FIELD BOOK

361

48

KEUFFEL & ESSER CO.

DRAWING MATERIALS
AND
SURVEYING INSTRUMENTS.
NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

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

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	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.

Property of
County Engineers Office
Court House
Waterloo Iowa

BLACK HAWK COUNTY
ENGINEER'S OFFICE
COURT HOUSE
WATERLOO, IOWA 50703

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Corner Stone Ties

BLACK HAWK COUNTY
ENGINEER'S OFFICE
COURT HOUSE
WATERLOO, IOWA 50703

					℄ Grade				
		951.8							
B.M.	6.00	951.77		945.77		Rt. of 210+20 Spike in Root C.W. Tree.			
212		F2.0 / ℄		945.62 / 6.15	945.00			943.2 / 8.6	
+50									
211		F1.8 / ℄			945.28			943.7 / 8.1	
+50	Twp. Rd.		C2.2 / 26	945.62 / 6.15		943.4	946.9 / 4.9 / 28	945.42 / 6.35	945.6 / 6.2 / 28
210	C3.3 / 28	F0.1 / ℄		C2.0 / 28	945.57	943.57			
209	C4.3 / 28	C1.3 / ℄	C2.5 / 28		945.34	943.34	947.6 / 4.2 / 28	946.6 / 5.2	945.8 / 6.0 / 28
+50									
208	C3.9 / 28	C1.4 / ℄	C2.9 / 28		944.05	942.05	945.9 / 5.9 / 28	945.4 / 6.4	944.9 / 6.9 / 28
207	C2.9 / 28	C0.7 / ℄	C4.7 / 28		941.71	939.71	942.6 / 9.2 / 28	942.4 / 9.4	942.4 / 9.4 / 28
T.P.	1.22	944.07	8.92	942.85					
206		F0.7 / ℄			938.86			938.2 / 5.8	
+50									
205	"	F1.6 / ℄			936.71			935.27 / 8.80	
T.P.	5.29	939.75	9.61	934.46					
204+50								934.25 / 5.5	
204	"	F1.8 / ℄			936.00				

B.M. High point on Boulder Rt. 20+60 935.14

		939.75			℄ Grade				
203	C	F 1.9 / ℄			936.00		4.75	934.20 / 5.55	
B.M. ✓			4.6	935.15					
202	C 1.6 / 28	F 1.5 / ℄	C 0.8 / 25		936.22	934.22	935.85 / 3.9 / 28	934.85 / 4.9	933.45 / 6.3 / 25
201	C 3.0 / 28		C 1.2 / 25		937.11	935.11	938.05 / 1.7 / 28	937.15 / 2.6	936.35 / 3.4 / 25
200									

B.M.				896.91		Spikein Poplar St. 200' Rt. 170+54
170						
169					898.00	
168					898.00	
167					898.00	
166					897.75	F 3.8 / 18.7 F 1.6 / 15.4
	2.62	900.17	432	897.55		
165					897.50	F 3.6 / 18.4 F 0.4 / 13.7
164					897.25	
163						
162						
161						
160						
159						
B.M.	4.65	901.87		897.22		X E. Hdwall

	0.95	927.53		926.58	
112+74					
112	19+	C3.2 / 23.8	C0.5	C3.1 / 23.6	924.63
111	C2.4 / 26	F0.4	C2.5 / 26		921.25
110	C1.8 / 26	F0.6	C1.5 / 26		917.88
	0.89	916.12	12.30	915.23	
109	C2.1 / 26	F0.3	C1.8 / 26		914.50
108	C2.2 / 26	F0.5	C2.2 / 26		911.13
107	C2.2 / 26	F0.9	C2.2 / 26		907.75
T.P.	2.51	906.68	11.95	9.04.17	
106	C2.0 / 26	F0.7	C2.1 / 26		904.36
LEAVE SPACE					
105+50					902.69
105	C1.9 / 26	F0.3	C1.5 / 26		901.29
104	C0.9 / 25	F0.9	F2.0 / 16.0	25	897.92
B.M.			5.35	901.33 / 901.39	

927.53

926.25 926.83 925.94 925.53 926.4 926.9 926.2 925.5 925.6 926.3 926.6

0.9 0.5 0.7 2.5 2.6 2.0 1.1 0.6 1.3 2.0 1.9 1.2 0.9

32 27 22 20 17 15 11 12 15 19 22 29

925.2 925.6 925.6 923.2 924.0 924.5 925.1 924.5 923.9 924.1 925.7 925.9

922.63 2.3 1.9 1.9 4.3 3.5 3.0 2.4 3.2 3.6 3.4 1.8 1.6

32 29 20 17 15 11 12 14 18 23 32

921.3 921.7 921.7 921.6 918.9 919.9 920.6 920.5 919.8 919.0 921.2 921.8 921.9

919.25 5.8 5.8 5.9 8.6 7.6 6.9 920.1 7.0 7.7 8.5 6.3 5.7 5.6

32 28 26 20 18 15 12 6.6 10 14 16 18 26 32

17.3 17.8 917.7 17.6 15.2 16.6 16.9 15.4 15.6 17.1 917.4 17.7 17.3

915.88 10.2 9.7 7.8 9.9 12.3 11.0 917.3 10.6 12.1 11.9 10.4 10 9.8 10.0

31 29 26 21 17 15 10.2 10 15 17 19 26 29 32

(916.1)

14.0 14.5 914.4 14.4 11.7 13.3 913.2 13.8 13.2 12.1 14.0 914.3 14.2

912.5 1.6 1.5 1.7 4.4 2.8 1.9 2.3 2.9 4.0 2.1 1.8 1.9

30 28 26 19 17 14 10 13 15 17 26 32

910.9 11.4 11.3 11.2 8.8 8.7 9.4 10.2 909.6 9.9 8.7 10.9 911.3 11.3

909.13 4.7 4.8 4.9 7.3 7.4 6.7 5.9 908.6 6.2 7.4 5.2 4.8 4.8

5.2 28 26 21 19 17 16 12 5.5 12 15 18 26 31

907.8 907.7 907.6 905.2 905.3 905.2 906.9 906.4 905.2 905.4 907.8 907.9 907.9

905.75 8.8 8.8 8.5 10.1 10.8 9.9 9.2 9.7 10.9 10.7 8.3 8.2 8.2

30 28 26 21 19 17 14 906.7 15 16 18 26 30

904.2 904.2 904.4 902.7 903.6 903.2 903.7 903.3 902.6 903.6 903.2 903.7 904.8 904.5

902.36 2.5 2.5 2.3 2.7 4.0 4.1 3.5 3.0 3.4 4.1 4.1 3.5 3.0 2.2 2.2

31 29 26 24 20 17 16 14 15 18 19 21 23 31

901.3 901.3 901.1 899.7 900.3 900.6 901.0 900.9 900.4 900.3 901.0 900.8 900.9

899.29 5.6 5.5 5.5 7.0 6.4 6.1 5.7 5.8 6.3 6.5 5.7 5.8 5.8

31 25 23 21 14 12 11 14 17 18 25 32

898.8 898.5 898.8 898.2 898.7 899.1 899.0 899.0 898.3 897.9 897.7 897.9 897.9

897.92 7.9 7.9 7.9 8.6 8.5 8.0 7.6 7.7 8.5 8.8 8.0 8.8 8.8 8.8

29 25 19 18 14 12 10 10 12 16 17 22 25 30

Top of N. end 18" X 28' Conc. outlet X 105+48

123	C2.1 / 32	C0.3 / E	C1.8 / 32	903.80	901.80	903.9 903.6 0 5 0 3 0 2 5 0 3 0 3 3 0 9 9 / 4.7 5.1 6.1 5.3 5.3 4.7 / 32 20 20 17 14 9	904.1 / 4.5
						03.6 03.0 05.2 03.5 03.9 903.6 / 5.1 5.6 6.4 5.1 4.7 5.0 / 10 14 17 20 28 32	
122	C2.1 / 32	0.0 / E	C1.6 / 32	905.50	903.50	905.6 / 3.0 3.2 3.6 4.8 3.8 3.2 / 32 25 21 19 16 10	905.5 / 3.1
						04 05 03 03 04 05 4 / 905.5 04 9 04.4 03.7 05.0 905.1 / 3.9 4.2 4.9 3.6 3.5 / 11 13 17 19 32	
T.P.	3.47	908.59	5.93	905.12			908.6
121	C2.0 / 26	F0.2 / E	C1.3 / 25	907.50	905.50	Hub at 07.7 07.8 07.7 08.5 05.3 06.0 / 33.2 4.0 5.5 5.7 5.0 / 35 29 20 17 17 16	907.3 / 3.8
						06.0 04.7 05.0 06.7 06.5 / 5.0 6.3 6.0 4.3 4.5 / 13 15 17 19 33	
120	25' Lt	F1.3 / 25	C1.0 / 25	25' Rt.	909.50	08.9 09.1 08.5 06.9 06.8 07.7 / 21.9 2.5 4.1 4.1 3.3 / 33 28 24 19 18 17	908.1 / 2.9
						07.8 07.0 06.9 08.1 08.3 / 3.2 4.0 4.1 2.9 2.7 / 13 14 17 18 33	911.0
	1.70	911.05	9.81	909.35			
119	C1.7 / 26 Lt	F0.6	C0.8 / 25	25' Rt.	911.50	11.4 11.6 11.9 09.2 09.0 09.9 / 8.1 7.6 8.2 10.0 10.2 9.3 / 35 27 22 19 18 16	910.9 / 8.3
						08.9 08.8 08.8 10.4 10.4 / 9.3 10.4 10.4 8.8 8.8 / 13 15 16 18 33	
118	C2.2 / 22.3	F0.2 / E	C1.8 / 21.7	913.50	911.50	13.8 14.2 13.6 11.8 11.8 12.6 / 5.4 5.0 5.6 7.4 7.4 6.6 / 33 27 21 19 18 16	913.3 / 5.9
						12.4 11.2 11.1 13.1 13.2 / 6.8 8.0 8.1 6.1 6.0 / 13 15 17 18 33	
117	C3.2 / 23.8	0.0	C1.9 / 21.9	915.64	913.64	16.4 16.6 16.1 14.3 14.2 15.4 / 2.8 2.6 3.1 4.9 5.0 3.8 / 33 27 21 19 18 16	915.7 / 3.5
						14.8 13.7 13.5 15.4 15.3 / 4.4 5.5 5.7 3.8 3.9 / 14 16 17 19 32	
116	C3.4 / 24.1	0.0	C2.4 / 22.6	918.63	916.63	19.3 19.1 19.1 17.4 17.4 18.5 / +0.1 +0.3 0.1 1.8 1.8 0.7 / 32 27 20 19 17 16	918.6 / 0.6
						17.7 16.4 16.8 18.4 18.5 / 1.5 2.8 2.4 0.8 0.7 / 14 17 18 19 32	918.3
	0.90	919.16	11.56	918.26			
115	C3.0 / 23.5	0.0 / E	C2.7 / 22.1	921.75	919.75	23.5 23.8 22.7 20.1 20.1 20.7 / 7.3 7.0 7.1 9.7 9.7 9.1 / 31 28 24 21 19 18	21.4 / 8.1
						21.7 21.4 20.8 19.7 20.0 21.7 21.8 / 8.4 9.0 10.1 9.8 8.1 8.0 / 11 14 16 18 21 28	
114	C2.3 / 22.5	F0.2	C1.7 / 21.6	924.88	922.88	24.9 24.8 24.5 23.1 22.8 24.1 / 4.9 4.8 5.0 6.7 7.0 5.7 / 33 26 21 20 18 13.2	24.6
						24.3 22.9 23.1 24.2 24.7 / 5.5 6.4 6.7 5.6 5.1 / 10 15 17 20 30	
Sta. 112+50							
113	19' out	C0.6 / E		926.12	924.12	C2.7 / 23 26.8 26.8 24.7 26.1 / 3.1 3.0 5.1 3.7 / 32 22 19 12	926.7 / 3.1
						26.9 26.7 26.5 / 3.8 4.9 3.1 / 11 16 24	3.3 / 28
B.M.	3.24	929.82		926.58		Spike in Maple	929.8

C2.6 / 22.9

B.M. Spike in Maple 10 Yard 40 Rt. 926.58

136	F3.4 / 18.1	F1.3	F3.2 / 17.8	894.2	
135	F2.8 / 17.2	F1.6	F1.7 / 15.6	894.2	
134	F2.5 / 16.8	F1.2	F1.6 / 15.4	894.2	
133	F2.6 / 16.9	F1.1	F1.1 / 14.7	894.2	
132	C1.5	F0.2	C1.0 / 32	894.2	
	3.17	896.88	11.21	893.71 / 893.83	Conv. Elev. 893.96
131	C1.2	F0.2	C1.1 / 32	894.46	
130	C1.3 / 32	F0.1	C2.4 / 32	895.83	
129	C2.6 / 32	C0.7	C3.8 / 32	897.67	
128	C2.3 / 32	C1.2	C4.0 / 32	899.37	
127	C1.3 / 32	C0.3	C3.3 / 32	900.30	
126	C0.5 / 32	C1.0	C1.5 / 32	901.10	
	3.81	905.04	7.36	901.23	
125	C0.9 / 32	F0.1	C0.7 / 32	901.90	
124	C1.9 / 32	C0.2	C1.4 / 32	902.70	
		908.59			

	91.5 91.4 91.3 90.3 91.3 92.3	89.7	93.6 91.8 90.7 90.8 91.8 91.3		
	5.4/4 5.5/30 5.6/20 6.6/17 5.6/10 4.6/7	4.2	4.3/10 5.1/15 6.2/18 6.1/22 5.1/25 5.6/43		
	91.9 91.7 91.7 91.1 91.4 92.5	89.2	92.3 90.8 90.8 91.8 91.7		
	5.0/42 5.2/27 5.2/21 5.8/13 5.5/8 4.4/6	4.5	4.6/16 6.1/20 6.0/25 5.1/26 5.2/43		
	92.3 92.3 91.6 91.5 91.8 92.5	89.8	92.3 91.4 91.2 91.5 93.1 92.1 91.7		
	4.6/42 4.6/24 5.3/21 5.4/16 5.1/8 4.4/7	4.1	4.6/15 5.5/19 5.7/20 5.4/22 4.8/25 4.8/29 5.2/43		
	92.8 92.9 93.7 92.0 91.8 92.5	89.9	92.8 91.9 91.9 93.7 93.5 92.5		
	4.3/43 4.0/26 4.2/22 4.9/19 5.1/13 4.4/8	4.0	4.1/16 5.0/19 5.0/21 4.8/23 4.2/25 4.4/32 4.4/43		
92.00	93.5 93.6 93.8 92.4 92.2 93.2	89.3	93.2 93.5 93.7 93.0		
	3.4/32 3.3/28 4.1/26 4.5/19 4.7/15 3.9/10	3.1	3.7/15 4.4/19 4.2/22 3.9/32		
		89.6.9			
92.46	89.3.7 93.6 93.2 93.0 93.8	89.4.3	94.9 93.3 93.8 93.6		
	11.3/32 11.4/21 11.8/18 11.8/14 11.2/10	10.7	11.0/16 11.7/18 11.4/21 11.4/32		
93.83	89.5.1 95.2 95.3 94.3 95.3	89.5.7	95.4 95.1 94.1 94.5 95.6 89.6.2		
	9.9/32 9.8/27 9.7/20 10.7/16 9.7/10	9.3	9.6/11 9.9/15 10.9/18 10.5/21 9.4/23 8.8/32		
95.67	89.8.3 98.2 97.6 97.5 96.9 96.8 98.4	89.8.5	98.4 99.4 97.0 95.6 96.6 97.9 99.8 98.5		
	6.7/32 6.8/25 7.4/22 7.5/19 8.1/16 8.2/13 6.6/10	6.5	6.6/10 8.7/13 8.0/16 10.0/19 8.4/21 7.1/28 5.6/30 5.5/32		
97.37	89.9.7 99.8 99.1 98.2 98.1 98.2 100.4	90.0.6	100.2 98.8 98.7 97.3 98.2 98.0 99.2 101.5 101.4		
	5.3/32 5.2/26 5.9/19 6.8/18 5.9/16 5.8/12 4.6/9	4.4	4.8/10 6.2/12 6.3/16 7.7/18 6.8/19 7.0/22 5.8/25 3.5/29 3.6/32		
98.30	89.9.6 99.5 99.9 99.3 100.4	90.0.6	100.5 99.6 98.1 98.1 99.0 100.0 100.8 101.0		
	5.4/32 5.5/20 6.1/18 5.7/13 4.6/9	4.4	4.5/10 5.4/11 5.9/15 6.9/17 6.0/18 5.0/23 4.2/26 4.0/32		
99.10	89.9.6 99.9 99.9 100.1 99.8 100.9	90.2.1	100.7 99.6 99.1 100.2 100.6		
	5.4/32 5.4/21 6.0/19 5.0/17 5.2/14 4.1/9	3.9	4.3/9 5.4/14 5.9/18 4.8/21 4.4/32		
		90.5.0			
99.9	90.0.8 100.0 99.6 100.6 101.4	90.1.8	101.0 100.4 100.2 99.6 100.3 100.8 100.6		
	7.8/32 8.1/21 9.0/19 8.0/16 7.2/10	6.8	7.3/11 8.2/13 8.4/16 9.0/18 8.3/21 7.8/29 8.0/32		
	90.2.6 102.1 102.1 101.8 102.6	90.2.9	102.4 101.7 100.9 102.1 102.1		
100.70	6.0/32 6.5/21 7.4/19 6.8/16 6.0/10	5.7	6.2/11 6.9/14 7.9/18 6.5/21 6.5/32		
		908.6			

B.M. Sta. 147+60 21.8 Cor. Lowest step (Conc) 8
front of House Left Elev 897.69

147	C2.2/30	F0.9/14.3	F0.1	F1.5/15.2	C1.7/30	895.00 ~~895.30~~	892.2 ~~892.6~~	94.9 94.8 94.2 93.3 94.4 / 4.6 4.7 5.3 6.2 5.1 / 33 30 20 18 15
146	C2.5/30	F2.3/16.5	F0.3/E	F1.2/14.8	C2.0/30	894.85 ~~894.00~~	892.0 ~~892.4~~	94.9 94.9 93.3 92.8 92.5 90.4 / 4.6 4.6 4.2 6.7 7.0 5.1 / 33 30 24 21 16.8
145	C2.3/30	F1.7/15.6	F0.6/E	F1.3/15.0	C1.7/30	894.45 ~~894.15~~	891.8 ~~892.2~~	94.4 94.5 94.0 91.7 93.9 / 5.1 5.0 5.5 7.8 5.6 / 33 30 23 19 9
144	C1.4/30	F1.5/15.3	F0.6/E	F2.2/16.3	C1.3/30	894.25 ~~894.35~~	891.6 ~~892.00~~	93.4 93.4 93.5 91.4 93.7 / 6.1 6.1 6.0 8.1 5.8 / 33 30 24 20 10
143	C/30		F0.1/E		C2.4/30	894.20	891.2	93.7 93.1 93.6 91.3 91.4 93.6 / 5.8 5.9 5.9 8.2 8.1 5.9 / 33 30 23 21 18 9
B.M.	1.79	899.48			897.69			
142	C1.6/30	F3.2/17.8	F0.8/E	F3.2/17.8	C1.8/33	894.20	891.0	92.8 92.7 93.1 92.9 91.1 92.6 93.2 / 4.7 4.8 4.6 6.6 6.4 4.9 4.3 / 33 30 25 18 18 15 9
141	C1.3/33	F3.5/18.3	F1.9/E	F3.8/18.7	C0.9/40	894.20	890.8	92.1 91.8 / 5.4 5.7 / 43
140+18								90.7 91.5 90.7 92.0 / 6.6 6.8 6.8 / 43 33 32
139+95	F4.0/19.0	F1.4/E		F3.6/18.4		894.2		91.6 90.4 89.3 90.7 92.9 / 5.9 7.1 8.2 6.8 7.1 / 43 43 27 21
T.P. H06 #139	5.87	897.48		6.65	891.34	891.61		897.5
139	F2.9/17.4	F1.4		F3.6/18.4		894.20		91.5 91.4 91.2 90.1 91.5 93.4 / 6.5 6.4 6.8 7.9 6.5 5.6 / 43 25 17 15 12 8
138	F3.3/18.0	F1.2		F3.2/17.8		894.20		92.8 93.2 90.3 90.2 91.9 93.9 / 5.2 5.0 7.1 7.3 7.8 6.2 5.1 / 43 28 23 18 17 13 9
137	F3.2/17.8	F0.6		F3.4/18.1		894.20		91.8 91.7 91.4 91.8 91.2 90.1 / 6.2 6.3 6.6 7.2 6.8 4.9 / 43 28 20 18 12 7
	4.11	897.99		3.00	893.88			
		896.88						

147								94.3 93.9 / 5.2 5.6 / 30 33
146								94.4 94.1 / 5.1 5.4 / 30 33
145								92.1 93.1 93.9 92.8 / 7.4 6.4 5.6 5.7 / 20 20 30 33
144								93.2 93.1 93.2 / 6.5 6.4 6.3 / 16 20 33
143								93.6 / 5.9 / 33
B.M.								
142								92.9 89.8 / 4.5 4.7 / 5 43
141								91.9 91.7 / 6.4 5.6 / 5.8 43
140+18								90.5 90.1 92.3 92.5 92.6 89.6 / 7.0 9.4 6.3 8.0 7.9 / 24 24 29 29 43
139+95								90.1 / 7.4 / 43
T.P. H06 #139								
139								91.5 91.4 91.2 90.1 91.5 93.4 / 6.5 6.4 6.8 7.9 6.5 5.6 / 43 25 17 15 12 8
138								92.0 / 6.0 / 43
137								91.7 / 6.3 / 43
								898.00

			2.39	890.98	
7+00	F4.1 / 19.1 26' Fill	F1.3 / ℄	C2.3 / 30' Rt	889.50	
6+00	F3.6 / 18.4 26 Fill	F1.3	C.2.3 / 30' Rt.	889.50	
5+00	24 C1.3 / 26' Lt. / 26 / 1.95	C0.1 / ℄ (893.37)	C3.4 / 28' Rt	889.58	
			4.40	891.42	
4+00	24' C2.1 / 26' Lt.	C1.1 / ℄	C4.6 / 30' Rt	890.13	
3+00	F2.7 / 17 Fill	F0.3 / ℄	C3.1 / 28' Rt.	890.75	
2+00	F2.6 / 16.9 Lt. Fill	F0.5 / ℄	C.28 / 25' Rt.	891.38	
1+00	24' 19' +			891.47	
0+20	24' 19' +			890.78	
B.M.	2.67	895.82		893.15	0+25 N.W. Cor. of end of cement walk to Parsonage
B.M.	4.03	895.83		891.80	0+55 N-W cor. lowest step Church Rt.

887.00 — 7.5/32 7.3/28 6.8/22 7.6/20 8.0/16 5.9/11 5.3/10 6.3/14 6.9/18 5.8/19 4.9/22 4.2/28 4.1/30 4.0/33

887.00 — 7.0/32 6.6/25 6.6/20 7.4/19 7.4/16 5.9/13 5.2/9 6.2/12 6.5/18 4.9/20 4.2/25 4.1/33

887.58 — 5.2/32 4.7/28 4.5/23 6.4/19 6.4/16 4.3/11 4.0/10 4.9/12 4.6/17 2.7/20 2.4/27 2.1/33

888.13 — 6.2/31 5.7/22 7.7/18 7.6/16 5.2/11 4.8/9 6.2/13 5.7/16 5.6/18 4.3/19 3.4/24 3.1/30 3.1/33

888.75 — 7.3/33 7.1/29 6.5/22 7.5/20 7.5/16 5.7/13 5.5/9 6.4/12 6.5/15 5.9/18 5.0/19 4.2/23 3.9/28 3.5/33

889.38 — 6.3/32 5.8/26 7.0/20 6.9/16 5.6/13 4.9/9 5.1/9 5.7/11 6.0/14 5.0/17 3.8/21 3.3/25 3.6/33

889.47

888.78

B.M. Sta. 9+46 + in Q of 16" Headwall Elev. 890.98

19		C3.8 / 25	0.0 / E	C3.8 / 25	912.50
T.P.		12.71	923.45	2.79	910.74
18	30	C4.4 / 25.6	F0.2 / E	C3.1 / 30	907.00
17		C3.4 / 30 24	C0.1 / E	C3.0 / 30	902.28
		11.05	913.53	0.19	902.48
16		C1.5 / 30	0.0 / E	C1.9 / 30	899.10
15		C0.4 / 30	F0.4 / E	C1.3 / 30 RX	896.70
14	24 30		F0.4 / E	C0.9 / 30 RX	894.30
T.P.		9.45	902.67	0.80	893.22
13	24 30	C0.5 / 30	C0.1 / E	C2.6 / 30	891.90
12	22 30 RX		C0.5 / E	C3.1 / 30 RX	890.10
11	28	F 1.7 / 15.5	F0.4 / E.	C2.4 / 30 RX	889.50
10	26	F3.1 / 17.7	F0.6 / E	C1.8 / 30 RX	889.50
9	26	F3.3 / 18.0	F1.6 / E	C1.4 / 30 RX	889.50
8+00	126	F3.7 / 18.5	F1.5 / E	C2.3 / 30 RX	889.50
B.M.		3.04	894.02		890.98

910.50 — 914.6 914.5 910.6 912.3 912.5 912.4 911.5 912.0 914.9 914.3 914.2 L
9.0/30 9.0/21 12.9/16 11.2/12 11.0 11.4/10 12.0/13 11.5/18 7.0/21 7.2/29 9.3/33

915.00 — 909.4 909.0 909.9 906.4 906.8 906.5 906.6 906.2 909.0 904.7 904.9 908.1 904.1 L
4.1/25 4.7/21 7.7/16 7.6/13 7.1/11 6.7 7.0/11 7.9/12 7.3/16 4.5/21 4.8/23 5.1/25 5.4/30 5.4/33

900.28 — 903.6 903.7 903.7 904.0 904.1 903.4 903.2 901.1 900.9 901.8 903.7 903.3 903.3 L
9.9/33 9.8/30 9.8/21 13.1/15 11.4/12 11.1 11.3/9 12.4/11 12.7/15 11.7/16 9.8/20 10.2/30 10.2/33

897.10 — 899.5 898.6 899.0 897.6 897.1 897.7 899.9 899.8 899.0 899.1 899.0 899.4 899.0 899.0 L
4.2/33 4.1/36 3.7/23 5.7/20 5.8/16 4.0/13 3.6 3.8/9 4.7/10 5.6/13 3.7/17 3.3/23 3.7/30 3.7/33

894.70 — 895.1 894.9 895.1 894.6 894.3 894.9 894.1 894.3 896.3 896.0 896.0 L
7.8/33 7.6/30 7.1/26 7.4/22 8.8/18 8.6/17 6.4/13 6.4 6.7/8 8.0/9 8.2/11 8.8/13 7.1/16 6.4/23 6.7/30 6.7/33

892.30 — 892.1 891.9 892.3 891.9 891.6 892.5 893.9 893.4 892.5 891.9 893.0 893.2 893.2 L
10.7/33 10.6/30 10.3/27 9.8/26 9.7/23 10.9/20 11.1/18 8.9/14 8.8 9.3/9 10.2/10 10.8/15 9.7/16 9.5/23 9.5/30 9.5/33

889.90 — 890.4 890.4 891.1 889.8 889.5 891.7 891.3 889.2 889.8 891.3 892.1 892.5 892.4 L
3.5/30 3.5/26 2.9/23 4.1/20 4.2/18 2.3/14 2.0 2.7/9 4.8/12 4.2/16 2.7/17 1.9/22 1.5/30 1.6/33

888.10 — 888.6 888.9 889.3 888.2 888.9 890.6 890.2 889.0 889.5 889.6 890.1 891.2 891.2 L
5.4/30 5.1/27 4.8/22 5.7/20 5.8/17 4.1/13 3.4 3.8/8 5.0/10 5.5/12 5.4/15 3.8/17 2.8/24 2.8/30 2.8/33

887.5 — 887.2 887.5 887.8 887.2 887.7 888.1 889.7 888.0 888.0 889.5 889.8 889.9 901 L
6.8/33 6.5/29 6.2/22 6.7/20 6.8/16 5.3/14 4.9 5.3/10 6.0/12 6.0/17 4.5/18 4.2/25 4.1/30 3.9/33

887.00 — 886.5 886.2 887.2 886.6 886.4 886.1 888.9 889.6 887.2 887.7 888.4 888.6 888.8 887.7 L
7.5/32 7.2/25 6.8/20 7.4/19 7.4/16 5.9/12 5.1 5.4/9 6.8/12 6.3/16 5.6/18 5.4/23 5.2/30 5.3/33

887.00 — 886.5 886.7 886.7 886.5 886.3 887.9 886.1 884.8 887.0 887.8 888.3 888.4 888.5 L
8.1/32 7.5/25 7.2/22 7.5/19 8.3/17 8.2/13 6.7/9 6.1 5.9/9 7.2/11 7.0/16 6.2/18 5.7/23 5.6/30 5.2/33

887.00 — 886.0 885.7 885.9 886.0 886.5 888.0 887.7 887.0 886.8 886.7 889.3 889.4 L
8.0/32 7.7/29 7.3/20 8.3/18 8.1/14 7.0/12 6.0 6.3/10 7.0/12 7.2/18 5.3/21 4.7/30 4.6/33

B.M. Sta. 25+96 Spike in 12" Gate Post 5. Fence of Farm West
Elev. 921.53

29	C3.8 / 24.7	C0.8 / E	C3.2 / 22.2	924.63	922.63
28	C3.0 / 23.5	F0.5	C2.5 / 22.8	923.25	921.25
27	C1.4 / 21.1	F1.1 / E	C0.3 / 19.5	921.88	919.88
B.M.	8.72	930.18	7.31	921.46	
26	C1.4 / 21.1	F0.8	C0.2 / 19.3	921.14	919.14
25	C2.2 / 22.3	F1.2 / E	C0.6 / 19.9	921.67	19.67
24	C3.3 / 24.0	F0.3 / E	C1.7 / 21.6	922.83	20.83
23+50				923.22	921.22
23	C2.9 / 23.4	C0.6 / E	C2.5 / 22.8	923.21	921.21
22+50					
22	C1.9 / 21.9	0.0	C2.4 / 22.6	922.00	920.00
H.O. 21	7.39	928.77	2.07	921.38	
21	C2.0 / 22	C0.2 / E	C3.4 / 24.1	920.00	18.00
20	C3.4 / 24.1	C0.7 / E	C4.6 / 25.9	917.18	15.18
		923.45			

38	C1.8 / 21.7	0.0	C1.1 / 20.6		903.28	901.28
37+50						
B.M.	5.35	906.49		901.14		
37	C1.7 / 20.8	0.0	C1.7 / 21.6		905.15	903.15
T.P.	1.32	906.62	11.52	905.30		
36	C1.4 / 21.1	F0.5 / 4	C2.3 / 22.5		908.00	906.00
35	C1.8 / 21.7	F0.7 / 4	C3.3 / 24.0		911.00	909.00
34	C2.2 / 22.3	F0.5 / 4	C3.2 / 23.8		914.00	912.00
Hub Sta. 34	1.57	916.82	7.49	915.25		
33	C2.4 / 22.6	F0.1 / 4	C3.4 / 24.1		917.00	915.00
32	C3.0 / 23.5	F0.1 / 4	C3.3 / 24.0		920.00	918.00
	1.22	922.74	8.66	921.52		
31	C3.2 / 23.8	C0.1 / 4	C3.4 / 24.1		923.00	921.00
30+50						
30	C3.6 / 24.4	C0.9 / 4	C3.2 / 23.8	0	924.91	922.91
29+10						
		930.18				

B.M. Sta. 41+46 tin center of B. Headwall 3
24 x 24 Elev. = 901.14

45+50	C2.3 / 25	F1.0 / E	C3.3 / 25	900.00	898.00	
47	C0.8 / 23	F1.3	C0.7 / 23	894.75	892.75	
	1.15	897.11	12.71	895.96		
46	C2.6 / 25	F1.7 / E	C2.4 / 25	898.25	896.25	
45	C3.8 / 24.7	C0.3 / E	C4.3 / 25.4	901.47	899.47	
44+50		C1.4 / E		902.37	900.37	
44	C.53 / 24	C1.5 / E	C3.7 / 24.0	902.73	900.73	
43+50	C4.0 / 23	C0.2 / E	C3.3 / 24.0	902.5	900.5	
43	F1.5 / 15.2	F1.2 / E	F2.7 / 17	902.00		
42	F1.7 / 15.6	F1.0 / E	F3.1 / 17.6	901.0		
41+50	7.53	908.67		901.14		
41	C1.3 / 21.0	F0.7	F2.2 / 16.3	900.88	898.88	
40	C2.4 / 22.6	F0.3 / E	C0.6 / 19.9	901.63	899.63	
39	C2.4 / 22.6	F0.3 / E	C0.9 / 20.9	902.38	900.38	
		906.49				

B.M. Sta 52+09 Spike in N.E. Cor. old Jubilee Blacksmith Shop & roads
Elev. 900.23

58	C3.3 / 24.0	F0.3 / ℄	C3.2 / 23.8	911.75	909.75	12.6 9 13.3 10.3 10.3 11.5 91 14 11.1 10.0 10.1 12.6 9 13.2 12.6 / 5.5 4.8 7.8 7.8 6.6 6.7 7.0 8.1 8.0 5.5 4.9 5.5 / 32 21 14 12 9 11 14 15 17 21 33
57	C3.3 / 24.0	00 / ℄	C2.8 / 23.2	908.25	906.25	09.8 9 09.5 08.1 08.1 08.1 908.3 07.9 06.7 06.7 07.7 09.2 07.9 / 8.6 8.6 11.0 11.0 10.0 9.8 10.2 11.4 11.4 10.4 8.9 9.3 / 32 21 14 13 9 12 14 15 15 21 33
56	C2.0 / 22.0	F0.1 / ℄	C2.0 / 22	906.00	904.00	05.9 9 05.9 05.3 04.5 05.5 905.9 05.5 04.1 04.1 05.9 06.0 05.7 / 12.2 12.2 12.6 13.6 12.6 12.2 12.6 14.0 14.0 13.0 12.1 12.4 / 33 21 16 13 10 14 16 17 20 33
	12.10	918.06	1.45	905.96		
55	C1.9 / 21.9	F0.1 / ℄	C0.6 / 19.9	905.00	903.00	05.2 9 04.8 03.3 04.2 904.9 04.2 03.0 02.9 903.6 02.7 / 2.2 2.6 4.1 3.2 2.5 3.2 4.4 4.5 3.8 4.7 / 31 20 13 11 7 14 17 18 33
54	C3.1 / 23.7	F0.1 / ℄	C1.2 / 21 cut	904.00	902.00	05.3 9 05.1 03.8 04.0 903.9 03.5 02.5 01.6 01.5 903.5 02.5 / 2.1 2.3 4.6 3.4 3.5 3.9 4.9 5.8 5.9 4.6 3.9 4.9 / 31 21 13 9 11 14 15 16 16 20 33
53.	C2.9 / 22	0.0 / ℄	C2.8 / 23.2 cut	902.10	900.10	903.0 02.9 902.1 01.6 01.1 02.1 903.2 02.9 / 4.4 4.5 5.3 5.8 6.3 5.1 4.2 4.6 / 22 15 9 16 18 21 33
	7.18	907.41		900.23		
LEAVE SPACE 52	C1.6 / 24	F0.5 / ℄	C2.8 / 25	899.30	897.30	99.1 8 98.9 99.2 97.9 97.7 98.2 898.8 96.3 98.0 99.0 899.7 900.1 / 1.3 1.5 1.2 2.2 2.5 2.7 2.2 2.1 2.4 1.4 0.7 0.3 / 25 20 17 15 13 11 16 14 17 18 20 25
51	C0.5 / 22	F0.9 / ℄	C1.2 / 24	896.50	894.5	94.8 8 95.0 95.0 94.7 94.9 895.6 94.1 94.3 94.6 95.2 95.4 96.1 / 5.6 5.4 5.4 5.7 5.5 4.8 5.3 6.1 5.8 5.2 5.0 4.3 / 33 22 18 17 13 13 16 18 20 22 33
50	C0.1 / 22	F0.9 / ℄	C0.3 / 24	893.70	891.70	91.6 8 91.8 91.1 92.1 92.5 892.8 92.6 91.9 90.0 91.6 92.4 8 92.0 90.1 / 8.8 8.6 9.3 8.3 7.9 7.6 7.8 8.6 9.4 8.8 8.0 8.4 8.3 / 33 20 19 11 8 13 16 19 20 25 33
B.M.	7.76	900.41	4.46	892.65		Center East Headwall
49	22	F1.5 / 15 ℄ F0.4 / ℄	F2.0 / 16	891.94	889.94	892.5 8 890.0 91.2 891.5 91.2 890.0 889.9 90.2 90.5 889.9 89.8 / 6.6 6.5 7.1 5.9 5.6 5.9 7.1 7.2 6.9 6.6 7.2 7.3 / 33 17 15 5 11 16 17 18 22 23 33
48 + 50						90.1 7.0 / 33 89.0 90.7 90.1 91.4 91.3 89.4 89.3 89.7 90.1 / 7.2 6.4 7.6 5.7 5.4 5.8 7.7 7.8 7.4 7.0 / 23 19 14 8 10 14 18 20 33
48.	F2.0 / 16.0	F0.7 / 897.11	F2.2 / 16.3	892.29	890.29	90.2 9 90.2 90.1 890.9 890.2 90.0 91.1 891.6 91.3 890.1 90.1 90.7 90.7 890.2 89.5 / 6.9 6.3 6.2 6.9 6.9 6.0 5.5 5.8 7.0 7.0 6.4 6.4 6.9 7.6 / 22 20 16 15 12 10 11 15 18 19 22 24 33
						90.5 6.6 / 33

68	C2.6 / 22.9	F0.1	C2.6 / 22.9		904.71	902.71
67	C2.8 / 22.8	F0.6	C3.1 / 23.7		907.65	905.65
T.P.	1.84	911.17	9.45	909.33		
66	C2.7 / 23	F0.8	C3.5 / 24.3		910.59	908.59
65	C2.9 / 23.4	F0.6	C3.0 / 23.5		913.37	911.37
64+50					914.36	912.36
64	C3.3 / 24	C0.4	C2.6 / 22.9		915.04	913.04
63	C3.2 / 23.8	0.0	C1.8 / 21.7		915.60	913.60
H+6 at 64	2.99	918.78	4.47	915.79		
62	C1.8 / 21.7	F0.7	C0.5 / 19.8		916.00	914.00
61	C2.5 / 23.2	F0.6 / 2	C0.8 / 20.2		916.40	914.40
60+50						
60	C3.4 / 24.1	C0.3 / 2	C1.9 / 21.9		916.55	914.55
59+50					916.02	914.02
T.P.	2.89	920.26	0.69	917.37		
59	C3.9 / 24.9	C0.4 / 2	C3.3 / 24		915.00	913.00
		918.06				

M. Sta 73+16 Spike top of Willow stump
Left opposite 4.5x4x16 Culv. Elev. 892.57

77+50						
77	C5.1 / 26.7	C0.6 / E	C2.6 / 22.9	895.86	93.86	
76+50						
76	C4.7 / 26.1	C1.3	C3.4 / 24.1	895.76	93.76	
75+50						
	5.43	901.96	1.35	896.53		
75	C3.0 / 23.5	F0.6 / E	C1.8 / 21.7	894.00	92.00	
74	C0.5 / 19.8	F0.9 / E	C0.5 / 19.8	892.20	90.20	
	F2.3 / 16.4	F0.2	F1.9 / 15.9			
73				891.85	89.85	
Hdwall	4.93	897.88	9.42	892.95	893.10	
72	F1.3 / 15	F0.1	F1.5 / 15.3	893.14	91.14	
71	C1.3 / 21	F0.6	C1.5 / 21.2	895.89	93.89	
70	C3.0 / 23.5	F0.4	C3.2 / 23.8	898.83	96.83	
T.P.	1.52	902.37	10.32	900.85		
69	C2.5 / 22.7	F0.3	C2.8 / 23.2	901.77	89.77	
		911.17				

B.M. 88+ 85 + Center of E headwall 5x4x26 Elev. 890.06

B.M. Sta. 79+00 Highest point large Boulder near Fence Cor. Rt. Elev. 893.32

89	C1.7 / 3.0	F3.8 / 18.7	00 / E Road	Fill F3.1 / 17.6	C0.6 / 3.0		889.5
B.M.		3.12	893.18	4.20		889.99	890.06
88	C1.7 / 2.6	F2.8 / 17.2	2.6 Fill F1.5 / E	F3.7 / 18.6	C1.5 / 2.5		889.58
87	C2.0 / 2.6	F2.1 / 16.2	2.6 Fill F1.5		C1.3 / 2.5		889.65
86	C2.9 / 2.6	F2.3 / 16.4	2.6 Fill F0.7 / E		C2.0 / 2.5		889.73
85	C2.1 / 2.6	F2.1 / 16.2	2.6 Fill F0.8 / E		C1.5 / 2.5		889.81
84	C1.7 / 2.4	F0.8 / E			C1.0 / 2.3		889.89
T.P.		6.10	894.19	7.60		888.09	
83	C1.7 / 2.4	2.4 Cut 0.0			C0.8 / 2.3		889.96
82		C2.8 / 23.2	F0.2		C1.2 / 20.8		890.36
81		C2.6 / 22.9	F0.3		C1.1 / 20.6		891.07
80		C2.5 / 22.8	F0.5		C1.0 / 20.5		891.79
79		C2.8 / 23.2	F0.2		C1.5 / 21.2		892.50
B.M.		2.37	895.69	8.80		893.16	893.32
78		C3.0 / 23.5	F0.8 / E		C1.3 / 21		894.30
			901.96				

85.5	87.5 / 5.7 / 33	887.2 / 6.5 / 3.2	885.7 / 7.5 / 20	85.9 / 7.3 / 15	89.7 / 4.0 / 12	889.5 / 3.7	886.4 / 3.7 / 7
85.5	87.3 / 6.9 / 33	887.2 / 7.0 / 26	886.7 / 6.7 / 21	87.0 / 7.5 / 20	87.6 / 7.2 / 15	87.9 / 8.1 / 14	888.1 / 6.3 / 9
86.0	88.1 / 6.1 / 33	888.0 / 6.2 / 26	888.1 / 6.1 / 19	88.4 / 7.8 / 15	87.3 / 6.9 / 11	88.1 / 6.1 / 10	888.2 / 6.0
86.5	89.1 / 4.6 / 33	88.9 / 4.8 / 26	88.9 / 4.8 / 18	89.0 / 7.3 / 15	89.0 / 7.2 / 14	89.2 / 6.2 / 13	89.9 / 6.0 / 11
7.00	89.1 / 5.1 / 33	88.9 / 5.0 / 26	88.7 / 5.0 / 21	87.6 / 6.6 / 18	87.3 / 6.9 / 14	89.4 / 5.8 / 14	89.8 / 5.3 / 10
7.39	89.3 / 4.9 / 33	89.1 / 5.1 / 24	89.1 / 5.1 / 21	89.0 / 6.2 / 17	88.7 / 6.4 / 14	88.4 / 5.8 / 13	88.9 / 5.7 / 10
7.96	89.9 / 6.0 / 33	89.8 / 6.2 / 24	89.0 / 5.7 / 21	89.0 / 6.4 / 20	89.3 / 6.3 / 16	89.4 / 5.7 / 11	89.0 / 5.7 / 10
8.36	891.3 / 4.4 / 33	891.3 / 4.4 / 22	89.8 / 6.9 / 13	90.0 / 5.5 / 9	89.0 / 5.5	89.6 / 6.1 / 13	89.4 / 7.3 / 15
9.07	89.2 / 3.5 / 33	89.2 / 4.5 / 16	89.6 / 6.1 / 14	89.4 / 6.3 / 13	90.7 / 5.0 / 10	89.8 / 4.9	90.3 / 5.4 / 12
89.79	89.6 / 2.9 / 33	89.4 / 3.3 / 21	91.0 / 3.9 / 17	89.6 / 6.1 / 13	89.2 / 6.5 / 12	90.2 / 5.5 / 12	91.1 / 4.6 / 9
90.50	89.3 / 2.0 / 33	89.4 / 2.3 / 21	90.0 / 2.7 / 17	90.1 / 5.6 / 13	90.1 / 5.6 / 12	91.4 / 4.3 / 12	90.2 / 3.5 / 8
2.30	93.6 / 6.4 / 33	89.2 / 6.8 / 20	92.2 / 9.8 / 13	92.2 / 8.4 / 8	93.6 / 8.5	93.1 / 8.9 / 14	92.1 / 9.9 / 15

85.5	886.0 / 6.8 / 18	886.0 / 6.0 / 20	886.0 / 5.9 / 22	886.0 / 7.1 / 30	886.0 / 7.2 / 33		
85.5	87.3 / 7.2 / 25	87.0 / 7.5 / 33					
86.0	887.3 / 6.9 / 25	87.3 / 6.9 / 33					
86.5	887.0 / 6.3 / 16	887.9 / 5.5 / 16	88.7 / 6.1 / 19	88.5 / 5.8 / 25	88.4 / 5.8 / 33		
7.00	888.5 / 5.7 / 25	88.1 / 6.1 / 33					
7.39	88.4 / 5.7 / 22	88.4 / 6.4 / 23	88.7 / 5.8 / 33				
7.96	88.3 / 6.6 / 23	88.7 / 7.7 / 33					
8.36	889.7 / 6.0 / 22	89.8 / 6.9 / 33					
9.07	89.8 / 5.5 / 17	89.2 / 6.2 / 33					
89.79	90.8 / 4.9 / 12	89.2 / 6.5 / 15	89.2 / 6.5 / 16	90.0 / 5.5 / 16	89.8 / 4.9 / 23	90.1 / 5.6 / 33	
90.50	91.5 / 3.8 / 13	91.5 / 5.0 / 16	91.5 / 3.8 / 17	91.5 / 3.6 / 23	91.5 / 4.2 / 33		
2.30	93.6 / 8.7 / 14	93.1 / 9.9 / 15	93.6 / 9.9 / 17	93.6 / 8.8 / 17	93.6 / 8.4 / 26	93.1 / 8.9 / 33	

99	C1.7 / 25	F0.4 / E		C0.7 / 25	894.50	892.50	93.6 893.7 93.9 92.7 92.4 93.9 894.1 93.6 92.3 92.0 93.6 93.6 893.2 93.4 / 4.8 4.6 4.5 6.5 5.5 4.4 4.5 6.0 6.3 4.8 4.5 5.1 4.9 / 33 25 19 17 14 10 4.2 8 13 16 18 20 25 33
98	C1.0 / 25	F1.0 / E		C0.2 / 25	894.08	891.58	92.6 893.0 92.6 92.1 93.0 893.1 92.7 91.5 91.5 92.5 92.4 891.7 91.9 / 5.8 5.3 5.5 6.2 5.3 5.6 6.8 6.8 5.8 5.9 6.6 6.4 / 33 24 18 15 11 5.2 8 12 15 16 20 25 33
97	C1.1 / 19	F1.0 / E	F2.0 / 16	0.0 / 27	893.67	891.17	892.3 91.1 93.4 91.6 91.6 92.6 92.7 891.2 91.7 891.0 91.0 / 6.0 6.2 5.9 6.7 6.7 5.7 892.7 6.1 7.2 7.1 6.6 7.3 / 27 33 20 16 14 10 5.6 8 12 15 19 27 33
E. Hdwall	4.61	898.31	3.55	893.70			
96	C1.4 / 30	F1.3 / 2E	C0.2 / 30		893.25	891.75	892.1 92.7 91.3 92.1 / 5.2 5.2 5.1 6.0 5.2 892.0 91.9 91.0 91.0 91.6 890.9 90.9 / 33 30 23 14 10 5.3 8 11 15 19 30 33
95	C4.3 / 30	C0.2 / E		C2.1 / 30	892.44	89.94	94.1 894.2 93.8 91.1 92.4 892.6 92.2 90.6 91.2 92.6 892.0 92.1 / 3.2 3.1 3.5 6.2 4.9 4.7 5.1 6.5 6.1 4.7 5.3 5.2 / 33 30 21 14 12 4.7 8 11 14 19 30 33
94+50	30	24 Cut		30	892.03	89.53	96.4 93.6 91.8 91.9 93.6 93.5 92.6 91.3 92.3 94.4 93.9 / 1.9 1.7 5.5 5.4 3.8 3.8 4.7 6.0 5.0 2.9 3.4 / 33 25 20 15 9 4.7 9 11 14 18 33
94	C5.6 / 30	C1.5 / 24 Cut	5	C5.5 / 30	891.62	89.12	94.1 894.7 94.9 91.6 91.1 92.9 893.1 92.6 91.0 92.2 94.1 894.6 94.6 / 2.7 2.6 2.4 5.7 6.2 4.4 4.7 6.3 5.1 3.2 2.7 2.7 / 33 30 23 18 14 12 4.2 10 11 16 20 30 33
	6.22	897.25	2.15	891.03			
93	C2.2 / 30	F0.1 / E		C2.7 / 30	890.81	88.31	89.5 90.7 90.4 89.3 90.8 890.7 90.6 89.0 90.1 90.1 93.1 891.0 90.1 / 2.9 2.7 2.5 3.5 3.9 2.4 2.6 4.2 4.1 3.1 2.4 2.2 2.1 / 33 30 21 16 14 11 2.5 8 11 13 14 20 30 33
92	C1.5 / 30	F1.5 / 15.2	F0.5 / E	Fill F1.5 / 15.2	C1.7 / 30	890.00	89.0 88.5 89.4 89.9 89.6 89.1 89.4 88.6 88.7 89.0 / 4.2 4.0 4.7 4.9 3.7 88.5 4.1 5.0 3.6 4.0 4.2 / 33 30 20 20 14 7 3.7 8 12 20 30 33
91	C0.9 / 30	F2.1 / 16.1	F0.9 / E	Fill 1.7 / 15.5	C1.0 / 30	889.83	88.2 88.2 88.4 88.7 87.9 88.6 88.9 89.0 89.0 88.7 89.7 89.3 88.3 89.4 / 4.9 5.2 4.8 5.5 5.3 4.7 88.9 5.2 6.2 6.2 4.5 4.5 4.9 4.8 / 33 30 22 17 14 12 4.3 10 12 14 17 25 49 25 30 33
90	C0.8 / 30	F2.9 / 17.4	F1.3 / 20	Fill 2.1 / 16.1	C0.1 / 30	889.07	88.9 88.7 88.6 88.5 88.4 88.1 87.0 88.5 88.3 88.6 87.0 / 5.3 5.3 5.3 6.6 6.2 4.8 88.4 5.1 6.2 6.6 5.5 6.2 / 33 30 21 19 12 10 4.8 7 10 16 17 30 33
		893.18					

B.M. 2.56 901.34

103	C0.9 / 25	F0.8 / E	F1.5 / 16	898.43	96.83	897.7 96.6 96.6 97.1 98.1 898.0 97.9 96.6 96.3 897.3 97.2 96.1 96.5 / 6.4 6.2 6.4 7.3 6.8 5.8 6.0 7.2 7.6 6.6 6.7 7.8 7.4 / 33 25 19 18 14 10 5.9 9 13 16 16 21 24 33
102	C1.2 / 25	F0.5	F1.7 / 15.6	897.75	95.75	96.6 896.9 96.6 96.6 96.0 96.3 97.2 897.3 97.0 895.5 96.4 896.1 96.0 96.1 95.3 / 7.3 7.3 8.3 7.0 7.6 6.7 6.9 8.4 8.5 7.8 7.9 8.8 8.6 / 33 25 20 19 16 15 11 6.6 7 12 15 16 19 23 33
101	8.49 / C1.5 / 26	903.90 / F0.3	2.90 / 895.41 / C0.3 / 23	896.67	4.67	96.1 896.7 96.2 96.4 96.7 96.3 96.2 96.3 896.4 96.3 96.3 96.5 96.2 96.6 96.6 96.0 895.8 96.3 / 2.2 2.1 2.9 3.6 3.0 3.1 2.0 1.9 2.0 3.0 2.8 4.1 2.7 2.1 3.3 3.3 3.0 / 33 26 23 19 19 17 14 11 7 10 11 11 15 21 21 23 33
100	C1.8 / 26	0.0	C1.7 / 25	895.58	93.58	96.0 895.4 96.4 96.3 96.4 96.4 896.6 96.3 93.8 93.7 96.6 96.9 96.6 95.3 95.6 / 3.3 2.9 2.6 4.5 4.3 2.9 2.7 3.0 4.5 4.6 2.7 2.6 3.2 3.0 2.7 / 33 26 23 18 14 10 2.7 8 13 15 17 20 21 25 33

898.31

B.M. Sta. 158+72 + Center of E Headwall 2
2x2x30 RCP Elev. 897.22

160							
159							
B.M.	C1.8	F0.2	3.05	897.22			
158	~~C1.4~~ / 30 E	~~F0.3~~ E	E	C1.1 ~~0.7~~ / 30	895.83 ~~895.87~~	893.47 ~~893.87~~	95.2 95.2 94.3 95.6 95.2 93.8 95.0 94.5 94.4 / 5.1 5.1 6.0 5.1 5.1 6.5 5.3 5.8 5.9 / 23 17 17 47 9 17 22 30 33
157	C1.7 ~~C1.3~~ / 30	F0.4 ~~F0.5~~ E		C1.3 ~~C0.4~~ / 30	895.67 ~~895.73~~	93.33 ~~93.73~~	95.2 94.9 93.4 94.7 95.2 95.0 93.0 94.6 94.6 94.5 / 5.1 5.35.4 6.9 5.6 5.1 5.3 7.3 5.7 5.1 5.8 / 33 30 21 18 15 9 17 28 30 33
156	C1.8 ~~C1.4~~ / 30	~~F0.4~~ E	F0.3	C0.9 ~~C0.5~~ / 30	895.50 ~~895.60~~	93.20 ~~93.60~~	95.2 95.0 94.8 93.1 94.4 95.2 94.9 93.3 94.4 94.1 94.3 / 5.1 5.3 5.5 7.2 5.9 5.4 7.0 5.9 6.2 6.0 / 23 31 21 19 15 9 17 23 30 33
155	C1.7 / 30	F0.2 ~~F0.1~~ E		C0.9 / 30	895.33 ~~895.47~~	93.07 ~~93.47~~	95.2 94.5 93.4 94.8 95.1 94.7 93.3 94.1 94.4 94.3 / 5.1 5.8 6.9 5.5 5.2 5.6 7.0 6.2 5.9 6.0 / 33 19 18 9 9 17 18 30 33
154	C1.8 / 30	C0.1 F0.1 E	C1.0 / 30		895.16 ~~895.33~~	92.93 ~~93.33~~	95.4 95.1 95.0 93.3 94.8 94.1 94.8 95.2 94.6 93.7 92.9 94.0 94.3 94.4 / 4.9 5.2 5.3 7.0 5.5 6.2 5.5 5.1 5.7 6.6 7.4 6.3 6.0 5.9 / 33 30 19 18 14 13 9 13 14 18 19 33
153	C1.6 / 30	F1.1 / 14.7	F0.0 E	F2.2 / 16.3 C0.6 / 30	895.00 ~~895.2~~	92.8 ~~93.2~~	95.0 94.8 94.5 93.1 94.1 95.1 94.3 92.9 93.8 94.0 / 5.3 5.5 5.8 7.2 6.2 6.0 7.4 6.5 6.3 / 33 30 19 18 15 13 17 18 33
	5.65	9.00 .27	4.32	894.62			900.3
152	C1.4 / 30	F1.7 / 15.5	F0.6 E	F1.9 / 15.9 C0.7 / 30	895.0 ~~895.20~~	92.7 ~~93.1~~	94.5 94.5 94.1 93.2 94.4 94.0 92.3 93.7 93.8 / 4.4 4.2 4.8 5.7 4.5 4.6 6.0 5.2 5.1 / 33 30 18 17 11 18 19 33
151	C1.4 / 30	F2.4 / 16.6	F0.6	F2.2 / 16.3 C0.7 / 30	895.0 ~~895.2~~	92.6 93.00	94.5 94.4 93.8 92.8 93.9 94.6 94.0 92.3 93.5 94.0 93.7 93.9 / 4.4 4.5 5.1 6.1 5.0 4.9 6.1 5.4 4.9 5.2 5.0 / 33 30 18 18 10 43 11 17 18 23 30 33
150	C1.3 / 30	F1.3 / 15	F0.8 E	F1.7 / 15.6 C0.6 / 30	895.00 ~~895.20~~	92.5 ~~92.9~~	94.4 93.8 92.9 94.0 93.9 93.0 93.6 93.5 93.7 / 4.5 5.1 6.0 4.9 5.0 5.9 5.3 5.4 5.2 / 33 18 17 11 45 12 18 18 30 33
149	C1.7 / 30	F1.6 / 15.4	F0.4	F2.1 / 16.2 C0.8 / 30	895.00 ~~895.20~~	92.4 ~~92.8~~	94.7 94.5 94.4 93.1 93.4 94.2 94.8 94.2 93.3 93.1 93.8 93.6 / 4.2 4.4 4.5 5.8 5.5 4.7 4.7 5.6 5.8 5.1 5.3 / 33 30 21 30 13 9 41 10 12 17 20 33
148	C2.1 / 30	F1.6 / 15.4	F0.3 E	F2.0 / 16 C1.2 / 30	895.00 ~~895.20~~	92.3 ~~92.7~~	95.1 94.8 94.4 93.0 93.5 94.1 94.1 93.0 93.9 93.9 93.8 / 3.8 4.1 4.5 5.9 5.4 4.8 5.9 5.0 5.0 5.1 / 33 30 19 18 16 4.2 10 17 20 30 33
B.M.	1.25	898.94		897.69			

898.9

Dewar-Rendlyn Tile

Apr. 14, 1924.

6 hrs. labor on old Tile line Force Acct. between Sta. 13+78 to 32+50 on West side of Highway

6" Tile Complete = .1075
8" " " .1550
Type B ~~Intake~~ " 15.50

6" — sta. tenth $ = .1613
8" — sta. " = .2325

6" — 276 sta. T. @ .1613 = $
8" — 28 " T. @ .2325 = $
Type B. intakes @ 15.50 $

1 — 8" Culvert Hole
5 — 6" " Holes.
2 — 6" " Holes on Derkerton Rd.

Dewar-Readlyn Road Tile Apr. 16, 1924. 26

Spencer
Keeling

					Grade		
T.P.	7.82	116.59	2.64	108.77			
23			2.64	108.77	104.9	3.84	
22			3.52	107.89	104.1	3.79	
21			4.73	106.68	103.27	3.41	0.83%
20			6.30	105.11	102.49	2.67	
19			7.44	103.97	101.51	2.46	
18			8.01	103.40	100.68	2.72	
T.P.	8.05	111.41	5.61	103.36			
17			5.61	103.36	100.56	2.80	
16			6.00	102.97	100.44	2.53	0.12%
15			6.10	102.87	100.3	2.55	
14			6.03	102.94	100.2	2.74	
13+78			4.81	104.16	100.1	3.99	No Overcut
F.L.			8.80	100.17			
	East side	108.97					
B.M.			5.33	103.64			
F.L. Culv.			8.35	100.62			
13+74			4.57	104.40	100.6	3.78	
13+00			5.79	103.18	100.8	2.33	0.37%
12+00			4.37	104.60	101.1	3.45	
T.P.	2.24	108.97	10.99	106.73			2.66%
11+00			10.99	106.73	103.8	2.92	
10+00			8.02	109.70	106.4	3.23	
9+00			5.95	111.77	109.1	2.64	
8+00			4.42	113.30	110.0	3.30	0.87%
7+00			3.06	114.66	110.9	3.71	
B.M.	1.99	117.72		115.73			
	West side						

Elev. 115.73
Elev. 103.70
Sta. 6+02.
" 12+77
B.M.
B.M.

B.M. Sta. 3944 Bent Spike in N. Gate Post at Drive Rt.
Elev. 133.29

East Side

40			3.99	133.07	129.11	3.96	
39			6.48	130.58	126.65	3.93	
T.P.	9.69	137.06	1.66	127.37			
38			1.08	127.95	124.19	3.76	
37			3.56	125.47	121.73	3.74	
36			5.97	123.06	119.27	3.79	No Overcut
35			8.22	120.81	116.81	4.00	
T.P.	11.19	129.03	3.04	117.84			
34			2.28	118.60	114.90	3.70	
33			4.30	116.58	112.99	3.59	
32			5.85	115.03	111.08	3.95	
31			7.00	113.88	110.58	3.30	
30			7.40	113.48	110.08	3.40	
T.P.	8.34	120.88	4.05	112.54			
29			4.05	112.54	109.58	2.96	
28			4.97	111.62	109.09	2.54	
27			5.84	110.75	108.25	2.50	
26			6.97	109.62	107.42	2.20	
25			7.19	109.40	106.59	2.81	End of 8"
24			7.61	108.98	105.76	3.22	

2.46%

1.91%

0.57%

0.83%

116.59

East side

West Side

B.M.			3.86	133.20			
40			4.00	133.06	129.11		3.95
39			6.92	130.14	126.65		3.49
T.P.	9.69	137.06	1.66	127.37			
38			1.66	127.37	124.19		3.18
37			4.08	124.95	121.73		3.22
36			6.60	122.43	119.27		3.16
35			9.09	119.94	116.81		3.13
T.P.	11.19	129.03	3.04	117.84			
34			3.04	117.84	114.90		2.94
33			4.59	116.29	112.99		3.30
32+50			5.05	115.83	112.04		3.79
36' across Road		120.88					

1.91% 2.46%

No Overcut

West Side

West Side

B.M.				121.35		Spike in Root C.W. Left.
			1.27	121.41		
	10.17	122.68				
58			4.56	112.56	108.60	3.96
59			4.99	112.13	108.0	4.09
60			5.69	111.43	107.48	3.95
61			6.39	110.73	106.92	3.81
62			7.26	109.86	106.36	3.50
63	7.81	117.12	3.74	109.31	105.8	3.51
64			4.27	108.83	105.24	3.59
65			4.39	108.66	104.68	3.98 3½ sta. tenths
66			5.04	108.01	103.28	4.73
67 +10					103.14	8" Tile Outlet
			6.00	107.05	104.84	2.21
68			6.36	106.69	104.6	2.05
69			5.80	107.25	104.44	2.81
B.M.	4.45	113.05		108.60		on NE. Cor. of E. Headwall
F.L. 69+22			8.71	104.34	104.40	

66+10 Tile outlet Elev. 103.14 8" Tile Crosses Road

Tile Check

63			6.60	106.32	105.6
64			7.08		
65			7.72	105.20	104.6
66			9.10	103.82	103.62
67			9.02 7.48	103.90	
68			7.76	105.16	
69			7.98	104.94	
69+22			8.10	104.82	104.2
B.M.	4.3	112.92		108.60	

Apr. 18, 1924

Gunn Pit

Base Line along North Line of Pit 237 X 40

2+37			
2+25			
2+00			
1+75			
1+50			
1+25			
1+00			
0+75			
0+50			
0+25			
0+00	N-W Cor. of Pit		
BM.	7.20	107.20	100.00

96.94 — 10.26 — 0 — Hub at N-E Cor.

98.54 — 8.66 — 40 — Hub at S-E Cor.

98.6 — -8.6 — 0
99.0 — 8.2 — 6
99.2 — 8.0 — 19
98.1 — 9.1 — 40

99.4 — 7.8 — 0
99.2 — 8.0 — 7
98.8 — 8.4 — 20
97.7 — 9.5 — 25
96.9 — 10.3 — 40

100.0 — 7.2 — 0
99.7 — 7.5 — 6
99.5 — 7.7 — 22
99.7 — 7.5 — 41

101.1 — 6.1 — 0
101.0 — 6.2 — 7
100.5 — 6.7 — 10
101.1 — 6.1 — 26
101.8 — 5.4 — 30
102.5 — 4.7 — 32
102.1 — 5.1 — 38
95.5 — 11.7 — 35

102.2 — 5.0 — 0
101.6 — 5.4 — 7
101.4 — 5.8 — 24
101.8 — 5.4 — 25
101.7 — 5.5 — 27
92.6 — 14.6 — 36

102.3 — 4.9 — 0
101.5 — 5.7 — 5
105.6 — 4.6 — 21
103.4 — 3.6 — 23
102.7 — 4.5 — 27
92.1 — 15.1 — 40

102.9 — 4.3 — 0
102.5 — 4.9 — 15
102.7 — 4.5 — 18
103.0 — 4.2 — 22
97.7 — 9.7 — 32
96.1 — 11.1 — 40

102.1 — 5.1 — 0
101.9 — 5.3 — 16
102.6 — 4.6 — 22
100.0 — 7.2 — 24
97.7 — 9.5 — 30
96.5 — 11.0 — 40

101.4 — 5.8 — 0
101.6 — 5.6 — 17
101.3 — 5.9 — 32
101.1 — 6.1 — 40

100.48 — 6.72 — 0
100.0 — 7.20 — 40

Top of Hub S-W. Cor. of Pit

107.20

Norden Pit

Base line = North line of Pit

218' E & W.

100' N & S

2+18				99.6 / 9.9 / 0 — 99.4 / 6.1 / 50 — 97.2 / 8.3 / 100
1+50				100.5 / 5.0 / 0 — 99.6 / 5.9 / 50 — 97.5 / 8.0 / 100
1+00				100.3 / 5.2 / 0 — 98.9 / 6.6 / 50 — 96.9 / 8.6 / 96 — 96.2 / 9.3 / 100
0+50				99.0 / 5.5 / 0 — 97.7 / 6.9 / 50 — 95.4 / 9.1 / 93 — 95.5 / 10.0 / 100
0+00				99.9 / 1.6 / 0 — 97.7 / 7.8 / 50 — 95.9 / 9.6 / 100
B.M.	5.53	105.53	100.00	105.53 Center of South Headwall Culv. west of intersection.

		West side					
B.M.	4.70	119.19		114.49		3.98	119+40 X on N. end of E. Headwall conc. Culv.
114			2.97	116.22	112.25	4.18	1 sta. 10th.
115			3.32	115.87	111.69	4.72	4½ sta. 10ths
116			3.33	115.86	111.14	4.10	4 sta. tenth
117			4.50	114.69	110.55	2.60	
118			6.12	113.07	110.4	2.79	
119			6.05	113.14	110.35	3.47	
119+38			5.42	113.77	110.3		
F.L.			9.10	110.09	110.50		
				114.49			
119+42	6.10	120.59	6.85	113.74	110.35	3.44	
120			7.10	113.49	110.3	3.12	
121			6.24	114.35	110.4	3.86	
122			4.44	116.15	112.8	3.34	
123	4.83	123.37	2.05	118.54	115.	3.41	
124			2.09	121.28	117.4	3.83	
		120.59					
		East side					
		120.59					
F.L.			10.60	109.99			
119+42			7.05	113.54	110.25	3.34	
120			7.33	113.26	110.27	2.99	
121			6.90	113.69	110.3	3.30	
122			4.60	115.99	112.8	3.14	
123		123.37	1.77	118.82	115.3	3.51	
124			1.60	121.77	117.7	4.00	

Re-Cross-Section Gunn Pit Apr. 26, 1924.

2+21	8.4 / 9.5 / 0	98.9 / 8.0 / 7	97.4 / 9.5 / 13	96.9 / 10.0 / 42	97.7 / 9.2 / 50	97.9 / 9.0 / 55	✓	
2+16	9.3 / 7.6 / 0	99.5 / 7.4 / 7	95.9 / 11.0 / 14	97.4 / 9.5 / 47	96.9 / 10.0 / 65	✓		
2+00	100.2 / 6.7 / 0	100.1 / 6.8 / 4	96.7 / 10.2 / 13	96.7 / 10.2 / 24	99.1 / 7.8 / 39	✓		
1+75	101.4 / 5.5 / 0	101.1 / 5.8 / 4	97.5 / 9.4 / 12	99.9 / 7.0 / 31	✓			
1+50	102.2 / 4.7 / 0	98.6 / 8.3 / 9	100.6 / 6.3 / 25	✓				
1+25	101.8 / 5.1 / 0	99.1 / 7.8 / 6	101.5 / 5.4 / 27	✓	✓			
1+00	101.9 / 5.0 / 0	99.9 / 7.0 / 6	99.3 / 7.6 / 21	100.6 / 6.3 / 25	✓			
0+75	101.6 / 5.3 / 0	99.8 / 7.1 / 5	99.5 / 7.4 / 22	96.7 / 10.2 / 38	✓			
0+50	101.0 / 5.9 / 0	99.7 / 7.2 / 5	98.7 / 8.2 / 6	99.2 / 7.7 / 39	97.7 / 9.2 / 73	96.6 / 10.3 / 86	98.3 / 8.6 / 94	
0+25	100.3 / 6.6 / 0	98.9 / 8.0 / 5	98.0 / 8.9 / 7	97.9 / 9.0 / 50	96.4 / 10.5 / 71	97.7 / 9.2 / 86		
0+03								

B.M. 6.4 106.9 100.50

F-W Cor of Pit

M. Sta. 159+40 X on E. end N. Headwall
2x2x26 RCB Rt. Elev. 140.69

West side

156			5.62	135.91	131.1	4.75	6½ sta. tenth
155			6.90	134.63	130.0	4.55	4 sta. tenth
154			8.32	133.21	129.0	4.21	2 sta. 10th.
153	9.40	141.53	2.03	132.13	127.9	4.21	1 sta. 10th.
152			3.30	130.86	126.85	4.02	
151			4.53	129.63	126.3	3.32	
150			5.08	129.08	125.78	3.30	
149			5.90	128.26	125.25	3.01	27 sta. 10th. for 8" tile
148			6.56	127.60	124.72	2.88	
147			6.89	127.27	124.19	3.08	
146+75			7.19	126.97	124.1	2.81	
Outlet 61 feet			9.09	125.07	124.10	0.97	
Water			10.1	124.06			
	4.89	134.16		129.27			
B.M.	5.10	134.37		129.27			a. 146+50. High point of large Boulder 100' left.
Water 47' to outlet			10.3	124.07			
			9.27	125.10	124.10	1.00	
145+90			6.81	127.56	124.33	3.23	
145			6.42	128.95	124.78	4.17	
144			5.70	128.67	125.28	3.39	No Overcut
143			5.37	129.00	125.78	3.22	
142			4.91	129.46	126.2	3.18	
141			3.90	130.47	126.78	3.69	
140			3.09	131.28	127.28	4.00	

West

172			2.75	147.17	143.2		3.95	
171			3.99	145.95	142.4		3.47	
170			4.93	145.01	141.7		3.29	
169			5.93	144.01	140.9		3.05	
168			6.64	143.30	140.20	0.76	3.10	
167			7.12	142.82	139.44		3.38	
166	7.67	149.94	3.48	142.27	138.62		3.65	
165			3.92	141.83	137.92		3.91	
164			4.96	140.79	137.16		3.63	
163			5.53	140.22	136.4		3.82	
162			6.28	139.47	135.9		3.57	
161			6.96	138.79	135.4		3.39	
160			7.60	138.15	134.9		3.25	1336'-8" Tile
F.L. 6" Tile			10.00	135.75				23-6" " to connect
B.M.	5.10	145.75	0.88	140.65				farm tile at Sta. 159+50
159			3.11	138.42	134.4		4.02	1½ sta. 10th.
158			3.90	137.63	133.3		4.31	5 sta. 10th.
157			4.66	136.87	132.2		4.63	
		141.53						7 sta. 10th.

East side

160			6.69	139.06	134.	4.16 ✓	3 sta. 10th
159	5.10	145.75	2.69	138.94	134.4	4.44 ✓	5 sta. 10th.
158			3.60	137.93	133.3	4.61 ✓	6 sta. 10th.
157			4.65	136.88	132.2	4.64 ✓	6 sta. 10th.
156			5.85	135.68	131.1	4.52 ✓	5 sta. 10th.
155			6.99	134.54	130.0	4.46 ✓	3 sta. 10th.
154			8.41	133.12	129.	4.12 ✓	1 sta. 10th.
153		141.53	2.19	131.97	127.9	4.05 ✓	1½ sta. 10th.
152			3.06	131.10	126.8	4.26 ✓	
151			4.30	129.86	126.3	3.55 ✓	
150			4.93	129.23	125.7	3.45 ✓	
149			5.99	128.17	125.2	2.92 ✓	
148			6.76	127.40	124.7	2.68 ✓	
147			7.21	126.95	124.1	2.76 ✓	
146+46	4.89	134.16	7.63	126.53	124.1	2.41 ✓	Connection
B.M.	5.10	134.37		129.27			
146+10			7.92	126.45	124.1	2.27 ✓	Connection
145			7.33	127.04	124.6	2.40 ✓	
144			6.12	128.25	125.0	3.19 ✓	
143			5.79	128.58	125.4	3.10 ✓	
142			5.21	129.16	125.9	3.26 ✓	
141			4.16	130.21	126.3	3.89 ✓	
140			3.63	130.74	126.7	4.00 ✓	

$3\frac{1}{2}$

East side

East side

172			3.30	146.64	143.3	3.40
171			4.28	145.66	142.4	3.18
170			5.00	144.94	141.7	3.22
169			5.98	143.96	140.9	3.00
168			6.80	143.14	140.2	2.94
167			7.50	142.44	139.4	3.00
166	167	149.94	3.53	142.22	138.6	3.54
165			3.78	141.97	137.9	4.05
164			4.55	141.20	137.1	4.04
163			5.36	140.39	136.4	3.99
162			5.75	140.00	135.9	4.10
161			6.46	139.29	135.2	3.89
		145.75				

1 sta. 10th.

1 sta. 10th.

Dowar – Readlyn Road

	Tile		Check		
27			8.57	104.92	
26			8.98	104.97	
25			10.00	107.45	
T.P.	8.45	117.45	2.60	109.00	
24			5.00	106.60	
23			5.85	105.75	105.00
22			6.63	104.97	104.24
21			7.24		
20			8.49		
19			9.5	102.10	
T.P.	8.20	111.60	5.42	103.40	
18			7.42	101.40	
17			7.53		
16			7.57		
15			7.65		
14			7.84		
13+78			7.86		
11			4.40		
12			7.00		
13			7.43		
13+74			7.58	101.24	
B.M.	5.12	108.82		103.70	

T.le check

W 123				
W 122			5.10	113.44
W 121			7.50	111.04
W 120			7.52	111.02
W 119+42			7.66	110.88
E 123			2.45	
E 122			4.91	
E 121			7.40	
E 120			7.51	
E 119+42			7.58	
116			6.81	
117			7.31	
118			7.54	
119			7.60	
119+38			7.73	110.81
B.M.	4.05	118.54		114.49
31.			5.22	117.23
30			6.75	110.70
29			7.25	110.20
28			7.74	109.71
		117.45		

Dewar - Readlyn Road Tile

			4.22	139.75			
	1.93	143.97	7.75	142.04			
T.P.	3.60	149.79	5.73	146.19			
Ditch 185			8.46	143.46			
185			6.60	145.32	142.00	3.32	
186			6.33	145.59	141.74	3.85	3 sta. 10th.
187			5.79	146.13	141.47	4.66	12 " "
188			5.06	146.86	141.21	5.65	18 sta. "
189	5.02	151.92	2.94	146.90	140.95	5.95	17 " "
190			3.65	146.19	140.69	5.50	13 sta. 10ths.
191			4.33	145.51	140.43	5.08	8 sta. 10th.
192			5.12	144.72	140.17	4.55	6 sta. 10th.
193			5.78	144.06	139.35	4.71	7 sta. 10th.
194			6.64	143.20	138.52	4.68	5 sta. 10th.
195	7.78	149.84	1.60	142.06	137.69	4.37	3 sta. 10ths
196			2.90	140.76	136.86	3.90	92 sta. 10ths.
197			4.42	139.24	136.04	3.20	
198			5.83	137.83	135.21	2.62	
199			6.78	136.88	134.38	2.50	
200			7.35	136.31	134.18	2.13	
200 + 39			6.06	137.60	134.10	3.50	
Top of Water			9.58	134.08			
B.M.	3.87	143.66		139.79			N. end W. Hd wall

Cuts. -

Spike in Tel. pole Rt. 175+10 Elev. 150.96

Norden Pit
Re-Cross-Section

May 12, 1924

218 X 100

2+18			
2+13			
1+50			
1+00			
0+50			
0			
B.M.	1.31	101.31	100.00

100.6 / 0.7 / 10	98.6 / 2.7 / 13	97.8 / 3.5 / 50	97.1 / 4.2 / 75	96.4 / 4.9 / 85	97.5 / 3.8 / 100 ✓
99.0 / 2.3 / 10	97.9 / 3.4 / 13	96.3 / 5.0 / 50	96.3 / 5.0 / 89	97.3 / 4.0 / 100 ✓	
98.6 / 2.7 / 0	97.0 / 4.3 / 11	96.7 / 4.6 / 50	95.5 / 5.8 / 91	97.4 / 3.9 / 96 ✓	
97.0 / 4.3 / 0	96.3 / 5.3 / 50	94.9 / 6.7 / 89	96.6 / 4.7 / 43 ✓		
96.7 / 4.6 / 0	95.5 / 5.8 / 47	94.3 / 7.0 / 90	94.7 / 6.6 / 93	96.7 / 5.1 / 96 ✓	
97.2 / 4.1 / 0	96.4 / 4.9 / 43	95.9 / 6.3 / 87	95.7 / 5.6 / 97 ✓		

101.3

Dewar - Readlyn Road Tiling
East Side and 8" Outl.

223			6.52	153.85	149.87	3.98	2 sta. 10ths
222			6.51	153.86	149.67	4.19	2 " "
221		160.37	5.00	153.64	149.47	4.17	2½ " "
220			5.07	153.57	149.27	4.30	1½ sta. 10ths.
219			5.59	153.05	149.07	3.98	
218			5.89	152.75	148.87	3.88	
217			6.12	152.52	148.67	3.85	
216			6.25	152.39	148.27	4.12	
215			6.10	152.54	147.87	4.67	4 sta. 10ths
214		158.64	4.85	152.71	147.47	5.24	10 sta. 10ths.
18 feet to Connect			5.92	151.64	147.40	4.24	2
10+50 B.M.			2.77	154.79			9+60 = End 8"
9+50			6.57	150.99	147.06	3.99	24 sta. 10ths.
9			7.72	149.84	146.56	3.28	
8			7.74	149.82	145.67	4.15	1 sta. 10th. on 8"
7			8.84	148.72	144.78	3.94	
6	10.05	157.56	3.13	147.51	143.89	3.62	
5			4.14	146.50	143.00	3.50	
4			4.68	145.96	142.50	3.46	
3			5.17	145.47	142.00	3.47	
2			5.51	145.13	141.50	3.63	
1			6.17	144.47	141.00	3.47	
0+00			5.80	144.84	140.85	3.99	
Outlet			9.90	140.74			
B.M.			4.46	146.18			nter North Headwall at Outlet
	4.14	150.64	9.65	146.50			
B.M.	1.39	156.15		154.76			n. End West Headwall 213+00

B. M. sta 2374+53.8 X on N. End West Headwall 2x2x26 Elev. 158.62

B.M.			3.30	158.75			
	4.28	162.05	6.84	157.77			
T.P.	6.88	164.61	2.64	157.73			
West side							
226			4.62	155.75	151.8	3.88	
225			5.28	155.09	151.2	3.88	1 sta. 10ths.
224			5.66	154.71	150.54	4.17	2 1/2
223			6.16	154.21	149.87	4.34	3
222			6.40	153.97	149.67	4.30	3
221 T.P.	6.55	160.37	4.92	153.72	149.4	4.25	2
220			5.20	153.44	149.2	4.17	2
219			5.41	153.23	149.07	4.16	1
218			5.83	152.81	148.87	3.94	
217			6.01	152.63	148.67	3.96	
216			6.10	152.54	148.27	4.27	2 sta 10ths
215	6.22	158.64	5.14	152.42	147.87	4.55	4 "
214+10			5.15	152.41	147.54	4.87	7 " "
39 feet to Jct.					147.40		5
		157.56					32 1/2
East side and 8" Outlet							
226			4.70	155.67	151.87	3.80	
225			5.68	154.69	151.21	3.48	
224			6.15	154.22	150.54	3.68	
		160.37					

Borrow Pit on Co. Road

6+00				
5+00				
4+00				
3+00				
2+00				
T.P.	9.23	918.43	1.89	909.20
1+00				
0+50				
0+00				
186' to Rd. Intersection from 0				
Top of Hubo+00			6.50	904.59
B.M.	9.70	911.09		901.39

1	14.3	13.5	14.2	13.9	13.5	13.1	13.9	
7	4.1	4.9	4.2	4.5	5.9	5.3	5.5	
0		8	10	16	31	40	41	51
6	13.2	14.3	13.5	14.3	13.8	13.9	13.2	13.8
.8	3.2	4.1	4.9	4.1	4.6	5.5	5.1	5.5
0		4	9	10	14	31	35 41	42 52
1	15.0	14.3	13.2	15.3	13.2	14.0	14.1	
1	3.4	4.1	3.2	3.1	5.2	4.4	4.3	
0		4	8	13	23	39	41	51
4	14.5	12.7	13.4	11.8	12.0	12.9	13.4	13.8
1	3.9	5.6	5.0	6.6	6.4	5.5	5.0	4.6
0		5	8	23	39	43	44	49 51
4	10.7	08.7	08.7	09.5	09.6	08.7	10.0	10.6
0	7.7	9.7	9.7	8.9	6.8	9.7	8.4	7.8
0		5	10	11	15	33	41	42 50
0	06.4	04.9	05.1	06.3	06.2	918.4	04.9	08.2	07.1
.1	4.7	6.2	6.0	4.8	4.9	6.2	4.9	4.0
0		7	9	12	18	34	41	43 50
0	03.8	04.9	04.7	03.1	04.3	04.7		
1	7.3	6.2	6.4	8.0	6.8	6.4		
0		12	18	35	43	45	50	
6	03.6	02.7	02.6	03.7	03.6	02.4	02.4	02.4
.5	7.5	8.4	8.5	7.4	7.5	8.7	8.7	8.7
0		7	10	14	19	35	39	48 50

911.1

Top of N. End Corn. Pit West side of Intersection

Re-Cross Section Borrow Pit on Co. Road

May 20, 1924.

5+80				
5+00				
4+00				
3+00				
	9.27	919.01	2.21	909.74
2+00				
1+00				
0+50				
0+00				
	7.37	911.96		904.59
B.M.	10.55	911.94		901.39

End of Cut

3.6/1	6.3/4	4.9/16	5.3/32	7.8/48	6.2/50	
2.5/1	6.4/4	5.2/9	5.7/38	7.3/47	5.0/49	
4.1/1	8.4/5	7.7/7	7.2/15	7.5/37	8.9/46	5.6/48
1.1/2	4.4/5	3.1/12	3.3/36	4.0/46	1.3/49	
5.2/2	7.6/4	7.3/10	5.9/17	6.1/34	7.8/47	5.4/49
7.4/2	9.0/3	7.2/17	7.2/33	8.8/41	8.8/46	7.8/47
7.8/3	9.8/4	9.4/13	8.1/20	8.3/35	9.6/39	9.3/49

911.9

Station						Elev.
253+86.1						972.5 0.5
253	C3.3/25	C0.6/E		C2.5/25		972.4 9.45
252	C0.7/25	F2.7/17.1	F1.2/E	F3.3/18	C0.1/25	971.91 9.9
251	C1.5/25	F2.3/16.5	F1.1/E	F3.3/18	0.0/25	971.3 9.00
	5.91	978.92		973.01		
250	C2.6/25	C1.4/E		C2.3/25		970.8 8.82
249	C2.4/28	C0.9/E		C2.4/28		970.27 8.27
248+50						
248	C2.2/28	F1.9/15.9 F0.7	F2.1/17	C0.8/28		969.90 .6
247	C2.1/28	F3.0/17.5 F1.2	F3.3/18	C0.2/28		969.7 6.6 culv. 969
246	C2.4/28	F3.0/17.5 F1.3/E	F2.1/17	C0.7/30		969.5 6.2
245				C0.3/30		969.6 6.6
B.M	1.15	974.76		973.01		

74.9 4.0/33, 70.8 3.7/27, 74.9 4.0/21, 73.4 5.5/16, 73.3 5.6/15, 74.3 4.6/12, 70.H 3.5, 75.2 3.7/11, 73.1 5.8/19, 74.7 4.2/25, 74.8 4.1/33

73.3 5.6/33, 73.8 5.1/28, 73.7 5.2/20, 73.4 5.5/23, 71.5 7.4/17, 72.9 6.0/13, 73.1 5.8, 73.1 5.8/10, 72.3 6.6/15, 71.2 7.7/17, 71.2 7.7/18, 72.9 6.0/24, 72.9 6.0/33

71.0 7.9/33, 70.6 8.3/25, 70.6 8.3/24, 69.1 9.8/19, 69.4 9.5/17, 70.6 8.3/10, 70.7 8.2, 70.6 8.3/10, 68.6 10.3/17, 68.6 10.3/19, 70.0 8.9/24, 70.0 8.9/33

71.1 7.8/33, 70.5 8.4/25, 70.3 8.6/24, 68.9 10.0/19, 69.0 9.9/17, 70.2 8.7/12, 70.3 8.6, 70.0 8.9/12, 68.1 10.8/17, 68.1 10.8/24, 69.0 9.9/25, 68.8 10.1/33

71.5 3.3/30, 72.4 2.4/29, 72.4 2.4/27, 70.2 4.6/21, 70.1 4.7/20, 71.5 3.3/12, 72.2 2.6, 71.9 2.9/11, 70.9 3.9/16, 69.6 5.2/18, 69.7 5.1/19, 71.1 3.7/25, 71.5 3.3/33

71.0 3.8/33, 70.7 4.1/28, 70.7 4.1/23, 69.3 5.5/19, 70.6 4.2/13, 71.1 3.7, 70.5 4.3/12, 69.9 5.9/16, 70.8 4.0/22, 70.9 3.9/33, 70.7 4.1/28

70.6 4.2/33, 70.2 4.6/24, 68.5 6.3/19, 69.6 6.2/17, 69.7 5.1/13, 70.2 4.6, 70.0 4.8/10, 68.1 6.7/15, 70.2 4.6/22, 69.3 5.5/26, 69.5 5.3/33

70.0 4.8/33, 68.8 5.0/24, 67.7 7.1/19, 68.1 6.7/16, 68.1 5.7/13, 69.2 5.6, 69.3 5.5/7, 68.7 6.1/11, 67.1 7.7/16, 67.1 7.7/17, 68.8 6.0/21, 68.7 6.1/25, 68.3 6.5/26, 68.5 6.3/33

68.9 5.9/33, 68.7 6.1/28, 68.3 6.5/24, 66.7 8.1/18, 68.2 6.6/11, 68.5 6.3, 68.3 6.5/8, 66.2 8.6/17, 67.1 7.7/24, 66.7 8.1/28, 66.9 7.9/33

68.9 5.9/33, 68.8 6.0/30, 68.4 6.4/24, 66.4 8.4/18, 68.1 6.7/11, 68.2 6.6, 67.6 7.2/11, 66.7 8.1/17, 66.8 8.0/33, 66.9 7.9/30

Sta. 250+23 Spike in 1st. post on 1/4 - 1/4 corner, Left

				919.63	922.39
334				917.75	
333				915.88	
332				914.00	
331				911.75	
330				909.50	907.00
329	F2.7 / 17.0	F1.7 / E	F3.0 / 17.5	907.7	4.7/30 5.3/27 6.2/26 6.0/14 4.8/6 906.9 4.8 4.8/12 904.6 6.2/16 6.5/27 6.0/30
328	F4.1 / 19.1	F2.2 / E	F3.4 / 18.1	907.0	902.9 4.8/32 7.9/21 7.6/14 7.0/13 6.2/7 904.8 6.0 5.8/11 6.9/16 903.1 7.7/21 7.1/27 7.2/30
327	F4.4 / 19.6	F2.0 / E	F5.0 / 20.5	907.2	902.7 8.1/21 8.0/14 7.7/9 5.6/6 905.2 5.6 5.5/8 8.0/12 902.2 8.6/17 8.0/30
326	F6.2 / 22.3	F1.6	F5.3 / 21	908.00	8.9/33 901.7 9.1/20 901.8 9.0/17 7.5/9 4.2/6 906.4 4.9 4.2/7 7.6/12 902.6 8.2/16 7.5/31
325	F6.6 / 22.9	F0.8 / E	F5.8 / 21.7	908.0	8.0/33 8.6/27 901.3 9.5/22 9.5/15 3.8/7 907.2 3.6 3.6/4 902.6 8.2/13 8.8/24 8.6/27
324	F3.0 / 17.6	F1.1 / E	F2.5 / 16.8	908.5	905.6 5.2/30 5.2/15 3.6/10 907.3 3.5 3.8/9 906.0 4.8/17 4.4/30 4.4/30
323				910.24	
B.M.	7.34	910.84		903.50	Spike in 1st. Tel. pole E. of Br. Left
255	28		28	970.75	968.75
254	c 4.5 / 25.8	02.9 / E	19 + c 4.3 / 25.4	972.3	0.3 94.7 4.2/33 74.8 4.1/29 4.1/23 5.8/15 74.8 731 4.7/12 75.1 3.7 2740 3.9/11 739 6.0/18 74.6 4.3/24 74.8 4.1/33
		978.92			

Borrow on Twp. Rd. West of Sta. 158+

5+50			
5			
4			
3			
2			
1			
0+00	N-W Cor. Post from Intersection		
B.M.	5.82	903.04	897.22

99.3	98.2	98.1	100.0	99.9	98.1	98.1	99.4	99.6	
3.7/11	4.8/12	4.9/14	3.0/22	3.1/40	4.9/45	4.9/46	3.4/50	3.4/65	✓
99.4	97.4	99.7	99.6	98.1	98.3	98.9	99.4		
3.6/9	5.6/12	3.3/21	3.4/40	4.9/44	4.7/49	4.1/49	3.6/65		✓
94.8	97.0	96.9	99.0	99.1	97.6	97.6	98.7	99.2	
4.2/9	6.0/12	6.1/14	4.0/20	3.9/40	5.4/44	5.4/50	4.3/50	3.8/65	✓
96.6	95.3	97.2	96.7	95.2	95.3	97.0	97.0	98.0	98.4
6.4/5	4.7/10	5.8/10	6.3/17	4.8/21	4.7/41	6.0/43	6.0/49	5.0/49	4.6/65 ✓
97.3	95.2	95.2	97.8	97.7	96.3	96.2	97.1	97.5	
5.7/7	7.8/10	7.8/16	5.2/25	5.3/41	6.7/44	6.8/51	5.9/51	5.5/65	✓
96.4	94.9	94.8	94.3	96.1	95.7	95.3	94.2	94.7	
6.6/9	8.1/12	8.2/18	6.7/25	6.9/43	7.3/45	7.7/52	6.8/53	6.3/65	✓
95.2	94.4	94.4	95.5	95.2	95.0	95.0			
7.8/4	8.6/9	8.6/18	7.7/25	7.8/46	8.0/50	8.0/60			✓

903.0

on Center C. Headwall Sta. 158+

Final
Borrow on Twp. Rd. West of Sta. 158

5+50

5

4

3

2

1

0

B.M. 5.39 902.61 897.22

End of Cut 00 Section

96.6 6.0/4 98.1 4.5/9 96.4 6.4/10 96.0 6.6/17 94.1 4.5/22 96.4 3.8/32 98.8 4.1/40 97.0 5.6/45 96.4 6.2/54 98.2 4.4/56 ✓

97.1 5.1/3 96.7 6.9/4 94.9 7.7/9 96.0 7.1/16 98.1 4.2/32 97.4 5.2/43 96.2 6.4/47 96.3 7.3/55 97.3 5.3/58 ✓

96.6 6.0/3 95.1 7.7/4 96.1 7.5/9 94.2 8.4/9 94.9 7.7/18 97.1 5.5/33 96.3 6.3/24 95.2 7.4/48 96.3 7.3/51 93.9 8.7/56 96.4 6.2/59 ✓

96.3 7.3/5 94.0 8.6/6 94.4 8.2/18 95.7 6.9/25 95.2 7.4/46 94.6 8.0/48 93.1 8.9/58 94.9 7.7/59 ✓

Dewar-Readlyn
Tile Check

150		7.7	892.34
	900.04		
149		7.05	892.54
146		West	
147		7.15	
146		6.95	
145		7.45	
144		7.5	
143		7.80	
142		8.15	
141		8.65	
		8.95	
		East	
141		8.55	
142		8.62	
143		8.25	
144		7.75	
145		7.95	
146		8.12	
147		8.05	891.54
~~150~~	899.59		
148		7.60	
149		7.50	892.09
	900.04	7.9	892.14
150			

Tile Check West side

170			6.27					
169			7.18					
168			7.82					
167			8.62					
166			9.42					
165			10.18	138.42			136.3	
							136.86	
164	6.60	148.60	2.94	142.00			Tile	137.61 Ditch
			7.25	137.69				
163			7.88			162+75	8.06	7.33
162			8.46					
161+05			8.90	136.04				
160			9.43	135.51				
	6.94	144.94	2.12	138.00				
159			5.00	135.12				
158			6.10	134.02				
157			7.12	133.00				
156			8.14					
155			9.24					
154			10.36	129.76				
153			11.44	128.68				
	9.03	140.12	2.58	131.09				
152			6.10	127.57	.32	151+76		
151			6.68	126.99				
150			7.16					
149			7.72					
148			8.20					
147			8.72					
146+75			8.78					
outlet 61			8.96					
B.M.	8.40	133.67		129.27				

4.23 = 140.71

172		East	Tile	Chec
171				
170			6.75	
169			7.00	
168			7.77	
167			8.57	
166			9.35	139.25
165			10.12	138.48
164		148.60	7.16	137.78
163			7.90	
162			8.40	
161			8.96	135.98
160			9.51	135.43
159	6.94	144.94	2.12	138.00
158			5.10	135.02
157			6.16	133.96
156			7.21	132.91
155			8.33	
154			9.40	
153			10.46	129.66
152	9.03	140.12	11.53	128.59
151			2.58	131.09
150			6.25	127.42
149			6.78	126.89
148			7.30	
147			7.85	
146+46			8.36	
			8.90	
			8.98	
	4.40	133.67		129.27

Borrow Pit on Twp. Rd. Sec. 3-10 Fox Twp.

4+08

4

3+00

2+90

2

1

0+00 59' from Corner Post

B.M. 8.15 965.84 957.69

Sta.						Elev.
284	C3.0/30 6.89	C0.1/℄ (969.62)	5.00	C1.0/30 962.7.3		963.6
283	C1.3/30	F2.5/16.8	F1.0/℄	F3.3/18	Fill end 0.0/30	963.7
282	C1.6/28	F2.9/17.4	F1.0/℄	F3.4/18!	0.0/28	963.9
281 Hub 281	C1.7/28 5.28	F2.0/16 (967.73)	F0.6/℄	F3.0/17.5 6.09	C0.5/28 962.45	964.0
280	C1.8/28	F1.7/15.6	F0.5/℄	F3.1/17.6	C0.3/28	964.2
279	C2.0/28	F3.0/17.5	F1.1/℄	F3.6/18.4		964.35
278	C1.8/28 5.53	F3.1/17.7 (968.54)	F1.4/℄	F3.8/18.7 6.85 7.17	961.69 963.01	964.5
277	C1.0/28	F2.9/17.4	F1.0	F3.2/17.8	C0.2/25	964.6
276	C2.4/29	F0.1		C1.1/30		964.75
275	C3.4/30	C1.1		C2.9/30		964.8
274	C3.5/30	C1.9		C4.1/30		964.7
273	C2.3/30	C0.7		C4.2/30		964.3
B.M.	3.00	970.18		967.18		

Hub – 278 — 961.91

Sta.	Grade	Left	℄	Right
284	61.6	64.6 5.0/31, 63.7 5.9/23, 62.5 7.1/18, 62.4 7.2/17, 63.6 6.0/11	63.7 5.9	62.9 6.7/14, 61.4 8.2/18, 7.0/22, 62.6 7.0/33 ✓
283	61.75	63.5 4.2/31, 63.0 4.7/28, 62.5 5.2/21, 61.2 6.5/17, 61.2 6.5/16, 62.8 4.9/12	62.8 4.9	62.1 5.6/13, 60.5 7.2/18, 60.6 7.1/19, 61.6 6.1/23, 61.2 6.5/33, 61.4 6.3/30 ✓
282	61.9	63.1 4.8/32, 62.9 5.1/23, 61.0 6.7/18, 61.3 6.4/16, 62.0 5.7/14, 62.1 5.6/12, 62.7 5.0/11	62.9 4.8	62.2 5.5/12, 60.7 7.0/17, 60.6 7.1/18, 61.7 6.0/23, 61.5 6.2/28, 61.3 6.4/33 ✓
281	62.05	63.2 4.9/33, 63.7 4.0/28, 62.9 4.8/21, 62.0 5.7/18, 62.0 5.7/16, 63.3 4.4/12	63.5 4.2	62.8 4.9/11, 61.1 6.6/16, 61.1 6.6/18, 62.3 5.4/22, 62.5 5.2/28, 62.3 5.4/33 ✓
280	62.2	64.0 4.5/31, 63.7 4.8/24, 62.2 6.3/19, 62.2 6.3/17, 63.6 4.9/12	63.7 4.8	63.1 5.4/10, 62.4 6.1/13, 61.3 7.2/17, 61.1 7.4/18, 62.4 6.1/23, 62.2 6.3/33 ✓
279		63.3 5.2/30, 62.6 5.9/22, 61.2 7.3/17, 61.2 7.3/16, 63.1 5.4/11	63.3 5.2	62.7 5.8/10, 60.7 7.8/17, 60.8 7.7/19, 61.7 6.8/21, 61.8 6.7/33 ✓
278	62.5	63.1 5.4/30, 62.4 6.1/21, 61.1 7.4/17, 61.1 7.4/15, 62.7 5.8/11	63.1 5.4	62.6 5.9/11, 60.7 7.8/16, 60.7 7.8/19, 61.7 6.8/21, 61.9 6.6/23, 61.6 6.9/33
277	62.6	63.6 6.6/31, 63.1 7.1/23, 61.7 8.5/19, 61.8 8.4/16, 63.4 6.8/11	63.6 6.6	63.0 7.2/10, 61.3 8.9/15, 61.1 9.1/18, 62.4 7.8/21, 62.6 7.6/30 ✓
276	62.75	65.1 5.1/29, 64.7 5.5/23, 63.1 7.1/17, 63.0 7.2/15, 64.0 6.2/12	64.6 5.6	64.1 6.1/11, 62.7 7.5/16, 62.6 7.6/18, 63.9 6.3/25, 63.8 6.4/30, 63.6 6.6/33 ✓
275	62.8	66.3 3.9/33, 66.2 4.0/30, 66.2 4.0/22, 64.9 5.3/18, 64.8 5.4/13, 65.5 4.7/12	65.9 4.3	65.1 5.1/15, 64.4 5.8/17, 64.4 5.8/18, 65.7 4.5/23, 65.7 4.5/30, 65.8 4.4/33 ✓
274	62.71	66.4 3.8/33, 66.2 4.0/30, 66.2 4.0/28, 65.8 4.4/26, 65.6 4.6/14, 66.1 4.1/10	66.6 3.6	66.5 3.7/12, 4.6/17, 65.6 4.6/20, 66.5 3.7/23, 66.5 3.7/29, 66.8 3.4/29, 66.8 3.4/33 ✓
273	62.33	64.8 5.4/33, 64.6 5.6/30, 64.6 5.6/28, 63.9 6.3/22	65.0 5.2	65.2 5.0/14, 64.2 6.0/19, 64.0 6.2/23, 66.2 4.0/28, 66.5 3.7/33 ✓

Spk. lone Mple Tree 100' Lt. 275+25

Sta. 288+81 Spokein 1/4 Sec. Cor. Post Left 59
Elev. 962.91

6.80 962.82

288 963.00

287 C3.5/30 C1.1/4 C2.2/30 963.15

286 C3.4/30 C1.2/4 C2.0/30 963.30

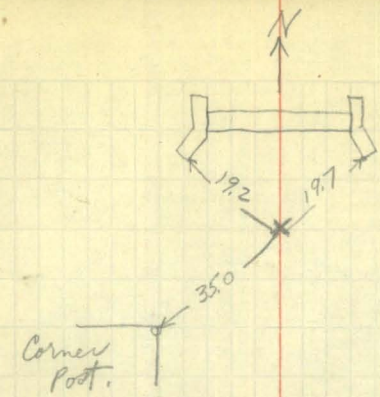
285 C3.6/30 C1.0/4 C2.1/30 963.45

969.62

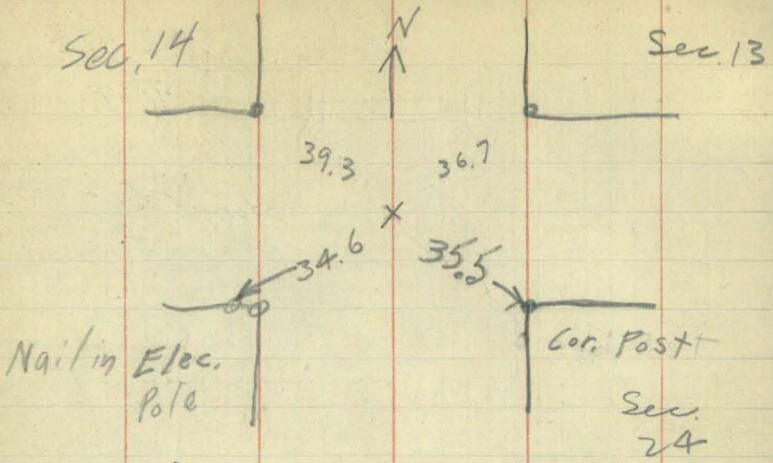
Apr. 28, 1924.

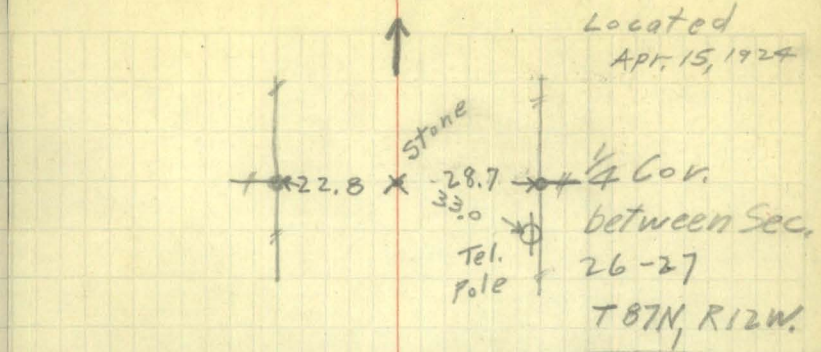
East Waterloo
Twp.

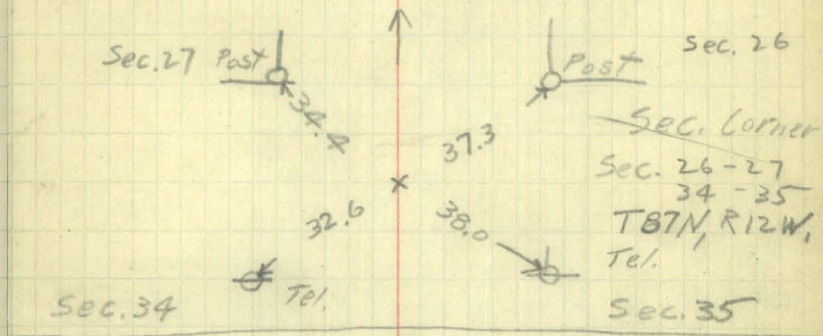
S-W Corner of
Sec. 27-89-12

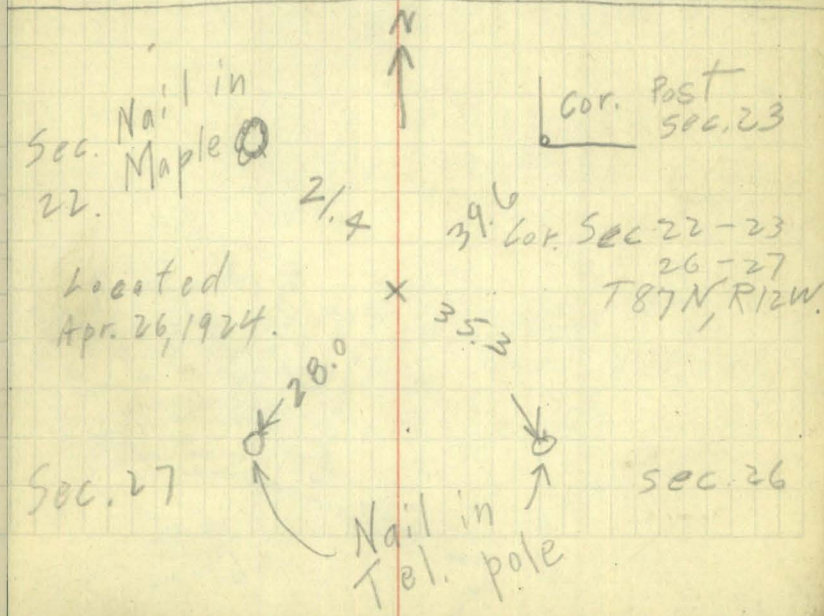


Eagle
Sec. 23-87-13


Sec. 14
N
Sec. 13
39.3
36.7
34.6
35.5
Nail in Elec. Pole
Cor. Post
Sec. 24
Sec. 23
Eagle Twp.
87-13


Located
Apr. 15, 1924
Stone
22.8
28.7
33.0
1/4 Cor.
between Sec.
26-27
Tel. Pole
T87N, R12W.


Sec. 27
Post
34.4
Post
Sec. 26
Sec. Corner
Sec. 26-27
34-35
T87N, R12W.
37.3
32.6
38.0
Tel.
Tel.
Sec. 34
Sec. 35


N
Nail in
Sec. Maple
22.
Cor. Post
Sec. 23
2/4
39.6
Cor. Sec 22-23
26-27
T87N, R12W.
Located
Apr. 26, 1924.
35.2
28.0
Sec. 27
Sec. 26
Nail in
Tel. pole

KEITH'S RAILROAD CURVE TABLES.

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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
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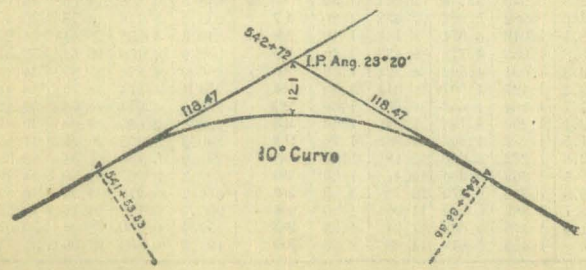

Table I. — Minutes in Decimals of a Degree.

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
31°	1589.0	216.3	**41°**	2142.2	387.4	**51°**	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	**42**	2199.4	407.6	**52**	2794.5	645.2
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	**43**	2257.0	428.5	**53**	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276 2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
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	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	**45**	2373.3	472.1	**55**	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
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	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	**47**	2491.3	518.2	**57**	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
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	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
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	**50**	2671.8	592.3	**60**	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132 7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
61°	3375.0	920.2	**71°**	4086.9	1308.2	**81°**	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
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	**73**	4239.7	1398.0	**83**	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
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	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	**75**	4396.5	1492.4	**85**	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296 4	2073.0
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	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	**77**	4557.6	1591.6	**87**	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
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	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	**79**	4723.2	1695.8	**89**	5630.5	2303.5
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	**80**	4807.7	1749.9	**90**	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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,

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For Tangents Add

Δ 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	.27	.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				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft	25 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.

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

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

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

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

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

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

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

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

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

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

Tan. def. = ½ chord de

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

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

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

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

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

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

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

Right Angle Triangles.—Square the altitude, divide by twice the ba 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. $25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875$ = Ba

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

To find Tons of Rail in one mile of track: multiply weight per ya 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	1465	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	4.2193	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 $1^1/_2$ 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.

MADE IN GERMANY.

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