



civil & structural  
engineering & planning

# STRUCTURAL CALCULATIONS

## Wang & Yang ADU Foundation Design

6450 E Mercer Way  
Mercer Island, WA 98040



03/02/2026

250 4<sup>th</sup> Ave S Ste 200  
Edmonds, WA 98020  
Phone: (425) 778-8500  
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CG Project No.: 25262.10

**Project Description**


During construction, the geotechnical Engineer determined that the soils were soft and provided a geotechnical Report addendum dated November 24, 2025. For this permit revision we are providing structural calculations for this ADU to be supported on a pin piling foundation. We also have designed a grade beam with pin piles to support a proposed masonry block wall per geotech recommendations.

**Scope of Work**

We will provide stamped structural calculations in accordance with the current building code.

**Basis of Design**

Roof	Dead	15 psf
	Live	25 psf (snow)
Upper Floor	Dead	15 psf
	Live	40 psf
Main Floor	Dead	15 psf
	Live	75 psf
2" Pin-Pile Capacity		6000 lbs

 250 4th Ave South Suite 200 Edmonds, WA 98020	Description	Project Summary	By AHB	Date 3/2/2026
			Checked	Date
			Scale NTS	Sheet No.
	Project	Wang-Yang ADU	Job No. 25262	1

## Gravity Design Loads

### Roof DL

Roofing Material	2.5	psf
5/8 Sheathing	1.8	psf
Insulation	1.0	psf
5/8 Gypsum	2.8	psf
Roof Truss @ 24"OC	2.5	psf
M/E	1.0	psf
Misc	1.5	psf

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13.1 psf

USE	15.0	psf
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### Floor DL

Flooring Material	2.0	psf
3/4 Sheathing	2.3	psf
Insulation	1.0	psf
5/8 Gypsum	2.8	psf
TJ1 110 14" @ 16" OC	2.1	psf
M/E	1.0	psf
Misc	1.5	psf

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12.7 psf

USE	15.0	psf
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### Ground Floor DL

Structural Slab	75.0	psf
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75.0 psf

USE	75.0	psf
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### Exterior Walls

Siding	2.0	psf
1/2 Sheathing	1.5	psf
Insulation	1.0	psf
5/8 Gypsum	2.8	psf
2x6 @ 16" OC	1.7	psf
Misc	1.0	psf

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10.0 psf

USE	10.0	psf
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<b>Roof LL (Snow)</b>	25.0	psf
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<b>Floor LL</b>	40.0	psf
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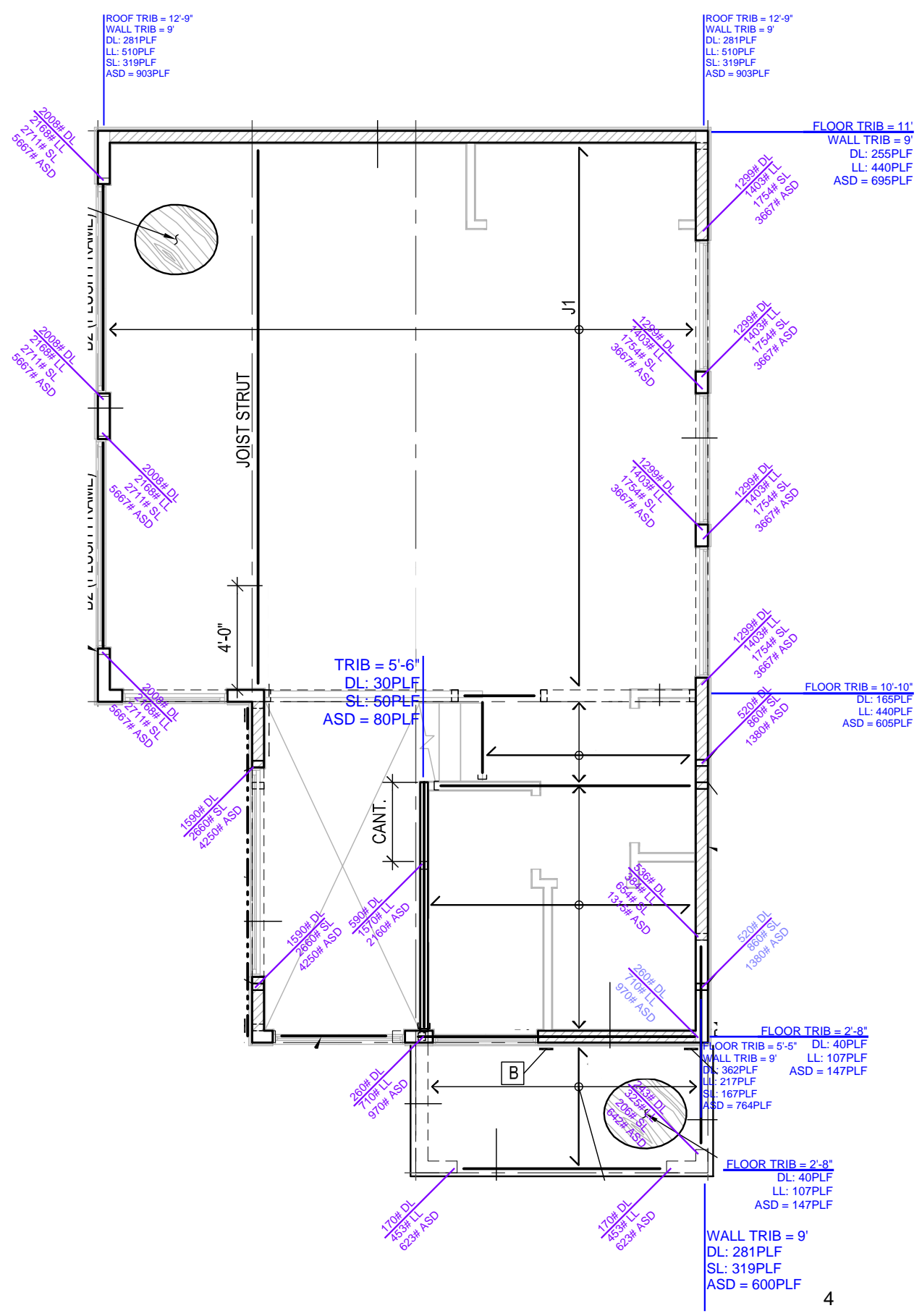
250 4th Ave. South  
Suite 200  
Edmonds, WA 98020

Description	Gravity Design Loads		By	AHB	Date	10/22/25
			Checked		Date	
			Scale		Sheet No.	
Project	Wang-Yang ADU		Job No.	25262		2



# Gravity Key Plan

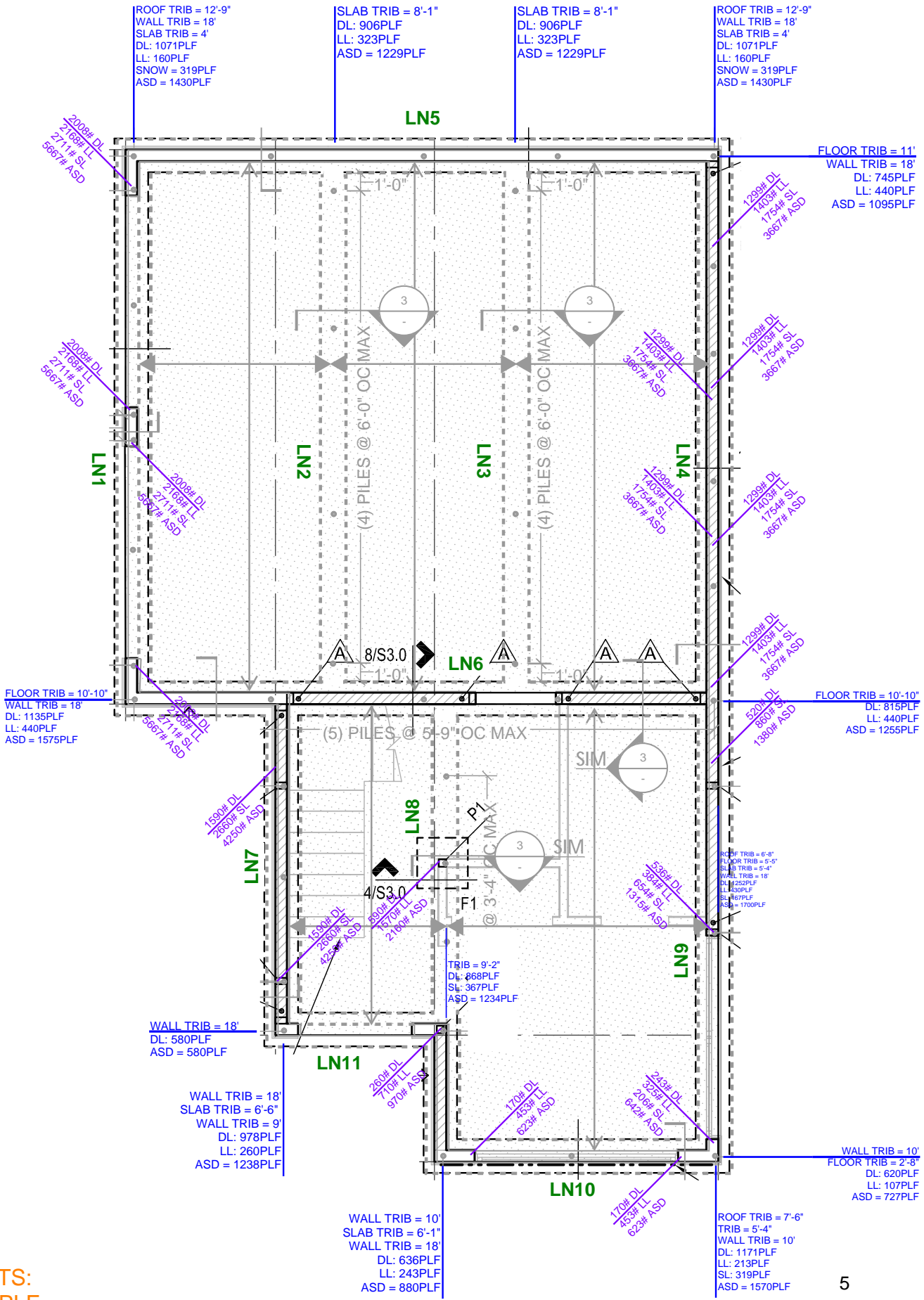
## Upper Floor Framing



NOTE: ALL LOADS ARE CUMULATIVE OF THE LEVELS ABOVE

# Gravity Key Plan

## Foundation Plan



SELF WEIGHTS:  
 EXT FND 400PLF  
 INT FND 300PLF

NOTE: ALL LOADS ARE CUMULATIVE OF THE LEVELS ABOVE

LN1

$$\text{SPACING} = \frac{\text{Pallow}}{w_{\text{max}}}$$

$$6000\text{lb}/1423\text{plf} = 4.2' \text{ MAX}$$

2" PIPE PILE Pallow = 6.0k [per geotech]  
wmax = VARIES, REFER TO KEY PLAN

LN2 and LN3

$$6000\text{lb}/1229\text{plf} = 4.9' \text{ MAX}$$

LN9

$$6000\text{lb}/1700\text{plf} = 4.2' \text{ MAX}$$

LN4

$$6000\text{lb}/1423\text{plf} = 4.2' \text{ MAX}$$

LN10

$$6000\text{lb}/727\text{plf} = 8.25' \text{ MAX}$$

LN5

$$6000\text{lb}/1095\text{plf} = 5.5' \text{ MAX}$$

LN11

$$6000\text{lb}/580\text{plf} = 10.3' \text{ MAX}$$

LN6

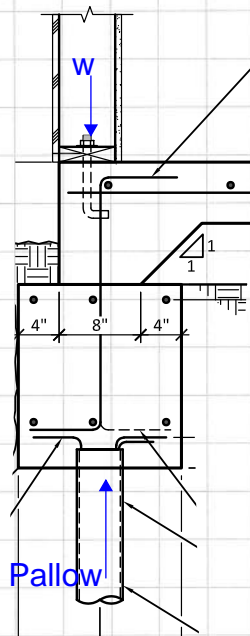
$$6000\text{lb}/1575\text{plf} = 4' \text{ MAX}$$

LN7

$$6000\text{lb}/1238\text{plf} = 4.8' \text{ MAX}$$

LN8

$$6000\text{lb}/1234\text{plf} = 4.8' \text{ MAX}$$



250 4th Ave. South  
Suite 200  
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425.778.8500  
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Description Pin-Pile Spacing

By AHB

Date 10/22/25

Checked

Date

Scale NTS

Sheet No.

Project Wang-Yang ADU

Job No.  
25262

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## STRUCTURAL SLAB DESIGN

Span	10 ft	Live Load	40 PSF
Thickness	6 in		
Rebar Depth	2.5 in		
f'c	2500 psi		
Conc. Weight	150 pcf		
Min. Reinf.	0.0018 ACI 7.12.2.1		

### Design Loads

w = (DL)1.2 + (LL)1.6 =	154 plf	Mu =	1.93 kft
		Vu =	0.77 k

### Moment Design

$$A_s = \frac{Mu}{0.9 f_y d} = 0.190 \text{ sq in req'd}$$

Area of Steel Used = 0.19 sq in

$$\phi_{min} = 0.9 A_s * f_y \left( d - \frac{a}{2} \right) = 1.95$$

$$a = \frac{A_s * f_y}{0.85 f'_c * b} = 0.447$$

Check Moment: Rebar adequate

### Shear Design

$$\phi V_c = 0.75 * 2 \sqrt{f'_c} b w d = 2.25 \text{ k}$$

Check Shear: Rebar adequate

### Summary

#### Major Span Reinforcement

#3 @	7.0	in	O.C.
#4 @	12.4	in	O.C.
#5 @	19.4	in	O.C.
#6 @	27.9	in	O.C.

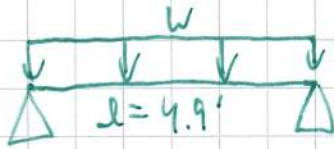
#### Max Shrinkage & Temp. Reinf. Spacing

#3 @	10.2	in	O.C.
#4 @	18.0	in	O.C.
#5 @	18.0	in	O.C.
#6 @	18.0	in	O.C.



Description	Structural Slab Design	By	AHB	Date	10/22/2025
		Checked		Date	
		Scale		Sheet No.	
Project	Wang & Yang Residence	Job No.	25262.1		

LN3



$$D_{slab} = 75 \text{ psf} \quad L = 40 \text{ psf}$$

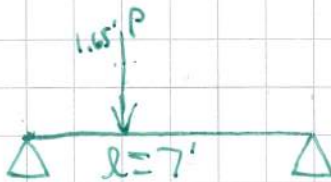
$$W_{D, foot} = 300 \text{ psf}$$

$$\text{Trib} = 8'-1''$$

$$W = 906D + 323L = 1229 \text{ (ASD)}$$

Use 12"x18" concrete w/  
(2)#4 Top. + Bot.

LN4



$$D_{slab} = 75 \text{ psf} \quad L = 40 \text{ psf}$$

$$D_{wall} = 10 \text{ psf}$$

$$D_{roof} = 15 \text{ psf} \quad S = 25 \text{ psf}$$

$$\text{Trib} = 4'$$

$$\text{Trib} = 18'$$

$$\text{Trib} = 12'-9''$$

$$P = 1299D + 1403L + 1754S$$

Use 16"x18" concrete beam  
w/ (3) #4 Top. + Bot.



250 4th Ave. South  
Suite 200  
Edmonds, WA 98020  
425.778.8500  
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Description Concrete beam checks

By AHB

Date 11/21/25

Checked

Date

Scale NTS

Sheet No.

Project Wang and Yang ADU

Job No.

25262.10

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Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Concrete Beam**

Project File: Wang-Yang.ec6

LIC#: KW-06015244, Build:20.24.06.04

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DESCRIPTION: LN3

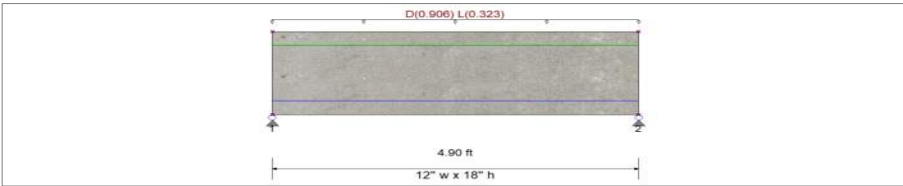
**CODE REFERENCES**

Calculations per ACI 318-19, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2021

**General Information**

$f_c$	=	2.50 ksi	$\phi$ Phi Values	Flexure :	0.90
$f_r = f_c^{1/2} \cdot 7.50$	=	375.0 psi		Shear :	0.750
$\gamma$ Density	=	145.0 pcf	$\beta_1$	=	0.850
$\lambda$ LWT Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
$f_y$ - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #	=	3
			Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = A



**Cross Section & Reinforcing Details**

Rectangular Section, Width = 12.0 in, Height = 18.0 in  
 Span #1 Reinforcing....

2-#4 at 3.0 in from Bottom, from 0.0 to 4.90 ft in this span      2-#4 at 3.0 in from Top, from 0.0 to 4.90 ft in this span

**Load for Span Number 1**

Uniform Load : D = 0.9060, L = 0.3230 k/ft, Tributary Width = 1.0 ft

**DESIGN SUMMARY**

Design OK

Maximum Bending Stress Ratio =	0.169 : 1		
Section used for this span	Typical Section		
Mu : Applied	4,814 k-ft		
Mn * Phi : Allowable	28,504 k-ft		
Location of maximum on span	2.454 ft		
Span # where maximum occurs	Span # 1		
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.000 in	Ratio = 0	<360.0 L Only
Max Upward Transient Deflection	0.000 in	Ratio = 0	<360.0 L Only
Max Downward Total Deflection	0.000 in	Ratio = 0	<180.0 Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio = 0	<180.0 Span: 1 : +D+L

**Vertical Reactions**

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.011	3.011
Max Upward from Load Combinations	3.011	3.011
Max Upward from Load Cases	2.220	2.220
D Only	2.220	2.220
+D+L	3.011	3.011
+D+0.750L	2.813	2.813
+0.60D	1.332	1.332
L Only	0.791	0.791

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Concrete Beam**

Project File: Wang-Yang.ec6

LIC#: KW-06015244, Build:20.24.06.04

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DESCRIPTION: LN3

**Shear Stirrup Requirements**

Entire Beam Span Length : Vu <= Phi\*lambda\*sqrt(fc)\*bw\*d, Req'd Vs = Not Req'd per 9.3.6.1, Stirrups are not required.

**Detailed Shear Information**

Load Combination	Span Number	Distance 'd' (ft)	(in)	Vu Actual (k)	Design (k)	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
+1.20D+1.60L	1	0.00	15.00	3.93	3.93	0.00	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.05	15.00	3.84	3.84	0.21	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.11	15.00	3.76	3.76	0.41	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.16	15.00	3.67	3.67	0.61	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.21	15.00	3.59	3.59	0.80	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.27	15.00	3.50	3.50	0.99	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.32	15.00	3.41	3.41	1.18	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.37	15.00	3.33	3.33	1.36	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.43	15.00	3.24	3.24	1.54	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.48	15.00	3.16	3.16	1.71	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.54	15.00	3.07	3.07	1.87	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.59	15.00	2.98	2.98	2.04	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.64	15.00	2.90	2.90	2.19	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.70	15.00	2.81	2.81	2.35	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.75	15.00	2.73	2.73	2.50	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.80	15.00	2.64	2.64	2.64	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.86	15.00	2.56	2.56	2.78	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.91	15.00	2.47	2.47	2.91	1.00	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	0.96	15.00	2.38	2.38	3.04	0.98	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.02	15.00	2.30	2.30	3.17	0.91	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.07	15.00	2.21	2.21	3.29	0.84	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.12	15.00	2.13	2.13	3.41	0.78	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.18	15.00	2.04	2.04	3.52	0.73	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.23	15.00	1.95	1.95	3.62	0.67	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.29	15.00	1.87	1.87	3.73	0.63	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.34	15.00	1.78	1.78	3.82	0.58	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.39	15.00	1.70	1.70	3.92	0.54	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.45	15.00	1.61	1.61	4.01	0.50	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.50	15.00	1.52	1.52	4.09	0.47	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.55	15.00	1.44	1.44	4.17	0.43	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.61	15.00	1.35	1.35	4.24	0.40	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.66	15.00	1.27	1.27	4.31	0.37	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.71	15.00	1.18	1.18	4.38	0.34	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.77	15.00	1.10	1.10	4.44	0.31	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.82	15.00	1.01	1.01	4.50	0.28	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.87	15.00	0.92	0.92	4.55	0.25	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.93	15.00	0.84	0.84	4.60	0.23	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	1.98	15.00	0.75	0.75	4.64	0.20	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.03	15.00	0.67	0.67	4.68	0.18	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.09	15.00	0.58	0.58	4.71	0.15	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.14	15.00	0.49	0.49	4.74	0.13	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.20	15.00	0.41	0.41	4.76	0.11	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.25	15.00	0.32	0.32	4.78	0.08	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.30	15.00	0.24	0.24	4.80	0.06	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.36	15.00	0.15	0.15	4.81	0.04	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.41	15.00	0.06	0.06	4.81	0.02	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.46	15.00	-0.02	0.02	4.81	0.01	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.52	15.00	-0.11	0.11	4.81	0.03	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.57	15.00	-0.19	0.19	4.80	0.05	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.62	15.00	-0.28	0.28	4.79	0.07	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.68	15.00	-0.37	0.37	4.77	0.10	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.73	15.00	-0.45	0.45	4.75	0.12	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.78	15.00	-0.54	0.54	4.72	0.14	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.84	15.00	-0.62	0.62	4.69	0.17	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0
+1.20D+1.60L	1	2.89	15.00	-0.71	0.71	4.66	0.19	6.30	Vu <= Phi*lambda*sqrt(fc)*bw*d	Req'd	pei	6.3 0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Concrete Beam**

Project File: Wang-Yang.ec6

LIC#: KW-06015244, Build:20.24.06.04

CG ENGINEERING

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DESCRIPTION: LN3

**Detailed Shear Information**

Load Combination	Span Number	Span Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
		(ft)	(in)	Actual	Design							
+1.20D+1.60L	1	2.95	15.00	-0.79	0.79	4.62	0.22	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.00	15.00	-0.88	0.88	4.57	0.24	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.05	15.00	-0.97	0.97	4.52	0.27	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.11	15.00	-1.05	1.05	4.47	0.29	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.16	15.00	-1.14	1.14	4.41	0.32	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.21	15.00	-1.22	1.22	4.35	0.35	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.27	15.00	-1.31	1.31	4.28	0.38	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.32	15.00	-1.40	1.40	4.21	0.41	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.37	15.00	-1.48	1.48	4.13	0.45	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.43	15.00	-1.57	1.57	4.05	0.48	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.48	15.00	-1.65	1.65	3.96	0.52	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.53	15.00	-1.74	1.74	3.87	0.56	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.59	15.00	-1.83	1.83	3.78	0.60	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.64	15.00	-1.91	1.91	3.68	0.65	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.70	15.00	-2.00	2.00	3.57	0.70	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.75	15.00	-2.08	2.08	3.46	0.75	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.80	15.00	-2.17	2.17	3.35	0.81	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.86	15.00	-2.25	2.25	3.23	0.87	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.91	15.00	-2.34	2.34	3.11	0.94	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	3.96	15.00	-2.43	2.43	2.98	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.02	15.00	-2.51	2.51	2.85	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.07	15.00	-2.60	2.60	2.71	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.12	15.00	-2.68	2.68	2.57	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.18	15.00	-2.77	2.77	2.42	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.23	15.00	-2.86	2.86	2.27	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.28	15.00	-2.94	2.94	2.12	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.34	15.00	-3.03	3.03	1.96	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.39	15.00	-3.11	3.11	1.79	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.44	15.00	-3.20	3.20	1.62	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.50	15.00	-3.29	3.29	1.45	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.55	15.00	-3.37	3.37	1.27	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.61	15.00	-3.46	3.46	1.09	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.66	15.00	-3.54	3.54	0.90	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.71	15.00	-3.63	3.63	0.71	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.77	15.00	-3.72	3.72	0.51	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.82	15.00	-3.80	3.80	0.31	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0
+1.20D+1.60L	1	4.87	15.00	-3.89	3.89	0.10	1.00	6.30	Vu <= Phi*lambda*t Req'd	pei	6.3	0.0

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)			
				Mu : Max	Phi*Mnx	Stress Ratio	
MAXimum BENDING Envelope							
Span # 1		1	4.900		4.81	28.50	0.17
+1.40D							
Span # 1		1	4.900		3.81	28.50	0.13
+1.20D+1.60L							
Span # 1		1	4.900		4.81	28.50	0.17
+1.20D+0.50L							
Span # 1		1	4.900		3.75	28.50	0.13
+1.20D							
Span # 1		1	4.900		3.26	28.50	0.11
+0.90D							
Span # 1		1	4.900		2.45	28.50	0.09

**Overall Maximum Deflections**

Load Combination	Span	Max. "+" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L	1	0.0009	2.450		0.0000	0.000



Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Concrete Beam**

Project File: Wang-Yang.ec6

LIC#: KW-06015244, Build:20.24.06.04

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DESCRIPTION: LN4

**Detailed Shear Information**

Load Combination	Span Distance 'd'		Vu (k)		Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in)		
	Number	(ft)	(in)	Actual								Design	Req'd
+1.20D+0.50L+1.60S	1	3.90	15.00	-1.19	1.19	3.70	0.40	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	3.98	15.00	-1.19	1.19	3.61	0.41	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.05	15.00	-1.19	1.19	3.52	0.42	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.13	15.00	-1.19	1.19	3.43	0.44	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.21	15.00	-1.19	1.19	3.33	0.45	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.28	15.00	-1.19	1.19	3.24	0.46	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.36	15.00	-1.19	1.19	3.15	0.47	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.44	15.00	-1.19	1.19	3.06	0.49	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.51	15.00	-1.19	1.19	2.97	0.50	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.59	15.00	-1.19	1.19	2.88	0.52	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.67	15.00	-1.19	1.19	2.79	0.54	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.74	15.00	-1.19	1.19	2.70	0.55	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.82	15.00	-1.19	1.19	2.60	0.57	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.90	15.00	-1.19	1.19	2.51	0.59	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	4.97	15.00	-1.19	1.19	2.42	0.62	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.05	15.00	-1.19	1.19	2.33	0.64	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.13	15.00	-1.19	1.19	2.24	0.67	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.20	15.00	-1.19	1.19	2.15	0.70	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.28	15.00	-1.19	1.19	2.06	0.73	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.36	15.00	-1.19	1.19	1.96	0.76	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.43	15.00	-1.19	1.19	1.87	0.80	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.51	15.00	-1.19	1.19	1.78	0.84	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.58	15.00	-1.19	1.19	1.69	0.88	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.66	15.00	-1.19	1.19	1.60	0.93	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.74	15.00	-1.19	1.19	1.51	0.99	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.81	15.00	-1.19	1.19	1.42	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.89	15.00	-1.19	1.19	1.32	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	5.97	15.00	-1.19	1.19	1.23	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.04	15.00	-1.19	1.19	1.14	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.12	15.00	-1.19	1.19	1.05	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.20	15.00	-1.19	1.19	0.96	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.27	15.00	-1.19	1.19	0.87	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.35	15.00	-1.19	1.19	0.78	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.43	15.00	-1.19	1.19	0.69	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.50	15.00	-1.19	1.19	0.59	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.58	15.00	-1.19	1.19	0.50	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.66	15.00	-1.19	1.19	0.41	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.73	15.00	-1.19	1.19	0.32	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.81	15.00	-1.19	1.19	0.23	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.89	15.00	-1.19	1.19	0.14	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0
+1.20D+0.50L+1.60S	1	6.96	15.00	-1.19	1.19	0.05	1.00	8.74	Vu <= Phi*lambda*t	Reqd	per	8.7	0.0

**Maximum Forces & Stresses for Load Combinations**

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	7.000			
+1.40D			6.38	41.90	0.15
Span # 1	1	7.000			
+1.20D+1.60L			2.29	41.90	0.05
Span # 1	1	7.000			
+1.20D+1.60L+0.50S			4.79	41.90	0.11
Span # 1	1	7.000			
+1.20D+0.50L			5.89	41.90	0.14
Span # 1	1	7.000			
+1.20D			2.85	41.90	0.07
Span # 1	1	7.000			
+1.20D+0.50L+1.60S			1.96	41.90	0.05
Span # 1	1	7.000			
+1.20D+1.60S			6.38	41.90	0.15
Span # 1	1	7.000			
+1.20D+1.60S			5.50	41.90	0.13

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Concrete Beam**

Project File: Wang-Yang.ec6

LIC#: KW-06015244, Build:20.24.06.04

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DESCRIPTION: LN4

Load Combination Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft)		
			Mu : Max	Phi*Mnx	Stress Ratio
+1.20D+0.50L+0.50S					
Span # 1	1	7.000	3.95	41.90	0.09
+1.20D+0.50L+0.70S					
Span # 1	1	7.000	4.39	41.90	0.10
+0.90D					
Span # 1	1	7.000	1.47	41.90	0.04

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750L+0.750S	1	0.0012	3.041		0.0000	0.000

**From:** merit@meritengineering.com  
**Sent:** Monday, October 27, 2025 11:36 AM  
**To:** Greg Guillen  
**Cc:** Mitch Delap; Nahum Estrada  
**Subject:** Re: Wang & Yang Residence

Hi Greg:

We are fine with the load, as long as refusal is reached on till soil, which is expected at depths greater than 10 feet.

Thanks,

---

Alex Y. Yu, Project Engineer,  
Civil Engineer  
Merit Engineering, Inc.  
10129 Main St., #201  
Bellevue, WA 98004  
(T) 360-389-7893  
<http://www.MeritEngineering.com>

On Oct 27, 2025, at 10:04 AM, Greg Guillen <[GregO@cgengineering.com](mailto:GregO@cgengineering.com)> wrote:

Hi Alex,  
We hope to achieve a working load of 6,000 pounds per 2” pipe pile driven to refusal.  
This is what we typically use in the city of Seattle.

Let us know if you have any issues with proceeding with this design load as we will need to submit for a permit revision soon to keep the project going.

Thanks,

<image002.png>**Greg Guillen, PE, SE, Principal**  
CG Engineering | p. 425.778.8500 | [www.cgengineering.com](http://www.cgengineering.com)

---

**From:** [merit@meritengineering.com](mailto:merit@meritengineering.com) <[merit@meritengineering.com](mailto:merit@meritengineering.com)>  
**Sent:** Monday, October 27, 2025 9:51 AM  
**To:** Mitch Delap <[MitchD@cgengineering.com](mailto:MitchD@cgengineering.com)>  
**Cc:** Greg Guillen <[GregO@cgengineering.com](mailto:GregO@cgengineering.com)>  
**Subject:** Re: Wang & Yang Residence

Hi Mitch:

We are in the process of scheduling the field work and will provide the parameters upon completion. I will keep you updated.

Thanks,

\_\_\_\_\_  
[SEP] [SEP]  
Alex Y. Yu, Project Engineer,  
[SEP] [SEP] Civil Engineer [SEP] [SEP]  
Merit Engineering, Inc.  
[SEP] [SEP] 10129 Main St., #201  
[SEP] [SEP] Bellevue, WA 98004 [SEP] [SEP]  
(T) 360-389-7893 [SEP] [SEP]  
<http://www.MeritEngineering.com>

On Oct 24, 2025, at 5:06 PM, Mitch Delap  
<[MitchD@cgengineering.com](mailto:MitchD@cgengineering.com)> wrote:

Good afternoon,

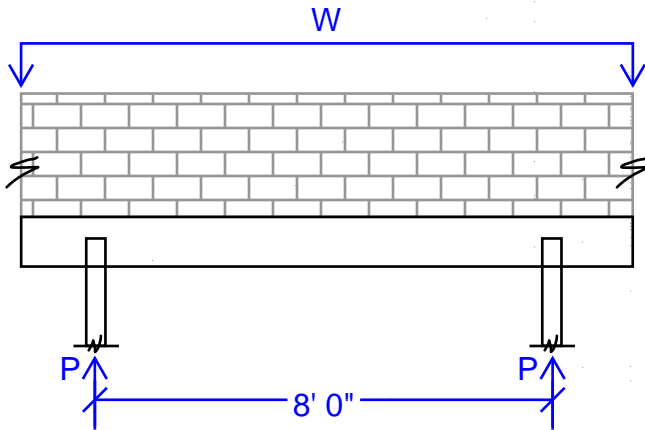
We are currently working on the foundation design for the Wang & Yang Residence ADU and would like to confirm the load capacity and design parameters for the 2" pin-pile supports proposed for the foundation.

Could you please provide the allowable load information for the piles?

Respectfully,

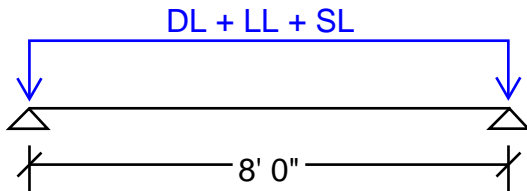
<image003.png> **Mitch Delap EIT, Design Engineer**  
CG Engineering | p. 425.778.8500 | [www.cgengineering.com](http://www.cgengineering.com)

GRADE BEAM



$$W = (100 \text{ PCF})(8'')(4' 0'') \\ = 270 \text{ PLF [ASD, DL]}$$

$$P = 2160 \text{ LB} < 6000 \text{ LB... OK}$$



WALL LOAD: (270 DL) PLF  
TOTAL LRFD LOAD: 324 PLF (1.2DL)

$$V_u = (324 \text{ PLF})(8 \text{ FT})/2 = 1296 \text{ LB}$$

$$V_n = 9600 \text{ LB... OK}$$

ACI 318-19 TABLE 14.5.5.1

$$M_u = WL^2/8 = (324 \text{ PLF})(8 \text{ FT})^2/8 = 2592 \text{ LB-FT}$$

$$M_n = 72000 \text{ LB-FT... OK}$$

ACI 318-19 EQ 14.5.2.1a

12"x12"xCONTINUOUS GRADE BEAM  
W/ PIPE PILE AT 8' OC ADEQUATE



250 4th Ave. South  
Suite 200  
Edmonds, WA 98020  
425.778.8500  
www.cgeengineering.com

Description	WALL GRADE BEAM	By	SPM	Date	03.02.26
		Checked		Date	
Project	WANG & YANG	Scale		Sheet No.	15
		Job No.	25262.10		