4

FIELD BOOK

364

Sec D

CHILLICOTHE ROAD
X-SECTIONS - LEVELS
STA 146+47.75 } BAINBRIDGE TWP
STA 282+24.19 }

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS SECTIONING.
ROADWAY 18 FEET. SIDE SLOPES 1½ TO 1.
FOR SINGLE TRACK EXCAVATION.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

For Keith's Railroad Curve Tabels see end of book.

CHILLICOTHE ROAD LEVELS FROM
BAINBRIDGE — TOWNSHIP LINE
L. M. Bobeau Consulting Engineer
355 The Arcade Cleveland Ohio
Feidler County Surveyor

Property of Geauga County

Pages 1-35
66-74

Levels along Chillicothe Rd. North of /

	B.S.	H.I	F.S.	Elev.
				1166.180
T.P.#1	6.144	1172.324	0.665	1171.659
T.P.#2	10.092	1181.751	1.229	1180.522
BM#1	13.061	1193.583	2.777	1190.806
B.M.#2		1193.583	1.330	1192.253
T.P.#3	3.868	1196.121	5.767	1190.354
BM#3	0.143	1190.497	12.640	1177.857
T.P.#4		1190.497	13.015	1177.482
T.P.#5	0.994	1178.376	13.066	1165.310
T.P.#6	1.188	1166.498	13.073	1153.425
BM#4	1.062	1154.487	5.102	1149.385
T.P.1			12.643	1141.844

June 10, 1927 Peterjohn 1

Bainbridge Diagonal Road. Pearson

U.S.G.S. B.M. on westerly headwall Chillicothe Rd. culvert just north of Chagrin Falls Bainbridge Rd.

B.M.#16 on east side Chillicothe road spike in root 20" inch elm 150' south Himmilstein drive

B.M.#17 on east side road 200' north Himmilstein drive spike in 20" maple

B.M.#18 on east side road, Cerrenek drive spike in root on east side 24" Maple.

B.M.#19 on west side road, 500 ft north of Cerrenek's place. Spike in root 30" S. Maple.

	B.S.	H.I.	F.S.	Elev.
				1141.844
P#8	0.950	1142.794	11.882	1130.912
P 9	.909	1131.821	11.323	1120.498
B.M.#5	.813	1121.371	6.370	1115.001
P#10		1121.371	10.977	1110.394
P#11	1.420	1111.814	11.567	1100.247
P 12	1.370	1101.617	12.487	1089.130
P 13	.973	1090.103	13.044	1077.059
P 14	.128	1077.181	12.090	1065.091
B.M.#6	.703	1066.400	11.794	1054.606
P 15		1066.400	12.488	1053.912
BM#7	4.052	1057.964	4.825	1053.139

BM #20 on east side road 250' south Cerrenka's drive. Bolt in root of 32" Maple ~~west~~ changed face of tree.

BM #21 on west side road 25' south of bridge, south of Hinckley res., Bolt in root of 20" forked elm. east face.

	B.S	H.I.	F.S	Elev.
P16		1057.964	0.019	1057.945
PM	7.818	1065.163	0.617	1065.146
BM#8	9.966	1075.112	8.280	1066.832
P 18		1075.112	0.982	1074.130
P 19	12.577	1086.707	0.990	1085.717
P 20	12.845	1098.562	.999	1097.563
P 21	11.790	1109.353	.142	1109.211
P 22	11.614	1120.829	.650	1120.179
P 23	12.726	1132.905	.578	1132.327
P 24	10.916	1143.143	.548	1142.595
P 30	11.310	1153.905	.371	1153.534

BM#22 on N.E. head wall of bridge 100' south of Hinckley res. (X)

BM#23 on N.west corner h. wall culvert over road 350' north Hinckley res (X)

	B.S.	H.I.	F.S.	Elev.
				1153.834
BM#9	12.193	1165.727	1.675	1164.052
		1165.727	0.102	1165.625
TP31	12.176	1177.801	0.097	1177.704
TP32	12.500	1190.204	0.138	1190.066
BM#10	11.890	1201.956	2.514	1199.442
TP33	6.474	1205.916	0.217	1205.699
BM#11	8.101	1213.800	2.684	1211.116
BM#12	3.911	1215.027	2.488	1212.539
T.P.	1.096	1213.635	7.401	1205.834

BM#24 on S.E corner of Chillicothe & Rock Spring Drive Rds. Spike in 24" wild cherry on west face (root)

BM#25 on west side Chillicothe Road 150' north Summit drive spike in root of 18" wild cherry east face.

B.M#26 on east side Chillicothe road. 350' south Canfield farm, spike in root 20" Maple. west face.

BM#27 on east side Chillicothe Road 75' North Canfield drive Spike in root 24" Maple. west face.

Check Levels along Chillico

Pearson, D.S.?

The Rd. - South - Market Rd. Peterjohn G.F.

	B.S.	H.I.	F.S	Elev.	
				1205.834	
B.M #12	7.801	1213.635	1.096	1212.539	
B.M # 11	1.698	1214.237	3.119	1211.118	
T.P.	2.600	1213.718	10.456	1203.262	
B.M. #10	1.930	1205.192	5.740	1199.452	.442
					(.010)
T.P.		1205.192	11.983	1193.209	
T.P.	1.052	1194.261	12.694	1181.567	
T.P.	1.390	1182.957	12.583	1170.374	
B.M. #9.	0.880	1171.254	7.182	1164.072	.052
					(.020)
T.P.		1171.254	12.843	1158.411	
T.P.	1.247	1159.658	12.260	1147.398	
T.P.	0.945	1148.343	12.950	1135.393	

	B.S	H I	F.S	Elev	
				1135.393	
T.P.	0.000	1135.393	12.405	1122.988	
T.P.	0.450	1123.438	12.745	1110.693	
T.P.	0.538	1111.231	13.101	1098.130	
T.P.	0.141	1098.271	12.601	1085.670	
T.P.	1.675	1087.345	12.745	1074.600	
B.M #8	0.745	1075.345	8.465	1066.880	.832 (.048)
T.P	2.888	1069.768	9.929	1059.838	
B.M #7	2.852	1062.690	9.523	1053.167	.139 (.028)
T.P.		1062.690	0.656	1062.034	
B.M #6	4.710	1066.744	12.100	1054.644	.606 (.038)
T.P.		1066.744	.360	1066.384	

	B.S.	H.I.	F.S.	Elev	
				1066.384	
T.P.	12.116	1078.500	0.820	1077.680	
T.P.	12.465	1090.1450	.401	1089.744	
TP	12.866	1102.6100	0.240	1102.370	
B.M.#5	12.693	1115.063	0.020	1115.043	.001
					(.042)
TP	11.900	1126.943	0.085	1126.858	
TP	12.982	1139.840	0.883	1138.957	
B.M.#4	12.480	1151.437	2.030	1149.407	.385
					(.022)
TP		1151.437	0.135	1151.302	
TP	11.842	1163.144	0.443	1162.701	
TP	12.674	1175.375	0.145	1175.230	
B.M.#3	9.850	1185.080	7.205	1177.875	.857
					(.018)

	B.S.	H.I	F.S.	Elev	
TP		1185.080	0.160	1184.920	
TP	10.959	1195.879	5.280	1190.599	
B.M #2	5.739	1196.338	4.060	1192.278	1253
					.025
B.M #1		1196.338	5.497	1190.891	.806
					.085
TP	1.755	1192.646	12.058	1180.588	
TP	-0.150	1180.738	9.030	1171.708	
U.S.G.B.M	2.565	1174.273	8.040	1166.233	.180
					.053

Check Levels (3) Correct Set

	B.S.	H.I	F.S	Elev.
				1166.180
TP	8.805	1174.985	.429	1174.556
TP	10.728	1185.284	1.588	1183.696
B.M #16	12.287	1195.983	5.156	1190.827
B.M #17			3.730	1192.250
TP			4.900	1191.083
TP	5.756	1196.839	10.419	1186.420
B.M #18	1.465	1187.885	10.050	1177.835
P			12.690	1175.195
T.P.	.250	1175.445	10.158	1165.287
TP	.471	1165.758	12.360	1153.398
B.M #19	.639	1154.037	4.676	1149.361

Correct Set

	B.S	H.I	F.S	Elev
TP		1154.037	12.212	1141.825
T.P.	.158	1141.983	12.602	1129.381
TP	.443	1129.824	11.912	1117.912
B.M#20	.146	1118.058	3.081	1114.977
TP			13.076	1104.982
TP	.598	1105.580	12.455	1093.125
TP	.144	1093.269	12.068	1081.201
TP	.815	1082.016	12.750	1069.266
TP	.039	1069.305	11.663	1057.642
B.M#21	4.590	1062.232	7.675	1054.557
B.M#22			9.138	1053.094
TP			0.830	1061.402

1114.977
4.006
1118.983

1118.983
2.297
1116.686

B.M#20 changed to 9" Maple 30' South
old B.M.#5 New Elev.— 1116.686

Correct Set

	B.S	HI	F.S	Elev
				1061.402
B.M #23	6.580	1067.982	1.114	1066.868
TP	12.412	1079.280	0.213	1079.067
TP	12.085	1091.152	0.425	1090.727
TP	12.535	1103.262	0.362	1102.900
TP	11.882	1114.782	0.170	1114.612
TP	12.621	1127.233	0.769	1126.464
TP	12.208	1138.672	0.252	1138.420
TP	12.650	1151.070	0.242	1150.828
TP	13.077	1163.905	1.110	1162.795
B.M. #24	11.908	1174.703	10.645	1164.058
TP			.295	1174.408

Correct Levels

	B.S	N.I	F.S	Elev
				1174.408
TP	12.178	1186.586	0.223	1186.363
TP	11.702	1198.065	0.710	1197.355
B.M#25	10.856	1208.211	8.731	1199.480
TP			0.250	1207.961
B.M#26	6.800	1214.761	3.583	1211.178
TP			4.950	1209.811
B.M#27	4.611	1214.422	1.840	1212.582
T.P	0.695	1213.277	6.200	1207.077
B.M#28	4.775	1211.852	4.261	1207.591

Continued

	①	②	③	④	
	1166.180	.233	.180		
1	1190.806	.891	.827		.021 ✓
2	1192.253	.278	.250		.003
3	1177.857	.875	.835		.018
4	1149.385	.407	.361		.034
5	1115.001	.043	.977		.029
6	1054.606	.644	.557	.574 (.017)	.049
7	1053.139	.167	.094	.102 (.008)	.045
8	1066.832	.880	.868	.849 (.019)	.036
9	1164.052	.072	.058		.006
10	1199.442	.452	.480	.493 (.013)	.038
11	1211.116	.118	.178	.181 (.003)	.062
12	1212.539	.539	.582	.583 (.001)	.043

B.M#28 X on East end of concrete foundation for gasoline pumps at gas station South-West intersection of Main Market St + Chillicothe Rd.

Check Levels ④

	B.S	H.I	F.S	Elev.
B.M #5.				1114.977
TP	2.145	1117.122	12.143	1104.979
TP	1.260	1106.239	12.659	1093.580
TP	1.128	1094.708	12.335	1082.373
TP	0.490	1082.863	12.216	1070.647
TP	0.371	1071.018	12.754	1058.264
B.M #6	1.932	1060.196	5.622	1054.574
B.M #7	8.010	1062.584	9.482	1053.102
TP			1.170	1061.414
B.M #8	6.550	1067.964	1.115	1066.849

Check Levels

B.S.	H.I.	F.S.	Elev.
B.M #9			1164.058
9.820	1173.878	.099	1173.779
12.182	1185.961	.081	1185.880
11.913	1197.793	.450	1197.343
			B.M #10
6.915	1204.358	4.765	1199.493
		0.325	1203.933
			B.M #11
10.113	1214.046	2.865	1211.181
		3.082	1210.964
3.374	1214.338	1.755	1212.583

Profile Levels.

Sta.	B.S.	H.I	R.R.	Elev. ℄	
				1166.18	
U.S.G.S	12.16	1178.34			
147+00			12.6	1165.7	
(CULVERT.) 147+13	Road		11.9	℄ 1166.4	top 1167.7 [F.L 1162.7] ℄ 1165.4 culvert
148+00			12.7	1165.6	
149+00			10.2	1168.1	
150+00			7.0	1171.3	
151+00			5.2	1173.1	
152+00			4.0	1174.3	
153+00			2.4	1175.9	
T.P.#1			0.56	1177.18	
	10.09	1187.87			
154+00			10.5	1177.4	

Pearson D.S.
Peterjohn C.F.

Sta.	B.S	H.I.	R.R.	Elev.
155+00		1187.87	8.4	1179.5
156+00			6.2	1181.7
157+00			4.0	1183.9
158+00			1.3	1186.6
T.P.#			1.32	1186.55
	9.52	1196.07		
158+50 (BM# 16)			5.25	1190.82
159+00			6.6	1189.5
160+00			5.0	1191.1
161+00			4.4	1191.7
161+96 (BM#17)			3.82	1192.25
162+00			3.8	1192.3

	B.S	H.I.	R.R	Elev
		1196.07		
163+00			4.4	1191.7
164+00			5.0	1191.1
165+00			5.4	1190.7
TP#3			4.88	1191.19
	5.45	1196.64		
166+00			5.4	1191.2
167+00			4.7	1191.9
168+00			4.0	1192.6
169+00			5.8	1190.8
170+00			8.7	1187.9
171+00			10.7	1185.9
171+50			10.9	1185.7

Sta.	B.S	H.I.	R.R.	Elev
		1196.64		
172+00			12.7	1183.9
TP#4			12.64	1184.00
	1.66	1185.66		
173+00			8.4	1177.3
173+40 BM#B			7.84	1177.82
173+75			16.1	1169.6
174+00			14.8	1170.9
TP#5			12.55	1173.11
	0.94	1174.05		
175+00			10.0	1164.0
TP#6			9.41	1164.64
	1.30	1165.94		

Sta.	B.S	H.I.	R.R	Elev.
		1165.94		
176+00			11.7	1154.2
TP#7			12.33	1153.61
	2.27	1155.88		
176+40 B.M.#19			6.53	1149.35
177+00			12.1	1143.8
TP#8			12.66	1143.22
	0.04	1143.26		
178+00			11.1	1132.2
TP#9			12.46	1130.80
	0.09	1130.89		
P.R.C. 178+33.71			3.5	1127.4

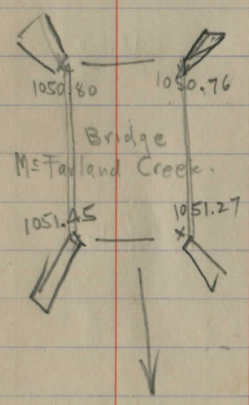
Sta.	B.S	H.I.	R.R	Elev.
		1130.89		
TP#10			12.79	1118.10
	0.15	1118.25		
178+74			7.5	1110.8
178+87 BM#29			3.29	1114.96
178+96			9.7	1109.6
179+00			5.3	1113.0
TP#11			12.88	1105.37
	.23	1105.60		
179+52			1.2	1104.4
180+00			5.1	1100.5
181+00			1.5	1098.1
TP#12			11.41	1094.19

Sta	B.S	H.I.	R.R	Elev.
				1094.19
	1.84	1096.03		
181+40			3.8	1092.2
182+00			5.5	1090.5
182+54			11.6	1084.4
182+73			10.5	1085.5
182+74			8.2	1091.8
183+00			9.4	1086.6
TP #13.			11.11	1084.92
	0.50	1085.42		
184+00			7.3	1078.1
TP 14			12.81	1072.61

Sta.	B.S.	H.I.	R.R.	Elev.
				1072.61
	.15	1072.76		
(P.C.C.) 184+83.63			1.0	1071.76
185+00			6.6	1066.2
TP 15			12.60	1060.16
	1.48	1061.64		
185+00 BM #21			7.10	1054.54
185+32			8.8	1052.8
185+53			12.6	1049.0
186+00			12.9	1048.7
187+00			12.7	1048.9
187+55			9.3	1052.3
TP 16			8.55	1053.09

BM #22
187+77

Sta.	B.S.	H.I.	R.R.	Elev.
				1053.09
T	9.20	1062.29		
Deck & Roadway 187 +66			9.8	1052.6
Flowline.			19.7	1042.6
N.W. Corner abutment			11.02	1051.27
S.W. Corner			11.53	1050.76
S.E corner.			11.49	1050.80
N.E Corner			10.84	1051.45
188 +00			9.2	1053.1
189 +00			3.1	1058.6
189 +40			2.9	1059.4
190 +00			2.8	1059.5
& drive over dam.				
190 +56			2.1	1060.2
L. Lucerni				



Sta.	B.S	H.I.	R.R.	Elev
		1062.29		
T 11			1.32	1060.91
	5.75	1066.72		
190+83.93			7.1	1059.6
191+00			6.8	1059.9
P.R.C 192+00			4.1	1062.0
				1060.97
	7.31	1068.28		
192+48			5.8	1062.5
193+00			4.6	1063.7
193+60			3.9	1064.4
194 PRC +00			3.9	1064.4
194+69			2.8	1065.5

Sta.	B.S	H.I.	R.R.	Elev
		1068.28		
195+00			4.7	1063.6
195+44			6.8	1061.5
196+00			6.6	1061.7
197+00			5.6	1062.7
198+00			2.5	1065.8
~~T#18~~ BM# 23 198+34			1.44	1066.84
	12.69	1079.53		
℄ Culvert 198+26			12.6	1066.9
E.h wall			12.6	1066.9
E. flow line			19.4	1060.1
E. Soffit			15.4	1064.1
W. flow line			19.9	1059.6

Dir flow west. by S.

Sta.	B.S	H. I.	R. R.	Elev.
		1079.53		
W. Soffit			15.7	1063.8
198+38			12.2	1067.3
199+00			1.6	1071.9
199+30			4.4	1075.1
T.P.			.46	1079.07
T#19	12.05	1091.12		
200+00			6.7	1084.4
200+13.50			5.5	1085.6
201+00			1.3	1089.8
T#20			.40	1090.72
	12.50	1103.22		
202+00			8.5	1094.7

Sta	B.S	H.I	R.R	Elev
		1103.22		
203+00			2.3	1100.9
TP #21			.62	1102.60
	13.12	1115.72		
204+10			7.2	1108.5
204+33			2.1	1113.0
TP #22			.38	1115.34
	12.89	1128.23		
205+00			9.4	1118.8
TP #23			.46	1127.77
	12.91	1140.68		
206+00			10.2	1130.5
TP #24			.45	1140.23

1164.058

Sta.	BS	H.I.	R.R.	Elev.
				1140.23
	11.59	1151.82		
207+00			11.1	1140.7
208+00			.7	1151.1
TP #25			.03	1151.79
	11.03	1162.82		
12" C.I. Pipe				
208+07 E. flowline			11.6	1151.2
W. flowline			11.7	1151.1
top pipe			10.8	1152.0
208+82			7.0	1155.8
209+00			5.2	1157.6
TP #26			.02	1162.80
	12.34	1175.14		
209+98 BM #24			11.08	1164.06

X-Sections — North Bainbridge

June 16, 1927.

W				℄	E			
30	23	8	3	147+00 ✓	12	20	25	30
1163.5	1163.7	1163.9	1165.4	1165.7	1165.7	1163.5	1164.3	1164.2
30 19	6	top culvert 4+6	4	147+13 ✓	12	14 top culvert 4+6	16	30
1164.3 1163.9	1164.2	1167.9	1166.6	1166.4	1166.3	1167.7	1164.4.	1164.4
30	27	19	6	148+00 ✓	5	13	30	
1169.6	1165.6	1166.0	1164.9	1165.6	1166.2	1165.4	1164.5	
30 17	10	9	6	149+00 ✓	13+16	17	22	30
1171.1 1169.6	1167.4	1166.1	1167.6	1168.1	1166.5	1168.0	1170.1	1170.2
30	14	12	9	150+00 ✓	9	10+11	12	30
1172.3	1171.7	1069.6	1170.8	1171.3	1170.2	1169.8	1171.9	1172.3
30 17	16	14	7	151+00 ✓	5	6	8	30
1173.7 1173.9	1172.2	1172.8	1173.7	1173.1 ✓	1174.4	1171.8	1173.7	1174.2
30	20	19+30	13	152+00 ✓	5	7	30	
1174.9	1174.5	1173.7	1175.2	1174.8 ✓	1173.3	1174.8	1175.1	
30 23	21	19	11	153+00 ✓	2	5	30	
1176.9 1175.9	1174.8	1175.1	1176.8	1175.9 ✓	1175.6	1176.2	1177.2	
30 22	21	17	10	154+00 ✓	3	4	30	
1178.4 1177.9	1176.6	1177.4	1174.4	1177.4 ✓	1176.9	1178.9	1179.9	
30	20 19	14	7	155+00 ✓	4	7	30	
1181.5	1179.3 1178.5	1179.4	1180.3	1179.5 ✓	1179.1	1180.8	1182.1	
30 17	16	12	5	156+00 ✓	6	8	30	
1183.3	1181.5 1180.3	1181.6	1182.5	1181.7 ✓	1180.4	1182.2	1182.3	

157 – 158+50 Ledge Park 20' wide

W				℄	E
	30	17	16	4	157.4 M ✓
	1185.9	1193.9	1183.0	1184.2	1183.9 ✓
30	23	19	15	4	158+00 ✓
1189.4	1189.0	1187.3	1186.3	1186.8	1186.6 ✓
30	21	14	14	9	159+00 ✓
1191.1	1190.4	1188.4	1188.0	1188.9	1189.4 ✓
H. tsn.				30	160+00 ✓
				1191.4	1191.0 ✓
	30		15	11	161+00 ✓
	1192.2		1191.9	1190.4	1191.6 ✓
			30	9	162+00 ✓
			1193.1	1191.4	1192.2
			30	9	163+00 ✓
			1192.5	1190.7	1191.6
			30	11	164+00 ✓
			1192.4	1190.0	1191.0
	30		12	12	165+00 ✓
	1191.1		1190.9	1190.3	1190.6
	30		11	11	166+00 ✓
	1192.4		1190.9	1190.3	1191.2
	30 ✓		11 ✓	11 ✓	167+00 ✓
	1193.2		1191.6	1190.8	1191.9
	30		12	10	168+00 ✓
	1193.3		1192.8	1191.3	1192.6

6	1	11	30
1182.6	1184.1	1185.1	1186.4
1	9	30	
1186.4	1188.5	1189.0	
10	12	30	
1187.8	1190.1	1190.6	
11	15	30	
1189.6	1190.9	1190.6	
10	12	30	
1190.1	1191.1	1190.9	
12	14	30	
1191.0	1191.9	1191.8	
12	13	30	
1190.5	1191.0	1191.0	
9	11	30	
1190.0	1190.9	1189.4	
7	9	30	
1190.3	1190.5	1190.8	
9	9	30	
1190.5	1191.1	1191.4	
9 ✓	25 ✓		
1190.9	1191.6		
10	12	30	
1191.2	1192.0	1191.9	

W			℄	E			
			169+00 ✓				
30	11	11		9	15	17	30
1192.6	1191.3	1189.7	1190.8	1190.0	1190.9	1191.5	1192.4
30	11	10	170+00 ✓	9	13	30	
1189.2	1186.8	1186.2	1187.9	1186.4	1188.1	1188.9	
30	12	11	171+00 ✓	12	19	30	
1186.4	1184.8	1184.5	1185.9	1184.9	1185.5	1185.6	
	30	12	171+50 ✓	14	18	30	
	1185.5	1184.0	1185.7	1184.1	1185.0	1184.6	
Jelly Fork	30	13	172+00 ✓	10	30		
	1184.8	1182.6	1183.9	1184.2	1184.2		
30	22	20	173+00 ✓	10	12	16	30
1179.6	1179.7	1178.8	1178.1	1177.7	1177.5	1179.5	1180.7
	30	25	173+75 ✓	24	26	30	
	1171.7	1171.9	1172.3	1170.3	1169.6	1169.7	
	30	18	174+00 ✓	4	8	11	31 35
	1170.1	1170.4	1170.8	1170.7	1168.7	1169.2	1169.2 1164.9
		30	175+00 ✓	17	22	30	
		1163.3	1164.0	1163.5	1164.8	1165.2	
			176+00 ✓	30			
			1154.2	1155.0			
			177+00 ✓	30			
			1143.8	1144.3			

W			℄	E			
		30	178+00 ✓	25	30		
		1132.7	1132.2 ✓	1131.8	1132.0		
	30	14	178+33.21 ✓	6	25	30	
	1126.2	1126.7	1127.4 ✓	1126.1	1125.2	1125.0	
		38	178+59 ✓	16	27	30	63
		1117.1	1118.4 ✓	1120.0	1117.3	1115.5	1120.1
50	40	31	15	178+74 ✓	40		
1113.2	1112.2	1110.6	1110.3	1110.8 ✓	1115.4		
	50	42	36	178+96 ✓	5	17	30	50
	1107.2	1107.2	1109.1	1109.6 ✓	1115.0	1114.9	1115.3	1112.3
42	31	6	3	179+00 ✓	38	42 +50		
1106.2	1107.4	1109.0	1112.7	1113.0 ✓	1111.0	1109.7		
54	38 Eddied.	25	22	179+52 ✓	30	43	56	
1103.8	1103.9	1103.3	1105.1	1104.4 ✓	1105.3	1104.3	1101.8	
42 Eddied. 850	26	15	13	180+00 ✓	25	40		
1106.1	1100.6	1102.2	1101.2	1100.5 ✓	1100.1	1100.5		
39	27 Eddied.	19	12	181+00 ✓	4	50		
1096.5	1096.0	1095.7 Eddied.	1094.0	1098.1 ✓	1097.4	1098.0		
	30	17 Eddied.	10	181+40 ✓	10	13	30	
	1093.6	1094.1	1093.8	1092.2 ✓	1097.9	1097.4	1097.4	
35	25	13	9	182+00 ✓	6	10	16	30+40
1093.6	1093.4	1088.4	1090.1	1090.5 ✓	1089.4	1088.8	1093.1	1094.3

179 – 1113.0
1.3
1122.3
-3.9
1118.4

W

30	10	6	182+54 ✓
1190.6	1190.7	1189.9	1084.4 ✓
30	5	2	182+73 ✓
1189.5	1189.3	1188.2	1085.5 ✓
	30	3	182+74 ✓
	1189.4	1189.0	1087.8 ✓
	30	13	183+00 ✓
	1188.0	1186.6	1086.6 ✓
		30	184+00 ✓
		1179.1	1078.1 ✓
	30	9	184+83.63 ✓
	1071.7	1071.7	1071.76.8 ✓
50	36	16	185+00 ✓
1065.2	1069.2	1066.4	1066.2 ✓
50	44	25	185+32 ✓
1051.8	1056.3	1056.8	1052.8 ✓
		50	185+53 ✓
		1048.8	1049.6 ✓
	42	24	186+00 ✓
	1049.7	1049.3	1048.7 ✓
35 17	10	8+9 6	187+00 ✓
1046.7 1046.9	1041.4	1041.1 1047.5	1048.9 ✓

E

15	25	33	37	
1185.8	1184.7	1188.6	1189.4	
6	10	21	32	
1182.6	1183.6	1184.1	1182.6	
1	8	13	22	30
1185.7	1182.8	1183.7	1183.6	1183.3
10	13	19	24	35
1185.6	1182.6	1179.6	1181.0	1181.1
30	50			
1177.5	1177.3			
16	25	40	50	
1070.9	1068.7	1064.1	1060.8	
14	25	32	50	
1064.6	1061.2	1058.2	1055.6	
28	50			
1052.3	1053.0			
41				
1051.8				
20 ✓	22 25	24	38	
1050.5	1049.5	1050.2	1051.0	
1	15	25	32	
1049.6	1049.3	1041.9	1041.9	

direction of flow west.

	W	W(f) line			℄
32 / 1045.1	10 / 1042.0	8+10 / 1051.6	5 / 1052.9		187+77 ✓ / 1052.9 ✓
35 / 1045.0	8 / 1045.2	7+8 abb / 1050.7	5 / 1052.4		187+58 ✓ / 1052.3 ✓
	40 / 1049.1	25 / 1050.1	11 / 1052.6		188+00 ✓ / 1053.1 ✓
	30 / 1060.0	9 / 1059.0	7 / 1058.6		189+00 ✓ / 1058.6 ✓
		30 / 1059.5	5 / 1059.0		190+00 ✓ / 1059.5 ✓
			30 / 1060.2		190+56 ✓ / 1060.2 ✓
30 / 1059.1	12 / 1059.1	11 / 1058.1	5 / 1058.6		190+83.93 ✓ / 1059.6 ✓
		30 / 1059.2	5 / 1059.3		191+00 ✓ / 1059.9 ✓
30 / 1063.0	27 / 1062.0	17 / 1061.5	11 / 1062.9	11 / 1062.0	192+00 ✓ / 1062.0 ✓
42 / 1057.3	30 / 1062.2	15 / 1063.8	14 / 1062.8	7 E.Rd. / 1063.3	192+48 ✓ / 1062.5 ✓
water 25 / 1056.5	19 / 1062.7	5 / 1063.5	2 / 1063.0		193+00 ✓ / 1063.7 ✓
42 / 1056.9	26 / 1061.0	22 / 1064.0	17 / 1064.8	16 / 1064.0	193+60 ✓ / 1064.4 ✓

Note 191+06.6 Drain E(f) line 1059.0 W(f) line 1058.9

McFarland Creek E(f) line

E

6 / 1052.9	8+9+10 / 1051.6	10 / 1042.1	23 / 1043.1	25 / 1045.1	35 / 1046.6
7 / 1052.2	9+10 abb. / 1051.3	10 / 1045.2	18 / 1046.6	25 / 1045.1	
6 / 1052.6	19+21 / 1048.7	21 / 1044.6		25 / 1045.7	
11 / 1058.1	16 / 1059.4	30 / 1059.8			
9 / 1059.8	20 / 1059.4	30 / 1060.5			
22 / 1059.9	30 / 1060.2				
18 / 1059.6	20 / 1059.4	22 / 1060.0		30 / 1059.5	
16 / 1059.8	17 / 1059.4	21 / 1059.7		30 / 1059.5	
6 / 1061.5	8 / 1062.0	15 / 1062.4		30 / 1063.9	
1 / 1062.2	2 / 1062.0	9 / 1064.0	17 / 1065.3	30 / 1065.5	
12 / 1065.1	30 / 1067.1				
12 / 1065.9	30 / 1068.4				

195+79 8" C.I.P.
E/E line . 1060.6
W/E line 1060.5

W					E
37	25	14	15	14	194+00 ✓
1063.1	1062.1	1064.~	1064.7	1064.1	1064.4 ✓
	30	11	10	4	194+69 ✓
	1064.9	1065.0	1064.2	1064.7	1065.5 ✓
		50	15	1	195+00 ✓
		1058.1	1058.6	1062.9	1063.6
		30	15	4	195+44 ✓
		1059.8	1058.8	1060.3	1061.5 ✓
			30	5	196+00 ✓
			1060.4	1060.7	1061.7 ✓
		30	24	21	197+00 ✓
		1062.7	1062.6	1062.1	1062.7 ✓
		30	12	6	198+00 ✓
		1063.5	1063.6	1065.6	1065.8 ✓
30	27	20	15	11	×198+38 ✓
1068.0	1067.9	1063.3	1066.6	1067.5	1067.3 ✓
40		30	19	16	199+00 ✓
1063.0		1078.5	1071.4	1072.2	1071.9 ✓
36		30	20	17	199+30 ✓
1081.1		1081.3	1074.7	1075.4	1075.1 ✓
40	27	21	18	10	200+00 ✓
1081.9	1088.0	1083.7	1084.7	1085.4	1084.4 ✓
24	~~	21	17	4	200+13.50 ✓
1044.6	1045.6	1084.6	1086.0	1086.6	1085.6 ✓

E					
5	5	30			
1064.3	1065.1	1068.2			
5	8	14	25		
1064.8	1065.6	1066.8	1067.5		
10	8	17	30		
1062.8	1063.5	1066.4	1069.6		
6	15	25	31	40	
1061.8	1061.2	1061.5	1063.0	1062.9	
7	15	30			
1062.4	1061.4	1061.1			
6	16	30			
1063.1	1062.6	1062.4			
9	12	30			
1065.7	1064.4	1064.8			
9	11	12	30		
1067.1	1064.2	1066.1	1066.5		
2	3	6	8	9	30
1071.8	1072.4	1071.9	1070.9	1072.1	1071.4
2	5	6	9	13	30
1076.5	1076.1	1074.3	1071.1	1071.1	1072.1
1	2	5	6	10	30
1084.4	1085.1	1082.5	1084.2	1081.0	1087.4
2	2	5	7	13	30
1085.6	1086.0	1085.6	1045.5	1088.0	1087.8

203+60 Ledge Rock

215+00 End Ledge Rock

Beginning W

35	24	16	12	201+00 ✓
1093.1	1093.2	1088.6	1089.6	1089.8 ✓
30	22	15	10	202+00 ✓
1098.0	1098.1	1093.8	1094.3	1094.1 ✓
22 19	14	13+14	9	203+00 ✓
1101.9 1100.2	1099.9	1099.7	1100.6	1100.9 ✓
30 1102.3	17	11	7+9	204+00 ✓
30 1114.5	1112.5	1110.2	1107.2	1108.1 1108.5 ✓
30	23	12	8	204+33 ✓
1119.3	1119.0	1117.6	1112.8	1113.0 ✓
30	22	18	13	205+00 ✓
1123.3	1122.9	1119.8	1118.1	1118.8 ✓
20 20	11	9+11	7	206+00 ✓
1135.5 1134.5	1130.9	1129.5	1130.2	1130.5 ✓
35	26	18	12	207+00 ✓
1146.0	1144.5	1139.4	1141.0	1140.7 ✓
	32	24	17	208+44 ✓
	1153.4	1152.1	1151.1	1151.1 ✓
34	27	15	12	208+82 ✓
1158.3	1158.6	1155.7	1156.2	1155.8 ✓
28 23	15	14+15	12	209+00 ✓
1159.9 1159.6	1157.1	1156.6	1157.4	1157.6 ✓
30 1159.1				

27

3	6+7	7	13	30
1089.1	1088.3	1089.4	1092.4	1092.3
6	7+8	9	15+30	
1094.2	1093.5	1094.6	1098.6	
9	11	18	30	
1100.3	1099.7	1103.6	1103.5	
8	9	11	16	30
1109.1	1107.5	1108.2	1110.5	1110.7
8	10	11	18	30
1112.5	1112.0	1113.1	1119.6	1119.6
7	12	12	19	25 40
1118.1	1117.3	1119.1	1121.9	1121.2 1120.7
9	12 9	22	30	
1130.6	1129.8	1135.6	1134.3	
7	12	17	25	
1139.6	1142.3	1147.9	1147.7	
4	30			
1152.1	1153.0			
12	19	30		
1155.4	1158.0	1158.8		
12	19	30		
1157.0	1159.6	1159.5		

N	℄ (℄ Drive)		E
30 / 1164.8; 1 / 1162.8	209+67 ✓	1162.8 ✓	1 / 1162.4; 11 / 1161.9; 16 / 1164.4; 30 / 1165.6
35 / 1167.4; 26 / 1167.7; 17 / 1165.4; 14 / 1164.6; 10 / 1165.0	210+00 ✓	1165.3 ✓	11 / 1164.6; 17 / 1167.3; 30 / 1168.3
30 / 1170.8; 22 / 1170.1; 16 / 1169.5; 14 / 1168.4; 12 / 1169.0	210+30 ✓	1169.1 ✓	8 / 1168.9; 12 / 1168.3; 14 / 1169.0; 16 / 1170.4; 30 / 1171.3
30 / 1176.9; 25 / 1177.0; 13 / 1174.1; 11 / 1174.7	211+00 ✓	1174.9 ✓	10 / 1174.4; 12 / 1173.7; 14 / 1174.7; 22 / 1177.2; 30 / 1176.9
30 / 1185.4; 25 / 1186.6; 18 / 1183.5; 12 / 118?.5; 9 / 1182.6	212+00 ✓	1182.8 ✓	11 / 1182.5; 14 / 1181.6; 17 / 1183.2; 21 / ~~1184~~ 1184.2; 30 / 1184.3
30 / 1192.7; 26 / 1192.5; 22 / 1191.0; 10 / 1188.9	213+00 ✓	1189.7 ✓	7 / 1189.7; 12 / 1188.6; 14 / 1190.1; 18 / 1192.5; 30 / 1191.4
30 / 1193.8; 20 / 1193.0; 14 / 1191.6	213+53.97 ✓	1192.1 ✓	8 / 1191.6; 11+12 / 1190.5; 12 / 1191.7; 3 / 1192.5
30 / 1194.4	213+74 ✓	1192.4 ✓	7 / 1192.1; 9+10 / 1191.3; 13 / 1192.4; 30 / 1192.9
30 / 1195.5; 13 / 1192.6	214+00 ✓	1192.9 ✓	21 / 1193.3; 25 / 1193.9; 30 / 1193.6
30 / 1198.2; 13 / 1196.9; 8 / 1194.9	215+00 ✓	1195.2 ✓	7 1 / 1194.9; 8 9 10 / 1194.3; 13 / 1195.8; 30 / 1195.8
30 / 1201.4; 12 / 1200.8; 6+7 / 1197.8; 4 / 1198.5	216+00 ✓	1198.8 ✓	11+12 / 1198.0; 15 / 1199.8; 20 / 1200.5; 30 / 1199.8
30 / 1205.0; 17 / 1204.0; 14 / 1202.4; 10 / 1201.3	217+00 ✓	1202.0 ✓	14 / 1201.0; 18 / 1201.6; 19 / 1202.7; 30 / 1202.7

W				℄
30	20	9		218+00 ✓
1206.9	1206.0	1204.8		1204.6 ✓
Bartholomew's Drive 30		17		218+15 ✓
1207.2		1206.6		1205.6 ✓
30	6	4		219+00 ✓
1209.1	1207.8	1206.4		1206.8 ✓
30	7	5		220+00 ✓
1209.7	1208.4	1207.0		1207.7 ✓
30	7	4		221+00 ✓
1209.0	1208.3	1207.5		1208.4 ✓
30	16	5	4	222+00 ✓
1209.9	1209.1	1209.0	1208.2	1208.9 ✓
30	16	5	4	223+00 ✓
1210.7	1209.9	1209.7	1208.6	1209.5 ✓
32	19	8	5	224+00 ✓
1212.3	1211.6	1211.1	1209.4	1210.3 ✓
35	20	6	4	225+00 ✓
1212.2	1211.5	1210.7	1209.7	1210.5 ✓
30	18	6	3	226+00 ✓
1211.5	1210.5	1210.5	1208.7	1209.5 ✓
30	9	5		227+00 ✓
1210.3	1208.9	1208.3		1209.3 ✓

E				
8	17	18	25	30
1204.9	1204.3	1205.2	1205.6	1205.5
same section				
8	16	17+18	19	20	30
1207.1	1206.5	1206.0	1206.8	1207.9	1207.4
12	17 18 19	21	30		
1208.0	1207.0	1208.2	1208.0		
12	15 + 17	19	30		
1208.4	1207.7	1207.6	1208.4		
7	14	18+19	20	25	30
1209.6	1209.1	1208.3	1208.9	1208.9	1209.1
7	13	17+18	19	30	
1210.0	1209.5	1208.7	1209.5	1209.5	
11	17	20	30		
1210.3	1209.5	1210.3	1210.7		
6	13	16	19	30	
1210.8	1210.5	1210.1	1210.9	1211.1	
6	13	17	19	30	
1210.1	1209.1	1208.9	1209.5	1209.9	
5	13	20	30		
1209.7	1209.3	1208.5	1208.8		

W

℄

E

30	9	7+8	228+00	✓
1209.4	1208.7	1208.0	1209.4	✓
30	10	7+9	5	229+00 ✓
1210.9	1210.0	1208.8	1209.1	1209.9 ✓
	same section			229+37 ✓
				1210.4 ✓
30	14	11	5	230+00 ✓
1211.0	1210.9	1208.8	1209.9	1210.3 ✓
30	16	12	6	231+00 ✓
1209.9	1209.6	1207.5	1208.2	1208.7 ✓
30	18	11	5	232+00 ✓
1207.8	1207.8	1206.5	1207.2	1207.5 ✓
30	14	12	5	233+00 ✓
1207.3	1207.3	1205.7	1206.4	1206.9 ✓
	30		6	239+00 ✓
	1207.0		1206.6	1207.0 ✓
	30		11 W pavement	234+94 ✓
℄ pavement	1206.9		1205.9	1205.9 ✓
	31		31	235+40 ✓
	1205.9		1205.9	1205.9 ✓
30	15	14	13	236+00 ✓
1205.6	1205.1	1204.7	1205.0	1205.4 ✓
30	15	15	3	237+00 ✓
1205.9	1205.1	1205.1	1205.9	1205.1 ✓

4	11	16+17	18	30
1209.7	1209.4	1207.9	1208.9	1208.5
10	13	16	17	20 + 30
1209.6	1208.9	1208.9	1209.8	1210.4
16	35		canfield arrive	
1210.2	1211.4			
7	14	25 + 30		
1210.2	1209.3	1211.5		
9	14	14 +22	30	
1208.5	1207.6	1208.6	1209.7	
8	11+14	17	30	
1207.3	1206.5	1208.1	1208.5	
8	11 +15	18	30	
1206.6	1206.0	1207.8	1207.9	
11	17	22 +30		
1206.5	1205.4	1207.1		
16 E pave	31	32+33	35	
1206.1	1205.9	1204.4	1205.9	
25	30+31	32		
1205.5	1204.4	1205.6		
7	8	30		
1204.9	1205.1	1205.4		
8	10	30		
1204.9	1205.✓	1206.1		

W

	30	16	16	238 +00 ✓
	1206.5	1205.7	1205.1	1206.1 ✓
30 16	15	14	8	239 +00 ✓
1206.6 1205.8	1205.2	1205.7	1206.3	1206.1 ✓
30	16	15	5	240 +00 ✓
1206.7	1206.1	1205.7	1206.5	1206.1 ✓
30	19	16	4	241 +00 ✓
1207.4	1206.9	1206.0	1206.8	1206.4 ✓
30	20	17	5	241 +60 ✓
1207.6	1207.4	1205.9	1207.0	1206.6 ✓
30	20	17	5	242 +00 ✓
1208.0	1206.8	1205.1	1206.7	1206.1 ✓
30	21	16	5	243 +00 ✓
1205.8	1205.6	1203.8	1204.6	1204.3 ✓
30	15	15	4	244 +00 ✓
1203.4	1203.3	1203.0	1203.7	1203.4 ✓
30 17	13	12	4	245 +00 ✓
1201.8 1201.6	1204.2	1203.8	1209.2	1203.8 ✓
30	17	17	4	246 +00 ✓
1203.7	1202.7	1202.4	1203.2	1202.8 ✓
30	20	16	5	246 +55 ✓
1205.1	1204.5	1202.7	1203.9	1203.5 ✓
30	19	16	4	247 +00 ✓
1203.8	1203.8	1202.4	1203.5	1203.1 ✓

E

8	9	13	30
1205.4	1205.2	1206.0	1206.8
9	9	30	
1205.5	1205.9	1206.3	
1	9	30	
1205.5	1206.0	1206.4	
8	10	30	
1206.0	1206.6	1206.9	
1	9	18	23 30
1205.9	1206.5	1206.5	1207.7 1207.2
6	17	22+30	
1205.5	1206.0	1207.0	
1	17	23	30
1203.6	1205.1	1206.7	1206.2
1	8	30	
1202.8	1203.1	1203.5	
5	8	22	25 30
1203.7	1202.4	1203.3	1201.8 1201.3
1	8	17	23+30
1202.3	1202.9	1203.4	1204.8
1	9+17	30	
1202.7	1203.4	1204.8	
1	8 15	21+30	
1202.2	1203.1	1204.9	

N

30	17	16	4	248 +00 ✓
1205	1201.8	1201.1	1202.2	1201.8 ✓
30 16	15	12	4	248+67 ✓
1201.4 1201.8	1200.1	1201.8	1202.2	1201.8 ✓
30 15	14	12	4	249+00 ✓
1201.3 1205	1199.6	1200.3	1201.0	1200.7 ✓
30	15	14	3	250+00 ✓
1199.3	1199.1	1198.3	1199.5	1199.3 ✓
30	15	14	3	251+00 ✓
1198.2	1198.2	1197.8	1199.0	1198.8 ✓
30	15	13	3	252+00 ✓
1198.7	1197.9	1197.3	1198.5	1198.3 ✓
	30	13	13	253+00 ✓
	1197.6	1197.5	1196.9	1197.8 ✓
30	14	14	2	254+00 ✓
1197.7	1197.7	1197.4	1198.2 ✓	1198.0 ✓
30	24	12	5	255+00 ✓
1198.4	1196.4	1197.8	1198.7	1198.5 ✓
30	16	16	6	256+00 ✓
1199.2	1199.0	1198.3	1199.7	1199.3 ✓
30	18	16	7	257+00 ✓
1199.6	1198.9	1198.2	1199.5	1199.1 ✓
			30	258+00 ✓
			1198.0	1198.3 ✓

E

8	12	30
1201.1	1202.0	1202.8
8	10	12 30
1201.3	1200.6	1201.3 1202.2
5	30	
1200.7	1202.3	
9	10	30
1198.6	1199.2	1200.8
8	30	
1198.6	1199.2	
8	16 +17	30
1197.5	1199.7	1199.8
11	30	
1197.4	1198.3	
9	12	30
1197.3	1198.0	1198.4
1	8	30
1197.1	1199.0	1200.5
6	9	30
1198.5	1199.6	1200.9
5	6	16 30
1198.7	1198.0	1199.4 1200.3
6	8	30
1197.6	1198.3	1199.3

W

30	16	6	259+00 ✓
1198.1	1196.3	1199.3	1198.9 ✓
30	17	7	260+00 ✓
1199.4	1199.3	1200.2	1199.6 ✓
	30	16	261+00 ✓
	1200.8	1200.3	1200.7 ✓
	30	14	7	261+32 ✓
	1199.8	1199.6	1200.1	1199.6 ✓
30	17	17	8	262+00 ✓
1199.6	1198.4	1197.5	1199.2	1197.6 ✓
30	17	17	10	263+00 ✓
1194.9	1194.1	1193.2	1194.2	1193.4 ✓
30	17	17	8	264+00 ✓
1193.7	1193.1	1192.5	1193.2	1192.0 ✓
30	16	16	7	265+00 ✓
1191.4	1191.6	1190.7	1191.6	1190.7 ✓
	30	18	7	266+00 ✓
	1190.3	1190.1	1190.3	1189.9 ✓
30	16	16	6	267+00 ✓
1190.0	1190.0	1189.6	1190.3	1190.0 ✓
24 24	21	17	16	368+00 ✓
1189.7 1191.0	1189.5	1189.6	1190.8	1190.6 ✓
	30	16	16	269+00 ✓
	1190.0	1190.0	1189.6	1190.0 ✓

E

5	7	30
1198.1	1199.1	1199.9
3	4	30
1199.2	1200.1	1202.1
5	8	25
1200.7	1201.5	1201.9
2	4	30
1199.4	1200.1	1201.2
2	6	30
1197.2	1197.5	1197.2
4	30	
1194.0	1195.4	
1	4	30
1192.0	1193.0	1199.3
2	4	30
1190.2	1190.9	1192.1
3	4	30
1189.1	1190.1	1199.1
1	9	30
1188.4	1190.0	1199.4
1	8	30
1190.6	1189.1	1189.5
1	30	
1189.6	1189.6	

W

30	17	17	5	270+00 ✓
1190.3	1190.1	1190.0	1190.6	1190.1 ✓
	30	18	1	271+00 ✓
	1191.3	1190.2	1191.0	1190.3 ✓
30	18	17	1	272+00 ✓
1192.2	1190.6	1190.8	1192.0	1191.1 ✓
30	17	16	6	273+00 ✓
1193.7	1192.8	1191.7	1192.9	1192.1 ✓
30 18	17	15	6	274+00 ✓
1195.3 1194.5	1192.6	1193.0	1194.0	1193.6 ✓
30 18	16	15	1	275+00 ✓
1196.7 1195.8	1193.9	1194.2	1195.1	1194.4 ✓
30	14	14	5	276+00 ✓
1198.4	1195.9	1194.9	1196.2	1195.9 ✓
	27	14	3	277+00 ✓
	1198.6	1196.8	1196.3	1197.7 1197.3 ✓
	35	15	3	277+63 ✓
	1198.9	1197.9	1198.2	1197.9 ✓
30	19	14	14	3	278+00 ✓
1199.4	1198.6	1197.9	1197.2	1198.3	1198.1 ✓
	30	14	13	3	279+00 ✓
	1200.0	1199.2	1197.8	1199.3	1199.0 ✓

E

6	30			
1190.0	1190.1			
3	5		20	
1190.0	1190.6		1190.7	
4	6		30	
1190.3	1191.2		1191.5	
5	6		30	
1190.9	1191.8		1193.1	
2	5+7		9	30
1193.5	1192.0		1193.9	1194.6
5	1		30	
1193.1	1194.8		1195.4	
6	7	8	30	
1195.3	1194.9	1196.3	1196.9	
9	9	30		
1196.3	1197.0	1198.0		
9	11	25		
1196.9	1198.1	1198.5		
9	12	30		
1197.2	1198.6	1199.1		
8	10	30		
1198.0	1199.1	1199.6		

W

℄

30	15	11	280+00 ✓
1200.1	1199.2	1198.9	1199.2 ✓
℄ Puzzer Dr.		30	280+80 ✓
		1199.3	1198.6 ✓
30	12	10	281+00 ✓
1199.3	1198.6	1198.0	1198.7 ✓
30	13	10	282+00 ✓
1199.3	1198.3	1197.3	1198.3 ✓
		30	282+10.6 ✓
		1198.2	1198.2 ✓
22	9	7	283+00 ✓
1196.7	1194.3	1194.0	1194.7 ✓
26	8	5	284+00
1193.2	1193.2	1194.3	1194.3

E

10	11		30	
1198.6	1199.1		1199.6	
10	30			
1198.3	1199.2			
9	30			
1198.1	1199.7			
3	13	13	30	
1198.3	1197.1	1197.7	1197.8	
3	15	16	30	
1198.5	1196.6	1198.4	1197.7	
4	13	15	30	
1195.2	1193.9	1194.5	1194.4	
3	12	16	18	30
1194.6	1194.0	1192.8	1193.3	1193.3

Levels along Chillicothe Rd from Main Market St. North to

	B.S	H.I.	F.S.	Elev.	
BM#28				1207.591	
TP	2.662	1210.253	3.913	1206.340	✓
B.M#29	3.154	1209.494	4.542	1204.952	✓
TP	—	1209.494	6.250	1203.244	✓
TP	2.235	1205.479	7.428	1198.051	✓
TP	5.809	1203.860	3.139	1200.721	✓
BM#30	3.248	1203.969	0.791	1203.178	✓
TP	—	1203.969	10.723	1193.246	✓
B.M#31	1.648	1194.894	2.582	1192.312	✓
TP	2.832	1195.144	2.060	1193.084	✓
B.M#32	7.889	1200.973	0.730	1200.243	

Correct Set

Bainbridge - Russell Township Line

June 17, 1927

Level - Notes - Peterjohn, C.F.

Rod - Pearson, D.S.

B.M#29 X on S.E. Corner of West headwall about 1000' North of Main Market Rd.

B.M#30 Spike in root of 30" forked Ash opposite Greenhouse on East side Chillicothe Rd. Opp. E.L. Lowes Greenhouse

B.M#31 X on N.W corner of West headwall about 500' North of Lowes Greenhouse

B.M#32 Spike in root of 15" Maple West side of Chillicothe Rd 140' North of Sopko drive

Check Levels from Township line to Main Market St. June 17, 1927

Level - Pearson, D.S.

Rod-Notes - Peterjohn, C.F.

	B.S	H.I	F.S	Elev
B.M #32				1200.293
TP	0.730	1200.973	7.889	1193.084
B.M #31	2.144	1195.228	2.911	1192.317
TP	2.587	1194.904	1.654	1193.250
B.M #30	10.706	1203.956	0.785	1203.171
TP	—	1203.956	3.240	1200.716
TP	3.142	1203.858	5.805	1198.053
TP	7.823	1205.876	2.635	1203.241
B.M #29	6.510	1209.751	4.796	1204.955
TP		1209.751	3.411	1206.340
B.M #28	4.584	1210.924	3.333	1207.591

PROFILE LEVELS (CONT'D)

Sta.	B.S	H.I.	R.R	Elev.
		1175.14		
℄ Rock Spring Dr. 209+67			12.3	1162.8
210+00			9.8	1165.3
210+30			6.0	1169.1
TP #1 211+00			0.20	1174.94
	12.23	1187.17		
212+00			4.4	1182.8
PR 28			.82	1186.35
	11.61	1197.96		
213+00			9.3	1189.7
213+53.91 P.I.			5.9	1192.1
℄ Summit Drive 213+74			5.6	1192.4

Sta.	B S	H.I.	R. R	Elev
		1197.96		
214+00			5.1	1192.9
215+00			2.8	1195.2
TP 4			0.21	1197.75
	10.92	1208.67		
BM=25 215+40			9.20	1199.47
216+00			9.9	1198.8
217+00			6.7	1202.0
218+00			4.1	1204.6
℄ Bartholomew Drive 218+15			3.1	1205.6
219+00			1.9	1206.8
220+00			1.0	1207.7
TP 30			0.90	1201.17

Sta.	B.S	H.I.	R.R.	Elev
				1207.77
	7.29	1215.06		
221+00			6.7	1208.4
222+00			6.2	1208.9
223+00			5.6	1209.5
BM #26 223+93			3.92	1211.14
224+00			4.8	1210.3
225+00			4.6	1210.5
226+00			5.6	1209.5
227+00			5.8	1209.3
228+00			5.7	1209.4
229+00			5.2	1209.9
Canfield drive 229+37			4.7	1210.4

Sta.	B.S	H.I.	R.R.	Elev
		1215.06		
TP 31			4.76	1210.30
	2.77	1213.07		
BM #27 229+96			.51	1212.56
230+00			2.8	1210.3
231+00			4.4	1208.7
232+00			5.6	1207.5
233+00			6.2	1206.9
234+00			6.1	1207.0
TP 32			5.30	1207.77
	2.90	1210.67		
234+63 BM #28			3.1	1207.57
234+94			4.9	1205.9

Sta.	B.S	H.I	R.R	Elev.
		1210.67		
235+00			4.8	1205.9
236+00			5.3	1205.4
237+00			5.0	1205.7
238+00			4.6	1206.1
239+00			4.6	1206.1
240+00			4.6	1206.1
241+00			4.3	1206.4
241+60			4.1	1206.6
242+00			4.6	1206.1
243+00			6.4	1204.3
244+00			7.3	1203.4
245+00			6.9	1203.8
BM #29			5.71	1204.96
245+00				

Sta.	B.S	H.I.	R.R	Elev.
				1204.96
	1.60	1206.56		
℄ Culvert 245 +09			2.7	1203.9
E.H. Wall.			1.6	1205.0
E (f) line			5.0	1201.6
E Soffit			4.3	1202.3
W (f) line.			4.9	1201.7
W Soffit			4.2	1202.4
246+00			3.8	1202.8
246+55			3.1	1203.5
247+00			3.5	1203.1
248+00			4.8	1201.8
248+67			4.8	1201.8
" +75	E (f) line	8" C.I.P.	6.0	1200.6
	W " "		6.6	1200.0
249+00			5.9	1200.7

Sta.	B.S.	H.I.	R.R.	Elev.
		1206.56		
250+00			7.3	1199.3
251~~+00~~			7.8	1198.8
12" C.I.P. Drain				
251+33	E(f) line		8.9	1197.7
	W(f) line		9.1	1197.5
252+00			8.3	1198.3
253+00			8.8	1197.8
+60			8.1	1198.5
E f line			9.5	1197.1
W f line			9.6	1197.0
TP			8.96	1197.60
	6.27	1203.87		
254+00			5.9	1198.0
255+00			5.4	1198.5
256+00			4.6	1199.3

Sta.	B.S.	H.I.	R.R.	Elev.
		1203.87		
257+00			4.8	1199.1
Box Culvert 8" sq.				
257+35	E f line		6.5	1197.4
	W f line		6.7	1197.2
258+00			5.6	1198.3
259+00			5.0	1198.9
260+00			4.3	1199.6
T.P.			3.07	1200.80
	3.57	1204.37		
BM #30			1.19	1203.18
261+00			3.7	1200.7
Drive Way 261+32			4.8	1199.6
262+00			6.8	1197.6

Sta.	B.S	H.I.	R.R.	Elev.
		1204.37		
263+00			11.0	1193.4
264+00			12.4	1192.0
PI			12.51	1191.86
	3.02	1194.88		
265+00			4.2	1190.7
266+00			5.0	1189.9
267+00			4.9	1190.0
268+00			4.3	1190.6
℄ Culvert				
268+24	Road		4.2	1190.7
E H. wall			3.0	1191.9
E. Soffit			5.5	1189.4
E flr			6.8	1188.1
W flr			6.6	1188.3
W Soffit			5.4	1189.5
268+08			2.57	1192.31
BM #31				
also W.H. wall				

Sta.	B.S	H.I.	R.R.	Elev.
		1194.88		
269+00			4.9	1190.0
270+00			4.8	1190.1
271+00			4.6	1190.3
272+00			3.8	1191.1
273+00			2.8	1192.1
274+00			1.3	1193.6
275+00			0.5	1194.4
PI			.64	1194.24
	8.68	1202.92		
276+00			1.0	1195.9
277+00			5.6	1197.3
+63 Sopko Ar. ℄			5.0	1197.9
278+00			4.4	1198.1

Sta.	B.S	H.I.	R.R	Elev
BM #32		1202.92		
278 +66			2.67	1200.25
279 +00			3.9	1199.0
280 +00			3.7	1199.2
& Powder Dr.				
280 +80			4.3	1198.6
281 +00			4.2	1198.7
282 +00			4.6	1198.3
two Lane				
282 +10.6			4.7	1198.2
283 +00			8.2	1194.7
284 +00			8.6	1194.3

B.M. Elevations From U.S.G.B.M To Market Rd.

~~No.~~	No	Elev.
~~1~~	16	1190.827
~~2~~	17	1192.250
~~3~~	18	1177.835
~~4~~	19	1149.361
~~5~~	20	1116.686
~~6~~	21	1054.557
~~7~~	22	1053.094
~~8~~	23	1066.868
~~9~~	24	1164.058
~~10~~	25	1199.480
~~11~~	26	1211.178
~~12~~	27	1212.582
~~13~~	28	1207.591

B.M. Elevations From Market Rd. To Township Line

~~14~~	29	1204.952
~~15~~	30	1203.178
~~16~~	31	1192.312
~~17~~	32	1200.243

KEITH'S RAILROAD CURVE TABLES.

Published by KEUFFEL & ESSER CO., New York.

HOW TO USE KEITH'S TABLES.

EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle of Intersection or I. P.=23° 20′ to the R. at Station 542+72.

Ext. in Tab. IV opposite 23° 20′=120.87
120.87÷12=10.07. Say a 10° Curve.

Tan. in Tab. IV opp. 23° 20′=1183.1
1183.1÷10=118.31.

Tab. V. correction for A. 23° 20′ for a 10° Cur.=0.16
118.31+0.16=118.47=corrected Tangent.

(If corrected Ext. is required find in same way)
Ang. 23° 20′=23.33°÷10=2.3333=L. C.

2° 19½′=def. for sta.	542	I. P =sta.	542+72
4° 49½′= " " "	+50	Tan.=	1.18.47
7° 19½′= " " "	543	B. C.=sta.	541+53.53
9° 49½′= " " "	+50	L. C.=	2.33.33
11° 40′= " " "	543+	E. C.=sta.	543+86.86
	86.86		

100—53.53=46.47×3′(def. for 1 ft. of 10° Cur.)=139.41′=
2° 19½″=def. for sta. 542.

Def. for 50 ft.=2° 30′ for a 10° Curve.

Def. for 36.86 ft.=1° 50½′ for a 10° Curve

(These tables are published in Field Books of KEUFFEL & ESSER Co., New York, N. Y.)

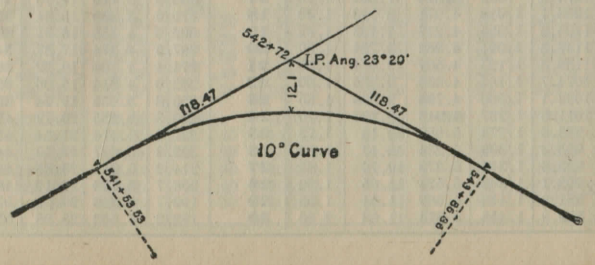


Table I. — Minutes in Decimals of a Degree.

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

Table II. — Inches in Decimals of a Foot.

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Table III. — Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot
0° 10′	34377.	.036	.145	.291	0.05′	7°	819.0	1.528	6.105	12.21	2.10′
20	17189.	.073	.291	.582	0.10	20′	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	8	716.8	1.746	6.976	13.95	2.40
1	5729.6	.218	.873	1.745	0.30	20	688.2	1.819	7.266	14.53	2.50
10	4911.2	.255	1.018	2.036	0.35	30	674.7	1.855	7.411	14.82	2.55
20	4297.3	.291	1.164	2.327	0.40	40	661.7	1.892	7.556	15.11	2.60
30	3819.8	.327	1.309	2.618	0.45	9	637.3	1.965	7.846	15.69	2.70
40	3437.9	.364	1.454	2.909	0.50	20	614.6	2.037	8.136	16.27	2.80
50	3125.4	.400	1.600	3.200	0.55	30	603.8	2.074	8.281	16.56	2.85
2	2864.9	.436	1.745	3.490	0.60	40	593.4	2.110	8.426	16.85	2.90
10	2644.6	.473	1.891	3.781	0.65	10	573.7	2.183	8.716	17.43	3.00
20	2455.7	.509	2.036	4.072	0.70	30	546.4	2.292	9.150	18.30	3.15
30	2292.0	.545	2.181	4.363	0.75	11	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	30	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	12	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	30	459.3	2.730	10.89	21.77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410.3	3.058	12.18	24.37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396.2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4.50
4	1432.7	.873	3.490	6.980	1.20	30	370.8	3.387	13.49	26.97	4.65
10	1375.4	.909	3.635	7.271	1.25	16	359.3	3.496	13.92	27.84	4.80
20	1322.5	.945	3.718	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

Table IV. — Tangents and Externals to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10′	58.34	.30	10′	560.11	27.31	10′	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

TABLE IV. — Tangents and Externals to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
91°	5830.5	2444.9	**101°**	6950.6	3278.1	**111°**	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
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	**103**	7203.2	3474.4	**113**	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
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	6162.6	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	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	**105**	7467.0	3682.3	**115**	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
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	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	**107**	7743.2	3902.9	**117**	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
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	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
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	**110**	8182.8	4259.7	**120**	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V. Corrections for use with table IV,

For Tangents Add

△ ANGLE	CURVE 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.10	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1 54	1 66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3 50	3.95	4.40	4.88	5.37	5.85	6.34

For Externals Add

ANGLE	CURVE 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	188	.236	.283	.332	.381	420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	777	.877	977	1.07	1.18	1.29	1.39
80°	.110	220	332	.445	.558	671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.985	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96

Table VI. Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 / sin. def. ang.	½ sub chord / R = sin of def. angle 12.5 Ft.	15 Ft.	20 Ft	25 Ft.	Length of arc for 100 ft.
30°	193.18	1° 51′	2° 17′	2° 58′	3° 43′	101.15
32°	181.39	1° 59′	2° 25′	3° 10′	3° 58′	101.33
34°	171.01	2° 06′	2° 33′	3° 21′	4° 12′	101.48
36°	161.80	2° 13′	2° 41′	3° 33′	4° 26′	101.66
38°	153.58	2° 20′	2° 49′	3° 44′	4° 40′	101.85
40°	146.19	2° 27′	2° 57′	3° 55′	4° 54′	102.06
42°	139.52	2° 34′	3° 05′	4° 07′	5° 08′	102.29
44°	133.47	2° 41′	3° 13′	4° 18′	5° 22′	102.53
46°	127.97	2° 48′	3° 21′	4° 29′	5° 36′	102.76
48°	122.92	2° 55′	3° 29′	4° 40′	5° 50′	103.00
50°	118 31	3° 02′	3° 38′	4° 51′	6° 04′	103.24
52°	114.06	3° 09′	3° 46′	5° 02′	6° 17′	103 54
54°	110.11	3° 16′	3° 54′	5° 13′	6° 31′	103 84
56°	106.50	3° 22′	4° 02′	5° 23′	6° 44′	104.14
58°	103.14	3° 29′	4° 10′	5° 34′	6° 57′	104.43
60°	100.00	3° 35′	4° 18′	5° 44′	7° 11′	104.72

CURVE FORMULAS.

$T = R \tan \frac{1}{2} I$

$T = \frac{50 \tan. \frac{1}{2} I}{\text{Sin. D}}$

$\text{Sin. D} = \frac{50}{R}$

$\text{Sin. D} = \frac{50 \tan. \frac{1}{2} I}{T}$

$R = T \cot. \frac{1}{2} I$

$R = \frac{50}{\text{Sin. D}}$

$E = R \text{ ex. sec. } \frac{1}{2} I$

$E = T \tan \frac{1}{4} I$

$\text{Chord def.} = \frac{\text{chord}^2}{R}$

$\text{No. chords} = \frac{\frac{1}{2} I}{D}$

$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

Table IV. contains Tangents and Externals to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Ext. opposite the given Central Angle by the given External.

To find. Nat. Tan. and Nat. Ex. Sec. for any angle by Table IV.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance: Multiply the angle by .01745, and the product by the distance.

Right Angle Triangles. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt 10 $10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. 25. $25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875$ = Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Natural Sines

Deg.	0′	10′	20′	30′	40′	50′	Deg.	Deg.	0′	10′	20′	30′	40′	50′	Deg.
0	0000	0029	0058	0087	0116	0145	89	40	6428	6450	6472	6494	6517	6539	49
1	0175	0204	0233	0262	0291	0320	88	41	6561	6583	6604	6626	6648	6670	48
2	0349	0378	0407	0436	0465	0494	87	42	6691	6713	6734	6756	6777	6799	47
3	0523	0552	0581	0610	0640	0669	86	43	6820	6841	6862	6884	6905	6926	46
4	0698	0727	0756	0785	0814	0843	85	44	6947	6967	6988	7009	7030	7050	45
5	0872	0901	0929	0958	0987	1016	84	45	7071	7092	7112	7133	7153	7173	44
6	1045	1074	1103	1132	1161	1190	83	46	7193	7214	7234	7254	7274	7294	43
7	1219	1248	1279	1305	1334	1363	82	47	7314	7333	7353	7373	7392	7412	42
8	1392	1421	1449	1478	1507	1536	81	48	7431	7451	7470	7490	7509	7528	41
9	1564	1593	1622	1650	1679	1708	80	49	7547	7566	7585	7604	7623	7642	40
10	1736	1765	1794	1822	1851	1880	79	50	7660	7679	7698	7716	7735	7753	39
11	1908	1937	1965	1994	2022	2051	78	51	7771	7790	7808	7826	7844	7862	38
12	2079	2108	2136	2164	2193	2221	77	52	7880	7898	7916	7934	7951	7969	37
13	2250	2278	2306	2334	2363	2391	76	53	7986	8004	8021	8039	8056	8073	36
14	2419	2447	2476	2504	2532	2560	75	54	8090	8107	8124	8141	8158	8175	35
15	2588	2616	2644	2672	2700	2728	74	55	8192	8208	8225	8241	8258	8274	34
16	2756	2784	2812	2840	2868	2896	73	56	8290	8307	8323	8339	8355	8371	33
17	2924	2952	2979	3007	3035	3062	72	57	8387	8403	8418	8434	8450	8465	32
18	3090	3118	3145	3173	3201	3228	71	58	8480	8496	8511	8526	8542	8557	31
19	3256	3283	3311	3338	3365	3393	70	59	8572	8587	8601	8616	8631	8646	30
20	3420	3448	3475	3502	3529	3557	69	60	8660	8675	8689	8704	8718	8732	29
21	3584	3611	3638	3665	3692	3719	68	61	8746	8760	8774	8788	8802	8816	28
22	3746	3773	3800	3827	3854	3881	67	62	8829	8843	8857	8870	8884	8897	27
23	3907	3934	3961	3987	4014	4041	66	63	8910	8923	8936	8949	8962	8975	26
24	4067	4094	4120	4147	4173	4200	65	64	8988	9001	9013	9026	9038	9051	25
25	4226	4253	4279	4305	4331	4358	64	65	9063	9075	9088	9100	9112	9124	24
26	4384	4410	4436	4462	4488	4514	63	66	9135	9147	9159	9171	9182	9194	23
27	4540	4566	4592	4617	4643	4669	62	67	9205	9216	9228	9239	9250	9261	22
28	4695	4720	4746	4772	4797	4823	61	68	9272	9283	9293	9304	9315	9325	21
29	4848	4874	4899	4924	4950	4975	60	69	9336	9346	9356	9367	9377	9387	20
30	5000	5025	5050	5075	5100	5125	59	70	9397	9407	9417	9426	9436	9446	19
31	5150	5175	5200	5225	5250	5275	58	71	9455	9465	9474	9483	9492	9502	18
32	5299	5324	5348	5373	5398	5422	57	72	9511	9520	9528	9537	9546	9555	17
33	5446	5471	5495	5519	5544	5568	56	73	9563	9572	9580	9588	9596	9605	16
34	5592	5616	5640	5664	5688	5712	55	74	9613	9621	9628	9636	9644	9652	15
35	5736	5760	5783	5807	5831	5854	54	75	9659	9667	9674	9681	9689	9696	14
36	5878	5901	5925	5948	5972	5995	53	76	9703	9710	9717	9724	9730	9737	13
37	6018	6041	6065	6088	6111	6134	52	77	9744	9750	9757	9763	9769	9775	12
38	6157	6180	6202	6225	6248	6271	51	78	9781	9787	9793	9799	9805	9811	11
39	6293	6316	6338	6361	6383	6406	50	79	9816	9822	9827	9833	9838	9843	10
Deg.	60′	50′	40′	30′	20′	10′	Deg.	Deg.	60′	50′	40′	30′	20′	10′	Deg.

Deg.	0′	10′	20′	30′	40′	50′	Deg.
80	9848	9853	9858	9863	9868	9872	9
81	9877	9881	9886	9890	9894	9899	8
82	9903	9907	9911	9914	9918	9922	7
83	9925	9929	9932	9936	9939	9942	6
84	9945	9948	9951	9954	9957	9959	5
85	9962	9964	9967	9969	9971	9974	4
86	9976	9978	9980	9981	9983	9985	3
87	9986	9988	9989	9990	9992	9993	2
88	9994	9995	9996	9997	9997	9998	1
89	9998	9999	9999	9999	1.0000	1.0000	0
Deg.	60′	50′	40′	30′	20′	10′	Deg.

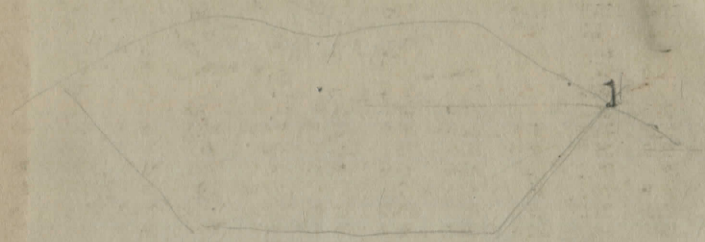
Natural Cosines

Natural Tangents

deg.	0′	10′	20′	30′	40′	50′	deg.	deg.	0′	10′	20′	30′	40′	50′	deg.
0	0000	0029	0058	0087	0116	0145	89	40	8391	8441	8491	8541	8591	8642	49
1	0175	0204	0233	0262	0291	0320	88	41	8693	8744	8796	8847	8899	8952	48
2	0349	0378	0407	0437	0466	0495	87	42	9004	9057	9110	9163	9217	9271	47
3	0524	0553	0582	0612	0641	0670	86	43	9325	9380	9435	9490	9545	9601	46
4	0699	0729	0758	0787	0816	0846	85	44	9657	9713	9770	9827	9884	9942	45
5	0875	0904	0934	0963	0992	1022	84	45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
6	1051	1080	1110	1139	1169	1198	83	46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
7	1228	1257	1287	1317	1346	1376	82	47	1.0724	1.0786	1.0850	1.0913	1.0977	1 1041	42
8	1405	1435	1405	1495	1524	1554	81	48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
9	1584	1614	1644	1673	1703	1733	80	49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
10	1763	1793	1823	1853	1883	1914	79	50	1.1918	1 1988	1.2059	1.2131	1.2203	1.2276	39
11	1944	1974	2004	2035	2065	2095	78	51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
12	2126	2156	2186	2217	2247	2278	77	52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
13	2309	2339	2370	2401	2432	2462	76	53	1.3270	1.3351	1.3452	1.3514	1.3597	1 3680	36
14	2493	2524	2555	2586	2617	2648	75	54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	35
15	2679	2711	2742	2773	2805	2836	74	55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
16	2867	2899	2931	2962	2994	3026	73	56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
17	3057	3089	3121	3153	3185	3217	72	57	1.5399	1.5497	1.5597	1.5697	1 5798	1.5900	32
18	3249	3281	3314	3346	3378	3411	71	58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
19	3443	3476	3508	3541	3574	3607	70	59	1.6643	1 6753	1.6864	1.6977	1.7090	1 7205	30
20	3640	3673	3706	3739	3772	3805	69	60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
21	3839	3872	3906	3939	3973	4006	68	61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
22	4040	4074	4108	4142	4176	4210	67	62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
23	4245	4279	4314	4348	4383	4417	66	63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
24	4452	4487	4522	4557	4592	4628	65	64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
25	4663	4699	4734	4770	4806	4841	64	65	2 1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
26	4877	4913	4950	4986	5022	5059	63	66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
27	5095	5132	5169	5206	5243	5280	62	67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
28	5317	5354	5392	5430	5467	5505	61	68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
29	5543	5581	5619	5658	5696	5735	60	69	2.6051	2 6279	2.6511	2.6746	2.6985	2.7228	20
30	5774	5812	5851	5890	5930	5969	59	70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
31	6009	6048	6088	6128	6168	6208	58	71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
32	6249	6289	6330	6371	6412	6453	57	72	3.0777	3 1084	3.1397	3.1716	3.2041	3.2371	17
33	6494	6536	6577	6619	6661	6703	56	73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
34	6745	6787	6830	6873	6916	6959	55	74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
35	7002	7046	7089	7133	7177	7221	54	75	3.7321	3.7760	3.8208	3.8657	3.9136	3.9617	14
36	7265	7310	7355	7400	7445	7490	53	76	4.0108	4.0611	4.1126	4.1653	4.2103	4.2747	13
37	7536	7581	7627	7673	7720	7766	52	77	4 3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
38	7813	7860	7907	7954	8002	8050	51	78	4 7046	4.7729	4.8430	4.9152	4.9894	5 0658	11
39	8098	8146	8195	8243	8292	8342	50	79	5.1446	5.2257	5,3093	5.3955	5.4845	5.5764	10
deg.	60′	50′	40′	30	20′	10′	deg.	deg.	60′	50′	40′	30′	20′	10′	deg.

deg.	0′	10′	20′	30′	40′	50′	deg.
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.727	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.542	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0
deg.	60′	50′	40′	30′	20′	10′	deg.

Natural Cotangents



DISTANCES FROM CENTER OF ROADWAY FOR CROSS SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.