ORCHARD PARK SITE RETAINING WALLS

Cantilevered Retaining Wall Lic. # : KW-06002811 DESCRIPTION: 4' HIGH

Criteria		
Retained Height	=	3.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	30.00 in
Water height over heel	=	0.0 ft
Vertical component of ac Lateral soil pressure opti USED for Soil USED for Slidi USED for Over	tive ons: Pressu ng Res rturning	re. istance. Resistance.

Design Summary

Wall Stability Ratios Overturning Sliding	= =	4.01 OK 14.12 OK
Total Bearing Loadresultant ecc.	= =	955 lbs 1.37 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= = Than A	642 psf OK 314 psf OK 1,500 psf Allowable
ACI Factored @ Toe	=	770 psf
ACI Factored @ Heel	=	376 psf
Footing Shear @ Toe	=	0.0 psi OK
Footing Shear @ Heel	=	3.7 psi OK
Allowable	=	82.2 psi
Sliding Calcs (Vertical C	ompon	ent Used)
Lateral Sliding Force	=	140.0 lbs
less 100% Passive Force	= -	1,546.9 lbs
less 100% Friction Force	= -	42 9.9 lbs
Added Force Req'd	=	0.0 lbs OK
for 1.5 : 1 Stability	=	0.0 lbs OK
Load Factors ——— Dead Load Live Load Earth, H Wind, W Seismic, E		1.200 1.600 1.600 1.600 1.600 1.000

Project Title: Engineer: Project ID: Project Descr:

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	Soil Data			Calculations per ACI 318-14, ACI 530-11, IBC 2015,
	Allow Soil Bearing =	1,500.0 p	sf	CBC 2016, ASCE 7-10
	Equivalent Fluid Pressure Method			
	Heel Active Pressure =	35.0 ps	sf/ft	TELED STRUC
	Toe Active Pressure =	35.0 p	sf/ft	11-11-20 P
	Passive Pressure =	275.0 p	sf/ft	
	Soil Density, Heel =	110.00 pc	cf	(ଛିଁ(ANTHONY E,)ହିଁ)
	Soil Density, Toe =	0.00 p	cf	、)、DEMITA /デノ
	Friction Coeff btwn Ftg & Soil =	0.450		A. DeMita
	Soil height to ignore for passive pressure =	12.00 in		State of Utal
	Stem Construction	T	op Stem	
			Stem OK	
	Design Height Above Fig	Π =	0.00	
	Thicknoss	= in _		
	Rehar Size	= 111	# 4	
	Rebar Spacing	in =	" 16.00	
	Rebar Placed at	=	Edge	
ΩV	Design Data			
0K OK	fb/FB + fa/Fa	=	0.062	
011	I otal Force @ Section	lbs =	168.0	
	MomentActual	ft-l =	254.3	
	NomentAllowable	IT-I =	4,119.2	
	Shear Allowahla	psi =	2.2	
OK	Wall Weight	psi =	02.Z 100.0	
OK	Pobar Dopth 'd'	µsi = in -	6.25	
	Lan splice if above	in –	12.00	
	Lap splice if below	in =	6.00	
	Hook embed into footing	in =	6.00	
	Concrete Data			
٥v	f'c	psi =	3,000.0	
	Fy	psi =		

Cantilevered Retaining Wall

Lic. # : KW-06002811

DESCRIPTION: 4' HIGH

Footing Dimensions 8	& Strenath	S
Toe Width	=	0.67 ft
Heel Width	=	1.33
Total Footing Width	=	2.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c = 3,000 psi Footing Concrete Densi	Fy =	60,000 psi 150.00 pcf
Min. As % Cover @ Top 2.0	= 0 @ Bti	0.0018 m.= 3.00 in

Footing Design Res	ults		
		Тое	Heel
Factored Pressure	=	770	
Mu' : Upward	=	163	0 ft-lb
Mu' : Downward	=	114	141 ft-lb
Mu: Design	=	49	141 ft-lb
Actual 1-Way Shear	=	0.00	3.74 psi
Allow 1-Way Shear	=	82.16	82.16 psi
Toe Reinforcing	=	# 5 @ 18.00 in	·
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	# 4 @ 1 ['] 2.50 in	
Other Acceptable Sizes	& S	Spacings	
Toe: Not req'd, Mu	< 5	S * Fr	

Heel: Not req'd, Mu < S * Fr Key: No key defined

Summary of Overturning & Resisting Forces & Moments

		O Force	/ERTURNING Distance	Moment
Item		lbs	ft	ft-lb
Heel Active Pressure	=	354.4	1.50	531.6
Surcharge over Heel	=			
Toe Active Pressure	=	-214.4	1.17	-250.1
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
Total	=	140.0		281.5
Resisting/Overturning F Vertical Loads used	Ratio for So	il Pressure	= = 955.4	4.01 Ibs

		R Force Ibs	ESISTING Distance ft	Moment ft-lb
Soil Over Heel	=	255.4	1.67	426.1
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Sten	ו =			
* Axial Live Load on Stem	=			
Soil Over Toe	=		0.34	
Surcharge Over Toe	=			
Stem Weight(s)	=	400.0	1.00	401.3
Earth @ Stem Transition	S =			
Footing Weight	=	300.0	1.00	300.0
Key Weight	=			
Vert. Component	=		2.00	
	tal =	955.4	lbs R.M. =	1,127.4

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

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Cantilevered Retaining Wall

Soil Data

Allow Soil Bearing

Fy

Lic. # : KW-06002811

DESCRIPTION: 6' HIGH

Criteria		
Retained Height	=	5.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	30.00 in
Water height over heel	=	0.0 ft
Vertical component of ac Lateral soil pressure optiv USED for Soil USED for Slidii USED for Over	tive ons: Pressu ng Res turning	re. istance. Resistance
SOED IOI OVOI		

Design Summary

Wall Stability Ratios Overturning Sliding	= =	2.48 OK 4.63 OK
Total Bearing Loadresultant ecc.	= =	1,857 lbs 5.04 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= = Than A	1,139 psf OK 99 psf OK 1,500 psf Ilowable
ACI Factored @ Toe	=	1,366 psf
ACI Factored @ Heel	=	119 psf
Footing Shear @ Toe	=	2.0 psi OK
Footing Shear @ Heel	=	10.6 psi OK
Allowable	=	82.2 psi
Sliding Calcs (Vertical C	ompon	ent Used)
Lateral Sliding Force	=	525.0 lbs
less 100% Passive Force	= -	1,687.5 lbs
less 100% Friction Force	= -	74 0.0 lbs
Added Force Req'd	=	0.0 lbs OK
for 1.5 : 1 Stability	=	0.0 lbs OK
Load Factors ——— Dead Load Live Load Earth, H Wind, W Seismic, E		1.200 1.600 1.600 1.600 1.600 1.000

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= 1,500.0 psf Method	Calculations per ACI 318-14, ACI 530-11, IBC 2015, CBC 2016, ASCE 7-10

Allow Joir Dearing –	1,000.0	psi	
Equivalent Fluid Pressure Method			
Heel Active Pressure =	35.0	psf/ft	
Toe Active Pressure =	35.0	psf/ft	
Passive Pressure =	300.0	psf/ft	
Soil Density, Heel =	110.00	pcf	
Soil Density, Toe =	0.00	pcf	
Friction Coeff btwn Ftg & Soil =	0.400		
Soil height to ignore for passive pressure =	12.00 i	n	
		Ton Stom	
Stem Construction	–	Stom OF	
Desian Height Above Fta	ft =	0.00	
Wall Material Above "Ht"	=	Concrete	
Thickness	in =	8.00	
Rebar Size	=	# 4	
Rebar Spacing	in =	16.00	
Rebar Placed at	=	User Spec	
Design Data		0.254	
ID/FB + IA/Fa	=	0.300	
l otal Force @ Section	IDS =	672.0	
MomentActual	TT-I =	1,407.0	
MomentAllowable	TT-I =	3,950.4	
ShearActual	psi =	9.3	
SnearAllowable	psi =	82.2	
Wall Weight	pst =	100.0	
Rebar Depth 'd'	in =	6.00	
Lap splice if above	in =	12.00	
Lap splice if below	in =	6.00	
HOOK embed Into footing	ın =	6.00	
	nci	2 000 0	
I C	psi =	3,000.0	

psi = 3,000.0

. psi =

Cantilevered Retaining Wall

Lic. # : KW-06002811

DESCRIPTION: 6' HIGH

Footing Dimensio	ns & S	Strength	IS
Toe Width		=	1.00 ft
Total Footing Width	n	=	3.00
Footing Thickness		=	12.00 in
Key Width Key Depth Key Distance from	Τορ	= = _	0.00 in 0.00 in 0.00 ft
fc = 3,000 Footing Concrete D Min. As % Cover @ Top	psi ensity 2.00	Fy = = @ Bt	60,000 psi 150.00 pcf 0.0018 m.= 3.00 i

			-
Footing Design Res	ults		
		Тое	Heel
Factored Pressure	=	1,366	
Mu' : Upward	=	614	0 ft-lb
Mu': Downward	=	255	805 ft-lb
Mu: Design	=	359	805 ft-lb
Actual 1-Way Shear	=	1.96	10.60 psi
Allow 1-Way Shear	=	82.16	82.16 psi
Toe Reinforcing	=	# 5 @ 18.00 in	•
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	# 4 @ 12.50 in	
Other Acceptable Sizes	5 & 5	Spacings	
Toe: Not req'd, Mu	l < S	5 * Fr	

Heel: Not req'd, Mu < S * Fr Key: No key defined

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Summary of Overturning & Resisting Forces & Moments

Item		0' Force Ibs	VERTURNING Distance ft	Moment ft-lb	
Heel Active Pressure	=	739.4	2.17	1,602.0	
Surcharge over Heel	=				
Toe Active Pressure	=	-214.4	1.17	-250.1	
Surcharge Over Toe	=				
Adjacent Footing Load	=				
Added Lateral Load	=				
Load @ Stem Above Soil	=				
Total	=	525.0	0.T.M. =	1,351.9	
Resisting/Overturning Ratio = 2.48 Vertical Loads used for Soil Pressure = 1,856.7 lbs					

		Rl Force Ibs	ESISTING Distance ft	Moment ft-lb
Soil Over Heel	=	806.7	2.33	1,882.2
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Sten	ר =			
* Axial Live Load on Stem	=			
Soil Over Toe	=		0.50	
Surcharge Over Toe	=			
Stem Weight(s)	=	600.0	1.33	800.0
Earth @ Stem Transition	S =			
Footing Weight	=	450.0	1.50	675.0
Key Weight	=			
Vert. Component	=		3.00 _	
Тс	tal =	1,856.7	bs R.M. =	3,357.2

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

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Project Title: Engineer: Project ID: F

Cantilevered Retaining Wall Lic. # : KW-06002811

DESCRIPTION: 8' HIGH

Criteria						
Retained Height	=	7.50 ft				
Wall height above soil	=	0.50 ft				
Slope Behind Wall	=	0.00 : 1				
Height of Soil over Toe	=	30.00 in				
Water height over heel	=	0.0 ft				
Vertical component of active						
Lateral soil pressure options:						
USED for Soil Pressure.						
LISED for Sliding Resistance						
	turning	Decistence				
USED IOI OVEI	unning	resistance.				

Design Summary

=	2.50 OK
=	2.81 OK
=	3,156 lbs
=	6.48 in
= = Than A	1,309 psf OK 177 psf OK 1,500 psf Ilowable
=	1,570 psf
=	212 psf
=	6.4 psi OK
=	21.4 psi OK
=	82.2 psi
ompone	ent Used)
=	1,050.0 lbs
= -	1,687.5 lbs
= -	1,26 2.0 lbs
=	0.0 lbs OK 0.0 lbs OK
	1.200 1.600 1.600 1.600 1.000
	= = = Than A = = = = = = = = = = = =

Project Descr:	

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Soil Data			Calculations per ACI 318-14,	ACI 530-11, IBC 2015,
Allow Soil Bearing	= 1,500.0	psf		CBC 2016, ASCE 7-10
Equivalent Fluid Pressure Meth	lod			
Heel Active Pressure	= 35.0	psf/ft		
Toe Active Pressure	= 35.0	psf/ft		
Passive Pressure	= 300.0	psf/ft		
Soil Density, Heel	= 110.00	pcf		
Soil Density, Toe	= 0.00	pcf		
Friction Coeff btwn Ftg & Soil	= 0.400			
Soil height to ignore for passive pressure	= 12.00 i	n		
Stem Construction		Top Stem		
Decign Lleight Above I	-ta 6	Stem OK		
Wall Material Above "	-ių ii = u+" _	0.00 Concrete		
Thickness	in –	8 00		
Rebar Size	= ""	# 5		
Rebar Spacing	in =	14.00		
Rebar Placed at	=	User Spec		
Design Data ———				
fb/FB + fa/Fa	=	0.553		
Total Force @ Section	lbs =	1,400.0		
MomentActual	ft-I =	3,791.7		
MomentAllowable	ft-l =	6,861.9		
ShearActual	psi =	19.4		
ShearAllowable	psi =	82.2		
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.00		
Lap splice if above	in =	12.00		
Lap splice if below	in =	6.00		
Hook embed into footi	ng in =	6.00		
Concrete Data ——		2 000 0		
	psi =	3,000.0		
гy	psi =			

Cantilevered Retaining Wall

Lic. # : KW-06002811

DESCRIPTION: 8' HIGH

Footing Dimensions	& Strength	าร
Toe Width Heel Width Total Footing Width	= = =	1.50 ft 2.75 4.25
Footing Thickness	=	12.00 in
Key Width Key Depth Key Distance from Toe	= = 2 =	0.00 in 0.00 in 0.00 ft
f'c = 3,000 psi Footing Concrete Dens Min. As % Cover @ Top 2.	Fy = sity = 00 @Bt	60,000 psi 150.00 pcf 0.0018 tm.= 3.00 in

Footing Design Res	ults		
		Toe	Heel
Factored Pressure	=	1,570	212 psf
Mu' : Upward	=	1,587	0 ft-lb
Mu' : Downward	=	574	2,539 ft-lb
Mu: Design	=	1,013	2,539 ft-lb
Actual 1-Way Shear	=	6.39	21.38 psi
Allow 1-Way Shear	=	82.16	82.16 psi
Toe Reinforcing	=	# 5 @ 18.00 in	·
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	# 4 @ 1 ['] 2.50 in	
Other Acceptable Sizes	883	Spacings	
Toe: Not req'd, Mu	1 < 5	Fr	

Heel: Not req'd, Mu < S * Fr Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Item		0۱ Force اbs	VERTURNING Distance ft	Moment ft-lb
Heel Active Pressure	=	1,264.4	2.83	3,582.4
Surcharge over Heel	=			
Toe Active Pressure	=	-214.4	1.17	-250.1
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
Total	=	1,050.0	0.T.M. =	3,332.3
Resisting/Overturning Ratio = 2.50 Vertical Loads used for Soil Pressure = 3,156.3 lbs				

		RE Force Ibs	SISTING Distance ft	Moment ft-lb
Soil Over Heel	=	1,718.8	3.21	5,514.3
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Sten	า =			
* Axial Live Load on Stem	=			
Soil Over Toe	=		0.75	
Surcharge Over Toe	=			
Stem Weight(s)	=	800.0	1.83	1,466.7
Earth @ Stem Transition	S =			
Footing Weight	=	637.5	2.13	1,354.7
Key Weight	=			
Vert. Component	=		4.25	
Тс	tal =	3,156.3	bs R.M. =	8,335.7

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

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Cantilevered Retaining Wall Lic. # : KW-06002811

DESCRIPTION: 10' HIGH

Criteria				
Retained Height	=	9.50 ft		
Wall height above soil	=	0.50 ft		
Slope Behind Wall	=	0.00 : 1		
Height of Soil over Toe	=	30.00 in		
Water height over heel	=	0.0 ft		
Vertical component of active Lateral soil pressure options: USED for Soil Pressure. USED for Sliding Resistance. USED for Overturning Resistance.				

Design Summary

Wall Stability Ratios Overturning Sliding	=	2.86 OK 2.19 OK
Total Bearing Loadresultant ecc.	= =	5,160 lbs 6.41 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= = Than A	1,398 psf OK 397 psf OK 1,500 psf Ilowable
ACI Factored @ Toe	=	1,678 psf
ACI Factored @ Heel	=	476 psf
Footing Shear @ Toe	=	11.7 psi OK
Footing Shear @ Heel	=	36.7 psi OK
Allowable	=	82.2 psi
Sliding Calcs (Vertical C	ompon	ent Used)
Lateral Sliding Force	=	1,715.0 lbs
less 100% Passive Force	= -	1,687.5 lbs
less 100% Friction Force	= -	2,06 9.0 lbs
Added Force Req'd	=	0.0 lbs OK
for 1.5 : 1 Stability	=	0.0 lbs OK
Load Factors ——— Dead Load Live Load Earth, H Wind, W Seismic, E		1.200 1.600 1.600 1.600 1.600 1.000

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Soil Data			Calculations per ACI 318-14, ACI 530-11, IBC 2015,
Allow Soil Bearing =	1,500.0	psf	CBC 2016, ASCE 7-10
Equivalent Fluid Pressure Metho	bd		
Heel Active Pressure =	35.0	psf/ft	
Toe Active Pressure =	35.0	psf/ft	
Passive Pressure =	300.0	psf/ft	
Soil Density, Heel =	110.00	pcf	
Soil Density, Toe =	0.00	pcf	
Friction Coeff btwn Ftg & Soil =	0.400		
Soil height to ignore for passive pressure =	12.00 i	n	
Stem Construction		Top Stem	
	(I	Stem OK	
Design Height Above F	LQ Π =	0.00 Concrete	
Thicknoss	ι = in_		
Rehar Size	= 111	# 5	
Rebar Spacing	- in =	10.00	
Rebar Placed at	=	Edae	
Design Data		- J -	
fb/FB + fa/Fa	=	0.600	
Total Force @ Section	lbs =	2,352.0	
MomentActual	ft-l =	7,856.3	
MomentAllowable	ft-l =	13,093.5	
ShearActual	psi =	23.9	
ShearAllowable	psi =	82.2	
Wall Weight	psf =	125.0	
Rebar Depth 'd'	in =	8.19	
Lap splice if above	in =	12.82	
Lap splice if below	in =	6.00	
Hook embed into footin	g in =	6.00	
Concrete Data ———			
f'c	psi =	3,000.0	
Fy	psi =		

Cantilevered Retaining Wall

Lic. # : KW-06002811

DESCRIPTION:	10 HIGH

Footing Dimensions & Strengths						
Toe Width		=	2	.00 ft		
Heel Width		=	3	.75		
Total Footing Width	۱	=	5	.75		
Footing Thickness		=	12	.00 in		
Key Width		=	0.	.00 in		
Key Depth		=	0.	.00 in		
Key Distance from	Тое	=	0.	.00 ft		
f'c = 3,000 Footing Concrete D	psi iensity	Fy_=	60,0 150	00 psi .00 pcf		
Cover @ Top	2.00	= @ Bti	0.00 m.=	3.00 in		

Footing Design Res	ults		
Factored Pressure	=	<u>Toe</u> 1,678 2,077	Heel 476 psf
Mu': Downward Mu: Design	=	1,020 2,057	6,099 ft-lb 6,099 ft-lb
Actual 1-Way Shear Allow 1-Way Shear	=	11.68 82.16	36.69 psi 82.16 psi
Toe Reinforcing Heel Reinforcing Key Reinforcing	= = =	# 5 @ 18.00 in None Spec'd # 4 @ 12.50 in	·
Other Acceptable Sizes	& S	Spacings	

Toe: Not req'd, Mu < S * Fr Heel: #4@ 11.75 in, #5@ 18.25 in, #6@ 25.75 in, #7@ 35.25 in, #8@ 46.25 in, #9@ 4 Key: No key defined

Summary of Overturning & Resisting Forces & Moments

	3			
Item		0\ Force Ibs	/ERTURNING Distance ft	Moment ft-lb
Heel Active Pressure	=	1,929.4	3.50	6,752.8
Surcharge over Heel	=			
Toe Active Pressure	=	-214.4	1.17	-250.1
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
Total	=	1,715.0	O.T.M. =	6,502.7
Resisting/Overturning F Vertical Loads used	Ratio for So	il Pressure :	= 2 = 5,160.4	2.86 lbs

		RE Force Ibs	SISTING Distance ft	Moment ft-lb
Soil Over Heel	=	3,047.9	4.29	13,080.6
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Ste	n =			
Axial Live Load on Stem	=			
Soil Over Toe	=		1.00	
Surcharge Over Toe	=			
Stem Weight(s)	=	1,250.0	2.42	3,020.8
Earth @ Stem Transition	IS =			
Footing Weight	=	862.5	2.88	2,479.7
Key Weight	=			
Vert. Component	=		5.75	
T	otal =	5,160.4 l	bs R.M. =	18,581.2
Avial live lead NOT inch	مليما اسلم	م امت ما من اما	ar used for such	rtu urun lun or

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

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Cantilevered Retaining Wall Lic. # : KW-06002811

DESCRIPTION: 12' HIGH

Criteria				
Retained Height	=	11.50 ft		
Wall height above soil	=	0.50 ft		
Slope Behind Wall	=	0.00 : 1		
Height of Soil over Toe	=	30.00 in		
Water height over heel	=	0.0 ft		
Vertical component of active Lateral soil pressure options: USED for Soil Pressure. USED for Sliding Resistance. USED for Overturning Resistance.				

Design Summary

Wall Stability Ratios Overturning Sliding	= =	3.51 OK 1.93 OK
Total Bearing Loadresultant ecc.	= =	7,933 lbs 4.18 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= = S Than A	1,300 psf OK 748 psf OK 1,504 psf Ilowable
ACI Factored @ Toe ACI Factored @ Heel	= =	1,559 psf 897 psf
Footing Shear @ Toe Footing Shear @ Heel Allowable	= = =	17.1 psi OK 62.1 psi OK 82.2 psi
Sliding Calcs (Vertical C Lateral Sliding Force less 100% Passive Force less 100% Friction Force	ompone = = - = -	ent Used) 2,520.0 lbs 1,687.5 lbs 3,17 0.0 lbs
Added Force Req'd for 1.5 : 1 Stability	= =	0.0 lbs OK 0.0 lbs OK
Load Factors Dead Load Live Load Earth, H Wind, W Seismic, E		1.200 1.600 1.600 1.600 1.600 1.000
Seismic, E		1.000

Soil Data			Calculations per ACI 318-14, ACI 530-11, IBC 2015,
Allow Soil Bearing	= 1,504.0	psf	CBC 2016, ASCE 7-10
Equivalent Fluid Pressure Meth	od	•	
Heel Active Pressure	= 35.0	psf/ft	
Toe Active Pressure	= 35.0	psf/ft	
Passive Pressure	= 300.0	psf/ft	
Soil Density, Heel	= 110.00	pcf	
Soil Density, Toe	= 0.00	pcf	
Friction Coeff btwn Ftg & Soil	= 0.400		
Soil height to ignore for passive pressure	= 12.00 i	n	
Stem Construction		Top Stem	
		Stem OK	
Design Height Above F	tg ft=	0.00	
Wall Material Above "H	it" =	Concrete	
I NICKNESS	in =	10.00	
Rebar Spacing	= in	# 5	
Rebai Spacing	111 =	0.00	
Repair Placed at Design Data	=	User Spec	
fb/FB + fa/Fa	=	0.663	
Total Force @ Section	lbs =	3,528.0	
MomentActual	ft-l =	14,049.0	
MomentAllowable	ft-l =	21,177.0	
ShearActual	psi =	35.9	
ShearAllowable	psi =	82.2	
Wall Weight	psf =	125.0	
Rebar Depth 'd'	in =	8.20	
Lap splice if above	in =	14.17	
Lap splice if below	in =	6.18	
Hook embed into footir	ng in =	6.18	
Concrete Data ——	-		
f'c	psi =	3,000.0	
Fy	psi =		

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Cantilevered Retaining Wall

Lic. # : KW-06002811

DESCRIPTION: 12' HIGH

Footing Dimensions & Strengths					
Toe Width Heel Width Total Footing Width		= = =	2. <u>5.</u> 7.	75 ft <u>00</u> 75	
Footing Thickness		=	12.	00 in	
Key Width Key Depth Key Distance from ⊺	Гое	= = =	0. 0. 0.	00 in 00 in 00 ft	
fc = 3,000 p Footing Concrete De Min. As % Cover @ Top	ensity 2.00	Fy = = @ Bt	60,0 150. 0.00 tm.=	00 psi 00 pcf 18 3.00 in	

Footing Design Res]		
		<u>Toe</u>	Heel
Factored Pressure	=	1,559 5,601	897 psi 0 ft lb
Mu' : Downward	=	1.928	0 ft-lb
Mu: Design	=	3,672	14,049 ft-lb
Actual 1-Way Shear	=	17.06	62.06 psi
Allow 1-Way Shear	=	82.16	82.16 psi
Toe Reinforcing	=	# 5 @ 18.00 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	# 4 @ 12.50 in	
Other Acceptable Sizes	5 & 5	Spacings	

Toe: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4 Heel: #4@ 6.50 in, #5@ 10.00 in, #6@ 14.00 in, #7@ 19.00 in, #8@ 25.00 in, #9@ 31 Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Item		۰۰۰۰۵ Force اbs	VERTURNING Distance ft	 Moment ft-lb	
Heel Active Pressure	=	2,734.4	4.17	11,393.2	
Surcharge over Heel	=				
Toe Active Pressure	=	-214.4	1.17	-250.1	
Surcharge Over Toe	=				
Adjacent Footing Load	=				
Added Lateral Load	=				
Load @ Stem Above Soil	=				
Total	=	2,520.0	0.T.M. =	11,143.1	
Resisting/Overturning Ratio= 3.5Vertical Loads used for Soil Pressure =7,933.3					

		RE Force Ibs	SISTING Distance ft	Moment ft-lb
Soil Over Heel	=	5,270.8	5.67	29,868.1
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Stem	=			
* Axial Live Load on Stem	=			
Soil Over Toe	=		1.38	
Surcharge Over Toe	=			
Stem Weight(s)	=	1,500.0	3.17	4,750.0
Earth @ Stem Transitions	=			
Footing Weight	=	1,162.5	3.88	4,504.7
Key Weight	=			
Vert. Component	=		7.75 _	
Tot	al =	7,933.3 II	bs R.M. =	39,122.7
Tot	 al =	7,933.3 II	bs R.M. =	39,122.7

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

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Project Title: ORCHARD CABIN Engineer: Project ID: 17011 Project Descr:

General Footing

Lic. # : KW-06002811

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DESCRIPTION: ELEVATOR FTG

Code References

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

General Information

Material Propertiesfc : Concrete 28 day strengthfy : Rebar YieldEc : Concrete Elastic ModulusConcrete Densityφ ValuesFlexure	= = = =	6 3,12 14 0	3.0 ksi 60.0 ksi 22.0 ksi 5.0 pcf 0.90	Soil Design Values Allowable Soil Bearing Increase Bearing By Footing Weight Soil Passive Resistance (for Sliding) Soil/Concrete Friction Coeff.	= = =	1.50 ksf No 250.0 pcf 0.30
Shear Analysis Settings Min Steel % Bending Reinf. Min Allow % Temp Reinf. Min. Overturning Safety Factor	=	0.7 = = =	750 0.00180 1.0 : 1	Increases based on footing Depth Footing base depth below soil surface Allow press. increase per foot of depth when footing base is below	= = =	0.50 ft ksf ft
Min. Sliding Safety Factor Add Ftg Wt for Soil Pressure Use ftg wt for stability, moments & shears Add Pedestal Wt for Soil Pressure Use Pedestal wt for stability, mom & shear		= : : :	1.0 : 1 Yes Yes Yes Yes	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	=	5.250 ft
Length parallel to Z-Z Axis	=	5.50 ft
Footing Thickness	=	12.0 in

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



z

Reinforcing

Bars parallel to X-X Axis Number of Bars Reinforcing Bar Size	=	#	5.0 5			
Bars parallel to Z-Z Axis			F 0			
Number of Bars Reinforcing Bar Size	=	#	5.0 5			
Bandwidth Distribution Chec	k (ACI 15.4.4.2	<u>.</u> 2)	Ũ			
Direction Requiring Closer Separation						
Bars along X-X Axis						
# Bars required within zone		97.	7 %			
# Bars required on each side	2.	3 %				



Applied Loads

		D	Lr	L	S	W	E	Н
P : Column Load OB : Overburden	=	3.0		1.0				k ksf
M-xx M-zz	=							k-ft k-ft
V-x V-z	=							k k

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DESCRIPTION: ELEVATOR FTG

DESIGN SUMM	ARY									Design	OK
Mi	n. Ratio	Item		Арр	olied			Capacity	Governi	ng Load Combinati	on
PASS	0.1890	Soil Bearing		0.283	5 ksf			1.50 ksf	+D+L a	bout Z-Z axis	
PASS	n/a	Overturning - X-X		0.	.0 k-ft			0.0 k-ft	No Ove	rturning	
PASS	n/a	Overturning - Z-Z		0.	.0 k-ft			0.0 k-ft	No Ove	rturning	
PASS	n/a	Sliding - X-X		0.0 k				0.0 k	No Slid	ing	
PASS	n/a	Sliding - Z-Z		0.	.0 k			0.0 k	No Slid	ing	
PASS	n/a	Uplift		0.	.0 k			0.0 k	No Upli	ft	
PASS	0.05608	Z Flexure (+X)		0.620)5 k-ft/ft			11.063 k-ft/f	t +1.20D	+1.60L	
PASS	0.05608	Z Flexure (-X)		0.620)5 k-ft/ft			11.063 k-ft/f	t +1.20D	+1.60L	
PASS	0.05884	X Flexure (+Z)		0.681	0 k-ft/ft			11.573 k-ft/f	t +1.20D	+1.60L	
PASS	0.05884	X Flexure (-Z)		0.681	0 k-ft/ft			11.573 k-ft/1	t +1.20D	+1.60L	
PASS	0.03836	1-way Shear (+X)		3.15	i2 psi			82.158 psi	+1.20D	+1.60L	
PASS	0.03836	1-way Shear (-X)		3.15	i2 psi			82.158 psi	+1.20D	+1.60L	
PASS	0.04019	1-way Shear (+Z)		3.30)2 psi			82.158 psi	+1.20D	+1.60L	
PASS	0.04019	1-way Shear (-Z)		3.30)2 psi			82.158 psi	+1.20D	+1.60L	
PASS	0.09576	2-way Punching		15.73	ls psi			164.317 psi	+1.20D	+1.60L	
Detailed Result	S										
Soil Bearing											
Rotation Axis & Load Combi	nation	Gross Allowabl	e	Xecc Z (in)	Zecc	A Bottom,	Actual -Z	Soil Bearing S Top, +Z	tress @ Loca Left, -X	tion Right, +X	Actual / Allow Ratio
X-X, D Only		1.50		n/a	0.0	0.248	89	0.2489	n/a	n/a	0.166
X-X, +D+L		1.50		n/a	0.0	0.283	35	0.2835	n/a	n/a	0.189
X-X, +D+0.750L		1.50		n/a	0.0	0.274	49	0.2749	n/a	n/a	0.183
X-X, +0.60D 7-7 D Only		1.50		n/a 0.0	0.0 n/a	0.149	93 Na	0.1493 n/a	n/a 0.2480	n/a 0.2489	0.100
Z-Z, +D+L		1.50		0.0	n/a	n	i/a	n/a	0.2835	0.2407	0.189
Z-Z, +D+0.750L		1.50		0.0	n/a	n	/a	n/a	0.2749	0.2749	0.183
Z-Z, +0.60D		1.50		0.0	n/a	n	l/a	n/a	0.1493	0.1493	0.100
Overturning Stat	oility										
Rotation Axis & Load Combin	nation		Ove	rturning M	oment		Re	esisting Mome	nt Sta	bility Ratio	Status
Footing Has NO C	Overturning										
Sliding Stability										A	II units k
Force Application	n Axis		c	Sliding For			ſ	Dosisting Force	n Sta	hility Patio	Statuc
	liding			Shungio	LE		1	Resisting Force	- Jia		Status
Footing Flexure	siung										
Flexure Axis & Load	d Combination	Mu k fi	Side	Tensic	on	As Req'd	C	Gvrn. As	Actual As	Phi*Mn	Status
		0.550		- Surfac	.0	0.0500		T 0/	0.0050	K-IL	
X-X, +1.40D		0.550	+/	Bottom	1	0.2592	Min Min	Temp %	0.2952	11.5/3	OK
X-X, +1.20D+1.60	1	0.6810	+7	Bottom	1	0.2592	Min ⁻	Temp %	0.2952	11.573	OK
X-X, +1.20D+1.60	Ĺ	0.6810	-Z	Bottom	1	0.2592	Min	Temp %	0.2952	11.573	ŎK
X-X, +1.20D+L		0.6024	+Z	Bottom	1	0.2592	Min	Temp %	0.2952	11.573	OK
X-X, +1.20D+L		0.6024	-Z	Bottom	1	0.2592	Min	Temp %	0.2952	11.573	OK
∧-⊼, +1.20D X-X +1.20D		0.4/14 0.471/	+Z _7	Bottom	1	0.2392 0.2502	IVIIN Min ⁻	Temn %	0.2952 0.2952	11.5/3 11.572	UK
X-X, +0.90D		0.3536	+Z	Bottom	1	0.2592	Min	Temp %	0.2952	11.573	OK
X-X, +0.90D		0.3536	-Z	Bottom	1	0.2592	Min	Temp %	0.2952	11.573	Ŏĸ
Z-Z, +1.40D		0.5011	-Х	Bottom	1	0.2592	Min	Temp %	0.2818	11.063	OK
Z-Z, +1.40D		0.5011	+X	Bottom	1	0.2592	Min	Temp %	0.2818	11.063	OK
Z-Z, +1.20D+1.60	L	0.6205	-X	Bottom	1	0.2592	Min	Temp %	0.2818	11.063	OK
∠-∠, +1.20D+1.60 7.7 +1 20D±1	L	0.6205 0.5780	+X _Y	Bottom	1	0.2392 0.2502	IVIIN Min ⁻	Temn %	0.2818 0.2818	11.063 11.062	UK
Z-Z, +1.20D+L		0.5489	+X	Bottom	1	0.2592	Min	Temp %	0.2818	11.063	OK

Project Title: ORCHARD CABIN Engineer: Project ID: 17011 Project Descr:

General Footing Lic. # : KW-06002811

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DESCRIPTION: ELEVATOR FTG

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. A in^2	s Actual in^2	As Phi	*Mn -ft	Status
Z-Z, +1.20D Z-Z, +1.20D Z-Z, +0.90D Z-Z, +0.90D One Way Shear	0.4295 0.4295 0.3222 0.3222	-X +X -X +X	Bottom Bottom Bottom Bottom	0.2592 0.2592 0.2592 0.2592 0.2592	Min Temp Min Temp Min Temp Min Temp	% 0.28 % 0.28 % 0.28 % 0.28	18 18 18 18	11.063 11.063 11.063 11.063	OK OK OK OK
Load Combination	Vu @ -X	Vu@·	+X Vu	@-Z Vi	I@+Z	Vu:Max	Phi Vn	/u / Phi*Vn	Status
+1.40D +1.20D+1.60L +1.20D+L +1.20D +0.90D Two-Way "Punching" Shear	2.55 p 3.15 p 2.79 p 2.18 p 1.64 p	si si si si si	2.55 psi 3.15 psi 2.79 psi 2.18 psi 1.64 psi	2.67 psi 3.30 psi 2.92 psi 2.29 psi 1.71 psi	2.67 psi 3.30 psi 2.92 psi 2.29 psi 1.71 psi	2.67 psi 3.30 psi 2.92 psi 2.29 psi 1.71 psi	82.16 psi 82.16 psi 82.16 psi 82.16 psi 82.16 psi	0.03 0.04 0.03 0.02 All units	OK OK OK OK K
Load Combination		Vu		Phi*Vn		Vu / Phi*Vn			Status
+1.40D +1.20D+1.60L +1.20D+L +1.20D +0.90D		12.7 ⁻ 15.74 13.92 10.89 8.1	1 psi 4 psi 2 psi 9 psi 7 psi	164.32 164.32 164.32 164.32 164.32 164.32	psi psi psi psi psi	0.07734 0.09576 0.08471 0.0663 0.04972			OK OK OK OK OK