
STRUCTURAL CALCULATIONS

FOR

SINGLE FAMILY DWELLING
RE-ROOFING

21 REDONDO AVE.
LONG BEACH, CALIFORNIA

REVISED
DATE: October 3, 2011



Man. A. Espino

JOB NO. 11-213

ENGINEERINGDA@HOTMAIL.COM

OFFICE: (323) 527-7485

DOUGLAS FIR-LARCH DESIGN VALUES							
DESIGNATION	GRADE	FB	FT	FC_{perp.}	FC	FV	E
LIGHT FRAMING 2" TO 4" THICK 2" TO 4' WIDE	CONSTRUCTION	1000	650	625	1650	180	1,500,000
JOIST & PLANKS 2" TO 4" THICK 6" & WIDER	NO. 2	900	575	625	1350	180	1,600,000
POST & TIMBER 5x5 AND LARGER WIDTH NOT MORE THAN 2" GREATER THAN THICKNESS	NO. 1	1200	825	625	1000	170	1,600,000
BEAM & STRINGER 5" & THICKER WIDTH MORE THAN 2" GREATER THAN THICKNESS	NO. 1	1350	675	625	925	170	1,600,000
GLU-LAM BEAMS	COMBINATION NO. 24F-V8	2400	1100	650	1650	265	1,800,000

(1) THE ABOVE VALUES ARE TAKEN FROM THE 05 NDS.

(2) USE STANDARD GRADING RULE NO. 17.

DESIGN CRITERIA

- 1 Soil supporting footings is natural grade or engineered fill.
- 2 Soil allowable bearing pressure used in design _____ 1500 PSF
- 3 Footing shall extend __18"__ minimum into undisturbed soil or __18"__ below finish grade whichever is lower.
- 4 All concrete shall develop a minimum compressive strength of 3000 psi in 28 days.
- 5 Reinforcing steel shall conform to ASTM 615, Grade 60.
- 6 Structural steel shall conform to the following:

Wide flange shapes	ASTM A992
TS shapes	ASTM A500, Grade B
Pipe shapes	ASTM A53 , Grade B
Other rolled shapes, Bars and plates	ASTM A36
- 7 Structural steel shall be fabricated in a shop of an approved fabricator.
- 8 All welding shall be done by Certified Welders.
- 9 Concrete Block shall conform to ASTM C90, Grade N-1.
- 10 Grout shall develop 2000 psi in 28 days.
- 11 Mortar shall be Type S and develop 1800 psi in 28 days.
- 12 All lumber shall be grade marked Douglas Fir. (Grading rule No. 17)

Light Framing	Construction
Joist & Planks	No. 2
Beams & Stringers	No. 1
Posts & Timbers	No. 1
- 13 Glue Laminated Timbers shall be combination No. 24F-V8.
- 14 Plywood shall conform to PS 1-95, Structural 1.
- 15 All material and workmanship shall conform to the requirements of 2010 California Residential Code.

PROJECT:

37683.00

Based On : 2007 CBC
 Wood : Douglas-Fir/Larch
 C_r = 1.15 (repetitive member factor) F_v = 180 psi (for Light Framing and Joists & Planks)
 E = 1,500,000 psi (Const Light Framing) F_v = 170 psi (for Beams & Stringers and Posts & Timbers)
 E = 1,600,000 psi (#2 Joists & Planks, #1 Beams & Stringers, #1 Posts & Timbers)

MEMBER: Nominal Grade Type	SIZE: B (in)	D (in)	(35 PCF) PLF	PROPERTIES:			BENDING STRESS:			FLOOR			ROOF		
				A(in ²)	S(in ³)	I(in ⁴)	F _b (psi)	C _F	F _b x C _F	V _{max}	(Lb-ft & Lb) M _{max}	C _d =1.00 M _{max} (rep)	V _{max}	(Lb-ft & Lb) M _{max}	C _d =1.25 M _{max} (rep)
2x4 Const. LF	1.5	3.50	1.3	5.3	3.1	5.4	1000	1.00	1000	630	255	293	788	319	367
2x6 #2 JP	1.5	5.50	2.0	8.3	7.6	20.8	900	1.30	1170	990	737	848	1238	922	1060
2x8 #2 JP	1.5	7.25	2.6	10.9	13.1	47.6	900	1.20	1080	1305	1183	1360	1631	1478	1700
2x10 #2 JP	1.5	9.25	3.4	13.9	21.4	98.9	900	1.10	990	1665	1765	2029	2081	2206	2537
2x12 #2 JP	1.5	11.25	4.1	16.9	31.6	178.0	900	1.00	900	2025	2373	2729	2531	2966	3411
2x14 #2 JP	1.5	13.25	4.8	19.9	43.9	290.8	900	0.90	810	2385	2963	3407	2981	3703	4259
4x4 Const LF	3.5	3.50	3.0	12.3	7.1	12.5	1000	1.00	1000	1470	595	685	1838	744	856
4x6 #2 JP	3.5	5.50	4.7	19.3	17.6	48.5	900	1.30	1170	2310	1720	1979	2888	2151	2473
4x8 #2 JP	3.5	7.25	6.2	25.4	30.7	111.1	900	1.30	1170	3045	2989	3438	3806	3737	4297
4x10 #2 JP	3.5	9.25	7.9	32.4	49.9	230.8	900	1.20	1080	3885	4492	5166	4856	5615	6457
4x12 #2 JP	3.5	11.25	9.6	39.4	73.8	415.3	900	1.10	990	4725	6091	7004	5906	7614	8756
4x14 #2 JP	3.5	13.25	11.3	46.4	102.4	678.5	900	1.00	900	5565	7681	8833	6956	9601	11041
6x4 #2 JP	5.5	3.50	4.7	19.3	11.2	19.7	900	1.00	900	2310	842	N/A	2888	1053	N/A
6x6 #1 PT	5.5	5.50	7.4	30.3	27.7	76.3	1200	1.00	1200	3428	2773	N/A	4285	3466	N/A
6x8 #1 PT	5.5	7.50	10.0	41.3	51.6	193.4	1200	1.00	1200	4675	5156	N/A	5844	6445	N/A
6x10 #1 BS	5.5	9.50	12.7	52.3	82.7	393.0	1350	1.00	1350	5922	9307	N/A	7402	11634	N/A
6x12 #1 BS	5.5	11.50	15.4	63.3	121.2	697.1	1350	1.00	1350	7168	13638	N/A	8960	17048	N/A
6x14 #1 BS	5.5	13.50	18.0	74.3	167.1	1127.7	1350	0.99	1332	8415	18550	N/A	10519	23188	N/A

PARALLAM (PSL) BEAMS

Fv= 290
 Fb= 2900
 E= 2000000
 E= 2000000

psi
 psi
 psi (STOCK BEAMS)
 psi (COMMERCIAL)

Depth Factor=(12/D)^0.111

b	d	A	S	I	100%		125%		
					V	M	V	M	
3.50	x	9.50	33.3	53	250	6.43	12.7	8.04	15.9
3.50	x	11.875	41.6	82	488	8.04	19.9	10.04	24.8
3.50	x	14.0	49.0	114	800	9.47	27.2	11.84	34.0
3.50	x	16.0	56.0	149	1195	10.8	35.0	13.53	43.7
3.50	x	18.0	63.0	189	1701	12.2	43.7	15.2	54.6
3.50	x	20.0	70.0	233	2333	13.5	53.3	16.9	66.6
3.50	x	22.0	77.0	282	3106	14.9	63.8	18.6	79.7
3.50	x	24.0	84.0	336	4032	16.2	75.2	20.3	94.0
3.50	x	26.0	91.0	394	5126	17.6	87.5	22.0	109.3
3.50	x	28.0	98.0	457	6403	18.9	100.6	23.7	125.8
5.25	x	9.500	49.9	79.0	375	9.64	19.1	12.1	23.9
5.25	x	11.875	62.3	123	733	12.1	29.8	15.1	37.3
5.25	x	14.0	73.5	172	1201	14.2	40.7	17.8	50.9
5.25	x	16.0	84.0	224	1792	16.2	52.4	20.3	65.5
5.25	x	18.0	95	284	2552	18.3	65.5	22.8	81.9
5.25	x	20.0	105	350	3500	20.3	79.9	25.4	99.9
5.25	x	22.0	116	424	4659	22.3	95.7	27.9	120
5.25	x	24.0	126	504	6048	24.4	113	30.5	141
5.25	x	26.0	137	592	7690	26.4	131	33.0	164
5.25	x	28.0	147	686	9604	28.4	151	35.5	189
5.25	x	30.0	158	788	11813	30.5	172	38.1	215
5.25	x	32.0	168	896	14336	32.5	194	40.6	243
5.25	x	34.0	179	1012	17196	34.5	218	43.1	272
5.25	x	36.0	189	1134	20412	36.5	243	45.7	303
5.25	x	38.0	200	1264	24007	38.6	269	48.2	336
5.25	x	40.0	210	1400	28000	40.6	296	50.8	370
5.25	x	42.0	221	1544	32414	42.6	325	53.3	406
7.00	x	9.50	66.5	105	500	12.9	25.4	16.1	31.8
7.00	x	11.875	83.1	165	977	16.1	39.8	20.1	49.7
7.00	x	14.0	98.0	229	1601	18.9	54.3	23.7	67.9
7.00	x	16.0	112	299	2389	21.7	69.9	27.1	87.4
7.00	x	18.0	126	378	3402	24.4	87.3	30.5	109
7.00	x	20.0	140	467	4667	27.1	107	33.8	133
7.00	x	22.0	154	565	6211	29.8	128	37.2	159
7.00	x	24.0	168	672	8064	32.5	150	40.6	188
7.00	x	26.0	182	789	10253	35.2	175	44.0	219
7.00	x	28.0	196	915	12805	37.9	201	47.4	252
7.00	x	30.0	210	1050	15750	40.6	229	50.8	287
7.00	x	32.0	224	1195	19115	43.3	259	54.1	324
7.00	x	34.0	238	1349	22927	46.0	290	57.5	363
7.00	x	36.0	252	1512	27216	48.7	323	60.9	404
7.00	x	40.0	280	1867	37333	54.1	395	67.7	493
7.00	x	42.0	294	2058	43218	56.8	433	71.1	541

(1) MEMBERS IN BOLD ARE COMMERCIAL SPECIAL ORDER

== TYPICAL POST/STUD DESIGN TABLE ==
(12/15/03)

PROJECT: _____
JOB NO. _____

GRADE	POST SIZE	AREA IN ²	ALLOWABLE LOAD (KIPS)-UNSUPPORTED HEIGHT IN FT (LOAD TABLE 133%)																			
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
No. 2	2X4	5.25	1.01																			
	2X4	5.25	4.87	3.74	2.94	2.36	1.93	1.61	1.36	1.16	1.01											
	2X4	5.25	1.07																			
	2X4	5.25	5.07	3.93	3.10	2.50	2.05	1.71	1.44	1.24	1.07											
	2X6	8.25	1.68																			
	2X6	8.25	12.99	11.50	9.92	8.45	7.19	6.14	5.27	4.57	3.99	3.51	3.10	2.77	2.48	2.23	2.02	1.84	1.68			
	2X8	10.88	2.21																			
	2X8	10.88	18.6	17.6	16.5	15.1	13.7	12.2	10.8	9.6	8.52	7.59	6.78	6.08	5.48	4.96	4.51	4.12	3.77			
No. 2	3X4	8.75	4.73	3.55	2.75	2.19	1.78															
	3X4	8.75	8.45	6.55	5.17	4.16	3.41	2.85	2.41	2.06	1.78											
	3X6	13.75	7.40	5.56	4.31	3.44	2.80															
	3X6	13.75	21.7	19.2	16.5	14.1	12.0	10.2	8.79	7.61	6.64	5.84	5.17	4.61	4.13	3.72	3.37	3.07	2.80			
	3X8	18.13	9.72	7.31	5.68	4.53	3.69															
	3X8	18.13	30.9	29.4	27.5	25.2	22.8	20.3	18.0	16.0	14.2	12.6	11.3	10.1	9.14	8.27	7.52	6.86	6.28			
	4X4	12.25	11.8	9.17	7.24	5.83	4.78	3.99	3.37	2.89	2.50											
	4X6	19.25	18.4	14.3	11.3	9.13	7.49	6.25	5.29	4.53	3.92											
No. 1	4X6	19.25	30.3	26.8	23.2	19.7	16.8	14.3	12.3	10.7	9.30	8.18	7.24	6.45	5.78	5.21	4.72	4.29	3.92			
	4X8	25.38	24.0	18.7	14.9	12.0	9.9	8.22	6.96	5.96	5.16											
	4X8	25.38	43.3	41.1	38.4	35.3	31.9	28.5	25.3	22.4	19.9	17.7	15.8	14.2	12.8	11.6	10.5	9.6	8.79			
	6X6	30.25	35.3	32.9	30.1	26.9	23.7	20.8	18.2	16.0	14.1	12.4	11.1	9.91	8.91	8.05	7.30	6.65	6.09			
	6X8	41.25	48.1	44.9	41.0	36.7	32.3	28.3	24.8	21.8	19.2	17.0	15.1	13.5	12.1	11.0	10.0	9.1	8.3			
	6X8	41.25	51.4	49.9	47.9	45.5	42.7	39.5	36.2	32.9	29.8	26.9	24.4	22.1	20.0	18.2	16.6	15.2	14.0			
	6X10	52.25	57.1	53.7	49.5	44.7	39.8	35.1	30.9	27.2	24.0	21.3	19.0	17.0	15.3	13.8	12.6	11.5	10.5			
	6X10	52.25	62.3	61.5	60.5	59.2	57.7	56.0	53.9	51.6	49.0	46.3	43.4	40.6	37.8	35.1	32.6	30.3	28.1			
8X8	56.25	70.5	68.6	66.1	63.1	59.5	55.5	51.2	46.8	42.6	38.7	35.0	31.8	28.9	26.4	24.1	22.1	20.3				

X INDICATES BRACED IN WEAK DIRECTION
ALL VALUES BASED ON DOUGLAS FIR-LARCH

ROOF LOADS

normal Wt. Conc. Tile	10.0 psf	
(E)Composite Shingles 2 layers	4.5 psf	
1/2" plywood	1.5 psf	
(e) 2x4 rafters@24	1.0 psf	
insulation	0.5 psf	
ceiling	4.5 psf	
beams/headers	1.0 psf	
MP&E/ misc.	0.5 psf	
	D= 23.5 psf	
	Lr= 20.0 psf	REDUCIBLE

FLOOR LOADS

flooring	1.0 psf	
3/4" plywood	2.3 psf	
joist	3.0 psf	
ceiling	4.0 psf	
beams/headers	2.0 psf	
MP&E/ misc.	2.7 psf	
	D= 15.0 psf	
	L= 40.0 psf	

EXTERIOR WALL LOADS

7/8" stucco	10.0 psf	
1/2" plywood	1.5 psf	
2x6 studs at 16"oc	1.5 psf	
insulation	0.5 psf	
1/2" gyp board	2.3 psf	
MP&E/ misc.	0.2 psf	
	D= 16.0 psf	

INTERIOR WALL LOADS

1/2" gyp board	2.3 psf	
1/2" plywood	1.5 psf	
2x6 studs at 16"oc	1.5 psf	
insulation	0.5 psf	
1/2" gyp board	2.3 psf	
MP&E/ misc.	1.9 psf	
	D= 10.0 psf	

Tag **RJ-1**

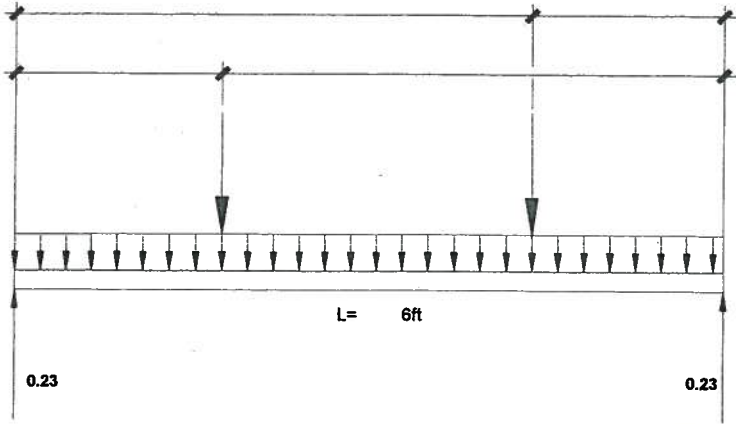
Beam

Member= 2x4

No. of members= 1
 CD= 1.25
 CF= 1.00
 CV= 1.00
 Cr= 1.15

L = 6 ft
 A = 5.25 in²
 S = 3.1 in³
 I = 5.4 in⁴
 E = 1,600,000 psi
 Va = 0.630 kips
 Ma = 0.255 k-ft

Total Load L/n= 180
 Live Load L/n= 240



Uniform load (W1)

NOT INCLUDING WT. FROM CEILING

	D	L	Trib				
w1,1	(18)	+	20	x	2	=	36
w1,2	()	+		x	0	=	0
w1,3	()	+		x	0	=	0
w1,4	()	+		x	0	=	0
w1,5	()	+		x	0	=	0
W1						=	36

+ 40 = **0.076 kif**

Point Load (P1)

	D	L	Trib.1	Trib.2			
p1,1	()	+		x	0	x	0
p1,2	()	+		x	0	x	0
p1,3	()	+		x	0	x	0
p1,4	()	+		x	0	x	0
p1,5	()	+		x	0	x	0
P1							0

+ 0 = **0.00 kips**

X1 (ft) X2 (ft)
0 6

Point Load (P2)

	D	L	Trib.1	Trib.2			
p2,1	()	+		x	0	x	0
p2,2	()	+		x	0	x	0
p2,4	()	+		x	0	x	0
p2,4	()	+		x	0	x	0
p2,5	()	+		x	0	x	0
P2							0

+ 0 = **0.00 kips**

X3 (ft) X4 (ft)
0 6

Shear

R1= 0.228 kips
 R2= -0.228 kips
 Vmax= 0.23 kips
 Vallow.= 0.79 x 1 = 0.7875 kips OK

Stress Ratio shear: .29

Flexure

M= 0.34 k-ft
 Mallow.= 0.37 x 1 = 0.3669 k-ft OK

flexure: .93

Deflection

D (D+L) = 0.258 + 0.000 = 0.26 = $\frac{L}{279}$ < $\frac{L}{180}$ OK

deflection: .65

D (L Only) = 0.136 + 0 = 0.14 = $\frac{L}{529}$ < $\frac{L}{240}$ OK

deflection: .46

USE: **1- 2X4 24" O.C. (MAX SPAN 6')**

Tag

RJ-2

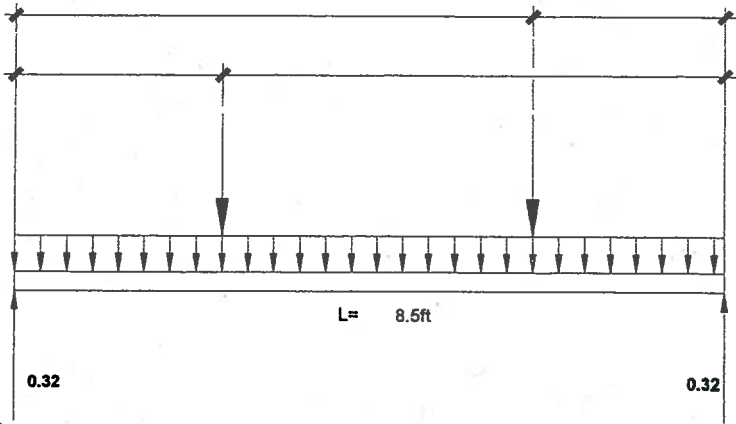
Beam

Member= 2x4

No. of members= 2
 CD= 1.25
 CF= 1.00
 CV= 1.00
 Cr= 1.15

L = 8.5 ft
 A = 5.25 in²
 S = 3.1 in³
 I = 5.4 in⁴
 E = 1,600,000 psi
 Va = 0.630 kips
 Ma = 0.255 k-ft

Total Load L/n= 180
 Live Load L/n= 240



NOT INCLUDING WT. FROM CEILING

Uniform load (W1)

	D	L	Trib				
w1,1	(18)	+	20)	x	2	=	36 + 40
w1,2	(	+	)	x	0	=	0 + 0
w1,3	(	+	)	x	0	=	0 + 0
w1,4	(	+	)	x	0	=	0 + 0
w1,5	(	+	)	x	0	=	0 + 0
W1						=	36 + 40 = 0.076 kif

Point Load (P1)

	D	L	Trib.1	Trib.2			
p1,1	(	+	)	x	0	x	0 = 0 + 0
p1,2	(	+	)	x	0	x	0 = 0 + 0
p1,3	(	+	)	x	0	x	0 = 0 + 0
p1,4	(	+	)	x	0	x	0 = 0 + 0
p1,5	(	+	)	x	0	x	0 = 0 + 0
P1							0 + 0 = 0.00 kips

X1 (ft) X2 (ft)
 0 8.5

Point Load (P2)

	D	L	Trib.1	Trib.2			
p2,1	(	+	)	x	0	x	0 = 0 + 0
p2,2	(	+	)	x	0	x	0 = 0 + 0
p2,4	(	+	)	x	0	x	0 = 0 + 0
p2,4	(	+	)	x	0	x	0 = 0 + 0
p2,5	(	+	)	x	0	x	0 = 0 + 0
P2							0 + 0 = 0.00 kips

X3 (ft) X4 (ft)
 0 8.5

Shear

R1= 0.323 kips
 R2= -0.323 kips
 Vmax= 0.32 kips

Vallow.= 0.79 x 2 = 1.575 kips OK

Stress Ratio shear: .21

Flexure

M= 0.69 k-ft

Mallow.= 0.37 x 2 = 0.7337 k-ft OK

flexure: .94

Deflection

D = D w1
 D (D+L) = 0.520

+ D p1 + D p2 = 0.52 = $\frac{L}{196}$ < $\frac{L}{180}$ OK

deflection: .92

D (L Only) = 0.274

+ 0 + 0 = 0.27 = $\frac{L}{372}$ < $\frac{L}{240}$ OK

deflection: .64

USE:

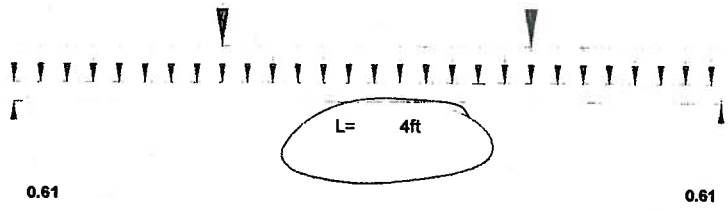
2- 2X4 24" O.C. (MAX SPAN 8.5')

Tag **PURLIN** (E) PURLIN CHECK

Beam

Member= 2x6	L = 4 ft
	A = 8.25 in ²
	S = 7.6 in ³
No. of members= 1	I = 20.8 in ⁴
CD= 1.25	E = 1,600,000 psi
CF= 1.30	Va = 0.990 kips
CV= 1.00	Ma = 0.567 k-ft
Cr= 1.00	

Total Load L/n= 180
Live Load L/n= 240



Uniform load (W1)

	D	L	Trib				
w1,1	(23.5	+	20)	x	7	=	164.5 + 140
w1,2	(	+	)	x	0	=	0 + 0
w1,3	(	+	)	x	0	=	0 + 0
w1,4	(	+	)	x	0	=	0 + 0
w1,5	(	+	)	x	0	=	0 + 0
W1						=	164.5 + 140 = 0.305 kif

Point Load (P1)

	D	L	Trib.1	Trib.2				
p1,1	(	+	)	x	0	x	0	= 0 + 0
p1,2	(	+	)	x	0	x	0	= 0 + 0
p1,3	(	+	)	x	0	x	0	= 0 + 0
p1,4	(	+	)	x	0	x	0	= 0 + 0
p1,5	(	+	)	x	0	x	0	= 0 + 0
P1								= 0 + 0 = 0.00 kips

X1 (ft) X2 (ft)
0 4

Point Load (P2)

	D	L	Trib.1	Trib.2				
p2,1	(	+	)	x	0	x	0	= 0 + 0
p2,2	(	+	)	x	0	x	0	= 0 + 0
p2,4	(	+	)	x	0	x	0	= 0 + 0
p2,4	(	+	)	x	0	x	0	= 0 + 0
p2,5	(	+	)	x	0	x	0	= 0 + 0
P2								= 0 + 0 = 0.00 kips

X3 (ft) X4 (ft)
0 4

Shear

R1= 0.609 kips
R2= -0.609 kips
Vmax= 0.61 kips
Vallow.= 1.24 x 1 = 1.2375 kips OK
Stress Ratio shear: .49

Flexure

M= 0.61 k-ft
Mallow.= 0.92 x 1 = 0.9217 k-ft OK
flexure: .66

Deflection

D (D+L) = D w1 + D p1 + D p2 = 0.053 + 0.000 + 0.000 = 0.053 = $\frac{L}{911} < \frac{L}{180}$ OK deflection: .20
D (L Only) = 0.024 + 0 + 0 = 0.024 = $\frac{L}{1981} < \frac{L}{240}$ OK deflection: .12

USE: **1- 2X6 MAX SPAN 4'-0"**

Tag **B1**

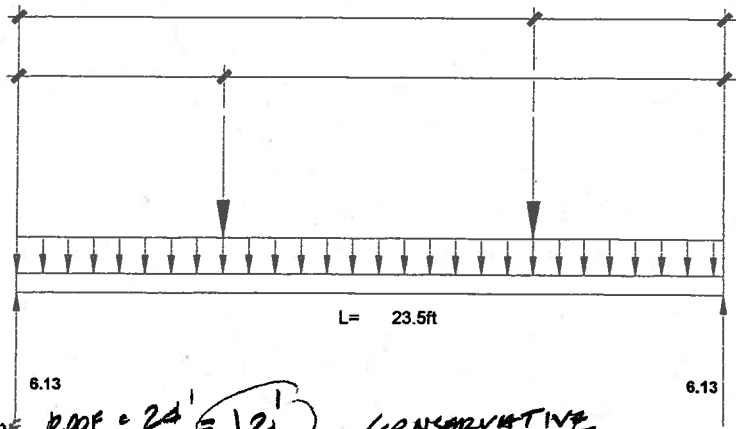
Beam

Member= 6x12

No. of members= 2
 CD= 1.25
 CF= 1.00
 CV= 1.00
 Cr= 1.00

Total Load L/n= 180
 Live Load L/n= 240

L = 23.5 ft
 A = 63.25 in²
 S = 121.2 in³
 I = 697.1 in⁴
 E = 1,600,000 psi
 Va = 7.590 kips
 Ma = 13.638 k-ft



Uniform load (W1)

	D	L	Trib				
w1,1	(23.5)	(20)	x	12	=	282	+ 240
w1,2	()	()	x	0	=	0	+ 0
w1,3	()	()	x	0	=	0	+ 0
w1,4	()	()	x	0	=	0	+ 0
w1,5	()	()	x	0	=	0	+ 0
W1					=	282	+ 240 = 0.522 kif

Point Load (P1)

	D	L	Trib.1	Trib.2			
p1,1	()	()	x	0	x	0	= 0 + 0
p1,2	()	()	x	0	x	0	= 0 + 0
p1,3	()	()	x	0	x	0	= 0 + 0
p1,4	()	()	x	0	x	0	= 0 + 0
p1,5	()	()	x	0	x	0	= 0 + 0
P1						0	+ 0 = 0.00 kips

Point Load (P2)

	D	L	Trib.1	Trib.2			
p2,1	()	()	x	0	x	0	= 0 + 0
p2,2	()	()	x	0	x	0	= 0 + 0
p2,4	()	()	x	0	x	0	= 0 + 0
p2,4	()	()	x	0	x	0	= 0 + 0
p2,5	()	()	x	0	x	0	= 0 + 0
P2						0	+ 0 = 0.00 kips

Shear

R1= 6.134 kips
 R2= -6.134 kips
 Vmax= 6.13 kips
 Vallow.= 9.49 x 2 = 18.975 kips OK

Stress Ratio shear: .32

Flexure

M= 36.03 k-ft
 Mallow.= 17.05 x 2 = 34.096 k-ft NO GOOD

flexure: 1.06 ≈ MINIM.

Deflection

D (D+L) = 1.606 + 0.000 + 0.000 = 1.61 = $\frac{L}{176}$ > $\frac{L}{180}$ NO GOOD
 D (L Only) = 0.738 + 0 + 0 = 0.74 = $\frac{L}{382}$ < $\frac{L}{240}$ OK

deflection: 1.02 ≈ O.K.

deflection: .63

OVER STRESSED BY 6%
 ADD 2X12 SISTERED
 IN BETWEEN 6X12 BEAMS
 OR AT ONE SIDE.

USE: **2- 6X12 w/ ADDITIONAL 2X12 SISTERED TO BEAM.**

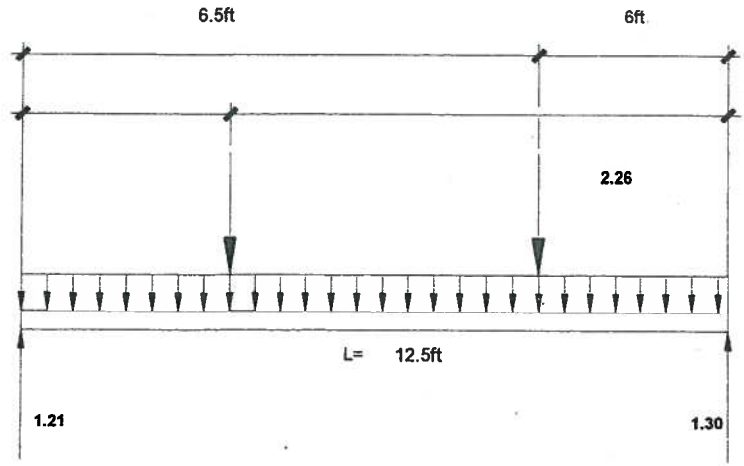
11

Tag **B2**

Beam
Member= 4x12
No. of members= 1
CD= 1.25
CF= 1.10
CV= 1.00
Cr= 1.00

L = 12.5 ft
A = 39.38 in²
S = 73.8 in³
I = 415.3 in⁴
E = 1,600,000 psi
Va = 4.725 kips
Ma = 5.537 k-ft

Total Load L/n= 180
Live Load L/n= 240



Uniform load (W1) *CEILING LOAD*

	D	L	Trib			
w1,1	(5.5	+	10)	x	1.33	= 7.315 + 13.3
w1,2	(	+	)	x	0	= 0 + 0
w1,3	(	+	)	x	0	= 0 + 0
w1,4	(	+	)	x	0	= 0 + 0
w1,5	(	+	)	x	0	= 0 + 0
W1						= 7.315 + 13.3 = 0.021 kif

Point Load (P1)

	D	L	Trib.1	Trib.2				
p1,1	(	+	)	x	0	x	0	= 0 + 0
p1,2	(	+	)	x	0	x	0	= 0 + 0
p1,3	(	+	)	x	0	x	0	= 0 + 0
p1,4	(	+	)	x	0	x	0	= 0 + 0
p1,5	(	+	)	x	0	x	0	= 0 + 0
P1								= 0 + 0 = 0.00 kips

X1 (ft) X2 (ft)
0 12.5

Point Load (P2) *FROM HIP (ROOF LOAD)*

	D	L	Trib.1	Trib.2				
p2,1	(18	+	20)	x	7	x	8.5	= 1071 + 1190
p2,2	(	+	)	x	0	x	0	= 0 + 0
p2,4	(	+	)	x	0	x	0	= 0 + 0
p2,4	(	+	)	x	0	x	0	= 0 + 0
p2,5	(	+	)	x	0	x	0	= 0 + 0
P2								= 1071 + 1190 = 2.26 kips

X3 (ft) X4 (ft)
6.5 6

Shear

R1= 1.214 kips
R2= -1.305 kips
Vmax= 1.30 kips

Vallow.= 5.91 x 1 = 5.9063 kips OK

Stress Ratio shear: .22

Flexure

M= 7.46 k-ft

Mallow.= 7.61 x 1 = 7.6135 k-ft OK

flexure: .98

Deflection

D (D+L) = 0.017

+ D p1 + Dp2 = 0.26 = $\frac{L}{586}$ < $\frac{L}{180}$ OK

deflection: .31

D (L Only) = 0.011

+ 0 + 0.12564949 = 0.14 = $\frac{L}{1098}$ < $\frac{L}{240}$ OK

deflection: .22

USE: **1- 4X12**