

STRUCTURAL CALCULATIONS

(for Delta 1 Revisions (conformance to new soils report))

For

BUILDING ADDITIONS BAKER FAMILY LEARNING CENTER MUSCOY, CA

03.20.26



DCSE Associates, Inc.
(714) 997-1145

1744 West Katella Avenue, Suite 107, Orange, California 92867

www.dcseassociates.com

JLee Engineering, Inc.
Approved
By Jae Lee

04/30/2026

This set of plans and specifications MUST be kept on the job site at all times and it is unlawful to make any changes or alterations on these plans without written permission from the local Jurisdictions or Agencies. The stamping of these plan and specifications shall NOT be held to permit or be an approval of the violations of the applicable codes, any provisions of any Local Ordinances or State law.

County of San Bernardino
BUILDING AND SAFETY

THE PLANS AND DETAILS HAVE BEEN

REVIEWED

FOR CODE COMPLIANCE

THE REVIEW OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY

By 
Date **05/29/2026**

THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS

**FINAL CODE COMPLIANT
PLANS & CALCS
ADDTNR-2025-00041**





Baker Family Learning Center

Muscoy, CA

JOB NO. **25105**

BY RS

DATE 3/20/2026

SH. N -1

Delta 1 Structural Revisions

The following structural revisions are due to requirements of the recently issued soil investigation report. The report specifies that any new loading to the existing foundations be underpinned by footings. We have interpreted that to mean that new point loads be supported on underpinned pad footings. There are limited areas of new uniform loads to the existing continuous footings. Due to constructability, we have added to the sides of the existing continuous footings such that the existing soil bearing pressure is not exceeded even though without this addition, the allowable soil bearing pressure will not be exceeded.

Beam 8 (Grid 8): Additional column was added to the south end to remove some loading further south.

Beam 15 (Grid 13): Beam added to remove new loading from adjacent existing beam.

Beam 14 (Grid E.7): Beam added to support beams B-11 & B-15 off of the existing pad footing.

Beam 3B (Grid H.1): Beam calculated for added reaction from B-15.

Foundation calculation sheets F-12 through F-45: Underpin pad footing calculations.

Wood Beam

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-3B New roof beam over Children's expansion

Code References

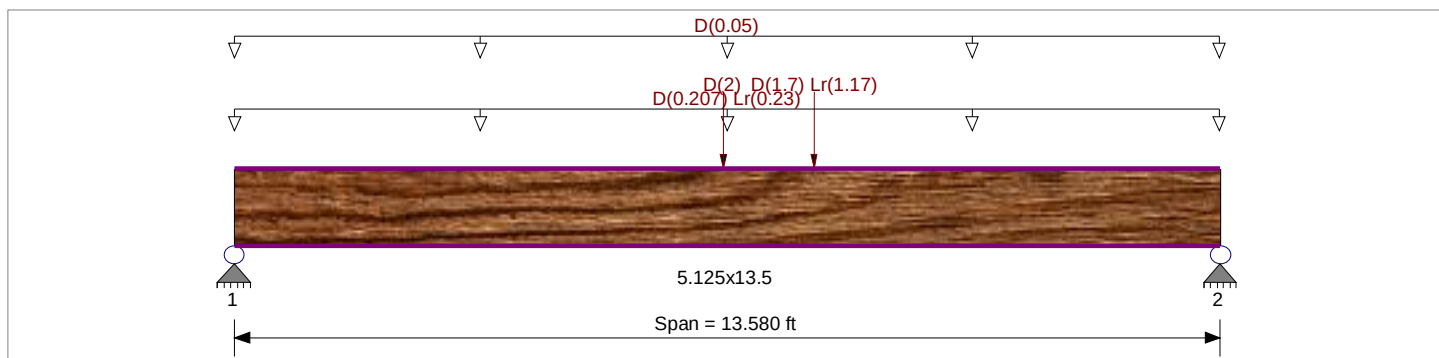
Governing Code : IBC 2021

Referenced Design Standard(s) : NDS 2018

Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination :	ASCE 7-22 / IBC 2024 (L<=100psf)	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species :	DF/DF	Fc - Perp	650.0 psi		
Wood Grade :	24F-V4	Fv	265.0 psi		
		Ft	1,100.0 psi	Density	31.210 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0180, Lr = 0.020 ksf, Tributary Width = 11.50 ft, (roof)

Point Load : D = 2.0 k @ 6.750 ft, (RTU)

Uniform Load : D = 0.010 ksf, Tributary Width = 5.0 ft, (wall)

Point Load : D = 1.70, Lr = 1.170 k @ 8.0 ft, (B-15)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.677	: 1	Maximum Shear Stress Ratio	=	0.363	: 1
Section used for this span		5.125x13.5	NDS2018	Section used for this span		5.125x13.5	NDS2018
fb: Actual	=	2,032.22 psi		fv: Actual	=	120.24 psi	
F'b	=	3,000.00 psi		F'v	=	331.25 psi	
Load Combination				Load Combination			
Location of maximum on span	=	7.137ft	+D+Lr	Location of maximum on span	=	12.490 ft	+D+Lr
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.147 in	Ratio =	1106 >=360	Span: 1 : Lr Only			
Max Upward Transient Deflection	0 in	Ratio =	0 >=360	n/a			
Max Downward Total Deflection	0.432 in	Ratio =	377 >=180	Span: 1 : +D+Lr			
Max Upward Total Deflection	0 in	Ratio =	0 >=180	n/a			

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+Lr	0.4316	6.939		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.594	6.093
Max Upward from Load Combinations	5.594	6.093



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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

8B

Printed: 20 MAR 2026, 10:52AM

Wood Beam

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-3B New roof beam over Children's expansion

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Cases	3.551	3.842
D Only	3.551	3.842
+D+Lr	5.594	6.093
+D+0.750Lr	5.083	5.531
+0.60D	2.131	2.305
Lr Only	2.042	2.251

Wood Beam

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-8 Beam betw Computer Lab & Maker Space

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : NDS 2018

Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

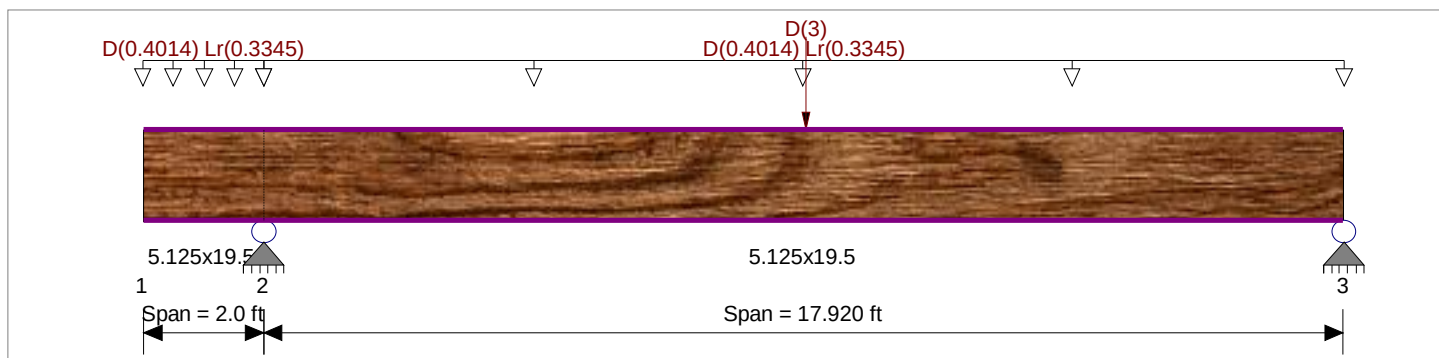
Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-22 / IBC 2024 (L<=100psf)

Wood Species : DF/DF
Wood Grade : 24F-V8

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

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	2,400.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi		
Fv	265.0 psi		
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0180, Lr = 0.0150 ksf, Tributary Width = 22.30 ft, (roof)

Load for Span Number 2

Uniform Load : D = 0.0180, Lr = 0.0150 ksf, Tributary Width = 22.30 ft, (roof)

Point Load : D = 3.0 k @ 9.0 ft, (RTU)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.548 : 1	Maximum Shear Stress Ratio	=	0.324 : 1
Section used for this span		5.125x19.5 NDS2018	Section used for this span		5.125x19.5 NDS2018
fb: Actual	=	1,591.62psi	fv: Actual	=	107.35 psi
F'b	=	2,903.51psi	F'v	=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	9.010ft	Location of maximum on span	=	2.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.133 in	Ratio = 1613 >=360	Span: 2 : Lr Only		
Max Upward Transient Deflection	-0.046 in	Ratio = 1042 >=360	Span: 1 : Lr Only		
Max Downward Total Deflection	0.412 in	Ratio = 522 >=180	Span: 2 : +D+Lr		
Max Upward Total Deflection	-0.141 in	Ratio = 340 >=180	Span: 1 : +D+Lr		

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1		0.0000	0.000	+D+Lr	-0.1406	0.000
2	+D+Lr	0.4117	9.010		0.0000	0.000



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Project Descr:

Printed: 20 MAR 2026, 10:49AM

Wood Beam

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-8 Beam betw Computer Lab & Maker Space

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		9.881	8.210
Max Upward from Load Combinations		9.881	8.210
Max Upward from Load Cases		6.177	5.250
D Only		6.177	5.250
+D+Lr		9.881	8.210
+D+0.750Lr		8.955	7.470
+0.60D		3.706	3.150
Lr Only		3.703	2.960

Wood Beam

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: B-14 Cantilever beam supporting B-11, B-15

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : NDS 2018

Load Combination Set : ASCE 7-22 / IBC 2024

Material Properties

Analysis Method : Allowable Stress Design

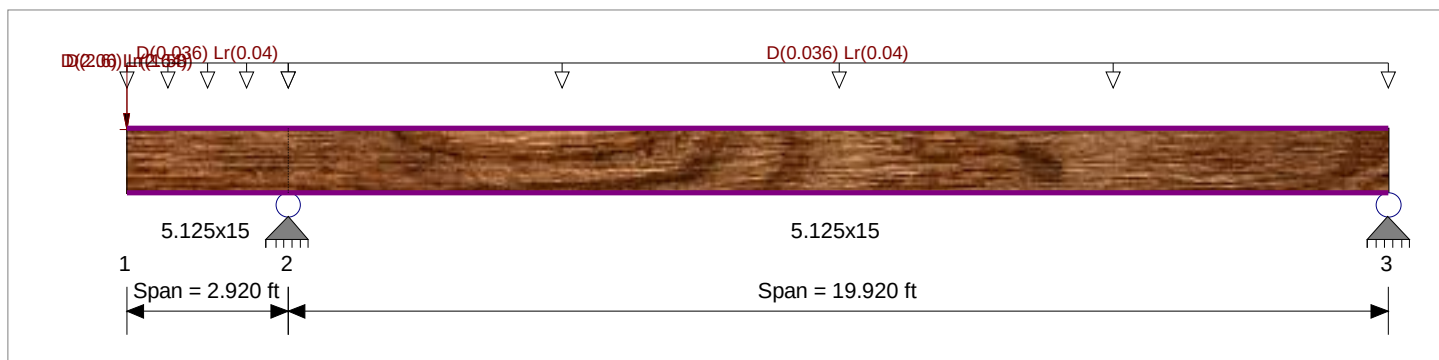
Load Combination : ASCE 7-22 / IBC 2024

Wood Species : DF/DF

Wood Grade : 24F-V8

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

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	2,400.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi		
Fv	265.0 psi		
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Point Load : D = 2.60, Lr = 2.640 k @ 0.0 ft, (B-11)

Uniform Load : D = 0.0180, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

Point Load : D = 2.060, Lr = 1.580 k @ 0.0 ft, (B-15)

Load for Span Number 2

Uniform Load : D = 0.0180, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio		=	0.557 : 1	Maximum Shear Stress Ratio		=	0.532 : 1
Section used for this span			5.125x15	Section used for this span			5.125x15
			NDS2018				NDS2018
fb: Actual	=	1,643.68psi		fv: Actual	=	176.31 psi	
F'b	=	2,949.33psi		F'v	=	331.25 psi	
Load Combination				Load Combination			
Location of maximum on span		=	0.000ft	Location of maximum on span		=	1.680 ft
Span # where maximum occurs		=	Span # 2	Span # where maximum occurs		=	Span # 1
Maximum Deflection				Maximum Deflection			
Max Downward Transient Deflection	0.185 in	Ratio =	378 >= 360	Span: 1 : Lr Only, LL Comb Run (L*)			
Max Upward Transient Deflection	-0.215 in	Ratio =	1112 >= 360	Span: 2 : Lr Only, LL Comb Run (L*)			
Max Downward Total Deflection	0.356 in	Ratio =	196 >= 180	Span: 1 : +D+Lr+H, LL Comb Run (L*)			
Max Upward Total Deflection	-0.383 in	Ratio =	624 >= 180	Span: 2 : +D+Lr+H, LL Comb Run (L*)			

Overall Maximum Deflections

Span	Load Combination	Max. "+" Defl	Location in Span	Load Combination	Max. "-" Defl	Location in Span
1	+D+Lr+H, LL Comb Run (L*)	0.3561	0.000		0.0000	0.000
2		0.0000	0.000	+D+Lr+H, LL Comb Run (L*)	-0.3827	8.124

Wood Beam

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: B-14 Cantilever beam supporting B-11, B-15

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		11.395	0.398
Max Upward from Load Combinations		11.395	0.229
Max Upward from Load Cases		6.033	0.398
Max Downward from all Load Conditions (Resisting Uplift)			-0.797
Max Downward from Load Combinations (Resisting Uplift)			-0.797
Max Downward from Load Cases (Resisting Uplift)			-0.627
+D+H		6.033	-0.170
+D+L+H, LL Comb Run (*L)		6.033	-0.170
+D+L+H, LL Comb Run (L*)		6.033	-0.170
+D+L+H, LL Comb Run (LL)		6.033	-0.170
+D+Lr+H, LL Comb Run (*L)		6.431	0.229
+D+Lr+H, LL Comb Run (L*)		10.997	-0.797
+D+Lr+H, LL Comb Run (LL)		11.395	-0.399
+D+0.70S+H		6.033	-0.170
+D+0.750Lr+0.750L+H, LL Comb Run (*L)		6.331	0.129
+D+0.750Lr+0.750L+H, LL Comb Run (L*)		9.756	-0.640
+D+0.750Lr+0.750L+H, LL Comb Run (LL)		10.054	-0.341
+D+0.750L+0.5250S+H, LL Comb Run (*L)		6.033	-0.170
+D+0.750L+0.5250S+H, LL Comb Run (L*)		6.033	-0.170
+D+0.750L+0.5250S+H, LL Comb Run (LL)		6.033	-0.170
+D+0.60W+H		6.033	-0.170
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L)		6.331	0.129
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (L*)		9.756	-0.640
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (LL)		10.054	-0.341
+D+0.750L+0.5250S+0.450W+H, LL Comb Run (*L)		6.033	-0.170
+D+0.750L+0.5250S+0.450W+H, LL Comb Run (L*)		6.033	-0.170
+D+0.750L+0.5250S+0.450W+H, LL Comb Run (LL)		6.033	-0.170
+0.60D+0.60W+0.60H		3.620	-0.102
+D+0.70E+H		6.033	-0.170
+D+0.750L+0.10S+0.5250E+H, LL Comb Run (*L)		6.033	-0.170
+D+0.750L+0.10S+0.5250E+H, LL Comb Run (L*)		6.033	-0.170
+D+0.750L+0.10S+0.5250E+H, LL Comb Run (LL)		6.033	-0.170
+0.60D+0.70E+0.60H		3.620	-0.102
D Only		6.033	-0.170
Lr Only, LL Comb Run (*L)		0.398	0.398
Lr Only, LL Comb Run (L*)		4.964	-0.627
Lr Only, LL Comb Run (LL)		5.362	-0.229
H Only			

Wood Beam

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-15 New beam along Grid 13

Code References

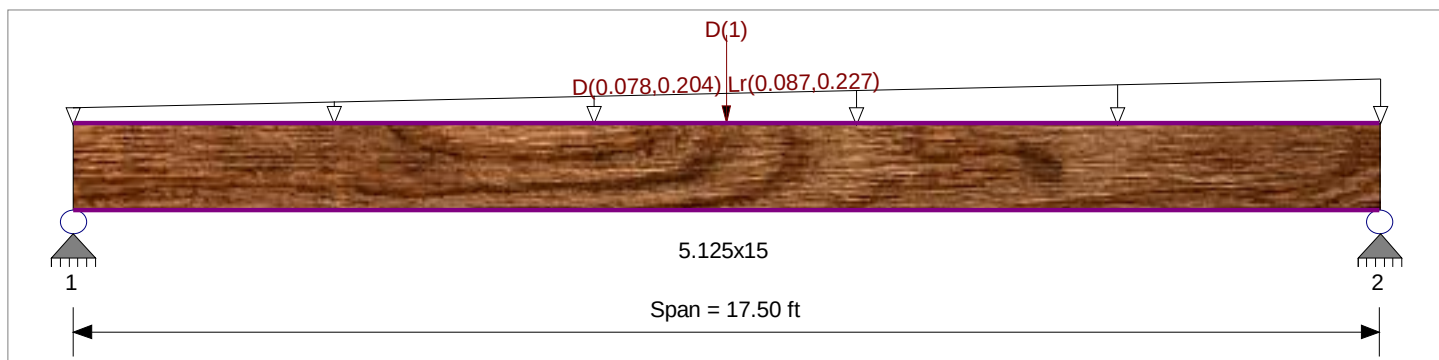
Governing Code : IBC 2021

Referenced Design Standard(s) : NDS 2018

Load Combination Set : ASCE 7-22 / IBC 2024 (L<=100psf)

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination :	ASCE 7-22 / IBC 2024 (L<=100psf)	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species :	DF/DF	Fc - Perp	650.0 psi		
Wood Grade :	24F-V4	Fv	265.0 psi		
		Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Varying Uniform Load : D= 0.0780->0.2040, Lr= 0.0870->0.2270 k/ft, Extent = 0.0 --> 17.50 ft, Trib Width = 1.0 ft, (low roof)

Point Load : D = 1.0 k @ 8.750 ft, (mech)

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.343	: 1	Maximum Shear Stress Ratio	=	0.183	: 1
Section used for this span		5.125x15	NDS2018	Section used for this span		5.125x15	NDS2018
fb: Actual	=	1,025.29psi		fv: Actual	=	60.67 psi	
F'b	=	2,987.78psi		F'v	=	331.25 psi	
Load Combination		+D+Lr		Load Combination		+D+Lr	
Location of maximum on span	=	8.750ft		Location of maximum on span	=	16.286 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.128 in	Ratio =	1634 >=360	Span: 1 : Lr Only			
Max Upward Transient Deflection	0 in	Ratio =	0 >=360	n/a			
Max Downward Total Deflection	0.332 in	Ratio =	632 >=180	Span: 1 : +D+Lr			
Max Upward Total Deflection	0 in	Ratio =	0 >=180	n/a			

Overall Maximum Deflections

Span	Load Combination	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+Lr	0.3322	8.878		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.865	3.641
Max Upward from Load Combinations	2.865	3.641



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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

24H

Printed: 20 MAR 2026, 10:56AM

Wood Beam

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: B-15 New beam along Grid 13

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Cases	1.696	2.063
D Only	1.696	2.063
+D+Lr	2.865	3.641
+D+0.750Lr	2.573	3.247
+0.60D	1.017	1.238
Lr Only	1.170	1.578

Steel Column

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: For B-8, south end

Extreme Reactions

Item	Extreme Value	Axial (k)	Rx (k)		Ry (k)		Mx (k-ft)		My (k-ft)	
		@ Base	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
Axial, Base Min		3.700								
Rx, Base Max			-0.093							
Rx, Base Min			-0.247							
Rx, Top Max				0.247						
Rx, Top Min				0.092						
Ry, Base Max										
Ry, Base Min										
Ry, Top Max										
Ry, Top Min										

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir		Distance	Max. Deflection in Y dir		Distance
D Only	0.1257	in	8.758 ft	0.000	in	0.000 ft
+D+Lr	0.2009	in	8.758 ft	0.000	in	0.000 ft
+D+0.750Lr	0.1821	in	8.758 ft	0.000	in	0.000 ft
+0.60D	0.0754	in	8.758 ft	0.000	in	0.000 ft
Lr Only	0.0752	in	8.758 ft	0.000	in	0.000 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000	in	I xx	=	16.00	in^4	J	=	25.800	in^4
Design Thick	=	0.233	in	S xx	=	6.41	in^3				
Width	=	5.000	in	R xx	=	1.930	in				
Wall Thick	=	0.250	in	Zx	=	7.610	in^3				
Area	=	4.300	in^2	I yy	=	16.000	in^4	C	=	10.500	in^3
Weight	=	15.620	plf	S yy	=	6.410	in^3				
				R yy	=	1.930	in				
Ycg	=	0.000	in								

Steel Column

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

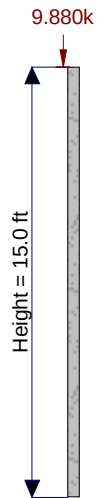
DALE CHRISTIAN, S.E. INC.

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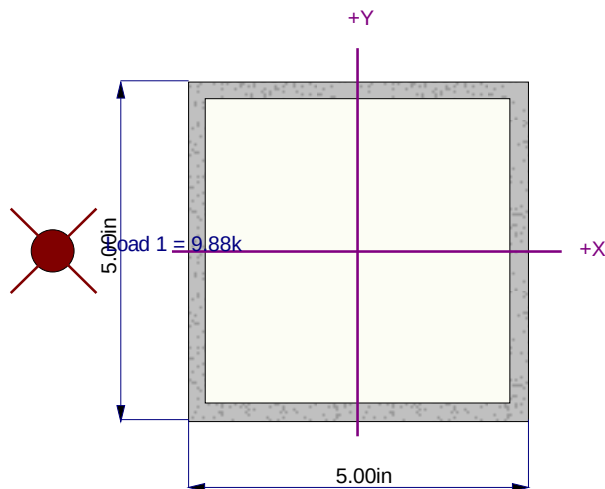
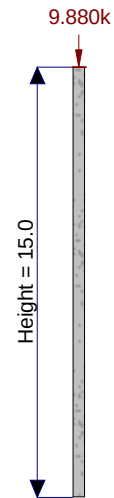
DESCRIPTION: For B-8, south end

Sketches

My Loads - Looking along Y-Y Axis



Mx Loads - Looking along X-X Axis



Steel Column

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: for B-14

Extreme Reactions

Item	Extreme Value	Axial (k)	Rx (k)		Ry (k)		Mx (k-ft)		My (k-ft)	
		@ Base	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
Axial, Base Min		3.717								
Rx, Base Max										
Rx, Base Min										
Rx, Top Max										
Rx, Top Min										
Ry, Base Max					0.141					
Ry, Base Min					0.045					
Ry, Top Max						-0.045				
Ry, Top Min						-0.141				

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	-0.091 in	7.883 ft
+D+Lr	0.0000 in	0.000 ft	-0.171 in	7.883 ft
+D+0.750Lr	0.0000 in	0.000 ft	-0.151 in	7.883 ft
+0.60D	0.0000 in	0.000 ft	-0.054 in	7.883 ft
Lr Only	0.0000 in	0.000 ft	-0.080 in	7.883 ft

Steel Section Properties : HSS4x4x1/4

Depth	=	4.000 in	I xx	=	7.80 in^4	J	=	12.800 in^4
Design Thick	=	0.233 in	S xx	=	3.90 in^3			
Width	=	4.000 in	R xx	=	1.520 in			
Wall Thick	=	0.250 in	Zx	=	4.690 in^3			
Area	=	3.370 in^2	I yy	=	7.800 in^4	C	=	6.560 in^3
Weight	=	12.210 plf	S yy	=	3.900 in^3			
			R yy	=	1.520 in			
Ycg	=	0.000 in						

Steel Column

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

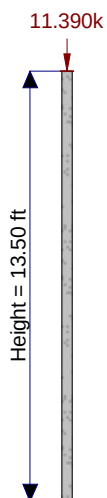
DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

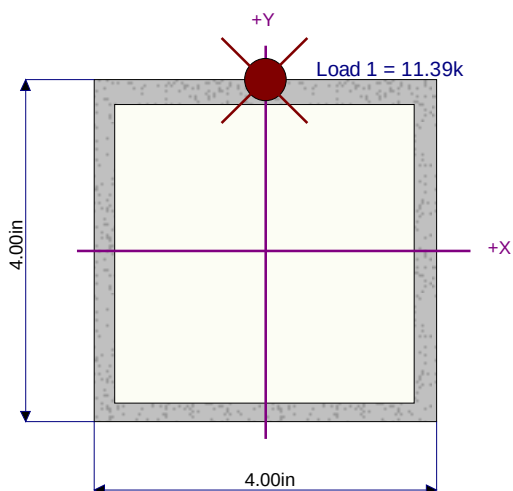
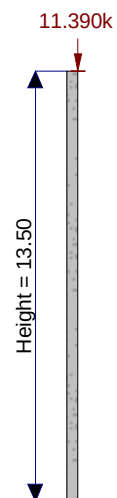
DESCRIPTION: for B-14

Sketches

My Loads - Looking along Y-Y Axis



Mx Loads - Looking along X-X Axis



PAD FOOTINGS UNDERPINNING EXISTING CONTINUOUS FOOTINGS.
ALLOWABLE SOIL BEARING = 2000 PSF @ 12" DEPTH.

GRID 7/C

	INT. WALL	EXT. WALL	D	Lr
	(6 PSF x 16' + 17 PSF x 4')		2' = 328 #	
		B-9	1200 #	1240 #
	150 PCF (1' x 0.625')		2' = 188 #	1240 # Lr
	EX. FTG ABN SOIL		1716 #	

USE 24" WIDE x 30" LONG PAD FTG.
W/ (4) #4 LONG & (4) #4 SHORT.
SEE CALC. NEXT PAGE

GRID 8/C

	D	Lr
(6 PSF x 16.5' + 17 PSF x 5.5')	2.5' = 481	
	B-10 + B-9	1600
150 PCF (1' x 0.625')	2.5' = 234	
	3665 #	1600 #

USE 30" WIDE x 36" LONG PAD FTG.
W/ (3) #4 LONG & (4) #4 SHORT
SEE CALC PG. F-16

GRID 9/A

(6 PSF x 16.5' + 17 PSF x 5.5')	2.75' = 530	
	B-7	2720
150 PCF (1' x 0.625')	2.75' = 259	
	7379 #	2720 #

USE 2'-9" WIDE x 3'-6" LONG W/
(4) #4 LONG, (5) #4 SHORT, SEE PG. F-19

GRID 11/A

(6 PSF x 16.5' + 17 PSF x 5.5')	3' = 578	
	B-7	4810
150 PCF (1' x 0.625')	3' = 281	
	11299	4810

USE 3'-0" SQ W/ (4) #4 ELW
SEE PG. F-22

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin Ftg for B-9 (mark UB)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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
---	---	--------

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	12.0 in

Load location offset from footing center...

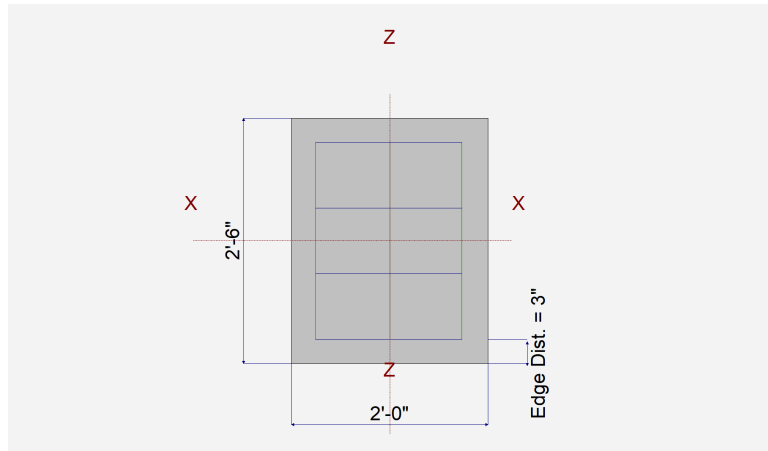
ez : Prll to Z-Z Axis	=	-9 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

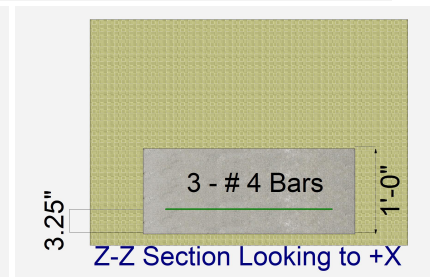
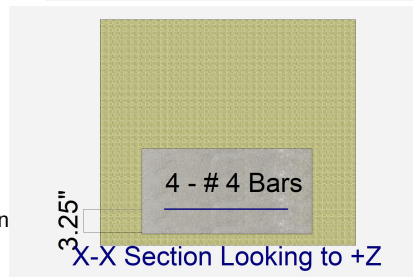
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Bars along X-X Axis
# Bars required within zone	88.9 %
# Bars required on each side of zone	11.1 %



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis (resisting X Flexure)			
Number of Bars	=		3.0
Reinforcing Bar Size	=	#	4
Rebar Centerline to Edge of Concrete...			
at Bottom of footing	=		3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin Ftg for B-9 (mark UB)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	1.773	1.240	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9650	Soil Bearing	1.930 ksf	2.0 ksf	+D+Lr about X-X 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 0.03385	Z Flexure (+X) Bot Tens	0.4112 k-ft/ft	12.148 k-ft/ft	+1.20D+1.60Lr
PASS 0.03385	Z Flexure (-X) Bot Tens	0.4112 k-ft/ft	12.148 k-ft/ft	+1.20D+1.60Lr
PASS 0.810	Min Steel X Flexure Bottom	0.259 in2/ft	0.320 in2/ft	n/a
PASS 0.02402	X Flexure (+Z) Bot Tens	0.2742 k-ft/ft	11.415 k-ft/ft	+1.20D+1.60Lr
PASS 0.02402	X Flexure (-Z) Bot Tens	0.2741 k-ft/ft	11.415 k-ft/ft	+1.20D+1.60Lr
PASS 0.864	Min Steel Z Flexure Bottom	0.259 in2/ft	0.300 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.04602	1-way Shear (+X)	2.193 psi	47.647 psi	+1.20D+1.60Lr
PASS 0.04602	1-way Shear (-X)	2.193 psi	47.647 psi	+1.20D+1.60Lr
PASS 0.01958	1-way Shear (+Z)	0.9132 psi	46.633 psi	+1.20D+1.60Lr
PASS n/a	1-way Shear (-Z)	0.0 psi	46.633 psi	n/a
PASS 0.07288	2-way Punching	11.976 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-5.887	1.183	0.0	n/a	n/a	0.592
X-X, +D+Lr	2.0	n/a	-6.864	1.930	0.0	n/a	n/a	0.965
X-X, +D+0.750Lr	2.0	n/a	-6.682	1.740	0.0	n/a	n/a	0.870
X-X, +0.60D	2.0	n/a	-5.887	0.7099	0.0	n/a	n/a	0.355
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.5421	0.5421	0.271
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	0.7901	0.7901	0.395
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	0.7281	0.7281	0.364
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.3253	0.3253	0.163

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-9 (mark UB)

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	0.1602	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.40D	0.1601	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D+0.50Lr	0.1793	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D+0.50Lr	0.1792	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D	0.1373	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D	0.1373	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D+1.60Lr	0.2742	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +1.20D+1.60Lr	0.2741	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +0.90D	0.1030	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
X-X, +0.90D	0.1029	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.415	OK
Z-Z, +1.40D	0.2482	-X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.40D	0.2482	+X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D+0.50Lr	0.2748	-X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D+0.50Lr	0.2748	+X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D	0.2128	-X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D	0.2128	+X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D+1.60Lr	0.4112	-X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.20D+1.60Lr	0.4112	+X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +0.90D	0.1596	-X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +0.90D	0.1596	+X	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.32 psi	1.32 psi	1.32 psi	47.65 psi	0.03	OK
+1.20D+0.50Lr	1.47 psi	1.47 psi	1.47 psi	47.65 psi	0.03	OK
+1.20D	1.14 psi	1.14 psi	1.14 psi	47.65 psi	0.02	OK
+1.20D+1.60Lr	2.19 psi	2.19 psi	2.19 psi	47.65 psi	0.05	OK
+0.90D	0.85 psi	0.85 psi	0.85 psi	47.65 psi	0.02	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.67 psi	0.67 psi	46.63 psi	0.01	OK
+1.20D+0.50Lr	0.00 psi	0.70 psi	0.70 psi	46.63 psi	0.01	OK
+1.20D	0.00 psi	0.58 psi	0.58 psi	46.63 psi	0.01	OK
+1.20D+1.60Lr	0.00 psi	0.91 psi	0.91 psi	46.63 psi	0.02	OK
+0.90D	0.00 psi	0.43 psi	0.43 psi	46.63 psi	0.01	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	7.23 psi	164.32 psi	0.04	OK
+1.20D+0.50Lr	8.00 psi	164.32 psi	0.05	OK
+1.20D	6.20 psi	164.32 psi	0.04	OK
+1.20D+1.60Lr	11.98 psi	164.32 psi	0.07	OK
+0.90D	4.65 psi	164.32 psi	0.03	OK

All units k

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-9 & B-10 (mark UC)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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	=	2.50 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Load location offset from footing center...

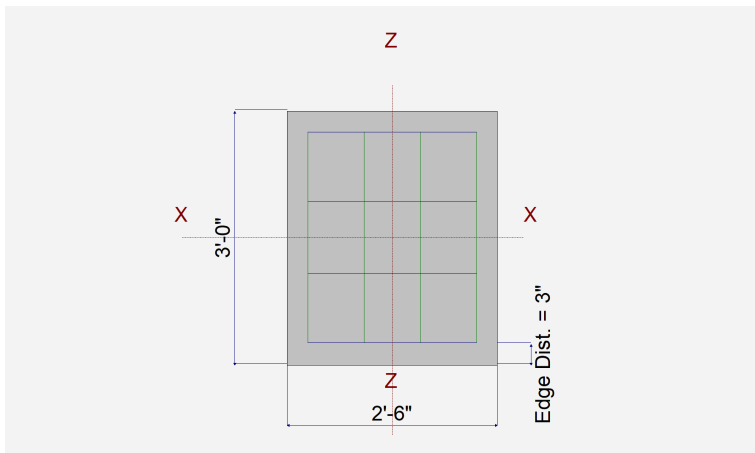
ez : Prll to Z-Z Axis	=	-9 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

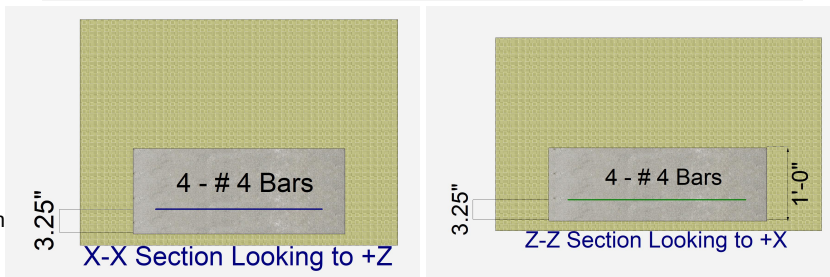
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Bars along X-X Axis
# Bars required within zone	90.9 %
# Bars required on each side of zone	9.1 %



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis (resisting X Flexure)			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Rebar Centerline to Edge of Concrete...			
at Bottom of footing	=		3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-9 & B-10 (mark UC)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	3.665	1.600	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9740	Soil Bearing	1.948 ksf	2.0 ksf	+D+Lr about X-X 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 0.07115	Z Flexure (+X) Bot Tens	0.7248 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.07115	Z Flexure (-X) Bot Tens	0.7248 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel X Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.04880	X Flexure (+Z) Bot Tens	0.5929 k-ft/ft	12.148 k-ft/ft	+1.20D+1.60Lr
PASS 0.04880	X Flexure (-Z) Bot Tens	0.5928 k-ft/ft	12.148 k-ft/ft	+1.20D+1.60Lr
PASS 0.810	Min Steel Z Flexure Bottom	0.259 in2/ft	0.320 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.1035	1-way Shear (+X)	4.639 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1035	1-way Shear (-X)	4.639 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.07326	1-way Shear (+Z)	3.490 psi	47.647 psi	+1.20D+1.60Lr
PASS 0.01399	1-way Shear (-Z)	0.6665 psi	47.647 psi	+1.20D+1.60Lr
PASS 0.1283	2-way Punching	21.084 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-6.504	1.404	0.0	n/a	n/a	0.702
X-X, +D+Lr	2.0	n/a	-7.103	1.948	0.0	n/a	n/a	0.974
X-X, +D+0.750Lr	2.0	n/a	-6.982	1.811	0.0	n/a	n/a	0.906
X-X, +0.60D	2.0	n/a	-6.504	0.8426	0.0	n/a	n/a	0.421
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.6762	0.6762	0.338
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	0.8895	0.8895	0.445
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	0.8362	0.8362	0.418
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.4057	0.4057	0.203

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-9 & B-10 (mark UC)

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	0.4337	+Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.40D	0.4336	-Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D+0.50Lr	0.4404	+Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D+0.50Lr	0.4403	-Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D	0.3718	+Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D	0.3717	-Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D+1.60Lr	0.5929	+Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +1.20D+1.60Lr	0.5928	-Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +0.90D	0.2788	+Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
X-X, +0.90D	0.2788	-Z	Bottom	0.2592	ACI 7.6.1.1	0.320	12.148	OK
Z-Z, +1.40D	0.5345	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	0.5345	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.5415	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.5415	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.4581	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.4581	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	0.7248	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	0.7248	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.3436	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.3436	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.42 psi	3.42 psi	3.42 psi	44.84 psi	0.08	OK
+1.20D+0.50Lr	3.47 psi	3.47 psi	3.47 psi	44.84 psi	0.08	OK
+1.20D	2.93 psi	2.93 psi	2.93 psi	44.84 psi	0.07	OK
+1.20D+1.60Lr	4.64 psi	4.64 psi	4.64 psi	44.84 psi	0.10	OK
+0.90D	2.20 psi	2.20 psi	2.20 psi	44.84 psi	0.05	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.49 psi	2.63 psi	2.63 psi	47.65 psi	0.06	OK
+1.20D+0.50Lr	0.49 psi	2.65 psi	2.65 psi	47.65 psi	0.06	OK
+1.20D	0.42 psi	2.25 psi	2.25 psi	47.65 psi	0.05	OK
+1.20D+1.60Lr	0.67 psi	3.49 psi	3.49 psi	47.65 psi	0.07	OK
+0.90D	0.31 psi	1.69 psi	1.69 psi	47.65 psi	0.04	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	15.55 psi	164.32 psi	0.09	OK
+1.20D+0.50Lr	15.75 psi	164.32 psi	0.10	OK
+1.20D	13.33 psi	164.32 psi	0.08	OK
+1.20D+1.60Lr	21.08 psi	164.32 psi	0.13	OK
+0.90D	10.00 psi	164.32 psi	0.06	OK

All units k

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (LEFT END) (mark UD)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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
---	---	-----

Dimensions

Width parallel to X-X Axis	=	2.750 ft
Length parallel to Z-Z Axis	=	3.50 ft
Footing Thickness	=	12.0 in

Load location offset from footing center...

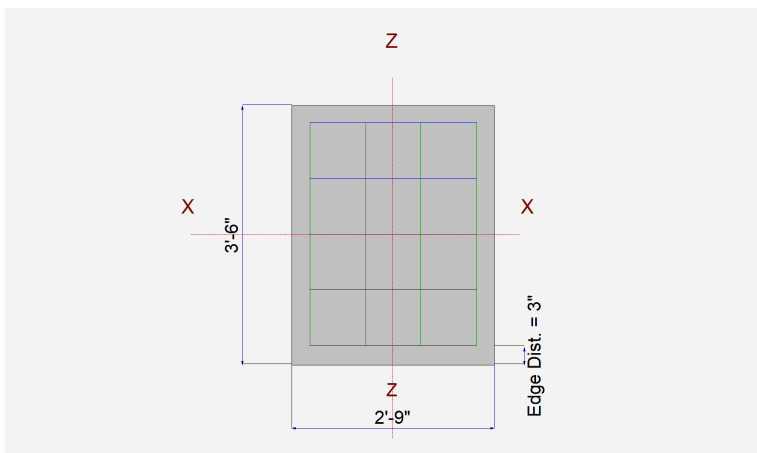
ez : Prll to Z-Z Axis	=	-5 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

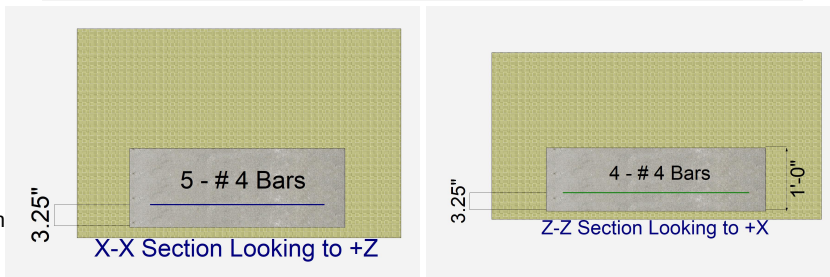
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Bars along X-X Axis
# Bars required within zone	88.0 %
# Bars required on each side of zone	12.0 %



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)			
Number of Bars	=		5.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis (resisting X Flexure)			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Rebar Centerline to Edge of Concrete...			
at Bottom of footing	=		3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (LEFT END) (mark UD)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	7.379	2.720	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9895	Soil Bearing	1.979 ksf	2.0 ksf	+D+Lr about X-X 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 0.1191	Z Flexure (+X) Bot Tens	1.297 k-ft/ft	10.890 k-ft/ft	+1.20D+1.60Lr
PASS 0.1191	Z Flexure (-X) Bot Tens	1.297 k-ft/ft	10.890 k-ft/ft	+1.20D+1.60Lr
PASS 0.907	Min Steel X Flexure Bottom	0.259 in2/ft	0.286 in2/ft	n/a
PASS 0.1687	X Flexure (+Z) Bot Tens	1.870 k-ft/ft	11.081 k-ft/ft	+1.20D+1.60Lr
PASS 0.1687	X Flexure (-Z) Bot Tens	1.870 k-ft/ft	11.081 k-ft/ft	+1.20D+1.60Lr
PASS 0.891	Min Steel Z Flexure Bottom	0.259 in2/ft	0.291 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.1802	1-way Shear (+X)	8.265 psi	45.880 psi	+1.20D+1.60Lr
PASS 0.1802	1-way Shear (-X)	8.265 psi	45.880 psi	+1.20D+1.60Lr
PASS 0.2351	1-way Shear (+Z)	10.850 psi	46.157 psi	+1.20D+1.60Lr
PASS 0.2683	1-way Shear (-Z)	12.385 psi	46.157 psi	+1.20D+1.60Lr
PASS 0.2481	2-way Punching	40.770 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-4.017	1.496	0.4120	n/a	n/a	0.748
X-X, +D+Lr	2.0	n/a	-4.242	1.979	0.4948	n/a	n/a	0.990
X-X, +D+0.750Lr	2.0	n/a	-4.196	1.858	0.4741	n/a	n/a	0.929
X-X, +0.60D	2.0	n/a	-4.017	0.8978	0.2472	n/a	n/a	0.449
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.9541	0.9541	0.477
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	1.237	1.237	0.619
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	1.166	1.166	0.583
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.5725	0.5725	0.286

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (LEFT END) (mark UD)

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	1.463	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.40D	1.462	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D+0.50Lr	1.446	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D+0.50Lr	1.446	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D	1.254	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D	1.253	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D+1.60Lr	1.870	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +1.20D+1.60Lr	1.870	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +0.90D	0.9402	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
X-X, +0.90D	0.9401	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2909	11.081	OK
Z-Z, +1.40D	1.015	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.40D	1.015	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D+0.50Lr	1.003	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D+0.50Lr	1.003	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D	0.8697	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D	0.8697	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D+1.60Lr	1.297	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +1.20D+1.60Lr	1.297	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +0.90D	0.6523	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK
Z-Z, +0.90D	0.6523	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	10.890	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	6.47 psi	6.47 psi	6.47 psi	45.88 psi	0.14	OK
+1.20D+0.50Lr	6.39 psi	6.39 psi	6.39 psi	45.88 psi	0.14	OK
+1.20D	5.54 psi	5.54 psi	5.54 psi	45.88 psi	0.12	OK
+1.20D+1.60Lr	8.27 psi	8.27 psi	8.27 psi	45.88 psi	0.18	OK
+0.90D	4.16 psi	4.16 psi	4.16 psi	45.88 psi	0.09	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	9.69 psi	8.49 psi	9.69 psi	46.16 psi	0.21	OK
+1.20D+0.50Lr	9.58 psi	8.39 psi	9.58 psi	46.16 psi	0.21	OK
+1.20D	8.30 psi	7.27 psi	8.30 psi	46.16 psi	0.18	OK
+1.20D+1.60Lr	12.39 psi	10.85 psi	12.39 psi	46.16 psi	0.27	OK
+0.90D	6.23 psi	5.46 psi	6.23 psi	46.16 psi	0.13	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	31.89 psi	164.32 psi	0.19	OK
+1.20D+0.50Lr	31.53 psi	164.32 psi	0.19	OK
+1.20D	27.34 psi	164.32 psi	0.17	OK
+1.20D+1.60Lr	40.77 psi	164.32 psi	0.25	OK
+0.90D	20.50 psi	164.32 psi	0.12	OK

All units k

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (RIGHT END) (mark UE)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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

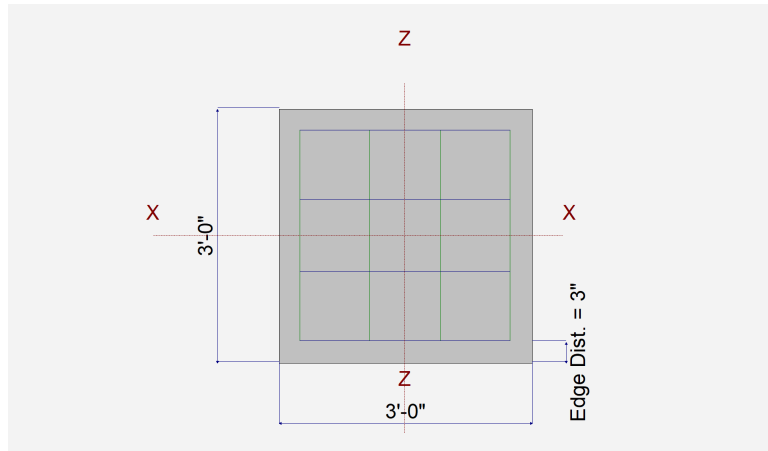
Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

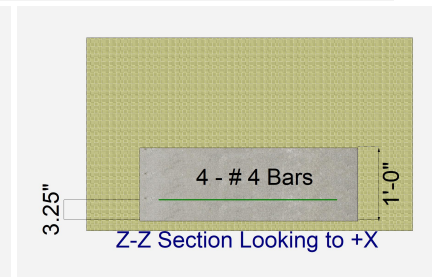
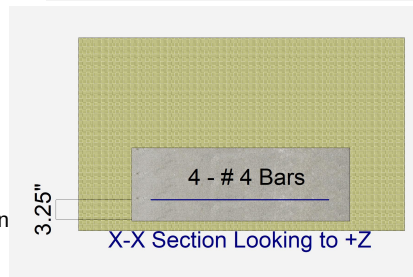
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis (resisting X Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (RIGHT END) (mark UE)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	11.299	4.810	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9885 Soil Bearing	1.977 ksf	2.0 ksf	+D+Lr 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	0.2608 Z Flexure (+X) Bot Tens	2.657 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS	0.2608 Z Flexure (-X) Bot Tens	2.657 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS	0.972 Min Steel X Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS	0.2608 X Flexure (+Z) Bot Tens	2.657 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS	0.2608 X Flexure (-Z) Bot Tens	2.657 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS	0.972 Min Steel Z Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS	0.0 Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0 Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000 Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.0 X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0 X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000 Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.3913 1-way Shear (+X)	17.544 psi	44.837 psi	+1.20D+1.60Lr
PASS	0.3913 1-way Shear (-X)	17.544 psi	44.837 psi	+1.20D+1.60Lr
PASS	0.3913 1-way Shear (+Z)	17.544 psi	44.837 psi	+1.20D+1.60Lr
PASS	0.3913 1-way Shear (-Z)	17.544 psi	44.837 psi	+1.20D+1.60Lr
PASS	0.3980 2-way Punching	65.406 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.443	1.443	n/a	n/a	0.722
X-X, +D+Lr	2.0	n/a	0.0	1.977	1.977	n/a	n/a	0.989
X-X, +D+0.750Lr	2.0	n/a	0.0	1.844	1.844	n/a	n/a	0.922
X-X, +0.60D	2.0	n/a	0.0	0.8658	0.8658	n/a	n/a	0.433
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.443	1.443	0.722
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	1.977	1.977	0.989
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	1.844	1.844	0.922
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.8658	0.8658	0.433

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				

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-7 (RIGHT END) (mark UE)

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	1.977	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.40D	1.977	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	1.995	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	1.995	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	1.695	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	1.695	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	2.657	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	2.657	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	1.271	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	1.271	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	1.977	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	1.977	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	1.995	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	1.995	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	1.695	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	1.695	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	2.657	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	2.657	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	1.271	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	1.271	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	13.06 psi	13.06 psi	13.06 psi	44.84 psi	0.29	OK
+1.20D+0.50Lr	13.18 psi	13.18 psi	13.18 psi	44.84 psi	0.29	OK
+1.20D	11.19 psi	11.19 psi	11.19 psi	44.84 psi	0.25	OK
+1.20D+1.60Lr	17.54 psi	17.54 psi	17.54 psi	44.84 psi	0.39	OK
+0.90D	8.39 psi	8.39 psi	8.39 psi	44.84 psi	0.19	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	13.06 psi	13.06 psi	13.06 psi	44.84 psi	0.29	OK
+1.20D+0.50Lr	13.18 psi	13.18 psi	13.18 psi	44.84 psi	0.29	OK
+1.20D	11.19 psi	11.19 psi	11.19 psi	44.84 psi	0.25	OK
+1.20D+1.60Lr	17.54 psi	17.54 psi	17.54 psi	44.84 psi	0.39	OK
+0.90D	8.39 psi	8.39 psi	8.39 psi	44.84 psi	0.19	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	48.68 psi	164.32 psi	0.30	OK
+1.20D+0.50Lr	49.12 psi	164.32 psi	0.30	OK
+1.20D	41.72 psi	164.32 psi	0.25	OK
+1.20D+1.60Lr	65.41 psi	164.32 psi	0.40	OK
+0.90D	31.29 psi	164.32 psi	0.19	OK

All units k

GRID 13/D.5

(17 psf x 22') 3'

EXT. WALL

150 pcf (1' x 0.625') 3'

EXT. FTG. ABV. SOIL

	$\frac{D}{= 1122 \#}$	$\frac{Lr}{= 2650}$
B-11	$= 2600$	$= 2650$
	$= 282$	
	$\frac{4004 \#}{}$	$\frac{2650 \#}{}$

USE 36" SQ PAD FTG W/ (4) #4 EA. WAY
SEE CALC PG. F-26

GRID E.7 EAST OF 13

(6 psf x 13') 2'

150 pcf (1' x 0.625') 2'

	$= 156 \#$	
B-14	$= 5890$	$= 5230$
	$= 188$	
	$\frac{6234 \#}{}$	$\frac{5230 \#}{}$

USE 2' WIDE x 2.3" LONG PAD FTG W/
(3) #4 EA. WAY
SEE CALC. PG. F-29

GRID 14/H.1

(17 psf x 16') 3'

150 pcf (1' x 0.625') 3'

	$= 816 \#$	
B-3B	$= 3840$	$= 2250$
	$= 282$	
	$\frac{4938 \#}{}$	$\frac{2250 \#}{}$

USE 36" SQ PAD FTG W/ (4) #4 EA. WAY
SEE CALC PG. F-32

GRID H.1 WEST OF 13

B-3 x 2 BEAMS

$= 6480 \#$	$= 3800 \#$
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USE 5' WIDE x 3' LONG PAD FTG W/
(4) #4 LONG & (1) #4 SHORT.
SEE CALC PG. F-35

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-11 (mark UE)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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
---	---	--------

Dimensions

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

Load location offset from footing center...

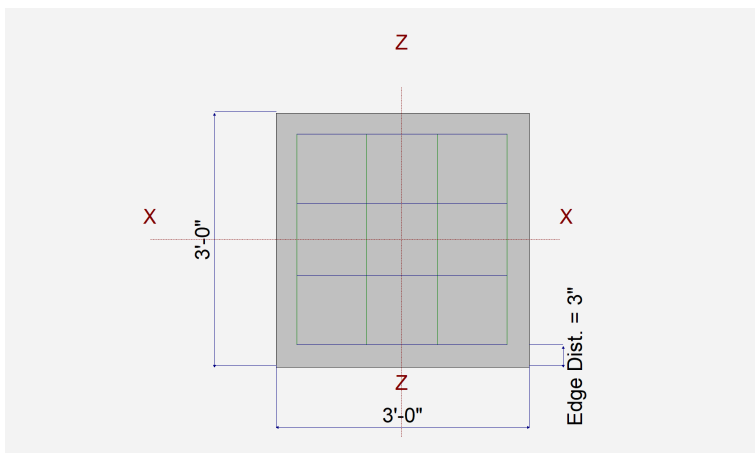
ez : Prll to Z-Z Axis	=	-8 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

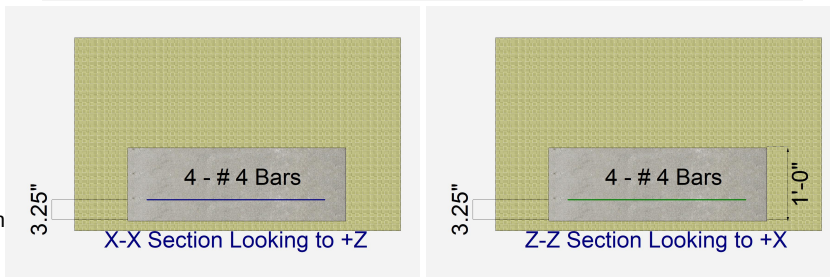
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis (resisting X Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-11 (mark UE)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	4.004	2.650	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9525	Soil Bearing	1.905 ksf	2.0 ksf	+D+Lr about X-X 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 0.1110	Z Flexure (+X) Bot Tens	1.131 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.1110	Z Flexure (-X) Bot Tens	1.131 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel X Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.07159	X Flexure (+Z) Bot Tens	0.7293 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.07159	X Flexure (-Z) Bot Tens	0.7292 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel Z Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.1665	1-way Shear (+X)	7.466 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1665	1-way Shear (-X)	7.466 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.09389	1-way Shear (+Z)	4.210 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.04415	1-way Shear (-Z)	1.980 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1694	2-way Punching	27.833 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-5.628	1.220	0.04514	n/a	n/a	0.610
X-X, +D+Lr	2.0	n/a	-6.382	1.905	0.0	n/a	n/a	0.953
X-X, +D+0.750Lr	2.0	n/a	-6.242	1.733	0.0	n/a	n/a	0.867
X-X, +0.60D	2.0	n/a	-5.628	0.7318	0.02708	n/a	n/a	0.366
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.6324	0.6324	0.316
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	0.9268	0.9268	0.463
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	0.8532	0.8532	0.427
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.3794	0.3794	0.190

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-11 (mark UE)

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	0.4513	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.40D	0.4512	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.4935	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.4934	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.3868	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.3867	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	0.7293	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	0.7292	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.2901	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.290	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	0.7007	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	0.7007	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.7662	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.7662	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.6006	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.6006	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	1.131	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	1.131	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.4505	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.4505	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	4.63 psi	4.63 psi	4.63 psi	44.84 psi	0.10	OK
+1.20D+0.50Lr	5.06 psi	5.06 psi	5.06 psi	44.84 psi	0.11	OK
+1.20D	3.97 psi	3.97 psi	3.97 psi	44.84 psi	0.09	OK
+1.20D+1.60Lr	7.47 psi	7.47 psi	7.47 psi	44.84 psi	0.17	OK
+0.90D	2.97 psi	2.97 psi	2.97 psi	44.84 psi	0.07	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.22 psi	2.62 psi	2.62 psi	44.84 psi	0.06	OK
+1.20D+0.50Lr	1.34 psi	2.86 psi	2.86 psi	44.84 psi	0.06	OK
+1.20D	1.05 psi	2.25 psi	2.25 psi	44.84 psi	0.05	OK
+1.20D+1.60Lr	1.98 psi	4.21 psi	4.21 psi	44.84 psi	0.09	OK
+0.90D	0.79 psi	1.68 psi	1.68 psi	44.84 psi	0.04	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	17.25 psi	164.32 psi	0.11	OK
+1.20D+0.50Lr	18.86 psi	164.32 psi	0.11	OK
+1.20D	14.79 psi	164.32 psi	0.09	OK
+1.20D+1.60Lr	27.83 psi	164.32 psi	0.17	OK
+0.90D	11.09 psi	164.32 psi	0.07	OK

All units k

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-14 (mark UA)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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

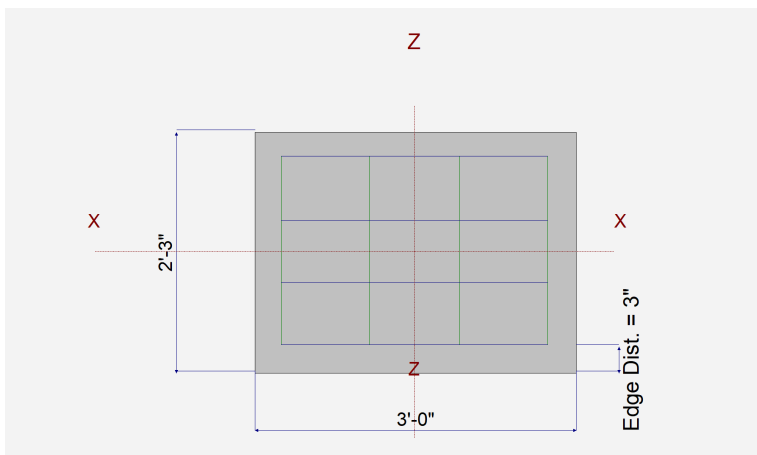
Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	2.250 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

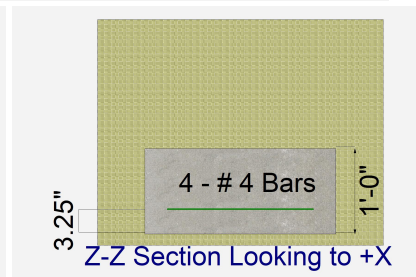
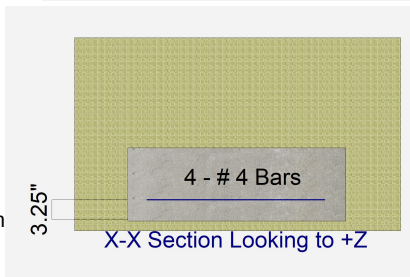
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Bars along Z-Z Axis
# Bars required within zone	85.7 %
# Bars required on each side of zone	14.3 %



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)	
Number of Bars	= 4.0
Reinforcing Bar Size	= # 4
Bars parallel to Z-Z Axis (resisting X Flexure)	
Number of Bars	= 4.0
Reinforcing Bar Size	= # 4
Rebar Centerline to Edge of Concrete...	
at Bottom of footing	= 3.250 in



General Footing

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LIC#: KW-06015539, Build:20.26.02.06

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DESCRIPTION: Underpin Ftg for B-14 (mark UA)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	6.030	5.360	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9375	Soil Bearing	1.875 ksf	2.0 ksf	+D+Lr 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 0.1960	Z Flexure (+X) Bot Tens	2.635 k-ft/ft	13.442 k-ft/ft	+1.20D+1.60Lr
PASS 0.1960	Z Flexure (-X) Bot Tens	2.635 k-ft/ft	13.442 k-ft/ft	+1.20D+1.60Lr
PASS 0.729	Min Steel X Flexure Bottom	0.259 in2/ft	0.356 in2/ft	n/a
PASS 0.1455	X Flexure (+Z) Bot Tens	1.482 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.1455	X Flexure (-Z) Bot Tens	1.482 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel Z Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.3526	1-way Shear (+X)	17.402 psi	49.350 psi	+1.20D+1.60Lr
PASS 0.3526	1-way Shear (-X)	17.402 psi	49.350 psi	+1.20D+1.60Lr
PASS 0.2015	1-way Shear (+Z)	9.035 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.2015	1-way Shear (-Z)	9.035 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.2901	2-way Punching	47.666 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	0.0	1.081	1.081	n/a	n/a	0.541
X-X, +D+Lr	2.0	n/a	0.0	1.875	1.875	n/a	n/a	0.938
X-X, +D+0.750Lr	2.0	n/a	0.0	1.676	1.676	n/a	n/a	0.838
X-X, +0.60D	2.0	n/a	0.0	0.6485	0.6485	n/a	n/a	0.324
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	1.081	1.081	0.541
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	1.875	1.875	0.938
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	1.676	1.676	0.838
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.6485	0.6485	0.324

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				

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-14 (mark UA)

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	0.7914	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.40D	0.7914	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.9296	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.9296	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.6784	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.6784	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	1.482	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	1.482	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.5088	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.5088	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	1.407	-X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.40D	1.407	+X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D+0.50Lr	1.653	-X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D+0.50Lr	1.653	+X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D	1.206	-X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D	1.206	+X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D+1.60Lr	2.635	-X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +1.20D+1.60Lr	2.635	+X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +0.90D	0.9045	-X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK
Z-Z, +0.90D	0.9045	+X	Bottom	0.2592	ACI 7.6.1.1	0.3556	13.442	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	9.29 psi	9.29 psi	9.29 psi	49.35 psi	0.19	OK
+1.20D+0.50Lr	10.91 psi	10.91 psi	10.91 psi	49.35 psi	0.22	OK
+1.20D	7.96 psi	7.96 psi	7.96 psi	49.35 psi	0.16	OK
+1.20D+1.60Lr	17.40 psi	17.40 psi	17.40 psi	49.35 psi	0.35	OK
+0.90D	5.97 psi	5.97 psi	5.97 psi	49.35 psi	0.12	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	4.82 psi	4.82 psi	4.82 psi	44.84 psi	0.11	OK
+1.20D+0.50Lr	5.67 psi	5.67 psi	5.67 psi	44.84 psi	0.13	OK
+1.20D	4.14 psi	4.14 psi	4.14 psi	44.84 psi	0.09	OK
+1.20D+1.60Lr	9.04 psi	9.04 psi	9.04 psi	44.84 psi	0.20	OK
+0.90D	3.10 psi	3.10 psi	3.10 psi	44.84 psi	0.07	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	25.45 psi	164.32 psi	0.15	OK
+1.20D+0.50Lr	29.89 psi	164.32 psi	0.18	OK
+1.20D	21.81 psi	164.32 psi	0.13	OK
+1.20D+1.60Lr	47.67 psi	164.32 psi	0.29	OK
+0.90D	16.36 psi	164.32 psi	0.10	OK

All units k

General Footing

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LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin Ftg for B-3B (mark UE)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Load location offset from footing center...

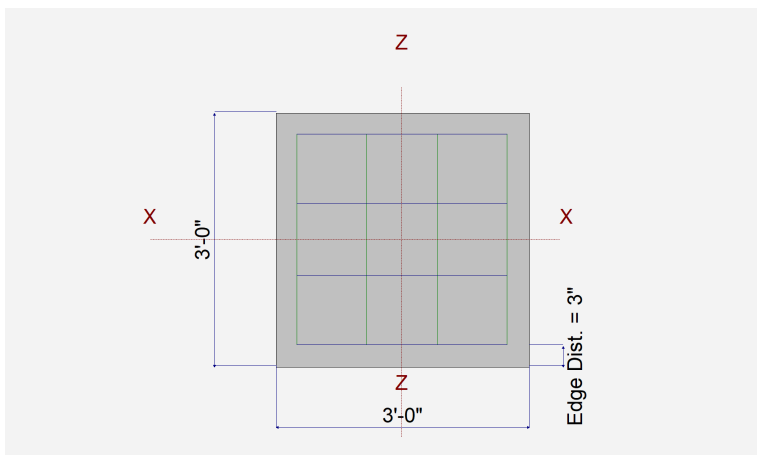
ez : Prll to Z-Z Axis	=	-7 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

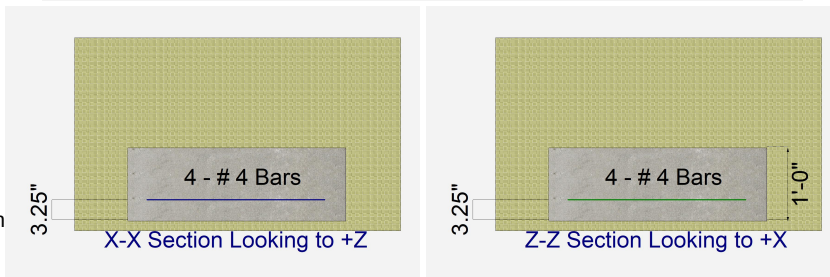
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis (resisting X Flexure)		
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.250 in



General Footing

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LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin Ftg for B-3B (mark UE)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	4.938	2.250	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9545	Soil Bearing	1.909 ksf	2.0 ksf	+D+Lr about X-X 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 0.1169	Z Flexure (+X) Bot Tens	1.191 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.1169	Z Flexure (-X) Bot Tens	1.191 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel X Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.08421	X Flexure (+Z) Bot Tens	0.8578 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.08419	X Flexure (-Z) Bot Tens	0.8576 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel Z Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.1754	1-way Shear (+X)	7.862 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1754	1-way Shear (-X)	7.862 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1088	1-way Shear (+Z)	4.876 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.08485	1-way Shear (-Z)	3.804 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.1779	2-way Punching	29.238 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-5.217	1.370	0.1025	n/a	n/a	0.685
X-X, +D+Lr	2.0	n/a	-5.669	1.909	0.06371	n/a	n/a	0.955
X-X, +D+0.750Lr	2.0	n/a	-5.579	1.774	0.07339	n/a	n/a	0.887
X-X, +0.60D	2.0	n/a	-5.217	0.8219	0.06147	n/a	n/a	0.411
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.7362	0.7362	0.368
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	0.9862	0.9862	0.493
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	0.9237	0.9237	0.462
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.4417	0.4417	0.221

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-3B (mark UE)

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	0.6225	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.40D	0.6224	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.6349	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+0.50Lr	0.6348	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.5336	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D	0.5335	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	0.8578	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +1.20D+1.60Lr	0.8576	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.4002	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
X-X, +0.90D	0.4001	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	0.8642	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	0.8642	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.8813	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	0.8813	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.7407	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	0.7407	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	1.191	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	1.191	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.5555	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	0.5555	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.71 psi	5.71 psi	5.71 psi	44.84 psi	0.13	OK
+1.20D+0.50Lr	5.82 psi	5.82 psi	5.82 psi	44.84 psi	0.13	OK
+1.20D	4.89 psi	4.89 psi	4.89 psi	44.84 psi	0.11	OK
+1.20D+1.60Lr	7.86 psi	7.86 psi	7.86 psi	44.84 psi	0.18	OK
+0.90D	3.67 psi	3.67 psi	3.67 psi	44.84 psi	0.08	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.76 psi	3.54 psi	3.54 psi	44.84 psi	0.08	OK
+1.20D+0.50Lr	2.82 psi	3.61 psi	3.61 psi	44.84 psi	0.08	OK
+1.20D	2.37 psi	3.03 psi	3.03 psi	44.84 psi	0.07	OK
+1.20D+1.60Lr	3.80 psi	4.88 psi	4.88 psi	44.84 psi	0.11	OK
+0.90D	1.78 psi	2.28 psi	2.28 psi	44.84 psi	0.05	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	21.22 psi	164.32 psi	0.13	OK
+1.20D+0.50Lr	21.64 psi	164.32 psi	0.13	OK
+1.20D	18.19 psi	164.32 psi	0.11	OK
+1.20D+1.60Lr	29.24 psi	164.32 psi	0.18	OK
+0.90D	13.64 psi	164.32 psi	0.08	OK

All units k

General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-3, 2 beams (mark UF)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

Load Combinations Used : ASCE 7-22 / IBC 2024

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : 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.	=	
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	:	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
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.350

Increases based on footing Depth

Footing base depth below soil surface	=	2.50 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
---	---	--------

Dimensions

Width parallel to X-X Axis	=	5.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Load location offset from footing center...

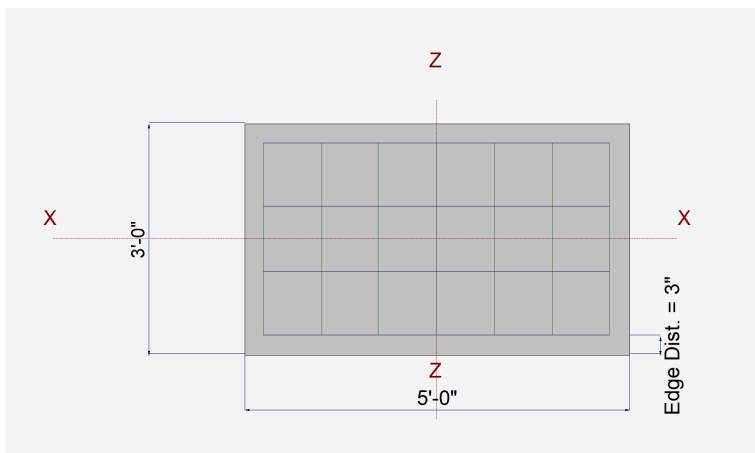
ez : Prll to Z-Z Axis	=	-8 in
	=	in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	Bars along Z-Z Axis
# Bars required within zone	75.0 %
# Bars required on each side of zone	25.0 %



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)

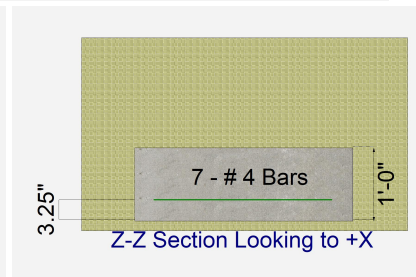
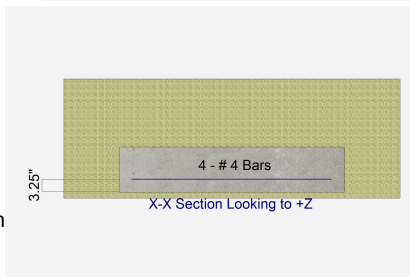
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis (resisting X Flexure)

Number of Bars	=	7.0
Reinforcing Bar Size	=	# 4

Rebar Centerline to Edge of Concrete...
at Bottom of footing

= 3.250 in



General Footing

Project File: 25105.ec6

LIC#: KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin Ftg for B-3, 2 beams (mark UF)

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	6.790	3.940	0.000	0.000	0.000	0.000	0.000 k
OB : Overburden	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 ksf
M-xx	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
M-zz	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k-ft
V-x	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k
V-z	=	0.000	0.000	0.000	0.000	0.000	0.000	0.000 k

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.9245	Soil Bearing	1.849 ksf	2.0 ksf	+D+Lr about X-X 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 0.2956	Z Flexure (+X) Bot Tens	3.011 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.2956	Z Flexure (-X) Bot Tens	3.011 k-ft/ft	10.186 k-ft/ft	+1.20D+1.60Lr
PASS 0.972	Min Steel X Flexure Bottom	0.259 in2/ft	0.267 in2/ft	n/a
PASS 0.06546	X Flexure (+Z) Bot Tens	0.6991 k-ft/ft	10.679 k-ft/ft	+1.20D+1.60Lr
PASS 0.06545	X Flexure (-Z) Bot Tens	0.6989 k-ft/ft	10.679 k-ft/ft	+1.20D+1.60Lr
PASS 0.926	Min Steel Z Flexure Bottom	0.259 in2/ft	0.280 in2/ft	n/a
PASS 0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS 0.3581	1-way Shear (+X)	16.058 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.3581	1-way Shear (-X)	16.058 psi	44.837 psi	+1.20D+1.60Lr
PASS 0.08864	1-way Shear (+Z)	4.039 psi	45.572 psi	+1.20D+1.60Lr
PASS 0.04163	1-way Shear (-Z)	1.897 psi	45.572 psi	+1.20D+1.60Lr
PASS 0.2775	2-way Punching	45.605 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, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.0	n/a	-5.657	1.238	0.04265	n/a	n/a	0.619
X-X, +D+Lr	2.0	n/a	-6.339	1.849	0.0	n/a	n/a	0.925
X-X, +D+0.750Lr	2.0	n/a	-6.208	1.695	0.0	n/a	n/a	0.848
X-X, +0.60D	2.0	n/a	-5.657	0.7426	0.02559	n/a	n/a	0.371
Z-Z, D Only	2.0	0.0	n/a	n/a	n/a	0.6402	0.6402	0.320
Z-Z, +D+Lr	2.0	0.0	n/a	n/a	n/a	0.9028	0.9028	0.451
Z-Z, +D+0.750Lr	2.0	0.0	n/a	n/a	n/a	0.8372	0.8372	0.419
Z-Z, +0.60D	2.0	0.0	n/a	n/a	n/a	0.3841	0.3841	0.192

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				

General Footing

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin Ftg for B-3, 2 beams (mark UF)

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	0.4592	+Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.40D	0.4591	-Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D+0.50Lr	0.4887	+Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D+0.50Lr	0.4886	-Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D	0.3936	+Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D	0.3935	-Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D+1.60Lr	0.6991	+Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +1.20D+1.60Lr	0.6989	-Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +0.90D	0.2952	+Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
X-X, +0.90D	0.2951	-Z	Bottom	0.2592	ACI 7.6.1.1	0.280	10.679	OK
Z-Z, +1.40D	1.980	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.40D	1.980	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	2.108	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+0.50Lr	2.108	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	1.698	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D	1.698	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	3.011	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +1.20D+1.60Lr	3.011	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	1.273	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK
Z-Z, +0.90D	1.273	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	10.186	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	10.56 psi	10.56 psi	10.56 psi	44.84 psi	0.24	OK
+1.20D+0.50Lr	11.24 psi	11.24 psi	11.24 psi	44.84 psi	0.25	OK
+1.20D	9.05 psi	9.05 psi	9.05 psi	44.84 psi	0.20	OK
+1.20D+1.60Lr	16.06 psi	16.06 psi	16.06 psi	44.84 psi	0.36	OK
+0.90D	6.79 psi	6.79 psi	6.79 psi	44.84 psi	0.15	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.25 psi	2.67 psi	2.67 psi	45.57 psi	0.06	OK
+1.20D+0.50Lr	1.33 psi	2.84 psi	2.84 psi	45.57 psi	0.06	OK
+1.20D	1.07 psi	2.29 psi	2.29 psi	45.57 psi	0.05	OK
+1.20D+1.60Lr	1.90 psi	4.04 psi	4.04 psi	45.57 psi	0.09	OK
+0.90D	0.80 psi	1.71 psi	1.71 psi	45.57 psi	0.04	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	30.00 psi	164.32 psi	0.18	OK
+1.20D+0.50Lr	31.93 psi	164.32 psi	0.19	OK
+1.20D	25.71 psi	164.32 psi	0.16	OK
+1.20D+1.60Lr	45.61 psi	164.32 psi	0.28	OK
+0.90D	19.28 psi	164.32 psi	0.12	OK

All units k

GRID 10/H.1

$$(17 \times 8' + 6 \times 14) \approx 3'$$

$$(150 \text{ pcf} \times (1 \times 0.625')) \approx 3'$$

	<u>D</u>	<u>Lr</u>
	= 660 #	
B-3A	= 1590 #	1660
	= 282	
	<u>2532 #</u>	<u>1660 #</u>

$$M_{u \text{ max}} = 0.474' \text{ k/ft or } 1.422' \text{ k or } 17064'' \text{ # for } 3' \text{ FTG}$$

$$(4) \#4 \quad a = \frac{0.40 (60000)}{.85 \times 3000 \times 36} = 0.261''$$

$$\phi M_n = 0.9 (0.4 \times 60000 \times (8.75'' - 0.261''/2)) = 186181'' \text{ #} > 17064'' \text{ #}$$

USE 3' SQ FTG w/ (4) #4 EA. WAY
SEE CALC PG. F-39

NEW PAD FOOTING w/IN NEW SLAB, GRID 7.9/Z

$$D-B = 6180'' + 3700'' = 9880''$$

2'-6" SQ PAD w/ (4) #4 EA. WAY. $2000 \text{ pcf} \times (2.5')^2 = 12500'' > 9880''$ OK

BEARING WALL ON EXIST'G CONTIN. FOOTING

GRID 8

EXISTING LOADING. $17 \text{ psf} \times 22'$

$$= 374 \text{ PLF}$$

$$374 \text{ PLF} / 1.5' \text{ W} = 249 \text{ PSF}$$

NEW LOADING:

$$6 \text{ psf} \times 14' + 17 \text{ psf} \times 8' + 18 \text{ psf} \times 2\frac{1}{2}'$$

$$= 409 \text{ PLF}$$

$$409 \text{ PLF} / 249 \text{ PSF} = 1.64' \approx 20"$$

INCREASE FOOTING WIDTH 6" = 24" TOTAL WIDTH > 1.64' - OK

GRID B

EXIST'G LOADING $17 \text{ psf} \times 14' + (18 \text{ psf} + 20) \times 23^2 / (2 \times 20.5) = 728 \text{ PLF}$

$$728 \text{ PLF} / 1.5' \text{ W} = 486 \text{ PSF}$$

NEW LOADING. $17 \text{ psf} \times 10.67' / 2 + 728$

$$= 819 \text{ PLF}$$

$$819 \text{ PLF} / 486 \text{ PSF} = 1.68' \approx 20"$$

INCREASE FOOTING WIDTH 6" = 24" TOTAL WIDTH > 1.68' - OK

EXIST'G PAD FOOTING 32' x 13' NEW 13'

WITH NEW PAD 9.67' x 13' (W/O NEW FOOT L.A.O.)

WITH NEW FOOT L.A.O.

$$17 \text{ psf} \times 5.87' / 2 = 10.14' = 10.14' \text{ INCREASE OF } 4.1\% < 5\% \text{ OK}$$

$$18 \text{ psf} \times 2.27' / 2 \times 16' / 2 = 1.58' \text{ INCREASE OF } 3.5\% < 5\% \text{ OK}$$

NORTH PAD 4' x 5' x 13' L.A.O.

General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin footing for B-3A (mark UE)

Code References

Governing Code : IBC 2021

Referenced Design Standard(s) : ACI 318-19

General Information

Material Properties

f'_c : Concrete	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
OMEGA : Concrete Densit	=	145.0 pcf
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Poissons Ratio	=	0.150
ϕ Values Flexure	=	0.90
Shear	=	0.750
Min Steel Ratio per ACI 7.6.1.1 (ratio=Steel Area/Concrete Area)	=	0.0018

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Subgrade Modulus	=	0.250 kip/in3

Coefficient of Soil/Concrete Friction = 0.350

Stability Settings

MIN. Safety Factors:

Overturning	=	1.0 :1
Sliding	=	1.0 :1

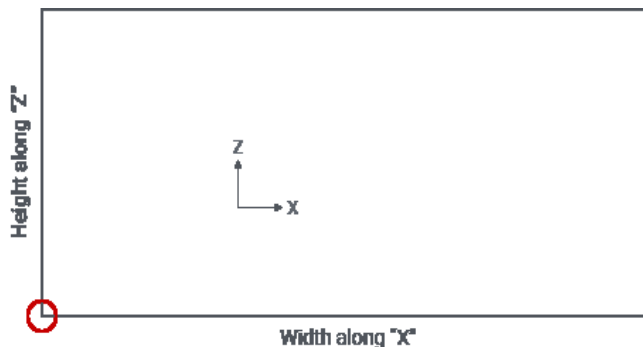
Footing Information

Footing Shape

Footing Shape Rectangle

Footing Dimensions

Width along "X" Axis	=	3.0 ft
Height along "Z" Axis	=	3.0 ft



Footing Target Mesh Element Size	=	6.0 in
Footing Thickness	=	12.0 in

Footing Stiffness

$I_{eff} = I_g * \text{Cracking Factor}$	=	0.250
Cracking Factor	=	

Rebar Clearance

Clear Cover from Footing Top & Bottom	=	3.0 in
	=	

○ : (0,0) Origin for Pedestal centroid location

Overburden load on footing

Overburden DL	=	ksf
Omit at pedestal locations	=	Yes

Pedestal 1 Information

Description	B-3A	Dimension	12.0in
Shape	Square		
CCW Rotation of Pedestal	0.00 deg	Pedestal Height	= 1.0 in
Pedestal Centroid to Footing Datum		M & V Applied with respect to:	= Footing Axes
Along "X"	= 0.830 ft	Omit @ Footprint of all pedestals	= Yes
Along "Z"	= 2.170 ft	Punching Shear Perimeter Adjustment Factor	
Target Mesh Element Size	= 3.0 in	Punching α	= 1.0
			= 40

Loads	+P towards -Y, P-y k	+M = higher pressure at +X & +Z, M-xx k-ft	+V acts towards +X & +Z at top of pedestal M-zz k-ft	V-x k	V-z k
D : Dead Load	2.532				
Lr : Roof Live	1.660				



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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-40

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General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin footing for B-3A (mark UE)

Results

Overturning :

Sliding :

Soil Bearing :

Punching Shear

Wood-Armer Mu & As :

X-X Flexure, BOTTOM of Footing :

Z-Z Flexure, BOTTOM of Footing :

X-X Flexure, TOP of Footing :

Z-Z Flexure, TOP of Footing :



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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-41

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General Footing by FEM

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LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin footing for B-3A (mark UE)

Detailed Results

Generated Mesh





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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-42

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General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

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DESCRIPTION: Underpin footing for B-3A (mark UE)

Wood-Armer Moments, TOP of Footing, Mu-XX all Load Combinations



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Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-43

Printed: 20 MAR 2026, 11:22AM

General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin footing for B-3A (mark UE)

Wood-Armer Moments, TOP of Footing, Mu-YY all Load Combinations



DCSE ASSOCIATES, INC.
1744 West Katella Ave., Suite 107
Orange, CA 92867
714-997-1145 www.dcseassociates.com

Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-44

Printed: 20 MAR 2026, 11:22AM

General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin footing for B-3A (mark UE)

Wood-Armer Moments, BOTTOM of Footing, Mu-XX all Load Combinations



DCSE ASSOCIATES, INC.
1744 West Katella Ave., Suite 107
Orange, CA 92867
714-997-1145 www.dcseassociates.com

Project Title: Baker FLC
Engineer: rs
Project ID: 25105
Project Descr:

F-45

Printed: 20 MAR 2026, 11:22AM

General Footing by FEM

Project File: 25105.ec6

LIC# : KW-06015539, Build:20.26.02.06

DALE CHRISTIAN, S.E. INC.

(c) ENERCALC, LLC 1982-2026

DESCRIPTION: Underpin footing for B-3A (mark UE)

Wood-Armer Moments, BOTTOM of Footing, Mu-YY all Load Combinations