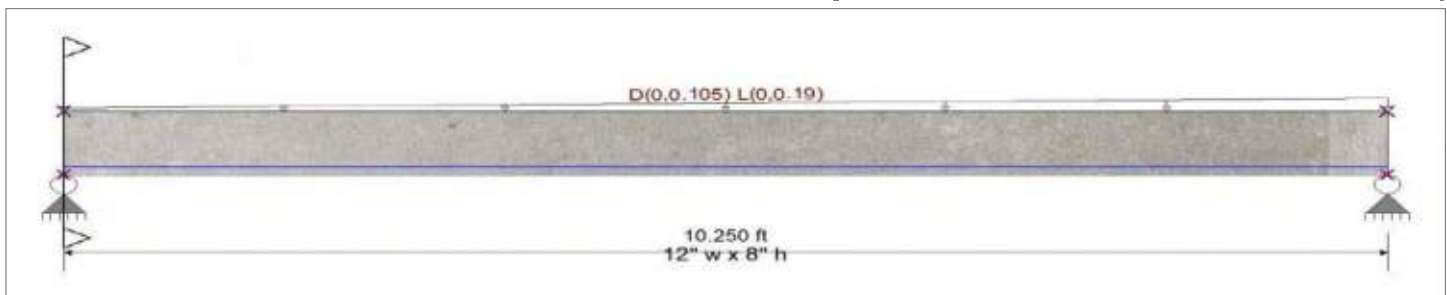
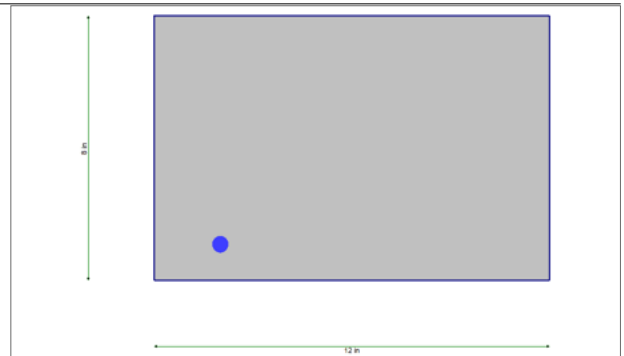
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 8.0 in

Span #1 Reinforcing....

1-#4 at 1.10 in from Bottom, from 0.0 to 10.250 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Varying Uniform Load : D= 0.0->0.1050, L= 0.0->0.190 k/ft, Extent = 0.0 ->> 10.250 ft, Trib Width = 1.0 ft, (Corner piece)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.723 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.013 in	Ratio = 9712 >=360.
μ_u : Applied		4.397 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
$M_n * \phi$: Allowable		6.078 k-ft	Max Downward Total Deflection	0.033 in	Ratio = 3783 >=240.
Location of maximum on span		5.657 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <240.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	ϕM_n (k-ft)		Moment of Inertia (in ⁴)		
		Bottom	Top	I gross	I cr - Bottom	I cr - Top
Section 1	1- #4 @ d=6.9",	6.08	0.00	512.00	58.62	1.04

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	0.999	1.503
Overall MINimum	0.325	0.513
+D+H	0.675	0.854
+D+L+H	0.999	1.503
+D+Lr+H	0.675	0.854
+D+S+H	0.675	0.854
+D+0.750Lr+0.750L+H	0.918	1.341

Concrete Beam

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DESCRIPTION: Exterior Canopy

Vertical Reactions

Support notation : Far left is #1

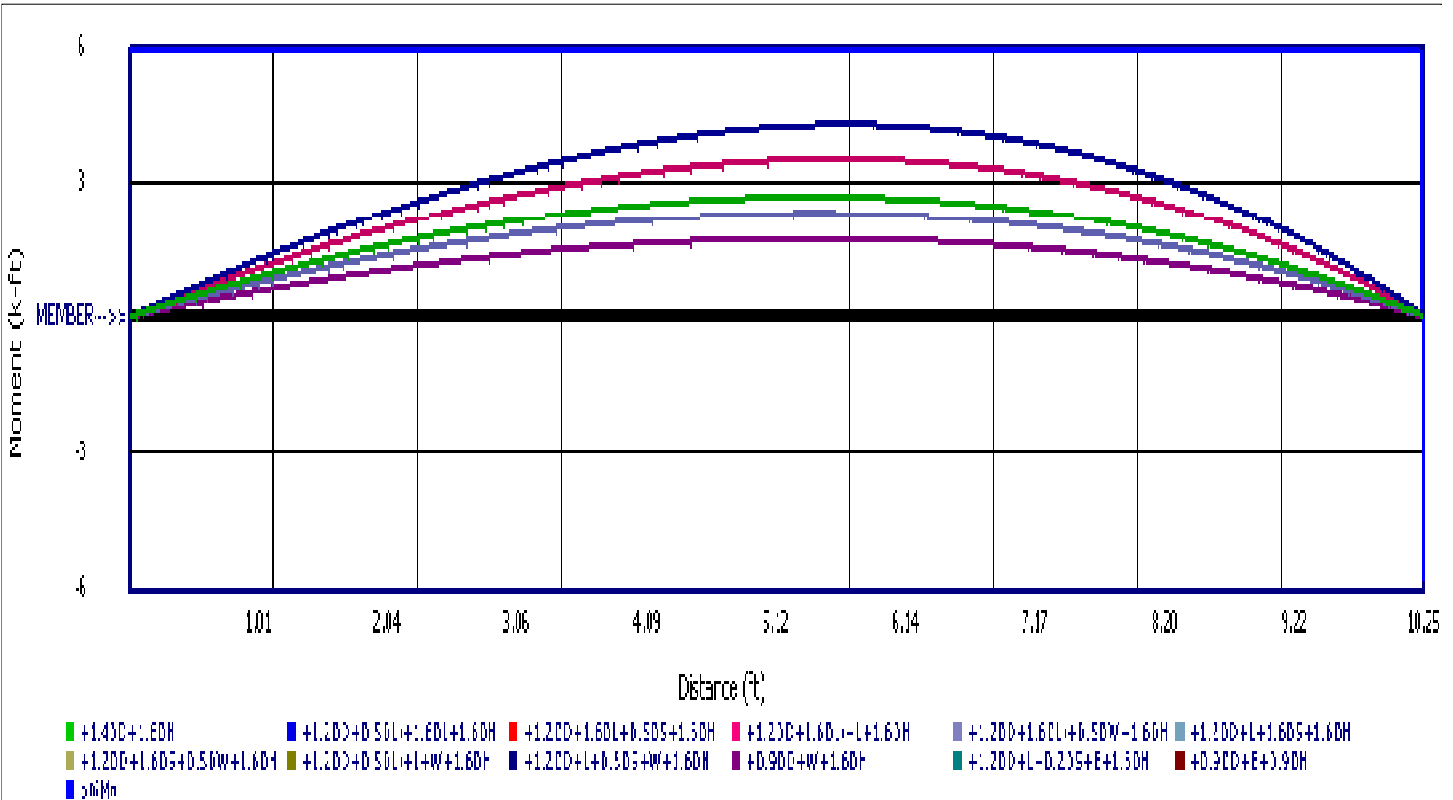
Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	0.918	1.341
+D+0.60W+H	0.675	0.854
+D+0.750Lr+0.750L+0.450W+H	0.918	1.341
+D+0.750L+0.750S+0.450W+H	0.918	1.341
+0.60D+0.60W+0.60H	0.405	0.513
+D+0.70E+0.60H	0.675	0.854
+D+0.750L+0.750S+0.5250E+H	0.918	1.341
+0.60D+0.70E+H	0.405	0.513
D Only	0.675	0.854
L Only	0.325	0.649
H Only		

Shear Stirrup Requirements

Entire Beam Span Length : $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in

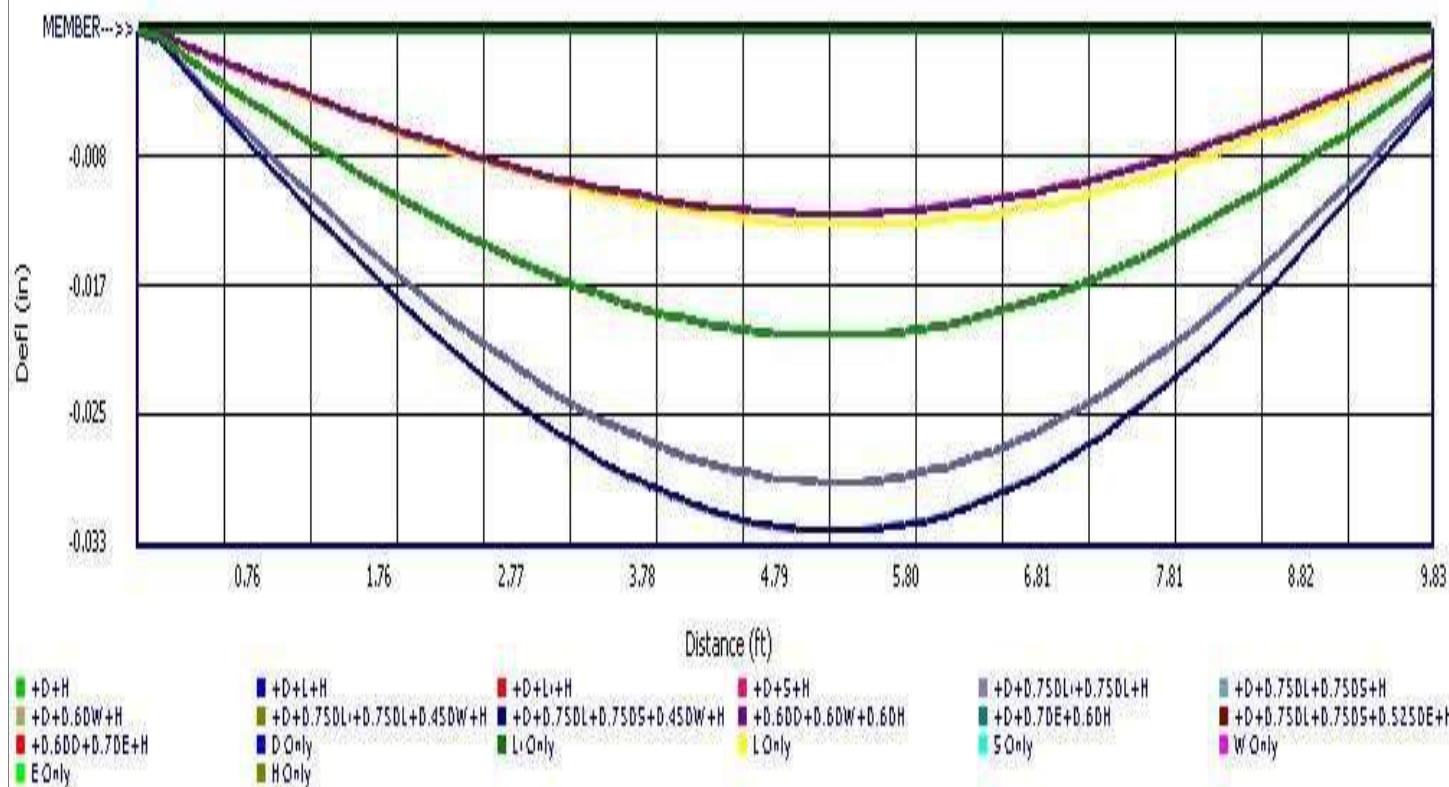
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.0325	5.293		0.0000	0.000



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DESCRIPTION: Exterior Canopy



Concrete Beam

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DESCRIPTION: 2B-4 AT GL 5 EXT. FROM GL A

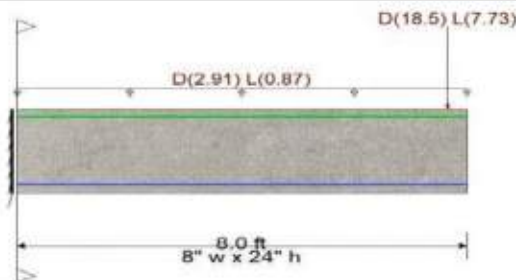
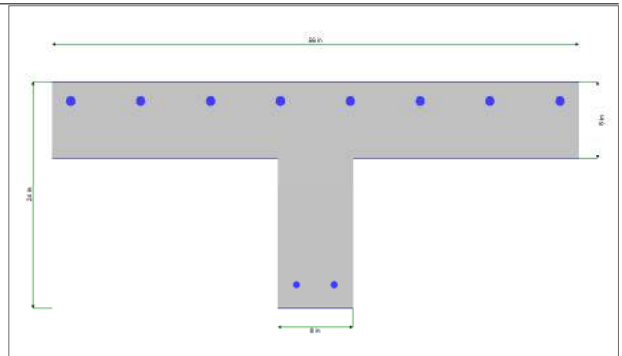
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	Fy - Stirrups	=	60.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Tee Section, Stem Width = 8.0 in, Total Height = 24.0 in, Top Flange Width = 56.0 in, Flange Thickness = 8.0 in

Span #1 Reinforcing....

2-#6 at 2.50 in from Bottom, from 0.0 to 8.0 ft in this span

8-#8 at 2.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 2.910, L = 0.870 k/ft, Tributary Width = 1.0 ft, (SLAB REACTION)

Point Load : D = 18.50, L = 7.730 k @ 7.670 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.985 : 1	Maximum Deflection	
Section used for this span	Typical Section	Max Downward Transient Deflection	0.061 in Ratio = 3128 >= 360.
Mu : Applied	-443.697 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 < 360.0
Mn * Phi : Allowable	450.333 k-ft	Max Downward Total Deflection	0.299 in Ratio = 640 >= 360.
Location of maximum on span	0.000 ft	Max Upward Total Deflection	0.000 in Ratio = 0 < 360.0
Span # where maximum occurs	Span # 1		

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	Phi*Mn (k-ft)		Moment of Inertia (in^4)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	2- #6 @ d=21.5", 8- #8 @ d=2",	101.94	450.33	19,456.00	2,808.59	10,075.29

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	61.110	
Overall MINimum	14.690	
+D+H	46.420	
+D+L+H	61.110	
+D+Lr+H	46.420	
+D+S+H	46.420	
+D+0.750Lr+0.750L+H	57.437	

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DESCRIPTION: 2B-4 AT GL 5 EXT. FROM GL A

Vertical Reactions

Support notation : Far left is #1

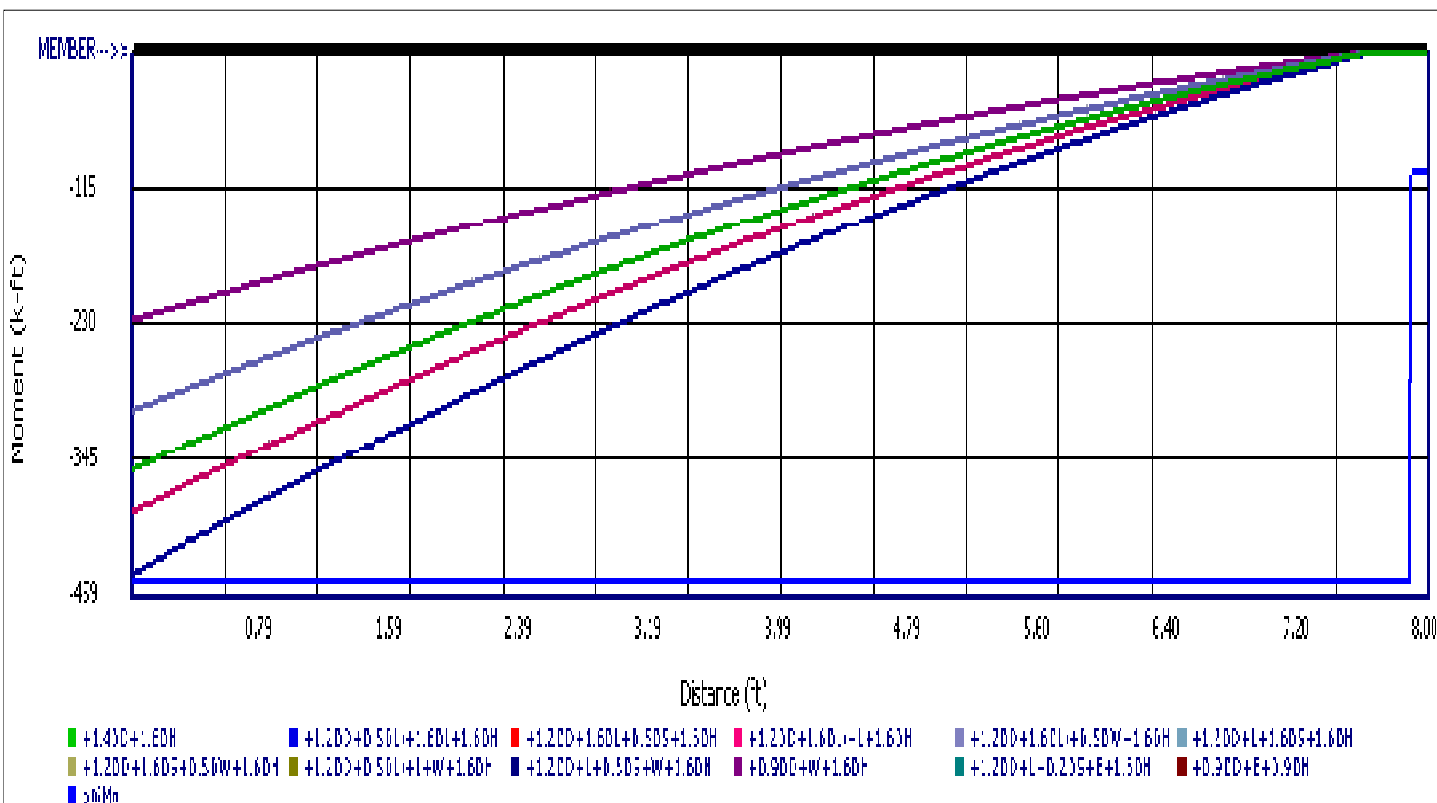
Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	57.437	
+D+0.60W+H	46.420	
+D+0.750Lr+0.750L+0.450W+H	57.437	
+D+0.750L+0.750S+0.450W+H	57.437	
+0.60D+0.60W+0.60H	27.852	
+D+0.70E+0.60H	46.420	
+D+0.750L+0.750S+0.5250E+H	57.437	
+0.60D+0.70E+H	27.852	
D Only	46.420	
L Only	14.690	
H Only		

Shear Stirrup Requirements

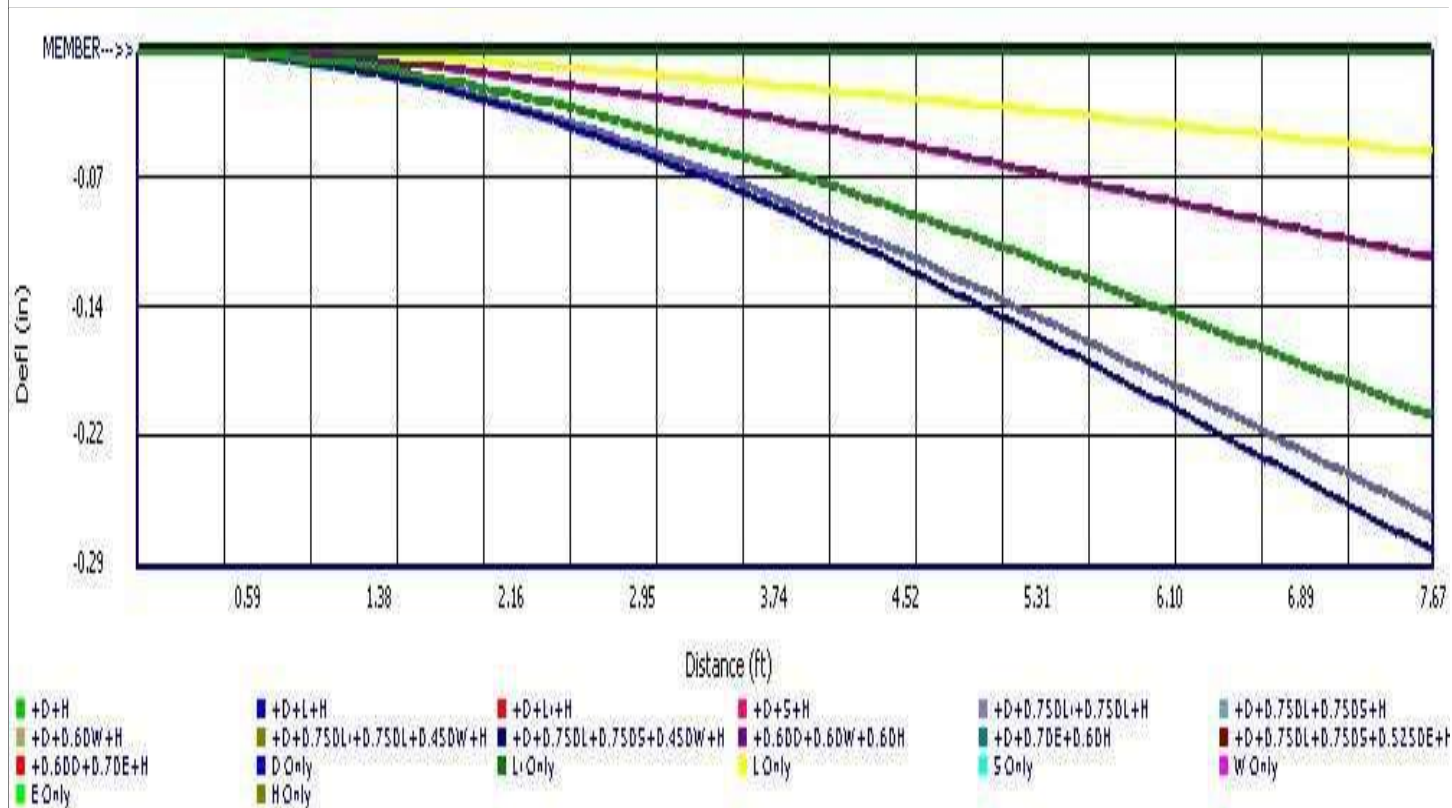
Between 0.00 to 4.05 ft, $V_s > (4bd'f_c^{0.5})$ ACI 11.4.5.3, Req'd $V_s = 33.448$, use #3 stirrups spaced at 3.000 in
Between 4.07 to 7.66 ft, $\Phi V_c < V_u$, Req'd $V_s = 8.726$, use #3 stirrups spaced at 6.000 in
Between 7.68 to 7.99 ft, $V_u < \Phi V_c/2$, Req'd $V_s = \text{Not Req'd}$ 11.4.6.1, use #3 stirrups spaced at 0.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.2994	8.000		0.0000	0.000



DESCRIPTION: 2B-4 AT GL 5 EXT. FROM GL A



Concrete Beam

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DESCRIPTION: 2B-5 AT GL 5 EXT. FROM GL A

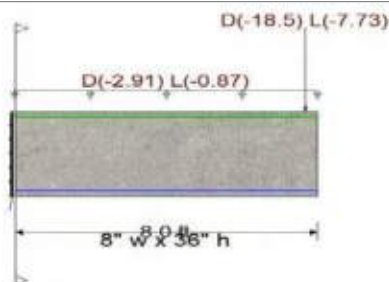
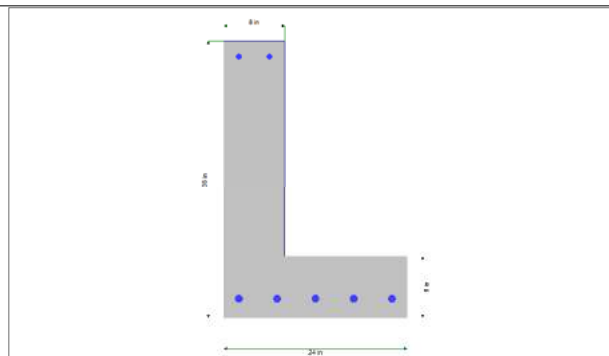
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

L Section, Stem Width = 8.0 in, Total Height = 36.0 in, Bottom Flange Width = 24.0 in, Flange Thickness = 8.0 in

Span #1 Reinforcing....

5-#8 at 2.50 in from Bottom, from 0.0 to 8.0 ft in this span

2-#6 at 2.0 in from Top, from 0.0 to 8.0 ft in this span

Load for Span Number 1

Uniform Load : D = -2.910, L = -0.870 k/ft, Tributary Width = 1.0 ft, (SLAB REACTION)

Point Load : D = -18.50, L = -7.730 k @ 7.670 ft, (WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.781 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.000 in	Ratio = 0 < 360.0
μ_u : Applied		421.425 k-ft	Max Upward Transient Deflection	-0.016 in	Ratio = 11824 >= 360.0
$M_n * \Phi$: Allowable		539.68 k-ft	Max Downward Total Deflection	0.000 in	Ratio = 0 < 360.0
Location of maximum on span		0.000 ft	Max Upward Total Deflection	-0.135 in	Ratio = 1422 >= 360.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	ΦM_n (k-ft)		Moment of Inertia (in ⁴)		
		Bottom	Top	I gross	I cr - Bottom	I cr - Top
Section 1	5- #8 @ d=33.5", 2- #6 @ d=2",	539.68	141.91	49,155.28	19,739.55	6,872.40

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	-56.470	
Overall MINimum	-14.690	
+D+H	-41.780	
+D+L+H	-56.470	
+D+Lr+H	-41.780	
+D+S+H	-41.780	
+D+0.750Lr+0.750L+H	-52.797	
+D+0.750L+0.750S+H	-52.797	

Concrete Beam

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DESCRIPTION: 2B-5 AT GL 5 EXT. FROM GL A

Vertical Reactions

Support notation : Far left is #1

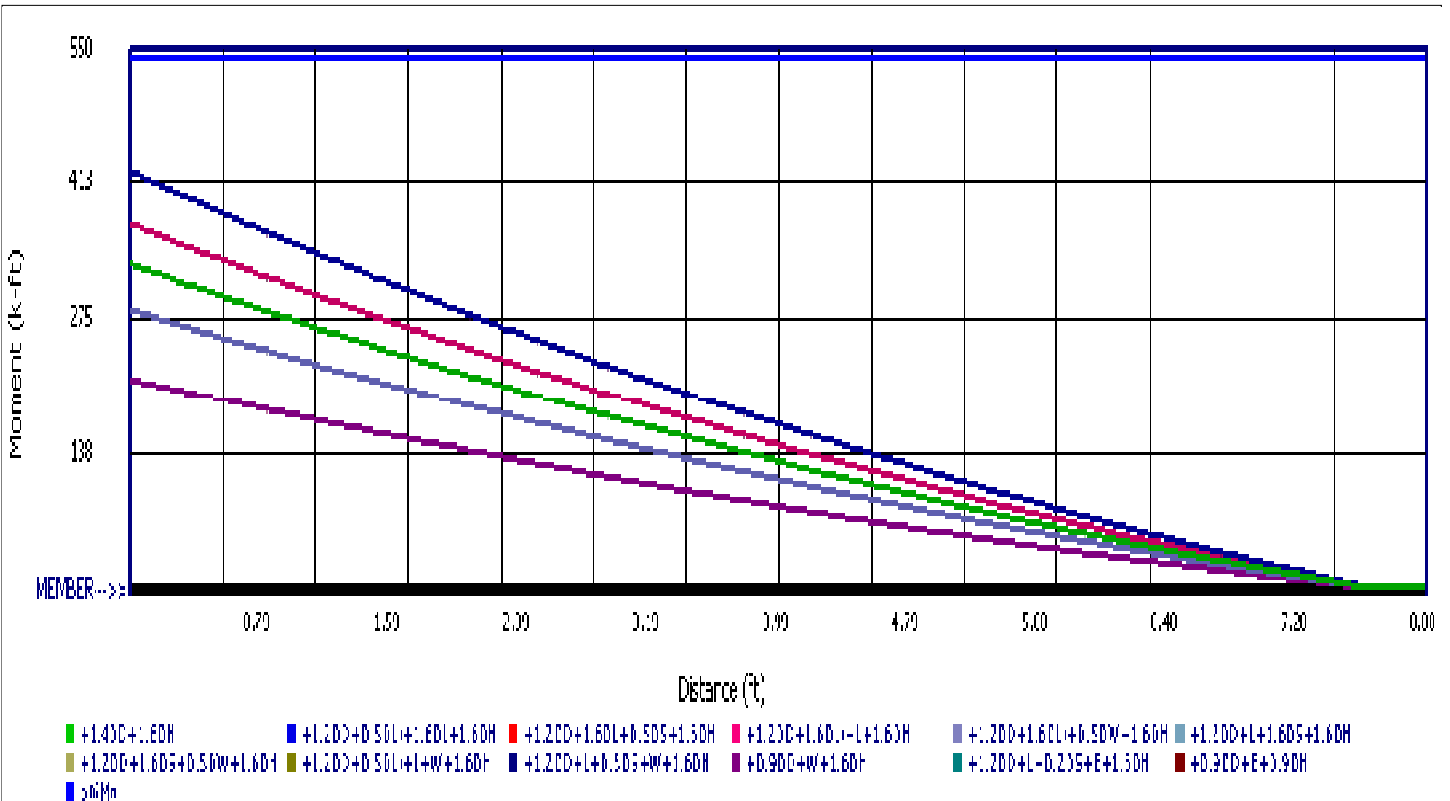
Load Combination	Support 1	Support 2
+D+0.60W+H	-41.780	
+D+0.750Lr+0.750L+0.450W+H	-52.797	
+D+0.750L+0.750S+0.450W+H	-52.797	
+0.60D+0.60W+0.60H	-25.068	
+D+0.70E+0.60H	-41.780	
+D+0.750L+0.750S+0.5250E+H	-52.797	
+0.60D+0.70E+H	-25.068	
D Only	-41.780	
L Only	-14.690	
H Only		

Shear Stirrup Requirements

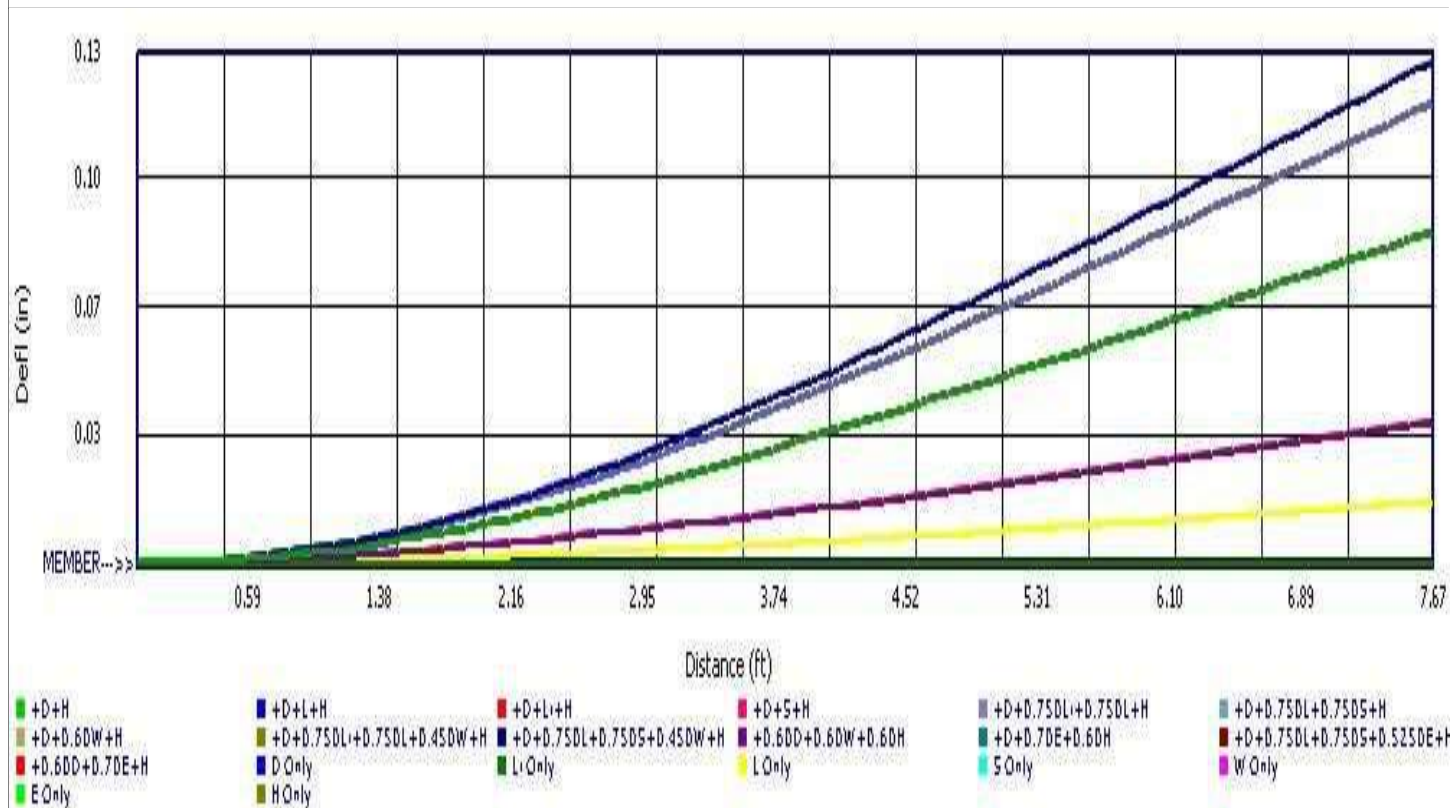
Between 0.00 to 7.66 ft, $\Phi V_c < V_u$, Req'd Vs = 4.645, use #3 stirrups spaced at 7.000 in
Between 7.68 to 7.99 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
	1	0.0000	0.000	+D+L+H	-0.1350	8.000



DESCRIPTION: 2B-5 AT GL 5 EXT. FROM GL A



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DESCRIPTION: RB-1

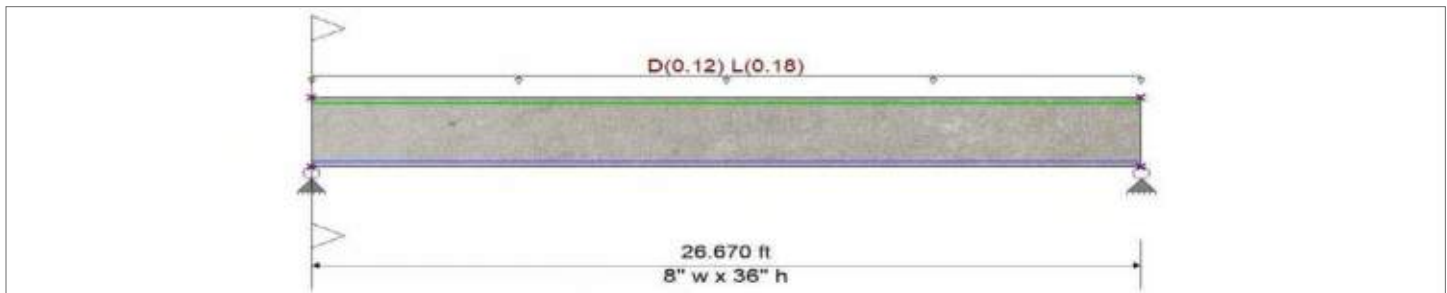
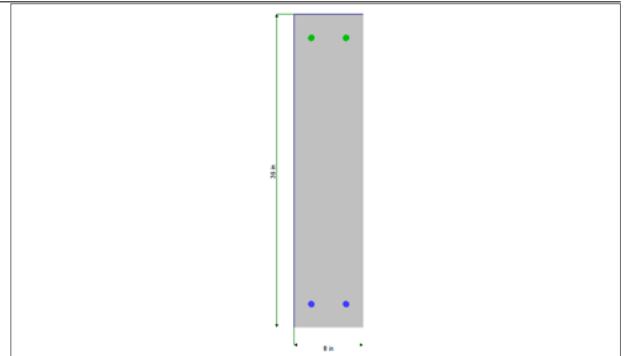
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 36.0 in

Span #1 Reinforcing....

2-#6 at 2.70 in from Bottom, from 0.0 to 26.670 ft in this span

2-#6 at 2.70 in from Top, from 0.0 to 26.670 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.020, L = 0.030 ksf, Tributary Width = 6.0 ft, (ROOF DESIGN)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.541 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.018 in	Ratio = 17709 >= 360.
μ_u : Applied		69.350 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 < 360.0
$M_n * \phi$: Allowable		128.294 k-ft	Max Downward Total Deflection	0.059 in	Ratio = 5402 >= 240.
Location of maximum on span		13.359 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 < 240.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	ϕM_n (k-ft)		Moment of Inertia (in ⁴)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	2- #6 @ d=33.3", 2- #6 @ d=2.7",	128.29	128.29	31,104.00	5,850.27	5,850.27

Vertical Reactions

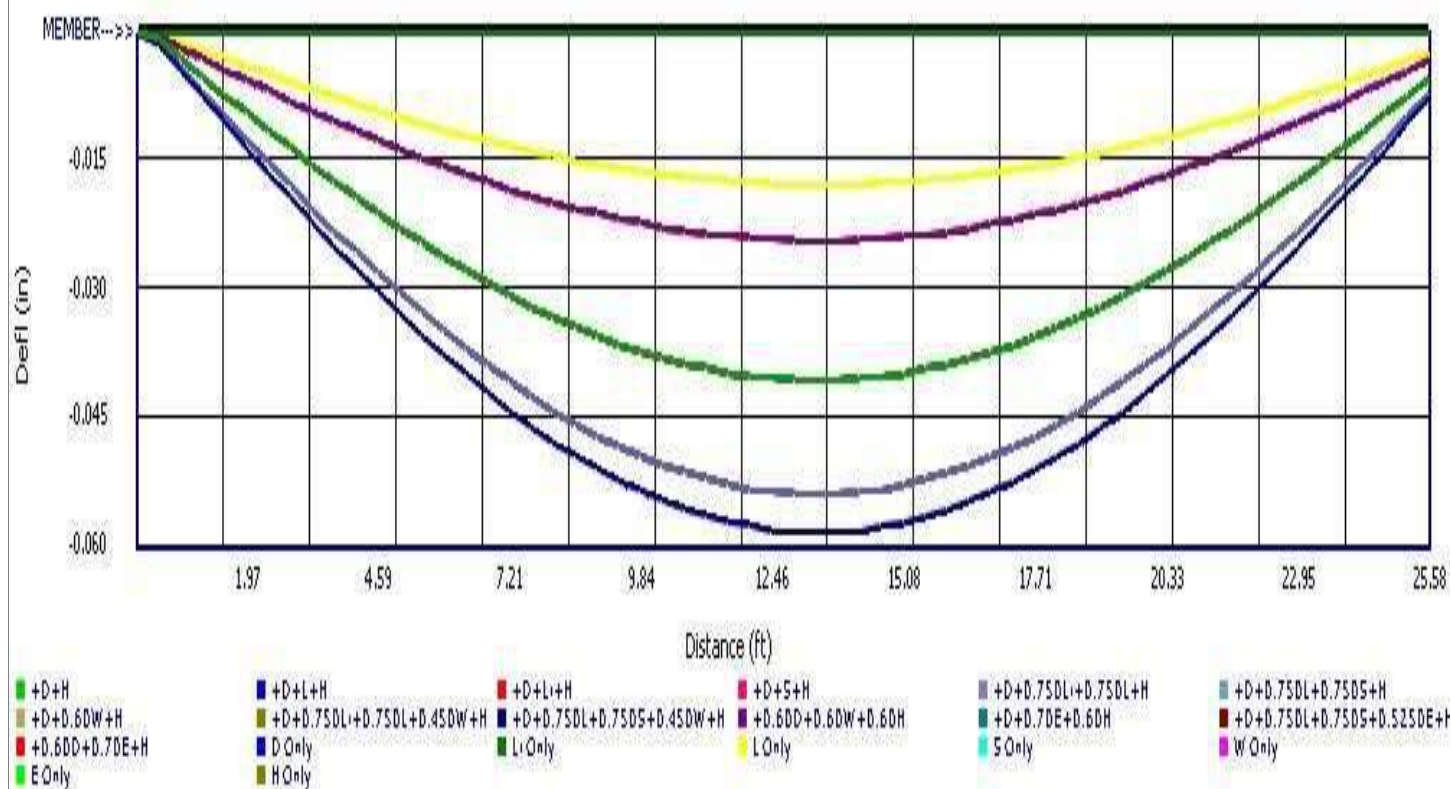
Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	7.868	7.868
Overall MINimum	2.400	2.400
+D+H	5.467	5.467
+D+L+H	7.868	7.868
+D+Lr+H	5.467	5.467
+D+S+H	5.467	5.467
+D+0.750Lr+0.750L+H	7.268	7.268
+D+0.750L+0.750S+H	7.268	7.268

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Support notation : Far left is #1

DESCRIPTION: RB-1



Concrete Beam

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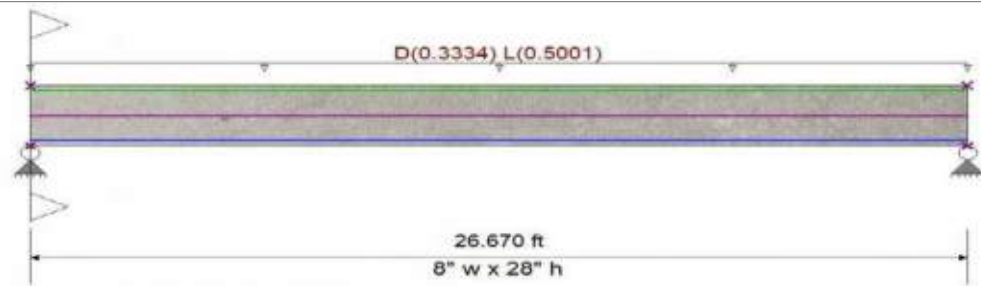
DESCRIPTION: RB-2

CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 28.0 in

Span #1 Reinforcing....

2-#7 at 2.70 in from Bottom, from 0.0 to 26.670 ft in this span
2-#5 at 14.0 in from Bottom, from 0.0 to 26.670 ft in this span

2-#7 at 2.70 in from Top, from 0.0 to 26.670 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.020, L = 0.030 ksf, Tributary Width = 16.670 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.813 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection		
Mu : Applied		130.780 k-ft	0.134 in Ratio =		
Mn * Phi : Allowable		160.851 k-ft	0.000 in Ratio =		
Location of maximum on span		13.359 ft	0.655 in Ratio =		
Span # where maximum occurs		Span # 1	0.000 in Ratio =		

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	Phi*Mn (k-ft)		Moment of Inertia (in^4)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	2- #7 @ d=25.3", 2- #7 @ d=2.7", 2- #5 @ d=14",	160.85	160.85	14,634.67	5,113.33	5,113.33

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	14.123	14.123
Overall MINimum	4.472	4.472
+D+H	7.454	7.454
+D+L+H	14.123	14.123
+D+Lr+H	7.454	7.454
+D+S+H	7.454	7.454
+D+0.750Lr+0.750L+H	12.455	12.455

Concrete Beam

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DESCRIPTION: RB-2

Vertical Reactions

Support notation : Far left is #1

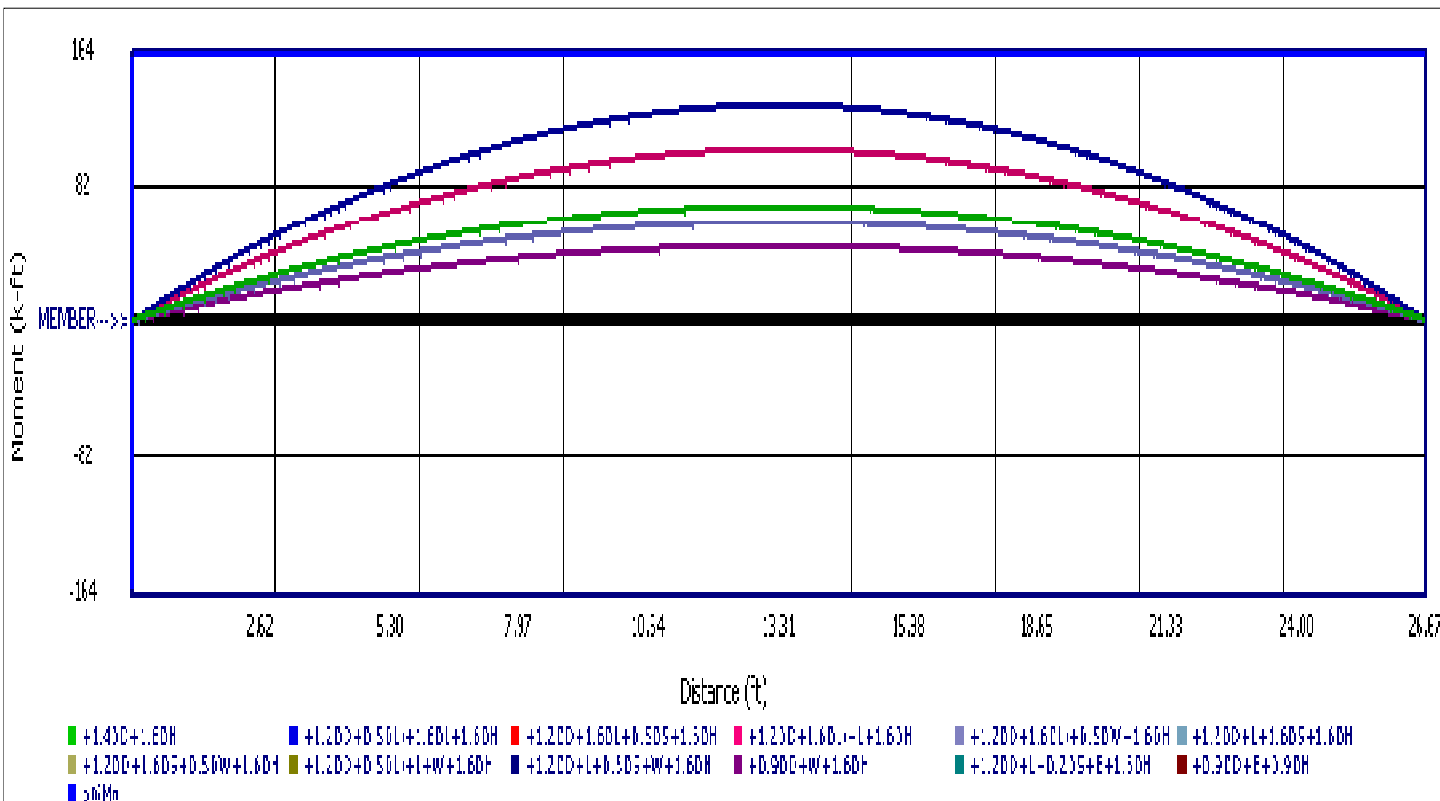
Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	12.455	12.455
+D+0.60W+H	7.454	7.454
+D+0.750Lr+0.750L+0.450W+H	12.455	12.455
+D+0.750L+0.750S+0.450W+H	12.455	12.455
+0.60D+0.60W+0.60H	4.472	4.472
+D+0.70E+0.60H	7.454	7.454
+D+0.750L+0.750S+0.5250E+H	12.455	12.455
+0.60D+0.70E+H	4.472	4.472
D Only	7.454	7.454
L Only	6.669	6.669
H Only		

Shear Stirrup Requirements

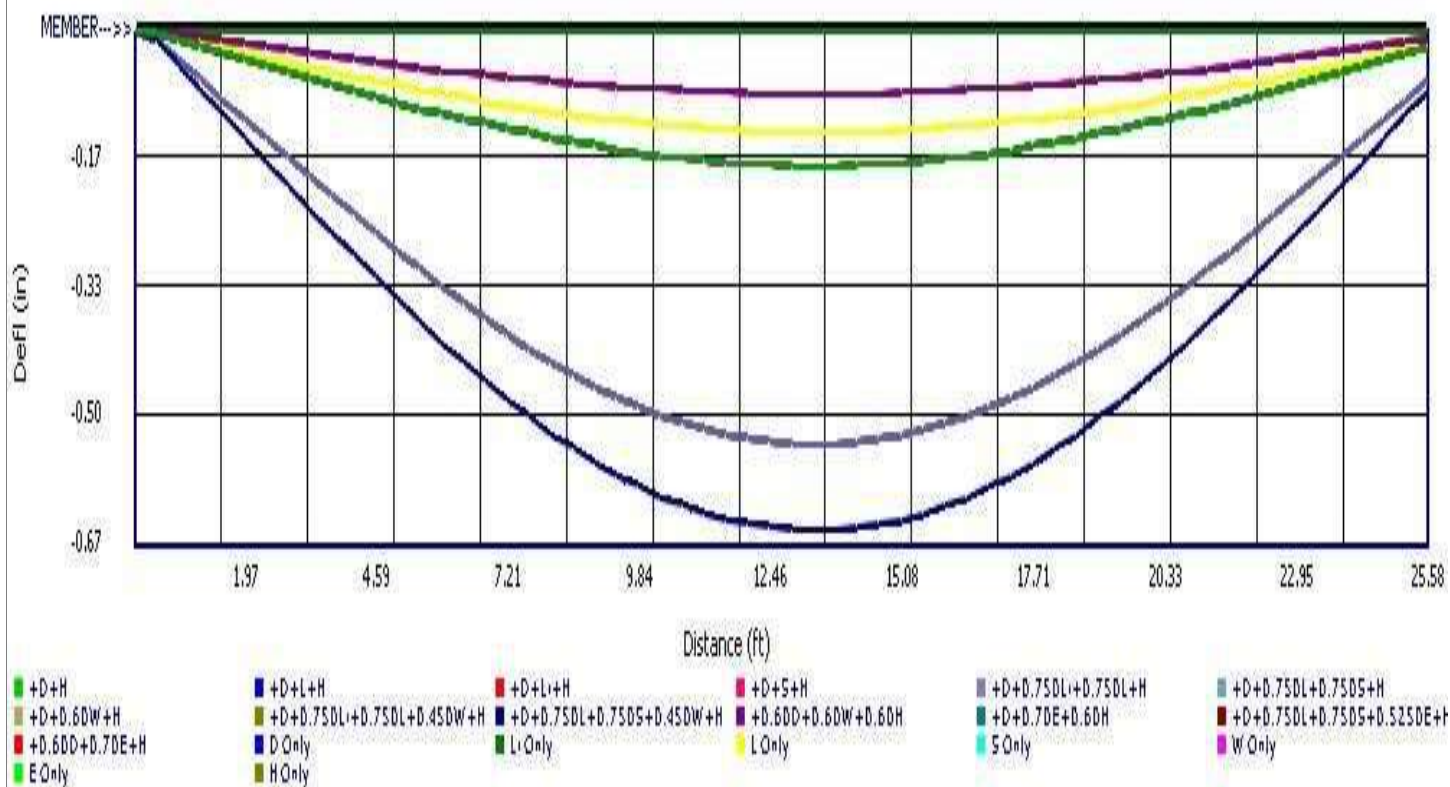
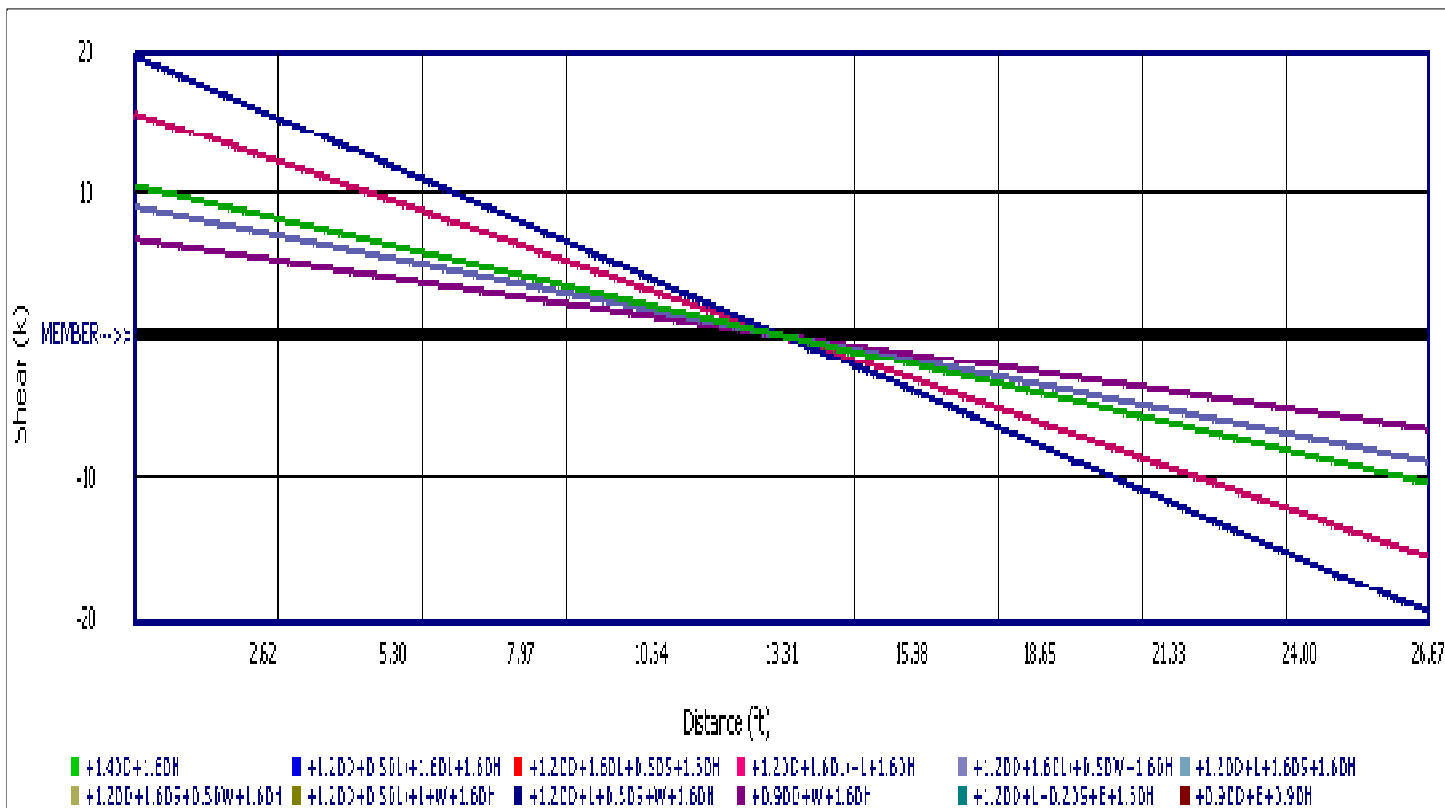
Between 0.00 to 6.90 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 11.4.6.1, use #3 stirrups spaced at 12.000 in
Between 6.95 to 19.72 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in
Between 19.77 to 26.62 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 11.4.6.1, use #3 stirrups spaced at 12.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.6554	13.335		0.0000	0.000



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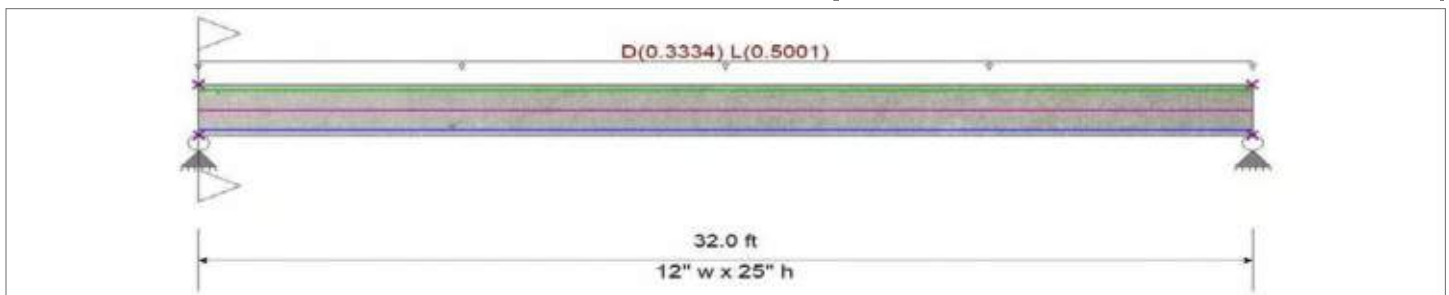
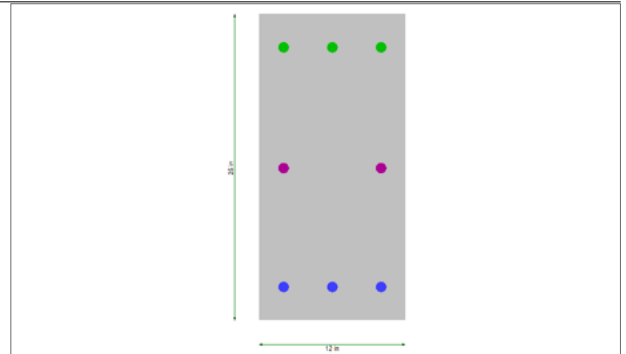
DESCRIPTION: RB-3

CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2}$	=	7.50		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 25.0 in

Span #1 Reinforcing....

3-#7 at 2.70 in from Bottom, from 0.0 to 32.0 ft in this span

3-#7 at 2.70 in from Top, from 0.0 to 32.0 ft in this span

2-#7 at 12.50 in from Top, from 0.0 to 32.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.020, L = 0.030 ksf, Tributary Width = 16.670 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.900 : 1	Maximum Deflection		
Section used for this span	Typical Section		Max Downward Transient Deflection	0.342 in	Ratio = 1123 >=360.
Mu : Applied	200.030 k-ft		Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable	222.273 k-ft		Max Downward Total Deflection	1.375 in	Ratio = 279 >=240.
Location of maximum on span	16.029 ft		Max Upward Total Deflection	0.000 in	Ratio = 0 <240.0
Span # where maximum occurs	Span # 1				

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	Phi*Mn (k-ft)		Moment of Inertia (in^4)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	3- #7 @ d=22.3", 3- #7 @ d=2.7", 2- #7 @ d=12.5",	222.27	222.27	15,625.00	5,885.64	5,885.64

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	18.169	18.169
Overall MINimum	6.101	6.101
+D+H	10.168	10.168
+D+L+H	18.169	18.169
+D+Lr+H	10.168	10.168
+D+S+H	10.168	10.168
+D+0.750Lr+0.750L+H	16.169	16.169

Concrete Beam

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DESCRIPTION: RB-3

Vertical Reactions

Support notation : Far left is #1

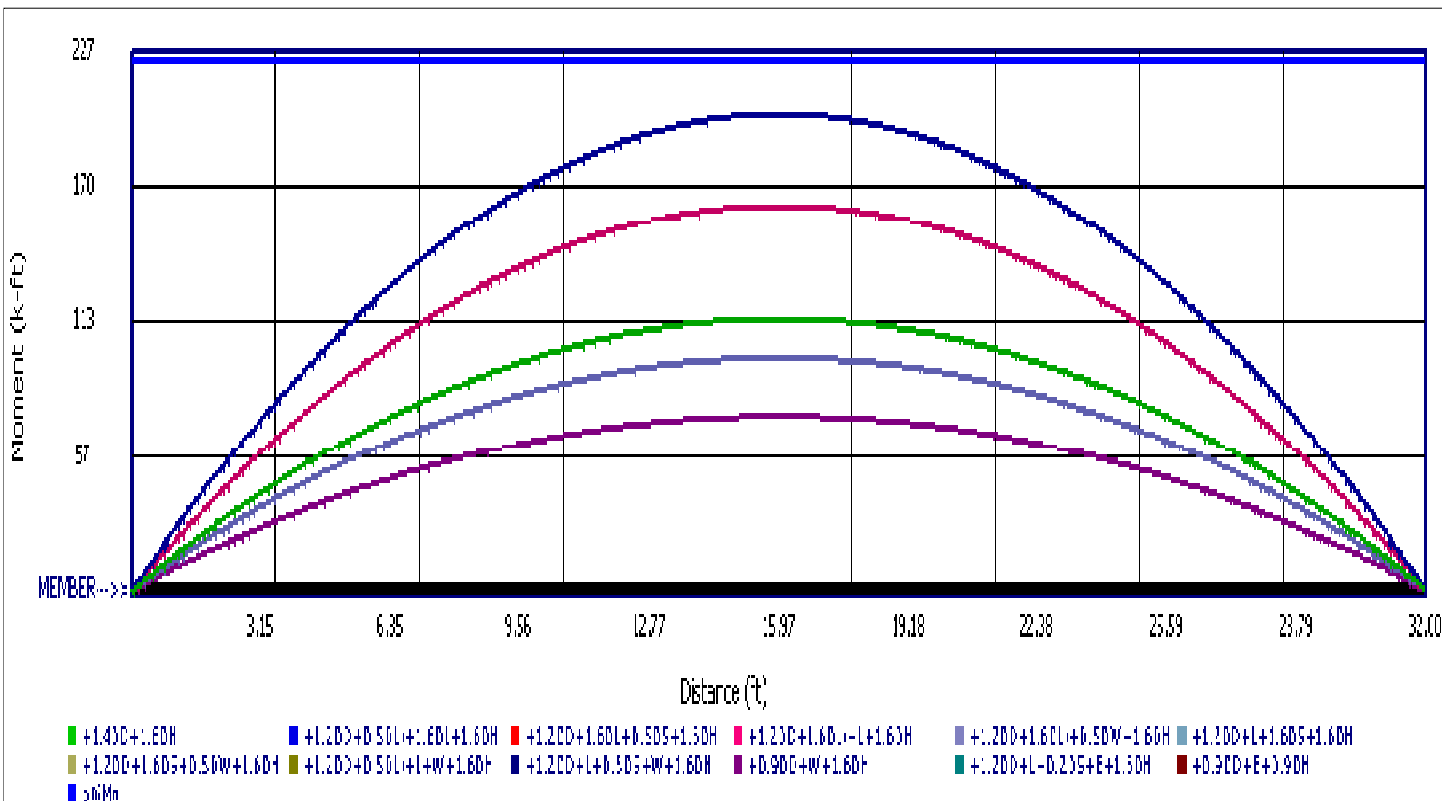
Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	16.169	16.169
+D+0.60W+H	10.168	10.168
+D+0.750Lr+0.750L+0.450W+H	16.169	16.169
+D+0.750L+0.750S+0.450W+H	16.169	16.169
+0.60D+0.60W+0.60H	6.101	6.101
+D+0.70E+0.60H	10.168	10.168
+D+0.750L+0.750S+0.5250E+H	16.169	16.169
+0.60D+0.70E+H	6.101	6.101
D Only	10.168	10.168
L Only	8.002	8.002
H Only		

Shear Stirrup Requirements

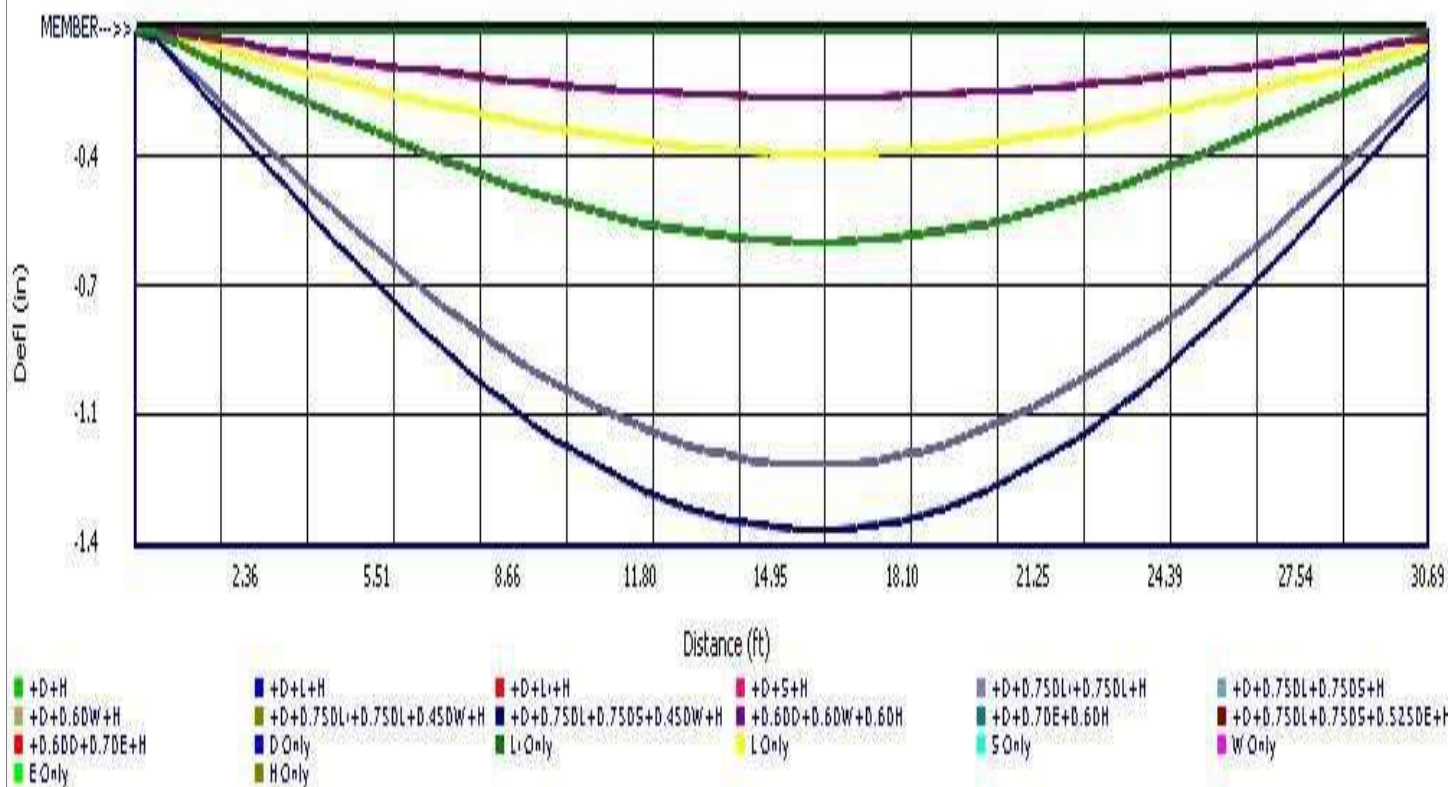
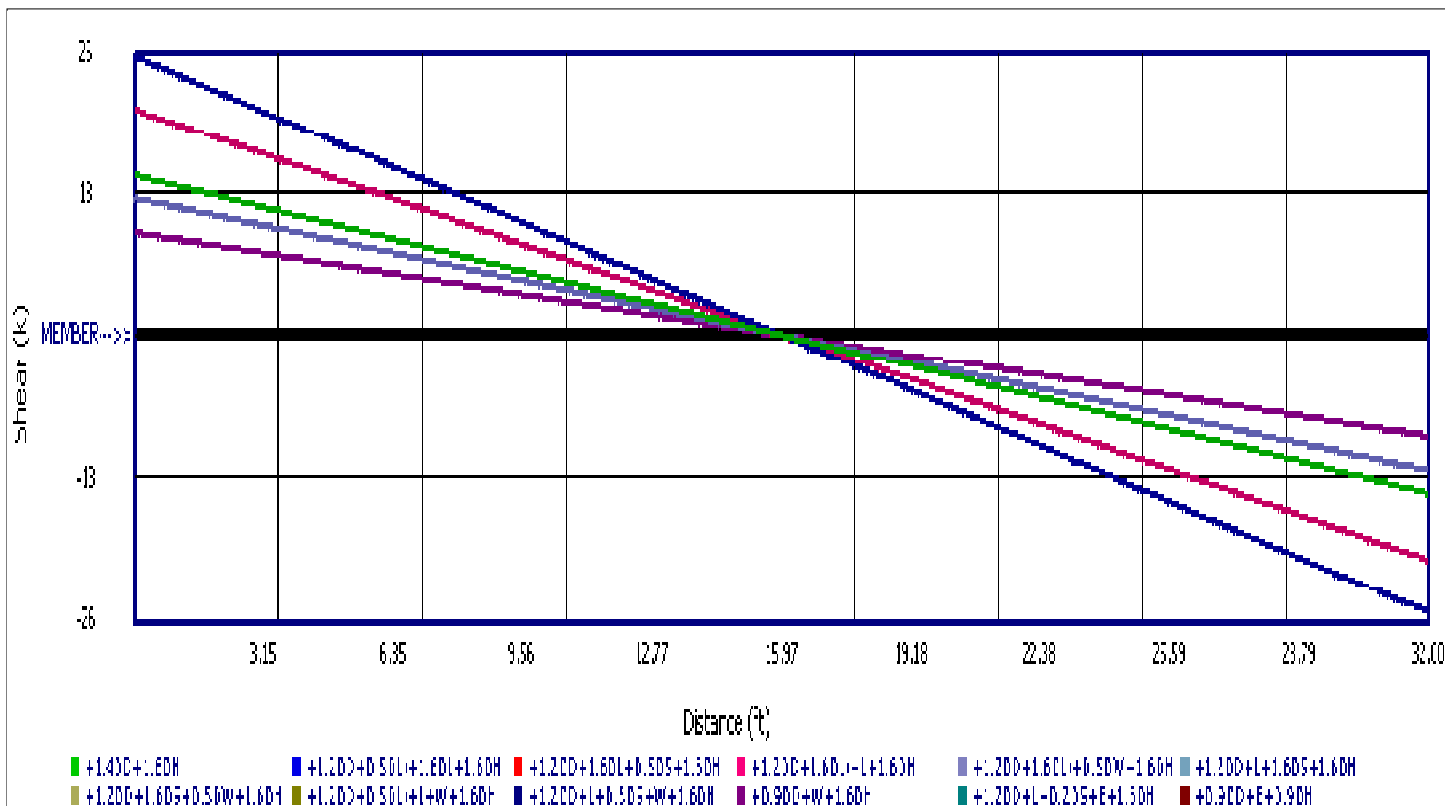
Between 0.00 to 7.99 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 11.4.6.1, use #3 stirrups spaced at 11.000 in
Between 8.04 to 23.96 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in
Between 24.01 to 31.94 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 11.4.6.1, use #3 stirrups spaced at 11.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	1.3752	16.000		0.0000	0.000



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Concrete Beam

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DESCRIPTION: RB-4

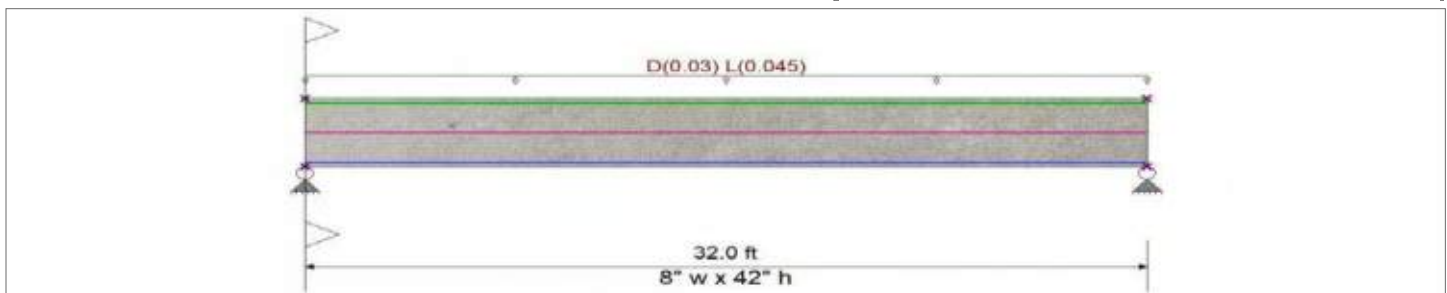
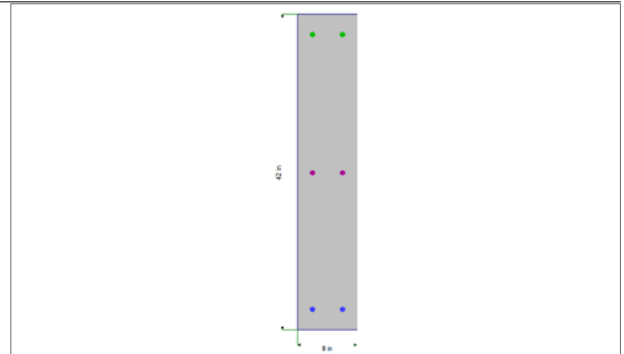
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	474.342 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	60.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 8.0 in, Height = 42.0 in

Span #1 Reinforcing...

2-#6 at 2.70 in from Bottom, from 0.0 to 32.0 ft in this span

2-#6 at 2.70 in from Top, from 0.0 to 32.0 ft in this span

2-#5 at 21.0 in from Top, from 0.0 to 32.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.020, L = 0.030 ksf, Tributary Width = 1.50 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.324 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.007 in	Ratio = 55791 >=360.
Mu : Applied		66.005 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		203.415 k-ft	Max Downward Total Deflection	0.063 in	Ratio = 6074 >=240.
Location of maximum on span		16.029 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <240.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	Phi*Mn (k-ft)		Moment of Inertia (in^4)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	2- #6 @ d=39.3", 2- #6 @ d=2.7", 2- #5 @ d=21",	203.41	203.41	49,392.00	10,536.69	10,536.69

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	6.613	6.613
Overall MINimum	0.720	0.720
+D+H	5.893	5.893
+D+L+H	6.613	6.613
+D+Lr+H	5.893	5.893
+D+S+H	5.893	5.893
+D+0.750Lr+0.750L+H	6.433	6.433

Concrete Beam

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DESCRIPTION: RB-4

Vertical Reactions

Support notation : Far left is #1

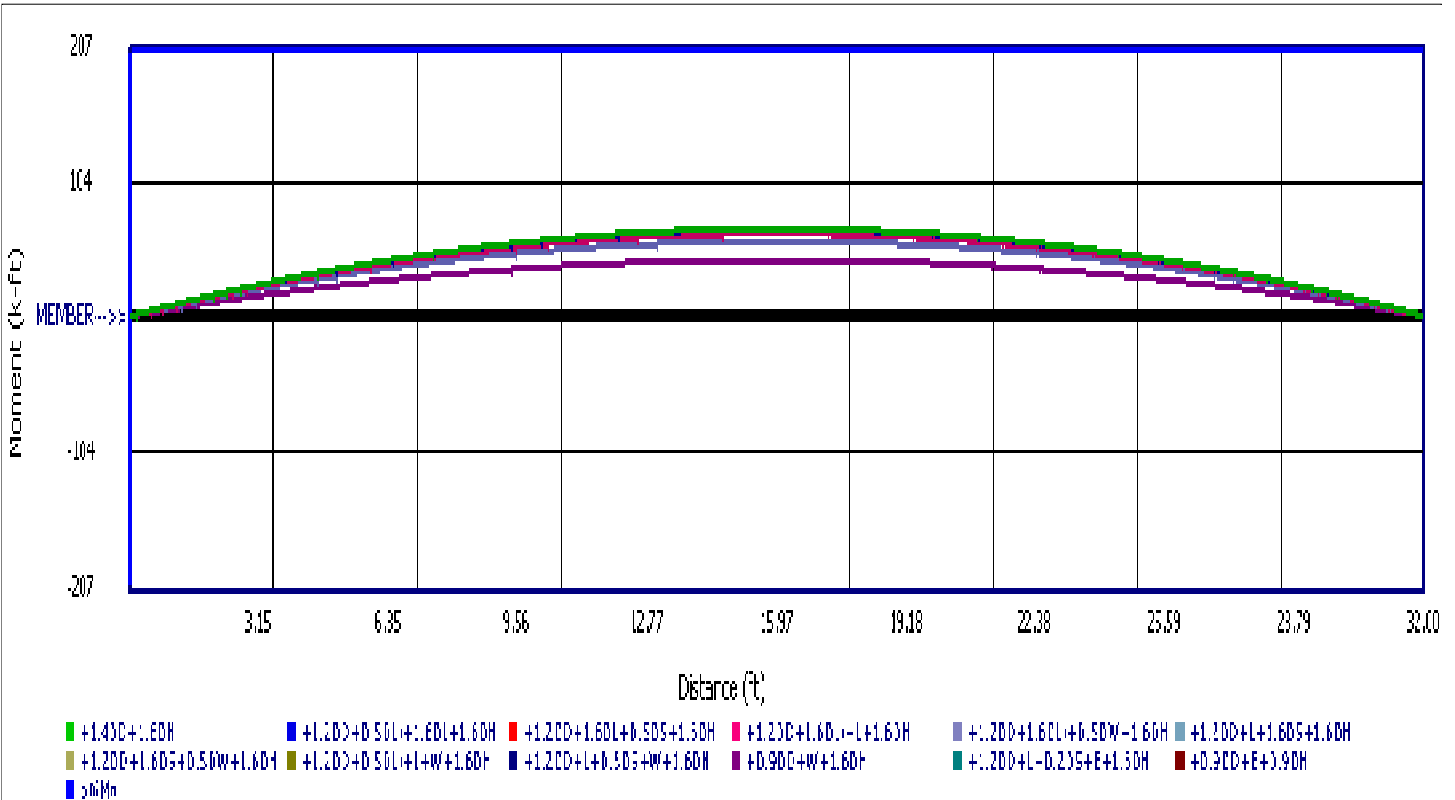
Load Combination	Support 1	Support 2
+D+0.750L+0.750S+H	6.433	6.433
+D+0.60W+H	5.893	5.893
+D+0.750Lr+0.750L+0.450W+H	6.433	6.433
+D+0.750L+0.750S+0.450W+H	6.433	6.433
+0.60D+0.60W+0.60H	3.536	3.536
+D+0.70E+0.60H	5.893	5.893
+D+0.750L+0.750S+0.5250E+H	6.433	6.433
+0.60D+0.70E+H	3.536	3.536
D Only	5.893	5.893
L Only	0.720	0.720
H Only		

Shear Stirrup Requirements

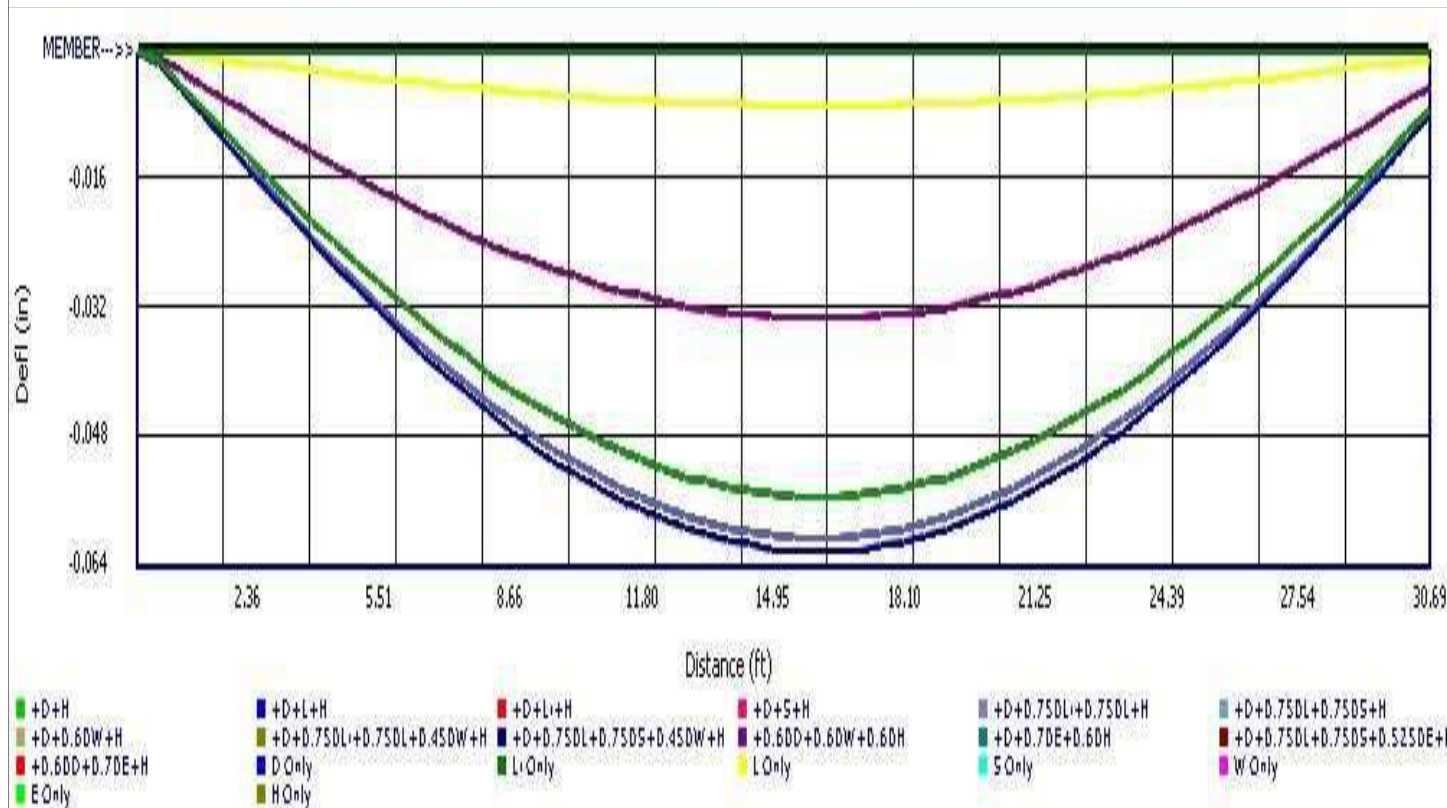
Entire Beam Span Length : $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.0632	16.000		0.0000	0.000



DESCRIPTION: RB-4



Wood Beam

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DESCRIPTION: 2x4 EXT. OVER GL 6 BETWEEN B AND D

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

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

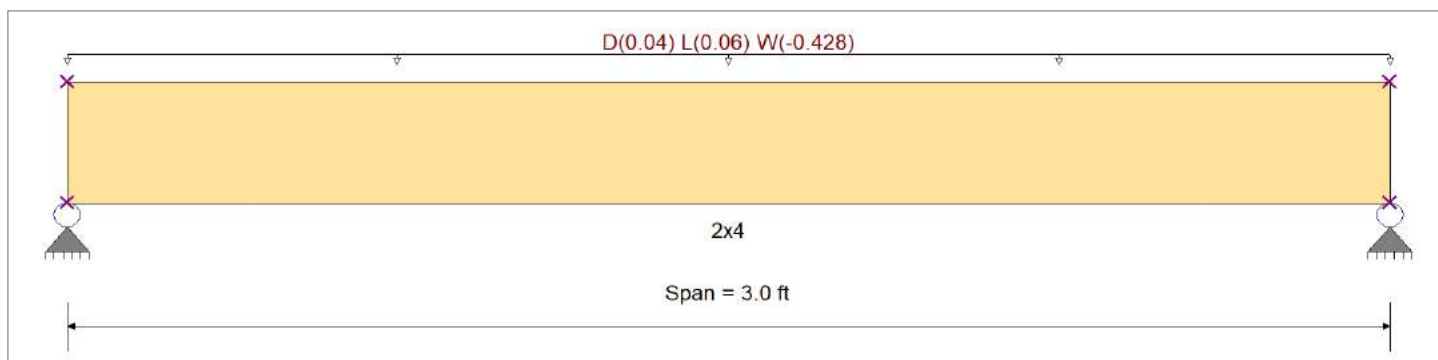
Wood Species : Southern Pine
Wood Grade : No.2: 2" - 4" Thick : 2" - 4" Wide

Beam Bracing : Completely Unbraced

Fb + 1100 psi
Fb - 1100 psi
Fc - Prll 1450 psi
Fc - Perp 565 psi
Fv 175 psi
Ft 675 psi

E : Modulus of Elasticity
Ebend- xx 1400 ksi
Eminbend - xx 510 ksi

Density 34.33pcf
Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.020, L = 0.030, W = -0.2140 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.519	1	Maximum Shear Stress Ratio	=	0.288	1
Section used for this span		2x4		Section used for this span		2x4	
fb: Actual	=	1,022.91	psi	fv: Actual	=	80.58	psi
Fb: Allowable	=	1,971.68	psi	Fv: Allowable	=	280.00	psi
Load Combination		+0.60D+0.60W		Load Combination		+0.60D+0.60W	
Location of maximum on span	=	1.500	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		0.015	in	Ratio =	2455	>=360	
Max Upward Transient Deflection		0.000	in	Ratio =	0	<360	
Max Downward Total Deflection		0.025	in	Ratio =	1455	>=240	
Max Upward Total Deflection		-0.057	in	Ratio =	634	>=240	

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

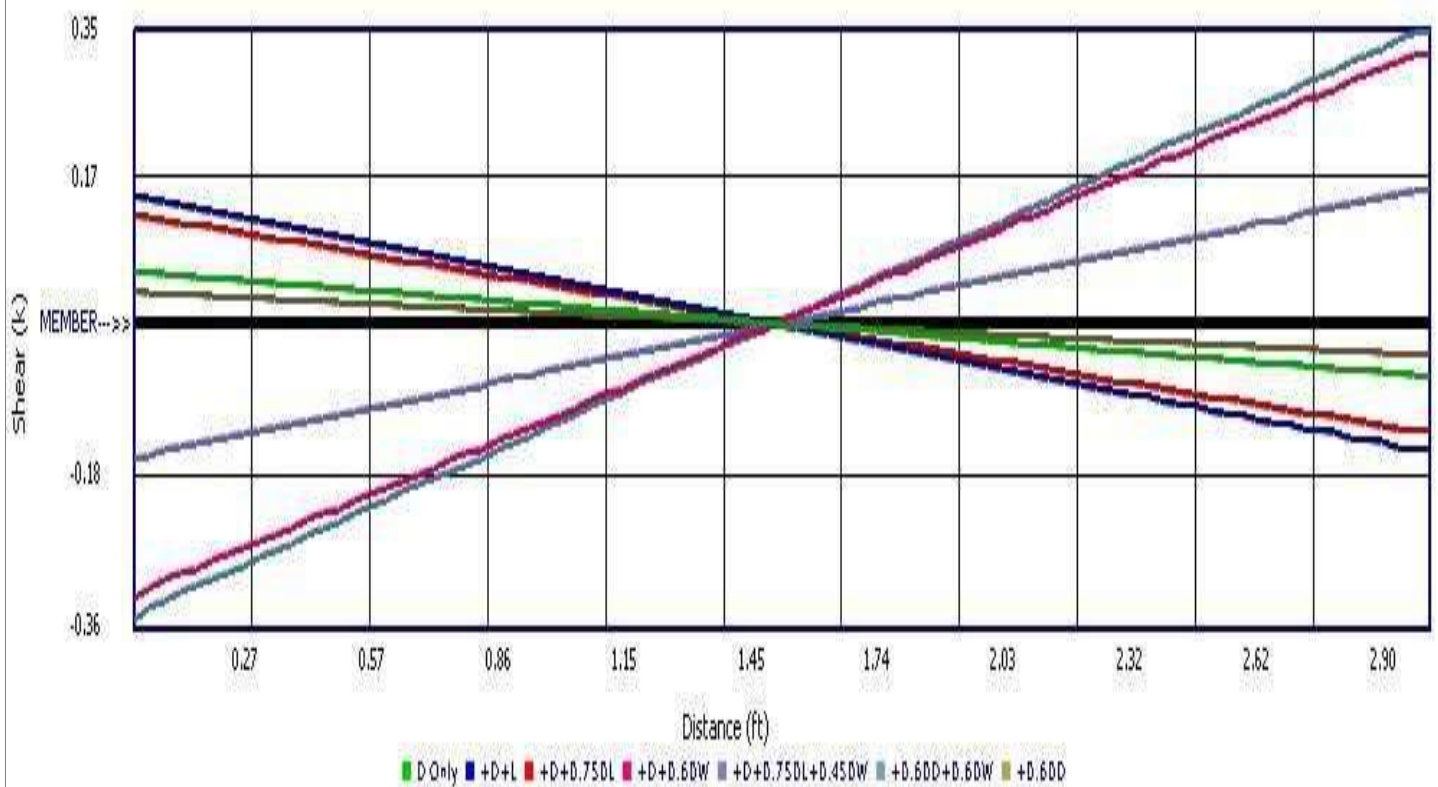
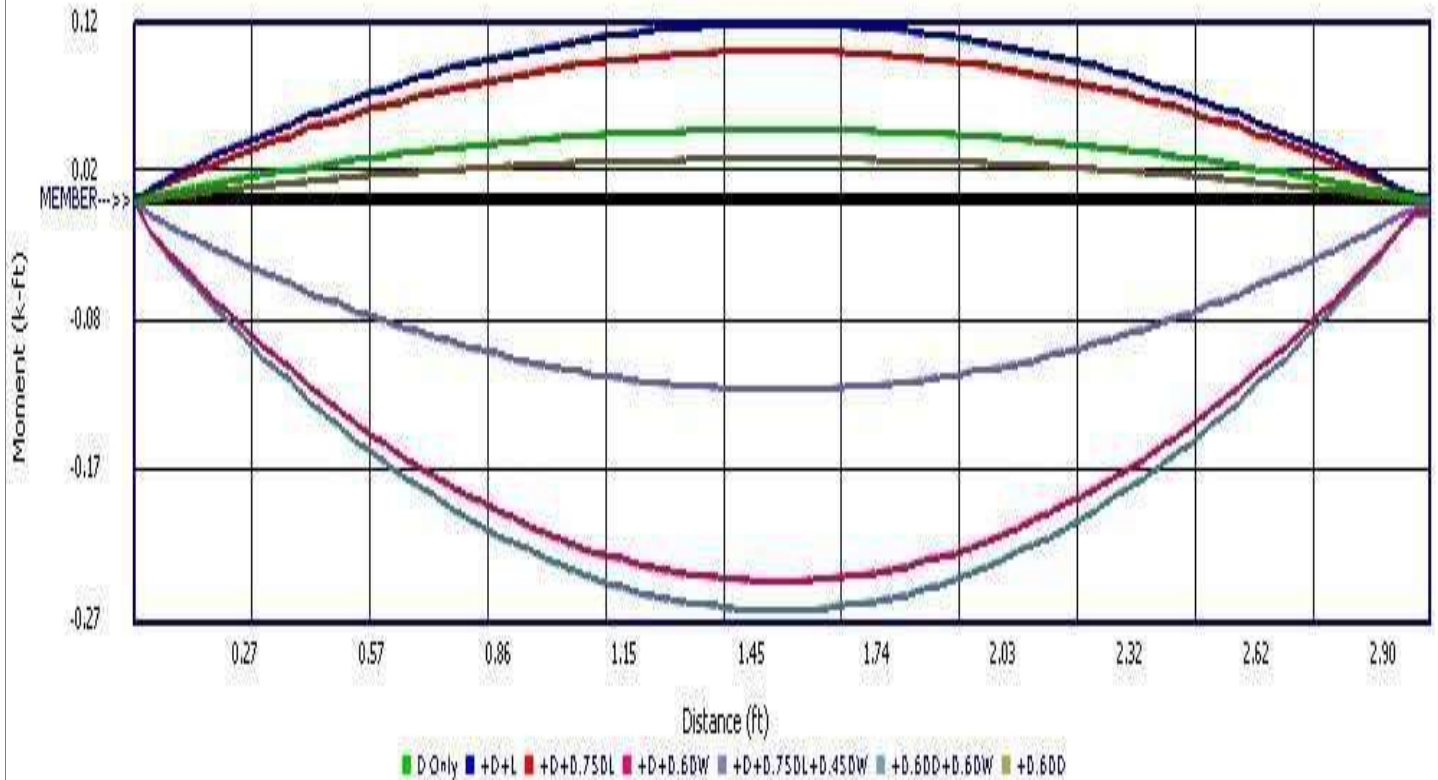
Load Combination	Support 1	Support 2
Overall MAXimum	-0.642	-0.642
Overall MINimum	0.090	0.090
D Only	0.062	0.062
+D+L	0.152	0.152
+D+0.750L	0.129	0.129
+D+0.60W	-0.323	-0.323
+D+0.750L+0.450W	-0.160	-0.160
+0.60D+0.60W	-0.348	-0.348
+0.60D	0.037	0.037
L Only	0.090	0.090
W Only	-0.642	-0.642

Wood Beam

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DESCRIPTION: 2x4 EXT. OVER GL 6 BETWEEN B AND D

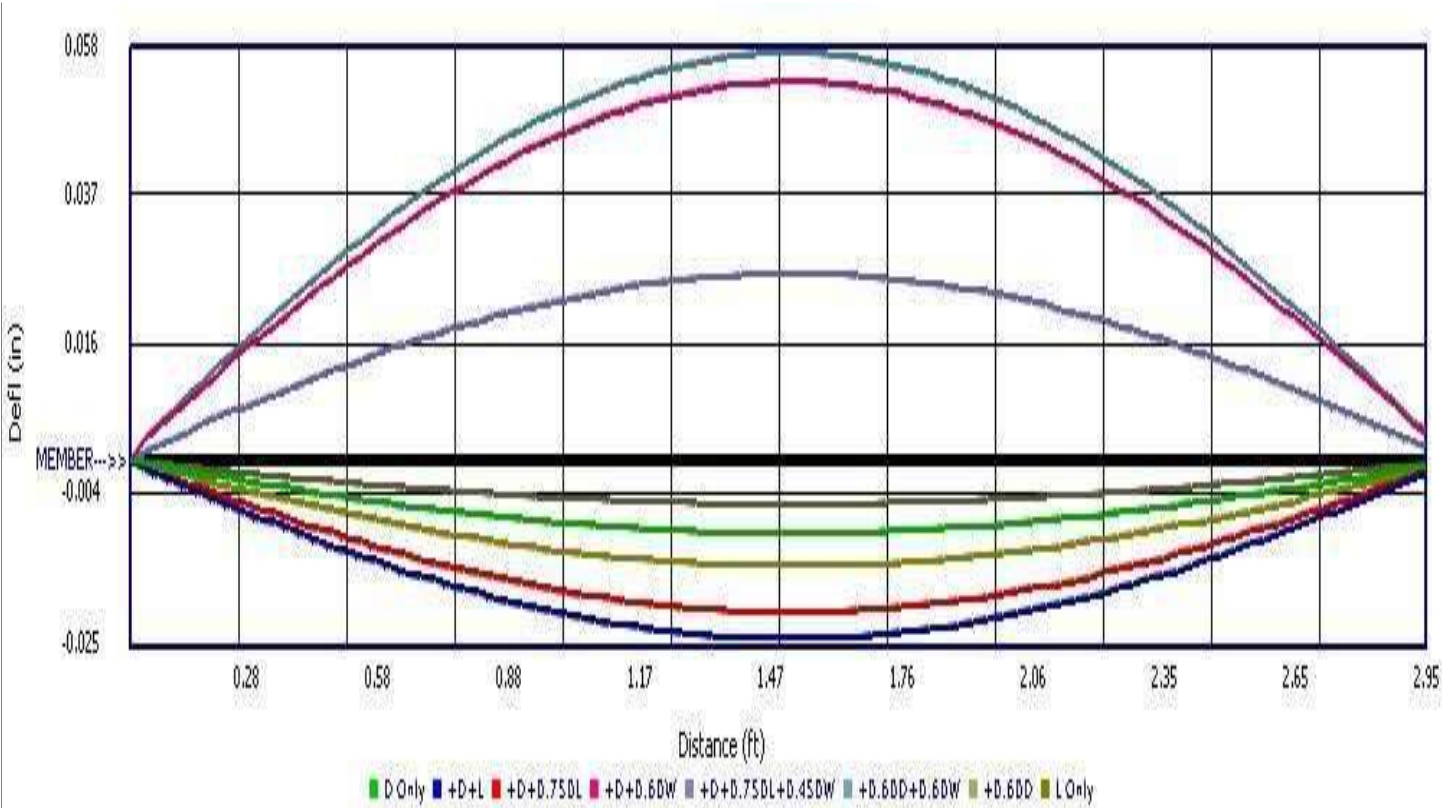


Wood Beam

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DESCRIPTION: 2x4 EXT. OVER GL 6 BETWEEN B AND D



Typ. Load Take Down for foundation Design

Critical Roof Span 31'-10"

Truss Load

$$\text{SI DL (including Self weight)} = 20 \text{ psf.}$$

$$\text{LL} = 30 \text{ psf.}$$

50 psf per FBC 23(9.17.2.1.5)

$$50 \text{ psf} \times \frac{31'-10''}{2} = 796 \text{ \# / ft}$$
$$\text{DL} = 319 \text{ \# / ft}$$
$$\text{LL} = 478 \text{ \# / ft}$$

wall Weight (Critical) (see ENERCALC) 2nd.

$$61 \text{ psf} \times 13'-6'' = 824 \text{ \# / ft DL}$$

↳ wall height @ highest point

Slab Reaction (Critical) (See ENERCALC)

$$\text{"Slab Strip Between GL 4 \& 5"} \quad \text{DL} = 2.33 \text{ K / ft} \rightarrow \text{per foot design}$$
$$\text{LL} = 0.80 \text{ K / ft}$$

$$\text{Slab (Interior DL)} \quad 150 \text{ psf} \times \frac{8' \frac{1}{2}}{12} \times \frac{23'-10''}{2} = 1267 \text{ \# / ft}$$

$$\text{SI DL} \quad 40 \text{ psf} \times \frac{23'-10''}{2} = 477 \text{ \# / ft}$$

$$\text{LL} \quad 40 \text{ psf} \times \frac{23'-10''}{2} = 477 \text{ \# / ft}$$

Wall weight - Ground

$$61 \text{ psf} \times 14'-6" = 0.885 \text{ k/ft}$$

Totals $DL = 5.0 \text{ k}$

$$LL = 1.3 \text{ k}$$

Typ. Load Around GL D & E.

Roof Loads

$$50 \text{ psf} \times \frac{17'-10"}{2} = 446 \text{ #/ft} \begin{cases} 178 \text{ #/ft DL} \\ 268 \text{ #/ft LL} \end{cases}$$

Wall

$$61 \text{ psf} \times 28'-6" = 1739 \text{ #/ft DL}$$

↳ Total wall height

Slab

$$150 \text{ psf} \times \frac{8"}{12} = (100 \text{ psf} + 40 \text{ psf}) \times \frac{17'-10"}{2} = 1249 \text{ #/ft DL}$$

↳ SI DL

$$40 \text{ psf} \times \frac{17'-10"}{2} = 357 \text{ #/ft}$$

Total loads

$$DL = 3.2 \text{ k}$$

$$LL = 0.625 \text{ k}$$

Reaction from 2B-2

$$DL = 41.25^k$$

$$LL = 11.70^k$$

See EVERCALC for Isolated footing Design F-6.0

Reaction from 2B-3

$$DL = 26.05^k$$

$$LL = 7.80^k$$

See EVERCALC for Isolated footing Design F-5.0

Column @ GL C4

$$AB-1 \text{ Reaction } DL = 5.47^k$$

$$LL = 2.40^k$$

$$AB-1 \text{ to the left } 150 \text{ pcf} \times \frac{8 \times 36}{144} \text{ ft}^2 \times \left(\frac{11'-6''}{2} + \frac{6'-0''}{2} \right) = 2.63^k$$

$$\text{Column weight } 150 \text{ pcf} \times \frac{8 \times 16}{144} \text{ ft}^2 \times (26'-0'' - 3'-0'') = 3.07^k$$

$$DL = 11.17^k$$

$$LL = 2.40^k$$

See EVERCALC for Isolated footing Design F-3.0

Column @ GL C5

$$AB-2 \text{ Reaction } DL = 7.45^k$$

$$L = 6.67^k$$

$$\text{wall weight } 61 \text{ pcf} \times 13'-0'' \times \frac{3'-2''}{2}$$

$$= 1.26^k$$

Column (see C4)

$$= 3.07^k$$

$$DL = 11.78^k$$

$$LL = 6.67^k$$

See EVERCALC for Isolated footing Design F-3.5

Reaction from AB-3 Along CL 6

$$DL = 10.2^k$$

$$LL = 8^k$$

Reaction from 2B-1 (Bridge)

$$DL = 22.35^k$$

$$LL = 1.17^k$$

Column Weight

$$\frac{8 \times 24}{144} \times 150 \text{ pcf} \times 26 \text{ ft} = 5.2^k$$

$$\begin{array}{rcl} DL \text{ Total} & = & 37.75^k \\ LL \text{ Total} & = & 9.17^k \end{array} \left. \vphantom{\begin{array}{rcl} DL \text{ Total} \\ LL \text{ Total} \end{array}} \right\} \text{ Use } F6.0$$

Wall Footing

File: New Residence.ec6
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Lic. #: KW-06012775

DESCRIPTION: Typ. Critical WF-3.5

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'_c : Concrete 28 day strength	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
ϕ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
AutoCalc Footing Weight as DL	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Reference Depth below Surface	=	3.0 ft
Allow. Pressure Increase per foot of depth when base footing is below	=	ksf ft

Increases based on footing Width

Allow. Pressure Increase per foot of width when footing is wider than	=	ksf ft
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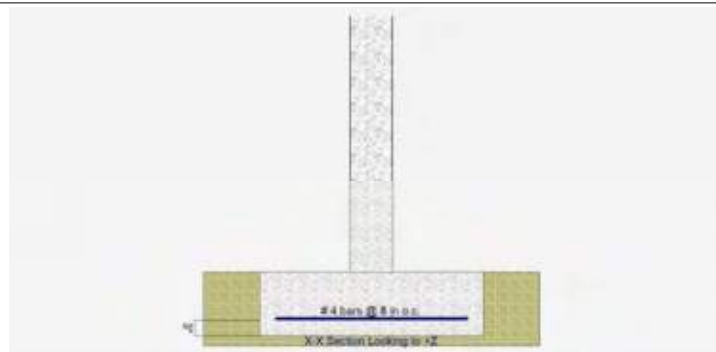
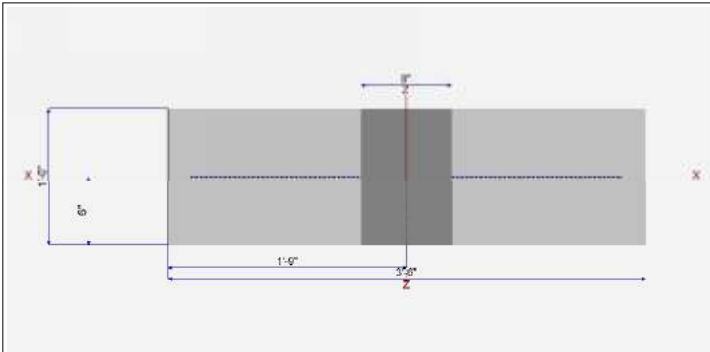
Adjusted Allowable Bearing Pressure

= 2.0 ksf

Dimensions

Reinforcing

Footing Width	=	3.50 ft	Footing Thickness	=	12.0 in	Bars along X-X Axis	=	
Wall Thickness	=	8 in	Rebar Centerline to Edge of Concrete...	=		Bar spacing	=	8.00
Wall center offset from center of footing	=	0 in	at Bottom of footing	=	3.0 in	Reinforcing Bar Size	=	# 4



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	5.0	1.30				k
OB : Overburden	=						ksf
V-x	=						k
M-zz	=						k-ft
Vx applied	=						in above top of footing

Wall Footing

File: New Residence.ec6
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Lic. #: KW-06012775

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DESCRIPTION: Typ. Critical WF-3.5

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9725	Soil Bearing	1.945 ksf	+D+L
PASS	0.2119	Z Flexure (+X)	2.491 k-ft	+1.20D+1.60L
PASS	0.1209	Z Flexure (-X)	1.421 k-ft	+0.90D
PASS	0.1828	1-way Shear (+X)	15.018 psi	+1.20D+1.60L
PASS	0.1828	1-way Shear (-X)	15.018 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress -X	Actual Soil Bearing Stress +X	Actual / Allowable Ratio
, D Only	2.0 ksf	0.0 in	1.574 ksf	1.574 ksf	0.787
, +D+L	2.0 ksf	0.0 in	1.945 ksf	1.945 ksf	0.973
, +D+0.750L	2.0 ksf	0.0 in	1.852 ksf	1.852 ksf	0.926
, +0.60D	2.0 ksf	0.0 in	0.9441 ksf	0.9441 ksf	0.472

Units : k-ft

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
, +1.40D	2.21	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.40D	2.21	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+1.60L	2.491	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+1.60L	2.491	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+L	2.267	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+L	2.267	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D	1.895	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D	1.895	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +0.90D	1.421	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +0.90D	1.421	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK

Units : k

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	13.327 psi	13.327 psi	13.327 psi	82.158 psi	0.1622	OK
+1.20D+1.60L	15.018 psi	15.018 psi	15.018 psi	82.158 psi	0.1828	OK
+1.20D+L	13.67 psi	13.67 psi	13.67 psi	82.158 psi	0.1664	OK
+1.20D	11.423 psi	11.423 psi	11.423 psi	82.158 psi	0.139	OK
+0.90D	8.567 psi	8.567 psi	8.567 psi	82.158 psi	0.1043	OK

Wall Footing

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DESCRIPTION: Typ. Critical WF-2.5

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'_c : Concrete 28 day strength	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
ϕ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
AutoCalc Footing Weight as DL	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Reference Depth below Surface	=	3.0 ft
Allow. Pressure Increase per foot of depth when base footing is below	=	ksf ft

Increases based on footing Width

Allow. Pressure Increase per foot of width when footing is wider than	=	ksf ft
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Adjusted Allowable Bearing Pressure

=	2.0 ksf
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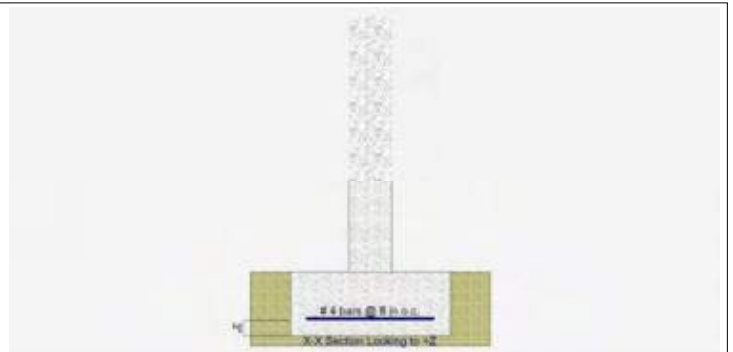
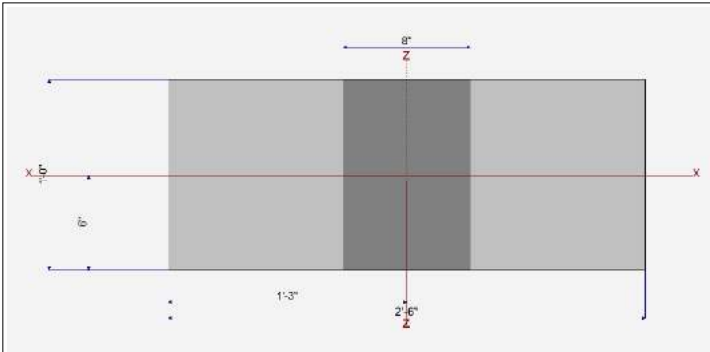
Dimensions

Footing Width	=	2.50 ft
Wall Thickness	=	8.0 in
Wall center offset from center of footing	=	0 in

Footing Thickness	=	12.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in

Reinforcing

Bars along X-X Axis	=	8.00
Bar spacing	=	
Reinforcing Bar Size	=	# 4



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	3.2	0.6250				k
OB : Overburden	=						ksf
V-x	=						k
M-zz	=						k-ft
Vx applied	=						in above top of footing

Wall Footing

File: New Residence.ec6
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DESCRIPTION: Typ. Critical WF-2.5

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8375	Soil Bearing	1.675 ksf	+D+L
PASS	0.07540	Z Flexure (+X)	11.753 k-ft	+1.20D+1.60L
PASS	0.04583	Z Flexure (-X)	11.753 k-ft	+0.90D
PASS	0.03963	1-way Shear (+X)	82.158 psi	+1.20D+1.60L
PASS	0.03963	1-way Shear (-X)	82.158 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress -X	Actual Soil Bearing Stress +X	Actual / Allowable Ratio
, D Only	2.0 ksf	0.0 in	1.425 ksf	1.425 ksf	0.713
, +D+L	2.0 ksf	0.0 in	1.675 ksf	1.675 ksf	0.838
, +D+0.750L	2.0 ksf	0.0 in	1.613 ksf	1.613 ksf	0.806
, +0.60D	2.0 ksf	0.0 in	0.8550 ksf	0.8550 ksf	0.428

Units : k-ft

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
, +1.40D	0.8379	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.40D	0.8379	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+1.60L	0.8862	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+1.60L	0.8862	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+L	0.8232	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D+L	0.8232	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D	0.7182	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +1.20D	0.7182	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +0.90D	0.5387	-X	Bottom	0.2592	Min Temp %	0.3	11.753	OK
, +0.90D	0.5387	+X	Bottom	0.2592	Min Temp %	0.3	11.753	OK

Units : k

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.079 psi	3.079 psi	3.079 psi	82.158 psi	0.03747	OK
+1.20D+1.60L	3.256 psi	3.256 psi	3.256 psi	82.158 psi	0.03963	OK
+1.20D+L	3.025 psi	3.025 psi	3.025 psi	82.158 psi	0.03682	OK
+1.20D	2.639 psi	2.639 psi	2.639 psi	82.158 psi	0.03212	OK
+0.90D	1.979 psi	1.979 psi	1.979 psi	82.158 psi	0.02409	OK

General Footing

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DESCRIPTION: 2B-2 FOUNDATION

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f _c : Concrete 28 day strength	=	3.0	ksi
f _y : Rebar Yield	=	60.0	ksi
E _c : Concrete Elastic Modulus	=	3,155.92	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	ft
Allow press. increase per foot of depth when footing base is below	=		ksf

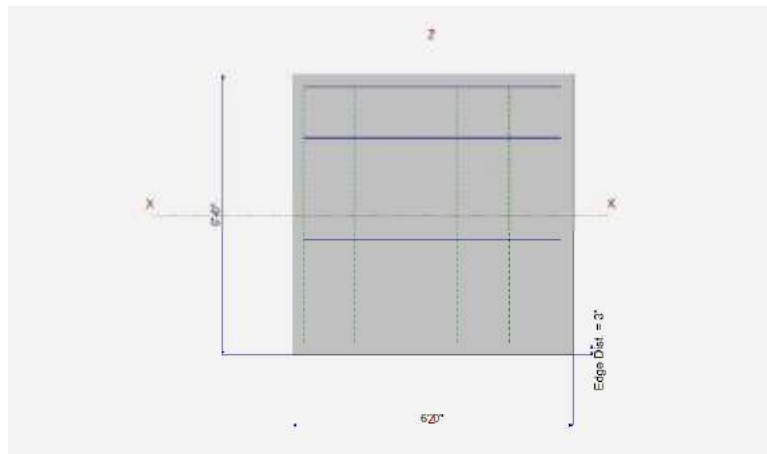
Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=		ksf
	=		ft

Dimensions

Width parallel to X-X Axis	=	6.0	ft
Length parallel to Z-Z Axis	=	6.0	ft
Footing Thickness	=	16.0	in

Pedestal dimensions...	=		in
px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0	in



Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	6
Reinforcing Bar Size	=	# 6
Bars parallel to Z-Z Axis	=	
Number of Bars	=	6
Reinforcing Bar Size	=	# 6

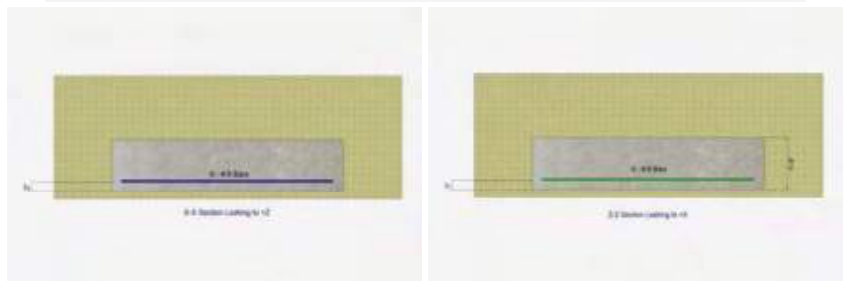
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars required within zone

Bars required on each side of zone

n/a
n/a
n/a



Applied Loads

	D	L _r	L	S	W	E	H
P : Column Load	=	41.250	11.70				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

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DESCRIPTION: 2B-2 FOUNDATION

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9240	Soil Bearing	1.848 ksf	2.0 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3427	Z Flexure (+X)	8.528 k-ft/ft	24.886 k-ft/ft	+1.20D+1.60L
PASS	0.3427	Z Flexure (-X)	8.528 k-ft/ft	24.886 k-ft/ft	+1.20D+1.60L
PASS	0.3427	X Flexure (+Z)	8.528 k-ft/ft	24.886 k-ft/ft	+1.20D+1.60L
PASS	0.3427	X Flexure (-Z)	8.528 k-ft/ft	24.886 k-ft/ft	+1.20D+1.60L
PASS	0.2839	1-way Shear (+X)	23.323 psi	82.158 psi	+1.20D+1.60L
PASS	0.2839	1-way Shear (-X)	23.323 psi	82.158 psi	+1.20D+1.60L
PASS	0.2839	1-way Shear (+Z)	23.323 psi	82.158 psi	+1.20D+1.60L
PASS	0.2839	1-way Shear (-Z)	23.323 psi	82.158 psi	+1.20D+1.60L
PASS	0.5943	2-way Punching	97.647 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
			(in)	Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.523	1.523	n/a	n/a	0.762
X-X, +D+L	2.0	n/a	0.0	1.848	1.848	n/a	n/a	0.924
X-X, +D+0.750L	2.0	n/a	0.0	1.766	1.766	n/a	n/a	0.883
X-X, +0.60D	2.0	n/a	0.0	0.9135	0.9135	n/a	n/a	0.457
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.523	1.523	0.762
Z-Z, +D+L	2.0	0.0	n/a	n/a	n/a	1.848	1.848	0.924
Z-Z, +D+0.750L	2.0	0.0	n/a	n/a	n/a	1.766	1.766	0.883
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.9135	0.9135	0.457

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	7.219	+Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.40D	7.219	-Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D+1.60L	8.528	+Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D+1.60L	8.528	-Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D+L	7.650	+Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D+L	7.650	-Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D	6.188	+Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +1.20D	6.188	-Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +0.90D	4.641	+Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
X-X, +0.90D	4.641	-Z	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.40D	7.219	-X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.40D	7.219	+X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D+1.60L	8.528	-X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D+1.60L	8.528	+X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D+L	7.650	-X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D+L	7.650	+X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D	6.188	-X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +1.20D	6.188	+X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +0.90D	4.641	-X	Bottom	0.3456	Min Temp %	0.440	24.886	OK
Z-Z, +0.90D	4.641	+X	Bottom	0.3456	Min Temp %	0.440	24.886	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	19.74 psi	19.74 psi	19.74 psi	19.74 psi	19.74 psi	82.16 psi	0.24	OK
+1.20D+1.60L	23.32 psi	23.32 psi	23.32 psi	23.32 psi	23.32 psi	82.16 psi	0.28	OK
+1.20D+L	20.92 psi	20.92 psi	20.92 psi	20.92 psi	20.92 psi	82.16 psi	0.25	OK
+1.20D	16.92 psi	16.92 psi	16.92 psi	16.92 psi	16.92 psi	82.16 psi	0.21	OK

General Footing

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DESCRIPTION: 2B-2 FOUNDATION

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+0.90D	12.69 psi	12.69 psi	12.69 psi	12.69 psi	12.69 psi	82.16 psi	0.15	OK
Two-Way "Punching" Shear								All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	82.66 psi	164.32psi	0.5031	OK
+1.20D+1.60L	97.65 psi	164.32psi	0.5943	OK
+1.20D+L	87.60 psi	164.32psi	0.5331	OK
+1.20D	70.85 psi	164.32psi	0.4312	OK
+0.90D	53.14 psi	164.32psi	0.3234	OK

General Footing

Lic. # : KW-06012775

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DESCRIPTION: CRITICAL 2B-3 FOUNDATION

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f _c : Concrete 28 day strength	=	3.0	ksi
f _y : Rebar Yield	=	60.0	ksi
E _c : Concrete Elastic Modulus	=	3,155.92	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	ft
Allow press. increase per foot of depth when footing base is below	=		ksf

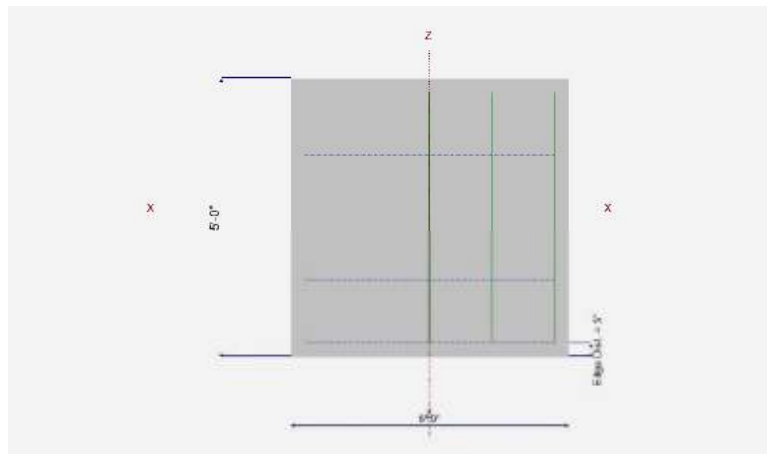
Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=		ksf
	=		ft

Dimensions

Width parallel to X-X Axis	=	5.0	ft
Length parallel to Z-Z Axis	=	5.0	ft
Footing Thickness	=	14.0	in

Pedestal dimensions...	=		
px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0	in



Reinforcing

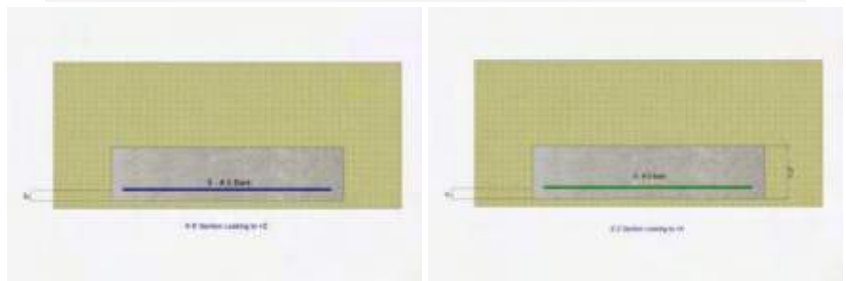
Bars parallel to X-X Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	L _r	L	S	W	E	H
P : Column Load	=	26.05		7.80			k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

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DESCRIPTION: CRITICAL 2B-3 FOUNDATION

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8625	Soil Bearing	1.725 ksf	2.0 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3664	Z Flexure (+X)	5.468 k-ft/ft	14.921 k-ft/ft	+1.20D+1.60L
PASS	0.3664	Z Flexure (-X)	5.468 k-ft/ft	14.921 k-ft/ft	+1.20D+1.60L
PASS	0.3664	X Flexure (+Z)	5.468 k-ft/ft	14.921 k-ft/ft	+1.20D+1.60L
PASS	0.3664	X Flexure (-Z)	5.468 k-ft/ft	14.921 k-ft/ft	+1.20D+1.60L
PASS	0.2581	1-way Shear (+X)	21.207 psi	82.158 psi	+1.20D+1.60L
PASS	0.2581	1-way Shear (-X)	21.207 psi	82.158 psi	+1.20D+1.60L
PASS	0.2581	1-way Shear (+Z)	21.207 psi	82.158 psi	+1.20D+1.60L
PASS	0.2581	1-way Shear (-Z)	21.207 psi	82.158 psi	+1.20D+1.60L
PASS	0.5322	2-way Punching	87.444 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
			(in)	Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.413	1.413	n/a	n/a	0.707
X-X, +D+L	2.0	n/a	0.0	1.725	1.725	n/a	n/a	0.863
X-X, +D+0.750L	2.0	n/a	0.0	1.647	1.647	n/a	n/a	0.824
X-X, +0.60D	2.0	n/a	0.0	0.8477	0.8477	n/a	n/a	0.424
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.413	1.413	0.707
Z-Z, +D+L	2.0	0.0	n/a	n/a	n/a	1.725	1.725	0.863
Z-Z, +D+0.750L	2.0	0.0	n/a	n/a	n/a	1.647	1.647	0.824
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.8477	0.8477	0.424

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	4.559	+Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.40D	4.559	-Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D+1.60L	5.468	+Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D+1.60L	5.468	-Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D+L	4.883	+Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D+L	4.883	-Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D	3.908	+Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +1.20D	3.908	-Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +0.90D	2.931	+Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
X-X, +0.90D	2.931	-Z	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.40D	4.559	-X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.40D	4.559	+X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D+1.60L	5.468	-X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D+1.60L	5.468	+X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D+L	4.883	-X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D+L	4.883	+X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D	3.908	-X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +1.20D	3.908	+X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +0.90D	2.931	-X	Bottom	0.3024	Min Temp %	0.310	14.921	OK
Z-Z, +0.90D	2.931	+X	Bottom	0.3024	Min Temp %	0.310	14.921	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	17.68 psi	17.68 psi	17.68 psi	17.68 psi	17.68 psi	82.16 psi	0.22	OK
+1.20D+1.60L	21.21 psi	21.21 psi	21.21 psi	21.21 psi	21.21 psi	82.16 psi	0.26	OK
+1.20D+L	18.94 psi	18.94 psi	18.94 psi	18.94 psi	18.94 psi	82.16 psi	0.23	OK
+1.20D	15.16 psi	15.16 psi	15.16 psi	15.16 psi	15.16 psi	82.16 psi	0.18	OK

General Footing

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DESCRIPTION: CRITICAL 2B-3 FOUNDATION

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+0.90D	11.37 psi	11.37 psi	11.37 psi	11.37 psi	11.37 psi	82.16 psi	0.14	OK
Two-Way "Punching" Shear								All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	72.91 psi	164.32psi	0.4437	OK
+1.20D+1.60L	87.44 psi	164.32psi	0.5322	OK
+1.20D+L	78.09 psi	164.32psi	0.4752	OK
+1.20D	62.49 psi	164.32psi	0.3803	OK
+0.90D	46.87 psi	164.32psi	0.2852	OK

General Footing

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CBenginfo

DESCRIPTION: GL C5 FOUNDATION

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f _c : Concrete 28 day strength	=	3.0	ksi
f _y : Rebar Yield	=	60.0	ksi
E _c : Concrete Elastic Modulus	=	3,155.92	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=		
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.0	: 1
Min. Sliding Safety Factor	=	1.0	: 1
Add Ftg Wt for Soil Pressure	:	Yes	
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	
Use Pedestal wt for stability, mom & shear	:	No	

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	ft
Allow press. increase per foot of depth when footing base is below	=		ksf

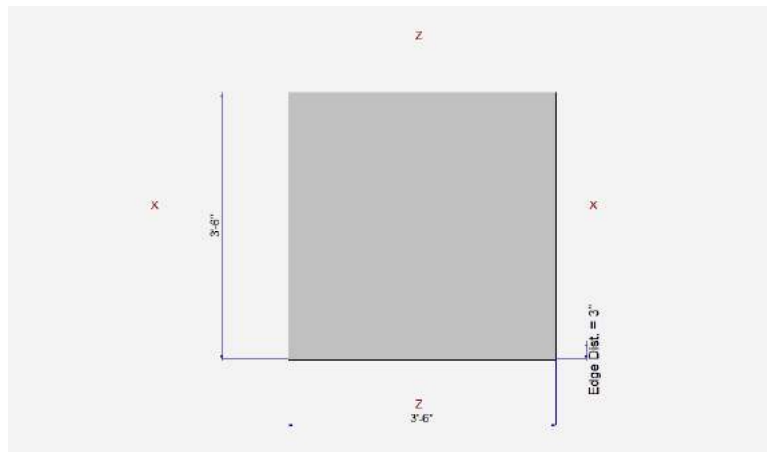
Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=		ksf
	=		ft

Dimensions

Width parallel to X-X Axis	=	3.5	ft
Length parallel to Z-Z Axis	=	3.50	ft
Footing Thickness	=	12.0	in

Pedestal dimensions...	=		
px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0	in



Reinforcing

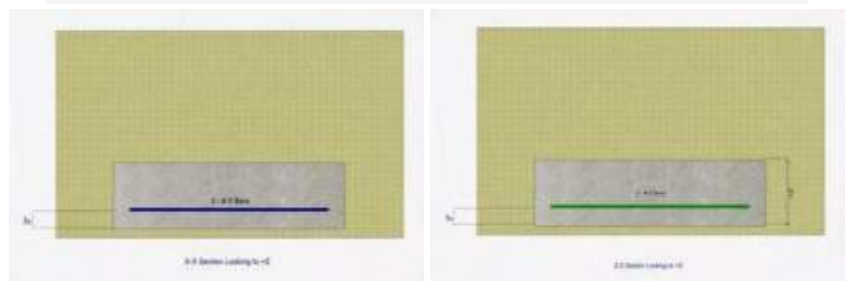
Bars parallel to X-X Axis	=		
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 5	

Bars parallel to Z-Z Axis	=		
Number of Bars	=	3.0	
Reinforcing Bar Size	=	# 5	

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	L _r	L	S	W	E	H
P : Column Load	=	11.780	6.670				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

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CBenginfo

DESCRIPTION: GL C5 FOUNDATION

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9355	Soil Bearing	1.871 ksf	2.0 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.2967	Z Flexure (+X)	3.101 k-ft/ft	10.450 k-ft/ft	+1.20D+1.60L
PASS	0.2967	Z Flexure (-X)	3.101 k-ft/ft	10.450 k-ft/ft	+1.20D+1.60L
PASS	0.2967	X Flexure (+Z)	3.101 k-ft/ft	10.450 k-ft/ft	+1.20D+1.60L
PASS	0.2967	X Flexure (-Z)	3.101 k-ft/ft	10.450 k-ft/ft	+1.20D+1.60L
PASS	0.2317	1-way Shear (+X)	19.033 psi	82.158 psi	+1.20D+1.60L
PASS	0.2317	1-way Shear (-X)	19.033 psi	82.158 psi	+1.20D+1.60L
PASS	0.2317	1-way Shear (+Z)	19.033 psi	82.158 psi	+1.20D+1.60L
PASS	0.2317	1-way Shear (-Z)	19.033 psi	82.158 psi	+1.20D+1.60L
PASS	0.4434	2-way Punching	72.862 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
			(in)	Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.327	1.327	n/a	n/a	0.664
X-X, +D+L	2.0	n/a	0.0	1.871	1.871	n/a	n/a	0.936
X-X, +D+0.750L	2.0	n/a	0.0	1.735	1.735	n/a	n/a	0.868
X-X, +0.60D	2.0	n/a	0.0	0.7960	0.7960	n/a	n/a	0.398
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.327	1.327	0.664
Z-Z, +D+L	2.0	0.0	n/a	n/a	n/a	1.871	1.871	0.936
Z-Z, +D+0.750L	2.0	0.0	n/a	n/a	n/a	1.735	1.735	0.868
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.7960	0.7960	0.398

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	2.062	+Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.40D	2.062	-Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D+1.60L	3.101	+Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D+1.60L	3.101	-Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D+L	2.601	+Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D+L	2.601	-Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D	1.767	+Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +1.20D	1.767	-Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +0.90D	1.325	+Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
X-X, +0.90D	1.325	-Z	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.40D	2.062	-X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.40D	2.062	+X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D+1.60L	3.101	-X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D+1.60L	3.101	+X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D+L	2.601	-X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D+L	2.601	+X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D	1.767	-X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +1.20D	1.767	+X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +0.90D	1.325	-X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK
Z-Z, +0.90D	1.325	+X	Bottom	0.2592	Min Temp %	0.2657	10.450	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	12.65 psi	12.65 psi	12.65 psi	12.65 psi	12.65 psi	82.16 psi	0.15	OK
+1.20D+1.60L	19.03 psi	19.03 psi	19.03 psi	19.03 psi	19.03 psi	82.16 psi	0.23	OK
+1.20D+L	15.96 psi	15.96 psi	15.96 psi	15.96 psi	15.96 psi	82.16 psi	0.19	OK
+1.20D	10.85 psi	10.85 psi	10.85 psi	10.85 psi	10.85 psi	82.16 psi	0.13	OK

General Footing

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CBenginfo

DESCRIPTION: GL C5 FOUNDATION

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+0.90D	8.13 psi	8.13 psi	8.13 psi	8.13 psi	8.13 psi	82.16 psi	0.10	OK
Two-Way "Punching" Shear								All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	48.44 psi	164.32psi	0.2948	OK
+1.20D+1.60L	72.86 psi	164.32psi	0.4434	OK
+1.20D+L	61.11 psi	164.32psi	0.3719	OK
+1.20D	41.52 psi	164.32psi	0.2527	OK
+0.90D	31.14 psi	164.32psi	0.1895	OK

General Footing

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CBenginfo

DESCRIPTION: GL C4 FOUNDATION

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f _c : Concrete 28 day strength	=	3.0	ksi
f _y : Rebar Yield	=	60.0	ksi
E _c : Concrete Elastic Modulus	=	3,155.92	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	3.0	ft
Allow press. increase per foot of depth when footing base is below	=		ksf

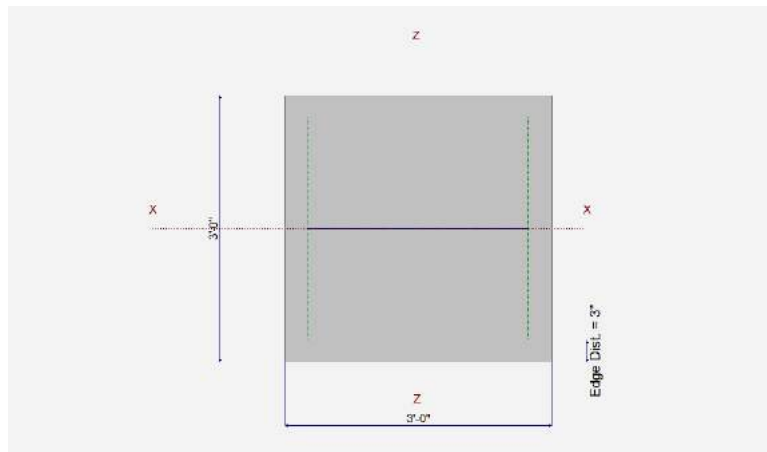
Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=		ksf
	=		ft

Dimensions

Width parallel to X-X Axis	=	3	ft
Length parallel to Z-Z Axis	=	3.0	ft
Footing Thickness	=	12.0	in

Pedestal dimensions...	=		in
px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0	in



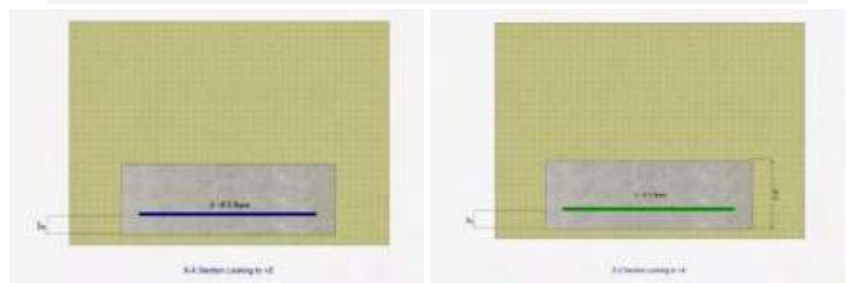
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 5
Bars parallel to Z-Z Axis	=	
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	L _r	L	S	W	E	H
P : Column Load	=	11.170	2.40				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

File: New Residence.ec6
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CBenginfo

DESCRIPTION: GL C4 FOUNDATION

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9365	Soil Bearing	1.873 ksf	2.0 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1777	Z Flexure (+X)	2.156 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.1777	Z Flexure (-X)	2.156 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.1777	X Flexure (+Z)	2.156 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.1777	X Flexure (-Z)	2.156 k-ft/ft	12.131 k-ft/ft	+1.20D+1.60L
PASS	0.1620	1-way Shear (+X)	13.306 psi	82.158 psi	+1.20D+1.60L
PASS	0.1620	1-way Shear (-X)	13.306 psi	82.158 psi	+1.20D+1.60L
PASS	0.1620	1-way Shear (+Z)	13.306 psi	82.158 psi	+1.20D+1.60L
PASS	0.1620	1-way Shear (-Z)	13.306 psi	82.158 psi	+1.20D+1.60L
PASS	0.3037	2-way Punching	49.896 psi	164.317 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
			(in)	Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.606	1.606	n/a	n/a	0.803
X-X, +D+L	2.0	n/a	0.0	1.873	1.873	n/a	n/a	0.937
X-X, +D+0.750L	2.0	n/a	0.0	1.806	1.806	n/a	n/a	0.903
X-X, +0.60D	2.0	n/a	0.0	0.9637	0.9637	n/a	n/a	0.482
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.606	1.606	0.803
Z-Z, +D+L	2.0	0.0	n/a	n/a	n/a	1.873	1.873	0.937
Z-Z, +D+0.750L	2.0	0.0	n/a	n/a	n/a	1.806	1.806	0.903
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.9637	0.9637	0.482

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.955	+Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.40D	1.955	-Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D+1.60L	2.156	+Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D+1.60L	2.156	-Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D+L	1.976	+Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D+L	1.976	-Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D	1.676	+Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +1.20D	1.676	-Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +0.90D	1.257	+Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
X-X, +0.90D	1.257	-Z	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.40D	1.955	-X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.40D	1.955	+X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D+1.60L	2.156	-X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D+1.60L	2.156	+X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D+L	1.976	-X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D+L	1.976	+X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D	1.676	-X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +1.20D	1.676	+X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +0.90D	1.257	-X	Bottom	0.2592	Min Temp %	0.310	12.131	OK
Z-Z, +0.90D	1.257	+X	Bottom	0.2592	Min Temp %	0.310	12.131	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	12.07 psi	12.07 psi	12.07 psi	12.07 psi	12.07 psi	82.16 psi	0.15	OK
+1.20D+1.60L	13.31 psi	13.31 psi	13.31 psi	13.31 psi	13.31 psi	82.16 psi	0.16	OK
+1.20D+L	12.19 psi	12.19 psi	12.19 psi	12.19 psi	12.19 psi	82.16 psi	0.15	OK
+1.20D	10.34 psi	10.34 psi	10.34 psi	10.34 psi	10.34 psi	82.16 psi	0.13	OK

General Footing

File: New Residence.ec6

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CBenginfo

DESCRIPTION: GL C4 FOUNDATION

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+0.90D	7.76 psi	7.76 psi	7.76 psi	7.76 psi	7.76 psi	82.16 psi	0.09	OK
Two-Way "Punching" Shear								All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	45.25 psi	164.32 psi	0.2754	OK
+1.20D+1.60L	49.90 psi	164.32 psi	0.3037	OK
+1.20D+L	45.73 psi	164.32 psi	0.2783	OK
+1.20D	38.79 psi	164.32 psi	0.236	OK
+0.90D	29.09 psi	164.32 psi	0.177	OK

$$11'' \quad 7\frac{1}{2}''$$

$$\frac{1}{2}(11'')(7\frac{1}{2}') = \frac{41.25 \text{ in}^2}{1' - 1\frac{5}{16}''} = 3.1 \text{ in (equivalent depth)}$$

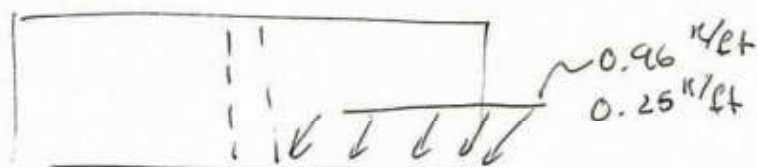
└ Thread length diagonal

$$150 \text{ psf} \times \frac{3.1}{12} \text{ ft} = 39 \text{ psf SI DL.}$$

$$2(39 \text{ psf}) + 5 \text{ psf} = 83 \text{ psf}$$

└ SI Dead load
└ Additional thread top & bottom

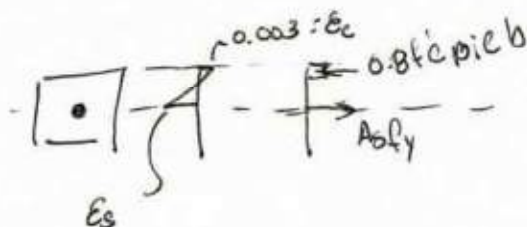
$$\text{Reaction} = \underbrace{0.96 \text{ k/ft}}_{\text{DL}} \underbrace{0.25 \text{ k/ft}}_{\text{LL}}$$



Imbalance Moment

$$0.25 \text{ k/ft} \times \frac{(4 \text{ ft})^2}{2} = 2.0 \text{ k-ft} \times 1.6 = 3.2 \text{ k-ft} \times \frac{12 \text{ in}}{1 \text{ ft}}$$

$$M_u = 38 \text{ k-in}$$



$$T = C$$

$$A_s f_y = 0.85 f'_c \rho_e b.$$

$$\frac{\epsilon_c}{c} = \frac{\epsilon_s}{d-c}$$

$$A_s E_s \times \epsilon_c \frac{(d-c)}{c} = 0.85 f'_c \rho_e b$$

$$\frac{\epsilon_c (d-c)}{c} = \epsilon_s$$

$$A_s E_s \epsilon_c (d-c) = 0.85 f'_c \rho_e c^2 b.$$

$$= 0.85 f'_c \rho_e c^2 b + A_s E_s \epsilon_c c - A_s E_s \epsilon_c d$$

$$c = 1.082 \text{ in}$$

$$\epsilon_s = 0.008 \geq 0.005 \text{ yielding.}$$

$$\phi M_n = 0.2(60 \text{ ksi}) \times \left(d - \frac{\rho_e c}{2}\right)$$

$$0.4(0.2)(60 \text{ ksi}) \times \left[4 - \frac{0.85(1.082 \text{ in})}{2}\right]$$

$$\phi M_n = 38.23 \text{ k-in} //$$

Right there

$$38.23 \text{ k-in} \geq 38 \text{ k-in} \text{ OK} //$$

Concrete Beam

File: New Residence.ec6
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CBenginfo

Lic. # : KW-06012775

DESCRIPTION: Stair high Flight Critical

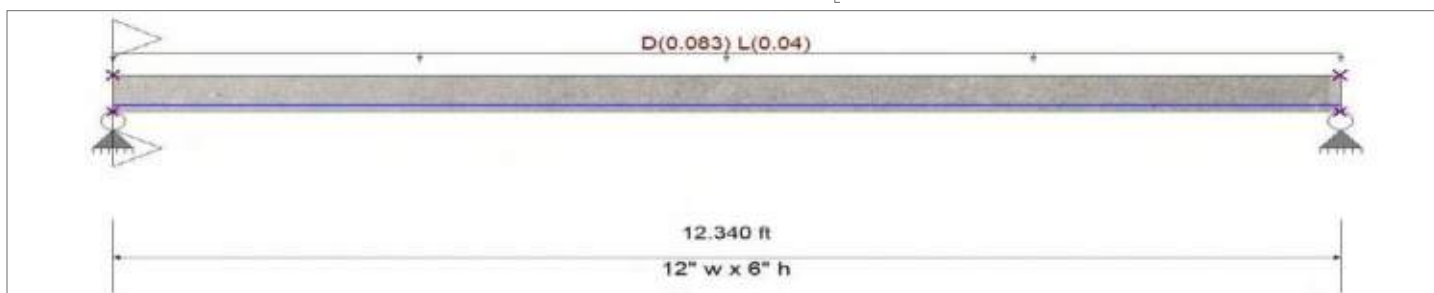
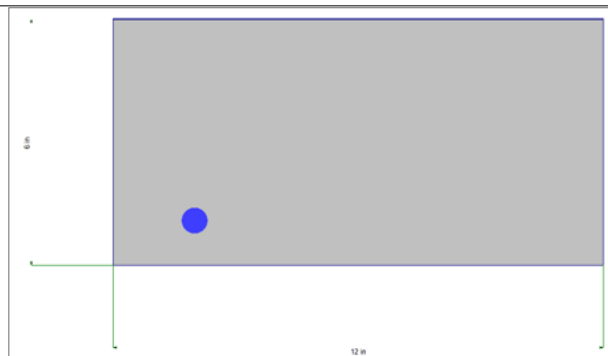
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2}$	=	7.50		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,644.15 ksi	F_y - Stirrups	=	60.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 6.0 in

Span #1 Reinforcing....

1-#5 at 1.10 in from Bottom, from 0.0 to 12.340 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0830, L = 0.040 k/ft, Tributary Width = 1.0 ft, (Thread Weight)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.732 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.027 in	Ratio = 5587 >= 360.
μ_u : Applied		4.770 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 < 360.0
$M_n \cdot \Phi$: Allowable		6.517 k-ft	Max Downward Total Deflection	0.219 in	Ratio = 677 >= 360.
Location of maximum on span		6.159 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 < 360.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	ΦM_n (k-ft)		Moment of Inertia (in ⁴)		
		Bottom	Top	I gross	I cr - Bottom	I cr - Top
Section 1	1- #5 @ d=4.9",	6.52	0.00	216.00	40.68	1.48

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.206	1.206
Overall MINimum	0.247	0.247
+D+H	0.959	0.959
+D+L+H	1.206	1.206
+D+Lr+H	0.959	0.959
+D+S+H	0.959	0.959
+D+0.750Lr+0.750L+H	1.145	1.145
+D+0.750L+0.750S+H	1.145	1.145

Concrete Beam

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CBenginfo

DESCRIPTION: Stair high Flight Critical

Vertical Reactions

Support notation : Far left is #1

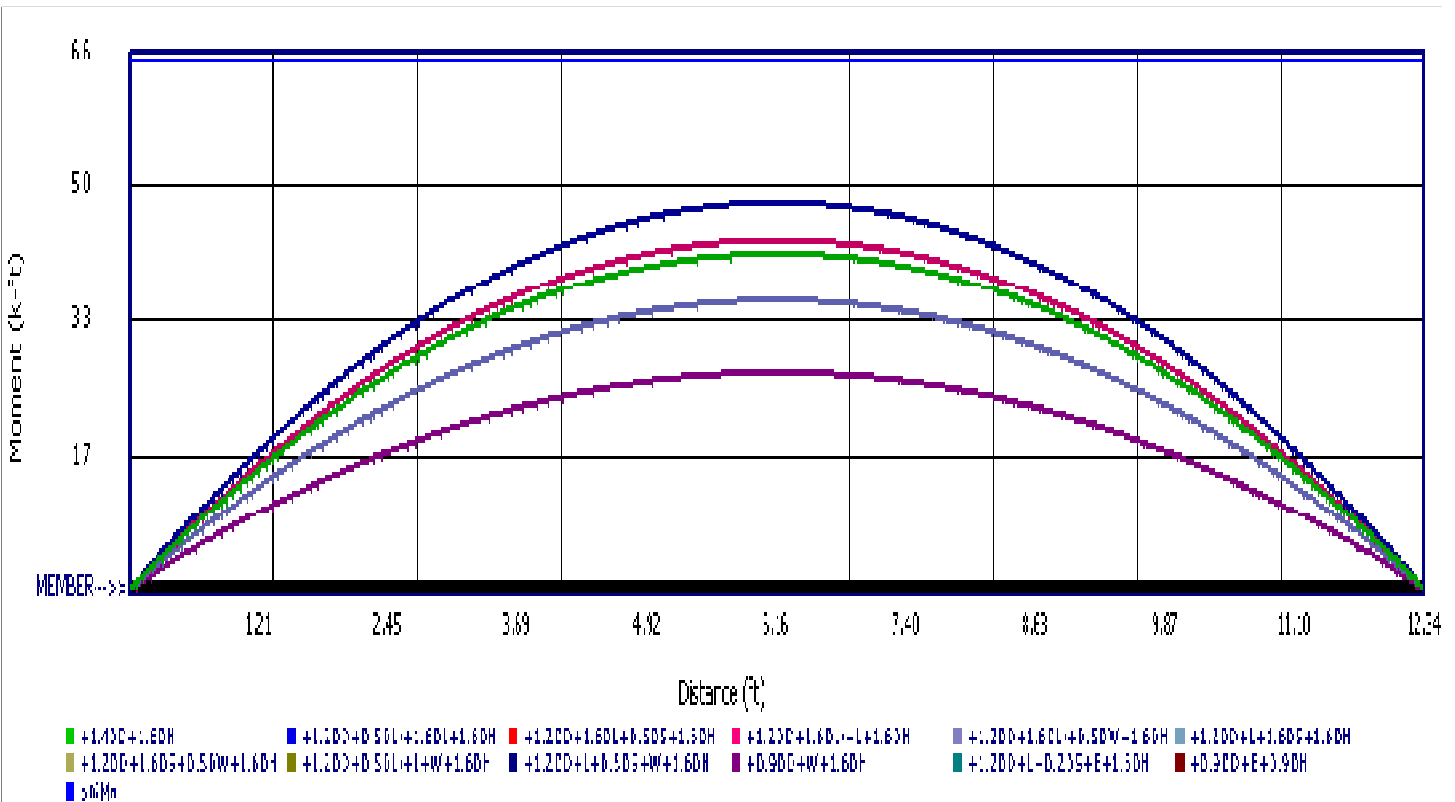
Load Combination	Support 1	Support 2
+D+0.60W+H	0.959	0.959
+D+0.750L+0.750L+0.450W+H	1.145	1.145
+D+0.750L+0.750S+0.450W+H	1.145	1.145
+0.60D+0.60W+0.60H	0.576	0.576
+D+0.70E+0.60H	0.959	0.959
+D+0.750L+0.750S+0.5250E+H	1.145	1.145
+0.60D+0.70E+H	0.576	0.576
D Only	0.959	0.959
L Only	0.247	0.247
H Only		

Shear Stirrup Requirements

Entire Beam Span Length : $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 11.4.6.1, use #3 stirrups spaced at 0.000 in

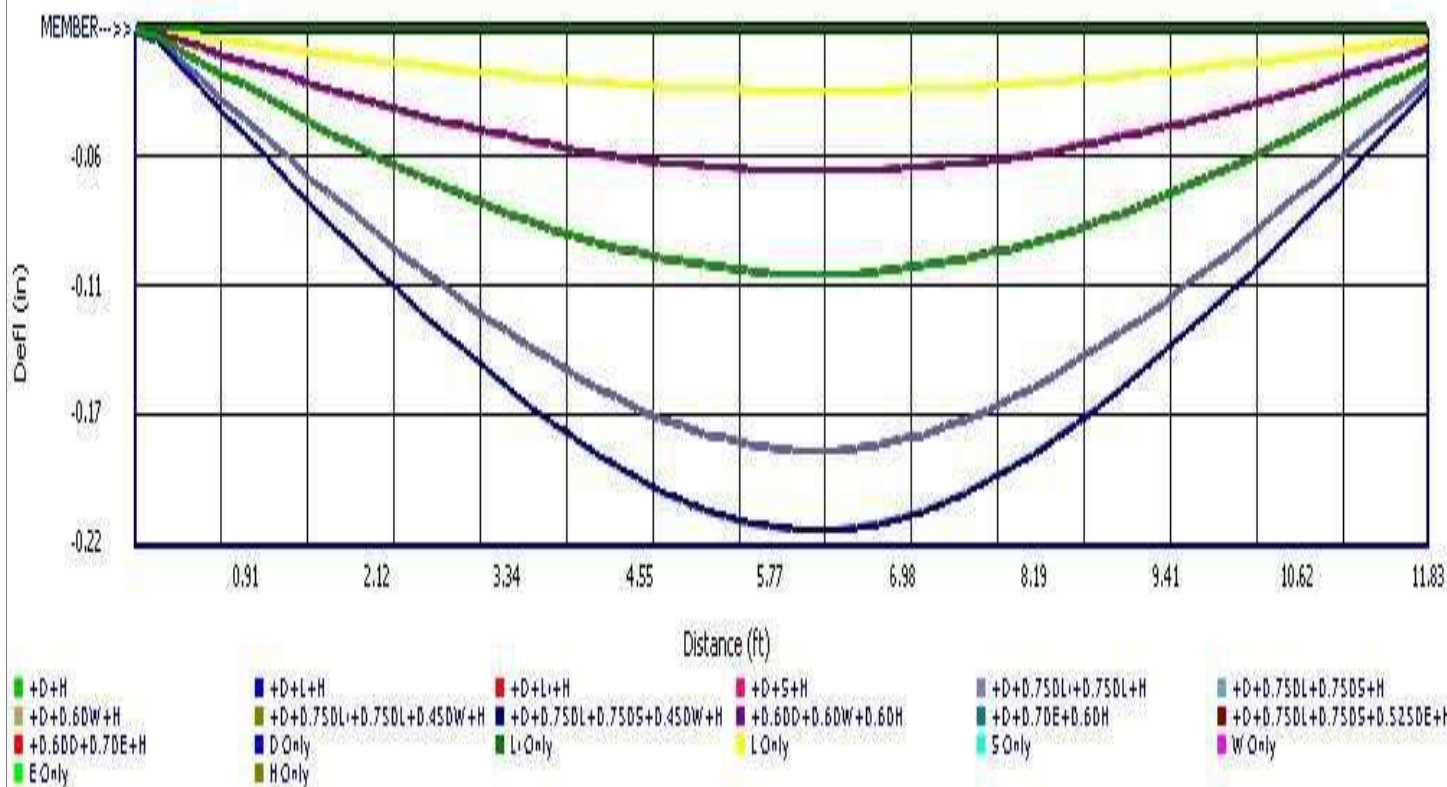
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.2186	6.170		0.0000	0.000



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DESCRIPTION: Stair high Flight Critical



Concrete Beam

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CBenginfo

DESCRIPTION: Intermediate Landing

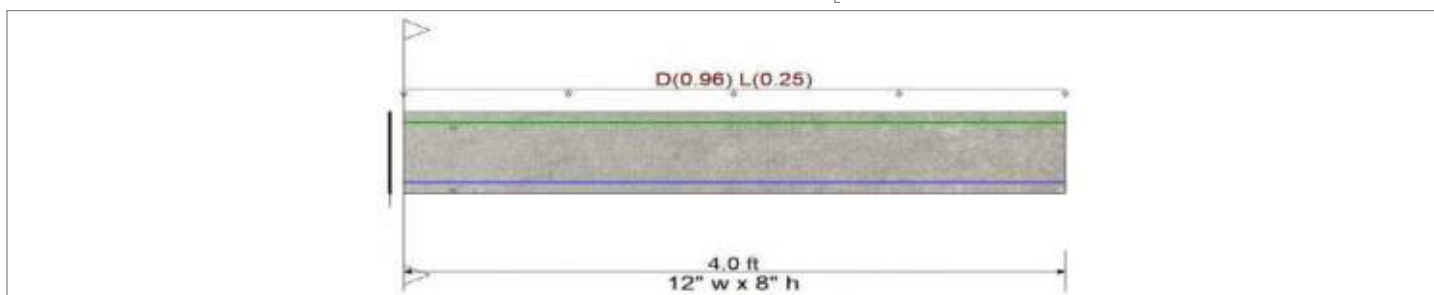
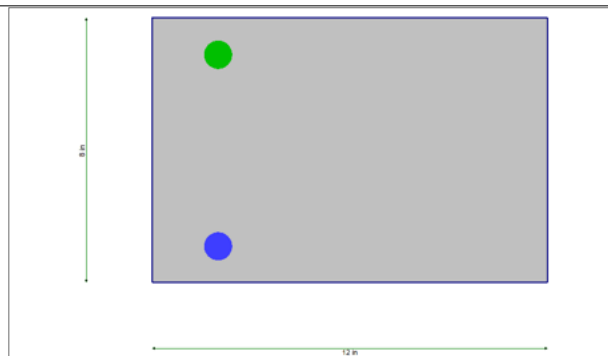
CODE REFERENCES

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

f'_c	=	3.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	410.792 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - Stirrups	=	40.0 ksi
f_y - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2



Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 8.0 in

Span #1 Reinforcing....

1-#7 at 1.10 in from Bottom, from 0.0 to 4.0 ft in this span

1-#7 at 1.10 in from Top, from 0.0 to 4.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.960, L = 0.250 k/ft, Tributary Width = 1.0 ft, (Stair Flight Reaction)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.783 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.009 in	Ratio = 11100 >= 360.
Mu : Applied		-13.344 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 < 360.0
Mn * Phi : Allowable		17.042 k-ft	Max Downward Total Deflection	0.096 in	Ratio = 998 >= 180.
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 < 180.0
Span # where maximum occurs		Span # 1			

Cross Section Strength & Inertia

Top & Bottom references are for tension side of section

Cross Section	Bar Layout Description	Phi*Mn (k-ft)		Moment of Inertia (in^4)		
		Bottom	Top	I gross	Icr - Bottom	Icr - Top
Section 1	1- #7 @ d=6.9", 1- #7 @ d=1.1",	17.04	17.04	512.00	169.81	169.81

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	5.227	
Overall MINimum	1.000	
+D+H	4.227	
+D+L+H	5.227	
+D+Lr+H	4.227	
+D+S+H	4.227	
+D+0.750Lr+0.750L+H	4.977	
+D+0.750L+0.750S+H	4.977	

Concrete Beam

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DESCRIPTION: Intermediate Landing

Vertical Reactions

Support notation : Far left is #1

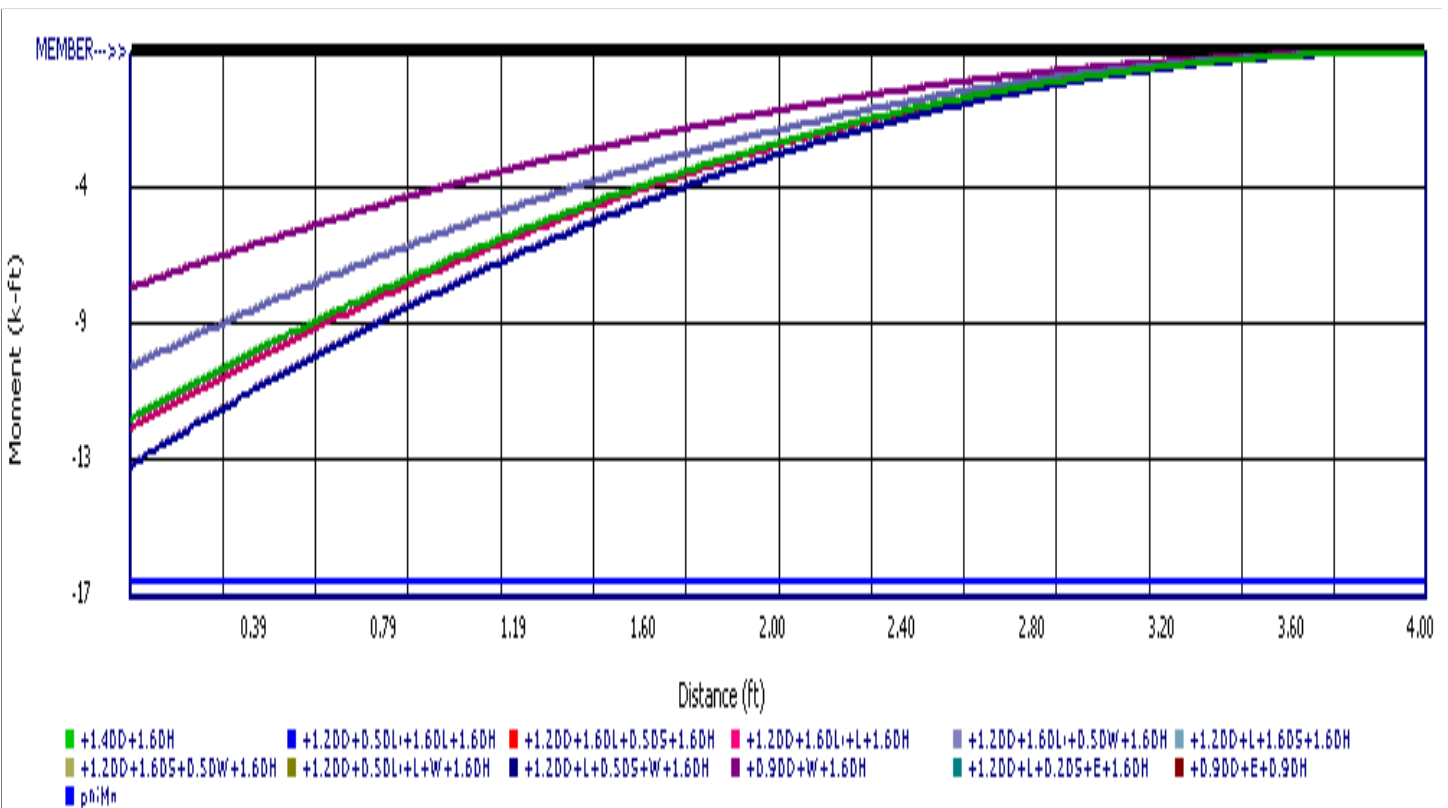
Load Combination	Support 1	Support 2
+D+0.60W+H	4.227	
+D+0.750Lr+0.750L+0.450W+H	4.977	
+D+0.750L+0.750S+0.450W+H	4.977	
+0.60D+0.60W+0.60H	2.536	
+D+0.70E+0.60H	4.227	
+D+0.750L+0.750S+0.5250E+H	4.977	
+0.60D+0.70E+H	2.536	
D Only	4.227	
L Only	1.000	
H Only		

Shear Stirrup Requirements

Entire Beam Span Length : $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = $H_t \leq 10"$, Not Req'd, use #3 stirrups spaced at 0.000 in

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.0960	4.000		0.0000	0.000

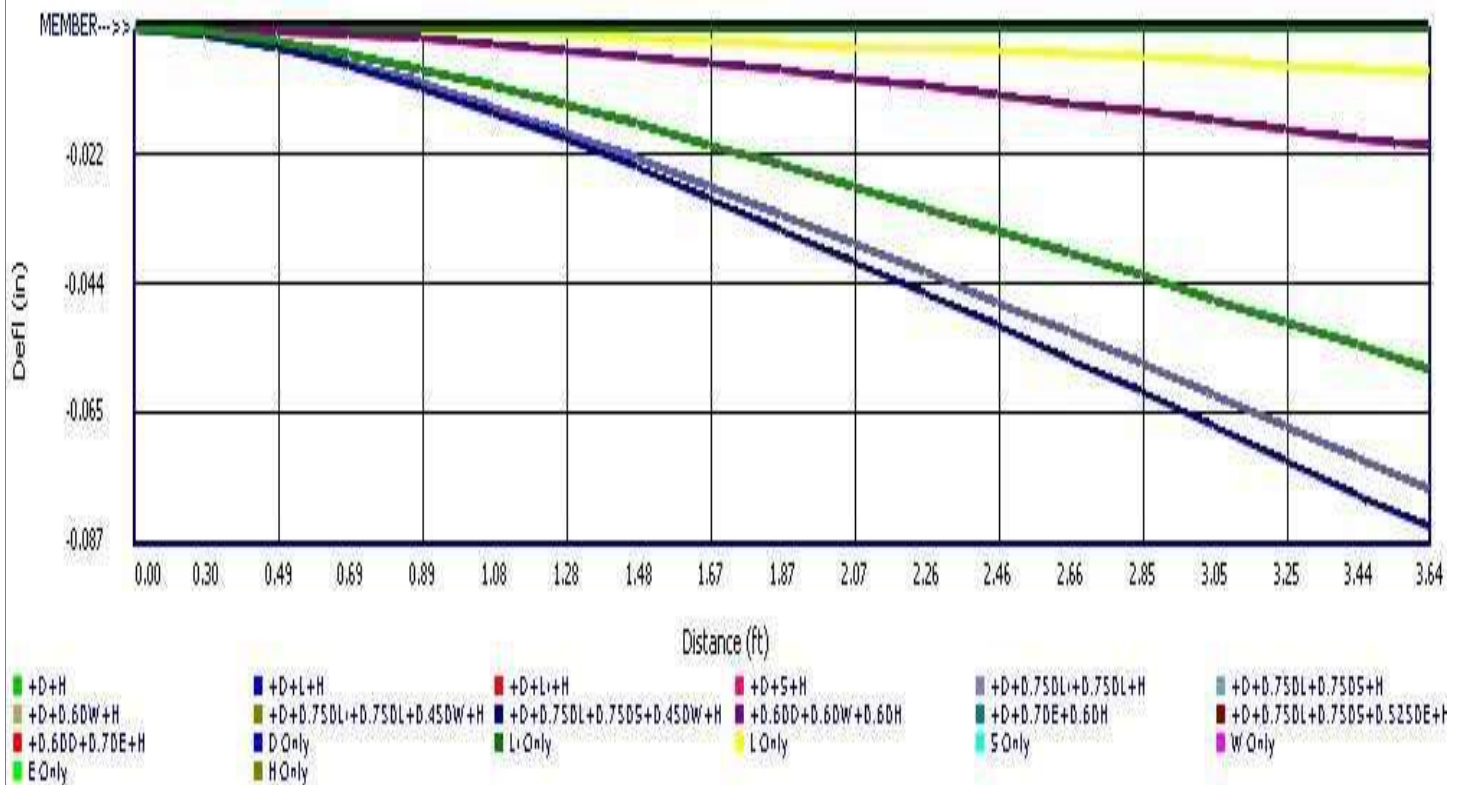
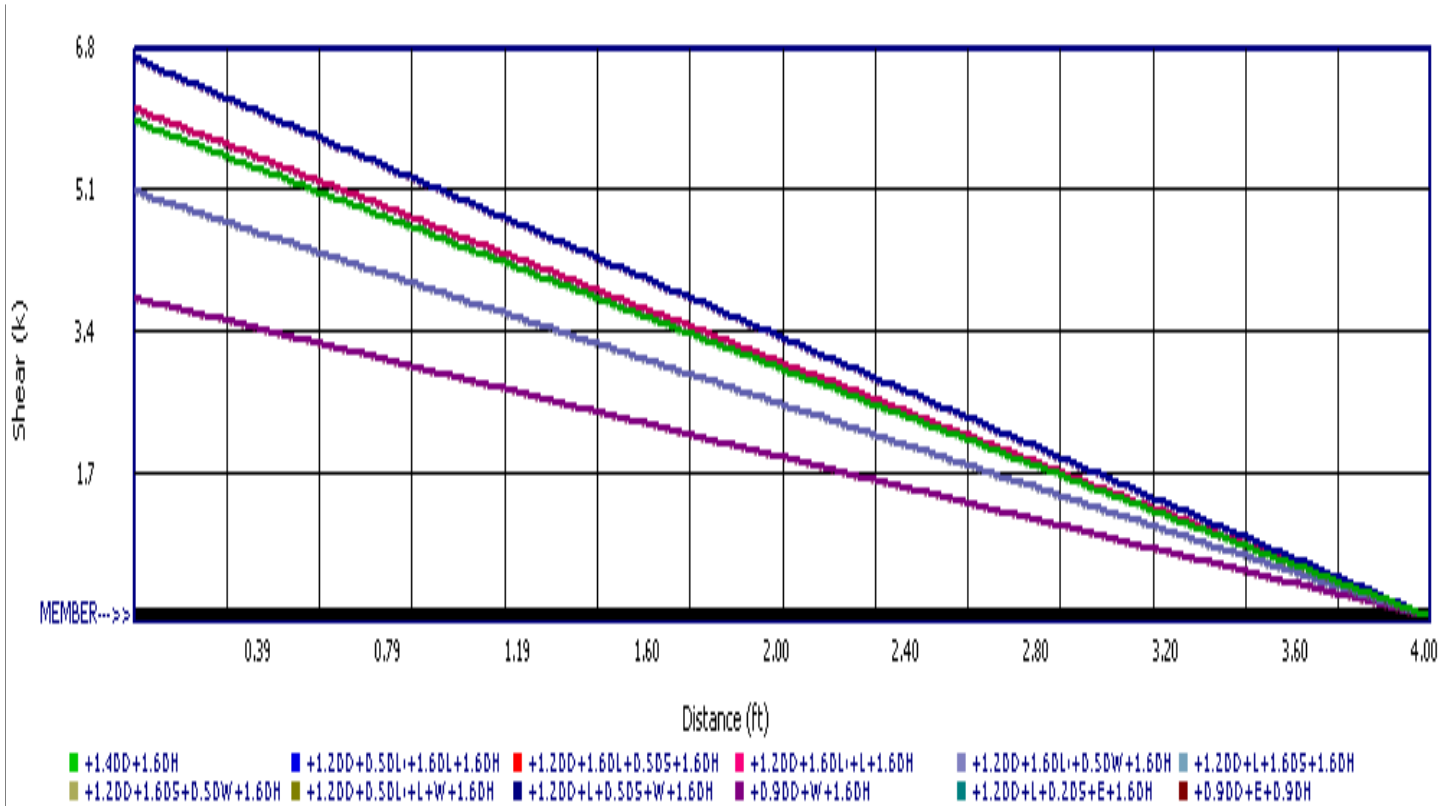


Concrete Beam

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CBenginfo

DESCRIPTION: Intermediate Landing



Wood Parapet

$$-95 \text{ psf} + 45 \text{ psf}$$

$$= 144 \text{ psf}$$

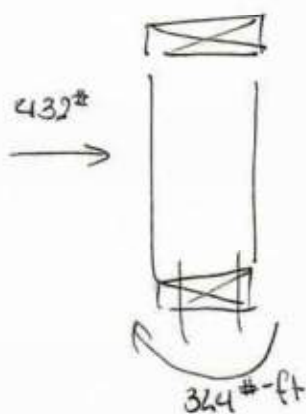
Zone 2 - Zone 4 +

$$144 \text{ psf} \times 1'-6"$$

$$= 216 \text{ \# / ft}$$

$$216 \text{ \#} \times \frac{1'-6"}{2}$$

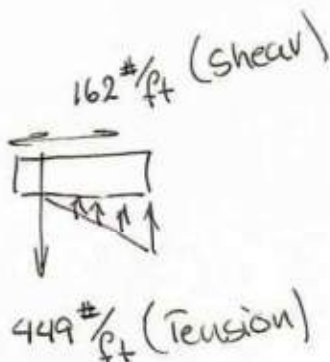
$$= 162 \frac{\text{\#} \cdot \text{ft}}{\text{ft}}$$



$$162 \frac{\text{\#} \cdot \text{ft}}{\text{ft}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 1944 \frac{\text{\#} \cdot \text{in}}{\text{ft}}$$

$$1944 \frac{\text{\#} \cdot \text{in}}{\text{ft}} \div \left(\frac{2}{3}\right) \left(6 \frac{1}{2}\right) = 449 \frac{\text{\#}}{\text{ft}}$$

Tension



Tension #12 wood screw

186 \# / in penetration

$$186 \text{ \# / in} \times 1.5 \text{ in} = 279 \text{ \#} \times 1.6$$

Load Duration

$$446.4 \text{ \#} \geq 225 \text{ \#} \text{ OK}$$

Place one every 6"

When a row is in tension; the other row does takes the shear

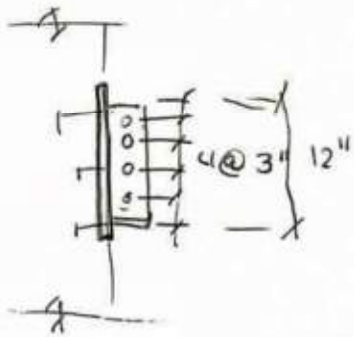
Shear

$$0.216 \phi 161 \text{ \#} \times 1.6 = 257 \text{ \#} \geq 81 \text{ \#} \text{ OK}$$

$$\frac{81}{257} + \frac{125}{446} \leq 1.0$$

$$0.82 \leq 1.0$$

Bucket Steel Design



$$\frac{1}{2}'' \phi \text{ BOLT } z_{II} = 860^{\#}$$

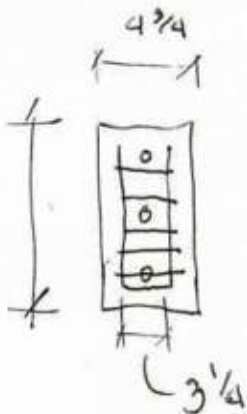
$$z' = z C_0 C_M C_t C_g C_A C_{eg} C_{di} C_{tn}$$

1.0 1.0 0.77 1.0 1.0 1.0 1.0

$$z' = 860^{\#} (1.6) (0.77)$$

$$z' = 1059^{\#}$$

$$\frac{4655^{\#}}{1059^{\#}/\text{screw}} = 4.4 \Rightarrow 5 \text{ screws}$$



$$\frac{5617^{\#}}{1240^{\#}} = 4.4 \quad \frac{3}{4}'' \phi \text{ Screw/Bolt.}$$