TABLE 3. USE ONLY FOR CONTINUOUS BEAMS

Safe Loading and Reinforcement for Rectangular Beams One Inch in Width. 1 : 2 : 4 Concrete. Mild Steel.

Based on $M = \frac{wl^2}{12}$ $n = 15$. $f_c = 650$. $f_s = 16000$. (*See p. 508 and item 18, p. 519.*)

Depth of Beam.	Total Safe Load (w) per Linear Foot for Beam One Inch Wide including Weight of Beam. *For safe live load deduct weight of beam in column (22)* (See important foot-notes.) Span in Feet (l).																			Weight of Beam One Inch Wide per Linear Foot.	Depth to Steel.	Depth Below Steel.	Steel Area in a Beam One Inch Wide.*	Safe Moment of Resistance. (*See p. 753.*)
(h) in.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30	35	lb.	(d) in.	(e) in.	sq. in.	(M) in.-lb.
																				(22)	(23)	(24)	(25)	(26)
5	70	48	36	28	22	17	14	12												5.4	4.0	1.0	0.031	1454
6	109	76	55	43	34	28	23	19	16											6.4	5.0	1.0	0.038	2272
7	155	109	80	61	48	40	32	28	23	20										7.5	6.0	1.0	0.046	3272
8	214	149	109	84	66	53	44	37	31	28	24									8.6	7.0	1.0	0.054	4454
9	262	182	133	102	80	66	54	46	38	34	29	25								9.6	7.75	1.25	0.060	5460
10	334	232	170	131	103	84	70	58	49	43	37	32	29							10.7	8.75	1.25	0.067	6960
11	415	288	211	162	128	103	85	72	61	53	46	41	36	32						11.8	9.75	1.25	0.075	8640
12	504	350	257	197	156	126	104	88	74	65	56	49	43	38	35					12.8	10.75	1.25	0.083	10505
13	577	401	294	226	178	144	119	101	85	73	64	56	50	44	40					13.9	11.50	1.5	0.089	12025
14	682	473	348	266	210	170	140	119	101	86	76	67	59	53	47	43				15.0	12.5	1.5	0.096	14200
15	796	552	406	311	245	199	164	138	118	101	89	78	68	61	55	49				16.0	13.5	1.5	0.104	16565
16	917	637	468	359	283	229	190	160	136	116	102	90	79	71	64	58				17.1	14.5	1.5	0.112	19115
17	1049	728	535	409	324	262	216	182	155	133	116	102	91	80	72	66	42			18.1	15.5	1.5	0.119	21840
18	1188	826	606	464	367	296	245	206	175	151	132	116	103	91	83	74	48			19.2	16.5	1.5	0.127	24750
19	1261	876	643	492	389	316	260	218	186	161	140	124	110	100	91	81	50			20.3	17.0	2.0	0.131	26270
20	1414	982	721	552	437	353	292	245	209	180	157	138	122	109	98	89	56			21.4	18.0	2.0	0.139	29450
22		1212	890	682	539	436	360	302	258	222	194	170	151	134	121	109	70	48		23.6	20.0	2.0	0.154	36360
24		1466	1078	824	652	528	436	367	312	269	235	206	182	163	146	132	84	59		25.7	22.0	2.0	0.169	43995
26			1282	982	775	628	518	437	372	320	280	245	217	194	174	157	101	70		27.9	24.0	2.0	0.185	52358
28				1152	910	737	610	512	442	376	328	288	256	228	204	185	118	82	60	30.0	26.0	2.0	0.200	61440
30				1336	1055	854	707	594	505	436	380	334	296	264	238	214	137	95	70	32.1	28.0	2.0	0.216	71250
36				1913	1511	1224	1012	850	725	624	544	478	424	378	340	306	196	136	100	38.5	33.5	2.5	0.258	102000
42				2660	2101	1702	1406	1182	1007	868	756	665	589	526	472	426	272	190	139	44.9	39.5	2.5	0.304	141804
48						2261	1869	1570	1338	1153	1005	883	782	697	626	565	361	251	185	51.4	45.5	2.5	0.350	188400

RULES. 1. **For safe load of any width of beam** multiply by width in inches.
2. **For area of cross-section of steel** for any width of beam multiply column (25) by width in inches.
3. **Total loads for other spans** (*l*) and the same depth of steel are inversely proportional to the squares of the spans.
4. **Total loads for other depths of steel** (*d*) and the same span are proportional to the squares of the depths of steel.
5. The values in this table may apply to a very carefully graded 1 : 2½ : 5 mixture.

* This is for a ratio of steel $p = 0.0077$ (0.77 per cent) which is required for the given working stresses.

TABLE 4. USE FOR END SPANS OF CONTINUOUS BEAMS. FOR SUPPORTED BEAMS DEDUCT 20 PER CENT.

Safe Loading and Reinforcement for Rectangular Beams One Inch in Width. 1 : 2 : 4 Concrete. Mild Steel.

Based on $M = \frac{wl^2}{10}$, $n = 15$, $f_c = 650$, $fs = 16\ 000$ (*See p. 508 and item 18, p. 519*).

For $M = \frac{wl^2}{8}$ deduct 20 per cent from safe loads, using same steel area.

Depth of Beam.	Total Safe Load (w) per Linear Foot for Beam One Inch Wide including Weight of Beam. *For safe live load deduct weight of beam in column (22)* (See important foot-notes.) Span in Feet (l).																			Weight of Beam One Inch Wide per Linear Foot	Depth to Steel.	Depth Below Steel.	Steel Area in a Beam One Inch Wide.*	Safe Moment of Resistance. (*See p. 753.*)
(h) in.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30	35	lb.	(d) in.	(e) in.	sq. in.	(M) in.-lb.
																				(22)	(23)	(24)	(25)	(26)
5	58	40	30	23	18	14	12	10												5.4	4.0	1.0	0.031	1454
6	91	63	46	36	28	23	19	16	13											6.4	5.0	1.0	0.038	2272
7	129	91	67	51	40	33	27	23	19	17										7.5	6.0	1.0	0.046	3272
8	178	124	91	70	55	44	37	31	26	23	20									8.6	7.0	1.0	0.054	4454
9	218	152	111	85	67	55	45	38	32	28	24	21								9.6	7.75	1.25	0.060	5460
10	278	193	142	109	86	70	58	48	41	36	31	27	24							10.7	8.75	1.25	0.067	6960
11	346	240	176	135	107	86	71	60	51	44	38	34	30	27						11.8	9.75	1.25	0.075	8640
12	420	292	214	164	130	105	87	73	62	54	47	41	36	32	29					12.8	10.75	1.25	0.083	10505
13	481	334	245	188	148	120	99	84	71	61	53	47	42	37	33					13.9	11.50	1.5	0.089	12025
14	568	394	290	222	175	142	117	99	84	72	63	56	49	44	39	36				15.0	12.3	1.5	0.096	14200
15	663	460	338	259	204	166	137	115	98	84	74	65	57	51	46	41				16.0	13.5	1.5	0.104	16565
16	764	531	390	299	236	191	158	133	113	97	85	75	66	59	53	48				17.1	14.5	1.5	0.112	19115
17	874	607	446	341	270	218	180	152	129	111	97	85	76	67	60	55	35			18.1	15.5	1.5	0.119	21840
18	990	688	505	387	306	247	204	172	146	126	110	97	86	76	69	62	40			19.2	16.5	1.5	0.127	24750
19	1051	730	536	410	324	263	217	182	155	134	117	103	91	83	75	66	42			20.3	17.0	2.0	0.131	26270
20	1178	818	601	460	364	294	243	204	174	150	131	115	102	91	82	74	47			21.4	18.0	2.0	0.139	29450
22		1010	742	568	449	363	300	252	215	185	162	142	126	112	101	91	58	40		23.6	20.0	2.0	0.154	36360
24		1222	898	687	543	440	363	306	260	224	196	172	152	136	122	110	70	49		25.7	22.0	2.0	0.169	43995
26			1068	818	646	523	432	364	310	267	233	204	181	162	145	131	84	58		27.9	24.0	2.0	0.185	52358
28				960	758	614	508	427	363	313	273	240	213	190	170	154	98	68	50	30.0	26.0	2.0	0.200	61440
30				1113	879	712	589	495	421	363	317	278	247	220	198	178	114	79	58	32.1	28.0	2.0	0.216	71250
36				1594	1259	1020	843	708	604	520	453	398	353	315	283	255	163	113	83	38.5	33.5	2.5	0.258	102000
42				2216	1751	1418	1172	985	839	723	630	554	491	438	393	355	227	158	116	44.9	39.5	2.5	0.304	141804
48						1884	1557	1308	1115	961	837	736	652	581	522	471	301	209	154	51.4	45.5	2.5	0.350	188400

RULES. 1. **For safe load of any width of beam** multiply by width in inches.
2. **For area of cross-section of steel** for any width of beam multiply column (25) by width in inches.
3. **Total loads of spans** (*l*) and same depth of steel are inversely proportional to the squares of the spans.
4. **Total loads for other depths of steel** (*d*) and same span are proportional to the squares of the depth of steel.
5. The values in this table may apply to a very carefully graded 1 : 2½ : 5 mixture.

* This is for a ratio of steel $p = 0.0077$ (0.77 per cent) which is required for the given working stresses.

TABLE 5. USE FOR DESIGNING SLABS, IF FULLY CONTINUOUS, ADD 20% TO LOADS

Safe Loadings per Square Foot and Reinforcement for Slabs for Various Working Stresses in Steel (f_s) and Concrete (f_c). (See pp. 508 and 420.)

Based on $M = \frac{wl^2}{10}$ For supported ends, $\left(M = \frac{wl^2}{8}\right)$, deduct 20% from loads. For fully continuous, $\left(M = \frac{wl^2}{12}\right)$, add 20%. For square slabs multiply by 2. Use same steel area always.

	Total depth of slab. (h)	Total safe load (w) per square foot, including weight of slab. For safe live load deduct weight of slab in column (14). (See important foot-notes on opposite page.) Span in feet (l). 4	5	6	7	8	9	10	11	12	13	14	15	Weight of slab per square foot. lb.	Depth to steel. (d) in.	Depth below steel. (e) in.	Steel area in section of slab one foot wide.* sq. in.	Safe Moment of resistance. See p. 753 M in.-lb.
														(14)	(15)	(16)	(17)	(18)
$n = 15$, $p = 0.0062$, $f_s = 14000$, $f_c = 500$	2½	147	94	66										32	1¾	¾	0.130	2830
	3	243	156	108	79									38	2¼	¾	0.167	4670
	3½	360	231	161	118	90								45	2¾	¾	0.205	6930
	4	507	326	226	166	127	100	81						51	3¼	¾	0.242	9750
	4½	589	378	262	192	147	116	94						58	3½	1	0.260	11320
	5	768	494	343	251	192	152	123	102					64	4	1	0.298	14780
	6	1201	772	536	393	300	238	192	159	134	113			77	5	1	0.372	23100
	7	1729	1111	771	565	432	342	276	229	193	163	143	123	90	6	1	0.446	33260
	8	2353	1512	1050	770	588	471	376	312	262	222	195	167	103	7	1	0.521	45270
	9	3081	1971	1369	1006	770	608	493	407	342	292	251	219	116	8	1	0.595	59140
	10	3898	2495	1733	1273	975	770	624	515	433	369	318	277	128	9	1	0.670	74840
$n = 15$, $p = 0.0084$, $f_s = 14000$, $f_c = 600$	2½	195	125	87	64									32	1¾	¾	0.176	3760
	3	322	207	143	105	80								38	2¼	¾	0.227	6190
	3½	480	308	214	157	120	95							45	2¾	¾	0.277	9230
	4	675	434	301	221	169	134	108						51	3¼	¾	0.328	12990
	4½	784	503	349	256	196	155	125	104					58	3½	1	0.353	15070
	5	1023	657	457	334	256	203	163	136	114	96			64	4	1	0.403	19680
	6	1599	1027	713	523	400	317	255	212	178	150	132	114	77	5	1	0.504	30750
	7	2303	1479	1027	753	575	456	367	305	257	217	190	163	90	6	1	0.605	44280
	8	3134	2013	1398	1024	783	621	500	417	349	295	259	223	103	7	1	0.706	60270
	9	4101	2625	1823	1339	1025	810	656	542	456	388	335	292	116	8	1	0.806	78720
	10	5191	3321	2307	1694	1298	1025	830	686	577	491	424	369	128	9	1	0.907	99630
$n = 15$, $p = 0.0107$, $f_s = 14000$, $f_c = 700$	2½	246	158	110	80									32	1¾	¾	0.225	4730
	3	407	261	181	133	102	81							38	2¼	¾	0.289	7830
	3½	604	388	269	197	151	120	96						45	2¾	¾	0.353	11620
	4	850	546	379	278	212	168	136	113	95				51	3¼	¾	0.417	16350
	4½	986	633	440	322	246	195	157	131	110	93			58	3½	1	0.449	18960
	5	1293	827	574	421	322	255	205	171	143	121	106		64	4	1	0.514	24770
	6	2012	1292	898	658	503	399	321	267	224	189	166	143	77	5	1	0.642	38700
	7	2898	1861	1293	947	724	574	462	384	323	273	239	206	90	6	1	0.770	55730
	8	3945	2534	1760	1289	986	781	629	523	440	372	326	281	103	7	1	0.899	75860
	9	5161	3303	2294	1685	1290	1019	826	682	573	489	421	367	116	8	1	1.027	99080
	10	6534	4181	2904	2133	1633	1290	1045	864	726	618	533	464	128	9	1	1.156	125400
$n = 15$, $p = 0.0050$, $f_s = 16000$, $f_c = 500$	2½	137	87											32	1¾	¾	0.105	2620
	3	226	145	101	74									38	2¼	¾	0.135	4340
	3½	335	215	149	109	84	66							45	2¾	¾	0.165	6440
	4	471	303	210	154	118	93	75						51	3¼	¾	0.195	9060
	4½	546	351	244	179	137	108	87	72	61				58	3½	1	0.210	10510
	5	713	458	318	233	178	141	114	95	80				64	4	1	0.240	13720
	6	1115	716	498	364	279	221	178	148	124	105	92		77	5	1	0.300	21450
	7	1605	1031	716	525	401	318	256	213	179	151	133	114	90	6	1	0.360	30880
	8	2186	1404	975	715	546	433	349	290	244	206	181	155	103	7	1	0.420	42040
	9	2860	1831	1271	934	715	565	457	378	318	271	233	203	116	8	1	0.480	54910
	10	3619	2317	1609	1182	905	715	579	479	402	343	295	257	128	9	1	0.540	69500
$n = 15$, $p = 0.0067$, $f_s = 16000$, $f_c = 600$	2½	183	117	82										32	1¾	¾	0.141	3520
	3	303	195	135	99									38	2¼	¾	0.181	5830
	3½	450	289	201	147	112	89	72						45	2¾	¾	0.221	8650
	4	632	406	282	207	158	125	101	84	70				51	3¼	¾	0.261	12160
	4½	734	471	327	240	183	145	117	97	82				58	3½	1	0.281	14110
	5	958	615	427	313	239	190	153	127	107	90	79		64	4	1	0.322	18430
	6	1497	962	668	489	374	297	239	199	167	141	124	106	77	5	1	0.402	28800
	7	2156	1385	962	705	539	427	344	286	240	203	178	153	90	6	1	0.482	41470
	8	2935	1885	1309	959	734	581	468	389	327	277	243	209	103	7	1	0.563	56450
	9	3840	2458	1707	1254	960	759	614	508	427	364	313	273	116	8	1	0.643	73740
	10	4860	3111	2160	1587	1215	960	778	643	540	460	397	346	128	9	1	0.724	93320

	Total depth of slab. (h) in.	Total safe load (w) per square foot including weight of slab. For safe live load deduct weight of slab column (15) (See important footnotes.) Span in feet. (l) 4	5	6	7	8	9	10	11	12	13	14	15	Weight of slab per square foot. lb.	Depth to steel. (d) in.	Depth below steel. (e) in.	Steel area in a section of slab one foot wide. sq. in.	Safe moment of resistance. See p. 753 (M) in. lb.
$n = 15$, $p = 0.0077$, $f_s = 16000$, $f_c = 650$ (USE THESE ORDINARILY)	2½	206	132	92	67	52								32	1¾	¾	0.162	3952
	3	340	218	151	111	85	61	54						38	2¼	¾	0.208	6536
	3½	509	326	226	166	127	101	81	67					45	2¾	¾	0.254	9770
	4	711	455	316	232	178	140	114	94	79	67			51	3¼	¾	0.300	13650
	4½	824	528	366	269	206	163	132	109	92	78	67		58	3½	1	0.323	15830
	5	1077	690	479	352	269	213	172	142	120	102	88	77	64	4	1	0.370	20680
	6	1683	1077	748	550	421	332	269	223	187	159	137	120	77	5	1	0.462	32310
	7	2423	1551	1077	791	606	479	388	320	269	229	198	172	90	6	1	0.554	46520
	8	3297	2111	1466	1077	824	651	528	436	366	312	269	234	103	7	1	0.647	63320
	9	4308	2758	1915	1407	1077	851	689	570	479	408	352	306	116	8	1	0.739	82720
	10	5454	3491	2424	1781	1366	1077	873	721	606	516	445	388	128	9	1	0.832	104700
$n = 15$, $p = 0.0087$, $f_s = 16000$, $f_c = 700$	2½	231	148	103	75									32	1¾	¾	0.183	4440
	3	382	245	170	125	95	76	61						38	2¼	¾	0.235	7340
	3½	567	364	253	185	142	112	90	75	63				45	2¾	¾	0.287	10900
	4	797	512	356	261	199	158	127	106	89	75			51	3¼	¾	0.339	15330
	4½	925	594	413	302	231	183	148	123	103	87			58	3½	1	0.365	17790
	5	1209	776	539	395	372	239	193	160	135	114	100		64	4	1	0.418	23230
	6	1887	1212	842	617	472	374	301	250	210	178	156	134	77	5	1	0.522	36300
	7	2719	1746	1213	889	679	538	434	361	303	256	225	193	90	6	1	0.626	52280
	8	3699	2390	1651	1209	925	732	590	491	413	349	306	263	103	7	1	0.731	71150
	9	4840	3098	2152	1581	1210	956	774	640	538	458	395	344	116	8	1	0.835	92940
	10	6126	3921	2723	2000	1531	1210	980	810	681	580	500	436	128	9	1	0.940	117600
$n = 15$, $p = 0.0034$, $f_s = 20000$, $f_c = 500$	2½	118	76	53										32	1¾	¾	0.071	2270
	3	195	126	87	64									38	2¼	¾	0.022	3760
	3½	290	186	129	95	72								45	2¾	¾	0.112	5580
	4	408	262	182	133	102	81							51	3¼	¾	0.133	7850
	4½	474	304	211	155	118	94	76						58	3½	1	0.143	9110
	5	619	398	276	202	155	122	99	82					64	4	1	0.163	11900
	6	967	621	431	316	242	192	154	128	108	91	80		77	5	1	0.204	18600
	7	1392	894	621	455	348	286	222	185	155	131	115	99	90	6	1	0.245	26780
	8	1895	1217	846	619	474	375	302	257	211	179	157	135	103	7	1	0.286	36450
	9	2480	1587	1102	810	620	490	397	328	276	235	202	176	116	8	1	0.326	47610
	10	3139	2009	1395	1025	785	620	502	415	349	297	256	223	128	9	1	0.367	60260
$n = 15$, $p = 0.0047$, $f_s = 20000$, $f_c = 600$	2½	161	103	72	53									32	1¾	¾	0.099	3100
	3	267	171	119	87	67								38	2¼	¾	0.127	5130
	3½	396	254	177	129	99	78							45	2¾	¾	0.155	7610
	4	556	357	248	182	139	110	89						51	3¼	¾	0.183	10700
	4½	646	415	288	211	161	128	103	86					58	3½	1	0.197	12420
	5	844	542	376	276	211	167	135	112	94	79			64	4	1	0.226	16220
	6	1318	846	588	431	329	261	210	175	147	124	109	94	77	5	1	0.282	25350
	7	1898	1219	847	620	474	376	303	252	212	179	157	135	90	6	1	0.338	36500
	8	2584	1659	1152	844	646	572	412	343	288	243	214	184	103	7	1	0.395	49680
	9	3381	2164	1502	1104	845	668	541	447	376	320	276	240	116	8	1	0.451	64900
	10	4279	2738	1901	1397	1070	845	684	566	475	405	349	304	128	9	1	0.508	82140
$n = 15$, $p = 0.0060$, $f_s = 20000$, $f_c = 700$	2½	202	130	90	66									32	1¾	¾	0.126	3890
	3	334	215	149	109	83								38	2¼	¾	0.162	6430
	3½	497	319	221	162	124	98							45	2¾	¾	0.198	9550
	4	698	449	311	228	175	138	111	93					51	3¼	¾	0.234	13430
	4½	810	520	361	265	202	160	129	107	90				58	3½	1	0.252	15580
	5	1058	679	472	346	264	210	169	140	118	100	87		64	4	1	0.288	20350
	6	1653	1062	737	540	413	327	264	219	184	156	137	117	77	5	1	0.360	31800
	7	2381	1530	1062	778	595	472	380	316	266	224	197	169	90	6	1	0.432	45790
	8	3240	2082	1445	1059	810	642	517	430	361	305	268	231	103	7	1	0.504	62330
	9	4241	2715	1885	1385	1060	838	678	561	471	402	346	302	116	8	1	0.576	81420
	10	5368	3435	2386	1753	1342	1060	859	710	596	508	438	382	128	9	1	0.648	103030

RULES. 1. For load for any width of slab multiply by width in feet.
2. For area of cross-section of steel for any width of slab multiply column (18) by width in feet.
3. Total loads for other spans (l) and same depth of steel are inversely proportional to the squares of the spans.
4. Total loads for other depths of steel (d) and same span are proportional to the squares of the depths of steel.

TABLE 6. USE FOR REVIEWING DESIGNS, IF FULLY CONTINUOUS ADD 20% TO LOADS.

Safe Loads per Square Foot and Reinforcement for Slabs. Proportions 1 : 2 : 4.
(See p. 508).

Based on $M = \frac{wl^2}{10}$; f_c = or < 650, $n = 15$; f_s = or < 1600

For supported ends, $\left(M = \frac{wl^2}{8}\right)$, deduct 20% from loads

For fully continuous, $\left(M = \frac{wl^2}{12}\right)$, add 20% to loads

For square slabs, $\left(M = \frac{wl^2}{20}\right)$, multiply loads by 2.

Total safe load (w) per square foot including weight of slab. For safe live load deduct weight of slab in column (15). (See important footnotes.)

Ratio of cross-section steel to beam above steel. (p)	Total depth of slab. (h) in.	Span in feet (l.) 4	5	6	7	8	9	10	11	12	13	14	15	Weight of slab per square foot. lb.	Depth to steel. (d) in.	Depth below steel. (e) in.	Steel area in a section of slab one foot wide. sq. in.	Safe moment of resistance. See p. 753 (M) in. lb.
														(15)	(16)	(17)	(18)	(19)
0.002	3	95	60	42										38	$2\frac{1}{4}$	$\frac{3}{4}$	0.054	1800
	4	198	125	88	64	49	39							51	$3\frac{1}{4}$	$\frac{3}{4}$	0.078	3760
	5	300	190	133	97	74	59	48						64	4	1	0.096	5702
	6	469	297	207	151	116	92	74						77	5	1	0.120	8910
	7	675	428	298	218	167	132	107						90	6	1	0.144	12830
	8	919	582	406	296	227	180	146	120					103	7	1	0.168	17460
	9	1201	760	531	387	296	235	190	157					116	8	1	0.192	22810
	10	1519	962	671	388	375	298	241	199	167				128	9	1	0.216	28870
0.004	3	185	117	82	60	46	36	29						38	$2\frac{1}{4}$	$\frac{3}{4}$	0.108	3510
	4	385	244	170	124	95	76	61	50					51	$3\frac{1}{4}$	$\frac{3}{4}$	0.156	7324
	5	584	370	258	188	144	114	92	77	64				64	4	1	0.192	11100
	6	913	578	403	294	225	179	144	120	100				77	5	1	0.240	17340
	7	1314	832	581	423	324	257	208	172	144				90	6	1	0.288	24970
	8	1788	1133	790	576	441	350	283	234	196	167	145	126	103	7	1	0.336	33980
	9	2336	1479	1032	752	576	458	370	306	257	219	189	164	116	8	1	0.384	44380
	10	2957	1873	1307	952	730	579	468	387	325	277	239	208	128	9	1	0.432	56180
0.006	3	272	172	120	87	67	52	43	36					38	$2\frac{1}{4}$	$\frac{3}{4}$	0.162	5160
	4	567	359	250	183	140	111	90	74	62				51	$3\frac{1}{4}$	$\frac{3}{4}$	0.234	10770
	5	858	544	379	276	212	168	136	112	94				64	4	1	0.288	16310
	6	1342	850	593	432	331	263	212	176	147				77	5	1	0.360	25490
	7	1932	1223	854	622	477	378	306	253	212				90	6	1	0.432	36700
	8	2630	1665	1162	847	649	515	416	345	289	246	213	185	103	7	1	0.504	49960
	9	3435	2175	1518	1106	848	673	544	450	377	321	278	242	116	8	1	0.576	65260
	10	4348	2753	1921	1400	1073	852	688	570	478	407	351	306	128	9	1	0.648	82600
0.008	3	348	220	153	112	86	68	55	46					38	$2\frac{1}{4}$	$\frac{3}{4}$	0.216	6610
	4	726	460	321	234	179	142	115	95	80				51	$3\frac{1}{4}$	$\frac{3}{4}$	0.312	13790
	5	1100	697	486	354	271	215	174	144	121				64	4	1	0.384	20900
	6	1719	1088	760	553	424	337	272	225	189				77	5	1	0.480	32650
	7	2475	1567	1094	797	611	485	392	324	272	231	200		90	6	1	0.576	47020
	8	3369	2134	1489	1085	831	660	533	441	370	315	272	237	103	7	1	0.672	64000
	9	4401	2787	1945	1417	1086	862	697	577	483	412	356	310	116	8	1	0.768	83600
	10	5570	3527	2461	1793	1374	1091	882	730	612	521	450	392	128	9	1	0.864	105800
0.010	3	374	237	165	120	92	73	59	49					38	$2\frac{1}{4}$	$\frac{3}{4}$	0.270	7100
	4	781	494	345	251	193	153	124	102	86				51	$3\frac{1}{4}$	$\frac{3}{4}$	0.390	14820
	5	1182	749	522	381	292	232	187	155	130				64	4	1	0.480	22460
	6	1847	1170	816	595	456	362	292	242	203	173	149		77	5	1	0.600	35090
	7	2660	1684	1175	856	656	521	421	348	292	249	215	187	90	6	1	0.720	50520
	8	3618	2292	1599	1165	893	709	573	474	397	339	292	255	103	7	1	0.840	68750
	9	4727	2993	2089	1522	1166	926	748	619	519	442	382	333	116	8	1	0.960	89800
	10	5986	3790	2645	1927	1477	1172	948	784	657	560	484	421	128	9	1	1.080	113700

* Percentages of steel are values in this column multiplied by 100.

Compression in concrete under tabular loads with the different percentages of steel:

Ratio of steel	0.002	0.004	0.006	0.008	0.010
Compression in concrete, lb. per sq. in.	370	500	610	650	650

RULES. 1. For load for any width of slab multiply by width in feet.

2. For area of cross-section of steel for any width of slab multiply column (18) by width in feet.

3. Total loads for other spans (l) and same depth of steel are inversely proportional to the squares of the spans.

4. Total loads for other depths of steel (d) and same span are proportional to the squares of the depths of steel.

TABLE 7. CINDER CONCRETE SLABS

A ratio of elasticity of $n = 33$ is used in the table below, although it is permissible to design with a ratio of 15 in very conservative practice.

The loads for slabs with a ratio of steel of 0.002 are limited by the working strength of the steel, and the values with the higher ratios by the working strength of the cinder concrete.

It is noticeable that less steel can be used economically for a given thickness of slab than with broken stone or gravel concrete, because the strength of the slab is more apt to be limited by the strength of the cinder concrete than by the strength of the steel.

Safe Loading and Reinforcement for CINDER CONCRETE SLABS One Foot in Width. Proportions 1 : 2½ : 5. Mild Steel. (See p. 515).

Based on $M = \frac{wl^2}{10}$ f_c = or < 225, f_s = or < 14 000, n=35

Total safe load (w^1) per square foot including weight of slab. For safe live load deduct weight of slab in column (12). (See important foot-notes.)

Ratio cross-section steel to beam above steel. p	Total depth of slab. in.	Span in Feet (l) 4	5	6	7	8	9	10	Weight of slab per square foot. lb.	Depth to steel. (d) in.	Depth below steel. (e) in.	Steel area in a section of slab one foot wide. sq. in.	Safe moment of resistance. (See p. 753.) (M_R) in. lb.
									(10)	(11)	(12)	(13)	(14)
0.002	$2\frac{1}{2}$	48	31						24	$1\frac{3}{4}$	$\frac{3}{4}$	0.042	920
	3	70	51	35	26				29	$2\frac{1}{4}$	$\frac{3}{4}$	0.054	1520
	$3\frac{1}{2}$	119	76	53	39				34	$2\frac{3}{4}$	$\frac{3}{4}$	0.066	2280
	4	166	106	74	54	41			39	$3\frac{1}{4}$	$\frac{3}{4}$	0.078	3180
	$4\frac{1}{2}$	192	123	85	63	48			43	$3\frac{1}{2}$	1	0.084	3690
	5	251	161	112	82	63	50		48	4	1	0.096	4820
	6	392	251	174	128	98	78	63	58	5	1	0.120	7530
	7	565	361	251	184	141	112	90	68	6	1	0.144	10840
	8	768	492	341	351	192	152	123	77	7	1	0.168	14750
0.004	$2\frac{1}{2}$	76	48	34	25				24	$1\frac{3}{4}$	$\frac{3}{4}$	0.084	1460
	3	125	80	56	41	31			29	$2\frac{1}{4}$	$\frac{3}{4}$	0.108	2400
	$3\frac{1}{2}$	187	120	83	61	47	37		34	$2\frac{3}{4}$	$\frac{3}{4}$	0.132	3590
	4	261	167	116	85	65	52	42	39	$3\frac{1}{4}$	$\frac{3}{4}$	0.156	5020
	$4\frac{1}{2}$	303	194	135	99	76	60	48	43	$3\frac{1}{2}$	1	0.168	5820
	5	396	253	176	129	99	78	63	48	4	1	0.192	7600
	6	619	396	275	202	155	122	99	58	5	1	0.240	11880
	7	891	570	396	291	223	176	143	68	6	1	0.288	17110
	8	1213	776	539	396	303	240	194	77	7	1	0.336	23290
0.006	$2\frac{1}{2}$	86	55	38	28				24	$1\frac{3}{4}$	$\frac{3}{4}$	0.126	1640
	3	141	90	63	46	35			29	$2\frac{1}{4}$	$\frac{3}{4}$	0.162	2710
	$3\frac{1}{2}$	211	135	94	69	53	42	34	34	$2\frac{3}{4}$	$\frac{3}{4}$	0.198	4050
	4	295	189	131	96	74	58	47	39	$3\frac{1}{4}$	$\frac{3}{4}$	0.234	5660
	$4\frac{1}{2}$	342	219	152	112	85	68	55	43	$3\frac{1}{2}$	1	0.252	6570
	5	447	286	199	146	112	88	72	48	4	1	0.288	8580
	6	698	447	310	228	175	138	112	58	5	1	0.360	13400
	7	1005	643	447	328	251	199	161	68	6	1	0.432	19300
	8	1368	876	608	447	342	270	219	77	7	1	0.504	26270

*Percentages of steel are values in this column multiplied by 100.

RULES. 1. **For load for any width of slab** multiply by width in feet.

2. **For area of cross-section of steel** for any width of slab multiply column (13) by width in feet.

3. **Total loads for other spans** (e) and same depth of steel are inversely proportional to the squares of the spans.

4. **Total loads for other depths of steel** (d) and same span are proportional to the squares of the depths of steel.

TABLE 8. USE FOR BEAMS WITH STEEL IN TOP AND BOTTOM.

Constants for Determining Depth of Beam, Moment of Resistance, and Fiber Stresses for Different Percentages of Steel. [See p. 428.] (*See Example on page* 470.)

Ratio of Elasticity of Steel to Concrete, $n = 15$.

Depth of beam $d = \sqrt{\dfrac{M}{b\, f_c\, C_c}}$ or $\sqrt{\dfrac{M}{b\, f_s\, C_s}}$ whichever is greater

Fiber stresses, $f_c = \dfrac{M}{C_c b\, d^2}$, $f_s = \dfrac{M}{C_s b\, d^2}$, $f_s' = \dfrac{M}{C'_s b\, d^2}$

Moment of resistance, $M = f_c C_c\, d^2$ or $f_s C_s b\, d^2$, whichever is less.

Rule 1. To determine Depth of Beam:
Assume p, ratio of tension steel and p' ratio compression steel.
Assume a, ratio depth of steel in compression to depth in tension.
Locate these values in table and find C_c and C_s corresponding.
Substitute values C_c and C_s in formulas for depth, d (above.)
Accept the larger value as depth from compressed surface of beam to center tension steel.

Rule 2. To determine Fiber Stresses and Moment of Resistance in a given beam:
Compute p and p' and a.
Locate these values in table and find required constants.
Substitute values in formulas above and obtain required stresses or moment of resistance.

Rule 3. To determine Depth of Haunch at support of a beam or girder.
Decide tentatively amount of steel in tension and compression.
Assume a trial depth of haunch.
Determine by Rule 2 the fiber stresses.
If stresses are not as required, assume new depth of haunce and re-compute.
(See Example 6, page 470.)

Rule 4. To interpolate values of any C when required ratio of p to p' is given in table:
Example: Given $a = 0.15$, $p = 0.012$, $p' = 0.006$. Then $p' = 0.5\,p$, and interpolating in this group between $p = 0.1$, $p' = .005$ and $p = .015$, $p' = .0075$. gives $C_c = .23$ and $C_s = 0.0103$,

Rule 5. To interpolate values of any C when required ratio of p to p' is not given in table.
Example: Given $a = 0.1$, $p = 0.013$, $p' = 0.009$. Then $p' = 0.69\,p$, which lies between groups $p' = 0.5\,p$; and $p' = p$.

Find by interpolation in group $p' = 0.5\,p$; for $p = 0.013$; $p' = 0.0065$, $C_c = .24$ and $C_s = 0.0114$.

and in group $p' = p$; for $p = 0.013$ and $p' = 0.013$; $C = .29$ and $C_s = .0115$.

Interpolate between the two above values and find for $p = 0.013$ and $p' = 0.09$, $C_c = 0.26$ and $C_s = 0.0114$.

p = Ratio Cross Section of Steel in Tension to Concrete above it.
p' = Ratio Cross Section of Steel in Compression to Concrete.
k = Ratio Depth of Neutral Axis to Depth of Tension Steel.
C_c, C_s, C'_s = Constants in formulas above.

	p	p'	k	C_c	C_s	C'_s	d	p'	k	C_c	C_s	C'_s
	a = 0.05 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension.						a = 0.1 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension					
$p' = 0.25\,p$	0.005	0.00125	0.307	0.15	0.0046	0.0121	0.005	0.00125	0.310	0.15	0.0045	0.0148
	0.01	0.0025	0.394	0.20	0.0088	0.0154	0.01	0.0025	0.398	0.20	0.0088	0.0175
	0.015	0.00375	0.450	0.24	0.0130	0.0179	0.015	0.00375	0.454	0.23	0.0129	0.0199
	0.02	0.005	0.490	0.27	0.0172	0.0199	0.02	0.005	0.494	0.26	0.0170	0.0219
	0.025	0.00625	0.521	0.30	0.0214	0.0218	0.025	0.00625	0.526	0.29	0.0210	0.0235
	0.03	0.0075	0.546	0.32	0.0256	0.0234	0.03	0.0075	0.551	0.31	0.0250	0.0250
	0.035	0.00875	0.566	0.34	0.0298	0.0250	0.035	0.00875	0.571	0.33	0.0290	0.0265
	0.04	0.01	0.583	0.36	0.0342	0.0265	0.04	0.01	0.589	0.35	0.0330	0.0280
$p' = 0.5\,p$	0.005	0.0025	0.296	0.16	0.0046	0.0131	0.005	0.0025	0.299	0.16	0.0045	0.0158
	0.01	0.005	0.373	0.22	0.0090	0.0174	0.01	0.005	0.381	0.21	0.0088	0.0192
	0.015	0.0075	0.420	0.28	0.0134	0.0210	0.015	0.0075	0.428	0.26	0.0131	0.0227
	0.02	0.01	0.454	0.32	0.0178	0.0240	0.02	0.01	0.462	0.30	0.0174	0.0256
	0.025	0.0125	0.480	0.36	0.0222	0.0269	0.025	0.0125	0.488	0.34	0.0215	0.0284
	0.03	0.015	0.499	0.40	0.0266	0.0296	0.03	0.015	0.509	0.38	0.0258	0.0312
	0.035	0.0175	0.515	0.44	0.0310	0.0323	0.035	0.0175	0.524	0.41	0.0301	0.0339
	0.04	0.02	0.528	0.48	0.0355	0.0350	0.04	0.02	0.539	0.44	0.0343	0.0356
$p' = p$	0.005	0.005	0.274	0.18	0.0046	0.0149	0.005	0.005	0.284	0.17	0.0045	0.0176
	0.01	0.01	0.336	0.27	0.0092	0.0212	0.01	0.01	0.349	0.25	0.0089	0.0232
	0.015	0.015	0.372	0.35	0.0138	0.0266	0.015	0.015	0.386	0.32	0.0133	0.0285
	0.02	0.02	0.395	0.42	0.0184	0.0320	0.02	0.02	0.410	0.38	0.0177	0.0337
	0.025	0.025	0.412	0.49	0.0230	0.0373	0.025	0.025	0.428	0.44	0.0221	0.0381
	0.03	0.03	0.425	0.56	0.0275	0.0423	0.03	0.03	0.442	0.50	0.0265	0.0411
	0.035	0.035	0.435	0.63	0.0322	0.0473	0.035	0.035	0.452	0.56	0.0309	0.0481
	0.04	0.04	0.443	0.70	0.0368	0.0523	0.04	0.04	0.461	0.62	0.0353	0.0503
$p' = 1.5\,p$	0.005	0.0075	0.256	0.20	0.0046	0.0168	0.005	0.0075	0.268	0.18	0.0045	0.0197
	0.01	0.015	0.305	0.32	0.0093	0.0251	0.01	0.015	0.322	0.27	0.0090	0.0276
	0.015	0.0225	0.331	0.42	0.0140	0.0330	0.015	0.0225	0.350	0.37	0.0134	0.0348
	0.02	0.03	0.349	0.52	0.0186	0.0404	0.02	0.03	0.369	0.46	0.0178	0.0417
	0.025	0.0375	0.361	0.62	0.0232	0.0476	0.025	0.0375	0.382	0.54	0.0222	0.0489
	0.03	0.045	0.369	0.72	0.0280	0.0550	0.03	0.045	0.392	0.62	0.0267	0.0454
	0.035	0.0525	0.376	0.81	0.0326	0.0625	0.035	0.0525	0.399	0.70	0.0312	0.0626
	0.04	0.06	0.381	0.91	0.0372	0.0699	0.04	0.06	0.405	0.78	0.0357	0.0691

TABLE 8.—Continued.

p = Ratio Cross Section of Steel in Tension to Concrete above it.
p' = Ratio Cross Section of Steel in Compression to Concrete.
k = Ratio Depth of Neutral Axis to Depth of Tension Steel.
C_c, C_s, C'_s = Constants in formulas above.

	p	p'	k	C_c	C_s	C'_s	p	p'	k	C_c	C_s	C'_s
	a = 0.15 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension.						a = 0.2 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension.					
$p' = 0.25\,p$	0.005	0.00125	0.312	0.15	0.0044	0.0189	0.005	0.00125	0.313	0.14	0.0044	0.0272
	0.01	0.0025	0.402	0.19	0.0086	0.206	0.01	0.0025	0.404	0.18	0.0086	0.0243
	0.015	0.00375	0.458	0.23	0.0127	0.0223	0.015	0.00375	0.460	0.22	0.0126	0.0202
	0.02	0.005	0.499	0.25	0.0167	0.240	0.02	0.005	0.503	0.24	0.0165	0.0272
	0.025	0.00625	0.530	0.28	0.0207	0.0257	0.025	0.00625	0.535	0.27	0.0204	0.0284
	0.03	0.0075	0.555	0.30	0.0247	0.0273	0.03	0.0075	0.560	0.29	0.0243	0.0297
	0.035	0.00875	0.577	0.32	0.0286	0.0285	0.035	0.00875	0.582	0.31	0.0282	0.0309
	0.04	0.010	0.595	0.33	0.0326	0.0297	0.04	0.010	0.600	0.32	0.0320	0.0320
$p' = 0.5\,p$	0.005	0.0025	0.304	0.15	0.0044	0.0202	0.005	0.0025	0.309	0.15	0.0044	0.0279
	0.01	0.005	0.386	0.21	0.0087	0.0226	0.01	0.005	0.392	0.20	0.0086	0.0272
	0.015	0.0075	0.435	[illegible]	0.0128	0.0254	0.015	0.0075	0.442	0.24	0.0126	0.0291
	0.02	0.01	0.471	[illegible]	0.0169	0.0279	0.02	0.01	0.479	0.27	0.0166	0.0312
	0.025	0.0125	0.496	0.32	0.0210	0.0306	0.025	0.0125	0.506	0.30	0.0206	0.0331
	0.03	0.015	0.518	0.35	0.0251	0.0328	0.03	0.015	0.527	0.33	0.0245	0.0354
	0.035	0.0175	0.535	0.38	0.0292	0.0353	0.035	0.0175	0.544	0.36	0.0284	0.0378
	0.04	0.02	0.549	0.41	0.0333	0.0376	0.04	0.02	0.559	0.38	0.0323	0.0397
$p' = p$	0.005	0.005	0.292	0.16	0.0044	0.0222	0.005	0.005	0.299	0.16	0.0044	0.0313
	0.01	0.01	0.360	0.23	0.0087	0.0265	0.01	0.01	0.371	0.22	0.0086	0.0314
	0.015	0.015	0.398	0.29	0.0129	0.0313	0.015	0.015	0.411	0.27	0.0126	0.0352
	0.02	0.02	0.425	0.35	0.0171	0.0357	0.02	0.02	0.439	0.32	0.0166	0.0390
	0.025	0.025	0.444	0.40	0.0213	0.0402	0.025	0.025	0.460	0.36	0.0206	0.0428
	0.03	0.03	0.458	0.45	0.0255	0.0446	0.03	0.03	0.475	0.41	0.0246	0.0470
	0.035	0.035	0.469	0.50	0.0297	0.0490	0.035	0.035	0.487	0.45	0.0286	0.0511
	0.04	0.04	0.479	0.55	0.0338	0.0528	0.04	0.04	0.497	0.49	0.0326	0.0551
$p' = 1.5\,p$	0.005	0.0075	0.280	0.17	0.0045	0.0247	0.005	0.0075	0.292	0.16	0.0044	0.0339
	0.01	0.015	0.338	0.26	0.0087	0.0306	0.01	0.015	0.353	0.23	0.0086	0.0359
	0.015	0.0235	0.369	0.33	0.0129	0.0373	0.015	0.0235	0.386	0.30	0.0126	0.0416
	0.02	0.03	0.389	0.40	0.0171	0.0439	0.02	0.03	0.409	0.36	0.0166	0.0464
	0.025	0.0375	0.403	0.47	0.0213	0.0505	0.025	0.0375	0.424	0.42	0.0206	0.0531
	0.03	0.045	0.414	0.54	0.0256	0.0569	0.03	0.045	0.436	0.48	0.0246	0.0592
	0.035	0.0525	0.422	0.61	0.0298	0.0635	0.035	0.0525	0.444	0.54	0.0286	0.0653
	0.04	0.06	0.429	0.68	0.0340	0.0697	0.04	0.06	0.452	0.59	0.0326	0.0709
	a = 0.25 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension.						a = 0.3 = Ratio of Depth of Steel in Compression to Depth of Steel in Tension.					
$p' = 0.25\,p$	0.005	0.00125	0.316	0.15	0.0045	0.0458	0.005	0.00125	0.318	0.14	0.0045	0.1687
	0.01	0.0025	0.408	0.19	0.0086	0.0320	0.01	0.0025	0.411	0.18	0.0086	0.0455
	0.015	0.00375	0.465	0.22	0.0126	0.0311	0.015	0.00375	0.468	0.21	0.0125	0.0395
	0.02	0.005	0.507	0.24	0.0164	0.0315	0.02	0.005	0.511	0.23	0.0163	0.0377
	0.025	0.00625	0.539	0.26	0.0202	0.0321	0.025	0.00625	0.544	0.25	0.0201	0.0375
	0.03	0.0075	0.565	0.28	0.0240	0.0332	0.03	0.0075	0.571	0.27	0.0238	0.0376
	0.035	0.00875	0.588	0.30	0.0278	0.0338	0.035	0.00875	0.592	0.29	0.0275	0.0382
	0.04	0.010	0.606	0.31	0.0316	0.0349	0.04	0.010	0.611	0.30	0.0311	0.0389
$p' = 0.5\,p$	0.005	0.0025	0.314	0.15	0.0045	0.0476	0.005	0.0025	0.320	0.15	0.0045	0.1515
	0.01	0.005	0.398	0.19	0.0085	0.0347	0.01	0.005	0.404	0.19	0.0085	0.0489
	0.015	0.0075	0.450	0.23	0.0125	0.0342	0.015	0.0075	0.456	0.22	0.0124	0.0433
	0.02	0.01	0.487	0.26	0.0164	0.0354	0.02	0.01	0.495	0.25	0.0162	0.0423
	0.025	0.0125	0.514	0.29	0.0202	0.0373	0.025	0.0125	0.522	0.27	0.0199	0.0429
	0.03	0.015	0.537	0.32	0.0240	0.0386	0.03	0.015	0.546	0.29	0.0236	0.0434
	0.035	0.0175	0.556	0.34	0.0278	0.0404	0.035	0.0175	0.564	0.31	0.0272	0.0448
	0.04	0.02	0.570	0.36	090315	0.0422	0.04	0.02	0.580	0.33	0.0308	0.0463
$p' = p$	0.005	0.005	0.308	0.15	0.0045	0.0523	0.005	0.005	0.317	0.14	0.0044	0.1790
	0.01	0.01	0.382	0.20	0.0085	0.0386	0.01	0.01	0.393	0.19	0.0084	0.0550
	0.015	0.015	0.425	0.25	0.0124	0.0406	0.015	0.015	0.438	0.23	0.0123	0.0499
	0.02	0.02	0.454	0.29	0.0162	0.0435	0.02	0.02	0.468	0.27	0.0160	0.0507
	0.025	0.025	0.475	0.33	0.0200	0.0466	0.025	0.025	0.490	0.31	0.0197	0.0529
	0.03	0.03	0.491	0.37	0.0238	0.0504	0.03	0.03	0.507	0.34	0.0233	0.0556
	0.035	0.035	0.504	0.41	0.0276	0.0542	0.035	0.035	0.521	0.37	0.0269	0.0585
	0.04	0.04	0.515	0.44	0.0314	0.0577	0.04	0.04	0.532	0.40	0.0305	0.0616
$p' = 1.5\,p$	0.005	0.0075	0.304	0.15	0.0044	0.0567	0.005	0.0075	0.313	0.14	0.0044	0.2360
	0.01	0.015	0.369	0.22	0.0084	0.0446	0.01	0.015	0.384	0.20	0.0084	0.0614
	0.015	0.0225	0.404	0.27	0.0123	0.0475	0.015	0.0225	0.422	0.25	0.0122	0.0574
	0.02	0.03	0.428	0.32	0.0161	0.0519	0.02	0.03	0.447	0.30	0.0159	0.0595
	0.025	0.0375	0.444	0.37	0.0199	0.0576	0.025	0.0375	0.464	0.34	0.0195	0.0635
	0.03	0.045	0.457	0.42	0.0237	0.0623	0.03	0.045	0.478	0.38	0.0231	0.0694
	0.035	0.0525	0.466	0.47	0.0275	0.0681	0.035	0.0525	0.490	0.42	0.0266	0.0722
	0.04	0.06	0.475	0.52	0.0313	0.0732	0.04	0.06	0.497	0.46	0.0301	0.0770

TABLE 9. FLAT SLABS.

Data for Determining Bending Moments for FLAT SLABS SUPPORTED ON COLUMNS. (*See page* 485). *For example, see page* 487.

Rule. To find maximum bending moment in a flat plate loaded uniformly and supported on columns, or other fixed supports:

Determine radius of support, r_0, and radius of surface assumed to act as a fixed circular plate, r_1, (for a floor area this may be taken at $\frac{1}{2}$ the diagonal distance between the circumferences of the support plus the radius of the support).

Compute load per linear foot, q, on outer edge of the circumference (see p. 485).

Take for w the load per square foot on slab.

Select a proper value for Poisson's ratio, g, using 0.1 ordinarily.

Substitute corresponding constants in formulas

$$\text{Max. } M_2 = w\, r_0^2\, (0.2 + C_1 + C_2)$$
$$\text{Max. } M_b = q\, r_0\, (C_a + C_b)$$

These are moments at edge of support causing radial fiber stresses.

Sum of these bending moments $(M_2 + M_b)$ gives the total bending moment, M, to use in finding depth of slab required at support and amount of steel, from ordinary beam and slab formulas.

Note that if w is in pounds per square foot, q, in pounds per foot of length and, r_0, in feet the moments, M_2 and M_b will be in foot-pounds per foot of width or in inch-pounds per inch of width of the slab. If moments at other points are required, use formulas (54) to (57) on page 485

Poisson's ratio g	Ratio outer to inner radius $\frac{r_1}{r_0}$	Constants in formulas (52) to (57), pages 485 and 486.							
		For uniformly distributed loading.				For circumferential loading.			
		C_1	C_2	C_3	C_4	C_a	C_b	C_c	C_d
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	2.	0.74	0.21	2.47	0.72	1.23	0.43	2.47	1.35
	2.5	1.49	0.10	3.86	1.54	1.87	0.94	3.09	2.07
0.075	3.	2.55	0.65	5.56	2.72	2.57	1.49	3.71	2.87
	3.5	3.93	1.44	7.57	4.27	3.30	2.08	4.33	3.71
	4.	5.67	2.52	9.89	6.22	4.06	2.72	4.95	4.57
	4.5	7.77	3.90	12.52	8.58	4.86	3.40	5.56	5.48
	5.	10.25	5.59	15.45	11.37	5.67	4.09	6.18	6.40
	2.	0.72	0.19	2.53	0.71	1.19	0.45	2.54	1.35
	2.5	1.44	0.13	3.95	1.53	1.81	0.96	3.16	2.08
	3.	2.47	0.70	5.68	2.72	2.48	1.53	3.80	2.88
0.1	3.5	3.82	1.53	7.75	4.29	3.19	2.15	4.43	3.73
	4.	5.50	2.65	10.13	6.25	3.93	2.80	5.07	4.60
	4.5	7.52	4.05	12.80	8.61	4.71	3.41	5.70	5.53
	5.	9.95	5.84	15.80	11.46	5.50	4.22	6.33	6.47
	2.	0.67	0.18	2.64	0.67	1.12	0.51	2.65	1.36
	2.5	1.35	0.20	4.12	1.52	1.69	1.04	3.30	2.10
	3.	2.31	0.80	5.95	2.72	2.32	1.64	3.96	2.91
0.15	3.5	3.57	1.70	8.10	4.30	2.97	2.27	4.62	3.76
	4.	5.16	2.89	10.60	6.31	3.66	2.95	5.30	4.65
	4.5	7.06	4.42	13.40	8.72	4.38	3.66	5.96	5.57
	5.	9.32	6.30	16.52	11.60	5.12	4.42	6.61	6.53
	2.	0.63	0.17	2.76	0.67	1.05	0.57	2.76	1.37
	2.5	1.27	0.27	4.30	1.52	1.58	1.12	3.45	2.12
0.2	3.	2.16	0.91	6.20	2.71	2.16	1.74	4.14	2.94
	3.5	3.34	1.87	8.45	4.32	2.76	2.39	4.83	3.79
	4.	4.81	3.14	11.06	6.34	3.40	3.10	5.51	4.70
	4.5	6.58	4.73	14.00	8.78	4.06	3.90	6.20	5.65
	5.	8.69	6.71	17.25	11.71	4.75	4.62	6.90	6.62

TABLE 10. TABLE FOR CONSTANT C.

Data for Determining Depth of Beam, Moment of Resistance and Reinforcement

To be used in formulas for Depth of rectangular beam or slab. $d = C\sqrt{\frac{M}{b}}$

and in formulas for Moment of Resistance $M = \frac{b\,d^2}{C^2}$

(*See pp.* 418 *and* 754.)

Based on dimensions in inches and moments in inch-pounds.

Item	Working Strength of Steel f_s lb. per sq. in.	Working Strength of Concrete f_c lb. per sq. in.	Ratio of Moduli of Steel to Concrete $n = 10$: Ratio Depth of Neutral Axis to Depth of Steel. k	Ratio of Moment Arm to Depth of Steel $\left(1 - \frac{k}{3}\right)$ j	Ratio Area of Steel to Beam Above Steel. p	Safe Working Value of Constant C. C	Ratio of Moduli of Steel to Concrete $n = 15$: Ratio Depth of Neutral Axis to Depth of Steel. k	Ratio of Moment Arm to Depth of Steel, $\left(1 - \frac{k}{3}\right)$ j	Ratio Area of Steel to Beam Above Steel. p	Safe Working Value of Constant C. C
1	12000	500	0.294	0.902	0.0061	0.123	0.384	0.872	0.0080	0.109
2		550	0.314	0.895	0.0072	0.114	0.407	0.864	0.0093	0.102
3		600	0.333	0.889	0.0083	0.106	0.428	0.857	0.0107	0.095
4		650	0.351	0.883	0.0095	0.100	0.448	0.851	0.0121	0.090
5		700	0.368	0.877	0.0108	0.094	0.467	0.844	0.0136	0.085
6		750	0.384	0.872	0.0120	0.089	0.484	0.839	0.0151	0.081
7		800	0.400	0.867	0.0133	0.085	0.501	0.833	0.0167	0.077
8	14000	500	0.263	0.912	0.0047	0.129	0.348	0.884	0.0062	0.114
9		550	0.281	0.906	0.0055	0.120	0.372	0.876	0.0073	0.106
10		600	0.299	0.900	0.0064	0.111	0.392	0.869	0.0084	0.099
11		650	0.318	0.894	0.0074	0.104	0.409	0.861	0.0095	0.093
12		700	0.333	0.889	0.0083	0.098	0.428	0.857	0.0107	0.088
13		750	0.348	0.884	0.0093	0.093	0.446	0.851	0.0120	0.083
14		800	0.364	0.879	0.0104	0.088	0.462	0.846	0.0132	0.080
15	16000	500	0.238	0.921	0.0037	0.135	0.319	0.894	0.0050	0.118
16		550	0.256	0.915	0.0044	0.125	0.339	0.887	0.0058	0.110
17		600	0.272	0.909	0.0051	0.116	0.358	0.881	0.0067	0.103
18		650	0.288	0.904	0.0058	0.109	0.378	0.874	0.0077	0.096
19		700	0.304	0.899	0.0067	0.102	0.397	0.868	0.0087	0.091
20		750	0.319	0.894	0.0075	0.096	0.414	0.862	0.0097	0.086
21		800	0.333	0.889	0.0083	0.092	0.429	0.857	0.0107	0.083
22	20000	500	0.200	0.933	0.0025	0.146	0.272	0.909	0.0034	0.127
23		550	0.217	0.928	0.0030	0.134	0.292	0.903	0.0040	0.118
24		600	0.232	0.923	0.0035	0.124	0.311	0.896	0.0047	0.109
25		650	0.246	0.918	0.0040	0.117	0.328	0.891	0.0053	0.103
26		700	0.259	0.914	0.0045	0.110	0.344	0.885	0.0060	0.097
27		750	0.272	0.909	0.0051	0.104	0.359	0.880	0.0067	0.092
28		800	0.285	0.905	0.0057	0.098	0.374	0.875	0.0075	0.087
29	24000	500	0.172	0.943	0.0018	0.157	0.240	0.920	0.0025	0.135
30		550	0.185	0.938	0.0021	0.145	0.256	0.915	0.0029	0.125
31		600	0.200	0.933	0.0025	0.134	0.272	0.909	0.0034	0.116
32		650	0.213	0.929	0.0029	0.124	0.288	0.904	0.0039	0.109
33		700	0.226	0.925	0.0033	0.117	0.303	0.899	0.0044	0.103
34		750	0.238	0.921	0.0037	0.111	0.319	0.894	0.0050	0.096
35		800	0.251	0.916	0.0042	0.105	0.334	0.889	0.0056	0.092

NOTE —For intermediate stresses, interpolate.

TABLE 11. DATA FOR DETERMINING DEPTH OF RECTANGULAR BEAM OR SLAB OR MOMENT OF RESISTANCE FOR DIFFERENT PERCENTAGES OF STEEL.

Ratio of elasticity, $n = 15$.

Rule 1. To find depth of beam or slab for a given percentage of steel:

On line with the given percentage, select the higher value of C. This, substituted in formula

$$d = C \sqrt{\frac{M}{b}}$$

(see p. 418), gives the smallest permissible depth. Thus for 0.004 steel ratio the value of C from column (9) must be used instead of from column (6) because the latter would stress the steel to 23 700 pounds, which would not be allowable. It is evident also that the ratio of steel is too low for economy, because concrete is stressed only to 440 pounds.

Rule 2. To find amount of steel for a given beam or slab and given loading with stress in concrete limited to 650 pounds per square inch and stress in steel to 16 000 pounds per square inch:

Compute value of C from formula $M = \frac{bd^2}{C^2}$ (see p. 754). Locate this value either in column (6) or (9), whichever satisfies the allowed stresses, and find the corresponding value of p in the first column. Thus, if $C = 0.097$, it must be located in column (9) instead of column (6), because the latter would give a higher stress in steel than is allowable. The desired ratio of steel is therefore 0.0077. If $C = 0.088$, it must be located in column (6) because column (9) would give too high a stress in concrete.

Ratio area of steel to beam above steel.	Ratio depth of neutral axis to depth of steel.	Ratio moment arm to depth of steel.	Working compressive strength of concrete Lb. per sq. in.	Maximum fibre stress in steel corresponding to $f_c = 650$	Constant in formula $d = C\sqrt{\frac{M}{b}}$ see page 418	Working tensile strength of steel Lb. per sq. in.	Maximum fiber stress in concrete corresponding to $f_s = 16000$	Constant in formula $d = C\sqrt{\frac{M}{b}}$ see page 418
p (1)	k (2)	j (3)	f_c (4)	f_s (5)	C (6)	f_s (7)	f_c (8)	C (9)
0.002	0.217	0.928	650	32900	0.124	16000	290	0.183
0.003	0.258	0.914	650	28000	0.114	16000	370	0.151
0.004	0.292	0.903	650	23700	0.108	16000	440	0.132
0.005	0.320	0.893	650	20800	0.104	16000	500	0.118
0.006	0.344	0.885	650	18600	0.100	16000	560	0.108
0.007	0.365	0.878	650	16900	0.098	16000	610	0.101
0.008	0.384	0.872	650	15600	0.096	16000	670	0.095
0.009	0.402	0.866	650	14500	0.094	16000	720	0.089
0.010	0.418	0.861	650	13600	0.092	16000	760	0.085
0.012	0.446	0.851	650	12100	0.090	16000	860	0.078
0.014	0.471	0.843	650	11000	0.088	16000	950	0.072
0.016	0.493	0.836	650	10000	0.086	16000	1040	0.068
0.018	0.513	0.829	650	9300	0.085	16000	1120	0.065
0.020	0.531	0.823	650	8600	0.084	16000	1210	0.061

TABLE 22. PROPORTIONAL DEPTHS OF NEUTRAL AXIS

The table below gives the proportional depths of the neutral axis calculated from formula (6) on page 420 for various percentages of steel and moduli of elasticity. Its use is *not* advised for ordinary calculations of moments of resistance and dimensions of beams or slabs, because it presents no mean s of determining, without further calculation, the stress in the steel or the concrete, and therefore is liable to lead to uneconomical design. Its principal use is for determining the moment of resistance, and consequently the safe loading for beams already built.

Proportional Depth of Neutral Axis below top of Beam for different per cents of Steel and various assumptions of Elasticity. (See p. 310.)

p Ratio of area of steel to area of cross-section of beam above steel.	k Ratio of depth of neutral axis to depth of center of steel below most compressed surface of beam. Ratios of Modulus of Elasticity of Steel to Modulus of Concrete in Compression, $\frac{E_s}{E_c} = n$								
	6	7.5	10	12	15	20	30	35	40
0.001	0.10	0.115	0.132	0.143	0.158	0.181	0.217	0.232	0.246
0.002	0.184	0.159	0.181	0.196	0.217	0.246	0.292	0.311	0.328
0.003	0.173	0.191	0.217	0.235	0.258	0.292	0.344	0.365	0.384
0.004	0.196	0.217	0.246	0.266	0.292	0.328	0.384	0.420	0.428
0.005	0.217	0.239	0.270	0.292	0.320	0.358	0.418	0.442	0.464
0.006	0.235	0.258	0.292	0.314	0.344	0.384	0.446	0.471	0.493
0.007	0.251	0.276	0.311	0.334	0.365	0.407	0.471	0.497	0.519
0.008	0.266	0.292	0.328	0.353	0.384	0.428	0.493	0.519	0.412
0.009	0.279	0.306	0.344	0.369	0.402	0.446	0.513	0.539	0.562
0.010	0.292	0.320	0.358	0.384	0.418	0.463	0.531	0.557	0.584
0.012	0.315	0.344	0.384	0.402	0.446	0.493	0.562	0.588	0.611
0.014	0.334	0.364	0.407	0.436	0.471	0.519	0.588	0.614	0.638
0.016	0.353	0.384	0.428	0.457	0.493	0.542	0.611	0.637	0.660
0.018	0.369	0.402	0.446	0.476	0.513	0.562	0.631	0.657	0.680
0.020	0.384	0.418	0.463	0.493	0.531	0.580	0.649	0.675	0.697
0.030	0.446	0.483	0.531	0.562	0.599	0.649			
0.040	0.493	0.531	0.580	0.611	0.649	0.697			
0.050	0.531	0.569	0.618	0.649	0.686	0.732			