

**HD Engineering & Design** 

Solutions for all your engineering and design needs

## PLAN ADDENDUM

3/30/2023

STARR HOMES

## RE: MILLIGAN RESIDENCE 512 NE PROMISED VIEW DR LEE'S SUMMIT, MO.

Our firm has been asked to address a foundation design change for the garage tall foundation.

The footing width of the foundation for the sports court area has been reduced based the support provided by the pier supported foundation. The footing width has been reduced to 40" per the attached calculations. The footing in place is approximately 36" wide. The current footing will be extended inward 12" with two rows of #4 pins at 12" on center and two continuous #4 bars top and bottom. The footing reduction requires that the floor slab and precast slab be in place prior to backfill. The foundation for the garage will require 1/2" clean rock backfill full height.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. No warranties, either express or implied, are intended or made.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact us.

Very truly yours, HD ENGINEERING & DESIGN, INC.

John Hulse, Principal



STRUCTURAL REVIEW HD ENGINEERING & DESIGN HD: 42639 DATE: 3/30/2023

11656 W. 75th Street Shawnee, KS 66214

913-631-2222 service@hdengineers.com

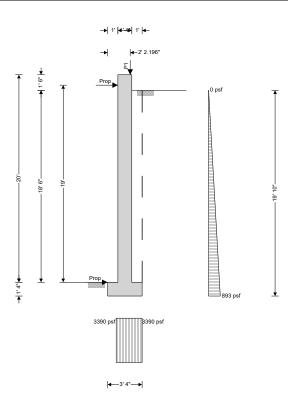
Tekla Tedds HD Engineering and Design 11656 W. 75th Street Shawnee, KS 66214	Section	EERING AND DE	SIGN FOUND	ATION WALLS	18' WALL Sheet no./rev 1 App'd by	
	J	3/28/2023				
RETAINING WALL ANALYSIS	Building C	ode 2018			MUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMU	HRIS

## **Retaining wall details** Propped cantilever pinned at the base Stem type Stem height h<sub>stem</sub> = 20 ft Prop height $h_{prop} = 19 \text{ ft}$ t<sub>stem</sub> = **16** in Stem thickness Angle to rear face of stem $\alpha$ = **90** deg Stem density γ<sub>stem</sub> = **150** pcf Toe length $I_{toe} = 1 ft$ Heel length $I_{heel} = 1$ ft t<sub>base</sub> = **16** in Base thickness Base density γbase = 150 pcf Height of retained soil h<sub>ret</sub> = 18.5 ft $\beta = 0 \deg$ Angle of soil surface Depth of cover d<sub>cover</sub> = 0 ft **Retained soil properties** Soil type Dense well graded sand and gravel γmr = **131** pcf Moist density Saturated density γsr = **143** pcf Prescribed at rest lateral soil pressure por = 45 psf/ft **Base soil properties** Very Dense rock fill Soil type γ<sub>b</sub> = **110** pcf Soil density Prescribed passive lateral soil pressure pob = 60 psf/ft Allowable bearing pressure Pbearing = 3500 psf Loading details

Vertical line load at 2.183 ft

P<sub>D1</sub> = **1200** plf P<sub>L1</sub> = **170** plf

Tekla. Tedds	Project HD ENGINEEF	RING AND DESI	GN FOUNDATIO	ON WALLS	Job Ref. 18' WALL	
HD Engineering and Design 11656 W. 75th Street Shawnee, KS 66214	Section TALL FOUNDA	TIONS			Sheet no./rev. 2	
	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date



General arrangement

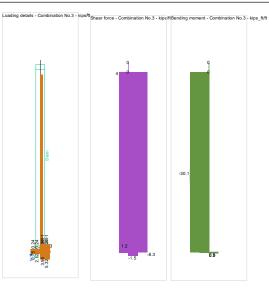
Calculate	retaining	wall	geometry
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Base length Ibase = Itoe + tstem + Iheel = 3.333 ft Moist soil height h<sub>moist</sub> = h<sub>soil</sub> = **18.5** ft Retained surface length  $I_{sur} = I_{heel} = 1$  ft Effective height of wall  $h_{eff}$  =  $h_{base}$  +  $d_{cover}$  +  $h_{ret}$  = **19.833** ft Astem = hstem \* tstem = 26.667 ft<sup>2</sup> Area of wall stem - Distance to vertical component  $x_{stem} = I_{toe} + t_{stem} / 2 = 1.667 \text{ ft}$ Area of wall base  $A_{base} = I_{base} * t_{base} = 4.444 \text{ ft}^2$ - Distance to vertical component  $x_{\text{base}} = I_{\text{base}} / 2 = 1.667$  ft Area of moist soil Amoist =  $h_{moist} * I_{heel} = 18.5 \text{ ft}^2$  $x_{moist v} = I_{base} - (h_{moist} * I_{heel}^2 / 2) / A_{moist} = 2.833 \text{ ft}$ - Distance to vertical component  $x_{moist h} = h_{eff} / 3 = 6.611 \text{ ft}$ - Distance to horizontal component Soil coefficients Coefficient of friction to back of wall K<sub>fr</sub> = 0.325 K<sub>fb</sub> = 0.325 Coefficient of friction to front of wall Coefficient of friction beneath base K<sub>fbb</sub> = 0.325 From IBC 2018 cl.1807.2.3 Safety factor Load combination 1 1.0 \* Dead + 1.0 \* Live + 1.0 \* Lateral earth

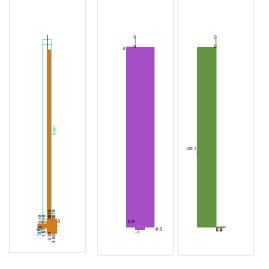
Tekla Tedds	Section	IEERING AND DE		TION WALLS	18' WALL Sheet no./rev		
11656 W. 75th Street		INDATIONS			3		
Shawnee, KS 66214	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date	
Bearing pressure check							
Vertical forces on wall							
Wall stem		F <sub>stem</sub> = A <sub>stem</sub>	* γ <sub>stem</sub> = <b>4000</b> p	olf			
Wall base		F <sub>base</sub> = A <sub>base</sub>	* γ <sub>base</sub> = <b>667</b> pl	f			
Line loads			P <sub>L1</sub> = <b>1370</b> plf				
Moist retained soil			ist * γmr = <b>2428</b>	plf			
Total		F <sub>total</sub> v = F <sub>stem</sub>	+ Fbase + FP v	+ Fmoist v = <b>846</b>	5 plf		
Horizontal forces on wall							
Moist retained soil		$F_{model h} = n_{0r}$	* h <sub>eff</sub> ² / 2 <b>= 885</b>	<b>1</b> plf			
Base soil			* (dcover + hbase	•			
Total		-	$t_h + F_{pass_h} = 8$	,			
Moments on wall				•			
Wall stem		Matam = Fatam	* Xstem = 6667	h ft/ft			
Wall base			* Xbase = 1111	—			
Line loads							
Moist retained soil		M <sub>P</sub> = ((P <sub>D1</sub> + P <sub>L1</sub> )) * p <sub>1</sub> = <b>2991</b> lb_ft/ft M <sub>moist</sub> = F <sub>moist_v</sub> * x <sub>moist_v</sub> = <b>6880</b> lb_ft/ft					
Total		Mtotal = Mstem + Mbase + MP + Mmoist = <b>17648</b> lb_ft/ft					
Check bearing pressure					_		
Distance to reaction		$\overline{\mathbf{x}} = \mathbf{M}_{\text{total}} / \mathbf{F}$	total v = <b>2.085</b> ft				
Eccentricity of reaction		$e = \overline{x} - I_{base}$	_				
Loaded length of base			$\overline{x}_{i} = -\overline{x}_{i} = 2.497$	ft			
Bearing pressure at toe		$q_{toe} = 0 \text{ psf}$	, - , - <b></b>	it.			
Bearing pressure at heel			/ I <sub>load</sub> = <b>3390</b> p	sf			
Factor of safety			ring / max(q <sub>toe</sub> , c				
,	PAS	S - Allowable bea			imum applied b	earing pres	
RETAINING WALL DESIGN							
In accordance with ACI 318-14					Tedds cal	culation versior	
Concrete details							
Compressive strength of concrete		f'₀ <b>= 3500</b> ps	i				
Concrete type		Normal weig					
Reinforcement details							
Yield strength of reinforcement		fy = <b>60000</b> ps	si				
Modulus of elasticity or reinforcem	ent	$E_s = 290000$					
Compression-controlled strain limi		ε <sub>ty</sub> = <b>0.002</b>	ee poi				
Cover to reinforcement							
Front face of stem		<sub>Csf</sub> = <b>2.5</b> in					
Rear face of stem		c <sub>sr</sub> = <b>2.5</b> in					
Top face of base		c <sub>bt</sub> = <b>3</b> in					
Bottom face of base		c <sub>bb</sub> = <b>1.5</b> in					
From IBC 2018 cl.1605.2 Basic lo	and an web in	-					

Tekla Tedds HD Engineering and Design 11656 W. 75th Street	HD ENGINEE Section TALL FOUND	ERING AND DES	Sign Founda	TION WALLS	S 18' WALL Sheet no./rev 4	
Shawnee, KS 66214	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date
Load combination no.2 Load combination no.3 Load combination no.4		1.2 * Dead + 0.9 * Dead +	1.0 * Earthquak	ke + 1.0 * Liv ke + 1.6 * Lai	e + 1.6 * Lateral e	earth
	2. 2. 3. 3. 3. 3. 3. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1.1 - kupaft Shear force - Combination No.1		No.1 - Kp=_0/II		
	Loading details - Combination No	1.2 - kipsM Shear force - Combination No.2	-30.1	No.2- kips_ft/ft		

Tekla Tedds	Project HD ENGINEER	RING AND DESI	GN FOUNDATIO	ON WALLS	Job Ref. 18' WALL	
HD Engineering and Design 11656 W. 75th Street Shawnee, KS 66214	Section TALL FOUNDA	TIONS			Sheet no./rev. 5	
	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date



Loading details - Combination No.4 - kips/ft Shear force - Combination No.4 - kips/ft/Bending moment - Combination No.4 - kips\_ft/ft



Check stem design at 7.96 ft	
Depth of section	h = <b>16</b> in
Rectangular section in flexure - Section 22.3	
Design bending moment combination 4	M = <b>30097</b> lb_ft/ft
Depth of tension reinforcement	d = h - $c_{sf}$ - $\phi_{sx}$ - $\phi_{sfM}$ / 2 = <b>12.75</b> in
Compression reinforcement provided	No.4 bars @ 12" c/c
Area of compression reinforcement provided	A <sub>srM.prov</sub> = π * φ <sub>srM</sub> <sup>2</sup> / (4 * s <sub>srM</sub> ) = <b>0.196</b> in <sup>2</sup> /ft
Tension reinforcement provided	No.4 bars @ 4" c/c
Area of tension reinforcement provided	$A_{sfM,prov} = \pi * \phi_{sfM}^2 / (4 * s_{sfM}) = 0.589 in^2/ft$
Maximum reinforcement spacing - cl.11.7.2	s <sub>max</sub> = min(18 in, 3 * h) = <b>18</b> in
	PASS - Reinforcement is adequately spaced
Depth of compression block	a = A <sub>sfM.prov</sub> * f <sub>y</sub> / (0.85 * f' <sub>c</sub> ) = <b>0.99</b> in

Tekla Tedds	Project HD ENGINE	ERING AND DE	SIGN FOUND	ATION WALLS	Job Ref. 18' WALL	
HD Engineering and Design 11656 W. 75th Street	Section TALL FOUNI	DATIONS			Sheet no./rev 6	
Shawnee, KS 66214	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date
Neutral axis factor - cl.22.2.2.4.3		βı = min(ma	x(0.85 - 0.05 ×	(f'c - 4 ksi) / 1 k	(si, 0.65), 0.85) =	= 0.85
Depth to neutral axis		c = a / β <sub>1</sub> = <b>1</b>	165 in	. ,		
Strain in reinforcement		•	(d - c) / c = <b>0.0</b> 2	29841		
			( )		s in the tension	controlled
Strength reduction factor		₀ <sub>f</sub> = min(max	x(0.65 + 0.25 *(	εt - εty) / 0.003,	0.65), 0.9) = <b>0.9</b>	)
Nominal flexural strength		$M_n = A_{sfM.prov}$	* fy * (d - a / 2)	= 36094 lb_ft/f	ft	
Design flexural strength		$\phi M_n = \phi_f \times M_f$	n = <b>32485</b> lb_ft/	′ft		
		M / φMn = 0.9	927			
		PASS - D	Design flexura	l strength exc	eeds factored b	ending mo
By iteration, reinforcement require	d by analysis	AsfM.des = <b>0.5</b>	<b>44</b> in²/ft			
Minimum area of reinforcement - o	1.9.6.1.2	AsfM.min = max	x(3 * √(f'₀ * 1 ps	si), 200 psi) * d	/ f <sub>y</sub> = <b>0.51</b> in <sup>2</sup> /ft	
PASS - A	Area of reinfor	rcement provid	ed is greater t	han minimum	area of reinfor	cement req
Check stem design at base of st	em					
Depth of section		h = <b>16</b> in				
Rectangular section in shear - S	ection 22 5					
Design shear force	22.5	V = 8322 lb/	ft			
Concrete modification factor - cl.1	924	λ = <b>1</b>				
Nominal concrete shear strength -			√(f'c × 1 psi) × d	t = 18103 lb/ft		
Strength reduction factor	6411.22.0.0.1	φ <sub>s</sub> = 0.75				
Design concrete shear strength - o	11511	·	= <b>13577</b> lb/ft			
Design concrete shear strength - t		ψν <sub>c</sub> = ψ <sub>s</sub> × ν <sub>c</sub> V / φV <sub>c</sub> = <b>0.6</b>				
		<b>ν</b> / ψνc – <b>υ.υ</b>	15	PASS - No s	shear reinforce	ment is rea
Charle stars desire at such				1400 1100		inclutio req
Check stem design at prop Depth of section		h = <b>16</b> in				
		II – <b>IO</b> III				
Rectangular section in shear - S	ection 22.5		-			
Design shear force		V = 3999 lb/i	ft			
Concrete modification factor - cl.1		$\lambda = 1$	1. <b>.</b>			
Nominal concrete shear strength -	eqn.22.5.5.1		√(f'c × 1 psi) × d	d = <b>18103</b> lb/ft		
Strength reduction factor		φs = <b>0.75</b>				
Design concrete shear strength - c	1.11.5.1.1		= <b>13577</b> lb/ft			
		V / ∳Vc = <b>0.2</b>	95			
				PASS - No s	shear reinforce	ment is req
Horizontal reinforcement paralle	el to face of st	em				
Minimum area of reinforcement - c		-	2 * tstem = <b>0.38</b> 4			
Transverse reinforcement provide		-	12" c/c each f			
Area of transverse reinforcement				a) = <b>0.393</b> in <sup>2</sup> /ft		
	PASS - Area	of reinforcem	ent provided is	s greater than	area of reinfor	cement req
Check base design at heel						
Depth of section		h = <b>16</b> in				
Rectangular section in flexure -	Section 22.3					
Design bending moment combinat		M = <b>946</b> lb_f	t/ft			
Depth of tension reinforcement		$d = b - c_{bb} - d$	рьь / 2 = <b>14.25</b> і	n		

Tekla Tedds	Project HD ENGINEE	ERING AND DE	SIGN FOUND	ATION WALLS	Job Ref. 18' WALL	
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Shawnee, KS 66214	TALL FOUND	DATIONS			7	
	Calc. by J	Date 3/28/2023	Chk'd by	Date	App'd by	Date
Compression reinforcement provid	ed	No.4 bars @	16" c/c			
Area of compression reinforcemen	t provided	$A_{bt.prov} = \pi * \phi$	$(4 * s_{bt}^2) = (4 * s_{bt}) = (1 + s_{bt})$	<b>).147</b> in²/ft		
Tension reinforcement provided		No.4 bars @	6" c/c			
Area of tension reinforcement prov	ided	Abb.prov = $\pi * \alpha$	фы <sup>2</sup> / (4 * sыb) =	0.393 in²/ft		
Maximum reinforcement spacing -	cl.7.7.2.3	s <sub>max</sub> = min(18	3 in, 3 * h) = <b>18</b>	in <b>PASS - Reinfo</b>	rcoment is add	auately sn
Depth of compression block		a = A <sub>bb prov</sub> * 1	fy / (0.85 * f'c) =			equatory op
Neutral axis factor - cl.22.2.2.4.3				(f' <sub>c</sub> - 4 ksi) / 1 ks	si. 0.65). 0.85) =	= 0.85
Depth to neutral axis		$c = a / \beta_1 = 0$			, , , ,	
Strain in reinforcement		•	d - c) / c = 0.0	52057		
		5. 0.000 × (	<b>UU</b> _U		in the tension	controlled
Strength reduction factor		տք = min(max	(0 65 + 0 25 *(	εt - εty) / 0.003, 0		
Nominal flexural strength				= 27332 lb_ft/ft		
Design flexural strength			n = <b>24599</b> lb_ft/	—		
		M / φM <sub>n</sub> = <b>0.0</b>	_			
		•		l strength exce	eds factored b	endina mo
By iteration, reinforcement required	d by analysis	A <sub>bb.des</sub> = <b>0.01</b>	-	<b>j</b>		j
Minimum area of reinforcement - cl			18 * h = <b>0.346</b>	in²/ft		
PASS - A	rea of reinfor	cement provide	ed is greater t	han minimum a	area of reinford	cement req
Rectangular section in shear - Section						
Rectangular Section in Shear - O	ection 22.5					
Design shear force	ection 22.5	V = <b>1377</b> lb/f	ït			
-		V = <b>1377</b> lb/f λ = <b>1</b>	t			
Design shear force	9.2.4	λ = <b>1</b>	ʻt √(f'c × 1 psi) × c	d = <b>20233</b> lb/ft		
Design shear force Concrete modification factor - cl.19	9.2.4	λ = <b>1</b>		d = <b>20233</b> lb/ft		
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength -	).2.4 eqn.22.5.5.1	$\lambda = 1$ $V_{c} = 2 \times \lambda \times 2$ $\phi_{s} = 0.75$		d = <b>20233</b> lb/ft		
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	).2.4 eqn.22.5.5.1	$\lambda = 1$ $V_{c} = 2 \times \lambda \times 2$ $\phi_{s} = 0.75$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft	d = <b>20233</b> lb/ft		
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	).2.4 eqn.22.5.5.1	$\lambda = 1$ $V_{c} = 2 \times \lambda \times \gamma$ $\phi_{s} = 0.75$ $\phi V_{c} = \phi_{s} \times V_{c}$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft		hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c	).2.4 eqn.22.5.5.1	$\lambda = 1$ $V_{c} = 2 \times \lambda \times \gamma$ $\phi_{s} = 0.75$ $\phi V_{c} = \phi_{s} \times V_{c}$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft		hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	).2.4 eqn.22.5.5.1	$\lambda = 1$ $V_{c} = 2 \times \lambda \times \gamma$ $\phi_{s} = 0.75$ $\phi V_{c} = \phi_{s} \times V_{c}$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft		hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section	9.2.4 eqn.22.5.5.1 I.7.6.3.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v V_c = \phi_s \times V_c$ $V / \phi_v V_c = 0.09$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft		hear reinforcei	ment is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b>	9.2.4 eqn.22.5.5.1 I.7.6.3.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v V_c = \phi_s \times V_c$ $V / \phi_v V_c = 0.09$	√(f'c × 1 psi) × c = 15175 lb/ft 91		hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b>	9.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5	$\lambda = 1$ $V_c = 2 \times \lambda \times 1$ $\phi_s = 0.75$ $\phi_v V_c = \phi_s \times V_c$ $V / \phi_v V_c = 0.05$ $h = 16 \text{ in}$	√(f'c × 1 psi) × c = 15175 lb/ft 91		hear reinforcei	ment is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19	9.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.09$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$	√(f'∝ × 1 psi) × c = 15175 lb/ft 91 t	PASS - No sl	hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength -	9.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.05$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$	√(f'c × 1 psi) × c = 15175 lb/ft 91	PASS - No sl	hear reinforcei	ment is requ
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	0.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5 0.2.4 eqn.22.5.5.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.09$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft 9 <b>1</b> ∛(f'c × 1 psi) × c	PASS - No sl	hear reinforcei	ment is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength -	0.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5 0.2.4 eqn.22.5.5.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \lambda$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.09$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \lambda$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft 91 √(f'c × 1 psi) × c = <b>15175</b> lb/ft	PASS - No sl	hear reinforcei	nent is req
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	0.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5 0.2.4 eqn.22.5.5.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.09$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft 91 √(f'c × 1 psi) × c = <b>15175</b> lb/ft	<b>PASS - No sl</b> d = <b>20233</b> lb/ft	hear reinforcei	
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c	0.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5 0.2.4 eqn.22.5.5.1 I.7.6.3.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \lambda$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$ $V / \phi_v = 0.09$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \lambda$ $\phi_s = 0.75$ $\phi_v = \phi_s \times V_c$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft 91 √(f'c × 1 psi) × c = <b>15175</b> lb/ft	<b>PASS - No sl</b> d = <b>20233</b> lb/ft		
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor	<ul> <li>b.2.4</li> <li>eqn.22.5.5.1</li> <li>l.7.6.3.1</li> <li>ection 22.5</li> <li>b.2.4</li> <li>eqn.22.5.5.1</li> <li>l.7.6.3.1</li> <li>el to base</li> </ul>	$\lambda = 1$ $V_c = 2 \times \lambda \times 1$ $\phi_s = 0.75$ $\phi_v = \phi_s \times v_c$ $V / \phi_v = 0.03$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times 1$ $\phi_s = 0.75$ $\phi_v = \phi_s \times v_c$ $V / \phi_v = 0.16$	√(f'c × 1 psi) × c = <b>15175</b> lb/ft 91 √(f'c × 1 psi) × c = <b>15175</b> lb/ft	PASS - No sl d = 20233 lb/ft PASS - No sl		
Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Check base design at heel</b> Depth of section <b>Rectangular section in shear - Se</b> Design shear force Concrete modification factor - cl.19 Nominal concrete shear strength - Strength reduction factor Design concrete shear strength - c <b>Transverse reinforcement paralle</b>	9.2.4 eqn.22.5.5.1 I.7.6.3.1 ection 22.5 9.2.4 eqn.22.5.5.1 I.7.6.3.1 I.7.6.3.1 el to base I.7.6.1.1	$\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times v_c$ $V / \phi_v = 0.03$ $h = 16 \text{ in}$ $V = 1631 \text{ lb/f}$ $\lambda = 1$ $V_c = 2 \times \lambda \times \gamma$ $\phi_s = 0.75$ $\phi_v = \phi_s \times v_c$ $V / \phi_v = 0.10$ $A_{bx,req} = 0.00$	√(f'c × 1 psi) × c = 15175 lb/ft 91 √(f'c × 1 psi) × c = 15175 lb/ft 08	<i>PASS - No sl</i> d = 20233 lb/ft <i>PASS - No sl</i> 46 in²/ft		

