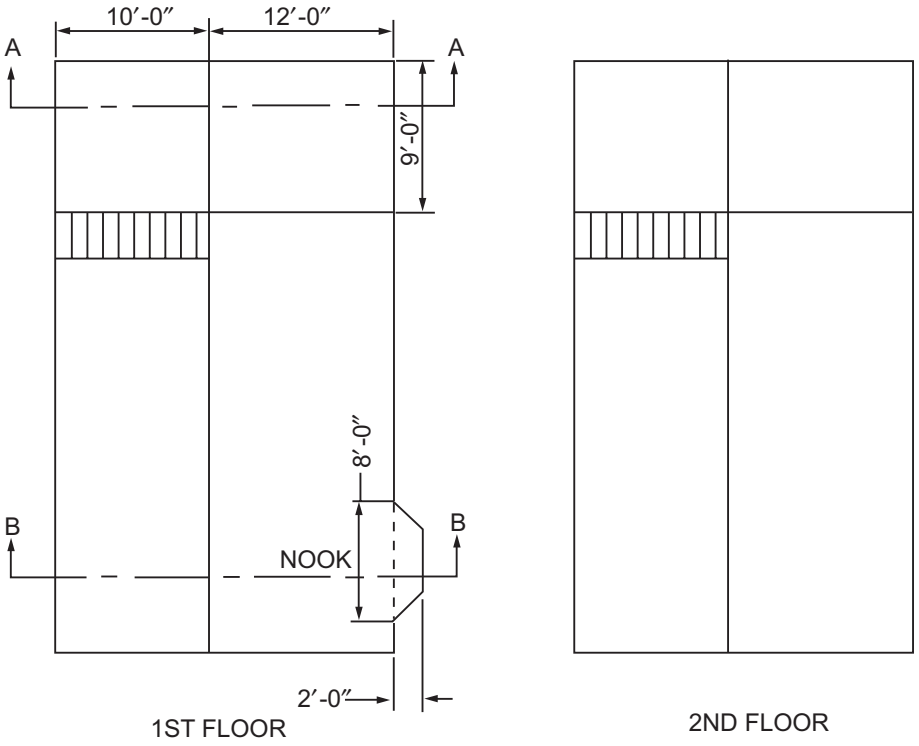
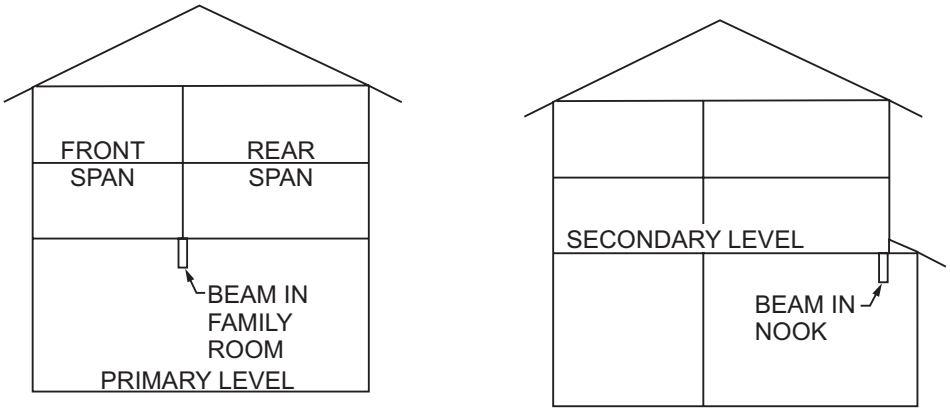
APPENDIX N

BASIC LOAD ESTIMATING



PLAN VIEW



SECTION A-A **SECTION B-B**

For SI: 1 inch = 25.4, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

ASSUMPTIONS:

Loads

Secondary floor level is 30# L.L. + 10# D.L. = 40#/sq. ft.

Attic level is 20# live load + 10# dead load = 30#/sq. ft.

Nook ceiling is 10# dead load = 10#/sq. ft.

Wall load

Studs @ 16", $^1/_2$" gypsum = 8#/sq. ft.

Roof load

EXAMPLE OF LOAD ESTIMATING LOAD ON BEAM IN FAMILY ROOM

Loads in Section A - A as follows: Total Loads

$$\text{2nd floor load} = \left(\frac{\text{frontspan}}{2} + \frac{\text{rearspan}}{2}\right) \times \text{2nd floor (deadload + load)} = \text{LOAD / linear foot}$$

$$= \left(\frac{10}{2} + \frac{12}{2}\right) \times 40 = 11 \times 40 = 440\#/1\text{ft.} \qquad \text{2nd floor} = 440\#/1\text{ft.}$$

Interior wall load = 8#/sq. ft. × 8ft. (Ceiling height) = 64#/1ft. Interior wall = 64#/1ft.

$$\text{Attic load} = \left(\frac{\text{frontspan}}{2} + \frac{\text{rearspan}}{2}\right) \times \text{attic (deadload + live load)} =$$

$$= \left(\frac{10}{2} + \frac{12}{2}\right) \times 30 = 11 \times 30 = 330\#/\text{linear ft.} \qquad \text{Attic} = 330\#/1\text{ft.}$$

Roof load: No roof load is transmitted to the beam in the family room. Roof = 0

Total Load on Beam in Family Room = 834#/1ft.

Beam span in family room is 9 feet and total estimated load is 834#/linear foot:

By using Table No. N-1, the required beam is 4 @ 2" × 12" Southern pine

OR

By using Table No. N-2, the required minimum flitch beam is

2 @ 2" × 8" with $^1/_2$" × 7"steel plate bolted with $^1/_2$" bolts spaced at 2' o.c..

EXAMPLE OF LOAD ESTIMATING ON BEAM IN NOOK AREA

Loads in Section B - B as follows Total Loads

$$\text{2nd floor load} = \frac{\text{joistspan}}{2} \times \text{2nd floor (deadload + live load)} = \frac{12}{2} \times 40 = 240\#/1\text{ft.}$$

Wall load = 64#/1ft. Wall load = 64#/1ft.

$$\text{Attic floor load} = \frac{\text{joistspan}}{2} \times \text{Attic (deadload + live load)} = \frac{12}{2} \times 30 = 180\#/1\text{ft.}$$

Roof load = (rafter span + overhang) × Roof (live load + dead load) =

$$\frac{= (12+1) \times 30 = 390\#/1\text{ ft.}}{\text{nook span}} \qquad \frac{\text{Roof load} = 390\#/1\text{ ft.}}{\text{nook span}}$$

$$\text{Nook roof load} = \frac{\quad}{2} \times \text{roof load (live + dead)} + \frac{\quad}{2} \times \text{ceiling dead load} =$$

$$= \frac{2}{2} \times 30 + \frac{2}{2} \times 10 = 40\#/1\text{ft.} \qquad \text{Nook} = 40\#/1\text{ft.}$$

Total Load on Beam in Nook = 914#/1 ft.

Beam span in nook is 8 feet and total estimated load is
914#/linear foot.

By using Table No. N-1, the required beam is 4 @ 2" × 12 × Southern pine, or 4 @ 2" × 12" Spruce-pine-fir
OR
By using Table No. N-2, the required minimum flitch is 2 @ 2" × 8" with $^3/_8$" × 7" steel plate bolted with $^1/_2$" bolts spaced at 2" o.c.

For SI: 1 inch = 25.4, 1 foot = 304.8 mm.

TABLE N-1
WOOD BEAMS AND GIRDERS (19%) #2 GRADE, ALLOWABLE LOADS
IN POUNDS PER LINEAR FOOT SIMPLE SPAN, DEFLECTION = L/360, LOAD DURATION FACTOR 1.0, ADEQUATE BEARING AND LATERAL SUPPORT MUST BE PROVIDED

2×8 ($1^1/_2 \times 7^1/_4$)

SPECIES	SPRUCE-PINE-FIR[1] NUMBER OF MEMBERS			SOUTHERN PINE NUMBER OF MEMBERS		
SPAN[2] (feet)	2	3	4	2	3	4
3	1133	1700	2266	1457	2186	2914
4	727	1091	1454	935	1403	1870
5	535	803	1070	688	1032	1376
6	424	636	848	538	807	1076
7	350	525	700	400	600	800
8	270	405	540	309	464	618
9	215	323	430	246	369	492
10	175	263	350	200	300	400
12	107	161	214	123	185	246
14	68	102	136	78	117	156

2×10 ($1^1/_2 \times 9^1/_4$)

SPECIES	SPRUCE-PINE-FIR[1] NUMBER OF MEMBERS			SOUTHERN PINE NUMBER OF MEMBERS		
SPAN[2] (feet)	2	3	4	2	3	4
3	1776	2664	3552	2283	3425	4566
4	1054	1581	2108	1355	2033	2710
5	749	1124	1498	963	1445	1926
6	581	872	1162	747	1121	1494
7	475	713	950	570	855	1140
8	401	602	802	440	660	880
9	321	482	642	350	525	700
10	261	392	522	285	428	570
12	183	275	366	200	300	400
14	135	203	270	147	221	294

2×12 ($1^1/_2 \times 11^1/_4$)

SPECIES	SPRUCE-PINE-FIR[1] NUMBER OF MEMBERS			SOUTHERN PINE NUMBER OF MEMBERS		
SPAN[2] (feet)	2	3	4	2	3	4
3	2800	4200	5600	3600	5400	7200
4	1482	2223	2964	1906	2859	3812
5	1008	1512	2016	1296	1944	2592
6	764	1146	1528	982	1473	1964
7	615	923	1230	783	1175	1566
8	514	771	1028	604	906	1208
9	431	647	862	481	722	962
10	351	527	702	392	588	784
12	246	369	492	274	411	548
14	182	273	364	203	305	406

For SI: 1 foot = 304.8 mm.

1. Spruce-Pine-Fir not Spruce-pine-fir (Southern) is used in this table.
2. Span in clear span - effective span for bending and deflection is clear span plus 3 inch.

TABLE N-2
FLITCH PLATE BEAMS-DESIGN VALUES AND ASSUMPTIONS

Steel- Fb = 24000(psi) E = 29000000(psi)
Wood- Fb = 1200(psi) E = 2900000(psi)
Deflection- 1/360 of Span
(Top of Beam Laterally Supported)

2 - 2 x 6	ALLOWABLE LOAD (pounds/ft)								
1	PLATE	Bm Wgt(lbs/ft)		8	10	13	15	17	21
		Span (ft)	Plate	1/4 x 5	3/8 x 5	1/2 x 5	5/8 x 5	3/4 x 5	1 x 5
		6.00		756	965	1175	1385	1595	2014
		7.00		555	709	863	1018	1172	1480
		8.00		411*	520*	638*	739*	848*	1067*
		9.00		289*	365*	442*	519*	596*	749*
		10.00		210*	266*	322*	378*	434*	546*
		11.00		158*	200*	242*	284*	326*	410*
		12.00		122*	154*	187*	219*	251*	316*
		*Denotes Load Controlled by Deflection							

2 - 2 x 8	ALLOWABLE LOAD (pounds/ft)								
1	PLATE	Bm Wgt(lbs/ft)		11	14	17	20	23	29
		Span (ft)	Plate	1/4 x 7	3/8 x 7	1/2 x 7	5/8 x 7	3/4 x 7	1 x 7
		6.00		1406	1818	2229	2640	3051	3873
		7.00		1033	1335	1637	1939	2242	2846
		8.00		791	1022	1254	1485	1716	2179
		9.00		625	808	991	1173	1356	1722
		10.00		506	654	802	950	1098	1394
		11.00		400*	516*	631*	746*	862*	1092*
		12.00		308*	397*	486*	575*	664*	841*
		13.00		243*	312*	382*	452*	522*	662*
		14.00		194*	250*	306*	362*	418*	530*
		15.00		158*	203*	249*	294*	340*	431*
		16.00		130*	168*	205*	243*	280*	355*
		*Denotes Load Controlled by Deflection							

2 - 2 x 10	ALLOWABLE LOAD (pounds/ft)								
1	PLATE	Bm Wgt(lbs/ft)		14	18	22	26	30	37
		Span(ft)	Plate	1/4 x 9	3/8 x 9	1/2 x 9	5/8 x 9	3/4 x 9	1 x 9
		6.00		2310	2990	3669	4349	5029	6388
		7.00		1697	2197	2696	3195	3695	4693
		8.00		1299	1682	2064	2446	2829	3593
		9.00		1027	1329	1631	1933	2235	2839
		10.00		832	1076	1321	1566	1810	2300
		11.00		687	890	1092	1294	1496	1901
		12.00		576	747	917	1087	1257	1597
		13.00		492	637	782	926	1071	1361
		14.00		409*	528*	647*	765*	884*	1122*
		15.00		332*	429*	526*	622*	719*	912*
		16.00		274*	353*	433*	513*	592*	752*
		17.00		228*	295*	361*	427*	494*	627*
		18.00		192*	248*	304*	360*	416*	528*
		19.00		164*	211*	259*	306*	354*	449*
		20.00		140*	181*	222*	263*	301*	385*
		*Denotes Load Controlled by Deflection							

2 - 2 x 12	ALLOWABLE LOAD (pounds/ft)								
1	PLATE	Bm Wgt(lbs/ft)		18	22	27	32	36	46
		Span (ft)	Plate	1/4 x 11	3/8 x 11	1/2 x 11	5/8 x 11	3/4 x 11	1 x 11
		6.00		3437	4452	5468	6483	7498	9529
		7.00		2525	3271	4017	4763	5509	7001
		8.00		1933	2504	3076	3647	4218	5360
		9.00		1528	1979	2430	2881	3333	4235
		10.00		1237	1603	1968	2334	2699	3430
		11.00		1023	1325	1627	1929	2231	2835
		12.00		859	1113	1367	1621	1875	2382
		13.00		732	948	1165	1381	1597	2030
		14.00		631	818	1004	1191	1377	1750
		15.00		550	712	875	1037	1200	1525
		16.00		483	626	769	912	1054	1340
		17.00		414*	535*	657*	778*	899	1142*
		18.00		349*	451*	553*	655*	757	962*
		19.00		297*	384*	470*	557*	644	818*
		20.00		254*	329*	403*	478*	552	701*
		21.00		220*	284*	348*	413*	477	606*
		22.00		191*	247*	303*	359*	415	527*
		23.00		167*	216*	265*	314*	363*	461*
		24.00		147*	190*	233*	276*	320	406*
		*Denotes Load Controlled by Deflection							