---------- THESIS ----------

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----COMMERCIAL TESTING OF CONCRETE.----

The material included within this report is the result of a series of tests of concrete specimens taken during the construction of various buildings in the cities of Pasadena and Los Angeles over a period of eight months.

The object of the problem is to determine the effect of the water ratio on the ultimate strength of the concrete as obtained from data observed and recorded from specimens taken from actual building practice rather than that from laboratory specimens made under ideal ,or at least more nearly standard conditions.

The conclusions are drawn in a tabular form on page 10.

It was also observed that about eight out of every ten contractors are using addmixtures to the extent of about three per cent by weight of the cement used .

The strength of specimens tested at seven days were evaluated for comparative purposes to their probable strength at twentyeight days by Abrams diagram formula:

Strength(28 days) is equal to Strength (7 days) plus 30 times square root of Strength (7 days).

All specimens taken are for a nominal mix of 1:2½ : 3½.

Spec No.	Cast	Tested	Days	Slump.	#/sqin (7 days).	#/sqin (28 days)
1.	3/4	4/3	29	9		1700
2.	3/4	4/3	29	9		1220
3	3/4	4/3	29	8		1400
4	3/4	4/3	29	8		1470
5	3/5	4/3	28	6		1900
6	3/5	4/3	28	5		1720
7	3/5	4/3	28	9		1645
8	3/5	4/3	28	7		1850
9	3/6	4/4	29	5		1420
10	3/6	4/4	29	9		1360
11	3/6	4/4	29	7		1335
12	3/6	4/4	29	7		1356
13	1/27	2/25	29	10		1050
14	1/27	2/25	29	10		1400
15	3/25	4/22	28	3		2350
16	3/25	4/22	28	3		2600
17	3/25	4/22	28	3		2375
18	3/26	4/22	33	4		2230
19	3/25	4/22	28	4		2210
20	3/26	4/22	28	5		1925
21	3/26	4/23	28	3		2430
22	3/26	4/23	28	4		2360

Spec No.	Cast	Test	Days	Slump	#/sq in (7 days)	#/sq in. (28 days)	
23	3/26	4/23	28	3		2695	
24	3/26	4/23	28	3		2885	
25	3/26	4/23	28	4		2220	
26	3/31	5/5	35	3		2825	
27	4/16	5/15	29	9		1130	
28	4/16	5/15	29	6		1730	
29	4/17	5/15	28	9		1300	
30	4/17	5/15	28	9		1420	
31	4/17	5/15	28	11		925	
32	4/17	5/15	28	8		1660	
33	4/27	5/5	8	4	1595	2795	
34	4/27	5/5	8	4	1530	2710	
35	4/28	5/5	7	4	1322	2412	
36	4/29	5/6	7	5	1133	2138	
37	5/1	5/8	7	6	1535	2710	1% D.E.
38	5/1	5/8	7	4	1358	2460	2% D.E.
39	5/1	5/8	7	5	1353	2460	3% D.E.
40	5/3	5/10	7	4	1560	2745	
41	5/8	5/15	7	5	1400	2525	
42	5/8	5/15	7	4	1602	2802	
43	5/8	5/15	7	5	1482	2632	
44	4/19	5/17	28	6		2245	
45	4/19	5/17	28	4		1818	

Spec. No.	Cast	Test	Days	Slump	#/sq in (7 day)	#/sq in (28 day)	
46	4/19	5/17	28	5		2020	
47	4/20	5/18	28	4		3210	
48	4/21	5/19	28	3		3215	
49	4/22	5/20	28	4		2900	
50	4/22	5/20	28	3		3285	
51	5/13	5/20	7	2	2075	3445	
52	4/26	5/24	28	4		2495	
53	4/26	5/24	28	4		2900	
54	4/27	5/25	28	4		2535	
55	4/27	5/25	28	3		3375	
56	4/28	5/26	28	4		2620	
57	4/30	5/28	28	4		2421	
58	5/21	5/28	7	6	1500	2660	
59	5/21	5/28	7	6	1568	2758	
60	5/21	5/28	7	6	1661	2880	
61	5/1	5/29	28	4		2140	1% D.E.
62	5/1	5/29	28	3		3160	2% DE
63	5/1	5/29	28	5		2080	3% D.E.
64	5/24	5/31	7	3	1728	2980	
65	5/24	5/31	7	4	1588	2790	
66	5/24	5/31	7	4	1660	2880	
67	5/28	6/4	7	4	1623	2830	
68	5/28	6/4	7	6	1438	2580	

Spec. No.	Cast	Test	Days.	Slump.	#/sq in (7 day)	#/sq in (28 day)
69	5/28	6/4	7	4	1567	2760
70	4/21	4/28	7	3	1640	2850
71	4/21	4/28	7	3	1560	2750
72	4/1	4/29	28	3		3000
73	4/1	4/29	28	3		2975
74	4/1	4/29	28	3		2890
75	4/1	4/29	28	3		3065
76	4/20	5/4	14	3	2278	2953
77	4/20	5/4	14	5	1942	2600
78	4/20	5/4	14	6	1525	2110
79	4/20	5/4	14	3	2272	2987
80	5/7	5/15	8	6	1400	2520
81	5/7	5/15	8	7	1075	2055
82	5/7	5/15	8	6	1108	2100
83	5/7	5/15	8	7	1025	1985
84	4/20	5/18	28	3		2522
85	4/20	5/18	28	3		2660
86	4/20	5/18	28	3		2530
87	4/20	5/18	28	3		2520
88	4/20	5/18	28	4		2400
89	4/20	5/18	28	6		1782
90	5/6	6/4	28	5		2050
91	5/6	6/4	28	4		2410

Spec No.	Cast	Test	Days	Slump	#/sq in (7 day)	#/sq in (28 day)	
92	5/6	6/4	28	3		2810	
93	5/6	6/4	28	6		2250	
94	11/11	12/9	28	7		1720	
95	11/19	2/16	90	8		1250	
96	11/19	2/16	90	12		980	3% D.E.
97	11/19	2/16	90	6		1485	3% D.E.
98	11/19	2/16	90	8		1700	

Slump	2	3	4	5	6	7	8	9	10	11	12
Spec. No.											
1								1700			
2								1220			
3							1400				
4							1470				
5					1900						
6				1720							
7								1645			
8						1850					
9				1420							
10								1360			
11						1335					
12						1356					
13									1050		
14									1400		
15		2350									
16		2600									
17		2375									
18			2230								
19			2210								
20				1925							
21		2430									
22			2360								
23		2695									
24		2885									
25			2220								
26		2825									
27								1130			
28					1730						
29								1300			
30								1400			
31										925	
32							1660				
33			2795								
34			2710								
35			2412								
36				2138							
37					2710						
38			2460								
39				2460							
40			2745								
41				2525							
42			2802								
43				2632							
44					2245						
45			1818								
46				2020							
47			3210								
48		3215									
49			2900								
	3415	40727	32872	23570	21710	10301	7450	8755	2411	925	1180

Slump	2	3	4	5	6	7	8	9	10	11	12
Spec. No.											
50		3285									
51	3445										
52			2495								
53			2900								
54			2535								
55		3375									
56			2620								
57			2421								
58					2660						
59					2758						
60					2880						
61			2140								
62		3160									
63				2080							
64		2980									
65			2790								
66			2880								
67			2830								
68					2580						
69			2760								
70		2850									
71		2750									
72		3000									
73		2975									
74		2890									
75		3065									
76		2993									
77				2600							
78					2110						
79		2987									
80					2520						
81						2055					
82					2100						
83						1985					
84		2522									
85		2660									
86		2530									
87		2520									
88			2400								
89					1782						
90				2050							
91			2410								
92		2810									
93					2250						
94						1720					
95							1250				
96											980
97					1485						
98							1700				
	3445	49374	64857	6730	23125	3760	2950				980

Slump (inches)	2	3	4	5	6	7	8	9	10	11	12
Summation	3445	70 725	64 054	23 570	31 700	10 301	7480	9755	2450	925	980
Number Specimens	1	25	25	11	14	6	5	7	2	1	1
Average*/sq.in.	3445	2830	2565	2150	2260	1720	1500	1400	1225	925	980
Maximum	—	3375	3210	2632	2880	2055	1700	1700	1400	—	—
% > average	—	19	25	22	27	20	13	21	14	—	—
Minimum	—	2350	1818	1420	1485	1335	1250	1130	1050	—	—
% < average	—	17	29	34	34	22	17	19	14	—	—