LORAC DESIGN GROUP, LLC
Structural Engineers

June 28, 2017

Mr. Doug Parks
Lee's Summit, Mo. 64064

HAND DELIVERED

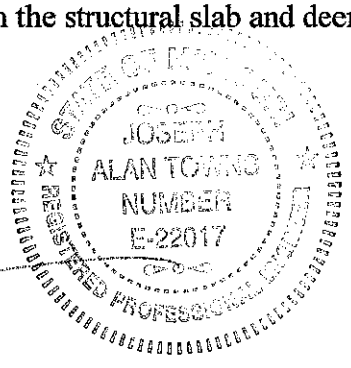
Re: 1328 NE Brandywine Road, Lee's Summit, Missouri – Structural Review, Porch Structural Slab Lee's Summit, Permit # PRRES20162554

Doug,

This letter is to certify that I have personally inspected and verified through calculation the strength and placement of the front porch structural slab located at the above address.

After careful review, we are comfortable with the structural slab and deem it safe for use.

Photos are available upon request.



For the Firm,
LORAC Design Group, LLC

Joseph A. Towns, R.A. P.E., AIA, NCARB, LEED AP, BD+C
Missouri Professional Engineer, #E-22017 (Structural)

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Design Calculations

1328 NE Brandywine Road

Lee's Summit, Missouri

Concrete Structural Slab Check at Porch

*	Trib Width (Selected)		1 ft	Per Drawings
*	Max Span		8 ft	Per Drawings
	Slab Thickness	Minimum Slab "t" check	8 inches	OK
	Weight of Concrete		150 pcf	
*	Loading Dead		0.100 kips/ft^2	Per Drawings
	Loading Live		0.100 kips/ft^2	Per Drawings
	Point Load		0.500 kips/ft	Per Drawings
	Trib Area		0.50 feet	By Calculation
	f'c =		4000.00 psi	By Design
	fy =		60000.00 psi	By Design
		Beam Ldg (Dead)	**0.05 kips/lin. ft**	
		Beam Ldg (Live)	**0.05 kips/lin. ft**	
	Moment (Dead)		0.40 kip-feet	By Calculation
	Moment (Live)		0.40 kip-feet	By Calculation
	Moment (Point)		1.00 kip-feet	By Calculation
		Total Moment	**1.80 kip-feet**	**By Calculation**
	Factored Moment (Dead)		**0.56** kip-feet	By Calculation
	Factored Moment (Live)		**0.68** kip-feet	By Calculation
	Factored Moment (Point)		**1.40** kip-feet	By Calculation
		Total Factored Mom.	**2.64 kip-feet**	**By Calculation**
	Reactions (Dead)		0.20 kips	By Calculation
	Reactions (Live)		0.20 kips	By Calculation
		Total Reaction	**0.40 kips/ft**	
		b =	**12.00 inch**	**By Design**
		d =	**6.00 inch**	**By Calculation**
		Omega =	**0.0204**	
		Omega'=	**0.0201**	
		rho =	**0.0013**	

As, Rqd	As =	0.10 in^2	
As, min =		0.23	ACI 10.5.1
Select =	Reinforcement #4's @ 12"	0.200 in^2/ft	
		OK	

Beam Check

T = Asfy =		12.00 kips
a = Asfy/.85f'cb =		0.29 inches
Moment Strength =		63.21 in-kips
	or	5.27 kip-feet
		OK

Check Shear Capacity at Supp.	4.55 kips/ft	(Concrete ONLY)
	OK	S.F. = 11.38
Temp Steel Requirement	0.14 in/ft^2/ft	
	#3's @12 oc	

Deflection Calculations

Sustained Load

b =		12.0 inches
d =		8.0 inches
d'=		1.5 inches
h=		8.0 inches
As =		0.20 in^2
A's =	Top Steel	0.000 in^2
f'c =		4000.0 psi
fy=		60000.0 psi
Weight of Concrete =		150.0 lb/ft^3
span =		8.0 feet
Slab Thickness =		8.0 inches
Md =		0.4 k-ft
Ml =		0.7 k-ft
Mtotal =		1.1 k-ft
Msus =		0.7 k-ft

Minimum Thickness

	h min = l / 18.5 =	5.19 inches
		OK

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Modulas of Rupture

fr=(7.5*(f'c)^.5 =	474 psi	**Eq. (9-10)**
Ec = 33*(wc^3*f'c)^.5 =	3,834,254 psi	**Eq. (8.5.1)**
ns=Es/Ec =	7.6	

Gross and Cracked Section Moments of Inertia

I gross = bh^3/12 =	512 in^4
B = b/n As =	7.933 I/in
r = ((n-1)*A's)/(n*As) =	0.000
a = (((2dB(1+rd'/d)+(1+r)^2)^.5)-(1+r))/B =	1.30 inches
Icr = b*a^3/3+n*As*(d-a)^2+(n-1)*A's*(a-d')^2 =	77 in^4

Effective Moments of Inertia

Mcr = fr*Ig/yt =	5.1 ft-k	**Eq. (9-8)**
Mcr/Md =	12.65	
(Mcr/Msus)^3 =	319.643	
(Ie)sus = (Mcr/Ma)^3*Ig+[1-(Mcr/Ma)^3]*Icr < Ig	139220 in^4	**Eq. (9-7)**
(Mc/Md+l)^3 =	102.823	
(Ic)d+l =	44836 In^4	

Initial or short-time deflections, using Eq. (4) — **9.5.2.2** **9.5.2.3**

(ai)d = (K*(5/48)*Mdl^2)/(Ec*(Ie)d) =	0.002 inch
(ai)sus = (K*(5/48)*Msus^2)/(Ec*(Ie)sus) =	0.000 inch
(ai)d+l = (K*(5/48)*Md+l^2)/(Ec*(Ie)d+l) =	0.000 inch
(ai)l = (ai)d+l - (ai)d =	0.002 inch

Long-term deflections at ages 3 mos and 5yrs (ult. Values)

Lamda = (zeta)/(1+50 rho') =	1.770	
a(cp+sh) = Lamda*(ai)sus =	0.000 inch	
a(cp+sh) + (ai)l =	0.002 inch	**Ultimate Value**

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