OIL DENSITY
PROCTOR DENSITY
1958-59
CO. ROAD A & H & X

oil Density 1958-59
Proctor Density
Co. Rd. "A" + "H" + "X"

1220

Co. Rd. "H" U.S. 63 E. 6 miles
Co. Rd "A" U.S. 63 E. To Eagle Center
Co. Rd "L"

July 9, 1958

N.A.T.X 9647 Capy. 9950 Gal. M.C. 4 9414 Gal. @ 60°

Length = 32-1'

Diam. = 7-3' = 87

Zo = 23½"

C = .6'

Temp. = 126°

N.A.T.X. 9590 Capy. 9978 Gal. M.C. - 4 9373 Gal. @ 60°

Length 32.4'

Diam. 7-5" = 89"

Zo 7½" @ 60° - 9299 Gal.

C .6'

Temp. 125°

N.A.T.X. 9737 Capy 9737 M.C. - 0 9649 Gal @ 60°

Length. 30.4'

Diam. 90" @ 60° - 9596 Gals

Zo = 3¼"

C .45'

Temp. 88°

32.72 7 8½ 7.77' 7.9¼

Taken from job
550 Gal. @ 100°

N.A.T.X.	1546	9776	Copy 10144		M.C.O
L	26'				
D	8'	oil 7.62'			
Zo	3 3/4"				
C					
Temp	98°				

N.A.T.X	4023	9853	Copy 10223		M.C.-O
Length	26'				
Diam	8'	oil 7.75			
Zo	3 7/8				
C					
Temp.	102°				

N.A.T.X	9688	9416	Copy 9930		M.C.-4
Length	33'				
Diam.	7'-3"	oil			
Zo	2 7/8"	6'-11 1/2"			
C					
Temp	197°				

N.A.T.X	9590	9408	Copy. 9578	M.C.-4
Length	23.75'			
Diam.	7'-3			
Zo	5¼"	6'-9"		
Temp	196°			

N.A.T.X.	9086	Copy. 8012	M.C.-4
Length	32'-1"		
Diam.	6'-2" = 74"		
Zo	3¼"		
Temp.	144°		

N.A.T.X.	9697	Copy 9933	
Length	32.66		
Diam.	7.33		
Zo	.64'		
Temp.	136°		


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   3275
   3.52
   6550
  16075
  98351
 1150800

  8012
   115
   11

  7897
  .971
  7897
 55279
 78083
7,668981
```

2228
149
2081

Sta.	250+99		250+99			
Test No.	1	2	1	2	3	4
Dry wt. of sample						
H_2O Added	310	50	250	30	30	40
Wet wt of of spec.	2108	2088	2025	2060	2081	
Pan No.	1	2	1	2	3	4
wet wt. of Pan & Sample	629	647	629	846	833	
Dry wt. of Pan & Sample	577	590	600	768	753	
Wt. of Pan Dry	129	147	129	147	150	
Wt. of Sample	448	443	471	621	603	
Moisture Loss	52	57	29	78	80	
% Moisture	11.6	12.9	6.2	10.	10.6	
Calc. Dry wt.	1889	1849	1907	1873	1885	
Dry wt. lb. per cu. ft.	124.8	122.2	126.0	123.6	124.6	
Wet wt. lb per cu. ft	139.3	138.0	133.8			
Proctor Density						
95% of						

251+00

1	2	3	4	5	6
2445	2445	2445	2445	2445	2445
120	169	218	267	316	365
1856	1938	1958	2070	2109	2073
04.9%	06.9	08.9	10.9	12.9	14.9
1769	1813	1798	1867	1868	1804
116.9	119.8	118.8	123.4	124.6	119.2
122.64	128.1	129.4	136.8	139.4	137.0

277463			2898	552700					
1	2	3		1	2	3	4		
2850	2850	2850		2489					
278	338	398		174	50 224	50 274	50 324		
2059	2132	2120		1927	2068	2118	2138		
9.8	11.9	14.0		7%	9%	11%	13%		
1845	1905	1860		1801	1897	1908	1892		
123.9	125.9	122.9		119.0	125.4	126.1	125.0		
136.1	140.9	140.1							
1.99	2.02	1.97		1.91	2.01	2.02	2.00		

1.92

11.7%

62.4

305+00

1	2	3	4
2564	2564	2564	2564
205	51 256	52 308	52 360
2000	2086	2125	2100
8%	10 %	12 %	14%
1852	1896	1897	1842
122.4	125.3	125.4	121.7
19.6	2.01	2.01	1.95

Wet	728
Dry	622
Loss	106
	17 %

331+00

1	2	3	4
3068	3068	3068	
245	62 307	61 368	62 430
2066	2166	2133	
8 %	10 %	12 %	
1913	1969	1904	
126.4	130.1	125.8	
2.03	2.08	2.02	

Wet	400	655	150
Dry	350	589	
Loss	50	66	
	14.3 %	12.5 %	

7714
150
2564

542+00

1	2	3	4
2582			
180	50 230	50 280	50 330
1991	2084	2127	2096
7%	9%	11%	13%
1861	1912	1916	1855
123.0	126.3	126.6	122.6
1.94	2.02	2.03	1.96

See Page 17 for Sta 552+00.

W 461

D 671

L 90

13.4 %

354+00

Base on East mile
Co. Rd. "H"

1	2	3	
2581	2581	2581	2581
	52	52	26
206	258	310	336
1930	2081	2194	2188
8%	10%	12%	13%
1782	1892	1959	1936
118.1	125.0	129.5	127.9
1.89	2.0	2.08	2.05

Co. Rd. "A"

Base Void

91+00

1	2	3	4	5	6	7
3867	3586	3214	2846	2482	2482	2482
202	34	32	28	25	25	25
1962	1996	2011	2075	2174	2178	2168
1	2	3	4	5		6
546	547	549	549			646
527	524	522	518			598
146	147	149	149			146
381	377	373	369			452
19	23	27	31			48
6 5%	7 6.1%	8 7.2%	9 8.4%	9.5%	10.6%	10.6%
1867	1881	1876	1914	1986	1969	
123.4	124.3	124.0	126.4	131.2	129.0	
1.98	1.99	1.99	2.03	2.10	2.07	

Co. Rd. A Subbase

100+00 Aug. 22, 1958

1	2	3	4	5	6	7
4670	4296	3926	3559	3196	2832	2475
327	43	39	36	32	28	25
1882	1927	2001	2027	2061	2099	2101
1	2	3	4	5	6	1
546	547	549	549	549	546	546
517	515	513	511	512?	500	502
146	147	149	149	149	146	146
371	368	364	362	363	354	356
29	32	36	38	36?	46	44
7.8%	8.7%	9.9%	10.5	11.7%	13%	13.6
1746	1777	1821	1825	1845	1857	1863
115.4	117.4	120.3	120.6	121.9	122.7	123.1
1.85	1.88	1.92	1.93		1.97 95% 1.87	

Co. Rd. A Subbase

150+00 Aug. 27, 1958

2234						
266	25	22	22	22	22	22
1877	1907	1957	2001	2027	2045	2031
						2
						1147
						1002
						147
						855
						145
11.9	13	14	14.5	15	16	17
			1748	1763	1763	1736
			115.5	116.5	116.5	114.7
			1.85	1.87	1.87	1.84
					95%	~~95%~~
					1.78	~~1.75~~

Sta.	160+00		
1	2	3	
2391	2391	2391	2391
263	48	48	24
1891	1989	2029	2029
			1
			1006
			889
			146
			743
			117
11%	13%	15%	15.9%
1703	1760	1764	1751
112.5	116.3	116.6	115.7
		1.87	
		1.78	

Base Co. Rd. "A"

3	283							
	1							
~~2895~~	4146	4146	4146	4146				
~~231~~	298	41	41	41				
~~2122~~	2074	2217	2276	2260				
				4				
				949				
				881				
				149				
				732				
				68				
~~8.0%~~	7%	8%	8.7 9%	9.37. 10%				
	1938	2053	2088	2055				
	128.1	135.7	138.0					
		2.17	2.21					

Sta. 216+00 To Sta. 227+00

227+00

1	2	3	4	5	6	7	8	9	10
5335	4583	4118	3658	3203	3153	2708	2708	2708	2708
320	46	41	36	32	32	27	27	27	27
1716	1731	1782	1804	1854	1880	1924	1980	1990	2026
1	2	3	4	5	6	1	2		
946	647	649	649	649	646	None			
899	611	610	607	603	596				
146	147	149	149	149	146				
753	464	461	458	454	450				
47	36	39	42	46	50				
6.2	7.8	8.5	9.4	10.1	11.1	12.0	12.9	13.8	14.7
1616	1605	1642	1649				1754		1766
									116.70
									1.87

Sta. 229+00
To 239+50

223+00	235+00			
11				
2208	5480	5030	4570	4160
27	550	100	92	82
2003	1897	1999	2036	2000
6	1	2	3	4
904	646	647	649	649
798	599	589	584	579
146	146	147	149	149
652	453	442	435	430
106	47	58	65	70
15.6%	10.4	13.1	14.9	16.3
	1718	1768	1772	
			117.07	
			1.87	

Sta 200+00 To 216+00

208+00

1	2	3	4	5	6
5720	5270	4830	4395	3965	3540
356	53	48	44	40	35
1925	1984	2025	2046	2058	2037
1	2	3	4	5	6
646	647	649	649	649	646
595	594	594	593	582	577
146	147	149	149	147	146
449	447	445	444	433	431
51	53	55	56	67	69
11.4	~~12.6~~ 11.8	~~12.3~~ 12.3	~~12.3~~ 12.3	15.5	16.0
1728	1775	1787	1790	1782	
114.18	116.43				
1.83	1.85		1.93		
			1.83		

Sta. 184+00 To 200+00

192

1	2	3	4
4417	3968	3528	3098
456	80	70	62
1852	1942	2004	2015
1	2		
646	647	649	649
597	591	586	577
146	147	149	149
451	444	437	428
49	56	63	72
10.8%	12.6%	14.4%	16.8
1672	1725	1752	1725
110.5	114.0	115.8	114.0
1.77	1.83	1.86	1.83
		1.77	

255+00 To 266+00

258+00

1	2	3		
3817	3634	3364	3101	2660
382	72	70	62	50
1725	1815	1906	1983	2005
1	2	3	4	5
346	447	449	649	649
329	417	412	580	575
146	147	149	149	147
183	270	263	431	426
17	30	37	69	74
9.3	11.1	14.1	16.0	17.4
1578	1634	1662	1709	1708
		109.8	112.9	
		1.76	1.81	
			1.72	

183 Sta 240 To 255

266 To 293

280+00

1	2	3	4
5663	4855	4159	3479
665	75	42	35
1969	2014	2050	2046
1	2	3	4
946	947	949	949
866	846	855	845
146	147	149	149
720	699	706	696
80	101	94	104
11.1	12.6 14.2	13.8	15.0
1748	1789 1766	1801	1779
117.5	118.2	117	117.6
1.88	1.89	1.91 1.81	1.88

4E June 11, 1959 " "

194+00 Base		Co. Rd	A
1	2	3	4
4542	4170	3792	3471
317	42	38	35
2067	2178	2276	2267
1	2	3	4
546	547	549	649
519	518	517	605
148	147	149	149
373	371	368	456
27	29	32	45
7.2%	7.8%	8.7%	9.9%
1928	2020	2094	
127.4	133.5	138.4	
2.04	2.12	2.22	2.18

July 31, 1959

506400 Co. Rd "X"

1	2	3	4	5	6
5449	4989	4540	4095	3655	3215
448	100	45	41	37	32
1884	1993	2035	2082	2090	2087
1	2	3	4	5	6
646	647	649	649	649	646
609	602	602	600	592	590
146	147	149	149	149	146
463	455	453	451	443	444
37	45	47	49	57	56
8.0%	9.9%	10.4%	10.9%	12.8%	12.6%
1744	1816	1843	1877	1853	
115.24	120.00	121.79	124.03	122.4	
			1.99		
			1.89		

Base Co. Rd. "X" aug 18, 1958

1	2	
5735		
526	57	25
2188	2245	2243
1	2	
646	647	649
603	602	601
146	147	149
457	455	452
43	45	48
9.4%	9.9%	10.6%
2000	2043	2028
132.2	134.9	134.0
2.12	216.0	2.15

1	2	3	4	5	6				

	8-30-61	8-30-61	8-30-61	8-29-61	8-29-61
	129+00	106+00	99+00	69+00	52+00
	10' R	10' L	10' R	10' L	10' R
	7"	5"	7½"	5"	7"
	1421	851	1338	1750	1272
	1346	796	1266	1662	1224
					48
	75	55	72	88	48
	5.6%	6.9%	5.7%	5.3%	4.0%
6	5	4	3	2	1
12.00	1205	1212	1202	1202	1245
	692	906	699	569	795
	513	306	503	633	450
	76°	76°	74°	85°	80°
	8704	8704	8710	.8672	.8689
	584	351	578	730	518
	2.29	2.27	2.17	2.28	2.38

		9-5-59	9-5-59	9-5-59	9-3-59	9-3-59	9-3-59	9-2-59	9-2-59 ~~38~~
		412+00	404+00	396+00	428+00	444+00	444+00	380+00	388+00
		11' Lt	11' Rt	11' Lt.	11' Lt	11' Lt	11' Rt	11' Lt	11' Rt
		5 1/2"	4 1/2"	5 1/2"	5"	6"	5 1/2"	6"	7"
		1445	960	972	1159	1476	1203	1154	1460
		—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—
		1368	899	907	1085	1386	1123	1084	1368
		77	61	65	74	90	80	70	72
					6.8%	6.5%	7.1%	6.4%	6.7%
2	1	6	5	4	3	2	1	6	5
1224	1229	1210	1238	1230	1249	1215	1229	1179	1253
		656	891	885	824	[illegible]	776	760	711
		554	347	345	425	546	[illegible]	419	542
		79°	78°	79°	86°	69	62°	72°	72°
		8694	8678	.8694	8668	.8733	[illegible]	.8718	.8718
		637	398	396	490	624	518	480	621
		2.16	2.26	228	2[illegible]	2.23	2.18	2.27	2.21

9-2-59	9-1-59	9-1-59	9-1-59 ~~10-1-59~~	9-1-59 ~~10-1-59~~	9-1-59 ~~10-31-59~~	8-31-59	8-31-59	8-31-59	8-31-59
396+00	404+00	412+00	428+00	436+00	444+00	420+00	428+00	436+00	444+00
11' Lt	11' Rt	11' Lt	11' Rt	11' Lt	11' Rt	11' Rt	11' Lt	11' Rt	11' Lt
5⅛"	4"	6¼"	5"	5¼"	6"	6"	6"	6¼	6½"
1112	1018	1481	1375	1512	1437	1341	1429	1424	1386
937	954	1409	1292	1433	1366	1252	1353	1359	1326
175	64	72	83	79	71	89	76	65	60
16.2%	6.7%	5.1%	6.4%	5.5%	5.2%	7.1%	5.6%	4.8%	4.5%
4	3	2	1	6	5	4	3	2	1
1232	1239	1215	1228	1164	1249	1224	1256	1230	1221
818	859	630	733	608	661	746	696	692	679
414	380	585	495	556	578	478	560	538	542
62°	77°	76°	66°	66°	66°	74°	74°	71°	71°
8755	.8701	.8701	8740	8740	8740	.8710	.8710	.8722	.8722
474	436	670	566	634	659	549	642	615	621
1.97	2.18	2.10	2.28	2.26	2.08	2.28	2.11	2.21	2.17
					See Page 43-Rt				See Page 43 Rt

8-25-59	8-25-59	8-25-59	8-25-59	8-22-59	8-22-59	8-22-59	8-22-59	8-21-59	8-21-59
452	460+00	468+00	476+00	484+00	492+00	500+00	513	528	508+00
11' Rt	11' Lt	11' Rt	11' Lt	11' Rt	11' Lt	11' Rt	11' Rt	11' Rt	11½' Lt
5½	6"	5"	6½"	5"	6"	6¼"	6¼"	6"	5½"
1753	1889	1423	1997	1440	1533	1689	1574	1354	1187
1622	1771	1326	1850	1348	1472	1574	1521	1290	1131
131	119	97	147	92	61	115	53	64	55
8.1%	6.7%	7.3%	8.0%	6.8%	4.1%	7.3	3.5%	5.0%	4.9%
6	5	4	3	2	1	6	5	4	3
1154	1238	1225	1251	1223	1220	1165	1219	1221	1235
534	557	719	530	712	667	563	666	735	811
620	681	506	721	511	553	602	553	486	424
88°	87°	86	86	82°	82°	81°	80°	89°	88°
.8661	.8665	.8668	.8668	.8682	.8682	.8686	.8689	.8658	.8661
720	789	585	833	590	649	695	639	550	490
2.27	2.25	2.27	2.22	2.28	2.30	2.27	2.38	2.34	2.30

Base Co. Rd "X"		Subbase Co. Rd. "X"			2	Subbase 3"			
8-21-59	8-21-59	8-14-59	8-14-59	8-14-59	8-14-59	8-13-59	8-13-59	8-13-59	8-13-59
520+30	513+00	421+00	427+00	456+00	459+00	377+00	385+00	391+00	397+00
7' Lt	11' Rt	12½ Lt	12½ Rt	12½ Rt	12½ Lt	12½ Lt	12½ Rt	12½ Rt	12½ Lt
6"	7"	4"	4"	4"	4"	4"	4"	4"	4"
1406	1914	1532	931	1117	1079	1307	1049	1012	906
1340	1817	1391	860	1021	993	1187	973	927	827
66	97					120	76	85	79
4.9	5.3%							9.2%	9.5%
2	1	6	5	4	3	2	1	6	5
1198	1215	1183	1221	1192	1212	1183	1122	1179	1222
698	414	532	831	724	793	668	698	778	850
500	801	651	390	468	419	515	424	401	372
89°	89°	88°	88°	86°	86°	76°	75°	72°	72°
.8658	.8658	.8661	.8661	.8668	.8668	8704	8708	.8710	.8718
579	928	753	450	538	484	591	488	460	427
8.32	1.96	1.84	1.91	1.91	2.05	2.02	2.00	2.02	1.93
	See Page 45 RT								

Subbase Co. Rd. "X"

Bt 179

8-12-59	8-12-59	8-12-59	8-11-59	8-11-59	8-10-59	8-10-59	8-10-59	8-10-59	8-10-59
403+00	903+00	415+00	421+00	458+00	427+00	439+00	440+00	446+00	458+00
12½ Rt	12' Lt	12' Rt	12½' Lt	12½ Lt	12½ Rt	12½' Lt	12½' Rt	℄	12½ Rt
4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
1331	934	1065	993	1144	549	691	892	786	815
—	—	—	—	—	514				
—	—	—	—	—	0	0	0	0	—
1222	878	988	926	1042	514	658	842	745	721
109	56	77	67	102	35	33	50	41	84
8.3	6.4%	7.8%	7.2%	9.8	6.8%	5.0%	5.9%	5.5%	11.6%
4	3	2	1	6	5	4	3	2	1
1233	1226	1209	1213	1169	1207	1221	1220	1240	1221
736	825	795	752	665	959	965	836	925	874
497	401	414	461	504	248	256	384	315	347
82°	79°	78°	74°	74°	86	88°	87°	87°	74°
.8682	.8693	.8697	.8710	.8710	8668	8661	8665	.8665	.8712
573	461	475	529	579	287	276	444	363	398
2.13	1.90	2.07	1.75	1.81	1.79	2.22	1.96	2.05	1.81

6 = 3

Co. Rd. "L" Base

			7-27-59	7-27-59	7-27-59	7-27-59	7-24-59
			131+00	124+00	89+00	95+00	100+00
			℄	11' Rt	11' Rt	11' Lt	℄
			6"	4½	5½	4½"	5½"
			1226	987	1046	1052	1202
			1160	951	1005	1009	1140
			66	36	43	43	62
				3.8%	4.3%	4.3%	5.5%
	1	6	5	4	3	2	1
	1192	1153	1196	1210	1220	1221	1213
			755	847	840	833	784
			441	363	380	388	429
			86°	86°	80°	71°	80°
			.8668	8668	8689	.8715	8689
			510	419	438	444	493
			2.27	2.28	2.30	2.27	2.32

	Base Co. Rd. "L"		Subbase Co. Rd. "L"		Co. Rd. "L" Subbase			Base Co. Rd. A	
7-24-59	7-24-59	7-24-59	7-18-59	7-18-59	7-14-59	7-14-59	7-14-59	7-6-59	7-6-59
106+00	113+00	124+00	130+00	123+00	89+00	96+00	110+00	250+00	243+00
11 R	11' Lt	11½ Rt	12½ Rt	12½ Lt	12½ Lt	12½ Rt	12½ Lt	℄	℄
6"	6¼"	4¾	4"	4"	4"	4"	4"	5"	6"
1335	1198	1172	938	877	931	1101	1242	1184	1292
1278	1156	1104	859	805	872	1030	1178	1122	1223
		~~115~~	~~99~~	~~104~~	~~72~~	~~93~~	~~100~~	115	99
57	42	68	79	72	59	71	64	1007	1129
4.5%	3.6%	6.1%	9.2	8.9				62	69
6	5	4	3	2	1	6	5	4	3
1147	1193	1220	1213	1230	1220	1178	1222	1227	1230
661	741	764	857	889	826	717	748	836	776
486	452	456	356	341	394	461	474	391	454
78°	78°	72°	86°	84°	82	82°	80°	64°	64°
.8697	.8697	.8718	.8689	.8675	.8682	.8682	.8689	.8748	.8748
559	521	521	410	392	453	532	544	453	519
2.28	2.22	2.13	2.07	2.05	1.93	1.94	2.16	2.22	2.18

Co. Rd. "A" Base

7-3-59	7-3-59	7-2-59	7-2-59	7-2-5	7-1-59	7-1-59	7-1-59	7-1-59	6-25-59
252+00	246+50	252+00	246+50	241	330+00	320+00	252+00	245+00	228+00
11' Lt	℄	11' L	℄	11' R	11' Lt	11' Rt	℄	11' Rt	11' Lt
6"	6"	6 1/4	6	5 1/2	5	5"	6"	6"	6"
1907	1331	1582	1497	1648	1372	1430	1316	1622	1647
1804	1244	1491	1402	1563	1268	1331	1228	1505	1554
104	92	93	100	115	99	104	92	93	100
1700	1152	1398	1302	1448	1169	1227	1136	1412	1454
		91	95	85	106	99	88	117	93
		6.5	7.3	5.9	9.1%	8.0%	7.8%	8.3%	6.4%

Co. Rd. "A" Base

2	1	6	5	4	3	2	1	6	5
1227	1226	1180	1210	1212	1213	1213	1250	1168	1248
572	739	611	676	648	748	737	792	602	698
655	487	569	534	564	465	476	458	566	550
68°	66°	78°	74°	72°	62°	63°	63	64°	98°
.8733	.8740	.8697	.8710	.8718	.8755	.8752	.8752	.8748	.8625
749	559	656	612	646	532	545	523	645	638
2.27	2.07	2.13	2.13	2.25	2.20	2.25	2.16	2.19	2.28

Same

Co. Rd. A
Base

6-25-59	6-25-59	6-25-59	6-24-59	6-24-59	6-24-59	6-24-59	6-23-59	6-23-59	6-23-59
221-00	215+00	277+00	305-00	312+00	249-00	282+00	275+00	270+00	265+00
3' Lt	11' Lt	11' Rt	℄	11' Lt	11' Rt	11' Lt	℄	11' Rt	11' Lt
6"	7 3/4"	6"	7"	7 3/4"	6 1/2"	4 3/4	5"	4 3/4	5 3/4
1510	2302	1663	2059	2151	2012	1690	1280	1186	1581
1441	2178	1569	1926	2026	1934	1627	1210	1134	1527
115	99	104	92	93	100	115	99	104	92
1326	2079	1465	1834	1933	1834	1512	1111	1030	1435
69	124			125	78	71	70	52	54
5.2%	6%			6.1	4.3	4.7	6.3%	5.0%	3.8%
4	3 ~~2~~	2	1 ~~4~~	6 ~~5~~	5	4	3	2	1
1213	1212	1213	1228 1213 1183	1196 1175	1212 1214	1208	1214	1226	1221
720	2440 591 1649 1634 806	645	2396 1670	2371 1622	2426 1729	610	772	789	642
493		568	726	749	697	598	442	437	579
98°	97°	92°	91°	91°	86°	84°	60°	58°	81°
.8625	.8629	.8647	.8650	.8650	.8668	.8675	.8762	.8769	.8686
572	932	655	839	865	805	690	505	500	663
2.32	2.23	2.24	2.28	2.23	2.27	2.19	2.18	2.06	2.16

Co. Rd. "A" Base

6-22-57	6-22-57	6-22-57	6-22-57	6-22-57
275+00	270+00	265+00	260+00	255+00
℄	11' R	11' L	℄	11' Rt
4 3/4"	4 1/2"	5"	6 1/4"	6 1/2"
1514	1472	1719	1660	1715
1415	1400	1658	1590	1644
93	100	115	99	104
1322	1300	1543	1491	1540
99	72	61	70	71
7.5%	5.1%	3.9%	4.7%	4.6
6	5	4	3	2
1157	1195	1231	1204	1197
631	667	606	636	619
526	528	625	568	578
79°	78°	76°	72°	70°
.8693	.8697	.8764	8716	8725
604	607	718	650	660
2.19	2.15	2.16	2.29	2.33

See Page 52 Rt.

Co. Rd. "A" Base

6-22-57	6-22-57	6-22-57	6-19-57	6-19-57
228+00	222+00	215+00	253+00	253+00
11' Rt.	3' Rt	11' Rt	11 Lt	11' Rt
7"	5 1/4"	6"	4 1/2"	6"
2129	1557	1235	1500	2007
2048	1497	1199	1426	1918
92	93	100	115	99
1956	1404	1097	1311	1819
81		36	74	89
4.1		3.3%	4.9	4.9%
1-4	6	5	4	3
2 = 1196 1201 2397 1645	1147	1201	1183	6 = 1151 3 = 1203 2354 1576
752	543	426	541	776
68°	67°	69°	84	76°
.8733	.8736	.8729	8675	.8704
861	622	484	626	890
227	2.26	2.27	2.10	2.04

.8675
8668

Co. Rd "A"
Base

6-19-59	6-19-59	6-17-59	6-17-59	6-16-59
249+00	241+00	253+00	232+00	236+00
11' Lt	11' Rt	11' Rt	11' Lt	10' Rt
6 3/4	5 1/2	6"	6"	8"
1755	1689	1282	1265	1761
1668	1604	1217	1220	1685
104	92	92	100	115
1564	1512	1125	1120	1570
87	85	65	45	76
5.5%	5.6%	5.7%	4.0	4.8
2	1	6	5	4
1213	1190	1168	1214	1229
613	585	696	784	611
600	605	472	430	618
76°	75°	68°	68°	88
.8704	.8708	.8733	.8733	.8661
688	694	540	492	701
2.29	2.18	2.09	2.28	2.24
		See Rt. Side Page 52		

Co. Rd. "A"
Base

6-16-59	6-16-59	6-16-59	6-15-59	6-15-59
227+00	218+00	209+10	209+00	201+00
℄	11' Lt	11' Rt	11' Rt	℄
5"	7"	6"	6"	5 1/2"
1479	1789	1323	1685	1312
1431	1720	1284	1630	1264
99	104	92	92	100
1332	1616	1192	1538	1164
48	69	39	55	48
3.6%	4.3%	3.3%	3.6%	4.1%
3	2	1	6	5
1238	1263	1239	1176	1252
667	584	765	537	791
571	679	474	639	461
86°	82°	80°	67°	65°
.8668	.8682	.8689	.8736	.8744
660	781	545	734	528
2.02	2.06	2.18	2.10	2.22
See Page 52-Rt.	See Sta. 215 Page 52 Rt			

Co. Rd. "A" Base		Co. Rd. "A" Subbase			Co. Rd. A Subbase				
6-15-59	6-15-59	6-10-59	6-10-59	6-10-59	6-5-59	6-8-59	6-8-59	6-8-59	6-8-59
174+00	185+00	333+00	323+00	315+00	307+00	298+00	289+00	280+00	271+00
11' Lt	11' Rt	12½ Lt	12½ Rt	℄	12½ Rt	12½ Lt	℄	12½ Rt	12½ Lt
5"	6"	4"	4"	4"	4"	4"	4"	4"	4"
1334	1529	1024	1058	990	1127	1168	1043	1060	1141
1289	1465	939	968	899	1048	1110	958	997	1053
115	99	104	92	92	100	115	99	104	92
1174	1366	835	876	807	948	995	859	893	981
45	64					58	85	63	88
3.8%	4.7%					5.8	9.9	7.1	9.0
4	3	2	1	6	5	4	3	2	1
1258	1268	1173	1147	1162	1204	1207	1214	1220	1211
793	722	776	744	772	784	778	803	798	763
465	546	397	403	394	420	429	411	422	448
65°	65°	82°	80°	78°	78°	77°	74	73°	77°
.8744	.8744	.8682	.8689	.8697	.8697	.8701	.8710	.8716	.8722
531	622	459	464	453	483	493	472	484	514
2.21	2.20	1.82	1.88	1.79	1.97	2.05	1.82	1.87 1.81	1.81
2.22	2.22						1.81	1.81	1.81

Co. Rd. "A"
subbase

6-3-59	6-3-59	6-3-59	6-3-59	
257+00	253+00	249+00	241+00	
12½ Lt	℄	12½ Rt	12½ Lt	
1153	1108	1133	1232	
1015	997	991	1120	
100	115	99	104	92
905	882	892	1016	
138	111	142	112	
15.1	12.6%	15.7%	11.0%	
5	4	3	2	1
1183	1193	1211	1240	1211
746	798	780	795	
437	395	431	445	
74°	72°	72°	68	
8710	8722	8722	.8733	
501	453	494	510	
1.82	1.55	1.81	1.99	
1.92	1.83	1.83	1.87	

Co. Rd. A
C Subbase

6-3-59	5-27-59	5-27-59	5-27-59	5-25-59
265+00	209+00	203+00	194+00	187+00
12½ Rt	12½ Rt	12½ Lt	12½ Rt	12½ Lt
4"	4"	4"	4"	4"
1135	1147	1389	1147	1419
1016	1073	1248	1009	1244
92	100	115	99	104
924	973	1133	910	1140
119	74	141	138	175
12.9		12.4	15.2	15.4
6	5	4	3	2
1154	1213	1196	1175	1217
726	743	661	743	642
428	470	535	452	575
74°	72°	72°	72	70°
.8710	.8716	.8716	.8718	.8725
492	538	614	518	659
1.88	1.81	1.85	1.76	1.73
1.72	1.83	1.83	178	1.77
	✓	✓	✓	✓
			Subbase 1½"	

Subbase				Subbase		Base			
5-25-59	5-25-59	5-25-59	5-15-59	5-15-59	5-14-59	9-20-58			9-20-58
197+00	203+00	209+00	234+00	228+00	222+00	215+00	183+00		177+00
℄	12½ Rt	12½ Lt	℄	11½ Rt.	11½ Lt	11½ Rt	11' Lt		11' Rt.
4"	4"	4"	4"	4"	4"	4"	6"		6"
1462	1558	1178	1472	1132	1287	1316	1820		2118
1295	1382	1043	1384	1049	1146	1205	1718		2030
.92	.92	100	115	99	104	92	92	92	100
1203	1290	942	1269	950	1042	1113	1626		1930
167	176	135	88	83	141	111	102		88
14.7	13.6	12.8	6.9	8.7	13.5	10.7	6.3%		4.6%
1	6	5	4	3	2	1	1	6	5-6
1198	1215	1245	1251	1238	1216	1217	1235	1190	1190 1233 2423 1637
627	580	771	623	769	706	669	618	6	
571	635	474	628	469	510	548	617		786
70	68°	67°	46°	46°	50°	51°	60°		60°
.8725	.8733	.8736	.8812	.8812	.8798	.8794	.8783		.8783
645	727	543	710	532	579	622	703		896
1.87	1.79	1.73	1.79	1.78	1.81	1.79	2.31		2.16
			✓	✓	✓	✓			
1.77	1.83	1.83	1.78	1.78	1.78				

See Page 55-Rt.

9-20-58	9-20-58	9-18-58	9-18-58	9-18-58	9-18-58	9-18-58	9-18-58	9-13-59	9-13-58
171+00	165+00	125+00	159+00	152+00	146+00	140+00	134+00	128+00	122+00
11' Lt	11' Rt.	11' Rt	11' Lt	11' Rt	11' Lt.	11½ Rt	11½ Lt	11½ Rt.	11½ Lt.
6"	6"	6"	5"	6½"	7¼"	7"	6"	4¾"	6"
1600	1360	1919	2030	2546	2069	2331	1660	1510	1675
1510	1293	1829	1936	2425	1973	2217	1574	1454	1590
115	99	102	92	102	92	92	100	115	99
1395	1194	1727	1844	2323	1881	2125	1474	1339	1491
90	67	90	94	121	96	114	86	56	85
6.5%	5.6%	5.2%	5.1%	5.2%	5.1%	5.4%	5.8%	4.2%	5.7%
4	3	2	1	2-3	1	6-4	5	4	3
1226	1254	1236	1212	3-1236 2-1271 2507 1596 911	1256	4-1272 5-1203 2475 1628	1231	1240	1254
699	788	582	488		517		658	713	652
527	466	754	731		739	847	573	527	602
56°	56°	67°	66°	60°	58	56°	56°	58°	55°
.8797	.8797	.8761	.8765	.8783	.8790	.8797	.8797	.8790	.8801
599	530	861	836	1040	841	961	652	600	685
2.33	2.25	2.01	2.22	2.23	2.24	2.21	2.25	2.23	2.18

1-1184
2-515
1699

Base

Subbase

9-13-58	9-12-58	9-8-58	9-11-58	9-10-58	9-10-58	9-8-58	9-8-58	9-2-58	9-2-58
116+00	116+00	80+00	110+00	104+00	98+00	92+00	86+00	152+00	146+00
11½ Rt	11½' Rt	11½' Rt	11½' Lt	11½" R.	11½' Lt	11½ Rt	11½ Lt	11½ Lt	11½ Rt
7"	6¾"	6"	6"	6"	6"	6"	6"	4"	4"
2079	2311	1787	2029	2019	1680	2074	1663	1159	1105
1983	2210	1712	1938	1919	1589	1989	1605	1055	1001
102	92	92	92	100	115	99	102	92	92
1881	2118	1660	1846	1819	1474	1890	1503	963	909
96	101	75	91	100	91	85	58	104	104
5.1%	4.8%	4.6%	4.9%	5.5%	6.2%	4.5%	3.8%	10.8%	11.4%
2-1	1-6	1	6	5	4	3	2	1	6
1-1272	6-1216								
1230	1-1240	1229	1199	1225	1249	1263	1248	1226	1175
2502	2456								
1699	1549	609	502	521	670	519	665	777	769
803	907	620	697	704	579	744	583	449	406
54°	54°	62°	54°	54°	54°	67°	64°	83°	84°
.8805	.8805	.8776	.8805	.8805	.8805	.8758	.8769	.8699	.8689
911	1020	708	790	802	657	850	669	517	468
2.06	2.06	2.28	2.33	2.27	2.24	2.22	2.26	1.87	1.94
								178	1.78

Co. Road C-816 "A" subbase

9-2-58	9-2-58	9-2-58	9-2-58	9-2-58	8-29-58	8-29-58	8-29-58	8-29-58	8-29-58
128+00	122+00	116+00	110+00	85+00	182+00	104+00	97+00	91+00	85+00
11½' Rt	11½ Lt	11½ Rt	11½ Lt	℄	11½ Lt	℄	11½ Rt	11½ Lt	℄
4"	4"	4"	4	4"	4"	4"	4"	4"	4"
1237	1137	1305	1180	1051	1290	1162	1376	973	1368
1142	1035	1201	1091	966	1154	1056	1223	909	1217
100	115	99	102	92	92	100	115	99	102
1042	920	1102	989	874	1062	956	1108	810	1115
95	102	104	89	85	136	116	153	64	151
9.1%	11.5%	9.4%	9.0%	9.7%	12.8	12.1%	13.8%	7.9%	13.8%
5	4	3	2	1	6	5	4	3	2
1228	1255	1257	1272	1253	1179	1230	1235	1254	1210
766	843	759	838	858	704	780	714	913	659
462	412	498	434	395	475	450	521	341	554
84°	83°	66°	66°	64°	82°	80°	81°	81	78°
8696	8699	8761	8761	8769	8703	8710	8706	8706	8717
531	473	569	496	451	546	516	597	392	631
1.97	1.94	1.94	1.99	1.94 2nd. Test	1.95	1.86	1.85	2.06	1.78 See Lt side of Page
1.87	1.87	1.87	1.87	1.87		1.87	1.87	1.87	1.87

Co. Road "A" subbase
C-816

8-29-58	8-29-58	8-29-58	8-29-58	8-29-58
175+00	168+00	162+00	140+00	234+00
11½ Rt	℄	11½ Lt	11½ Lt	11½ Rt
4"	5"	4	4"	4"
1295	1435	1385	1292	1229
1175	1303	1259	1161	1128
92	92	100	115	99
1083	1211	1159	1046	1029
120	132	126	131	101
1	6	5	4	3
1237	1187	1205	1204	1225
747	625	676	701	775
490	562	529	503	450
75°	75°	74°	73°	73°
.8728	.8728	.8732	.8736	.8736
560	645	605	578	514
1.94	1.88	1.92	1.82	2.00
			1.78	1.87

Co. Road "A" subbase

8-28-58	8-28-58	8-28-58	8-28-58	8-28-58
120+00	128+00	106+00	99+00	93+00
11½ RT	11½ Lt	11½ Lt	11½ Rt	11½ Lt
4"	4"	4"	4"	4"
255	1043	1507	1191	1379
785	959	1366	1070	1268
102	92	92	100	115
683	867	1274	970	1153
170	84	141	121	111
10.0%	9.5%	11.1%	13.5%	9.2%
2	1	6	5	4
1209	1221	1166	1229	1203
884	817	595	762	653
325	404	571	467	550
84°	84°	69°	67°	66°
.8696	.8696	.8751	.8758	.8761
573	465	652	535	629
1.83	1.86	1.95	1.82	1.84
1.87	1.87	1.87	1.87	1.87
				see sta 91

County Road "A" Subbase			County Road "H"		Base				
8-28-58	8-28-58	8-27-58	8-18-58	8-18-58	8-18-58	8-18-58	8-18-58	8-18-58	8-18-58
87+00	81+00	150+00	277+00	241+00	247+00	257+00	267+00	277+00	287+00
℄	11½ Rt.	11½ Lt	11½ Lt	11½ Lt	11½ Rt	11½ Lt	11½ Rt	11½ Lt	11½ Rt.
4"	4"	4"	6"		6½"	5"	6½"	6¼"	5"
1476	1609	1247	2030	1639	2118	1238	1697	1430	1249
1320	1493	1000	1941	1559	2008	1171	1622	1370	1199
99	102	92	92	100	115	99	102	92	92
1221	1391	1008	1849	1459	1893	1072	1520	1278	1107
156	106	147	89	80	110	67	75	60	50
12.8%	7.6%	14.6%	4.8%	5.5%	5.7%	6.3%	4.9%	4.7%	4.5%
3	2	1	6	5	4-5	3	2	1	6
1213	1202	1218	1172	1226	1244 1250	1260	1253	1249	1198
634	579	716	437	594	594 1110	833	601	680	744
585	623	502	735	632	784	427	652	569	454
66°	64°	64°	96°	85°	82°	76°	76°	75°	72°
.8761	.8769	.8769	.8654	.8692	.8703	.8725	.8725	.8726	.8740
669	712	572	850	730	900	483	748	650	518
1.83	1.95	1.76	2.18	2.00	2.10	2.22	2.04	1.96	2.15
1.87	1.87	1.78							
		See sta 152+00 Rt. side Page 58							

Subbase	Base					Sub-Base	Base		
8-13-58	8-13-58	8-13-58	8-12-58	8-12-58	8-12-58	8-12-58	8-12-58	8-12-58	8-12-58
258+00	295+00	301+00	240+50	244+00	246+00	271+00	241+00	241+00	240+00
11½ Rt	11½ Lt	11½' Rt.	℄	9' Rt.	9' Lt	11½ Rt.	11½ Rt	11½' Rt	℄
4"	7"	7"	6"±	8"	6"	4"	3¼"	6½"	3"
990	1776	1800	1883	2378	1550	968	1208	1670	1238
909	1706	1713	1787	2224	1460	890	1138	1566	1153
100	115	99	102	92	92	100	115	99	102
809	1591	1614	1685	2132	1368	790	1023	1467	1051
81	70	87	96	154	90	78	70	104	85
10.7%	4.4%	5.4%	5.7%	7.2%	6.6%	9.9%	6.8%	7.1%	8.1%
5	4	3	2	1-4	6	5	4	3	2
1255	1240	1237	1200	4-1225 1-1212	1140	1214	1216	1230	1217
877	568	532	535	2437 1485	549	869	785	599	803
378	672	705	665	952	591	345	431	631	414
70°	70°	66°	92°	92°	93°	93°	91°	90°	84°
.8743	.8747	8761	.8668	.8668	8664	.8664	.8671	8675	.8696
432	771	805	769	1100	685	399	498	730	476
1.84	2.07	2.02	2.19	1.94	2.00	1.98	2.06	2.02	2.22
	22.8	22.4				Subbase			

Base			Subbase					
8-12-58	8-12-58	8-12-58	8-11-58	8-11-58	8-11-58	8-11-58	8-11-58	8-11-58
240+00	241+00	241+00	258+50	263+00	268+00	257+00	273+00	278+00
℄	11' Rt	11' Rt	11½' Rt.	11½' Lt.	℄	11½ Lt.	11½ Lt.	11½ Rt.
6½"	3½"	7"	4"	4	4"	4"	4"	4"
1833	1179	2169	1145	1206	1164	1386	1404	1264
1707	1090	2006	1028	1137	1084	1226	1286	1167
~~92~~ 92	100	115	99	102	92	92	92	100
1615	990	1891	929	1035	994	1134	1194	1067
126	89	163	117	69	80	160	118	97
7.8%	9.0%	8.6%	12.6%	6.7%	8.0%	14.1	10.0%	9.1%
6	5	4-1	3	2	1	1	6	5
~~1211~~ 1211	1177	1227	1-1211 4-1227 2438 1586	1258	1221	1235	1221	1189	1221
490	821			788	773	794	661	682	755
687	406	852		470	448	441	560	507	466
83°	78°	79°		84°	83°	83°	77°	77°	78°
.8699	.8717	.8714		.8696	.8699	.8699	.8721	.8721	.8717
790	465	979		541	515	509	641	579	511
2.04	2.13	1.94		1.71	2.02	1.97	1.76	2.07	2.09
				See page 62			See page 62		

Subbase

8-11-58	8-11-58	8-11-58	8-9-58	8-9-58	8-8-58	8-9-58	8-9-58	8-8-58	8-8-58
284+00	290+00	252+10	243+00	258+50	259+	268+00	269+00	259+	279+00
℄	16½' Rt.	℄	℄	10' Rt.		10' Rt	℄		℄
4"	4"	4"	4"	4"	4"	4"	4"	4"	1463
1593	1333	1350	1178	1081	1110	1222	1120	1296	1040
1474	1216	1254	1096	935	1015	1123	1046	1057	
115	99	102	92	92	100	115	99	102	92
1359	1112	1152	1004	843	915	1008	947	1055	948
119	122	96	82	146	95	99	74	139	123
8.8%	11.0%	8.4	8.1	17.6%	10.2	9.8%	7.8%	13.2	13.0%
4	3	2	1	6	5	4	3	2	1
1225	1234	1205	1213	1181	1220	1241	1227	1201	1224
269	268	678	793	740	760	785	782	664	782
556	466	523	440	441	460	456	445	537	442
74°	77°	76°	85°	75°	101°	76°	72°	96°	95°
.8724	8721	8721	.8699	8728	.8636	.8721	.8740	.8654	8657
634	534	600	507	505	531	522	509	620	511
2.12	2.08	1.92	1.98	1.65	1.79	1.93	1.87	1.70	1.85
				See 258 Pag 62	See stu. 258 on Page 62				

Subbase					Base				
8-8-58	8-7-58	8-8-58	8-8-58	8-7-58	8-6-58	8-6-58	8-6-58	8-6-58	8-6-58
252+00	264+00	239+00	247+00	288+00	337+00	307+00	313+00	321+00	329+00
℄	11 Rt.	11½ Lt.	11½ Rt.	11½ Lt	11½' Lt.	11½' Lt.	11½' Rt	11½' Lt.	11½ Rt
4"	4"	4"	4"	4"	6½"	6¼"	6½"	6"	5¾"
1294	986	1280	1187	1725	2745	1627	1956	1753	1390
1201	859	1202	1106	1588	2589	1526	1834	1654	1310
92	100	115	99	102	92	102	92	92	100
1109	759	1087	1007	1486	2497	1424	1742	1562	1210
93	127	78	81	137	176	101	122	99	80
8.8%	16.8%	7.2%	8.0%	9.2	4.5%	7.1%	7.0%	6.3%	6.6%
6	5	4	3	2	1-6	2	1	6	5
1178	1222	1227	1227	1215	1180 1210 2390	1202	1237	1211	1180
685	777	762	786	494	1330	614	530	560	702
493	445	465	441	721	1060	588	707	651	478
97°	84°	92°	92°	82°	86°	85°	85°	84°	76°
.8650	8696	.8668	.8668	8703	.8689	.8692	.8692	.8696	8725
570	511	537	510	830	1221	678	812	750	547
1.80 See Page #64	1.48	2.03	1.98	1.79 See stw. 284 Page 64 Lt.	2.04 2nd Test	2.11	2.12	2.09	2.21
				1:00	1 = 486 6 = 844 1330	23.1	23.3	22.8	22.7

Base		Subbase	Base	Base
8-6-58	8-6-58	8-4-58	8-4-58	8-4-58
337+00	385+00	286+00	3 345+00	353+00
11½' Lt.	11½' Lt	11½' Rt	11½ Rt	11½ Lt
6¾"	6"	4"	7½"	6"
1710	1737	1757	1519	1752
1617	1641	1651	1436	1683
115	99	102	100	92
1502	1542	1549	1336	1591
93	96	106	83	69
6.2%	6.2%	6.8%	6.1%	4.3%
4	3	2 -3	5	6
1206	1243	1225 1207 2432 1614	1209	1189
544	608		619	519
662	635	818	588	670
87°	76°	76°	76°	72°
.8685	.8725	.8725	.8725	.8740
765	728	935	671	715
1.92	2.13	1.66	1.98	2.23
See Page 65			✓	
22.8	23.1		23.1	23.1

Subbase				Base
8-2-58	8-1-58	8-1-58	8-1-58	8-1-58
361+00	294+00	300+00	306+00	369+00
11½ Rt.	11½ Lt	11½ R	11½' L	11½' L
6"	4"	4"	4	7½"
1515	1537	1546	1355	2510
1431	1413	1435	1252	2351
92	115	99	102	91
1339	1298	1336	1150	2260
84	124	111	103	159
6.3%	9.6%	8.3%	9.0%	7.1%
1	4	3	2	1-5
1224	1197	1230	1218	5-1215 1239 2454 1498
685	619	661	715	
539	578	569	503	956
78°	82°	79°	78°	78°
.8717	.8703	.8714	.8717	.8717
618	662	652	579	1091
2.18	1.96	2.07	1.99	2.07
23.2				

Base	Subbase					Base			Base
8-1-58	7-31-58	7-31-58	7-30-58	7-30-58	7-30-58	7-30-58	7-30-58	7-30-58	7-30-58
377+00	312+00	319+00	327+00	335+00	343+00	393+00	402+00	409+00	417+00
11½' R	11½ Rt	11½ Lt	11½ Rt	11½ Lt	11½ Rt.	11½' Rt.	11½ Lt	11½ Rt.	11½ Lt.
4¾"	4"	4"	4"	4"	4"	5¼"	5"	5"	4¾"
1723	1352	1187	1213	1162	936	1616	1419	1292	1483
1628	1258	1107	1143	1082	848	1522	1334	1216	1409
92	100	115	99	102	91	92	100	115	99
1536	1158	992	1044	980	757	1430	1234	1101	1310
95	94	80	70	80	88	92	85	76	74
6.2%	8.1	8.1%	6.7%	8.2%	11.6%	6.4%	6.9%	6.9%	5.6%
6	5	4	3	2	1	6	5	4	3
1158	1204	1203	1225	1209	1224	1177	1222	1234	1240
562	699	773	795	792	880	622	702	798	710
596	505	430	430	417	344	555	520	436	530
73°	86°	86°	76°	74°	74°	67°	66°	66°	65°
.8736	.8689	.8689	.8725	.8723	.8723	.8758	.8761	.8761	.8765
681	581	495	491	478	394	629	.592	497	605
2.25	1.99	2.00	2.13	2.05	1.92	2.28	2.08	2.22	2.17
						22.4	21.5	22.6'	22'

Subbase				Base				Subbase	
7-28-58	7-28-58	7-28-58	7-28-58	7-25-58	7-25-58	7-25-58	7-25-58	7-23-58	7-23-58
369+75	352+00	360+00	368+00	425+00	433+00	441+00	449+00	376+00	384+00
11½ Lt	11½ Lt	11½ Rt	11½ Lt	11½ Rt.	11½ Lt	11½ Rt	11½ Lt.	11½ R	11½ L
4"	4"	4"	4"	4¼"	5"	5¼"	6¼"	4"	4"
1556	1414	1402	1195	1406	1594	1512	1689	1222	1070
1424	1300	1270	1080	1327	1516	1425	1598	1153	974
102	91	92	100	115	99	102	91	115	109
1322	1209	1178	980	1212	1417	1323	1507	1038	874
132	114	132	115	79	78	87	91	69	96
	9.4%	10.2%	11.7%	6.5%	5.5%	6.5%	6.0%	6.6%	11.0%
2	1	6	5	4	3	2	1	4	5
1224	1230	1189	1218	1233	1222	1213	1226	1222	1225
652	720	676	575	754	656	682	607	780	823
572	510	513	643	479	566	531	619	442	402
78°	75°	71°	69°	77°	74°	69°	68°	80°	73°
.8717	.8728	.8743	.8751	.8721	.8732	.8751	.8754	.8710	.8736
658	584	587	735	549	649	609	708	508	460
2.02	2.07	2.00	1.33%	2.22	2.18	2.18	2.22	2.04	1.90
			?						
				24'	24	23.3	23.2		

1216
755
463
530
1.85

		Subbase		Base					
7-23-58	7-17-58	7-17-58	7-17-58	7-12-58	7-12-58	7-12-58	7-12-58	7-10-58	7-10-58
392+00	400+00	408+00	424+00	462+00	486+00	470+00	478+00	551+00	555+00
11½ R	11½ Lt	11½ Lt	11½ Rt	11½' L	11½' R	11½' R	11½' L	11½' L	11½' L
4"	4"	4"	4"	6¼"	7½"	8¼"	5½"	6"	5"
1160	1762	1492	1358	2073	2210	2342	1756	1708	1368
1081	1628	1377	1205	1958	2061	2180	1641	1587	1275
92	99	102	91	102	91	102	91	102	91
989	1529	1275	1114	1856	1970	2078	1550	1485	1184
79	134	115	153	115	149	162	115	121	93
8.0%	8.8%	9.0%	13.8%	6.2%	7.4%	7.8%	7.4%	8.1%	7.8%
6	3	2	1	285	186	213	1	2	1
1173	1238	1224	1215	1221 1215 2436	1193 1223 2406	1246 1238 2484	1229	1228	1232
711	627	690	719	1642	1580	1612	568	628	751
462	611	534	496	794	826	872	661	600	481
70°	65°	64°	62°	80°	79°	72°	66°	78°	78°
8747	8765	8769	8776	.8710	.8714	.8723	.8744	.8700	.8700
529	699	610	568	910	945	1000	755	690	553
1.90	2.18	2.08	1.96	2.03	2.08	2.08	2.05	2.16	2.15

Co. Rd. "H"

Base		Subbase		Base		Subbase		Base	
7-9-58	7-9-58	7-8-58	7-8-58	7-8-58	7-7-58	7-7-58	7-7-58	7-7-58	7-7-58
555+00	555+00	416+00	424+00	529+00	541+00	452+00	456+00	549+00	555+00
11½ L	11½ L	11½ L	11½ R	11½ R	11½ L	11½ R	11½ R	11½ R	11½ L
7"	7"	4"	4"	4"	8"	4"	4"	8½"	6¾"
1877	1776	1810	1403	1602	1636	1577	1688	2340	2635
1758	1662	1671	1274	1508	1563	1475	1477	2225	2482
115	99	102	91	115	115	99	102	91	92
1643	1573	1569	1183	1393	1448	1376	1375	2134	2390
119	114	139	129	93	73	102	219	115	153
7.2%	7.2%	18.9%	10.9%	6.7%	5.0%	7.5%	15.3%	5.4%	6.4%
4	3	4	1	4	4	3	2	1	2
1217	1221	1210	1214	1233	1248	1201	1206	1183 / 1252 / 2439	1226 / 1159 / 2387
520	520	515	661	666	659	598	545	1557	1283
697	701	695	553	567	590	603	661	882	1104
85°	80°	78°	76°	72°	80°	81°	81°	79°	79°
.8674	.8692	.8700	.8708	.8723	.8692	.8689	.8689	.8696	.8696
805	808	799	672	648	680	695	762	1013	1275
2.04	1.95	1.97	1.76	2.15	2.13	1.98	1.80	2.12	1.88
	See Page 69-Rt.		See Page 69-Lt.						See 11 of Page 9 Page 69-Rt.
23.3'	24.0'			23.4'					

Co. Rd. "H"				Base	Subbase				
7-7-58	7-7-58	7-7-58	~~7-7-58~~	7-1-58	7-1-58	7-1-58	7-1-58	7-1-58	7-1-58
494+00	502+00	512+00	~~520+00~~	527+00	427+00	432+00	439+00	446+00	456+00
11½ L	11½ R	11½ L	~~11½ R~~	℄	℄	11½ R	11½ L	11½ R	11½ R
7"	5½"	6"	~~3¾"~~	7"	7"	4"	4"	4"	4"
2675	1765	2060	~~1477~~	1910	1828	2098	1659	1716	1509
2513	1663	1953		1822	1747	1988	1528	1567	1323
100	115	99		91	92	115	99	103	91
2413	1548	1854		1731	1655	1873	1429	1464	1232
162	102	107		88	81	110	131	149	176
6.7	6.6	5.8		5.1%	4.9%	5.8%	9.3%	9.9%	14.3%
5-6	4	3	2	1	6	485	3	2	1
1159-6 / 1229-5 / 2380	1230	1224	~~1254~~	1189	1201	2506	1208	1197	1202
1387	613	496		508	513	1695	607	547	614
993	617	728		681	688	811	601	650	588
76°	76°	74°	~~66°~~	83°	83°	78°	77	76°	75°
8708	8708	8715		8681	8681	8700	8704	8708	8712
1140	708	832		785	791	935	689	746	667
2.12	2.20	2.22		2.21	2.09	2.00	2.08	1.98	1.85

Base Co. Rd. "H"				Sub base					
6-28-58	6-28-58	6-28-58	6-28-58	6-26-58	6-26-58	6-26-58	6-26-58	6-26-58	6-23-58
532+00	540+00	548+00	555+00	452+00	458+00	462+00	468+00	474+00	468+00
11' Lt.	℄	11' Rt.	11' Lt	11½ Lt	11½' Rt	℄	11½ L	11' R	11½ L
6"	5¼"	6½"	7"	4"	4"	4"	4"	4"	4"
2170	1495	1641	2134	1850	1583	1358	1492	1464	1177
2075	1417	1549	2015	1731	1393	1273	1353	1317	1062
115	99	103	91	115	99	102	90	92	105
1965	1318	1446	1924	1616	1294	1171	1263	1225	957
95	78	82	119	119	130	85	139	147	115
4.8%	5.9%	6.3	6.2%	7.4%	14.7%	7.5	11.0%	12.0%	10.8%
4.5	3	2	1 & 6	4	3	2	1	6	5
2488	1208	1220	2378	1204	1170	1228	1226	1177	1214
1661	609	639	1462	556	549	720	658	635	759
821	599	581	916	648	621	508	568	562	455
85°	83°	77°	69°	76°	75°	75°	74°	73°	73°
2068	8681	8704	8733	8708	8712	8712	8715	8719	8717
950	691	662	1024	741	712	591	649	645	520
2.96	1.89	2.17	1.92	2.17	1.82	2.02	1.96	1.90	1.84
	See Page 70		See Page 70 & Page 69-81.						

Same place

Rock
June 20 = 1
10.6%

Co. Rd. "H" Subbase

6-23-58	6-20-58	6-20-58	6-20-58	6-18-58
474+00	480+00	510+00	516+00	498+00
11½ R	℄	11½ L	℄	℄
4"	4"	4"	4"	4"
1248	1462	1124	1402	1151
1124	1366	1002	1288	1076
105	99	102	90	90
1009	1267	900	1198	986
124	96	122	114	75
12.3%	7.6%	13.6	9.6	7.6%
4	3	2	1	1
1221	1235	1235	1238	1290
737	670	826	721	840
484	565	409	517	450
73	67	63°	62°	82°
.8719	.8741	8755	8760	.8685
553	648	467	589	520
1.82	1.96	1.93	2.03	1.90

See Right Side of Page 72

Rock
June 19 9.6%

6-18-58	6-18-58	6-18-58	6-18-58
492+00	486+00	510+25	510+00
11½ L	11½ R	11½ L	11½ L
4"	4"	4"	4"
1167	1321	1332	1138
1086	1177	1160	987
109	115	99	102
977	1062	1061	885
81	144	172	151
8.3%	13.5%	15.2%	17.0%
5	4	3	2
1267	1276	1264	1289
851	773	742	847
416	503	522	442
82°	86°	73°	70°
8685	.8670	.8719	.8738
480	581	600	508
2.03	1.83	1.76	1.75

See left of page

Rock
1697
1535
162

June 18 Rock 12.6%

Co. Rd. "H" Subbase ✓

6/18/58	6-17-58	6-17-58	6-17-58	6-17-58
516+00	504+00	510+00	516+00	522+00
℄	11½ R	11½ L	℄	11½ R
4"	4"	4"	4"	4"
.1181	1116	1046	1293	1251
1059	1006	937	1201	1134
90	92	100	105	99
969	914	837	1086	1035
122	110	109	92	117
12.6%	11.0%	13.0%	7.7%	10.7
1	6	5	4	3
1269	1223	1264	1249	1267
805	808	859	701	817
464	415	405	548	450
68°	66°	64°	64°	66°
.8737	8745	.8752	.8752	.8745
530	474	462	669	513
1.84	1.92	1.81	1.63	2.01

See Left Side of Page 73

← See Left Side Page #73

Co. Rd. "H"

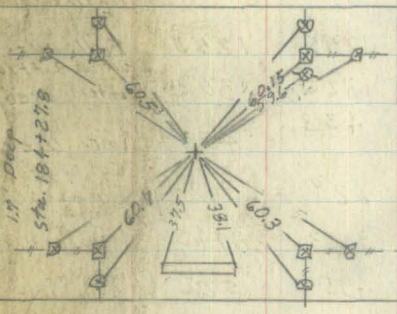
6-17-58	6-17-58	6-14-58	6-14-58	June 12 58	Date
528+00	534+00	540+00	546+00	552+00	Sta.
11½ L	℄	11½ R	11½ L	℄	Distance From ℄
4"	4"	4"	4"	4"	
1322	1272	1120	1238	1285	Depth
1203	1153	1048	1156	1163	Wet. Wt. Pan of Sample
102	90	99	102	115	Dry wt. Pan & Sample
1101	1063	949	1054	1048	Wt. Pan
119	119	72	82	122	Dry wt.
10.7%	11.2%	7.6%	5.7%	11.1%	Loss % Moist
2	1	3	2	4	Oil Bottle No.
1268	1262	1244	1255	1259	Full wt.
781	759	837	822	802	wt. of Bot. after used
487	503	407	433	457	wt. used
62°	62°	72°	62°	66°	Temp.
.8763	.8763	.8728	.8763	.8745	Cor.
545	578	466	495	522	Cor.
2.04	1.84	2.03	2.13	2.00	

95% of Proct.

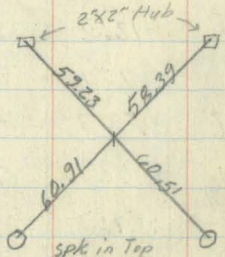
66.80 96.4

N.E. Cor. 21-87-13
Sta. 345+54.5

N.E. Cor. 24-87-14
1.1' Deep
Sta. 184+27.8

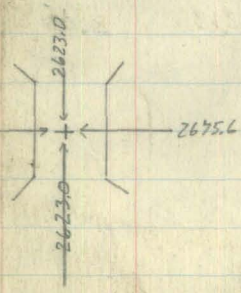


2"x2" Hub

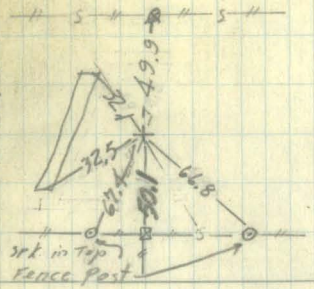


Spk. in Top
Cor. Post

N¼ Cor. 27-87-14
Sta. 157+52.2

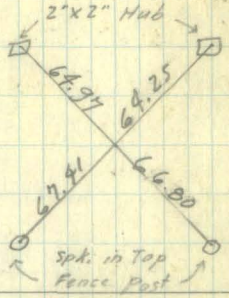


N¼ Cor. 21-87-13
Sta. 319+26.2

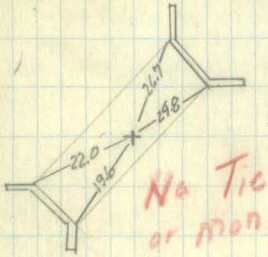


42.8 R.S.

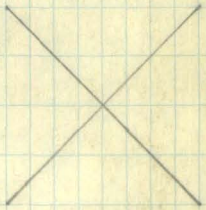
2"x2" Hub



N.E. Cor. 20-87-13
Sta. 292+98.5

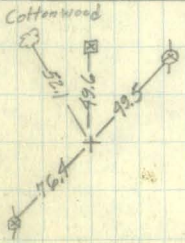


No Ties
or Mon.



N.¼ Cor. 20-87-13
Sta. 266+39.9

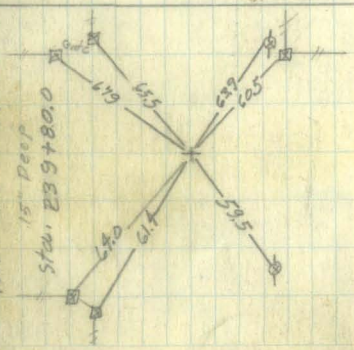
Cottonwood



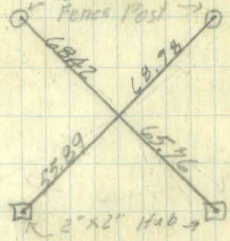
2"x2" Hub

Spk. in Top
Fence Post

N.E. Cor. 19-87-13
1.5' Deep
Sta. 239+80.0



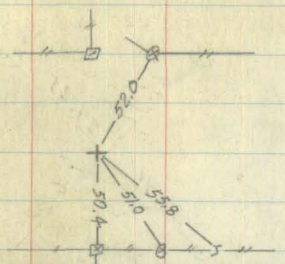
Spk. in Top
Fence Post



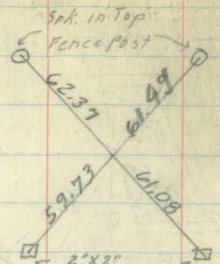
2"x2" Hub

Co. Road "A"

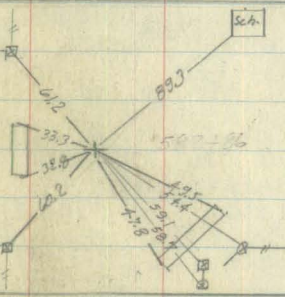
N. 1/4 Cor 19-84-13
Sta. 213+40.9

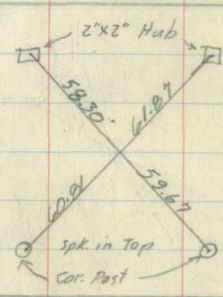


See Page 75 for Sec. 24-84-14

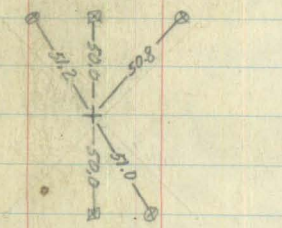


N.E. Cor 23-84-14
Sta. 131+06.1

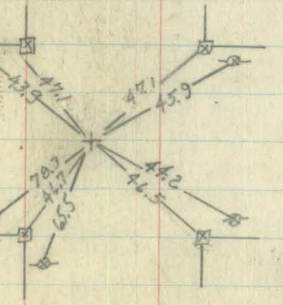


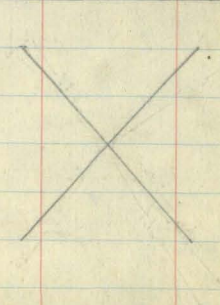


N 1/4 Cor 23-84-14
Sta 105+41.4



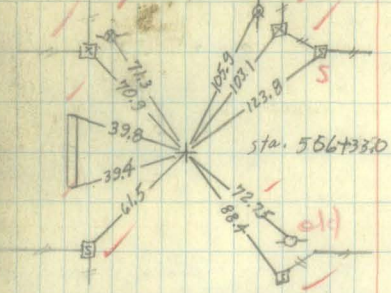
N.E. Cor. 22-84-14
Sta. 79+11.1

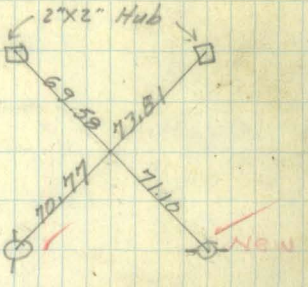




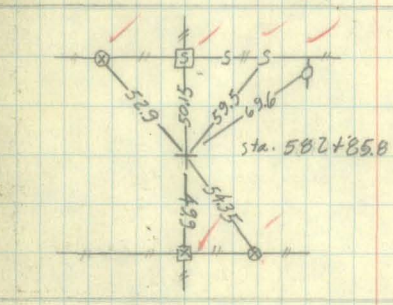
Co. Road "H"

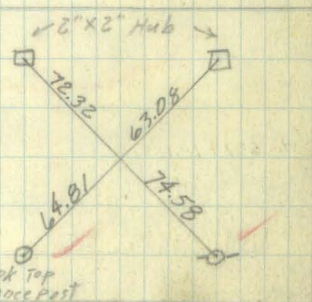
N.E. Cor. 35-90-12



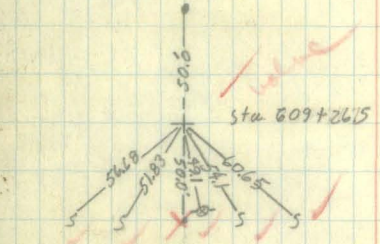


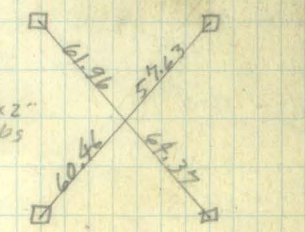
N 1/4 36-90-12



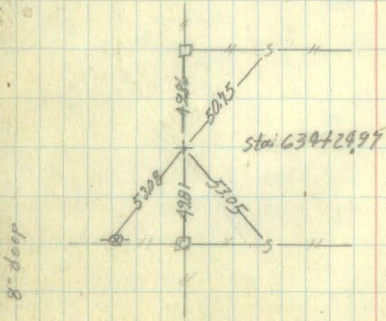


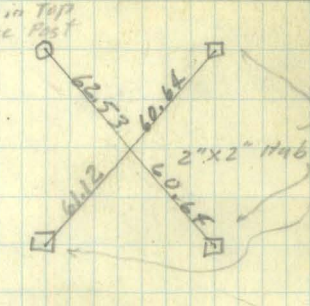
N.E. Cor. 36-90-12



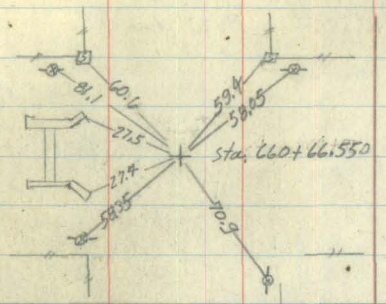


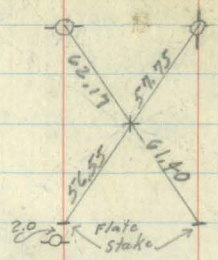
N 1/4 Cor. 31-90-11
8" deep



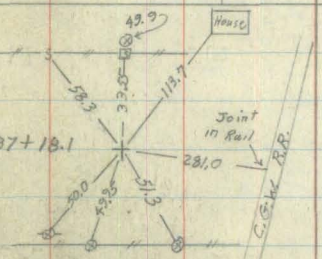


N.E. Cor. 31-90-11

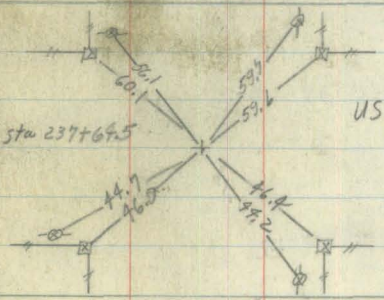




N 1/4 Cor. 32-90-11

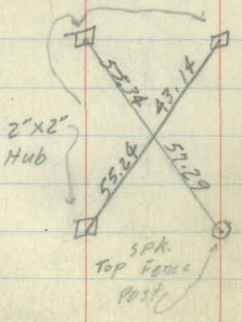


N.E. Cor. 35-90-13

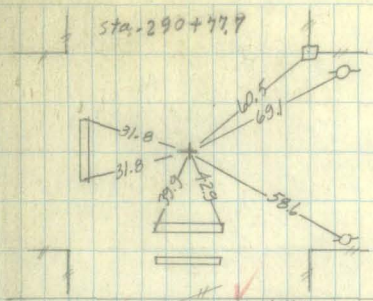


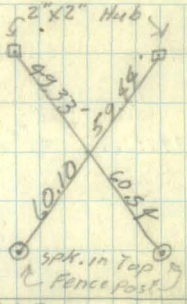
US. #63

N 1/4 Cor. 36-90-13

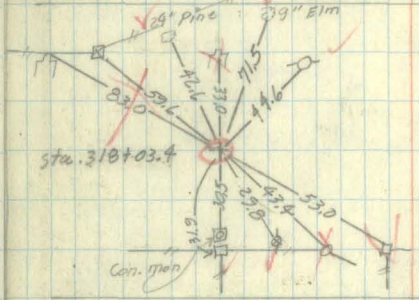


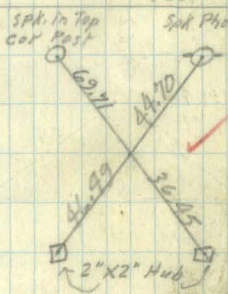
sta. 290+77.7



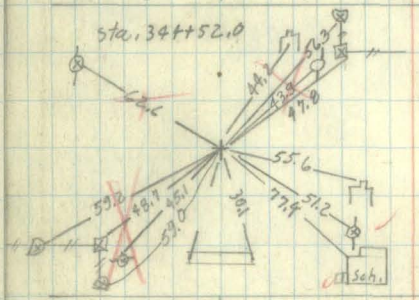


N.E. Cor. 36-90-13

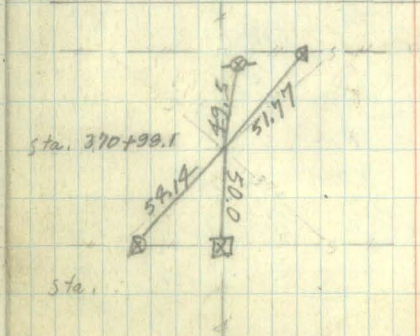




N. 1/4 Cor. 31-90-12

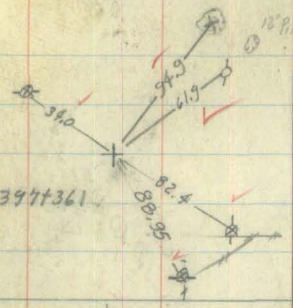


N.E. Cor. 31-90-12

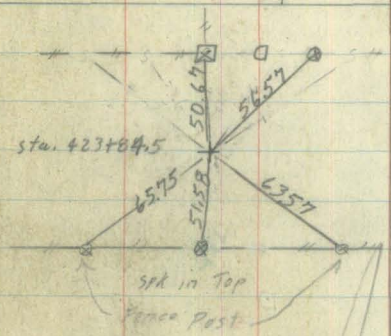


N. 1/4 Cor. 32-90-12

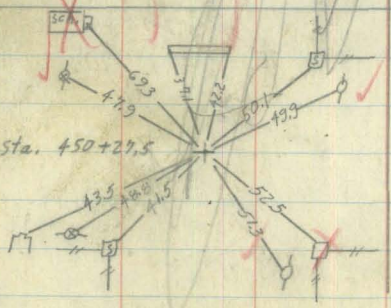
N.E. Cor. 32-90-12

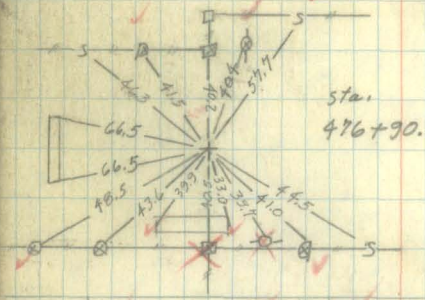


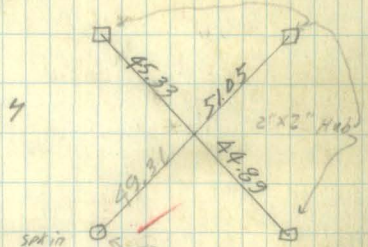
N.¼ Cor. 33-90-12

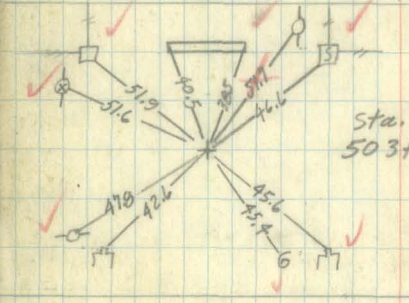


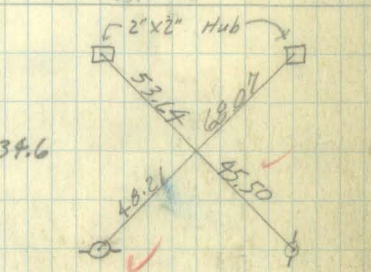
N.E. Cor. 33-90-12

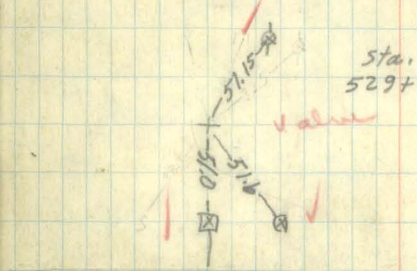


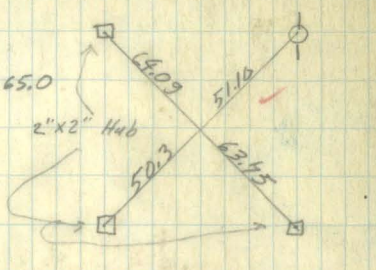


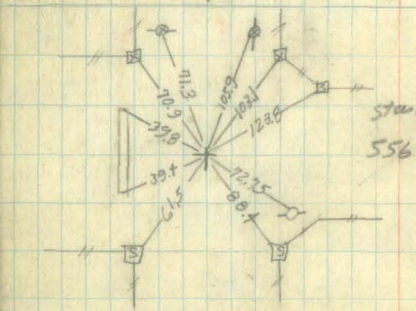


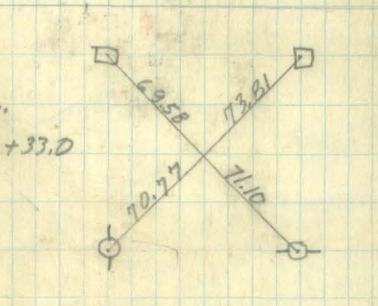












N.¼ Cor. 34-90-12

N.E. Cor. 34-90-12

N.¼ Cor. 35-90-12

N.E. Cor. 35-90-12

IMPROVED TABLES AND INFORMATION

HORIZONTAL STADIA CORRECTIONS

2°—00′	—	0.1	21°—00′	—	12.8	33°—00′	—	29.7
3°—00′	—	0.3	21°—30′	—	13.4	33°—15′	—	30.1
4°—00′	—	0.5	22°—00′	—	14.0	33°—30′	—	30.5
5°—00′	—	0.8	22°—30′	—	14.7	33°—45′	—	30.9
6°—00′	—	1.1	23°—00′	—	15.3	34°—00′	—	31.3
7°—00′	—	1.5	23°—30′	—	15.9	34°—15′	—	31.7
8°—00′	—	1.9	24°—00′	—	16.5	34°—30′	—	32.1
9°—00′	—	2.5	24°—30′	—	17.2	34°—45′	—	32.5
10°—00′	—	3.0	25°—00′	—	17.9	35°—00′	—	32.9
10°—30′	—	3.3	25°—30′	—	18.6	35°—15′	—	33.3
11°—00′	—	3.6	26°—00′	—	19.2	35°—30′	—	33.7
11°—30′	—	4.0	26°—30′	—	19.9	35°—45′	—	34.1
12°—00′	—	4.3	27°—00′	—	20.6	36°—00′	—	34.6
12°—30′	—	4.7	27°—30′	—	21.3	36°—15′	—	35.0
13°—00′	—	5.1	28°—00′	—	22.0	36°—30′	—	35.4
13°—30′	—	5.5	28°—30′	—	22.8	36°—45′	—	35.8
14°—00′	—	5.9	29°—00′	—	23.5	37°—00′	—	36.2
14°—30′	—	6.3	29°—30′	—	24.3	37°—15′	—	36.6
15°—00′	—	6.7	30°—00′	—	25.0	37°—30′	—	37.1
15°—30′	—	7.2	30°—15′	—	25.4	37°—45′	—	37.5
16°—00′	—	7.6	30°—30′	—	25.8	38°—00′	—	37.9
16°—30′	—	8.1	30°—45′	—	26.2	38°—15′	—	38.3
17°—00′	—	8.5	31°—00′	—	26.5	38°—30′	—	38.7
17°—30′	—	9.0	31°—15′	—	26.9	38°—45′	—	39.1
18°—00′	—	9.5	31°—30′	—	27.3	39°—00′	—	39.6
18°—30′	—	10.1	31°—45′	—	27.7	39°—15′	—	40.0
19°—00′	—	10.6	32°—00′	—	28.1	39°—30′	—	40.5
19°—30′	—	11.2	32°—15′	—	28.5			
20°—00′	—	11.7	32°—30′	—	28.9			
20°—30′	—	12.3	32°—45′	—	29.3			

Chains to Feet	
1	66
2	132
3	198
4	264
5	330
6	396
7	462
8	528
9	594
10	660

Feet to Chains	
100	1.515
200	3.030
300	4.545
400	6.060
500	7.575
600	9.090
700	10.606
800	12.121
900	13.636
1,000	15.151

DIRECTIONS FOR USE OF TABLES

TABLE No. 1.

Distance of slope stake from side or shoulder stake for any width roadway, slope 1½ to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

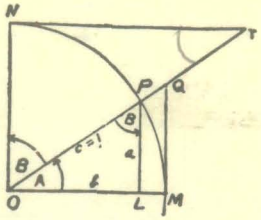
TABLE No. 9.

To find Tangent and External for curve of any other degree, divide by degree of curve and add correction found in column of corrections.

Degree of curve with a given I may be found by dividing tangent, (or external), opposite I by given tangent, (or external).

The distance from a point on the tangent to the curve is very nearly the square of the tangent lenth divided by twice the radius.

211
692) 1353
1264
690
642
480
211
730) 11550
1460
900
730
70



992
493
1485

TABLE II
TRIGONOMETRIC FORMULÆ.

$\angle A = \angle MOP \qquad \angle B = \angle PON = \angle OPL$

$R = OP = c = 1$

2135
621) 1326
1242
840
621
219
1883
3270
3255

$$\sin A = \frac{a}{c} = \frac{a}{1} = a = \cos B = LP$$

$$\cos A = \frac{b}{c} = \frac{b}{1} = b = \sin B = OL$$

$$\tan A = \frac{a}{b} = \frac{MQ}{OM} = \frac{MQ}{1} = MQ = \cot B = MQ$$

$$\cot A = \frac{NT}{ON} = \frac{NT}{1} = NT = \tan B = NT$$

$$\sec A = \frac{OQ}{OM} = \frac{OQ}{1} = OQ = \csc B = OQ$$

$$\csc A = \frac{OT}{ON} = \frac{OT}{1} = OT = \sec B = OT$$

$$\text{vers } A = \frac{LM}{OP} = LM = \text{covers } B \ \#$$

$$\text{covers } A = \frac{OP - LP}{OP} = OP - LP = \text{vers } B$$

$$\text{exsec } A = PQ = \text{coexsec } B$$
$$\text{coexsec } A = PT = \text{exsec } B$$

$$\sin \tfrac{1}{2} A = \sqrt{\frac{1 - \text{Cos } A}{2}} \qquad \cos \tfrac{1}{2} A = \sqrt{\frac{1 + \text{Cos } A}{2}}$$

$$\sin 2A = 2 \sin A \cos A \qquad \cos 2A = \cos^2 A - \sin^2 A$$

Law of Sines $\quad \dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

Law of Cosines $\quad c^2 = a^2 + b^2 - 2\,ab \cos C$

Law of Tangents $\quad \dfrac{a+b}{a-b} = \dfrac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$

Table II—Continued

TRIGONOMETRIC FORMULAE (continued)

In any triangle:

Given a, b, C; to find c, B, A.

Use Law of Sines.

Given A, B, c; to find a, b, C.

Use Law of Sines.

Given a, b, c; to find A, B, C.

$$\text{Let } \frac{a+b+c}{2} = s, \sqrt{\frac{(s-a)\ (s-b)\ (s-c)}{s}} = r$$

$$\cos \tfrac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \tfrac{1}{2} A = \frac{r}{s-a}$$

$$\tan \tfrac{1}{2} B = \frac{r}{s-b}$$

$$\tan \tfrac{1}{2} C = \frac{r}{s-c}$$

Area of a triangle:

$$\text{Area} = \tfrac{1}{2}\, ab \sin C$$

$$\text{Area} = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$$

PRISMOIDAL FORMULA.

$$\text{Vol.} = \frac{h}{6}\,(B+b+4M)$$

h = altitude; b, B = bases; M = midsection

Table III

INCHES AND FRACTIONS OF AN INCH IN DECIMALS OF A FOOT

	0	1	2	3	4	5	6	7	8	9	10	11	
1/16	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	1/16
1/8	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	1/8
3/16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	3/16
1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375	1/4
5/16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	5/16
3/8	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	3/8
7/16	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	7/16
1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	1/2
9/16	.0469	.1302	.2135	.2969	.3803	.4635	.5469	.6302	.7135	.7969	.8802	.9635	9/16
5/8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	5/8
11/16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	11/16
3/4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	3/4
13/16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	13/16
7/8	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896	7/8
15/16	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	15/16
1	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.000	1
	0	1	2	3	4	5	6	7	8	9	10	11	

Table IV

USEFUL RELATIONS.

Lineal feet	×.00019	= miles
Lineal yards	×.0006	= miles
Square inches	×.007	= square feet .0069 4/9
Square feet	×.111	= square yards
Square yards	×.0002067	= acres
Acres	×4840	= square yards
Cubic inches	×.00058	= cubic feet
Cubic feet	×.03704	= cubic yards
Links	×.22	= yards
Links	×.66	= feet
Feet	×1.5	= links

144
.00058
1152
720
.08352
144
12
288
144
1728
.00058
13824
8640
.99224

$360° = 21600' = 1296000''$

Radius = arc of 57.2957790°

Arc of 1° (radius = 1) = .017453292

Arc of 1′ (radius = 1) = .000290888

Arc of 1″ (radius = 1) = .000004848

$\pi = 3.141592654$ $\qquad \sqrt{\frac{1}{\pi}} = 0.564190$

$\frac{\pi}{4} = 0.785398163$ $\qquad \sqrt[3]{\frac{6}{\pi}} = 1.240700982$

$\frac{\pi}{6} = 0.523598776$ $\qquad \pi^2 = 9.869604401$

$\sqrt{\frac{4}{\pi}} = 1.128379167$ $\qquad \frac{1}{\pi^2} = 0.101321184$

$\frac{\pi}{6} = 0.523598776$ $\qquad \sqrt{\pi} = 1.772453851$

$\frac{4.\pi}{3} = 4.188790205$ $\qquad \frac{1}{\pi} = 0.3183099$

Curvature of Earth's surface = about 0.7 feet in 1 mile

Curvature in feet = 0.667 (Dist. in miles)²

Difference between arc and chord length, 0.05 feet in 11½ miles

$$\text{Probable error of a single observation} = 0.6754\sqrt{\frac{M\,v^2}{n-1}}$$

Error in chaining of 0.01 feet in 100 feet:

Due to—

1. Length of tape error of 0.01 feet
2. Alignment. One end 1.4 feet out of line
3. Sag of tape at centre of 0.61 feet.
4. Temperature difference of 15°
5. Difference of pull of 15 lbs.

STADIA REDUCTION FORMULÆ.

Horizontal Distance = R — R sin² a + C cos a

Vertical Distance = R ½ sin 2 a + C sin a

$$R = \text{Reading} \times \frac{\text{distance from Object glass to cross hairs}}{\text{distance between cross hairs}}$$

C = distance from Object glass to cross hairs + distance from Object glass to center of instrument.

a = angle of elevation for mid Reading

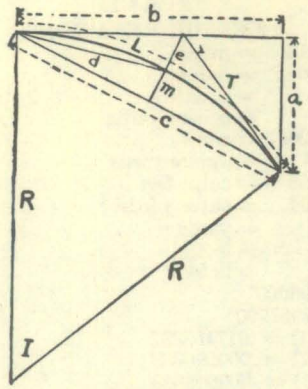


Table V

CURVE FORMULAE FOR SIMPLE CURVES

Compiled by J. Calvin Locke, C.E.

(1) $c = \sqrt{2Ra}$ (2) $c = \sqrt{a^2+b^2}$

(3) $c = \sqrt{2R\,(R-\sqrt{(R+b)\,(R-b)}} = \sqrt{2R(R-\sqrt{R^2-b^2})}$

(4) $c = 2\sqrt{m\,(2R-m)}$

(5) $c = 2R \sin \frac{1}{2} I$ (6) $c = 2T \cos \frac{1}{2} I$

(7) $e = R \operatorname{exsec} \frac{1}{2} I$

(8) $e = R \tan \frac{1}{2} I \tan \frac{1}{4} I$ (9) $e = T \tan \frac{1}{4} I$

(10) $b = \sqrt{a\,(2R-a)}$

(11) $b = \sqrt{\left(c+\frac{c^2}{2R}\right)\left(c-\frac{c^2}{2R}\right)} = \sqrt{c^2-\frac{c^4}{4R^2}}$

(12) $b = R \sin I$ (13) $b = a \cot \frac{1}{2} I$

(14) $R = \frac{a^2+b^2}{2a} = \frac{c^2}{2a}$ (15) $R = \frac{d^2}{2m} = \frac{c^2+4m^2}{8m}$

(16) $d = \sqrt{R\,(2R-\sqrt{(2R+c)\,(2R-c)}} = \sqrt{R(2R-\sqrt{4R^2-c^2})}$

(17) $d = \sqrt{2Rm}$ (18) $d = 2R \sin \frac{1}{4} I$ (19) $m = \frac{d^2}{2R}$

(20) $m = R \mp \sqrt{\left(R+\frac{c}{2}\right)\left(R-\frac{c}{2}\right)} = R \mp \sqrt{R^2-\frac{c^2}{4}}$

(21) $m = R \operatorname{vers} \frac{1}{2} I$ (22) $m = R \sin \frac{1}{2} I \tan \frac{1}{4} I$ (23) $m = \frac{1}{2} c \tan \frac{1}{4} I$

(24) $a = \frac{c^2}{2R}$ (25) $a = R - \sqrt{(R+b)\,(R-b)} = R - \sqrt{R^2-b^2}$

(26) $a = 2\,R\,(\sin^2 \frac{1}{2} I)^2$ (27) $a = R \operatorname{vers} I$ (28) $a = R \sin I \tan \frac{1}{2}$

(29) $a = b \tan \frac{1}{2} I$ (30) $a = T \sin I$ (31) $T = R \tan \frac{1}{2} I$

(32) $I = \frac{L}{R} \times 57.295780$ (33) $R = \frac{L}{I} \times 57.295780$

(34) $L = IR \times 0.01745329$ (35) $L = \frac{8d-c}{3}$

(36) Area Seg. $= \frac{I.R - R^2 \operatorname{Sin} I}{2} = \frac{LR - Rb}{2}$

Table VI

SINES, COSINES, TANGENTS, COTANGENTS

deg.	sin 0′	tan 0′	sin 10′	tan 10′	sin 20′	tan 20′	sin 30′	tan 30′	sin 40′	tan 40′	sin 50′	tan 50′	deg.
0	0000	0000	0029	0029	0058	0058	0087	0087	0116	0116	0145	0145	89
1	175	0175	0204	0204	0233	0233	0262	262	291	291	320	320	88
2	349	349	378	378	407	407	436	437	465	466	494	495	87
3	523	524	552	553	581	582	610	612	640	641	669	670	86
4	698	699	727	729	756	758	785	787	814	816	843	846	85
5	872	875	901	904	929	934	958	963	987	992	1016	1022	84
6	1045	1051	1074	1080	1103	1110	1132	1139	1161	1169	190	198	83
7	219	228	248	257	279	287	305	317	334	346	363	376	82
8	392	405	421	435	449	465	478	495	507	524	536	554	81
9	564	584	593	614	622	644	650	673	679	703	708	733	80
10	736	763	765	793	794	823	822	853	851	883	880	914	79
11	908	944	937	974	965	2004	994	2035	2022	2065	2051	2095	78
12	2079	2126	2108	2156	2136	186	2164	217	193	247	221	278	77
13	250	309	278	339	306	370	334	401	363	432	391	462	76
14	419	493	447	524	476	555	504	586	532	617	560	648	75
15	588	679	616	711	644	742	672	773	700	805	728	836	74
16	756	867	784	899	812	931	840	962	868	994	896	3026	73
17	924	3057	952	3089	939	3121	3007	3153	3035	3185	3062	217	72
18	3090	249	3118	281	3145	314	173	346	201	378	228	411	71
19	256	443	283	476	311	508	338	541	365	574	393	607	70
20	420	640	448	673	475	706	502	739	529	772	557	805	69
21	584	839	611	872	638	906	665	939	692	973	719	4006	68
22	746	4040	773	4074	800	4108	827	4142	854	4176	881	210	67
23	907	245	934	279	961	314	987	348	4014	383	4041	417	66
24	4067	452	4094	487	4120	522	4147	557	173	592	200	628	65
25	226	663	253	699	279	734	305	770	331	806	358	841	64
26	384	877	410	913	436	950	4462	986	488	5022	514	5059	63
27	540	5095	566	5132	592	5169	617	5206	643	243	669	280	62
28	695	317	720	354	746	392	772	430	797	467	823	505	61
29	848	543	874	581	899	619	924	658	950	696	975	735	60
30	5000	774	5025	5812	5050	851	5075	890	5100	930	5125	969	59
31	150	6009	175	6048	200	6088	225	6128	250	6168	275	6208	58
32	299	249	324	289	348	330	5373	371	398	412	422	453	57
33	446	494	471	536	495	577	519	619	544	661	568	703	56
34	592	745	616	787	640	830	664	873	688	916	712	959	55
35	736	7002	760	7046	783	7089	807	7133	831	7177	854	7221	54
36	878	265	901	310	925	355	948	400	972	445	995	490	53
37	6018	536	6041	581	6065	627	6088	673	6111	720	6134	766	52
38	157	813	180	860	202	907	225	954	248	8002	271	8050	51
39	293	8098	316	8146	338	8195	361	8243	383	292	406	342	50
40	428	391	450	441	472	491	494	541	517	591	539	642	49
41	561	693	583	744	604	796	626	847	648	899	670	952	48
42	691	9004	713	9057	734	9110	756	9163	777	9217	799	9271	47
43	820	325	841	380	862	435	884	490	905	545	926	601	46
44	947	657	967	713	988	770	7009	827	7030	884	7050	942	45
45	7071	1.0000	7092	1.0058	7112	1.0117	133	1.0176	153	1.0235	173	1.0295	44
deg.	60′ cos	60′ cot	50′ cos	50′ cot	40′ cos	40′ cot	30′ cos	30′ cot	20′ cos	20 cot	10′ cos	10′ cot	deg.

Table VI (continued)
SINES, COSINES, TANGENTS, COTANGENTS (continued)

deg.	sin 0′	tan 0′	sin 10′	tan 10′	sin 20′	tan 20′	sin 30′	tan 30′	sin 40′	tan 40′	sin 50′	tan 50′	deg.
46	7193	1.0355	7214	1.0416	7234	1.0477	7254	1.0533	7274	1.0599	7294	1.0661	43
47	314	.0724	333	.0786	353	.0850	373	.0913	392	.0977	412	.1041	42
48	431	.1106	451	.1171	470	.1237	490	.1303	509	.1369	528	.1436	41
49	547	.1504	566	.1571	585	.1640	604	.1708	623	.1778	642	.1847	40
50	660	1.1918	7679	1.1988	7698	1.2059	7716	1.2131	7735	1.2203	7753	1.2276	39
51	771	.2349	790	.2423	808	.2497	826	.2572	844	.2647	862	.2723	38
52	880	.2799	898	.2876	916	.2954	934	.3032	951	.3111	969	.3190	37
53	986	.3270	8004	.3351	8021	.3452	8039	.3514	8056	.3597	8073	.3680	36
54	8090	.3764	107	.3848	124	.3934	141	.4019	158	.4106	175	.4193	35
55	192	.4281	208	.4370	225	.4460	241	.4550	258	.4641	274	.4733	34
56	290	.4826	307	.4919	323	.5013	339	.5108	355	.5204	371	.5301	33
57	387	.5399	403	.5497	418	.5597	434	.5697	450	.5798	465	.5900	32
58	480	.6003	496	.6107	511	.6212	526	.6319	542	.6426	557	.6534	31
59	572	.6643	587	.6753	601	.6864	616	.6977	631	.7090	646	.7205	30
60	660	1.7321	8675	1.7437	8689	1.7556	8704	1.7675	8718	1.7797	8732	1.7917	29
61	746	.8040	760	.8165	774	.8291	788	.8418	802	.8546	816	.8676	28
62	829	.8807	843	.8940	857	.9074	870	.9210	884	.9347	897	.9486	27
63	910	.9626	923	.9768	936	.9912	949	2.0057	962	2.0204	975	2.0353	26
64	988	2.0503	9001	2.0655	9013	2.0809	9026	.0965	9038	.1123	9051	.1283	25
65	9063	.1445	075	.1609	088	.1775	100	.1943	112	.2113	124	.2286	24
66	135	.2460	147	.2637	159	.2817	171	.2998	182	.3183	194	.3369	23
67	205	.3559	216	.3750	228	.3945	239	.4142	250	.4342	261	.4545	22
68	272	.4751	283	.4960	293	.5172	304	.5386	315	.5605	325	.5826	21
69	336	.6051	346	.6279	356	.6511	367	.6746	377	.6985	387	.7228	20
70	397	2.7475	9407	2.7725	9417	2.7980	9426	2.8239	9436	2.8502	9446	2.8770	19
71	455	.9042	465	.9319	474	.9600	483	.9887	492	3.0178	502	3.0475	18
72	511	3.0777	520	3.1084	528	3.1397	537	3.1716	546	.2041	555	.2371	17
73	563	.2709	572	.3052	580	.3402	588	.3759	596	.4124	605	.4495	16
74	613	.4874	621	.5261	628	.5656	636	.6059	644	.6470	652	.6891	15
75	659	.7321	667	.7760	674	.8208	681	.8657	689	.9136	696	.9617	14
76	703	4.0108	710	4.0611	717	4.1126	724	4.1653	730	4.2193	737	4.2747	13
77	744	.3315	750	.3897	757	.4494	763	.5107	769	.5736	775	.6382	12
78	781	.7046	787	.7729	793	.8430	799	.9152	805	.9894	811	5.0658	11
79	816	.1446	822	5.2257	827	5.3093	833	5.3955	838	5.4845	843	.5764	10
80	9848	5.6713	9853	5.7694	9858	5.8708	9863	5.9758	9868	6.0844	9872	6.1970	9
81	877	6.3138	881	6 4348	886	6.5606	890	6.6912	894	.8269	899	.9682	8
82	903	7.1154	907	7.2687	911	7.4287	914	7.5958	918	7.7704	922	7.9530	7
83	925	8.1443	929	8.3450	932	8.5555	936	8.7769	939	9.0098	942	9.2553	6
84	945	9.5144	948	9.7882	951	10.078	954	10.385	957	10.711	959	11.059	5
85	962	11.430	964	11.826	967	12.250	969	12.706	971	13.197	974	13.727	4
86	976	14.300	978	14.924	980	15.605	981	16.350	983	17.169	985	18.075	3
87	986	19.081	988	20.206	989	21.470	990	22.903	992	24.542	993	26.432	2
88	994	28.636	9995	31.242	9996	34.368	997	38.189	997	42 964	9998	49.104	1
89	9998	57.290	9999	68.750	9999	85.940	9999	114.58	1.000	171.88	1.000	343.77	0
deg.	60′ cos	60′ cot	50′ cos	50′ cot	40′ cos	40′ cot	30′ cos	30′ cot	20′ cos	20′ cot	10′ cos	10′ cot	deg.

TABLE VII
RODS IN FEET, 10THS AND 100THS OF FEET

Rods	Feet	Rods	Feet	Rods	Feet	Rods	Feet	Rods	Feet
1	16.50	21	346.50	41	676.50	61	1006.50	81	1336.50
2	33.00	22	363.00	42	693.00	62	1023.00	82	1353.00
3	49.50	23	379.50	43	709.50	63	1039.50	83	1369.50
4	66.00	24	396.00	44	726.00	64	1056.00	84	1386.00
5	82.50	25	412.50	45	742.50	65	1072.50	85	1402.50
6	99.00	26	429.00	46	759.00	66	1089.00	86	1419.00
7	115.50	27	445.50	47	775.50	67	1105.50	87	1435.50
8	132.00	28	462.00	48	792.00	68	1122.00	88	1452.00
9	148.50	29	478.50	49	808.50	69	1138.50	89	1468.50
10	165.00	30	495.00	50	825.00	70	1155.00	90	1485.00
11	181.50	31	511.50	51	841.50	71	1171.50	91	1501.50
12	198.00	32	528.00	52	858.00	72	1188.00	92	1518.00
13	214.50	33	544.50	53	874.50	73	1204.50	93	1534.50
14	231.00	34	561.00	54	891.00	74	1221.00	94	1551.00
15	247.50	35	577.50	55	907.50	75	1237.50	95	1567.50
16	264.00	36	594.00	56	924.00	76	1254.00	96	1584.00
17	280.50	37	610.50	57	940.50	77	1270.50	97	1600.50
18	297.00	38	627.00	58	957.00	78	1287.00	98	1617.00
19	313.50	39	643.50	59	973.50	79	1303.50	99	1633.50
20	330.00	40	660.00	60	990.00	80	1320.00	100	1650.00

TABLE VIII
LINKS IN FEET, 10THS AND 100THS OF FEET

Links	Feet	Links	Feet	Links	Feet	Links	Feet	Links	Feet	Links	Feet
1	0.66	18	11.88	35	23.10	52	34.32	69	45.54	86	56.76
2	1.32	19	12.54	36	23.76	53	34.98	70	46.20	87	57.42
3	1.98	20	13.20	37	24.42	54	35.64	71	46.86	88	58.08
4	2.64	21	13.86	38	25.08	55	36.30	72	47.52	89	58.74
5	3.30	22	14.52	39	25.74	56	36.96	73	48.18	90	59.40
6	3.96	23	15.18	40	26.40	57	37.62	74	48.84	91	60.06
7	4.62	24	15.84	41	27.06	58	38.28	75	49.50	92	60.72
8	5.28	25	16.50	42	27.72	59	38.94	76	50.16	93	61.38
9	5.94	26	17.16	43	28.38	60	39.60	77	50.82	94	62.04
10	6.60	27	17.82	44	29.04	61	40.26	78	51.48	95	62.70
11	7.26	28	18.48	45	29.70	62	40.92	79	52.14	96	63.36
12	7.92	29	19.14	46	30.36	63	41.58	80	52.80	97	64.02
13	8.58	30	19.80	47	31.02	64	42.24	81	53.46	98	64.68
14	9.24	31	20.46	48	31.68	65	42.90	82	54.12	99	65.34
15	9.90	32	21.12	49	32.34	66	43.56	83	54.78	100	66.00
16	10.56	33	21.78	50	33.00	67	44.22	84	55.44	101	66.66
17	11.22	34	22.44	51	33.66	68	44.88	85	56.10	102	67.32

Table IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=10°	I	T	E	I=20°	I	T	E	I=30°
1°	50.00	.218	+	11°	551.70	26.500	+	21°	1061.9	97.577	+
10′	58.34	.297	5° C.	10′	560.11	27.313	5° C	10′	1070.6	99.155	5° C
20′	66.67	.388	T	20′	568.53	28.137	T	20′	1079.2	100.75	T
30′	75.01	.491	.03	30′	576.95	28.974	.06	30′	1087.8	102.35	.10
40′	83.34	.606	E	40′	585.36	29.824	E	40′	1096.4	103.97	E
50′	91.68	.733		50′	593.79	30.686		50′	1105.1	105.60	
2°	100.01	.873	.001	12°	602.21	31.561	.006	22°	1113.7	107.24	.013
10′	108.35	1.024		10′	610.64	32.447		10′	1122.4	108.90	
20′	116.68	1.188		20′	619.07	33.347		20′	1131.0	110.57	
30′	125.02	1.364		30′	627.50	34.259		30′	1139.7	112.25	
40′	133.36	1.552		40′	635.93	35.183		40′	1148.4	113.95	
50′	141.70	1.752		50′	644.37	36.120		50′	1157.0	115.66	
3°	150.04	1.964	10° C.	13°	652.81	37.070	10° C.	23°	1165.7	117.38	10° C.
10′	158.38	2.188	T	10′	661.25	38.031	T	10′	1174.4	119.12	T
20′	166.72	2.425	.06	20′	669.70	39.006	.13	20′	1183.1	120.87	.19
30′	175.06	2.674	E	30′	678.15	39.993	E	30′	1191.8	122.63	E
40′	183.40	2.934	.003	40′	686.60	40.992	.011	40′	1200.5	124.41	.025
50′	191.74	3.207		50′	695.06	42.004		50′	1209.2	126.20	
4°	200.08	3.492		14°	703.51	43.029		24°	1217.9	128.00	
10′	208.43	3.790		10′	711.97	44.066		10′	1226.6	129.82	
20′	216.77	4.099		20′	720.44	45.116		20′	1235.3	131.65	
30′	225.12	4.421		30′	728.90	46.178		30′	1244.0	133.50	
40′	233.47	4.755		40′	737.37	47.253		40′	1252.8	135.35	
50′	241.81	5.100	15° C.	50′	745.85	48.341	15° C.	50′	1261.5	137.23	15° C.
5°	250.16	5.459	T	15°	754.32	49.441	T	25°	1270.2	139.11	T
10′	258.51	5.829	.09	10′	762.80	50.554	.19	10′	1279.0	141.01	.29
20′	266.86	6.211	E	20′	771.29	51.679	E	20′	1287.7	142.93	E
30′	275.21	6.606	.004	30′	779.77	52.818	.017	30′	1296.5	144.85	.038
40′	283.57	7.013		40′	788.26	53.969		40′	1305.3	146.79	
50′	291.92	7.432		50′	796.75	55.132		50′	1314.0	148.75	
6°	300.28	7.863		16°	805.25	56.309		26°	1322.8	150.71	
10′	308.64	8.307		10′	813.75	57.498		10′	1331.6	152.69	
20′	316.99	8.762		20′	822.25	58.699		20′	1340.4	154.69	
30′	325.35	9.230	20° C.	30′	830.76	59.914	20° C.	30′	1349.2	156.70	20° C.
40′	333.71	9.710	T	40′	839.27	61.141	T	40′	1358.0	158.72	T
50′	342.08	10.202	.13	50′	847.78	62.381	.26	50′	1366.8	160.76	.39
7°	350.44	10.707	E	17°	856.30	63.634	E	27°	1375.6	162.81	E
10′	358.81	11.224	.006	10′	864.82	64.900	.022	10′	1384.4	164.86	.051
20′	367.17	11.753		20′	873.35	66.178		20′	1393.2	166.95	
30′	375.54	12.294		30′	881.88	67.470		30′	1402.0	169.04	
40′	383.91	12.847		40′	890.41	68.774		40′	1410.9	171.15	
50′	392.28	13.413		50′	898.95	70.091		50′	1419.7	173.27	
8°	400.66	13.991		18°	907.49	71.421		28°	1428.6	175.41	
10′	409.03	14.582		10′	916.03	72.764		10′	1437.4	177.55	
20′	417.41	15.184	25° C.	20′	924.58	74.119	25° C.	20′	1446.3	179.72	25° C.
30′	425.79	15.799	T	30′	933.13	75.488	T	30′	1455.1	181.89	T
40′	434.17	16.426	.16	40′	941.69	76.869	.32	40′	1464.0	184.08	.49
50′	442.55	17.065	E	50′	950.25	78.264	E	50′	1472.9	186.29	E
9°	450.93	17.717	.007	19°	958.81	79.671	.028	29°	1481.8	188.51	.065
10′	459.32	18.381		10′	967.38	81.092		10′	1490.7	190.74	
20′	467.71	19.058		20′	975.96	82.525		20′	1499.6	192.99	
30′	476.10	19.746		30′	984.53	83.972		30′	1508.5	195.25	
40′	484.49	20.447		40′	993.12	85.431		40′	1517.4	197.53	
50′	492.88	21.161		50′	1001.7	86.904		50′	1526.3	199.82	
10°	501.28	21.887	30° C.	20°	1010.3	88.389	30° C.	30°	1535.3	202.12	30° C.
10′	509.68	22.624	T	10′	1018.9	89.888	T	10′	1544.2	204.44	T
20′	518.08	23.375	.19	20′	1027.5	91.399	.39	20′	1553.1	206.77	.59
30′	526.48	24.138	E	30′	1036.1	92.924	E	30′	1562.1	209.12	E
40′	534.89	24.913	.008	40′	1044.7	94.462	.034	40′	1571.0	211.48	.078
50′	543.29	25.700		50′	1053.3	96.013		50′	1580.0	213.86	

T = R tan ½ I E = R exsec ½ I

Table IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=40°	I	T	E	I=50°	I	T	E	I=60°
31°	1589.0	216.3	+	41°	2142.2	387.4	+	51°	2732.9	618.4	+
10′	1598.0	218.7	5° C.	10′	2151.7	390.7	5° C.	10′	2743.1	622.8	5° C.
20′	1606.9	221.1	T	20′	2161.2	394.1	T	20′	2753.4	627.2	T
30′	1615.9	223.5	.13	30′	2170.8	397.4	.17	30′	2763.7	631.7	.21
40′	1624.9	226.0	E	40′	2180.3	400.8	E	40′	2773.9	636.2	E
50′	1633.9	228.4		50′	2189.9	404.2		50′	2784.2	640.7	
32°	1643.0	230.9	.023	42°	2199.4	407.6	.037	52°	2794.o	645.2	.056
10′	1652.0	233.4		10′	2209.0	411.1		10′	2804.9	649.7	
20	1661.0	235.9		20′	2218.6	414.5		20′	2815.2	654.3	
30′	1670.0	238.4		30′	2228.1	418.0		30′	2825.6	658.8	
40′	1679.1	241.0		40′	2237.7	421.4		40′	2835.9	663.4	
50′	1688.1	243.5		50′	2247.3	425.0		50′	2846.3	668.0	
33°	1697.2	246.1	10° C.	43°	2257.0	428.5	10° C.	53°	2856.7	672.7	10° C.
10′	1706.3	248.7	T	10′	2266.6	432.0	T	10′	2867.1	677.3	T
20′	1715.3	251.3	.26	20′	2276.2	435.6	.34	20′	2877.5	682.0	.42
30′	1724.4	253.9	E	30′	2285.9	439.2	E	30′	2888.0	686.7	E
40′	1733.5	256.5	.046	40′	2295.6	442.8	.075	40′	2898.4	691.4	.112
50′	1742.6	259.1		50	2305.2	446.4		50′	2908.9	696.1	
34°	1751.7	261.8		44°	2314.9	450.0		54°	2919.4	700.9	
10′	1760.8	264.5		10′	2324.6	453.6		10′	2929.9	705.7	
20′	1770.0	267.2		20′	2334.3	457.3		20′	2940.4	710.5	
30′	1779.1	269.9		30′	2344.1	461.0		30′	2951.0	715.3	
40′	1788.2	272.6		40′	2353.8	464.6		40′	2961.5	720.1	
50′	1797.4	275.3	15° C.	50′	2363.5	468.4	15° C.	50′	2972.1	725.0	15° C.
35°	1806.6	278.1	T	45°	2373.3	472.1	T	55°	2982.7	729.9	T
10′	1815.7	280.8	.40	10′	2383.1	475.8	.51	10′	2993.3	734.8	.63
20′	1824.9	283.6	E	20′	2392.8	479.6	E	20′	3003.9	739.7	E
30′	1834.1	286.4	.070	30′	2402.6	483.4	.116	30′	3014.5	744.6	.168
40′	1843.3	289.2		40′	2412.4	487.2		40′	3025.2	749.6	
50′	1852.5	292.0		50′	2422.3	491.0		50′	3035.8	754.6	
36°	1861.7	294.9		46°	2432.1	494.8		56°	3046.5	759.6	
10′	1870.9	297.7		10′	2441.9	498.7		10′	3057.2	764.6	
20′	1880.1	300.6		20′	2451.8	502.5		20′	3067.9	769.7	
30′	1889.4	303.5	20° C.	30′	2461.7	506.4	20° C.	30′	3078.7	774.7	20° C.
40′	1898.6	306.4	T	40′	2471.5	510.3	T	40′	3089.4	779.8	T
50′	1907.9	309.3	.53	50′	2481.4	514.3	.68	50′	3100.2	784.9	.84
37°	1917.1	312.2	E	47°	2491.3	518.2	E	57°	3110.9	790.1	E
10′	1926.4	315.2	.093	10′	2501.2	522.2	.151	10′	3121.7	795.2	.225
20′	1935.7	318.1		20′	2511 2	526.1		20′	3132.6	800.4	
30′	1945.0	321.1		30′	2521 1	530.1		30′	3143.4	805.6	
40′	1954.3	324.1		40′	2531.1	534.2		40′	3154.2	810.9	
50′	1963.6	327.1		50′	2541.0	538.2		50′	3165.1	816.1	
38°	1972.9	330.2		48°	2551.0	542.2		58°	3176.0	821.4	
10′	1982.2	333.2	25° C.	10′	2561.0	546.3	25° C.	10′	3186.9	826.7	25° C.
20′	1991.5	336.3	T	20′	2571.0	550.4	T	20′	3197.8	832.0	T
30′	2000.9	339.3	.67	30′	2581.0	554.5	.85	30′	3208.8	837.3	1.05
40′	2010.2	342.4	E	40′	2591.0	558.6	E	40′	3219.7	842.7	E
50′	2019.6	345.5	.117	50′	2601.1	562.8	.189	50′	3230.7	848.1	.283
39°	2029.0	348.6		49°	2611.2	566.9		59°	3241.7	853.5	
10′	2038.4	351.8		10′	2621.2	571.1		10′	3252.7	858.9	
20′	2047.8	354.9		20′	2631.3	575.3		20′	3263.7	864.3	
30′	2057.2	358.1		30′	2641.4	579.5		30′	3274.8	869.8	
40′	2066.6	361.3		40′	2651.5	583.8		40′	3285.8	875.3	
50′	2076.0	364.5		50′	2661.6	588.0		50′	3296.9	880.8	
40°	2085.4	367.7	30° C.	50°	2671.8	592.3	30° C.	60°	3308.0	886.4	30° C.
10′	2094.9	371.0	T	10′	2681.9	596.6	T	10′	3319.1	892.0	T
20′	2104.3	374.2	.80	20′	2692.1	600.9	1.02	20′	3330.3	897.5	1.27
30′	2113.8	377.5	E	30′	2702.3	605.3	E	30′	3341.4	903.2	E
40′	2123.3	380.8	.141	40′	2712.5	609.6	.227	40′	3352.6	908.8	.340
50′	2132.7	384.1		50′	2722.7	614.0		50′	3363.8	914.5	

T = R tan ½ I E = R exsec ½ I

Table IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=70°	I	T	E	I=80°	I	T	E	I=90°
61°	3375.0	920.2	+	71°	4086.9	1308.2	+	81°	4893.6	1805.3	+
10′	3386.3	925.9	5° C.	10′	4099.5	1315.6	5° C.	10′	4908.0	1814.7	5° C.
20′	3397.5	931.6	T	20′	4112.1	1322.9	T	20′	4922.5	1824.1	T
30′	3408.8	937.3	.25	30′	4124.8	1330.3	.30	30′	4937.0	1833.6	.36
40′	3420.1	943.1	E	40′	4137.4	1337.7	E	40′	4951.5	1843.1	E
50′	3431.4	948.9	.080	50′	4150.1	1345.1	.110	50′	4966.1	1852.6	.149
62°	3442.7	954.8		72°	4162.8	1352.6		82°	4980.7	1862.2	
10′	3454.1	960.6		10′	4175.6	1360.1		10′	4995.4	1871.8	
20′	3465.4	966.5		20′	4188.5	1367.6		20′	5010.0	1881.5	
30′	3476.8	972.4		30′	4201.2	1375.2		30′	5024.8	1891.2	
40′	3488.3	978.3		40′	4214.0	1382.8		40′	5039.5	1900.9	
50′	3499.7	984.3		50′	4226.8	1390.4		50′	5054.3	1910.7	
63°	3511.1	990.2	10° C.	73°	4239.7	1398.0	10° C.	83°	5069.2	1920.5	10° C.
10′	3522.6	996.2	T	10′	4252.6	1405.7	T	10′	5084.0	1930.4	T
20′	3534.1	1002.3	.51	20′	4265.6	1413.5	.61	20′	5099.0	1940.3	.72
30′	3545.6	1008.3	E	30′	4278.5	1421.2	E	30′	5113.9	1950.3	E
40′	3557.2	1014.4	.159	40′	4291.5	1429.0	.220	40′	5128.9	1960.2	.299
50′	3568.7	1020.5		50′	4304.6	1436.8		50′	5143.9	1970.3	
64°	3580.3	1026.6		74°	4317.6	1444.6		84°	5159.0	1980.4	
10′	3591.9	1032.8		10′	4330.7	1452.5		10′	5174.1	1990.5	
20′	3603.5	1039.0		20′	4343.8	1460.4		20′	5189.3	2000.6	
30′	3615.1	1045.2		30′	4356.9	1468.4		30′	5204.4	2010.8	
40′	3626.8	1051.4		40′	4370.1	1476.4		40′	5219.7	2021.1	
50′	3638.5	1057.7	15° C.	50′	4383.3	1484.4	15° C.	50′	5234.9	2031.4	15° C.
65°	3650.2	1063.9	T	75°	4396.5	1492.4	T	85°	5250.3	2041.7	T
10′	3661.9	1070.2	.76	10′	4409.8	1500.5	.91	10′	5265.6	2052.1	1.09
20′	3673.7	1076.6	E	20′	4423.1	1508.6	E	20′	5281.0	2062.5	E
30′	3685.4	1082.9	.240	30′	4436.4	1516.7	.332	30′	5296.4	2073.0	.450
40′	3697.2	1089.3		40′	4449.7	1524.9		40′	5311.9	2083.5	
50′	3709.0	1095.7		50′	4463.1	1533.1		50′	5327.4	2094.1	
66°	3720.9	1102.2		76°	4476.5	1541.4		86°	5343.0	2104.7	
10′	3732.7	1108.6		10′	4489.9	1549.7		10′	5358.6	2115.3	
20′	3744.6	1115.1		20′	4503.4	1558.0		20′	5374.2	2126.0	
30′	3756.5	1121.7		30′	4516.9	1566.3		30′	5389.9	2136.7	
40′	3768.5	1128.2	20° C.	40′	4530.4	1574.7	20° C.	40′	5405.6	2147.5	20° C.
50′	3780.4	1134.8	T	50′	4544.0	1583.1	T	50′	5421.4	2158.4	T
			1.02				1.22				1.45
67°	3792.4	1141.4	E	77°	4557.6	1591.6	E	87°	5437.2	2169.2	E
10′	3804.4	1148.0		10′	4571.2	1600.1		10′	5453.1	2180.2	
20′	3816.4	1154.7	.321	20′	4584.8	1608.6	.445	20′	5469.0	2191.1	.603
30′	3828.4	1161.3		30′	4598.5	1617.1		30′	5484.9	2202.2	
40′	3840.5	1168.1		40′	4612.2	1625.7		40′	5500.9	2213.2	
50′	3852.6	1174 8		50′	4626.0	1634.4		50′	5517.0	2224.3	
68°	3864.7	1181.6		78°	4639.8	1643.0		88°	5533.1	2235.5	
10′	3876.8	1188.4		10′	4653.6	1651.7		10′	5549.2	2246.7	
20′	3889.0	1195.2	25° C.	20′	4667.4	1660.5	25° C.	20′	5565.4	2258.0	25° C.
30′	3901.2	1202.0	T	30′	4681.3	1669.2	T	30′	5581.6	2269.3	T
40′	3913.4	1208.9	1.28	40′	4695.2	1678.1	1.53	40′	5597.8	2280.6	1.83
50′	3925.6	1215.8	E	50′	4709.2	1686.9	E	50′	5614.2	2292.0	E
69°	3937.9	1222.7	.403	79°	4723.2	1695.8	.558	89°	5630.5	2303.5	.756
10′	3950.2	1229.7		10′	4737.2	1704.7		10′	5646.9	2315.0	
20′	3962.5	1236.7		20′	4751.2	1713.7		20′	5663.4	2326.6	
30′	3974.8	1243.7		30′	4765.3	1722.7		30′	5679.9	2338.2	
40′	3987.2	1250.8		40′	4779.4	1731.7		40′	5696.4	2349.8	
50′	3999.5	1257.9		50′	4793.6	1740.8		50′	5713.0	2361.5	
70°	4011.9	1265.0	30° C.	80°	4807.7	1749.9	30° C.	90°	5729.7	2373.3	30° C.
10′	4024.4	1272.1	T	10′	4822.0	1759.0	T	10′	5746.3	2385.1	T
20′	4036.8	1279.3	1.54	20′	4836.2	1768.2	1.84	20′	5763.1	2397.0	2.20
30′	4049.3	1286.5	E	30′	4850.5	1777.4	E	30′	5779.9	2408.9	E
40′	4061.8	1293.6	.485	40′	4864.8	1786.7	.671	40′	5796.7	2420.9	.910
50′	4074.4	1300.9		50′	4879.2	1796.0		50′	5813.6	2432.9	

T = R tan ½ I E = R exsec ½ I

Table IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=100°	I	T	E	I=110°	I	T	E	I=120°
91°	5830.5	2444.9	+	101°	6950.6	3278.1	+	111°	8336.7	4386.1	+
10′	5847.5	2457.1	5° C.	10′	6971.3	3294.1	5° C.	10′	8362.7	4407.6	5° C.
20′	5864.6	2469.3	T	20′	6992.0	3310.1	T	20′	8388.9	4429.2	T
30′	5881.7	2481.5	.43	30′	7012.7	3326.1	.51	30′	8415.1	4450.9	.62
40′	5898.8	2493.8	E	40′	7033.6	3342.3	E	40′	8441.5	4472.7	E
50′	5916.0	2506.1	.200	50′	7054.5	3358.5	.268	50′	8468.0	4494.6	.360
92°	5933.2	2518.5		102°	7075.5	3374.9		112°	8494.6	4516.6	
10′	5950.5	2531.0		10′	7096.6	3391.2		10′	8521.3	4538.8	
20′	5967.9	2543.5		20′	7117.8	3407.7		20′	8548.1	4561.1	
30′	5985.3	2556.0		30′	7139.0	3424.3		30′	8575.0	4583.4	
40′	6002.7	2568.6		40′	7160.3	3440.9		40′	8602.1	4606.0	
50′	6020.2	2581.3		50′	7181.7	3457.6		50′	8629.3	4628.6	
93°	6037.8	2594.0	10° C.	103°	7203.2	3474.4	10° C.	113°	8656.6	4651.3	10° C.
10′	6055.4	2606.8	T	10′	7224.7	3491.3	T	10′	8684.0	4674.2	T
20′	6073.1	2619.7	.86	20′	7246.3	3508.2	.103	20′	8711.5	4697.2	1.25
30′	6090.8	2632.6	E	30′	7268.0	3525.2	E	30′	8739.2	4720.3	E
40′	6108.6	2645.5	.401	40′	7289.8	3542.4	.536	40′	8767.0	4743.6	.721
50′	6126.4	2658.5		50′	7311.7	3559.6		50′	8794.9	4766.9	
94°	6144.3	2671.6		104°	7333.6	3576.8		114°	8822.9	4790.4	
10′	6162.2	2684.7		10′	7355.6	3594.2		10′	8851.0	4814.1	
20′	6180.2	2697.9		20′	7377.8	3611.7		20′	8879.3	4837.8	
30′	6198.3	2711.2		30′	7399.9	3629.2		30′	8907.7	4861.7	
40′	6216.4	2724.5		40′	7422.2	3646.8		40′	8936.3	4885.7	
50′	6234.6	2737.9	15° C.	50′	7444.6	3664.5	15° C.	50′	8965.0	4909.9	15° C.
95°	6252.8	2751.3	T	105°	7467.0	3682.3	T	115°	8993.8	4934.1	T
10′	6271.1	2764.8	1.30	10′	7489.6	3700.2	1.56	10′	9022.7	4958.6	1.93
20′	6289.4	2778.3	E	20′	7512.2	3718.2	E	20′	9051.7	4983.1	E
30′	6307.9	2792.0	.604	30′	7534.9	3736.2	.806	30′	9080.9	5007.8	1.09
40′	6326.3	2805.6		40′	7557.7	3754.4		40′	9110.3	5032.6	
50′	6344.8	2819.4		50′	7580.5	3772.6		50′	9139.8	5057.6	
96°	6363.4	2833.2		106°	7603.5	3791.0		116°	9169.4	5082.7	
10′	6382.1	2847.0		10′	7626.6	3809.4		10′	9199.1	5107.9	
20′	6400.8	2861.0		20′	7649.7	3827.9		20′	9229.0	5133.3	
30′	6419.5	2875.0	20° C.	30′	7672.9	3846.5	20° C.	30′	9259.0	5158.8	20° C.
40′	6438.4	2889.0	T	40′	7696.3	3865.2	T	40′	9289.2	5184.5	T
50′	6457.3	2903.1	1.74	50′	7719.7	3884.0	2.08	50′	9319.5	5210.3	2.52
97°	6476.2	2917.3	E	107°	7743.2	3902.9	E	117°	9349.9	5236.2	E
10′	6495.2	2931.6	.809	10′	7766.8	3921.9	1.08	10′	9380.5	5262.3	1.46
20′	6514.3	2945.9		20′	7790.5	3940.9		20′	9411.3	5288.6	
30′	6533.4	2960.3		30′	7814.3	3960.1		30′	9442.2	5315.0	
40′	6552.6	2974.7		40′	7838.1	3979.4		40′	9473.2	5341.5	
50′	6571.9	2989.2		50′	7862.1	3998.7		50′	9504.4	5368.2	
98°	6591.2	3003.8		108°	7886.2	4018.2		118°	9535.7	5395.1	
10′	6610.6	3018.4	25° C.	10′	7910.4	4037.8	25° C.	10′	9567.2	5422.1	25° C.
20′	6630.1	3033.1	T	20′	7934.6	4057.4	T	20′	9598.9	5449.2	T
30′	6649.6	3047.9	2.18	30′	7959.0	4077.2	2.61	30′	9630.7	5476.5	3.16
40′	6669.2	3062.8	E	40′	7983.5	4097.1	E	40′	9662.6	5504.0	E
50′	6688.8	3077.7	1.02	50′	8008.0	4117.0	1.36	50′	9694.7	5531.7	1.83
99°	6708.6	3092.7		109°	8032.7	4137.1		119°	9727.0	5559.4	
10′	6728.4	3107.7		10′	8057.4	4157.3		10′	9759.4	5587.4	
20′	6748.2	3122.9		20′	8082.3	4177.5		20′	9792.0	5615.5	
30′	6768.1	3138.1		30′	8107.3	4197.9		30′	9824.8	5643.8	
40′	6788.1	3153.3		40′	8132.3	4218.4		40′	9857.7	5672.3	
50′	6808.2	3168.7		50′	8157.5	4239.0		50′	9890.8	5700.9	
100°	6828.3	3184.1	30° C.	110°	8182.8	4259.7	30° C.	120°	9924.0	5729.7	30° C.
10′	6848.5	3199.6	T	10′	8208.2	4280.5	T	10′	9957.5	5758.6	T
20′	6868.8	3215.1	2.62	20′	8233.7	4301.4	3.14	20′	9991.0	5787.7	3.81
30′	6889.2	3230.8	E	30′	8259.3	4322.4	E	30′	10025.0	5817.0	E
40′	6909.6	3246.5	1.22	40′	8285.0	4343.6	1.63	40′	10059.0	5846.5	2.20
50′	6930.1	3262.3		50′	8310.8	4364.8		50′	10093.0	5876.1	

T = R tan ½ I E = R exsec ½ I

Table X.

MIDDLE ORDINATES OF RAILS

Length of Rail (feet)

C ° ′	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch	C °	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch
0–20	17189	.08	.07	.06	.05	.04	.03	8	716.8	1.88	1.64	1.42	1.20	1.01	.84
0–40	8594	.16	.14	.12	.10	.08	.07	9	637.3	2.12	1.84	1.60	1.35	1.14	.94
1–0	5730	.24	.20	.18	.15	.13	.10	10	573.7	2.36	2.05	1.78	1.50	1.27	1.04
1–20	4297	.31	.27	.23	.20	.17	.13	11	521.7	2.59	2.26	1.95	1.65	1.39	1.15
1–40	3438	.39	.34	.29	.25	.21	.17	12	478.3	3.83	2.47	2.15	1.81	1.54	1.26
2–0	2865	.47	.41	.35	.30	.25	.20	13	441.7	3.05	2.66	2.30	1.96	1.66	1.36
2–20	2456	.55	.48	.41	.35	.29	.23	14	410.3	3.30	2.87	2.48	2.10	1.78	1.46
2–40	2149	.63	.55	.47	.40	.33	.27	15	383.1	3.54	3.08	2.68	2.26	1.91	1.57
3–0	1910	.71	.62	.53	.45	.38	.31	16	359.3	3.76	3.28	2.83	2.40	2.04	1.67
3–20	1719	.78	.68	.59	.50	.42	.35	17	338.3	4.00	3.48	3.02	2.57	2.16	1.78
3–40	1563	.86	.75	.65	.55	.46	.38	18	319.6	4.21	3.67	3.18	2.70	2.28	1.87
4–0	1433	.94	.82	.71	.60	.50	.42	19	302.9	4.45	3.89	3.36	2.86	2.41	1.98
4–20	1323	1.02	.89	.77	.65	.55	.45	20	287.9	4.70	4.09	3.55	3.00	2.54	2.09
4–40	1228	1.10	.96	.83	.70	.59	.48	22	262.0	5.16	4.44	3.84	3.30	2.80	2.29
5	1146	1.18	1.03	.89	.75	.63	.52	24	240.5	5.64	4.92	4.20	3.59	3.04	2.50
6	955.3	1.41	1.23	1.06	.90	.76	.62	26	222.3	6.07	5.29	4.58	3.88	3.29	2.70
7	819.0	1.65	1.44	1.24	1.05	.89	.73								

Table XI.

SHORT RADIUS CURVES

Radius Feet	Chord Feet	Central Angle	Deflection Angle	Deflection for 1 Foot
35	10	16-26	8-13	49.3
45	10	12-46	6-23	38.3
50	15	17-16	8-38	34.5
60	15	14-22	7-11	28.8
75	15	11-30	5-45	23.0
100	20	11-30	5-45	17.3
120	20	9-34	4-47	14.3
150	20	7-39	3-49	11.5
190	25	7-32	3-46	9.15
200	25	7-10	3-35	8.6
225	25	6-25	3-12	7.7
240	25	5-58	2-59	7.2
250	25	5-44	2-52	6.9
275	25	5-12	2-36	6.2
288	50	9-58	4-59	6.0
300	50	9-32	4-46	5.7
350	50	8-12	4-06	4.9
376	50	7-40	3-50	4.6
400	50	7-10	3-35	4.3
410	50	7-00	3-30	4.2

To find length of curve divide angle from P. C. to P. T. by central angle of chord, and multiply by length of chord.

Table XII.

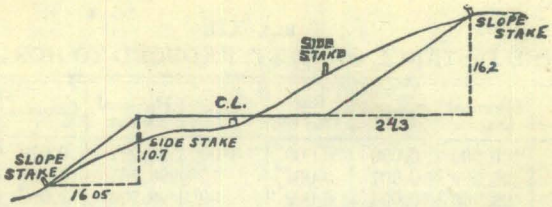
INCLINED DISTANCE OF 100 FT. REDUCED TO HORIZONTAL

Slope	Horizontal Distance	Correction	Rise Per Foot	Slope	Horizontal Distance	Correction	Rise Per Foot
0°00′	100.000	0.000	0.000	8°00′	99.027	0.973	0.139
15′	99.999	0.001	0.004	15′	98.965	1.035	0.143
30′	99.996	0.004	0.009	30′	98.902	1.098	0.148
45′	99.991	0.009	0.013	45′	98.836	1.164	0.152
1 00	99.985	0.015	0.017	9 00	98.769	1.231	0.156
15	99.976	0.024	0.022	15	98.700	1.300	0.161
30	99.966	0.034	0.026	30	98.629	1.371	0.165
45	99.953	0.047	0.031	45	98.556	1.444	0.169
2 00	99.939	0.061	0.035	10 00	98.481	1.519	0.174
15	99.923	0.077	0.039	15	98.404	1.596	0.178
30	99.905	0.095	0.044	30	98.325	1.675	0.182
45	99.885	0.115	0.048	45	98.245	1.755	0.187
3 00	99.863	0.137	0.052	11 00	98.163	1.837	0.191
15	99.839	0.161	0.057	15	98.079	1.921	0.195
30	99.813	0.187	0.061	30	97.992	2.008	0.199
45	99.786	0.214	0.065	45	97.905	2.095	0.204
4 00	99.756	0.244	0.070	12 00	97.815	2.185	0.208
15	99.725	0.275	0.074	15	97.723	2.277	0.212
30	99.692	0.308	0.078	30	97.630	2.370	0.216
45	99.657	0.343	0.083	45	97.534	2.466	0.221
5 00	99.619	0.381	0.087	13 00	97.437	2.563	0.225
15	99.580	0.420	0.092	15	97.338	2.662	0.229
30	99.540	0.460	0.096	30	97.237	2.763	0.233
45	99.497	0.503	0.100	45	97.134	2.866	0.238
6 00	99.452	0.548	0.105	14 00	97.030	2.970	0.242
15	99.406	0.594	0.109	15	96.923	3.077	0.246
30	99.357	0.643	0.113	30	96.815	3.185	0.250
45	99.307	0.693	0.118	45	96.705	3.295	0.255
7 00	99.255	0.745	0.122	15 00	96.593	3.407	0.259
15	99.200	0.800	0.126	15	96.479	3.521	0.263
30	99.144	0.856	0.131	30	96.363	3.637	0.267
45	99.087	0.913	0.135	45	96.246	3.754	0.271

Table XIII.

MINUTES IN DECIMALS OF A DEGREE.

0 30″	.00833	10′ 30″	.17500	20′ 30″	.34167	30′ 30″	.50833	40′ 30″	.67500	50′ 30″	.84167
1 00	.01667	11 00	.18333	21 00	.35000	31 00	.51667	41 00	.68333	51 00	.85000
30	.02500	30	.19167	30	.35833	30	.52500	30	.69167	30	.85833
2 00	.03333	12 00	.20000	22 00	.36667	32 00	.53333	42 00	.70000	52 00	.86667
30	.04167	30	.20833	30	.37500	30	.54167	30	.70833	30	.87500
3 00	.05000	13 00	.21667	23 00	.38333	33 00	.55000	43 00	.71667	53 00	.88333
30	.05833	30	.22500	30	.39167	30	.55833	30	.72500	30	.89167
4 00	.06667	14 00	.23333	24 00	.40000	34 00	.56667	44 00	.73333	54 00	.90000
30	.07500	30	.24167	30	.40833	30	.57500	30	.74167	30	.90833
5 00	.08333	15 00	.25000	25 00	.41667	35 00	.58333	45 00	.75000	55 00	.91667
30	.09167	30	.25833	30	.42500	30	.59167	30	.75833	30	.92500
6 00	.10000	16 00	.26667	26 00	.43333	36 00	.60000	46 00	.76667	56 00	.93333
30	.10833	30	.27500	30	.44167	30	.60833	30	.77500	30	.94167
7 00	.11667	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000
30	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833
8 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667
30	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500
9 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333
30	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167
10 00	.16667	20 00	.33333	30 00	.50000	40 00	.66667	50 00	.83333	60 00	1.00000



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING.

SLOPE 1½ TO 1. ROADWAY OF ANY WIDTH.

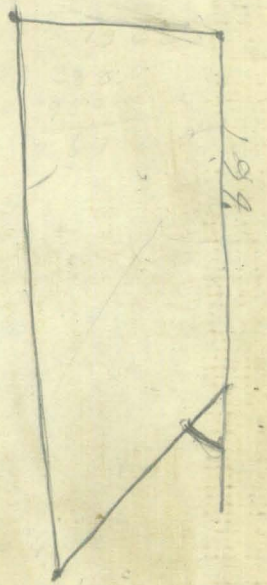
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

Computed by L. Leland Locke.

237+75

6-19-59

1 = 92
2 = 104
3 = 99
4 = 115
5 = 100
6 = 93



A.D. 24166

2 - 510
3 - 1086
1596

319+26.2

4 - 1157
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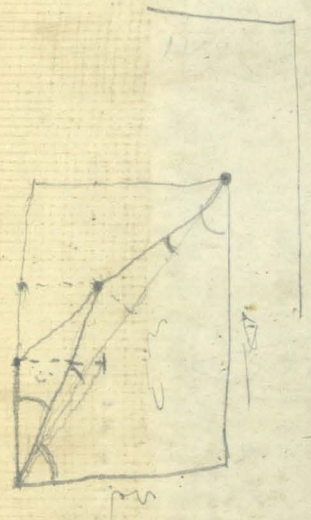

26+138