

Oct 09 2020

WEST COAST CODE CONSULTANTS



1729B Telegraph Avenue
Oakland, CA 94612

(510) 473-2221

STRUCTURAL CALCULATIONS:

PROJECT NO.:
18219

PROJECT NAME:
Patel Residence

PROJECT TYPE:
New Construction

PROJECT ADDRESS:
Lot 15, Ruby Hills
City of Pleasanton, CA 94566

ARCHITECT:
Arris Studio Architects
1306 Johnson Avenue
San Luis Obispo, CA 93401

PROJECT ENGINEER:
Thaddeus Holmes

DATE:
March 3, 2019

REVIEWED

CITY OF PLEASANTON
BUILDING DIVISION

JOB COPY

PERMIT NO.: B20-1140

DATE: 12/09/2020

INITIALS: For: WC3 - LA





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DESIGN PARAMETERS

Code: 2016 CBC (based upon the 2015 IBC)

Design Materials :

(Please refer to General Notes & Specifications for more detailed information)

Wood : Douglas Fir-Larch

Foundations:

Concrete	2500 psi
Rebar	60 ksi

Steel :

Wideflanges	50 ksi
Tubes	46 ksi
Pipes	35 ksi
Plates, Bars, Etc.	36 ksi
Frame Flange Plates	50 ksi

Bolts : A307 (UNO)

Welds: E70XX

Note:

The intent of lateral design is to prevent structural failures, in the event of seismic activities or high-winds, but not to prevent the damage of architectural finishes or systems. The lateral calculations herein conform to the specifications of the current California Building Code (CBC). Ashley & Vance Engineering Inc. provides no guarantees, expressed or implied, as to the adequacy of the CBC provisions.

These calculations, specifications, details and drawings are instruments of service and are the property of Ashley & Vance Engineering Inc. The information contained herein is for use on the specific project referenced above and shall not be used otherwise without the written authorization of Ashley & Vance Engineering Inc.

Job: [18219 - Patel Residence - Arris](#)

Load Sheet

ROOF LOADS

Typical Roof Live Loads	20.0 psf
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Typical Roof Dead Loads

Tile Roof	9.0 psf
1/2" Plywood	1.7 psf
Wood Framing	3.8 psf
Ceiling Framing	3.3 psf
10" Batt Insulation	0.8 psf
5/8" Gyp. Board Ceiling	2.8 psf
Misc. Mechanical	1.6 psf
Total Dead Load	23.0 psf

FLOOR LOADS

Typical Floor Live Loads	40.0 psf
--------------------------	----------

Typical Floor Dead Loads

Tile Over Thinset	10.5 psf
3/4" Plywood	2.5 psf
Open Web Truss Framing	3.5 psf
10" Batt Insulation	0.8 psf
5/8" Gyp. Board Ceiling	2.8 psf
Misc. Loads	1.7 psf
Total Dead Load	22 psf

CEILING LOADS

Typical Ceiling Live Load	10.0 psf
Typical Garage Dead Loads	
Wood Framing	3.3 psf
10" Batt Insulation	0.8 psf
5/8" Gyp. Board Ceiling	2.8 psf
Misc. Loads	1.6 psf
Total Dead Load	8.5 psf



Job: 18219 - Patel Residence - Arris

Criteria Sheet

DEFLECTION CRITERIA:

Construction	L	S	E W	D + L
Roof	360	360	360	240
Floor	360	---	---	240
Exterior Walls	---	---	240	---
Interior Partitions	240	---	---	---

LOAD CASE LEGEND

ASCE 07-10 Equations

- 2 16-9 D+L
 3 16-10a D+Lr|S
 4 16-11a D+0.75[L+Lr|S]
 5w 16-12a D+0.6W
 5e 16-12b $(1.0+0.14*S_{DS})D+0.7\Omega_0E$ *
 6 16-13c $(1.0+0.105*S_{DS})D+0.75[0.7\Omega_0E+L+Lr|S]$ *
 7 16-14 0.6D-0.6W
 8 16-15 $(0.6-0.14*S_{DS})D-0.7\Omega_0E$ *

*Factors containing S_{DS} equals 1 with no Seismic load

SEISMIC CRITERIA

 S_{DS} = 1.006 (link from seismic sheet) Ω_0 = 2.5

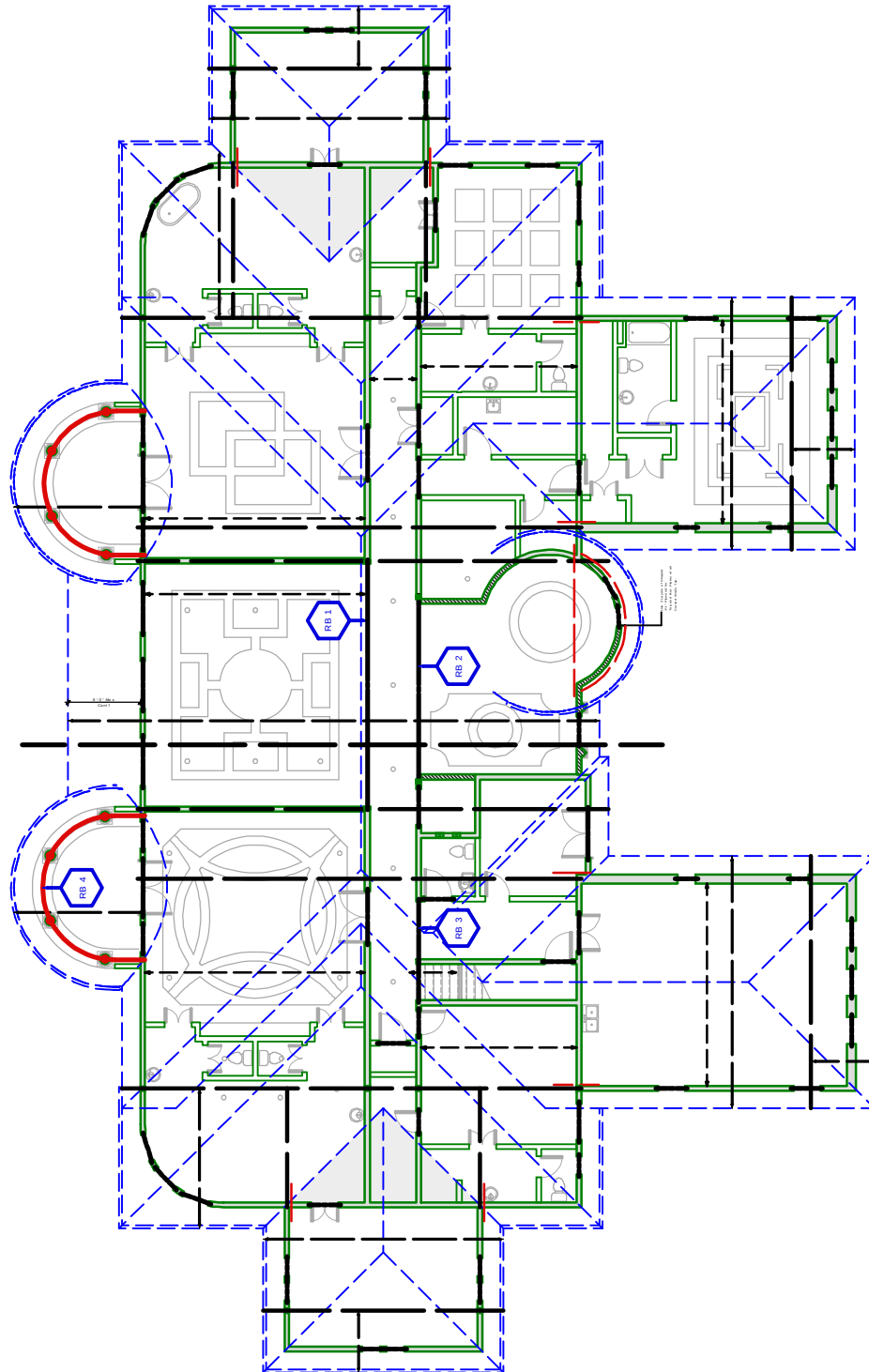
LOAD MATRIX

5r = 5 ft of roof trib

Description:		D	L _R	L	L ₂	S	W	E	
1r = 1 ft of roof trib	Roof	23	20	0	0	0	0	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	0	0	0	0	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	11	0	60	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	0	psf

**Patel Residence**1989 Ticino Court
Pleasanton, CA

Job No.: 18219

Roof Framing Layout


Job: 18219 - Patel Residence - Arris
Beam/Joist Input Data

Description:		D	L _R	L	
1r = 1 ft of roof trib	Roof	23	20	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	psf
4d = 4 ft of deck trib	Deck	11	0	60	psf
5w = 5 ft of wall trib	Wall	10	0	0	psf

 $S_{DS} = 1.006$
 $\Omega_0 = 2.5$
CEILING JOISTS
adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D (psf)	L _R (psf)	L (psf)	Span/Load Type	JOIST DESIGN			
		L/X _a (ft)	L _u /X _b (ft)								
CJ 1	0.0 r			0	0	0		2x12 D.F. #1 @ 16" o.c.			
	0.0 f			0	0	0			Force	Loc(ft)	%Max
	1.0 c			9	0	10		Bending	-1.3kft	12.0	93%
	0.0 d			0	0	0		Shear	-222#	0	15%
	0.0 w			0	0	0					
	Spans							REACTIONS	Loc(ft)	M(k*ft)	Rmin
1	24.0	8.0	9	0	10	Simple Span	Roller 1	0	---	61plf	222plf
							Roller 2	24	---	61plf	222plf
Additional Loads											
							DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max
							Max(ASD)	---	0.61	12.0	---
							L 360	875	0.33	12.0	41%
							E W S 360	---	0.00	0.0	---
							D+L 240	473	0.61	12.0	51%

Job: **18219 - Patel Residence - Arris**

Beam/Joist Input Data

Description:		D	L _R	L	
1r = 1 ft of roof trib	Roof	23	20	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	psf
4d = 4 ft of deck trib	Deck	11	0	60	psf
5w = 5 ft of wall trib	Wall	10	0	0	psf

S_{DS} = 1.006Ω₀ = 2.5

ROOF BEAMS

adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D (plf)	L _R (plf)	L (plf)	Span/Load Type		BEAM DESIGN			
		L/X _a (ft)	L _u /X _b (ft)									
RB 1	15.5 r			357	310	0			GLB 5-1/2" x 21"			
	0.0 f			0	0	0			Force	Loc(ft)	%Max	
	0.0 c			0	0	0		Bending	-60kft	13.5	77%	
	0.0 d			0	0	0		Shear	-8,910#	0	35%	
	4.0 w			40	0	0						
	Spans							REACTIONS	Loc(ft)	M(k*ft)	R _{min}	R _{max}
	1	27.0	27.0	397	310	0	Simple Span	Roller 1	0	---	2,835#	8,910#
								Roller 2	27	---	2,835#	8,910#
	Additional Loads							DEFLECTIONS	I / x	Defl _(in)	Loc(ft)	%Max
								Max(ASD)	---	1.03	13.5	---
								L 360	668	0.49	13.5	54%
								E W S 360	---	0.00	0.0	---
								D+L 240	314	1.03	13.5	77%
RB 2	10.0 r			230	200	0			GLB 5-1/2" x 13-1/2"			
	0.0 f			0	0	0			Force	Loc(ft)	%Max	
	0.0 c			0	0	0		Bending	-21kft	10.0	52%	
	0.0 d			0	0	0		Shear	-4,100#	0	25%	
	1.0 w			10	0	0						
	Spans							REACTIONS	Loc(ft)	M(k*ft)	R _{min}	R _{max}
	1	20.0	20.0	240	200	0	Simple Span	Roller 1	0	---	1,260#	4,100#
								Roller 2	20	---	1,260#	4,100#
	Additional Loads							DEFLECTIONS	I / x	Defl _(in)	Loc(ft)	%Max
								Max(ASD)	---	0.73	10.0	---
								L 360	677	0.35	10.0	53%
								E W S 360	---	0.00	0.0	---
								D+L 240	330	0.73	10.0	73%
RB 3 worst Case Hdr.	15.5 r			357	310	0			6x8 D.F. #1			
	0.0 f			0	0	0			Force	Loc(ft)	%Max	
	0.0 c			0	0	0		Bending	-3.5kft	3.3	54%	
	0.0 d			0	0	0		Shear	-2,145#	0	37%	
	4.0 w			40	0	0						
	Spans							REACTIONS	Loc(ft)	M(k*ft)	R _{min}	R _{max}
	1	6.5	6.5	397	310	0	Simple Span	Roller 1	0	---	683#	2,145#
								Roller 2	7	---	683#	2,145#
	Additional Loads							DEFLECTIONS	I / x	Defl _(in)	Loc(ft)	%Max
								Max(ASD)	---	0.09	3.25	---
								L 360	1938	0.04	3.25	19%
								E W S 360	---	0.00	0.0	---
								D+L 240	910	0.09	3.25	26%

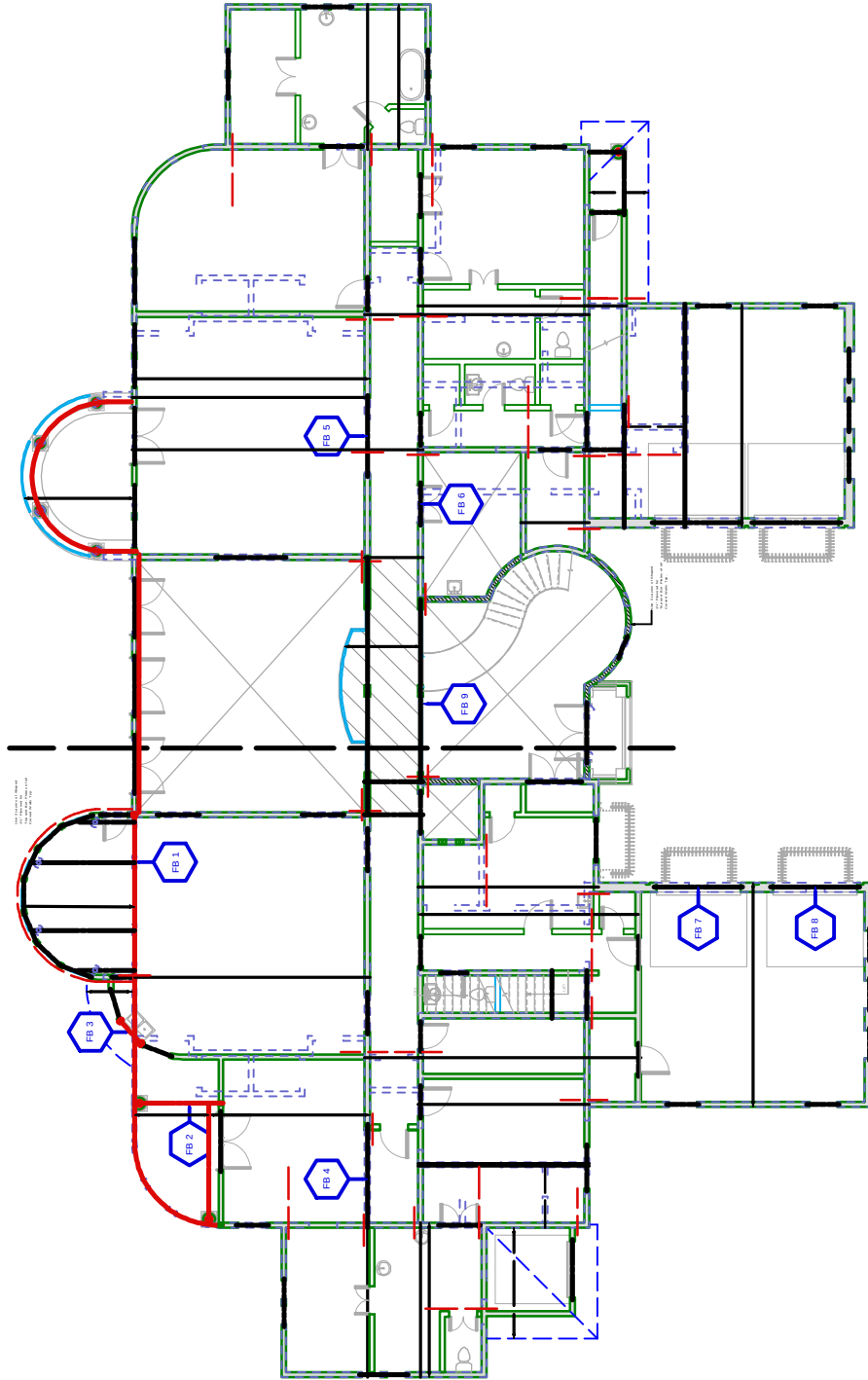

Job: 18219 - Patel Residence - Arris
Beam/Joist Input Data

Description:		D	L _R	L	
1r = 1 ft of roof trib	Roof	23	20	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	psf
4d = 4 ft of deck trib	Deck	11	0	60	psf
5w = 5 ft of wall trib	Wall	10	0	0	psf

 $S_{DS} = 1.006$
 $\Omega_0 = 2.5$
ROOF BEAMS
adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D (plf)	L _R (plf)	L (plf)	Span/Load Type	BEAM DESIGN					
		L/X _a (ft)	L _u /X _b (ft)										
RB 4	17.3 r			397	345	0			HSS8X4X1/8				
	0.0 f			0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0		Bending	-5.1kft	3.6	35%		
	0.0 d			0	0	0		Shear	2,834#	7.25	10%		
	4.0 w			40	0	0							
I								REACTIONS		Loc(ft)	M(k*ft)	Rmin	Rmax
	1	7.3	7.3	437	345	0	Simple Span	Roller	1	0	---	950#	2,834#
								Roller	2	7	---	950#	2,834#
Additional Loads													
								DEFLECTIONS		I / x	Defl _(in)	Loc(ft)	%Max
								Max(ASD)		---	0.07	3.63	---
							L 360	2694	0.03	3.63	13%		
							E W S 360	---	0.00	0.0	---		
							D+L 240	1189	0.07	3.63	20%		

Floor Framing Layout



Job: **18219 - Patel Residence - Arris**

Beam/Joist Input Data

Description:		D	L _R	L	L ₂	S	W	E	
1r = 1 ft of roof trib	Roof	23	20	0	0	0	0	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	0	0	0	0	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	11	0	60	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	0	psf

S_{DS} = 1.006Q_o = 2.5

FLOOR BEAMS

adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D	L _R	L	L ₂	S	W	E	Span/Load Type		BEAM DESIGN					
		L/X _a (ft)	L _u /X _b (ft)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)								
FB 1	19.5 r			449	390	0	0	0	0	0			W14X43					
	17.9 f			390	0	715	0	0	0	0				Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	97kft	11.3	73%		
	0.0 d			0	0	0	0	0	0	0			Shear	-25.3k	11.250001	34%		
	1.0 w			10	0	0	0	0	0	0			Ω InvEW Skip Loading Considered					
	Spans											REACTIONS		Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	4.3	4.3	848	390	715	0	0	0	0	0	Cantilever	Free	1	0	---	0	0
	2	7.0	7.0	848	390	715	0	0	0	0	0	Simple Span	Roller	2	4	---	-18.1k	28.5k
	3	23.5	23.5	848	390	715	0	0	0	0	0	Simple Span	Roller	3	11	0	-11.6k	46.1k
													Roller	4	35	0	2,283#	15.4k
Additional Loads																		
sw 31	1	0.3								6.4k	Point Load	DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max		
sw 31	2	17.5								-6.397#	Point Load	Max(ASD)	---	0.50	23.78	---		
Girder T.	3	4.3		2.4k	2.1k						Point Load	L 360	821	0.34	23.78	44%		
Curve	4	0.0		1.8k	800#	1.6k					Point Load	E W S ---	---	0.00	0.0	---		
												D+L 240	483	0.58	23.78	50%		
FB 2	0.0 r			0	0	0	0	0	0	0			W14X22					
	1.5 f			33	0	60	0	0	0	0				Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	25kft	8.5	31%		
	0.0 d			0	0	0	0	0	0	0			Shear	-25.4k	8.500001	45%		
	1.0 w			10	0	0	0	0	0	0			Ω InvEW Skip Loading Considered					
	Spans											REACTIONS		Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	8.5	8.5	43	0	60	0	0	0	0	0	Simple Span	Roller	1	0			
	2	1.0	1.0	43	0	60	0	0	0	0	0	Cantilever	Roller	2	9			
													Free	3	10			
	Additional Loads																	
FB 1	1	9.5		6.0k	4.0k	3.7k	0	0	0	11.9k	Point Load	DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max		
												Max(ASD)	---	-0.03	4.82	---		
												L 360	4529	-0.01	9.5	8%		
												E W S ---	---	0.00	0.0	---		
												D+L 240	2762	-0.01	9.5	9%		
FB 3	5.0 r			115	100	0	0	0	0	0			W8X15					
	10.0 f			218	0	400	0	0	0	0				Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-28kft	1.5	82%		
	0.0 d			0	0	0	0	0	0	0			Shear	-19.2k	0	54%		
	2.0 w			20	0	0	0	0	0	0			Ω InvEW Skip Loading Considered					
	Spans											REACTIONS		Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	3.0	3.0	353	100	400	0	0	0	0	0	Simple Span	Roller	1	0	---	5,414# x	
													Roller	2	3	---	5,414#	19.2k
	Additional Loads																	
FB 1	1	1.5		17.7k	8.8k	16.0k				-11.265#	Point Load	DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max		
												Max(ASD)	---	0.03	1.5	---		
												L 360	2009	0.02	1.5	18%		
												E W S ---	-4577	-0.01	1.5	---		
												D+L 240	1172	0.03	1.5	20%		

Job: **18219 - Patel Residence - Arris**

Beam/Joist Input Data

Description:		D	L _R	L	L ₂	S	W	E	
1r = 1 ft of roof trib	Roof	23	20	0	0	0	0	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	0	0	0	0	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	11	0	60	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	0	psf

S_{DS} = 1.006Ω₀ = 2.5

FLOOR BEAMS

adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D	L _R	L	L ₂	S	W	E	Span/Load Type		BEAM DESIGN				
		L/X _a (ft)	L _u /X _b (ft)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)							
FB 4	10.5 r			242	210	0	0	0	0	0			(1)-1 3/4" x 16" LVL				
	10.5 f			229	0	420	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-12kft	5.0	72%	
	0.0 d			0	0	0	0	0	0	0			Shear	-4,765#	0	85%	
	1.0 w			10	0	0	0	0	0	0							
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	10.0	1.0	480	210	420	0	0	0	0	Simple Span	Roller 1	0	---	1,441#	4,765#	
												Roller 2	10	---	1,441#	4,765#	
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
												Max(ASD)	---	0.18	5.0	---	
												L 360	1011	0.12	5.0	36%	
												E W S	---	0.00	0.0	---	
												D+L 240	574	0.21	5.0	42%	
FB 5	15.0 r			345	300	0	0	0	0	0			6x12 D.F. #1				
	15.0 f			327	0	600	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-11kft	4.1	80%	
	0.0 d			0	0	0	0	0	0	0			Shear	-5,536#	0	73%	
	4.0 w			40	0	0	0	0	0	0							
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	8.3	8.3	712	300	600	0	0	0	0	Simple Span	Roller 1	0	---	1,651#	5,536#	
												Roller 2	8	---	1,651#	5,536#	
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
												Max(ASD)	---	0.13	4.13	---	
												L 360	1177	0.08	4.13	31%	
												E W S	---	0.00	0.0	---	
												D+L 240	676	0.15	4.13	36%	
FB 6	0.0 r			0	0	0	0	0	0	0			4x10 D.F. #1				
	10.0 f			218	0	400	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-4.6kft	5.0	82%	
	0.0 d			0	0	0	0	0	0	0			Shear	-1,850#	0	41%	
	1.0 w			10	0	0	0	0	0	0							
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	10.0	10.0	228	0	400	0	0	0	0	Simple Span	Roller 1	0	---	360#	1,850#	
												Roller 2	10	---	360#	1,850#	
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
												Max(ASD)	---	0.21	5.0	---	
												L 360	1046	0.11	5.0	34%	
												E W S	---	0.14	5.0	---	
												D+L 240	654	0.18	5.0	37%	

Job: **18219 - Patel Residence - Arris**

Beam/Joist Input Data

Description:		D	L _R	L	L ₂	S	W	E	
1r = 1 ft of roof trib	Roof	23	20	0	0	0	0	0	psf
2f = 2 ft of floor trib	Floor	21.8	0	40	0	0	0	0	psf
3c = 3 ft of ceiling trib	Ceiling	8.5	0	10	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	11	0	60	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	0	psf

S_{DS} = 1.006Ω₀ = 2.5

FLOOR BEAMS

adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D	L _R	L	L ₂	S	W	E	Span/Load Type		BEAM DESIGN				
		L/X _a (ft)	L _u /X _b (ft)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)	(plf)							
FB 7	11.5 r			265	230	0	0	0	0	0			GLB 5-1/2" x 10-1/2"				
	11.5 f			251	0	460	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-15kft	5.5	56%	
	0.0 d			0	0	0	0	0	0	0			Shear	7,856#	5.5	49%	
	16.0 w			160	0	0	0	0	0	0			Ω InvEW Considered				
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	9.0	9.0	675	230	460	0	0	0	0	Simple Span	Roller	1	0	---	-628#	5,899#
												Roller	2	9	---	-796#	6,026#
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
SW6	1	3.5							5.9k	Point Load	Max(ASD)	---	0.18	4.5	---		
SW7	2	5.5							-5.927#	Point Load	L 360	1013	0.11	4.5	36%		
											E W S	---	0.00	0.0	---		
											D+L 240	525	0.21	4.5	46%		
FB 8	11.5 r			265	230	0	0	0	0	0			GLB 5-1/2" x 10-1/2"				
	11.5 f			251	0	460	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-26kft	5.5	83%	
	0.0 d			0	0	0	0	0	0	0			Shear	8,836#	9	54%	
	16.0 w			160	0	0	0	0	0	0			Ω InvEW Considered				
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	9.0	9.0	675	230	460	0	0	0	0	Simple Span	Roller	1	0	---	-2,206#	7,083#
												Roller	2	9	---	-4,223#	8,836#
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
SW6	1	5.5							5.9k	Point Load	Max(ASD)	---	0.35	4.8	---		
											L 360	1013	0.11	4.5	36%		
											E W S	---	0.00	0.0	---		
											D+L 240	525	0.21	4.5	46%		
FB 9	0.0 r			0	0	0	0	0	0	0			GLB 5-1/2" x 10-1/2"				
	4.0 f			87	0	160	0	0	0	0			Force	Loc(ft)	%Max		
	0.0 c			0	0	0	0	0	0	0			Bending	-12kft	9.5	59%	
	0.0 d			0	0	0	0	0	0	0			Shear	-2,443#	0	24%	
	1.0 w			10	0	0	0	0	0	0			Ω InvEW Considered				
	Spans											REACTIONS	Loc(ft)	M(k*ft)	Rmin	Rmax	
	1	19.0	19.0	97	0	160	0	0	0	0	Simple Span	Roller	1	0	---	554#	2,443#
												Roller	2	19	---	554#	2,443#
Additional Loads												DEFLECTIONS	I / x	Defl(in)	Loc(ft)	%Max	
											Max(ASD)	---	0.79	9.5	---		
											L 360	464	0.49	9.5	78%		
											E W S	---	0.00	0.0	---		
											D+L 240	289	0.79	9.5	83%		



ASD Lateral Force Analysis
2016 CBC

Job: **18219 - Patel Residence - Arris**

SEISMIC DESIGN BASE SHEAR (STATIC)

Risk Category: **II** (CBC Table 1604.5)

$I_e = 1.00$ (ASCE Table 1.5-2)

$R = 6.5$ (ASCE Table 12.2-1)

$C_d = 4$ (ASCE Table 12.2-1)

$\Omega_o = 2.5$ (ASCE Table 12.2-1)
Reduced by 1/2 for flexible diaphragms per
ASCE Table 12.2-1 footnote g

SEISMIC GROUND MOTION VALUES

Latitude: **37.632359**

Longitude: **-121.811663**

Site Classification = **D**

Short Period

$S_s = 1.509$

$F_a = 1.000$ (CBC Table 1613.3.3(1))

$S_{MS} = 1.509$ (CBC Eq. 16-37)

$S_{DS} = 1.006$ (CBC Eq. 16-39)

Long Period

$S_1 = 0.600$

$F_v = 1.500$ (CBC Table 1613.3.3(2))

$S_{M1} = 0.900$ (CBC Eq. 16-38)

$S_{D1} = 0.600$ (CBC Eq. 16-40)

APPROXIMATE FUNDAMENTAL PERIOD

Building Type: **All Other Structural Systems**

Maximum Height = **34.0 ft**

$T_a = 0.28$ sec (ASCE Eq. 12.8-7)

$T_0 = 0.12$ sec

$T_s = 0.60$ sec

$T_L = 8$ sec (ASCE Figure 22-12)

SEISMIC DESIGN CATEGORY

SDC = D

(ASCE 11.6)

SEISMIC BASE SHEAR

$C_s = 0.1548$ **Govs** (ASCE Eq. 12.8-2)

$C_{S\ MAX} = 0.3278$ (ASCE Eq. 12.8-3 & Eq. 12.8-4)

$C_{S\ MIN} = 0.0462$ (ASCE Eq. 12.8-5 & Eq. 12.8-6)

$C_s = 0.1548$

$V = 0.1548 * W$



ASD Lateral Force Analysis
2016 CBC

Job: **18219 - Patel Residence - Arris**

C_s : 0.155

k = 1.00 (ASCE Eq. 12.8-12)

VERTICAL SEISMIC FORCE DISTRIBUTION (ASCE 12.8.3)										
Level	Height (ft)	DL (psf)	PL (psf)	Floor Area (sq.ft.)	Weight (lbs)	wh^k (k-ft)	C_v (12.8-12)	Story Shear (lbs)	(psf)	% Total
Roof	30.0	23.0	10.0	2840	93720	2811.6	0.637	20941	7.4	63.7%
Floor	13.5	21.8	20.0	2840	118712	1602.6	0.363	11937	4.2	100.0%
Totals:					212432	4414.2	1.0	32878	11.6	

DIAPHRAGM LOADS (ASCE 12.10)											
NORTH-SOUTH DIRECTION							EAST-WEST DIRECTION				
Level	DL (psf)	PL (psf)	(12.10-1) (psf)	Max (psf)	Min (psf)	Gov (psf)	PL (psf)	(12.10-1) (psf)	Max (psf)	Min (psf)	Gov (psf)
Roof	23	10	7.4	13.3	6.6	7.4	10	7.4	13.3	6.6	7.4
Floor	21.8	20	6.5	16.8	8.4	8.4	20	6.5	16.8	8.4	8.4

Job: **18219 - Patel Residence - Arris**ASD Lateral Force Analysis
2016 CBC**IBC 1609.6 ALTERNATIVE ALL-HEIGHTS METHOD****DESIGN WIND PRESSURE - MAIN WIND FORCE RESISTING SYSTEM**

Exposure Category = **B** (CBC 1609.4.2)
 Roof Pitch = **4.0 :12** -----Angle = **18.4** °
 Eave Height = **25.0 ft**
 Maximum Height = **34.0 ft**
 Mean Roof Height = **29.5 ft**

N-S Dimension **40.0 ft**
 E-W Dimension **103.0 ft**
 Enclosure: **Enclosed**
 Low Rise? **YES**

Main Wind Force: $V_{ult} = 110$ mph (Figure 1609A) $V_{asd} = 85$ mph $K_{zt} = 1.00$ (ASCE 7 26.8) $I_w = 1.00$ (ASCE 7 Table 1.5-2) $\alpha = 7$ (ASCE 7 Table 26.9.1) $z_g = 1200$ (ASCE 7 Table 26.9.1)**WIND DISTRIBUTION ON NORTH-SOUTH ROOF**

Level	z (ft)	K_z (27.3-1)	Windward Roof			Leeward Roof			Parapet					F_{Total} (plf)
			C_{net}	p_{net} (psf)	Height (ft)	C_{net}	p_{net} (psf)	Height (ft)	C_{net}	p_{net} (psf)	C_{net}	p_{net} (psf)	Height (ft)	
Roof	29.5	0.701	-0.72	-15.57	9.0	-0.66	-14.32	9.0	1.28	27.78	-0.85	-18.4	0.0	144.0

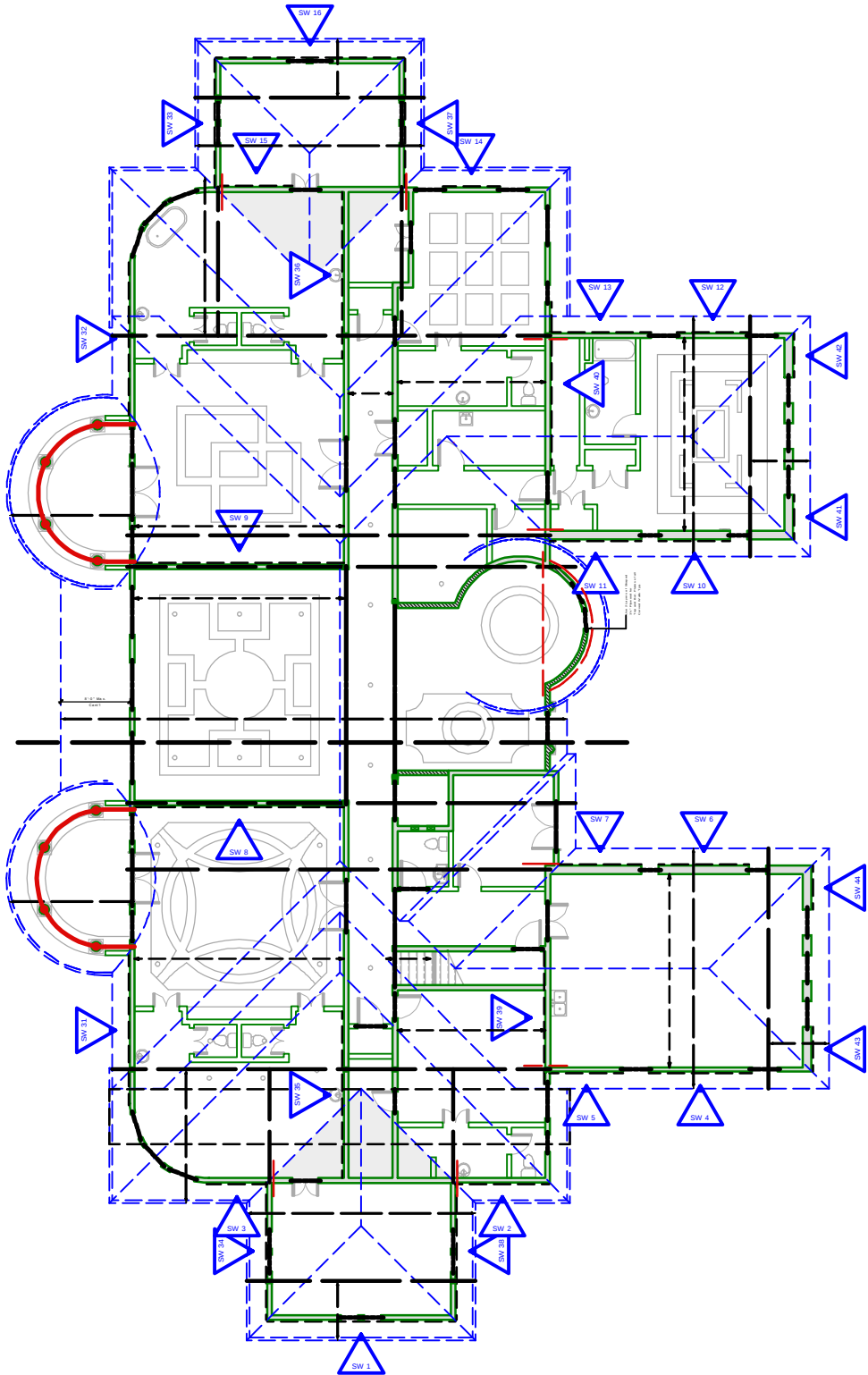
WIND DISTRIBUTION ON NORTH-SOUTH WALLS

Level	z (ft)	K_z (27.3-1)	Windward Walls				Leeward Walls				Total Wind		
			C_{net}	p_{net} (psf)	Height (ft)	F (plf)	C_{net}	p_{net} (psf)	Height (ft)	F (plf)	Roof (plf)	Walls (plf)	0.6x Total (plf)
Roof	30.0	0.701	0.43	9.335	6.0	56.0	-0.51	-11.1	6.0	-66.4	144.0	122.4	159.9
Floor	13.5	0.701	0.43	9.335	12.0	112.0	-0.51	-11.1	12.0	-132.9	0.0	244.9	146.9

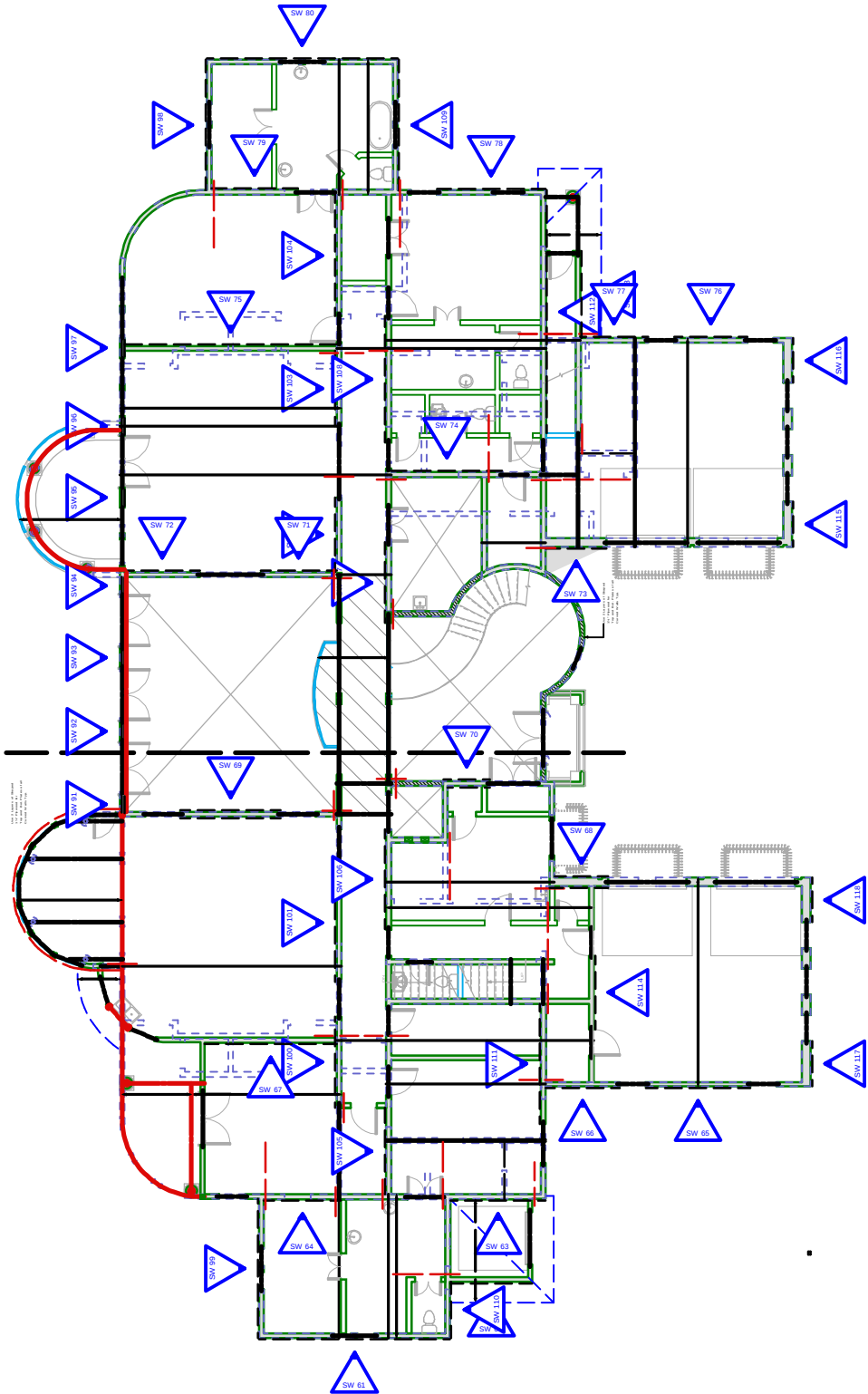
WIND DISTRIBUTION ON EAST-WEST ROOF														
Level			Windward Roof			Leeward Roof			Parapet					F _{Total} (plf)
	z (ft)	K _z (27.3-1)	C _{net}	p _{net} (psf)	Height (ft)	C _{net}	p _{net} (psf)	Height (ft)	C _{net}	p _{net} (psf)	C _{net}	p _{net} (psf)	Height (ft)	
Roof	29.5	0.701	-0.72	-15.6	9.0	-0.66	-14.3	9.0	1.28	27.79	-0.85	-18.5	0.0	144.0

WIND DISTRIBUTION ON EAST-WEST WALLS														
Level			Windward Walls				Leeward Walls				Total Wind			
	z (ft)	K _z (27.3-1)	C _{net}	p _{net} (psf)	Height (ft)	F (plf)	C _{net}	p _{net} (psf)	Height (ft)	F (plf)	Roof (plf)	Walls (plf)	0.6x (plf)	Total (plf)
Roof	30.0	0.701	0.43	9.335	6.0	56.0	-0.51	-11.1	6.0	-66.4	144.0	122.4		159.9
Floor	13.5	0.701	0.43	9.335	12.0	112.0	-0.51	-11.1	12.0	-132.9	0.0	244.9		146.9

Upper Shearwall Layout



Lower Shearwall Layout





ASD Lateral Force Analysis

2016 CBC

Job: **18219 - Patel Residence - Arris**

Building Forces Alt.		
Level	Seis. (psf)	Wind (plf)
Roof	5.2	159.9
Floor	2.9	146.9
Totals:	8.1	306.8

TYPE	Materials	Sides	EQ / Wind*
6	1/2" ST 1 10d @ 6"	1	340 / 476 plf
4	1/2" ST 1 10d @ 4"	1	510 / 714 plf
3	1/2" ST 1 10d @ 3"	1	665 / 931 plf
2	1/2" ST 1 10d @ 2"	1	870 / 1218 plf
44	1/2" ST 1 10d @ 4"	2	1020 / 1428 plf
33	1/2" ST 1 10d @ 3"	2	1330 / 1862 plf

Total Force = Trib Shear + Add'l Shear

Total Shear = Total Force / Wall Length

**Per 2015 SDPWS Table 4.3A, shearwall capacities have been increased by 40% when walls are governed by wind loading.*

Wall ID	Wall Len (ft)	Wall Ht. (ft)	% of Line Load	Seismic Trib		Wind Trib	Shear		Add'l		Wall H/L Ratio	Gov. Force (lbs)	Wall Shear (plf)	Gov Case	Type
				Len (ft)	Width (ft)	(ft)	Seis (lbs)	Wind (lbs)	Seis (lbs)	Wind (lbs)					

S-2.3 Roof Framing**NS**

SW 1	21.50	12.00	100%	26.7	9.3	9.3	1284	1491	0	0	5/9:1	1284	60 Seis	6
SW 2	11.00	12.00	61%	53.7	10.2	13.7	2834	2186	0	0	1:1	1732	157 Seis	6
SW 3	7.00	12.00	39%	53.7	10.2	13.7	2834	2186	0	0	1 5/7:1	1102	157 Seis	6
SW 4	12.00	12.00	59%	83.8	18.2	20.5	7854	3277	0	0	1:1	4598	383 Seis	4
SW 5	8.50	12.00	41%	83.8	18.2	20.5	7854	3277	0	0	1 2/5:1	3256	383 Seis	4
SW 6	10.50	12.00	24%	95.9	27.5	33.0	13611	5280	0	0	1 1/7:1	3248	309 Seis	6
SW 7	9.50	12.00	22%	95.9	27.5	33.0	13611	5280	0	0	1 1/4:1	2939	309 Seis	6
SW 8	24.00	12.00	55%	95.9	27.5	33.0	13611	5280	0	0	1/2:1	7425	309 Seis	6
SW 9	24.00	12.00	56%	95.7	24.3	29.0	11985	4631	0	0	1/2:1	6768	282 Seis	6
SW 10	8.00	12.00	19%	95.7	24.3	29.0	11985	4631	0	0	1 1/2:1	2256	282 Seis	6
SW 11	10.50	12.00	25%	95.7	24.3	29.0	11985	4631	0	0	1 1/7:1	2961	282 Seis	6
SW 12	8.00	12.00	41%	91.6	17.8	20.4	8401	3265	0	0	1 1/2:1	3447	431 Seis	4
SW 13	11.50	12.00	59%	91.6	17.8	20.4	8401	3265	0	0	1:1	4954	431 Seis	4
SW 14	6.50	12.00	45%	53.7	14.1	17.2	3892	2753	0	0	1 6/7:1	1745	268 Seis	6
SW 15	8.00	12.00	55%	53.7	14.1	17.2	3892	2753	0	0	1 1/2:1	2147	268 Seis	6
SW 16	21.50	12.00	100%	26.7	8.7	8.7	1196	1389	0	0	5/9:1	1196	56 Seis	6

EW

SW 31	17.50	12.00	50%	120.7	19.8	26.7	12313	4273	0	0	2/3:1	6157	352 Seis	4
SW 32	17.50	12.00	50%	120.7	19.8	26.7	12313	4273	0	0	2/3:1	6157	352 Seis	4
SW 33	14.50	12.00	100%	17.4	13.3	13.3	1195	2132	0	0	5/6:1	2132	147 Wind	6
SW 34	15.50	12.00	100%	18.3	13.3	13.3	1261	2132	0	0	7/9:1	2132	138 Wind	6
SW 35	19.00	12.00	50%	120.7	24.2	24.1	15041	3860	0	0	5/8:1	7521	396 Seis	4
SW 36	19.00	12.00	50%	120.7	24.2	24.1	15041	3860	0	0	5/8:1	7521	396 Seis	4
SW 37	15.00	12.00	100%	17.4	13.3	13.3	1195	2132	0	0	4/5:1	2132	142 Wind	6
SW 38	15.50	12.00	100%	18.3	13.3	13.3	1261	2132	0	0	7/9:1	2132	138 Wind	6
SW 39	15.00	12.00	44%	120.7	20.1	26.8	12544	4291	0	0	4/5:1	5534	369 Seis	4
SW 40	19.00	12.00	56%	120.7	20.1	26.8	12544	4291	0	0	5/8:1	7010	369 Seis	4
SW 41	5.00	12.00	50%	28.0	16.7	16.7	2411	2666	0	0	2 2/5:1	1205	241 Seis	6
SW 42	5.00	12.00	50%	28.0	16.7	16.7	2411	2666	0	0	2 2/5:1	1205	241 Seis	6
SW 43	5.00	12.00	50%	28.0	17.8	17.8	2567	2839	0	0	2 2/5:1	1283	257 Seis	6
SW 44	5.00	12.00	50%	28.0	17.8	17.8	2567	2839	0	0	2 2/5:1	1283	257 Seis	6

S-2.2 Floor Framing**NS**

SW 61	21.50	12.00	100%	22.1	8.0	8.0	518	1173	1284	1491	5/9:1	2664	124 Wind	6
SW 62	9.00	12.00	100%	11.9	6.1	6.1	214	900	0	0	1 1/3:1	900	100 Wind	6



ASD Lateral Force Analysis

2016 CBC

Job: **18219 - Patel Residence - Arris**

Building Forces Alt.		
Level	Seis. (psf)	Wind (plf)
Roof	5.2	159.9
Floor	2.9	146.9
Totals:	8.1	306.8

TYPE	Materials	Sides	EQ / Wind*
6	1/2" ST 1 10d @ 6"	1	340 / 476 plf
4	1/2" ST 1 10d @ 4"	1	510 / 714 plf
3	1/2" ST 1 10d @ 3"	1	665 / 931 plf
2	1/2" ST 1 10d @ 2"	1	870 / 1218 plf
44	1/2" ST 1 10d @ 4"	2	1020 / 1428 plf
33	1/2" ST 1 10d @ 3"	2	1330 / 1862 plf

Total Force = Trib Shear + Add'l Shear

Total Shear = Total Force / Wall Length

*Per 2015 SDPWS Table 4.3A, shearwall capacities have been increased by 40% when walls are governed by wind loading.

Per 2015 SDFWS Table 4.3A, shear wall capacities have been increased by 40% when walls are governed by wind loading.															
Wall ID	Wall Len (ft)	Wall Ht. (ft)	% of Line Load	Seismic Trib		Wind Trib (ft)	Shear		Add'l		Wall H/L Ratio	Gov. Force (lbs)	Wall Shear (plf)	Gov Case	Type
				Len (ft)	Width (ft)		Seis (lbs)	Wind (lbs)	Seis (lbs)	Wind (lbs)					
SW 63	10.50	12.00	55%	49.8	11.4	14.5	1664	2137	3933	2644	1 1/7:1	3093	295 Seis	6	
SW 64	8.50	12.00	45%	49.8	11.4	14.5	1664	2137	3933	2644	1 2/5:1	2504	295 Seis	6	
SW 65	12.00	12.00	34%	84.3	15.7	18.3	3883	2691	7979	3294	1:1	4009	334 Seis	6	
SW 66	8.50	12.00	24%	84.3	15.7	18.3	3883	2691	7979	3294	1 2/5:1	2840	334 Seis	6	
SW 67	15.00	12.00	42%	84.3	15.7	18.3	3883	2691	7854	3277	4/5:1	4959	331 Seis	6	
SW 68	6.00	12.00	27%	91.5	18.8	32.8	5069	4819	13611	5280	2:1	4982	830 Seis	44	
SW 69	11.50	12.00	51%	91.5	18.8	32.8	5069	4819	13611	5280	1:1	9548	830 Seis	44	
SW 70	5.00	12.00	22%	91.5	18.8	32.8	5069	4819	13611	5280	2 2/5:1	4151	830 Seis	44	
SW 71	8.50	12.00	50%	43.1	9.5	20.6	1207	3033	6712	2594	1 2/5:1	3959	466 Seis	4	
SW 72	8.50	12.00	50%	43.1	9.5	20.6	1207	3033	6712	2594	1 2/5:1	3959	466 Seis	4	
SW 73	7.00	12.00	100%	35.8	4.3	4.3	453	631	5273	2038	1 5/7:1	5726	818 Seis	2	
SW 74	12.50	12.00	100%	89.1	8.7	9.6	2271	1407	0	0	1:1	2271	182 Seis	6	
SW 75	24.00	12.00	61%	85.0	16.4	19.3	4103	2834	8149	3167	1/2:1	7445	310 Seis	6	
SW 76	8.00	12.00	20%	85.0	16.4	19.3	4103	2834	8149	3167	1 1/2:1	2481	310 Seis	6	
SW 77	7.50	12.00	19%	85.0	16.4	19.3	4103	2834	8149	3167	1 3/5:1	2327	310 Seis	6	
SW 78	9.50	12.00	56%	55.3	13.3	16.3	2157	2390	4144	2851	1 1/4:1	3517	370 Seis	4	
SW 79	9.50	12.00	44%	55.3	13.3	16.3	2157	2390	4144	2851	1 1/4:1	2785	293 Seis	6	
SW 80	21.50	12.00	100%	22.2	7.7	7.7	501	1125	1196	1389	5/9:1	2514	117 Wind	6	
EW															
SW 91	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 92	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 93	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 94	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 95	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 96	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 97	1.00	12.00	14%	115.9	15.6	24.6	5313	3612	9728	3376	12:1	2149	2149 Seis	A	
SW 98	14.50	12.00	100%	15.0	11.1	11.1	491	1633	3781	3029	5/6:1	4272	295 Seis	6	
SW 99	15.50	12.00	100%	16.1	11.0	11.0	521	1611	1697	2514	7/9:1	4125	266 Wind	6	
SW 100	10.50	12.00	19%	116.0	12.5	15.3	4251	2253	0	0	1 1/7:1	819	78 Seis	6	
SW 101	13.50	12.00	25%	116.0	12.5	15.3	4251	2253	0	0	8/9:1	1053	78 Seis	6	
SW 102	8.50	12.00	16%	116.0	12.5	15.3	4251	2253	0	0	1 2/5:1	663	78 Seis	6	
SW 103	8.50	12.00	16%	116.0	12.5	15.3	4251	2253	0	0	1 2/5:1	663	78 Seis	6	
SW 104	13.50	12.00	25%	116.0	12.5	15.3	4251	2253	0	0	8/9:1	1053	78 Seis	6	
SW 105	9.50	12.00	22%	115.4	8.1	10.2	2733	1496	0	0	1 1/4:1	590	62 Seis	6	
SW 106	11.00	12.00	25%	115.4	8.1	10.2	2733	1496	0	0	1:1	683	62 Seis	6	
SW 107	9.00	12.00	20%	115.4	8.1	10.2	2733	1496	0	0	1 1/3:1	559	62 Seis	6	
SW 108	14.50	12.00	33%	115.4	8.1	10.2	2733	1496	0	0	5/6:1	901	62 Seis	6	
SW 109	15.00	12.00	100%	15.0	11.1	22.2	491	3267	0	0	4/5:1	3267	218 Wind	6	



ASD Lateral Force Analysis

2016 CBC

Job: **18219 - Patel Residence - Arris**

Building Forces Alt.		
Level	Seis. (psf)	Wind (plf)
Roof	5.2	159.9
Floor	2.9	146.9
Totals: 8.1 306.8		

TYPE	Materials	Sides	EQ / Wind*
6	1/2" ST 1 10d @ 6"	1	340 / 476 plf
4	1/2" ST 1 10d @ 4"	1	510 / 714 plf
3	1/2" ST 1 10d @ 3"	1	665 / 931 plf
2	1/2" ST 1 10d @ 2"	1	870 / 1218 plf
44	1/2" ST 1 10d @ 4"	2	1020 / 1428 plf
33	1/2" ST 1 10d @ 3"	2	1330 / 1862 plf

Total Force = Trib Shear + Add'l Shear

Total Shear = Total Force / Wall Length

*Per 2015 SDPWS Table 4.3A, shearwall capacities have been increased by 40% when walls are governed by wind loading.

Wall ID	Wall Len (ft)	Wall Ht. (ft)	% of Line Load	Seismic Trib		Wind Trib	Shear		Add'l		Wall H/L Ratio	Gov. Force (lbs)	Wall Shear (plf)	Gov Case	Type
				Len (ft)	Width (ft)	(ft)	Seis (lbs)	Wind (lbs)	Seis (lbs)	Wind (lbs)					
SW 110	6.50	12.00	100%	16.0	11.1	11.1	523	1633	0	0	1 6/7:1	1633	251	Wind	6
SW 111	13.50	12.00	100%	48.2	12.0	25.9	1701	3812	5519	1888	8/9:1	7220	535	Seis	3
SW 112	27.50	12.00	100%	47.1	11.7	12.3	1619	1811	7025	2403	3/7:1	8643	314	Seis	6
SW 113	10.00	12.00	100%	43.5	10.0	14.3	1284	2103	7025	2403	1 1/5:1	8309	831	Seis	2
SW 114	8.50	12.00	100%	24.0	15.5	15.5	1095	2278	5519	1888	1 2/5:1	6614	778	Seis	2
SW 115	5.00	12.00	50%	24.0	14.1	14.1	994	2069	0	0	2 2/5:1	1035	207	Wind	6
SW 116	5.00	12.00	50%	24.0	14.1	14.1	994	2069	0	0	2 2/5:1	1035	207	Wind	6
SW 117	5.00	12.00	50%	24.2	15.4	15.4	1096	2265	0	0	2 2/5:1	1133	227	Wind	6
SW 118	5.00	12.00	50%	24.2	15.4	15.4	1096	2265	0	0	2 2/5:1	1133	227	Wind	6



Job: **18219 - Patel Residence - Arris**

ASD Lateral Force Analysis
2016 CBC

REDUNDANCY FACTOR CALCULATION

Is the structure regular in plan at all levels? **NO**
Is the structure light framed construction? **YES**
SDC **D**

> 35% Base Shear?	Wall ID	ASCE 12.3.4.2 a Wall Capacity (lbs)	H/L	% Capacity	ρ at Level	ρ per wall
YES	S-2.3 Roof Framing					
	NS	75480	(Total Story Strength)		1.0	
	SW 1	7310	0.57	N/A		1.0
	SW 2	3740	1.14	5%		1.0
	SW 3	2380	1.85	3%		1.0
	SW 4	6120	1.04	8%		1.0
	SW 5	4335	1.50	6%		1.0
	SW 6	3570	1.20	5%		1.0
	SW 7	3230	1.33	4%		1.0
	SW 8	8160	0.51	N/A		1.0
	SW 9	8160	0.51	N/A		1.0
	SW 10	2720	1.60	4%		1.0
	SW 11	3570	1.20	5%		1.0
	SW 12	4080	1.60	5%		1.0
	SW 13	5865	1.09	8%		1.0
	SW 14	2210	2.00	3%		1.0
	SW 15	2720	1.60	4%		1.0
	SW 16	7310	0.57	N/A		1.0
	EW	81600	Story Strength)		1.0	
	SW 31	8925	0.71	N/A		1.0
	SW 32	8925	0.71	N/A		1.0
	SW 33	4930	0.86	N/A		1.0
	SW 34	5270	0.80	N/A		1.0
	SW 35	9690	0.65	N/A		1.0
	SW 36	9690	0.65	N/A		1.0
	SW 37	5100	0.83	N/A		1.0
	SW 38	5270	0.80	N/A		1.0
	SW 39	7650	0.83	N/A		1.0
	SW 40	9690	0.65	N/A		1.0
	SW 41	1615	2.67	2%		1.0



Job: **18219 - Patel Residence - Arris**

ASD Lateral Force Analysis
2016 CBC

REDUNDANCY FACTOR CALCULATION

Is the structure regular in plan at all levels? **NO**
Is the structure light framed construction? **YES**
SDC **D**

> 35% Base Shear?	Wall ID	ASCE 12.3.4.2 a Wall Capacity (lbs)	H/L	% Capacity	ρ at Level	ρ per wall
	SW 42	1615	2.67	2%		1.0
	SW 43	1615	2.67	2%		1.0
	SW 44	1615	2.67	2%		1.0
YES	3-2.2 Floor Framing					
	NS	99420	Story Strength)		1.0	
	SW 61	7310	0.57	N/A		1.0
	SW 62	3060	1.41	3%		1.0
	SW 63	3570	1.20	4%		1.0
	SW 64	2890	1.50	3%		1.0
	SW 65	4080	1.04	4%		1.0
	SW 66	2890	1.50	3%		1.0
	SW 67	5100	0.83	N/A		1.0
	SW 68	6120	2.18	6%		1.0
	SW 69	11730	1.09	12%		1.0
	SW 70	4845	2.67	5%		1.0
	SW 71	4335	1.50	4%		1.0
	SW 72	4335	1.50	4%		1.0
	SW 73	6090	1.85	6%		1.0
	SW 74	4250	1.00	N/A		1.0
	SW 75	8160	0.51	N/A		1.0
	SW 76	2720	1.60	3%		1.0
	SW 77	2550	1.71	3%		1.0
	SW 78	4845	1.04	5%		1.0
	SW 79	3230	1.33	3%		1.0
	SW 80	7310	0.57	N/A		1.0
	EW	91883	Story Strength)		1.0	
	SW 91	0	12.00	0%		1.0
	SW 92	0	12.00	0%		1.0
	SW 93	0	12.00	0%		1.0



Job: [18219 - Patel Residence - Arris](#)

ASD Lateral Force Analysis
2016 CBC

REDUNDANCY FACTOR CALCULATION

Is the structure regular in plan at all levels? **NO**
Is the structure light framed construction? **YES**
SDC **D**

> 35% Base Shear?	Wall ID	ASCE 12.3.4.2 a Wall Capacity (lbs)	H/L	% Capacity	ρ at Level	ρ per wall
	SW 94	0	12.00	0%		1.0
	SW 95	0	12.00	0%		1.0
	SW 96	0	12.00	0%		1.0
	SW 97	0	12.00	0%		1.0
	SW 98	4930	0.86	N/A		1.0
	SW 99	5270	0.80	N/A		1.0
	SW 100	3570	1.20	4%		1.0
	SW 101	4590	0.92	N/A		1.0
	SW 102	2890	1.50	3%		1.0
	SW 103	2890	1.50	3%		1.0
	SW 104	4590	0.92	N/A		1.0
	SW 105	3230	1.33	4%		1.0
	SW 106	3740	1.14	4%		1.0
	SW 107	3060	1.41	3%		1.0
	SW 108	4930	0.86	N/A		1.0
	SW 109	5100	0.83	N/A		1.0
	SW 110	2210	2.00	2%		1.0
	SW 111	8978	0.92	N/A		1.0
	SW 112	9350	0.44	N/A		1.0
	SW 113	8700	1.26	9%		1.0
	SW 114	7395	1.50	8%		1.0
	SW 115	1615	2.67	2%		1.0
	SW 116	1615	2.67	2%		1.0
	SW 117	1615	2.67	2%		1.0
	SW 118	1615	2.67	2%		1.0



ASD Lateral Force Analysis

Job: **18219 - Patel Residence - Arris**

2016 CBC

Description of Variables:	L	Length of wall	PI	Left point load
	H	Height of wall	Px	Point load at Xp
	v	Unit shear on wall	Pr	Right point load
	Wt	Unit weight of wall	Xp	Location of Px
	Wdl	Dead load on wall	Wx	Location of Wall Above

Seismic: $HD = (p0.7M_{OT} - (0.6-0.1) \text{ (CBC 1605.3.2)})$ (ASCE 12.4.2.3)

Wind: $HD = (0.6M_{OT} - 0.6M_R) \text{ (CBC 1605.3.2)}$ (ASCE 2.4.1)

Wall ID	L (ft)	H (ft)	V (lbs)	Wt (psf)	Wdl (plf)	PI (lbs)	Px (lbs)	Pr (lbs)	Xp (ft)	Wall Above	Aligned Sides	Gov. Case
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S-2.3 Roof Framing**NS**

SW 1	20.50	12.00	1491	10	30	0	0	0	0	0	N/A	Wind
SW 2	10.00	12.00	1732	10	30	0	0	0	0	0	N/A	Seis
SW 3	6.00	12.00	1102	10	30	0	0	0	0	0	N/A	Seis
SW 4	11.00	12.00	4598	10	30	0	0	0	0	0	N/A	Seis
SW 5	7.50	12.00	3256	10	30	0	0	0	0	0	N/A	Seis
SW 6	9.50	12.00	3248	10	30	0	0	0	0	0	N/A	Seis
SW 7	8.50	12.00	2939	10	30	0	0	0	0	0	N/A	Seis
SW 8	23.00	12.00	7425	10	30	0	0	0	0	0	N/A	Seis
SW 9	23.00	12.00	6768	10	30	0	0	0	0	0	N/A	Seis
SW 10	7.00	12.00	2256	10	30	0	0	0	0	0	N/A	Seis
SW 11	9.50	12.00	2961	10	30	0	0	0	0	0	N/A	Seis
SW 12	7.00	12.00	3447	10	30	0	0	0	0	0	N/A	Seis
SW 13	10.50	12.00	4954	10	30	0	0	0	0	0	N/A	Seis
SW 14	6.00	12.00	1745	10	30	0	0	0	0	0	N/A	Seis
SW 15	7.00	12.00	2147	10	30	0	0	0	0	0	N/A	Seis
SW 16	20.50	12.00	1389	10	30	0	0	0	0	0	N/A	Wind

EW

SW 31	16.50	12.00	6157	10	30	0	0	0	0	0	N/A	Seis
SW 32	16.50	12.00	6157	10	30	0	0	0	0	0	N/A	Seis
SW 33	13.50	12.00	2132	10	30	0	0	0	0	0	N/A	Wind
SW 34	14.50	12.00	2132	10	30	0	0	0	0	0	N/A	Wind
SW 35	18.00	12.00	7521	10	30	0	0	0	0	0	N/A	Seis
SW 36	18.00	12.00	7521	10	30	0	0	0	0	0	N/A	Seis
SW 37	14.00	12.00	2132	10	30	0	0	0	0	0	N/A	Wind
SW 38	14.50	12.00	2132	10	30	0	0	0	0	0	N/A	Wind
SW 39	14.00	12.00	5534	10	30	0	0	0	0	0	N/A	Seis
SW 40	18.00	12.00	7010	10	30	0	0	0	0	0	N/A	Seis
SW 41	4.00	12.00	1333	10	30	0	0	0	0	0	N/A	Wind
SW 42	4.00	12.00	1333	10	30	0	0	0	0	0	N/A	Wind
SW 43	4.00	12.00	1420	10	30	0	0	0	0	0	N/A	Wind
SW 44	4.00	12.00	1420	10	30	0	0	0	0	0	N/A	Wind

S-2.2 Floor Framing

NS												
SW 61	20.50	12.00	2664	10	30	0	0	0	0	SW 1	Both	Wind
SW 62	8.00	12.00	900	10	30	0	0	0	0	0	N/A	Seis
SW 63	9.50	12.00	3093	10	30	0	0	0	0	SW 2	Both	Seis
SW 64	7.50	12.00	2504	10	30	0	0	0	0	0	N/A	Seis
SW 65	11.00	12.00	4009	10	30	0	0	0	0	SW 4	Both	Seis
SW 66	7.50	12.00	2840	10	30	0	0	0	0	SW 5	Both	Seis
SW 67	14.00	12.00	4959	10	30	0	0	0	0	0	N/A	Seis
SW 68	5.00	12.00	4982	10	30	0	0	0	0	0	N/A	Seis
SW 69	10.50	12.00	9548	10	30	0	0	0	0	0	N/A	Seis
SW 70	4.00	12.00	4151	10	30	0	0	0	0	0	N/A	Seis
SW 71	7.50	12.00	3959	10	30	0	0	0	0	SW 9	Left	Seis
SW 72	7.50	12.00	3959	10	30	0	0	0	0	SW 9	Right	Seis
SW 73	6.00	12.00	5726	10	30	0	0	0	0	SW 11	Left	Seis
SW 74	11.50	12.00	2271	10	30	0	0	0	0	0	N/A	Seis
SW 75	23.00	12.00	7445	10	30	0	0	0	0	0	N/A	Seis
SW 76	7.00	12.00	2481	10	30	0	0	0	0	SW 12	Both	Seis
SW 77	7.00	12.00	2327	10	30	0	0	0	0	SW 13	Left	Seis
SW 78	11.00	12.00	3517	10	30	0	0	0	0	SW 14	Right	Seis
SW 79	8.50	12.00	2785	10	30	0	0	0	0	SW 15	Right	Wind
SW 80	20.50	12.00	2514	10	30	0	0	0	0	SW 16	Both	Seis
EW												
SW 91	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 92	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 93	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 94	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 95	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 96	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Seis
SW 97	1.50	12.00	2149	10	30	0	0	0	0	0	N/A	Wind
SW 98	13.50	12.00	4662	10	30	0	0	0	0	SW 33	Both	Wind
SW 99	14.50	12.00	4125	10	30	0	0	0	0	SW 34	Both	Seis
SW 100	9.50	12.00	819	10	30	0	0	0	0	SW 35	Left	Seis
SW 101	12.50	12.00	1053	10	30	0	0	0	0	0	N/A	Seis
SW 102	7.50	12.00	663	10	30	0	0	0	0	0	N/A	Seis
SW 103	7.50	12.00	663	10	30	0	0	0	0	0	N/A	Seis
SW 104	12.50	12.00	1053	10	30	0	0	0	0	SW 36	Left	Seis
SW 105	8.50	12.00	590	10	30	0	0	0	0	0	N/A	Seis
SW 106	10.00	12.00	683	10	30	0	0	0	0	0	N/A	Seis
SW 107	8.00	12.00	559	10	30	0	0	0	0	0	N/A	Seis
SW 108	13.50	12.00	901	10	30	0	0	0	0	0	N/A	Wind
SW 109	14.00	12.00	3267	10	30	0	0	0	0	SW 37	Both	Wind
SW 110	5.50	12.00	1633	10	30	0	0	0	0	SW 38	Left	Seis
SW 111	12.50	12.00	7220	10	30	0	0	0	0	0	N/A	Seis
SW 112	26.50	12.00	8643	10	30	0	0	0	0	0	N/A	Seis
SW 113	9.00	12.00	8309	10	30	0	0	0	0	0	N/A	Seis
SW 114	7.50	12.00	6614	10	30	0	0	0	0	0	N/A	Wind
SW 115	4.00	12.00	1035	10	30	0	0	0	0	SW 41	Both	Wind
SW 116	4.00	12.00	1035	10	30	0	0	0	1	SW 42	Both	Wind
SW 117	4.00	12.00	1133	10	30	0	0	0	2	SW 43	Both	Wind
SW 118	4.00	12.00	1133	10	30	0	0	0	3	SW 44	Both	Seis



ASD Lateral Force Analysis

2016 CBC

Job: **18219 - Patel Residence - Arris**

Description of Variables:	Mot	Overturning Moment
	Mr Left	Resisting Moment about the Left side of the wall
	Mr Right	Resisting Moment about the Right side of the wall
	HD Left	Hold down force on the left side of the wall
	HD Right	Hold down force on the right side of the wall

Seismic: $HD = (p0.7M_{OT} - (0.6-0.14*S_{DS})M_R) / L$ (ASCE 12.4.2.3)Wind: $HD = (0.6MOT - 0.6M_R) / L$ (ASCE 2.4.1)

Wall ID	M _{OT} (lb-ft)	M _R Left (lb-ft)	M _R Right (lb-ft)	HD Left (lb)	HD Right (lb)	Gov.	Use Left	Use Right
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S-2.3 Roof Framing**NS**

SW 1	29825	32749	32749	-86	-86	Wind	OK	OK
SW 2	29687	8100	8100	1706	1706	Seis	H DU4	H DU4
SW 3	18892	3060	3060	1970	1970	Seis	H DU4	H DU4
SW 4	78816	9735	9735	4609	4609	Seis	H DU8	H DU8
SW 5	55820	4669	4669	4924	4924	Seis	H DU8	H DU8
SW 6	55672	7339	7339	3747	3747	Seis	H DU4	H DU4
SW 7	50376	5929	5929	3828	3828	Seis	H DU4	H DU4
SW 8	127281	41055	41055	3054	3054	Seis	H DU4	H DU4
SW 9	116022	41055	41055	2711	2711	Seis	H DU4	H DU4
SW 10	38667	4095	4095	3598	3598	Seis	H DU4	H DU4
SW 11	50769	7339	7339	3386	3386	Seis	H DU4	H DU4
SW 12	59093	4095	4095	5641	5641	Seis	H DU8	H DU8
SW 13	84932	8899	8899	5273	5273	Seis	H DU8	H DU8
SW 14	29910	2925	2925	3266	3266	Seis	H DU4	H DU4
SW 15	36809	4095	4095	3412	3412	Seis	H DU4	H DU4
SW 16	27777	32749	32749	-146	-146	Wind	OK	OK

EW

SW 31	105544	21409	21409	3882	3882	Seis	H DU4	H DU4
SW 32	105544	21409	21409	3882	3882	Seis	H DU4	CMSTC16
SW 33	42631	14479	14479	1251	1251	Wind	H DU4	H DU4
SW 34	42631	16639	16639	1076	1076	Wind	H DU4	H DU4
SW 35	128927	25380	25380	4366	4366	Seis	H DU4	H DU4
SW 36	128927	25380	25380	4366	4366	Seis	H DU4	H DU4
SW 37	42631	15540	15540	1161	1161	Wind	H DU4	H DU4
SW 38	42631	16639	16639	1076	1076	Wind	H DU4	H DU4
SW 39	94875	15540	15540	4234	4234	Seis	H DU4	H DU4

SW 40	120163	25380	25380	4026	4026	Seis	HDU4	HDU4
SW 41	26661	1440	1440	3783	3783	Wind	HDU4	HDU4
SW 42	26661	1440	1440	3783	3783	Wind	HDU4	HDU4
SW 43	28393	1440	1440	4043	4043	Wind	HDU4	HDU4
SW 44	28393	1440	1440	4043	4043	Wind	HDU4	HDU4

S-2.2 Floor Framing**NS**

SW 61	53281	32749	32749	515	515	Wind	HDU4	HDU4
SW 62	15428	5280	5280	1047	1047	Seis	HDU4	HDU4
SW 63	53025	7339	7339	5259	5259	Seis	HDU8	HDU8
SW 64	42930	4669	4669	3721	3721	Seis	HDU4	HDU4
SW 65	68732	9735	9735	8577	8577	Seis	HDU11	HDU11
SW 66	48681	4669	4669	9182	9182	Seis	HDU11	HDU11
SW 67	85006	15540	15540	3741	3741	Seis	HDU4	HDU4
SW 68	85407	2175	2175	11757	11757	Seis	HDU14	HDU14
SW 69	163672	8899	8899	10522	10522	Seis	HDU11	HDU11
SW 70	71156	1440	1440	12287	12287	Seis	HDU14	HDU14
SW 71	67875	4669	4669	8761	6049	Seis	HDU11	HDU8
SW 72	67875	4669	4669	6049	8761	Seis	HDU8	HDU11
SW 73	98159	3060	3060	14604	11218	Seis	HD19	HDU14
SW 74	38928	10609	10609	1946	1946	Seis	HDU4	HDU4
SW 75	127623	41055	41055	3065	3065	Seis	HDU4	HDU4
SW 76	42534	4095	4095	9626	9626	Seis	HDU11	HDU11
SW 77	39887	3938	3938	9003	3730	Seis	HDU11	HDU4
SW 78	60289	8085	8085	3499	6765	Seis	HDU4	HDU8
SW 79	55692	5929	5929	3513	6925	Wind	HDU4	HDU8
SW 80	43097	32749	32749	593	593	Seis	HDU4	HDU4

EW

SW 91	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 92	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 93	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 94	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 95	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 96	36846	124	124	17157	17157	Seis	Per Manu.	Per Manu.
SW 97	42987	124	124	17145	17145	Wind	Per Manu.	Per Manu.
SW 98	93245	14479	14479	4752	4752	Wind	HDU8	HDU8
SW 99	70722	16639	16639	3963	3963	Seis	HDU4	HDU4
SW 100	14044	7339	7339	5046	680	Seis	HDU8	HDU4
SW 101	18052	12469	12469	553	553	Seis	HDU4	HDU4
SW 102	11369	4669	4669	775	775	Seis	HDU4	HDU4
SW 103	11369	4669	4669	775	775	Seis	HDU4	HDU4
SW 104	18052	12469	12469	4919	553	Seis	HDU8	HDU4
SW 105	10116	5929	5929	513	513	Seis	HDU4	HDU4
SW 106	11714	8100	8100	448	448	Seis	HDU4	HDU4
SW 107	9582	5280	5280	535	535	Seis	HDU4	HDU4
SW 108	18012	14479	14479	157	157	Wind	HDU4	HDU4
SW 109	65332	15540	15540	3295	3295	Wind	HDU4	HDU4
SW 110	27999	2599	2599	4422	3347	Seis	HDU4	HDU4
SW 111	123775	12469	12469	6473	6473	Seis	HDU8	HDU8
SW 112	148172	54259	54259	2974	2974	Seis	HDU4	HDU4
SW 113	142438	6615	6615	10741	10741	Seis	HDU11	HDU11
SW 114	132289	4669	4669	10210	10210	Wind	HDU11	HDU11

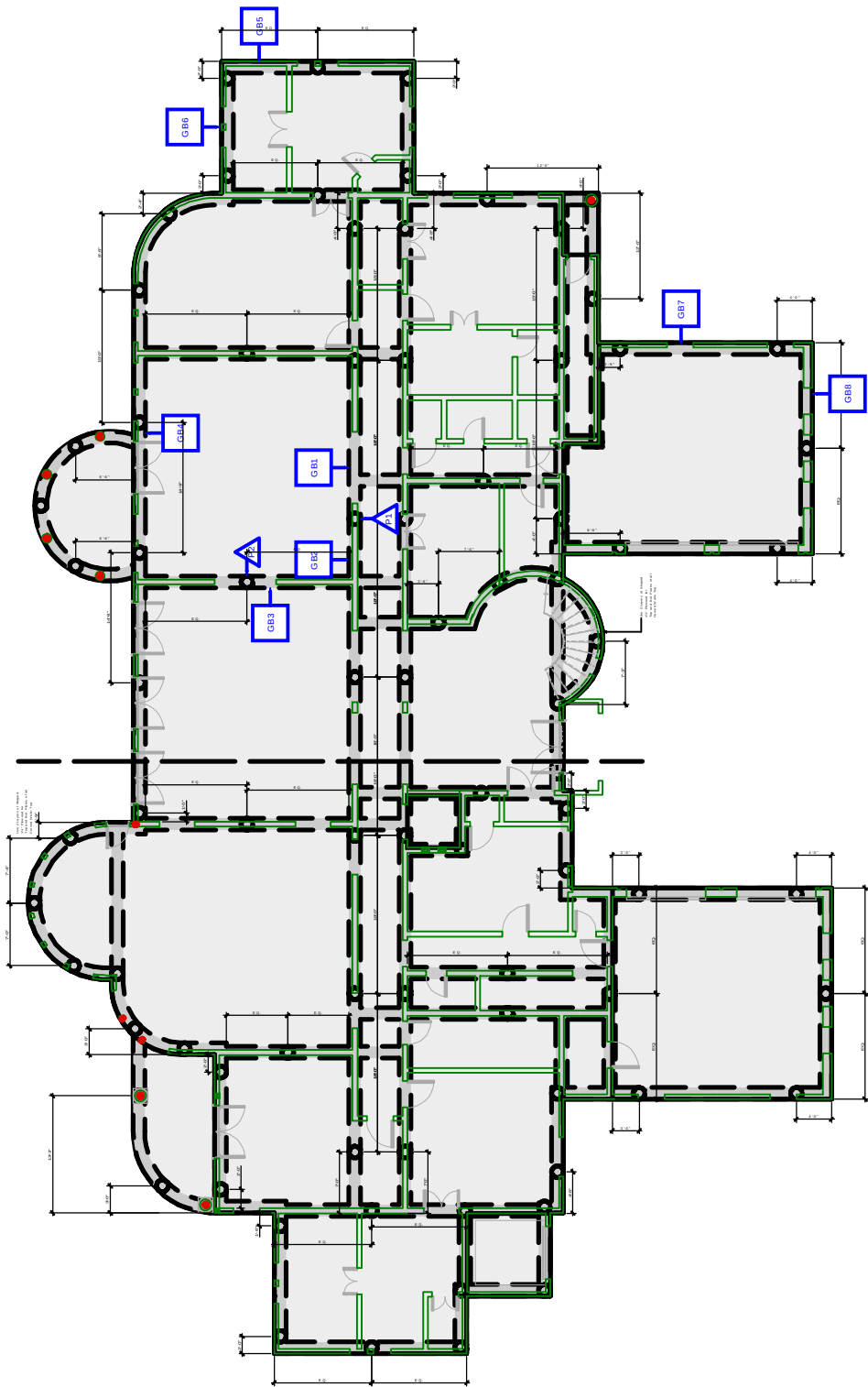
SW 115	20693	1440	1440	6671	6671	Wind	HDU8	HDU8
SW 116	20693	1440	1440	6671	6671	Wind	HDU8	HDU8
SW 117	22652	1440	1440	7225	7225	Wind	HDU8	HDU8
SW 118	19416	1440	1440	7275	7275	Seis	HDU8	HDU8



Patel Residence
1989 Ticino Court
Pleasanton, CA

Job No.: 18219

Foundation Layout



Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 1

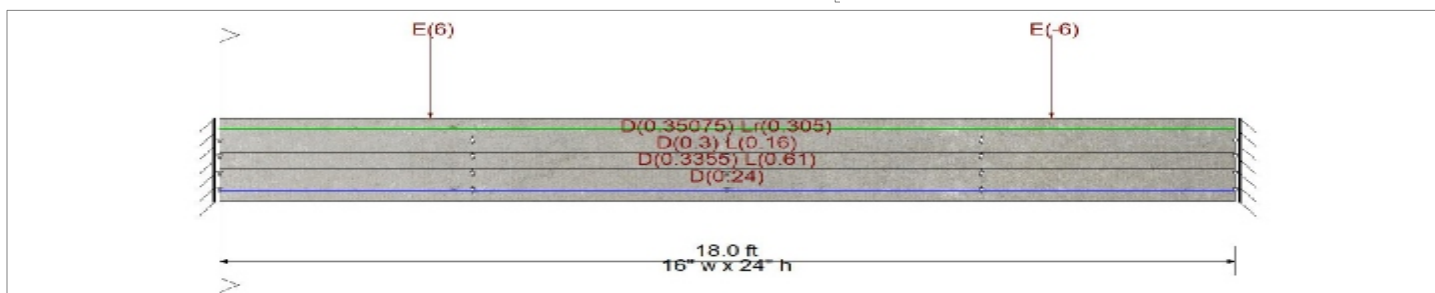
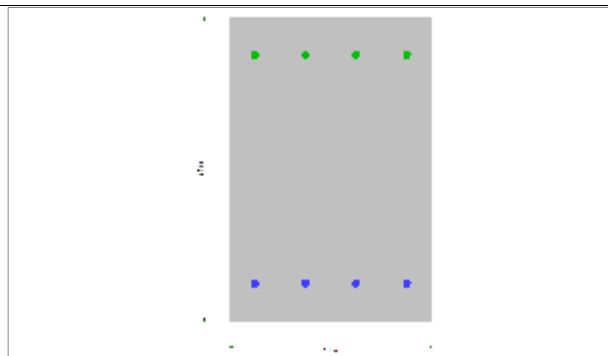
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

4-#5 at 3.0 in from Bottom, from 0.0 to 18.0 ft in this span

4-#5 at 3.0 in from Top, from 0.0 to 18.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 15.250 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 15.250 ft, (Roof Framing)

Point Load : E = 6.0 k @ 3.750 ft, (SW 100)

Point Load : E = -6.0 k @ 14.750 ft, (SW 101)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =		0.804 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.006 in	Ratio = 34189 >=360.
Mu : Applied		-89.640 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		111.447 k-ft	Max Downward Total Deflection	0.024 in	Ratio = 9157 >=180
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 1

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	21.838	21.877
Overall MINimum	2.745	2.745
D Only	14.516	14.516
+D+L	21.446	21.446
+D+Lr	17.261	17.261
+D+0.750Lr+0.750L	21.772	21.772
+D+0.750L	19.714	19.714
+D+0.70E	17.870	11.163
+D-0.70E	11.149	17.884
+D+0.750L+0.5250E	21.838	17.589
+D+0.750L-0.5250E	17.551	21.877
+0.60D	8.710	8.710
+0.60D+0.70E	12.077	5.342
+0.60D-0.70E	5.342	12.077
Lr Only	2.745	2.745
L Only	6.930	6.930
E Only	4.811	-4.811
E Only * -1.0	-4.811	4.811

Shear Stirrup RequirementsBetween 0.00 to 5.02 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 5.05 to 12.95 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 inBetween 12.98 to 17.97 ft, $\Phi V_c < V_u$, Req'd Vs = 4.584, use #3 stirrups spaced at 10.000 in**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750Lr+0.750L	1	0.0236	9.000		0.0000	0.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 2

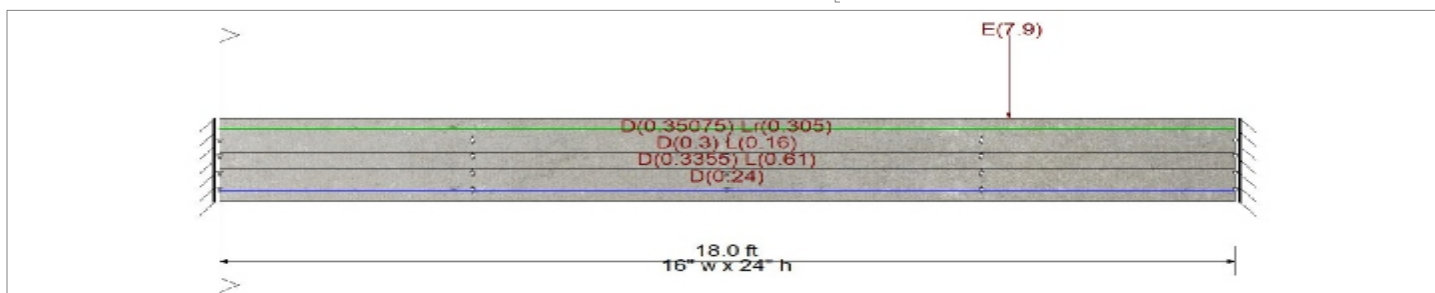
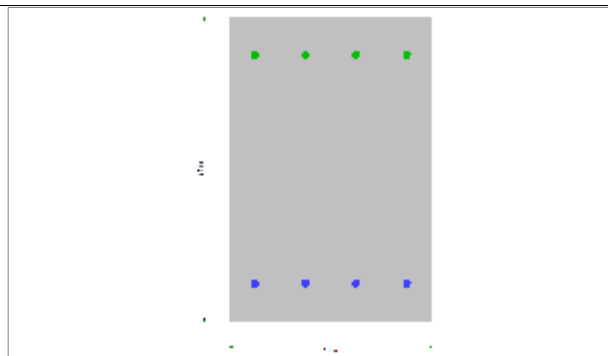
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

4-#5 at 3.0 in from Bottom, from 0.0 to 18.0 ft in this span

4-#5 at 3.0 in from Top, from 0.0 to 18.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 15.250 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 15.250 ft, (Roof Framing)

Point Load : E = 7.90 k @ 14.0 ft, (SW 71)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =		0.812 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.006 in	Ratio = 34189 >=360.
Mu : Applied		-90.531 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		111.447 k-ft	Max Downward Total Deflection	0.024 in	Ratio = 9157 >=180.
Location of maximum on span		18.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	21.772	22.972
Overall MINimum	-0.997	2.745

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 2

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
D Only	14.516	14.516
+D+L	21.446	21.446
+D+Lr	17.261	17.261
+D+0.750Lr+0.750L	21.772	21.772
+D+0.750L	19.714	19.714
+D+0.70E	15.347	19.215
+D-0.70E	13.818	9.684
+D+0.750L+0.5250E	20.603	22.972
+D+0.750L-0.5250E	19.080	16.200
+0.60D	8.710	8.710
+0.60D+0.70E	9.408	13.542
+0.60D-0.70E	8.012	3.878
Lr Only	2.745	2.745
L Only	6.930	6.930
E Only	0.997	6.903
E Only * -1.0	-0.997	-6.903

Shear Stirrup RequirementsBetween 0.00 to 5.02 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 5.05 to 12.95 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 inBetween 12.98 to 17.97 ft, $\Phi V_c < V_u$, Req'd Vs = 5.388, use #3 stirrups spaced at 10.000 in**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750Lr+0.750L	1	0.0236	9.000		0.0000	0.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 3

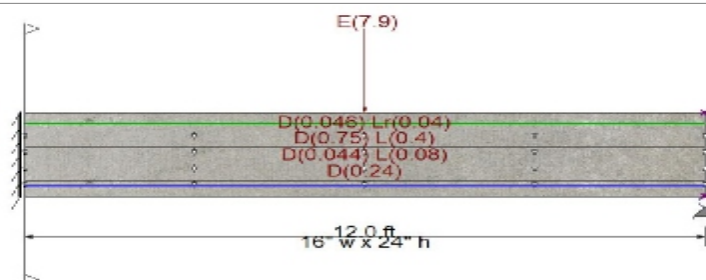
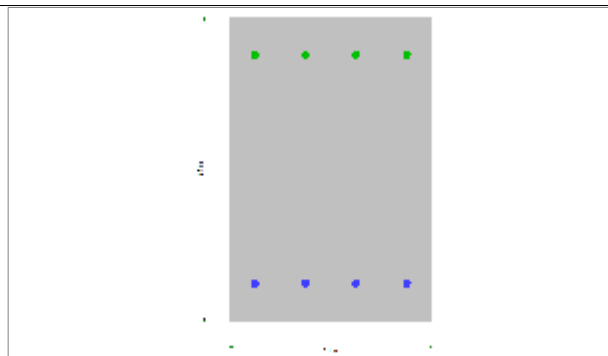
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
fy - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

4-#5 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span

4-#5 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 2.0 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 10.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Framing)

Point Load : E = 7.90 k @ 6.0 ft, (SW 71)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =		0.530 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.004 in	Ratio = 37725 >=360.
Mu : Applied		-59.086 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		111.447 k-ft	Max Downward Total Deflection	0.008 in	Ratio = 17661 >=180.
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	16.551	9.516
Overall MINimum	0.300	0.180

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 3

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
D Only	11.000	6.600
+D+L	14.600	8.760
+D+Lr	11.300	6.780
+D+0.750Lr+0.750L	13.925	8.355
+D+0.750L	13.700	8.220
+D+0.70E	14.802	8.328
+D-0.70E	7.198	4.872
+D+0.750L+0.5250E	16.551	9.516
+D+0.750L-0.5250E	10.849	6.924
+0.60D	6.600	3.960
+0.60D+0.70E	10.402	5.688
+0.60D-0.70E	2.798	2.232
Lr Only	0.300	0.180
L Only	3.600	2.160
E Only	5.431	2.469
E Only * -1.0	-5.431	-2.469

Shear Stirrup RequirementsBetween 0.00 to 4.13 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 4.15 to 11.98 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 in**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+0.5250E	1	0.0082	6.787		0.0000	0.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 4

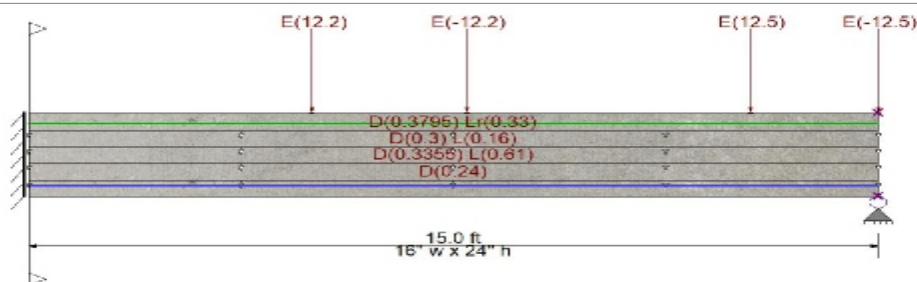
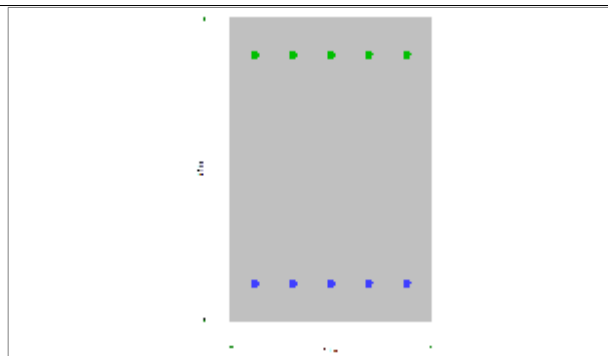
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
fy - 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



Cross Section & Reinforcing Details

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

5-#5 at 3.0 in from Bottom, from 0.0 to 15.0 ft in this span

5-#5 at 3.0 in from Top, from 0.0 to 15.0 ft in this span

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

Applied Loads

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 15.250 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 16.50 ft, (Roof Framing)

Point Load : E = 12.20 k @ 5.0 ft, (SW 95)

Point Load : E = -12.20 k @ 7.750 ft, (SW 95)

Point Load : E = 12.50 k @ 12.750 ft, (SW 96)

Point Load : E = -12.50 k @ 15.0 ft, (SW 96)

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 4

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =	0.692 : 1	Maximum Deflection	
Section used for this span	Typical Section	Max Downward Transient Deflection	0.006 in Ratio = 28405 >=360
Mu : Applied	-94.696 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 <360.0
Mn * Phi : Allowable	136.845 k-ft	Max Downward Total Deflection	0.023 in Ratio = 7806 >=180
Location of maximum on span	0.000 ft	Max Upward Total Deflection	0.000 in Ratio = 0 <180.0
Span # where maximum occurs	Span # 1		

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	22.948	15.185
Overall MINimum	3.094	1.856
D Only	15.391	9.234
+D+L	22.178	13.997
+D+Lr	18.418	11.157
+D+0.750Lr+0.750L	22.632	14.368
+D+0.750L	20.561	12.726
+D+0.70E	18.838	5.787
+D-0.70E	11.872	12.753
+D+0.750L+0.5250E	22.948	10.340
+D+0.750L-0.5250E	18.103	15.185
+0.60D	9.234	5.541
+0.60D+0.70E	12.753	2.022
+0.60D-0.70E	5.716	9.059
Lr Only	3.094	1.856
L Only	7.219	4.331
E Only	5.027	-5.027
E Only * -1.0	-5.027	5.027

Shear Stirrup RequirementsBetween 0.00 to 7.30 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 7.32 to 12.49 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 inBetween 12.51 to 14.97 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 in**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750Lr+0.750L	1	0.0231	8.484		0.0000	0.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 5

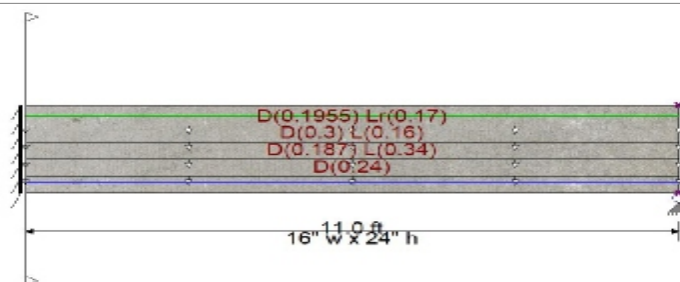
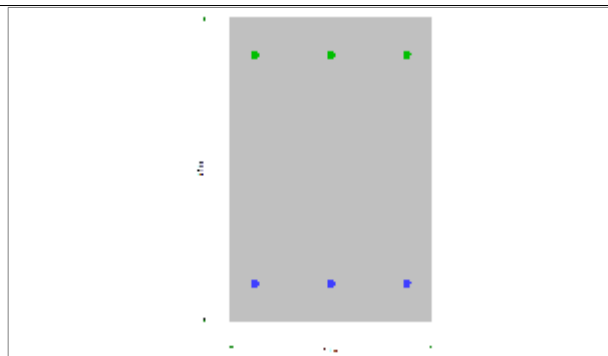
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
fy - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

3-#5 at 3.0 in from Bottom, from 0.0 to 11.0 ft in this span

3-#5 at 3.0 in from Top, from 0.0 to 11.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 8.50 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 8.50 ft, (Roof Framing)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =		0.433 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.001 in	Ratio = 110922 >=360
Mu : Applied		-37.147 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		85.821 k-ft	Max Downward Total Deflection	0.004 in	Ratio = 30613 >=180
Location of maximum on span		0.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	12.455	7.473
Overall MINimum	1.169	0.701
D Only	9.000	5.400
+D+L	12.438	7.463

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 5

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+D+Lr	10.169	6.102
+D+0.750Lr+0.750L	12.455	7.473
+D+0.750L	11.579	6.947
+0.60D	5.400	3.240
Lr Only	1.169	0.701
L Only	3.437	2.063

Shear Stirrup RequirementsBetween 0.00 to 1.64 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 1.66 to 10.98 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 in**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.750Lr+0.750L	1	0.0043	6.402		0.0000	0.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 6

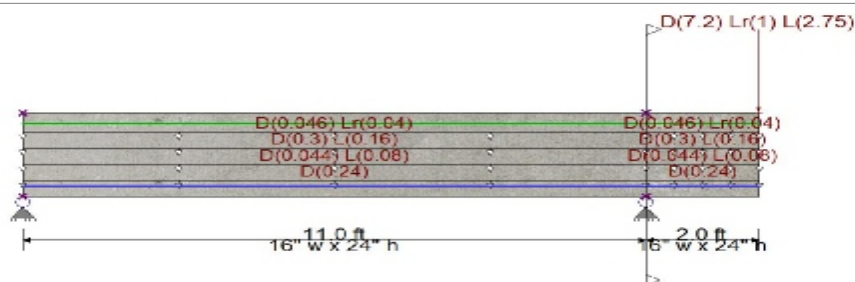
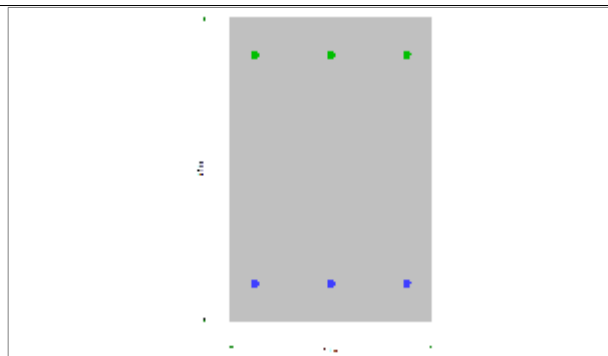
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
fy - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

3-#5 at 3.0 in from Bottom, from 0.0 to 11.0 ft in this span

Span #2 Reinforcing....

3-#5 at 3.0 in from Bottom, from 0.0 to 2.0 ft in this span

3-#5 at 3.0 in from Top, from 0.0 to 11.0 ft in this span

3-#5 at 3.0 in from Top, from 0.0 to 2.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 2.0 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Framing)

Load for Span Number 2

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 2.0 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Framing)

Point Load : D = 7.20, Lr = 1.0, L = 2.750 k @ 2.0 ft, (GB 5)

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 6

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =	0.353 : 1	Maximum Deflection	
Section used for this span	Typical Section	Max Downward Transient Deflection	0.000 in Ratio = 0 <360.0
Mu : Applied	-30.317 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 <360.0
Mn * Phi : Allowable	85.821 k-ft	Max Downward Total Deflection	0.002 in Ratio = 27626 >=180
Location of maximum on span	0.000 ft	Max Upward Total Deflection	0.000 in Ratio = 0 <180.0
Span # where maximum occurs	Span # 2		

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	4.875	21.412	
Overall MINimum	0.031	1.489	
D Only	4.098	16.318	
+D+L	4.875	21.412	
+D+Lr	4.129	17.807	
+D+0.750Lr+0.750L	4.704	21.255	
+D+0.750L	4.681	20.138	
+0.60D	2.459	9.791	
Lr Only	0.031	1.489	
L Only	0.777	5.093	

Shear Stirrup RequirementsBetween 0.00 to 10.96 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 inBetween 11.00 to 12.99 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 in**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	0.0023	4.243	L Only	-0.0002	9.900
+D+0.750Lr+0.750L	2	0.0017	2.000		0.0000	9.900

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 7

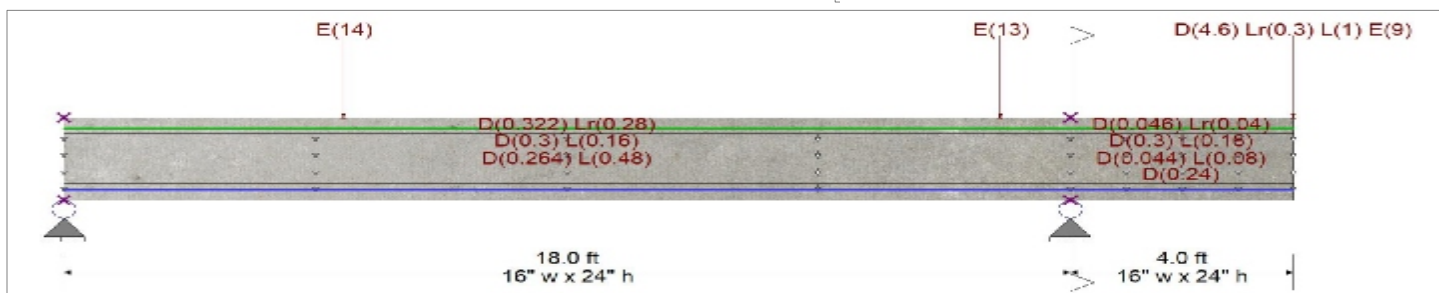
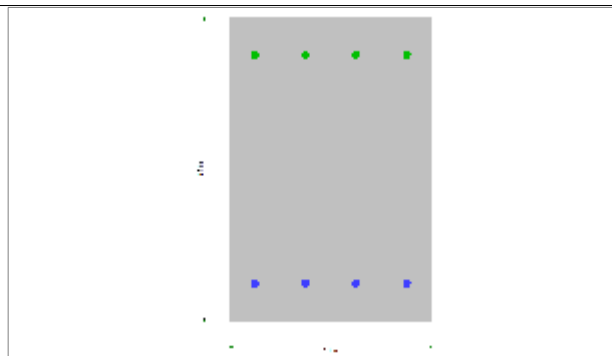
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

5-#5 at 3.0 in from Bottom, from 0.0 to 18.0 ft in this span

Span #2 Reinforcing....

4-#5 at 3.0 in from Bottom, from 0.0 to 4.0 ft in this span

5-#5 at 3.0 in from Top, from 0.0 to 18.0 ft in this span

4-#5 at 3.0 in from Top, from 0.0 to 4.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 0.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 12.0 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 14.0 ft, (Roof Framing)

Point Load : E = 14.0 k @ 5.0 ft, (SW 77)

Point Load : E = 13.0 k @ 16.750 ft, (SW 76)

Load for Span Number 2

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 2.0 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 7

Applied Loads

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

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Framing)

Point Load : D = 4.60, Lr = 0.30, L = 1.0, E = 9.0 k @ 4.0 ft, (GB 5)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio =		0.750 : 1	Maximum Deflection	
Section used for this span	Typical Section		Max Downward Transient Deflection	0.027 in Ratio = 7861 >=360
Mu : Applied	102.620	k-ft	Max Upward Transient Deflection	-0.014 in Ratio = 7088 >=360
Mn * Phi : Allowable	136.845	k-ft	Max Downward Total Deflection	0.143 in Ratio = 1509 >=180
Location of maximum on span	5.584	ft	Max Upward Total Deflection	-0.060 in Ratio = 1604 >=180
Span # where maximum occurs	Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	18.786	41.799	
Overall MINimum	-0.322	2.705	
D Only	9.980	21.595	
+D+L	15.411	29.643	
+D+Lr	12.416	24.659	
+D+0.750Lr+0.750L	15.880	29.929	
+D+0.750L	14.054	27.631	
+D+0.70E	16.290	40.485	
+D-0.70E	3.670	2.705	
+D+0.750L+0.5250E	18.786	41.799	
+D+0.750L-0.5250E	9.321	13.464	
+0.60D	5.988	12.957	
+0.60D+0.70E	12.298	31.847	
+0.60D-0.70E	-0.322	-5.933	
Lr Only	2.436	3.064	
L Only	5.431	8.049	
E Only	9.014	26.986	
E Only * -1.0	-9.014	-26.986	

Shear Stirrup RequirementsBetween 0.00 to 5.00 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 5.07 to 11.46 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 inBetween 11.53 to 21.98 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 in**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+0.5250E	1	0.1431	7.971	+D+0.750L+0.5250E	-0.0010	18.057
	2	0.0000	7.971	+D+0.750L+0.5250E	-0.0598	4.000

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 8

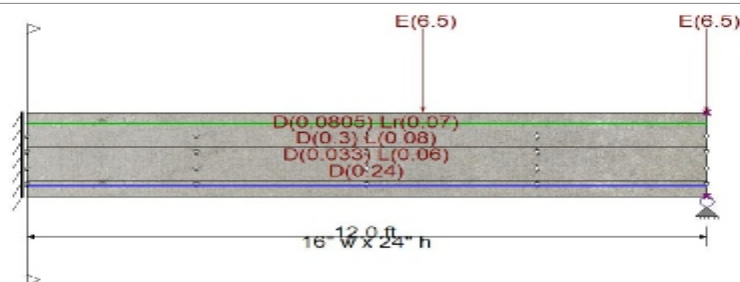
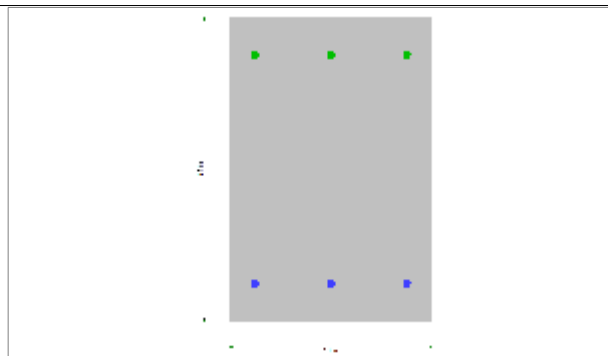
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups	=	40.0 ksi
fy - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 24.0 in

Span #1 Reinforcing....

3-#5 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span

3-#5 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.010 ksf, Tributary Width = 24.0 ft, (Wall Above)

Uniform Load : D = 0.0220, L = 0.040 ksf, Tributary Width = 1.50 ft, (Floor Framing)

Uniform Load : D = 0.0750, L = 0.020 ksf, Tributary Width = 4.0 ft, (Floor Slab)

Uniform Load : D = 0.0230, Lr = 0.020 ksf, Tributary Width = 3.50 ft, (Roof Framing)

Point Load : E = 6.50 k @ 7.0 ft, (SW 116)

Point Load : E = 6.50 k @ 12.0 ft, (SW 116)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio	=	0.477 : 1
Section used for this span		Typical Section
Mu : Applied		-40.926 k-ft
Mn * Phi : Allowable		85.821 k-ft
Location of maximum on span		0.000 ft
Span # where maximum occurs		Span # 1

Maximum Deflection		
Max Downward Transient Deflection	0.003 in	Ratio = 43528 >=360
Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Max Downward Total Deflection	0.006 in	Ratio = 24734 >=180
Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : GB 8

Vertical Reactions

Support notation : Far left is #1

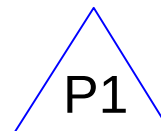
Load Combination	Support 1	Support 2
Overall MAXimum	10.598	11.101
Overall MINimum	0.525	0.315
D Only	7.801	4.681
+D+L	8.851	5.311
+D+Lr	8.326	4.996
+D+0.750Lr+0.750L	8.982	5.390
+D+0.750L	8.589	5.153
+D+0.70E	10.481	11.101
+D-0.70E	5.122	-1.740
+D+0.750L+0.5250E	10.598	9.969
+D+0.750L-0.5250E	6.579	0.338
+0.60D	4.681	2.808
+0.60D+0.70E	7.360	9.229
+0.60D-0.70E	2.001	-3.612
Lr Only	0.525	0.315
L Only	1.050	0.630
E Only	3.828	9.172
E Only * -1.0	-3.828	-9.172

Shear Stirrup RequirementsBetween 0.00 to 1.60 ft, $\Phi V_c/2 < V_u \leq \Phi V_c$, Req'd Vs = Min 9.6.3.1, use #3 stirrups spaced at 10.000 inBetween 1.62 to 11.98 ft, $V_u < \Phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 in**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+0.70E	1	0.0058	6.984		0.0000	0.000

Job: **18219 - Patel Residence - Arris**

Friction Pile Calculation - 2016 CBC

INPUTS

Frictional Resistance, $f = 600$ psf (per Soils Report)
 Maximum Load, $P = 44,000$ lbf (2- GB 1)

DESIGN

Diameter, $D = 16$ in.
 Embedment, $E = 20$ ft.

LONGITUDINAL REINFORCEMENT (CBC 1810.3.9.4.2)
 $0.005A_g < A_{st} < 0.08A_g$ (ACI 318-11 10.9.1)

 $A_{st,min.} > 1.01$ in.²
 $A_{st,max.} < 16.08$ in.²
Choose: **(6) #6**

Min. Length of Reinf.

10 ft. <--- Governs

10 ft. <--- Governs

4 ft.

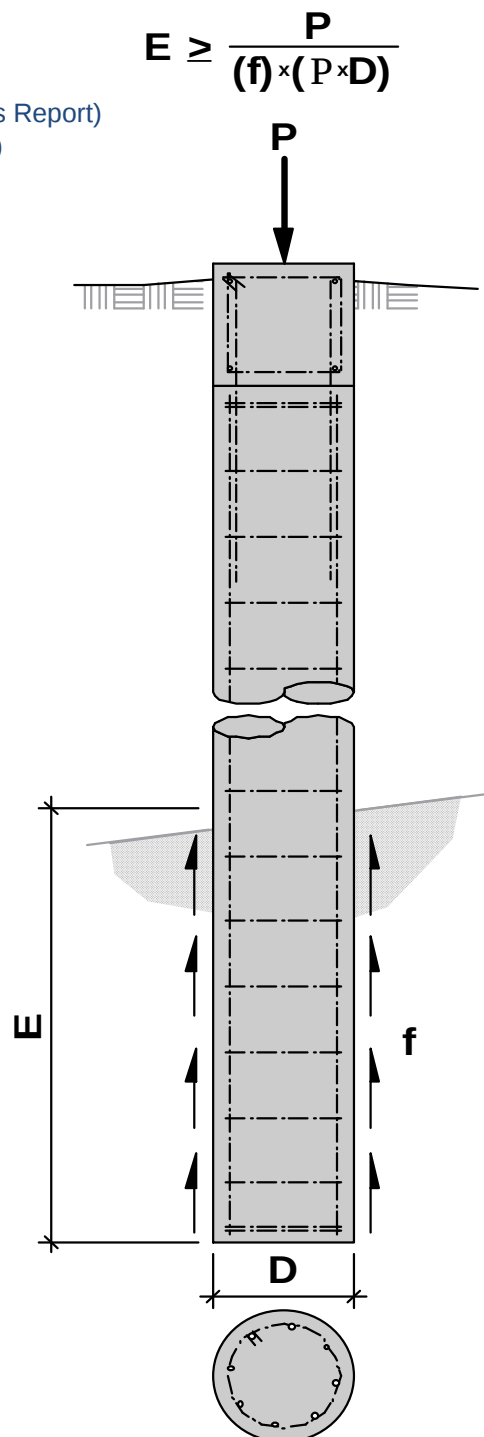
Bars must extend from top for the following length: **10.0 ft.**TRANSVERSE REINFORCEMENT (CBC 1810.3.9.4.2)

Min. Spacing of Ties

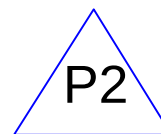
9 in.

8 in. <--- Governs

12 in.

Tie spacing shall not exceed: **8 in.**Minimum Tie Size--> **#3 bars**

$$E \geq \frac{P}{(f) \times (P \times D)}$$

Job: **18219 - Patel Residence - Arris**

Friction Pile Calculation - 2016 CBC

INPUTS

Frictional Resistance, $f = 600$ psf (per Soils Report)
 Maximum Load, $P = 34,000$ lbf (2-GB3)

$$E \geq \frac{P}{(f) \times (P \times D)}$$

DESIGN

Diameter, $D = 16$ in.
 Embedment, $E = 16$ ft.

LONGITUDINAL REINFORCEMENT (CBC 1810.3.9.4.2)

$$0.005A_g < A_{st} < 0.08A_g \text{ (ACI 318-11 10.9.1)}$$

$$A_{st,min.} > 1.01 \text{ in.}^2$$

$$A_{st,max.} < 16.08 \text{ in.}^2$$

Choose: **(6) #6**

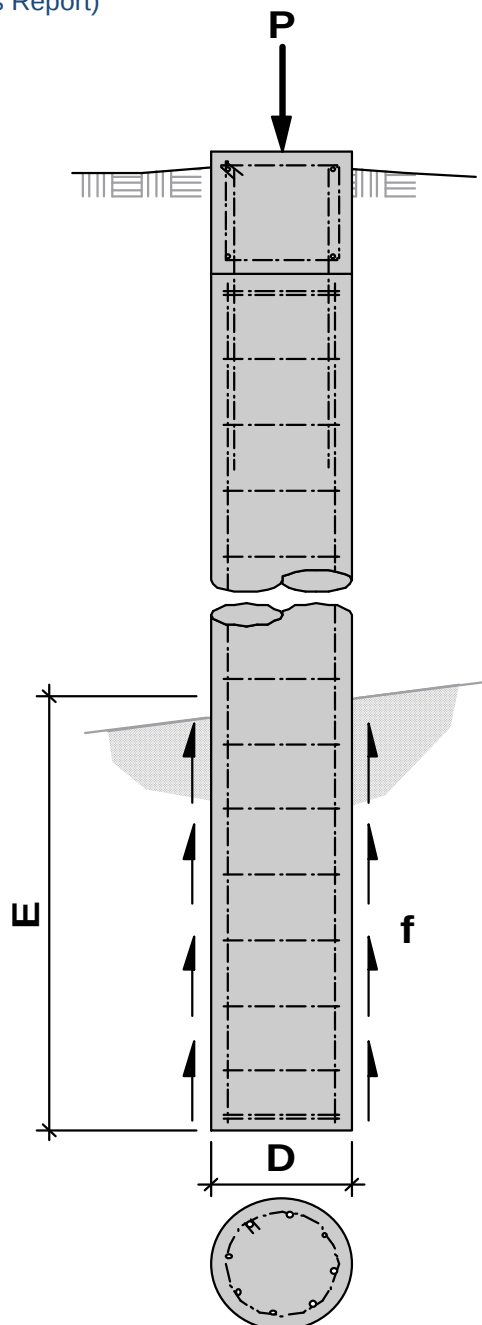
Min. Length of Reinf.

8 ft.
 10 ft. <--- Governs
 4 ft.

Bars must extend from top for the following length: **10.0 ft.**TRANSVERSE REINFORCEMENT (CBC 1810.3.9.4.2)

Min. Spacing of Ties

9 in.
 8 in. <--- Governs
 12 in.

Tie spacing shall not exceed: **8 in.**Minimum Tie Size--> **#3 bars**

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : Slab

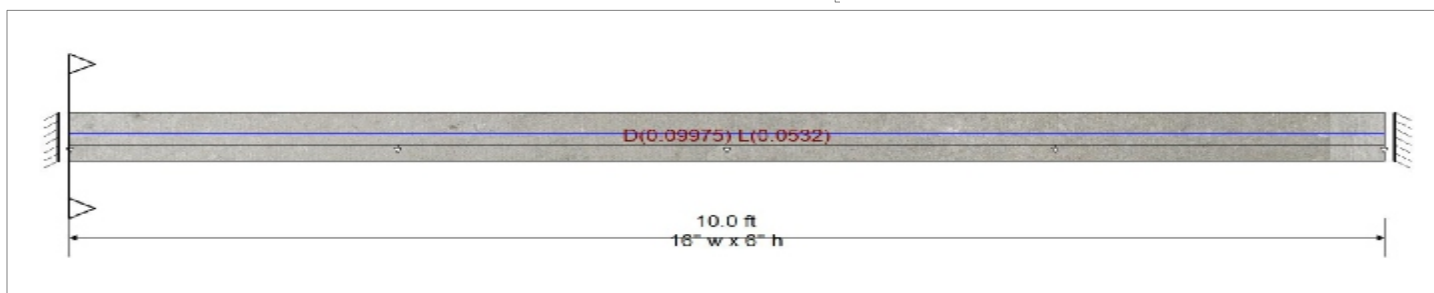
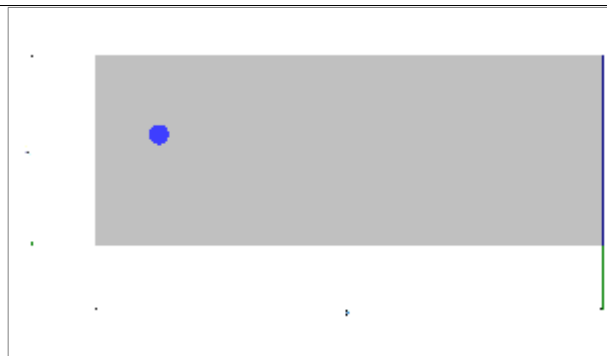
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

f'_c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
$f_r = f'_c^{1/2} * 7.50$	=	375.0 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.850
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	F_y - 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

**Cross Section & Reinforcing Details**

Rectangular Section, Width = 16.0 in, Height = 6.0 in

Span #1 Reinforcing....

1-#5 at 2.50 in from Top, from 0.0 to 10.0 ft in this span

Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0750, L = 0.040 ksf, Tributary Width = 1.330 ft, (Floor Slab)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio	=	0.594 : 1	Maximum Deflection		
Section used for this span		Typical Section	Max Downward Transient Deflection	0.003 in	Ratio = 45093 >=360
Mu : Applied		-2.674 k-ft	Max Upward Transient Deflection	0.000 in	Ratio = 0 <360.0
Mn * Phi : Allowable		4.501 k-ft	Max Downward Total Deflection	0.012 in	Ratio = 9610 >=180
Location of maximum on span		10.000 ft	Max Upward Total Deflection	0.000 in	Ratio = 0 <180.0
Span # where maximum occurs		Span # 1			

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	1.248	1.248
Overall MINimum	0.266	0.266
D Only	0.982	0.982
+D+L	1.248	1.248
+D+0.750L	1.182	1.182
+0.60D	0.589	0.589
L Only	0.266	0.266

Shear Stirrup RequirementsEntire Beam Span Length : $V_u < \phi V_c/2$, Req'd Vs = Not Req'd 9.6.3.1, use #3 stirrups spaced at 0.000 in

Concrete Beam

Lic. # : KW-06006695

Licensee : ASHLEY & VANCE ENGINEERING INC.

Description : Slab

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	0.0125	5.000		0.0000	0.000