



9719 South Dixie Hwy., Unit #2
Miami, FL 33156

Ph: 305.609.3652
CA 28548

STRUCTURAL CALCULATIONS per Revision 6

FOR

Huber Khomiak Residence
12020 SW 77th Ave
Pinecrest, FL 33156

prepared by:
Thomas Moe
PE 63863

THM
STRUCTURAL CONSULTING

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Huber Khomiak Residence

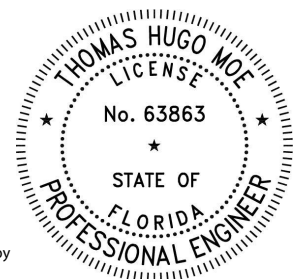
12020 SW 77th Ave
Pinecrest, FL 33156

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THOMAS
MOE

Digitally signed by
THOMAS MOE
Date: 2023.05.21
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Thomas Moe
PE 63863

DESIGN OF CONCRETE BEAM B-7 ABOVE GARAGE

LOADING, APPLY LOADING TO ENERCALC ANALYSIS, NEXT PAGES

$$wt_{\text{roof\_slab}} := \gamma_{\text{concrete}} \cdot (6 \cdot \text{in})$$

$$DL_r := 25 \cdot \text{psf}$$

$$LL_r := 30 \cdot \text{psf}$$

$$wt_{\text{roof\_slab}} = 72.5 \cdot \text{psf}$$

$$\text{trib}_r := \frac{(23.67 \cdot \text{ft})}{2}$$

$$\text{trib}_r = 11.84 \text{ ft}$$

TRIB ROOF DEAD LOADS

$$w_{DL_r} := \text{trib}_r \cdot (DL_r + wt_{\text{roof\_slab}})$$

$$w_{DL_r} = 1.15 \cdot \frac{\text{k}}{\text{ft}}$$

$$\gamma_{\text{concrete}} = 145 \cdot \frac{\text{lb}}{\text{ft}^3}$$

$$wt_{\text{blk}} := \gamma_{\text{blk}} \cdot 2.33 \cdot \text{ft}$$

$$wt_{\text{TB2}} := \gamma_{\text{concrete}} \cdot (0.67 \cdot \text{ft}) \cdot (3.33 \cdot \text{ft})$$

$$wt_{\text{blk}} = 128.15 \cdot \frac{\text{lb}}{\text{ft}}$$

$$wt_{\text{TB2}} = 323.51 \cdot \frac{\text{lb}}{\text{ft}}$$

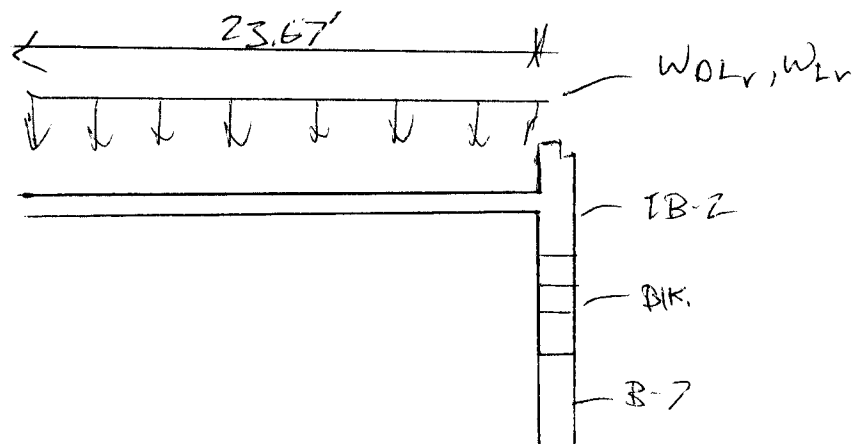
$$w_{DL\_Total} := w_{DL_r} + wt_{\text{TB2}} + wt_{\text{blk}}$$

$$w_{DL\_Total} = 1.606 \cdot \frac{\text{k}}{\text{ft}}$$

TRIB ROOF LIVE LOADS

$$w_{L_r} := \text{trib}_r \cdot LL_r$$

$$w_{L_r} = 0.37 \cdot \frac{\text{k}}{\text{ft}}$$



Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: Huber & Khomiak Residence_backup_2.ec6

LIC# : KW-06013533, Build:20.23.05.01

THM Structural Consulting

(c) ENERCALC INC 1983-2023

DESCRIPTION: CONCRETE BEAM (B-7) AT GARAGE

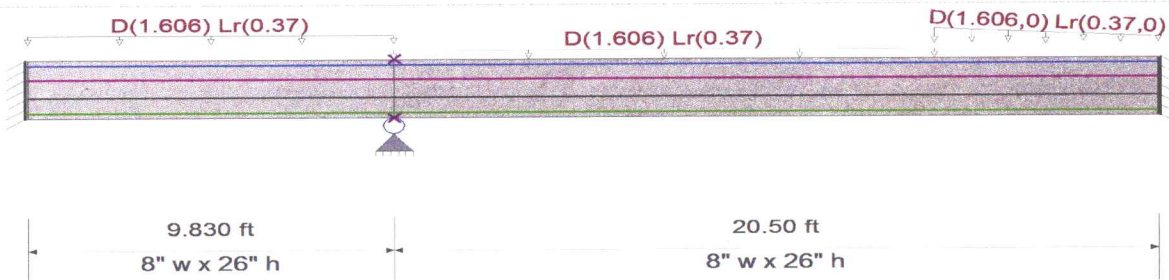
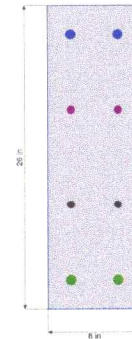
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : ASCE 7-16

General Information

f'_c	=	4.0 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2}$	=	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
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 = 26.0 in

Span #1 Reinforcing....

2-#7 at 2.50 in from Top, from 0.0 to 9.830 ft in this span

2-#5 at 9.0 in from Top, from 0.0 to 9.830 ft in this span

Span #2 Reinforcing....

2-#7 at 2.50 in from Top, from 0.0 to 20.50 ft in this span

2-#5 at 9.0 in from Top, from 0.0 to 20.50 ft in this span

2-#7 at 2.50 in from Bottom, from 0.0 to 9.830 ft in this

2-#5 at 9.0 in from Bottom, from 0.0 to 9.830 ft in this s

2-#7 at 2.50 in from Bottom, from 0.0 to 20.50 ft in this

2-#5 at 9.0 in from Bottom, from 0.0 to 20.50 ft in this s

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 1.606, Lr = 0.370 k/ft, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : D = 1.606, Lr = 0.370 k/ft, Extent = 0.0 --> 14.50 ft, Tributary Width = 1.0 ft

Varying Uniform Load : D = 1.606->0.0, Lr = 0.370->0.0 k/ft, Extent = 14.50 --> 20.50 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.553 : 1
Section used for this span		Typical Section
Mu : Applied		-97.759 k-ft
Mn * Phi : Allowable		176.665 k-ft
Location of maximum on span		20.500 ft
Span # where maximum occurs		Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.010 in	Ratio = 25266	>=360.0	Lr Only
Max Upward Transient Deflection	0.000 in	Ratio = 0	<360.0	Lr Only
Max Downward Total Deflection	0.083 in	Ratio = 2979	>=180.0	Span: 2 : +D+Lr
Max Upward Total Deflection	-0.005 in	Ratio = 21847	>=180.0	Span: 2 : +D+Lr

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DESCRIPTION: CONCRETE BEAM (B-7) AT GARAGE

Cross Section Strength & Inertia

Top & Bottom references are for tension side of sect

					Phi*Mn	(k-ft)	Moment of Inertia			(in^4)
Cross Section Bar Layout Description					Bottom	Top	I gross	Icr - Bottom	Icr - Top	
Section 1	2- #7 @ d=2.5",	2- #7 @ d=23.5",	2- #5 @ d=9",	2- #5 @ d=	176.66	176.66	11,717.33	4,748.04	4,748.04	
Section 2	2- #7 @ d=2.5",	2- #7 @ d=23.5",	2- #5 @ d=9",	2- #5 @ d=	176.66	176.66	11,717.33	4,748.04	4,748.04	

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.687	38.147	17.522
Max Upward from Load Combinations	4.687	38.147	17.522
Max Upward from Load Cases	3.867	31.754	14.624
D Only	3.867	31.754	14.624
+D+Lr	4.687	38.147	17.522
+D+0.750Lr	4.499	36.544	16.785
+0.60D	2.392	18.696	9.059
Lr Only	0.817	6.340	2.955

Shear Stirrup Requirements

Between 0.00 to 5.42 ft, $V_u < \Phi V_c / 2$, Req'd Vs = Not Req'd per 9.6.3.1, Stirrups are not required.
Between 5.46 to 16.52 ft, $\Phi V_c / 2 < V_u \leq \Phi V_c$, Req'd Vs = Min per 9.6.3.1, use #3 stirrups spaced at 10.000 in
Between 16.61 to 22.13 ft, $V_u < \Phi V_c / 2$, Req'd Vs = Not Req'd per 9.6.3.1, Stirrups are not required.
Between 22.21 to 30.25 ft, $\Phi V_c < V_u$, Req'd Vs = 6.908, use #3 stirrups spaced at 10.000 in

Detailed Shear Information

Load Combination	Span Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in)	
	Number	(ft)	(in)	Actual	Design						Req'd	
+1.20D+1.60Lr	1	0.00	20.25	6.10	6.10	2.32	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	0.24	20.25	5.43	5.43	3.71	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	0.48	20.25	4.77	4.77	4.94	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	0.72	20.25	4.10	4.10	6.01	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	0.96	20.25	3.43	3.43	6.91	0.84	17.46	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	17.5	0.0	
+1.20D+1.60Lr	1	1.20	20.25	2.76	2.76	7.66	0.61	16.68	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	16.7	0.0	
+1.20D+1.60Lr	1	1.44	20.25	2.10	2.10	8.24	0.43	16.07	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	16.1	0.0	
+1.20D+1.60Lr	1	1.69	20.25	1.43	1.43	8.67	0.28	15.55	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.6	0.0	
+1.20D+1.60Lr	1	1.93	20.25	0.76	0.76	8.93	0.14	15.37	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.4	0.0	
+1.20D+1.60Lr	1	2.17	20.25	0.10	0.10	9.04	0.02	15.37	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.4	0.0	
+1.20D+1.60Lr	1	2.41	20.25	-0.57	0.57	8.98	0.11	15.37	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.4	0.0	
+1.20D+1.60Lr	1	2.65	20.25	-1.24	1.24	8.76	0.24	15.41	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.4	0.0	
+1.20D+1.60Lr	1	2.89	20.25	-1.90	1.90	8.38	0.38	15.91	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	15.9	0.0	
+1.20D+1.60Lr	1	3.13	20.25	-2.57	2.57	7.84	0.55	16.49	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	16.5	0.0	
+1.20D+1.60Lr	1	3.37	20.25	-3.24	3.24	7.15	0.76	17.21	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	17.2	0.0	
+1.20D+1.60Lr	1	3.61	20.25	-3.91	3.91	6.29	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	3.85	20.25	-4.57	4.57	5.27	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	4.09	20.25	-5.24	5.24	4.08	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	4.33	20.25	-5.91	5.91	2.74	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	4.57	20.25	-6.57	6.57	1.24	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	4.81	20.25	-7.24	7.24	0.42	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	5.06	20.25	-7.91	7.91	2.25	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	5.30	20.25	-8.57	8.57	4.23	1.00	18.01	$V_u < \Phi V_c / 2$ Not Req'd per 9.6.3.1	18.0	0.0	
+1.20D+1.60Lr	1	5.54	20.25	-9.24	9.24	6.37	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	5.78	20.25	-9.91	9.91	8.68	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	6.02	20.25	-10.58	10.58	11.14	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	6.26	20.25	-11.24	11.24	13.77	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	6.50	20.25	-11.91	11.91	16.56	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	6.74	20.25	-12.58	12.58	19.50	1.00	18.01	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.1	10.1	
+1.20D+1.60Lr	1	6.98	20.25	-13.24	13.24	22.61	0.99	17.97	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	38.0	10.1	
+1.20D+1.60Lr	1	7.22	20.25	-13.91	13.91	25.88	0.91	17.70	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	37.7	10.1	
+1.20D+1.60Lr	1	7.46	20.25	-14.58	14.58	29.31	0.84	17.46	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	37.5	10.1	
+1.20D+1.60Lr	1	7.70	20.25	-15.24	15.24	32.90	0.78	17.27	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	37.3	10.1	
+1.20D+1.60Lr	1	7.94	20.25	-15.91	15.91	36.65	0.73	17.10	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	37.1	10.1	
+1.20D+1.60Lr	1	8.18	20.25	-16.58	16.58	40.56	0.69	16.95	$\Phi V_c / 2 < V_u$ Min per 9.6.3.1	37.0	10.1	
+1.20D+1.60Lr	1	8.43	20.25	-17.24	17.24	44.63	0.65	16.83	$\Phi V_c < V_u$	0.4194	36.9	10.1
+1.20D+1.60Lr	1	8.67	20.25	-17.91	17.91	48.86	0.62	16.71	$\Phi V_c < V_u$	1.20	36.8	10.1

Project Title:
 Engineer:
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 Project Descr:

Concrete Beam

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DESCRIPTION: CONCRETE BEAM (B-7) AT GARAGE

Detailed Shear Information

Load Combination	Span Number	Distance 'd' (ft)	(in)	Vu (k) Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
+1.20D+1.60Lr	1	8.91	20.25	-18.58	18.58	53.25	0.59	16.61	Phi*Vc < Vu	1.969	36.7	10.1
+1.20D+1.60Lr	1	9.15	20.25	-19.25	19.25	57.81	0.56	16.52	Phi*Vc < Vu	2.728	36.6	10.1
+1.20D+1.60Lr	1	9.39	20.25	-19.91	19.91	62.52	0.54	16.43	Phi*Vc < Vu	3.478	36.5	10.1
+1.20D+1.60Lr	1	9.63	20.25	-20.58	20.58	67.39	0.52	16.36	Phi*Vc < Vu	4.221	36.4	10.1
+1.20D+1.60Lr	2	9.91	20.25	26.15	26.15	69.38	0.64	16.77	Phi*Vc < Vu	9.381	36.8	10.1
+1.20D+1.60Lr	2	10.42	20.25	24.76	24.76	56.60	0.74	17.12	Phi*Vc < Vu	7.641	37.2	10.1
+1.20D+1.60Lr	2	10.92	20.25	23.37	23.37	44.52	0.89	17.62	Phi*Vc < Vu	5.747	37.7	10.1
+1.20D+1.60Lr	2	11.42	20.25	21.98	21.98	33.13	1.00	18.01	Phi*Vc < Vu	3.966	38.1	10.1
+1.20D+1.60Lr	2	11.92	20.25	20.59	20.59	22.45	1.00	18.01	Phi*Vc < Vu	2.575	38.1	10.1
+1.20D+1.60Lr	2	12.42	20.25	19.20	19.20	12.46	1.00	18.01	Phi*Vc < Vu	1.184	38.1	10.1
+1.20D+1.60Lr	2	12.93	20.25	17.81	17.81	3.17	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	13.43	20.25	16.42	16.42	5.42	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	13.93	20.25	15.02	15.02	13.31	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	14.43	20.25	13.63	13.63	20.50	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	14.93	20.25	12.24	12.24	27.00	0.77	17.21	Phi*Vc / 2 < Vu	lin per 9.6	37.3	10.1
+1.20D+1.60Lr	2	15.44	20.25	10.85	10.85	32.79	0.56	16.51	Phi*Vc / 2 < Vu	lin per 9.6	36.6	10.1
+1.20D+1.60Lr	2	15.94	20.25	9.46	9.46	37.89	0.42	16.04	Phi*Vc / 2 < Vu	lin per 9.6	36.1	10.1
+1.20D+1.60Lr	2	16.44	20.25	8.07	8.07	42.29	0.32	15.70	Phi*Vc / 2 < Vu	lin per 9.6	35.7	10.1
+1.20D+1.60Lr	2	16.94	20.25	6.68	6.68	46.00	0.25	15.44	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	17.44	20.25	5.29	5.29	49.00	0.18	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	17.95	20.25	3.90	3.90	51.31	0.13	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	18.45	20.25	2.51	2.51	52.91	0.08	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	18.95	20.25	1.12	1.12	53.82	0.03	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	19.45	20.25	-0.28	0.28	54.03	0.01	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	19.95	20.25	-1.67	1.67	53.54	0.05	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	20.46	20.25	-3.06	3.06	52.36	0.10	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	20.96	20.25	-4.45	4.45	50.47	0.15	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	21.46	20.25	-5.84	5.84	47.89	0.21	15.37	Vu < Phi*Vc / 2	Reqd pe	15.4	0.0
+1.20D+1.60Lr	2	21.96	20.25	-7.23	7.23	44.61	0.27	15.53	Vu < Phi*Vc / 2	Reqd pe	15.5	0.0
+1.20D+1.60Lr	2	22.46	20.25	-8.62	8.62	40.63	0.36	15.82	Phi*Vc / 2 < Vu	lin per 9.6	35.9	10.1
+1.20D+1.60Lr	2	22.97	20.25	-10.01	10.01	35.95	0.47	16.20	Phi*Vc / 2 < Vu	lin per 9.6	36.3	10.1
+1.20D+1.60Lr	2	23.47	20.25	-11.40	11.40	30.58	0.63	16.75	Phi*Vc / 2 < Vu	lin per 9.6	36.8	10.1
+1.20D+1.60Lr	2	23.97	20.25	-12.79	12.79	24.51	0.88	17.61	Phi*Vc / 2 < Vu	lin per 9.6	37.7	10.1
+1.20D+1.60Lr	2	24.47	20.25	-14.18	14.18	17.73	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	24.97	20.25	-15.49	15.49	10.28	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	25.48	20.25	-16.69	16.69	2.20	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	25.98	20.25	-17.79	17.79	6.46	1.00	18.01	Phi*Vc / 2 < Vu	lin per 9.6	38.1	10.1
+1.20D+1.60Lr	2	26.48	20.25	-18.78	18.78	15.64	1.00	18.01	Phi*Vc < Vu	0.7646	38.1	10.1
+1.20D+1.60Lr	2	26.98	20.25	-19.66	19.66	25.30	1.00	18.01	Phi*Vc < Vu	1.649	38.1	10.1
+1.20D+1.60Lr	2	27.49	20.25	-20.44	20.44	35.37	0.98	17.93	Phi*Vc < Vu	2.512	38.0	10.1
+1.20D+1.60Lr	2	27.99	20.25	-21.11	21.11	45.80	0.78	17.25	Phi*Vc < Vu	3.859	37.3	10.1
+1.20D+1.60Lr	2	28.49	20.25	-21.68	21.68	56.55	0.65	16.81	Phi*Vc < Vu	4.873	36.9	10.1
+1.20D+1.60Lr	2	28.99	20.25	-22.14	22.14	67.55	0.55	16.49	Phi*Vc < Vu	5.654	36.5	10.1
+1.20D+1.60Lr	2	29.49	20.25	-22.50	22.50	78.76	0.48	16.25	Phi*Vc < Vu	6.252	36.3	10.1
+1.20D+1.60Lr	2	30.00	20.25	-22.75	22.75	90.13	0.43	16.05	Phi*Vc < Vu	6.693	36.1	10.1

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment	Span #	Location (ft) along Beam	Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope						
Span # 1		1	9.830	-70.73	176.66	0.40
Span # 2		2	20.500	-97.76	176.66	0.55
+1.40D						
Span # 1		1	9.830	-64.92	176.66	0.37
Span # 2		2	20.500	-89.96	176.66	0.51
+1.20D+0.50Lr						
Span # 1		1	9.830	-60.36	176.66	0.34
Span # 2		2	20.500	-83.56	176.66	0.47
+1.20D						
Span # 1		1	9.830	-55.64	176.66	0.31

Concrete Beam

Project File: Huber & Khomiak Residence_backup_2.ec6

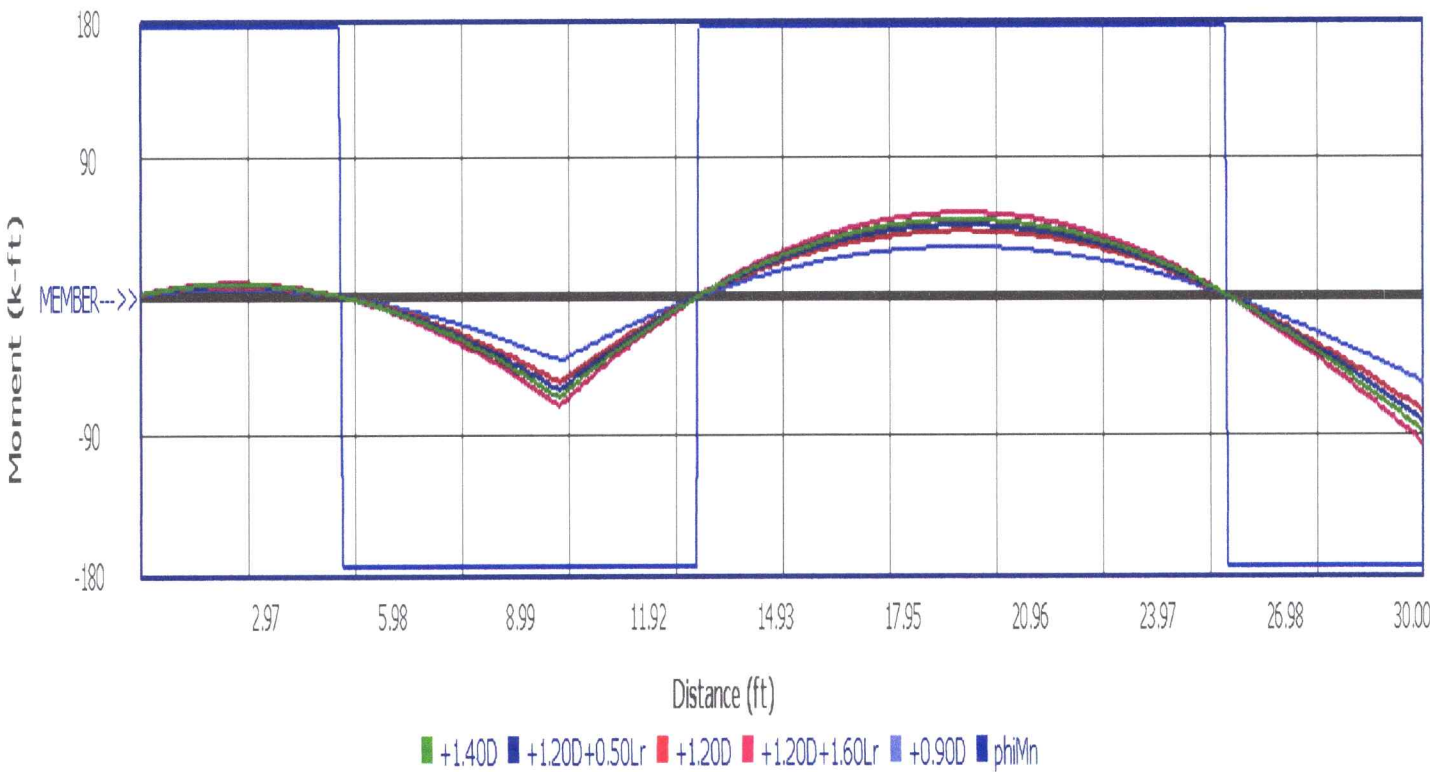
LIC# : KW-06013533, Build:20.23.05.01 TBM Structural Consulting (c) ENERCALC INC 1983-2023

DESCRIPTION: CONCRETE BEAM (B-7) AT GARAGE

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
Span # 2	2	20.500	-77.11	176.66	0.44
+1.20D+1.60Lr					
Span # 1	1	9.830	-70.73	176.66	0.40
Span # 2	2	20.500	-97.76	176.66	0.55
+0.90D					
Span # 1	1	9.830	-41.73	176.66	0.24
Span # 2	2	20.500	-57.83	176.66	0.33

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+Lr	1	0.0022	10.123	+D+Lr	-0.0054	7.443
+D+Lr	2	0.0826	9.664		0.0000	7.443



Concrete Beam

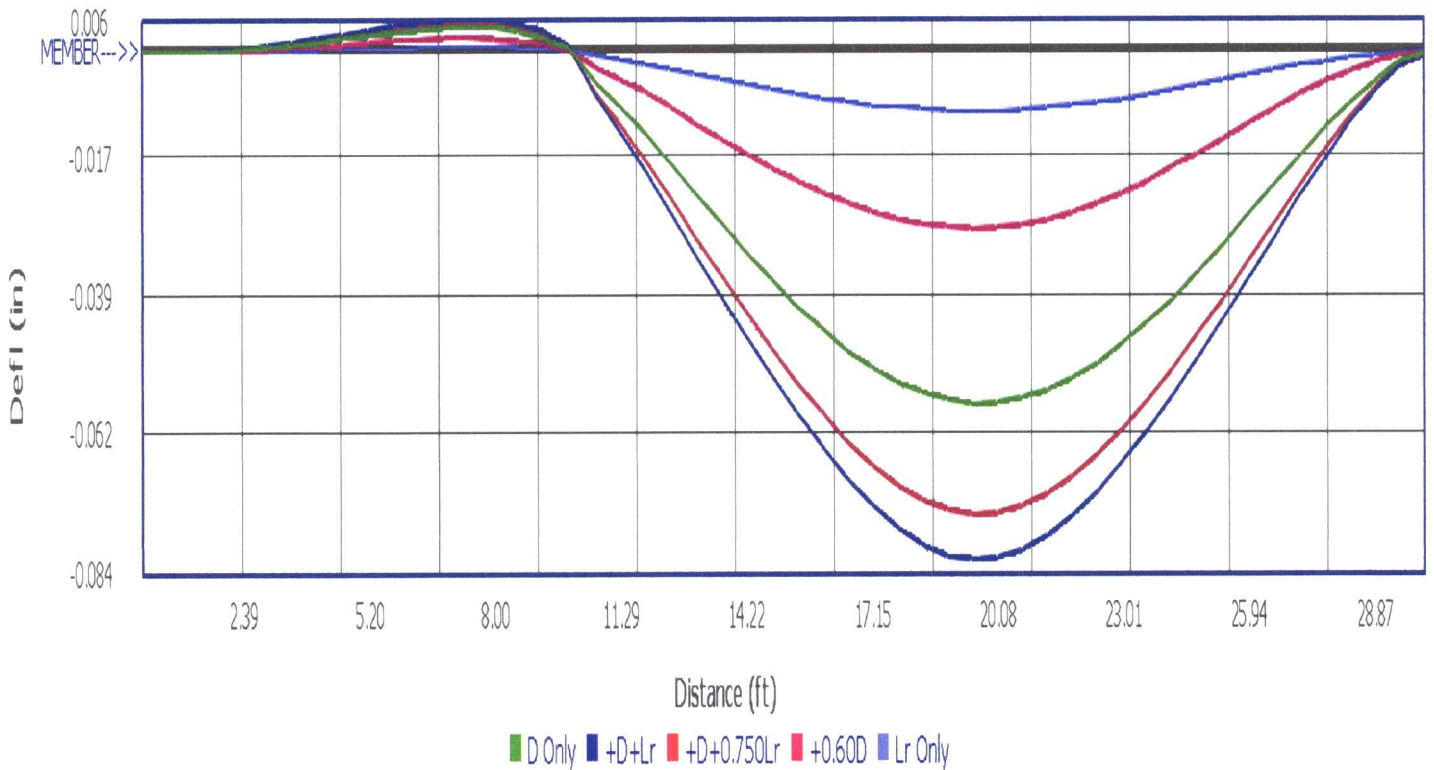
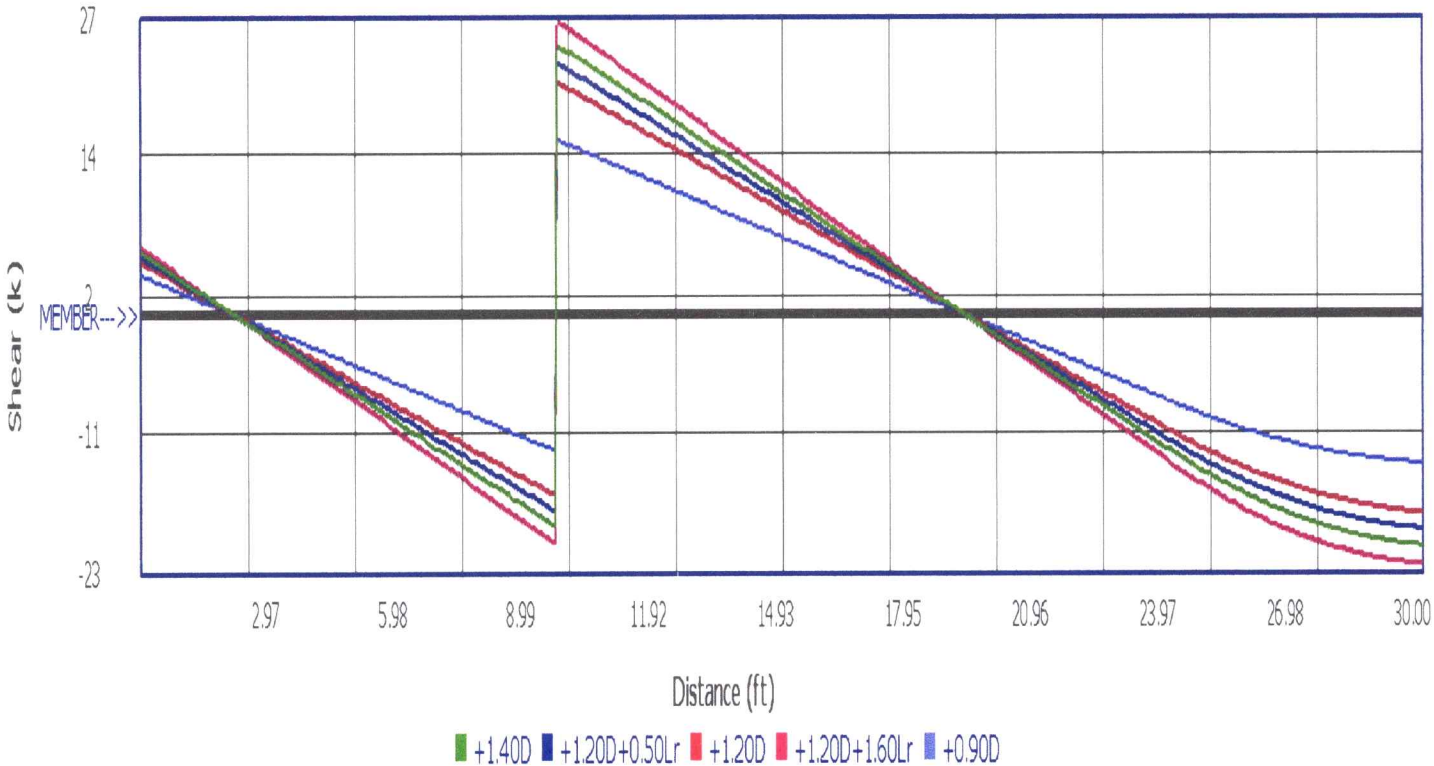
LIC# : KW-06013533, Build:20.23.05.01

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DESCRIPTION: CONCRETE BEAM (B-7) AT GARAGE



DESIGN OF PAD FOOTING 6

apply loading to Enercalc PAD design

$$P_{DL\_B7} := 31.754 \cdot k$$

$$P_{Lr\_B7} := 6.340 \cdot k$$

$$\gamma_{\text{concrete}} = 145 \frac{\text{lb}}{\text{ft}^3}$$

$$wt_{\text{column}} := \gamma_{\text{concrete}} \cdot 2.83 \cdot \text{ft} \cdot 0.67 \cdot \text{ft} \cdot 10.25 \text{ft}$$

$$wt_{\text{column}} = 2.82 \cdot k$$

$$P_{DL\_Total} := P_{DL\_B7} + wt_{\text{column}}$$

$$P_{DL\_Total} = 34.57 k$$

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: Huber & Khomiak Residence_backup_2.ec6

LIC# : KW-06013533, Build:20.23.05.01

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DESCRIPTION: PAD-6

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16

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
Add Ftg Wt for Soil Pressure	:	No
Use ftg wt for stability, moments & shears	:	No
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	3.0 ksf
Soil Density	=	110.0 pcf
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	=	2.330 ft
Allow press. increase per foot of depth when footing base is below	=	ksf ft

Increases based on footing plan dimension

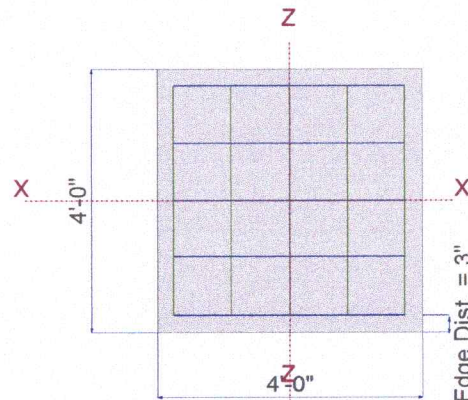
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	16.0 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



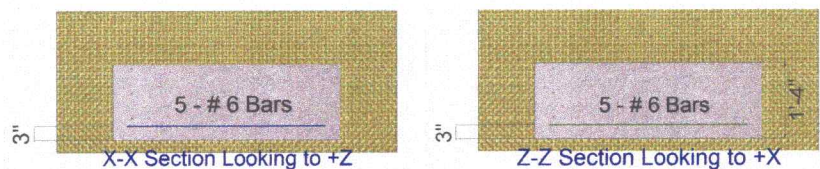
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 6
Bars parallel to Z-Z Axis	=	
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 6

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	Lr	L	S	W	E	H
P : Column Load	=	34.570	6.340				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

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LIC#: KW-06013533, Build:20.23.05.01

THM Structural Consulting

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DESCRIPTION: PAD-6

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8890	Soil Bearing	2.667 ksf	3.0 ksf	+D+Lr
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	0.2265	Z Flexure (+X)	6.985 k-ft/ft	30.840 k-ft/ft	+1.20D+1.60Lr
PASS	0.2265	Z Flexure (-X)	6.985 k-ft/ft	30.840 k-ft/ft	+1.20D+1.60Lr
PASS	0.2265	X Flexure (+Z)	6.985 k-ft/ft	30.840 k-ft/ft	+1.20D+1.60Lr
PASS	0.2265	X Flexure (-Z)	6.985 k-ft/ft	30.840 k-ft/ft	+1.20D+1.60Lr
PASS	0.2507	1-way Shear (+X)	20.598 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.2507	1-way Shear (-X)	20.598 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.2507	1-way Shear (+Z)	20.598 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.2507	1-way Shear (-Z)	20.598 psi	82.158 psi	+1.20D+1.60Lr
PASS	0.4458	2-way Punching	73.255 psi	164.317 psi	+1.20D+1.60Lr

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom Left	Top Left	Top Right	Bottom Right	
D Only								0.000
0.0 deg CCW	3.0	0.0	0.0	2.270	2.270	2.270	2.270	0.757
+D+Lr								0.000
0.0 deg CCW	3.0	0.0	0.0	2.667	2.667	2.667	2.667	0.889
+D+0.750Lr								0.000
0.0 deg CCW	3.0	0.0	0.0	2.567	2.567	2.567	2.567	0.856
+0.60D								0.000
0.0 deg CCW	3.0	0.0	0.0	1.362	1.362	1.362	1.362	0.454

Overturning Stability

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

All units k

Sliding Stability

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

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	6.611	+Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.40D	6.611	-Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D+0.50Lr	6.079	+Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D+0.50Lr	6.079	-Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D	5.667	+Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D	5.667	-Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D+1.60Lr	6.985	+Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +1.20D+1.60Lr	6.985	-Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +0.90D	4.250	+Z	Bottom	0.3456	AsMin	0.550	30.840	OK
X-X, +0.90D	4.250	-Z	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.40D	6.611	-X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.40D	6.611	+X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.20D+0.50Lr	6.079	-X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.20D+0.50Lr	6.079	+X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.20D	5.667	-X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.20D	5.667	+X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +1.20D+1.60Lr	6.985	-X	Bottom	0.3456	AsMin	0.550	30.840	OK

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

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LIC# : KW-06013533, Build:20.23.05.01

THM Structural Consulting

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DESCRIPTION: PAD-6

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
Z-Z, +1.20D+1.60Lr	6.985	+X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +0.90D	4.250	-X	Bottom	0.3456	AsMin	0.550	30.840	OK
Z-Z, +0.90D	4.250	+X	Bottom	0.3456	AsMin	0.550	30.840	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	19.49 psi	19.49 psi	19.49 psi	19.49 psi	19.49 psi	82.16 psi	0.24	OK
+1.20D+0.50Lr	17.92 psi	17.92 psi	17.92 psi	17.92 psi	17.92 psi	82.16 psi	0.22	OK
+1.20D	16.71 psi	16.71 psi	16.71 psi	16.71 psi	16.71 psi	82.16 psi	0.20	OK
+1.20D+1.60Lr	20.60 psi	20.60 psi	20.60 psi	20.60 psi	20.60 psi	82.16 psi	0.25	OK
+0.90D	12.53 psi	12.53 psi	12.53 psi	12.53 psi	12.53 psi	82.16 psi	0.15	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	69.33 psi	164.32psi	0.4219	OK
+1.20D+0.50Lr	63.75 psi	164.32psi	0.388	OK
+1.20D	59.43 psi	164.32psi	0.3617	OK
+1.20D+1.60Lr	73.26 psi	164.32psi	0.4458	OK
+0.90D	44.57 psi	164.32psi	0.2712	OK