WHITE BEAR RD.

Transit

FIELD BOOK

360

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.

	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.

Job-23-52

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Page to Page		Description	Sta. to Sta.	
2	8	Cross Sections - Original	138	214
9	10	" " " Fine Grading	90	101+74
11	13	" " " "	77+18	89+67
14	21	" " " "	165+50	209+75
22	32	" " " "	214+75	277+68
33	40	Final Topography	277+68	222
42	54	" "	208	110
54	61	" "	110	0-33

Station	+	H.I	−	Elev	Ground
135+25 B.M.	3.68	249.11		245.43	
138+00				44.7	44.6 24.5
+60				45.4	
139+00				45.5	45.3 3.9
140+00				46.3	46.3 3.0 3.1 246.7
T.P.	6.83	253.01	2.93	246.18	
140+56				47.0	47.0 6.8 6.4 246.2
141+23				47.1	47.1 6.3 6.0 246.8
+65				47.3	
142+00				47.5	47.5 5.7 47.3
143+00				48.6	48.6 5.6 48.0
T.P	7.40	258.53	1.88	251.13	
+70				49.6	
144+00				49.9	49.9 4.8 49.7
145+00				50.1	50.1 4.1 49.9
146+20 B.M	7.59	255.90	10.32 7	248.31	
146+00				50.4	50.4 5.7 49.7
147+00				50.8	50.8 5.4 50.1
148+00				51.9	51.9 4.0 4.8 5.0 51.1
+40				52.2	
+53				52.3	
+70				52.4	
149+00				53.0	53.0 3.4 3.6 3.7 52.8
T.P.	7.16	260.20	2.86	253.04	
+72				53.8	

L E R

3.7/33.0 3.6/30.0 6.6/27.5 7.1/19.8 4.6/15.0 5.1/12.0 4.6/8.0 4.4 4.6/5.0 5.2/12.0 7.5/19.0 11.8/25.0 12.7/29.1 13.4/33.0

[illegible]/33.0 3.0/26.5 [illegible]/22.0 [illegible]/20.0 4.7/14.5 [illegible]/7.0 3.7 4.3/14.0 5.1/17.0 5.2/25.0 7.9/33.0

6.2/33.0 [illegible]/26.0 3.6/23.3 3.3/17.0 3.4/14.0 3.9/13.0 [illegible]/9.5 3.6 3.7/11.5 4.9/14.0 4.3/21.0 2.7/30.5 2.6/33.0

13.2/33.0 9.8/28.0 8.0/23.0 3.8/17.0 3.6/12.5 3.8/10.0 2.8 3.2/15.0 3.8/17.1 3.7/25.0 3.3/33.0

12.9/33.0 13.1/23.4 10.8/17.0 6.9/10.0 6.0 4.1/12.0 7.1/15.0 7.7/18.0 7.2/24.0 6.7/30.0 3.8/33.0

6.9/33.0 7.9/25.5 8.7/19.6 9.2/19.0 9.2/14.0 6.3/11.0 5.9 6.5/11.0 9.0/16.5 8.5/19.6 9.3/26.0 7.3/33.0 6.7/33.0

4.6/33.0 6.0/21.5 8.6/19.0 8.4/16.5 6.3/12.0 5.7 6.2/11.0 8.5/15.0 8.8/24.0 9.4/26.0 9.4/33.0

5.6/33.0 5.9/21.0 6.8/23.0 8.4/20.0 8.4/17.0 6.0/12.0 5.7/6.5 5.5 5.7/4.4 5.9/10.0 6.5/12.0 8.7/18.4 9.1/21.1 10.7/24.0 10.9/33.0

4.8/33.0 4.7/23.5 5.4/23.0 5.6/14.9 5.6/15.0 5.0/13.4 4.4 4.7/10.0 5.0/13.0 5.2/16.3 6.2/22.0 5.7/25.0 5.3/33.0

9.2/33.0 6.4/23.0 9.4/20.5 9.8/16.0 9.5/15.0 8.9 9.1/11.0 9.7/14.0 11.0/21.5 8.5/27.0 3.7/27.0 3.5/33.0

9.4/33.0 8.4/28.5 8.2/24.6 8.1/22.5 9.4/17.0 9.8/11.6 8.6 8.8/9.5 9.1/13.0 8.8/16.5 8.5/22.0 6.4/25.0 4.3/28.5 3.5/33.0

10.5/33.0 8.4/26.5 9.3/22.0 10.0/20.0 10.2/17.5 9.2/15.0 9.2/13.8 8.6/9.0 8.4 8.6/10.0 8.6/15.0 8.4/23.8 8.1/24.0 6.7/26.5 6.5/33.0

9.1/33.0 8.8/25.5 7.9/18.5 6.6/15.0 6.2/10.6 5.5 5.9/9.0 6.2/11.0 7.8/15.0 7.8/18.4 7.5/20.5 7.0/27.0 7.4/33.0

5.0/33.0 4.9/31.0 7.3/24.0 7.7/22.5 7.2/15.1 5.8/14.4 5.1 5.5/12.0 5.8/12.6 7.0/16.0 7.0/17.5 6.9/22.5 8.8/33.0

4.3/33.0 6.6/28.0 6.4/18.7 6.2/15.0 4.6/14.0 4.0 4.5/11.0 6.9/17.5 9.2/22.0 9.2/22.3 11.6/33.0

3.9/34.0 6.1/30.3 6.2/24.0 6.2/16.5 4.1/12.5 3.7 4.5/13.0 5.7/15.5 10.2/26.5 10.5/33.0

4.2/34.0 6.8/30.0 6.6/24.5 6.0/18.5 4.2/13.6 3.6 4.3/13.0 5.5/29.0 5.5/33.0

4.1/35.0 6.7/30.0 6.5/19.5 4.1/14.0 3.5 4.0/13.5 4.9/25.0 5.5/33.0

3.2/33.0 3.1/31.5 5.8/25.0 6.1/23.1 6.1/19.5 3.7/12.0 2.9 3.6/11.0 4.9/15.0 5.7/18.0 5.7/18.9 7.9/23.5 8.4/28.0 8.5/33.0

8.0/33.0 7.8/22.5 8.7/20.0 8.4/16.0 6.8/12.0 6.4 7.0/12.0 8.3/17.5 8.6/25.5 7.0/27.5 7.2/33.0

Station	+	HI 260.20	−	Grade	Rod
150+00				54.1	4.5 6.7 - 5.8 / 53.5
+25				54.4	
+35				54.4	
151+00				55.1	5.2 5.5 - 5.2 / 54.7
T.P.	5.49	261.28	4.41	255.79	
152+00				56.1	5.5 5.8 - 6.1 / 55.5
153+00				56.2	5.6 5.8 - 6.0 / 55.5
154+00				56.1	6.2 / 55.1
155+00				55.2	6.4 / 54.4
B.M.	2.21	258.41	6.08	255.20	
156+00				55.6	3.1 / 55.3
157+00				56.5	2.4 / 56.0
T.P.	9.80	266.28	1.93	256.48	
+65				57.4	
158+00				57.6	9.8 9.2 8.6 / 57.1
159+00				58.8	8.6 8.0 7.4 / 57.3
160+00				59.7	7.8 7.2 6.6 / 57.1
T.P	12.56	274.93	3.91	262.37	
160+00					15.8 - 15.2 / 59.1
165+25 B.M	6.95	267.15	19.73 ?	255.20.	
T.P.	8.10	267.60	2.65	259.50	
+65	8.			59.6	
161+00				59.7	3.5 / 57.1
+45				59.3	

L

C

R

Station	+	H.I. 267.60	−	Grade	Rod.
162+00				58.6	9.0 / 58.6
+60				57.7	
T.P.	2.65	259.61	10.64	256.96	
163+00				57.0	6.1 / 56.5
164+00				54.8	5.3 / 54.3
164+55 B.M	7.87	257.11	5.37 ?	254.24	
165+00				53.4	4.8 / 52.6
+35	E. Rd			53.2	
166+00				52.3	4.9 / 52.2
+50				52.5	
167+00				52.7	5.0 / 52.1
+50				52.8	
168+00				52.8	5.1 / 52.0
169+00				52.4	5.2 / 51.9
+23 T.P	4.08	255.90	5.79	251.82	
170+00				52.1	4.1 / 51.8
171+00				51.4	4.2 / 51.7
172+00				51.3	4.2 4.3 4.4 / 51.6
T.P.	8.93	260.08	4.75	251.15	
+50				51.8	
173+00				51.7	8.0 7.6 8.2 / 51.5
+50				51.9	
174+00				52.0	7.9 8.7 9.5 / 51.5
+35				52.2	

A E P

6.9 6.7 7.7 7.8 8.5 9.4 9.9
33.0 26.0 25.2 21.0 16.0 13.0 7.5 9.0

11.1 10.7 13.5
33.0 26.5 15.5 1.9

9.4 8.8 7.6 8.0 2.2 2.1 1.7 1.3
7.5 11.5 13.5 16.0 23.0 28.0 30.7 33.0

13.3 10.6 10.0 10.3 8.5 7.7 6.2
9.0 12.0 14.0 17.3 21.0 27.5 33.0

5.8 4.3 2.1 5.3 3.1
33.0 29.5 22.5 16.3 11.2 2.6

3.1 3.9 4.1 2.6 2.3 2.0 1.0
9.2 13.2 17.5 20.5 23.9 27.0 33.0

9.8 7.6 6.4 6.0 5.7 5.2
38.0 26.0 21.3 16.7 14.0 7.3 4.8

5.2 5.4 7.5 7.1 7.0 5.9
8.3 13.0 16.5 19.3 21.5 33.0

9.2 8.7 7.2 6.7 6.6 4.3 4.1
33.0 30.0 26.0 19.6 16.0 10.3 7.3 3.7

3.9 5.0 5.6 6.0 4.2
15.0 17.1 20.0 24.8 33.0

4.0 4.5
33.0 15.0 3.9

3.9 7.6
13.0 33.0

6.2 5.9 5.9 6.7 6.3 5.1 4.9
23.0 20.0 17.5 14.0 10.5 8.0 2.9 4.8

4.5 4.9 5.2 5.8 5.7 3.7
6.0 15.0 16.5 23.0 27.0 33.0

3.4 5.6 5.5 6.1 5.1
33.0 24.5 19.5 11.0 8.0 4.6

4.5 5.1 5.4 12.5 4.9 3.5
3.0 15.0 13.5 4.7 27.5 33.0

4.7 4.6 4.5 4.4 5.5 5.8 5.6
33.0 28.0 23.0 20.5 16.5 12.0 6.0 4.4

5.0 5.6 4.3 4.1 3.4 2.5
12.0 18.5 21.5 23.9 27.0 33.0

3.6 3.7 3.5 3.7 5.4
33.0 22.5 16.5 14.0 12.0 4.3

4.4 5.0 2.7 2.5 1.1 1.3
11.0 18.5 24.0 26.5 29.5 33.0

2.9 3.2 3.9 4.7 5.5 5.1
33.0 24.9 22.0 18.5 12.0 10.2 4.3

5.1 5.5 3.9 3.9 3.2 2.9 3.1
13.5 17.0 20.0 23.5 24.7 28.2 33.0

5.2 4.9 5.7 6.1 6.3 5.9 5.3
33.0 28.0 23.6 17.0 11.8 12.4 7.5 4.7

5.2 5.4 6.1 6.1 6.3 5.8 6.4
10.0 14.0 16.5 17.4 20.0 23.0 33.0

4.2 4.4 5.0 6.2 6.3 6.1 4.7 4.1
33.0 28.0 21.5 19.2 13.7 15.5 12.0 6.8 2.4

4.1 4.4 5.8 6.5 5.2 4.5 5.2
3.2 11.5 16.0 19.6 23.0 26.5 33.0

5.2 5.8 7.2 7.2 7.0 5.1
33.0 26.0 20.5 17.5 16.0 12.5 4.5

4.6 5.0 8.4 10.2 10.9
16.0 12.5 17.0 26.3 33.0

3.9 4.9 5.0 6.2 4.6
33.0 28.0 23.0 17.0 13.0 4.6

4.9 9.5 11.3 12.0 6.2
11.0 16.0 27.3 33.0 15.7

4.6 7.4 7.2 9.6 9.6 8.9
33.0 27.0 22.0 17.0 15.0 13.0 8.3

8.7 9.8 9.2 9.6 11.0
11.6 16.0 17.0 24.0 33.0

3.5 4.0 6.4 8.6 9.4 9.5 9.0
33.0 29.0 24.4 22.0 18.0 14.0 12.5 6.4

8.9 9.9 8.6 8.1 8.1 7.1
11.0 13.0 15.5 21.5 24.1 33.0

4.8 5.4 8.8 8.9 8.4
33.0 23.0 17.0 15.5 13.0 8.2

8.4 9.4 8.1 7.3
11.0 13.0 17.0 33.0

4.8 4.9 9.2 9.1 8.6
38.0 26.0 22.5 17.0 13.0 8.1

8.7 8.3 7.8
15.0 24.0 33.0

4.2 4.2 8.1 8.7
33.0 25.0 20.5 13.0 7.9

8.4 8.5 8.1
14.0 25.0 33.0

Station	+	H.I. 260.08	—	Grade	Rod
174+43				52.3	
175+00				52.4	4.0 4.8 9.6 / 51.3
T.P.	8.96	261.49	7.55	252.53	
+50				52.6	
176+00				52.6	9.5 10.3 — / 51.2
+12				52.6	
+50				52.0	9.7 10.5 11.3 / 51.0
177+00				51.3	10.1 10.9 11.7 / 50.6
T.P.	3.39	253.91	10.97	250.52	
+50				50.1	3.2 4.0 4.8 / 49.9
178+00				48.7	4.2 5.0 5.8 / 48.9
179+00				46.1	6.7 7.2 — / 46.1
T.P.	4.16	249.56	9.21	245.70	
+65				45.1	
180+00				44.6	5.1 / 44.5
B.M. 180+15	7.81	249.05	8.32	241.24	
181+00				42.9	6.3 / 42.7
+25				42.2	
182+00				41.3	7.3 / 41.7
T.P.	3.98	244.61	8.42	240.63	
183+00				41.2	3.2 / 41.4
				41.3	
184+00				41.2	3.7 2.3 / 41.9
T.P.	9.00	249.43	4.18	240.43	

5

		4.0	4.7	8.7			6.5	8.6	5.4	5.4			
		33.0	29.5	29.0	13.4	7.8	17.0	23.0	29.5	33.0			
2.1	1.9	2.5	2.7	8.2	8.6		6.3	8.8	8.8	8.0	6.0	6.0	
33.0	29.1	24.5	19.3	13.0	10.5	7.7	17.0	20.0	29.0	24.6	29.5	33.0	
4.8	4.9	7.5	9.9	9.3			9.5	10.0	10.2	8.3			
33.0	24.0	19.5	12.0	10.0	8.7		16.5	20.0	28.0	34.0			
4.6	6.3	4.4	8.4	10.8			9.3	10.3	10.3	10.7			
33.0	28.2	22.0	18.5	14.0	8.9		13.0	23.0	23.8	33.0			
4.7	4.2	7.6	10.0	9.7			9.2	10.0	10.2				
33.0	23.0	20.0	16.0	12.5	8.9		12.0	27.0	33.0				
6.2	5.3	23.5	19.0	12.7			10.3	11.2	11.5	11.3			
33.0	27.0	4.3	10.5	15.0	9.5		16.0	21.3	27.0	33.0			
	7.3	7.2	10.5	11.7	11.0		11.0	12.9	12.8	12.8	13.6		
	33.0	23.9	22.5	19.5	14.5	10.2	12.5	17.1	22.0	27.0	33.0		
2.7	1.9	2.6	4.8	4.3	5.0	4.3	5.1	5.9	5.3	4.8	3.1		
33.0	29.0	25.0	22.5	18.7	13.0	13.5	11.5	17.9	21.5	29.5	33.0		
5.3	5.2	6.1	6.3	5.0			6.4	7.3	10.6	11.4	12.4	13.1	15.0
33.0	29.5	24.4	19.2	7.0	5.2		10.0	13.5	20.2	25.5	29.5	29.5	33.0
10.8	10.7	10.7	10.8	8.1			9.2	10.7	13.0	15	17.0	18.5	
33.0	24.5	22.3	19.6	14.0	7.8		9.0	13.0	15.0	18.0	25.0	34.0	
6.7	7.3	6.0	5.3	5.7	5.1		5.0	5.6	6.8	9.5	11.3		
33.0	29.0	22.5	16.5	14.5	12.0	4.5	19.0	17.0	21.5	29.5	33.0		
5.7	5.1	5.0	4.8	6.1	5.6	5.1	5.1	5.5	6.4	6.9	8.3		
33.0	23.0	20.0	16.0	13.0	12.0	5.0	5.5	14.5	18.0	27.0	33.0		
2.5	2.0	2.0	4.3	7.0	6.7	6.3	6.1	6.3	6.7	6.8	6.2	7.2	
33.0	27.3	15.3	12.0	8.5	7.0	1.0	7.0	13.0	16.6	26.8	33.5	33.0	
	2.1	2.4	3.0	7.7	7.2		6.7	7.7	6.8	7.6			
	33.0	20.5	15.0	8.5	6.5	6.9	7.5	21.5	25.0	33.0			
9.6	9.2	9.5	8.5	9.6	8.4		7.3	8.1	8.8	7.6	9.9		
33.0	23.0	19.3	13.0	9.5	7.0	7.8	7.0	17.2	22.0	28.0	33.0		
		8.8	8.8	7.5	4.5		3.4	4.0	9.2	11.5	12.3		
		33.0	23.8	19.0	10.0	3.4	7.5	15.5	24.0	29.4	33.0		
	4.4	3.9	4.9	5.0	4.0		4.2	6.2	9.0	10.8	11.9		
	33.0	26.5	21.0	19.0	13.5	3.3	10.0	15.0	21.0	26.0	33.0		
							4.3	6.6	7.9	9.7	11.2		
						3.4	10.0	18.0	16.5	23.0	30.4		

Station	+	H.I.	−	Grade	Rod
		249.43 ✓			
184+00				41.2	7.9 7.5 / 41.9
+30				41.2	
185+00				41.4	7.2 6.6 6.0 / 42.8
186+00				43.1	6.3 5.7 5.1 / 43.7
+50				44.0	
187+00				44.7	5.4 4.8 4.2 / 44.6
B.M	10.04	250.26 ✓	9.21 ?	240.22 ✓	
+50				45.3	
188+00				45.8	5.4 4.8 4.2 / 45.5
T.P.	8.05	253.97 ✓	4.34	245.92 ✓	
+50				46.3	
189+00				46.6	8.4 7.8 7.2 / 46.2
+30				47.0	
+50				47.2	
190+00				47.8	7.5 6.9 6.3 / 47.1
+25				48.3	
T.P.	6.13	254.32 ✓	5.78	248.19 ✓	
+50				48.2	
191+00				48.6	4.9 4.3 3.7 / 48.0
+50				49.1	
192+00				49.2	5.5 5.4 5.3 / 48.9
193+00				50.1	4.5 / 49.8
193+47 B.M.	6.33	256.23 ✓	4.42	249.90 ✓	
194+00				51.2	5.7 / 50.5

L ℄ R.

5.9/33.0 5.6/26.0 ×7.9/23.0 8.4/22.5 9.3/19.5 6.6/15.0 | 8.2 |

4.1/33.0 4.2/30.0 7.8/26.0 9.1/22.5 8.6/20.0 7.7/7.0 | 8.2 | 9.1/6.5 10.8/12.0 14.0/18.0 16.4/33.0

5.5/33.5 8.0/30.0 8.6/25.0 7.9/23.0 ×7.6/16.6 7.9/22.0 7.4/10.0 | 8.0 | 10.0/8.0 12.4/13.5 15.1/24.0 ×15.7/30.7 15.9/33.0

33.4/33.0 5.4/27.5 6.8/25.5 6.5/21.5 ×6.3/16.0 6.0/8.5 | 6.3 | 6.7/4.0 7.6/6.5 7.6/11.0 6.7/13.5 ×8.2/22.6 8.0/33.0

3.6/33.0 3.5/26.0 6.4/22.5 6.6/20.0 5.9/15.0 5.4/5.0 | 5.4 | 6.3/9.5 5.6/12.5 4.2/16.0 5.1/26.0 6.1/33.0

4.4/33.0 3.0/21.0 5.0/18.5 ×5.8/16.6 5.4/14.0 | 4.7 | 5.4/11.0 3.6/17.5 ×4.0/23.2 4.1/26.0 2.9/33.0

6.7/33.0 5.5/22.0 5.4/18.0 5.8/12.0 | 5.0 | 5.3/10.5 5.7/13.0 4.8/17.5 3.6/27.0 3.7/33.0

7.9/33.0 6.7/24.0 ×5.5/16.2 5.2/12.5 | 4.5 | 5.2/12.0 5.5/14.0 5.1/16.5 3.5/19.5 ×3.3/23.7 2.3/33.0

10.9/33.0 9.0/22.0 8.8/15.0 | 7.7 | 8.4/11.0 8.8/13.0 7.4/15.5 6.4/19.5 4.9/24.0 4.7/33.0

9.4/33.0 ×8.1/23.3 7.7/17.5 8.8/16.0 8.2/15.0 | 7.4 | 8.0/9.0 8.2/12.5 6.7/17.0 ×6.4/23.8 6.1/30.0 5.1/33.0

9.0/33.0 8.0/24.0 7.3/17.5 7.8/14.0 | 7.0 | 7.7/11.5 6.0/16.5 5.9/24.5 6.2/33.0

9.1/33.0 8.2/25.0 7.6/18.0 7.6/13.0 | 6.8 | 7.7/12.0 5.6/16.0 5.5/19.0 2.6/25.0 2.9/31.0 3.8/33.0

9.4/33.0 ×7.5/23.0 7.2/18.0 6.3/7.0 | 6.2 | 7.2/12.0 6.0/15.0 5.2/18.5 1.9/26.5 ×2.0/27.3 2.3/33.0

9.2/33.0 7.4/25.0 6.5/17.0 5.9/8.0 | 5.7 | 6.9/12.0 6.0/14.5 5.7/20.0 6.2/25.0 3.4/30.0 3.2/33.0

9.2/33.0 7.0/20.0 6.7/15.0 | 6.1 | 7.0/10.0 6.4/12.0 5.3/18.0 3.3/24.5 3.2/33.0

8.1/33.0 ×6.9/19.5 7.0/19.5 5.8/8.5 | 5.7 | 6.1/6.5 6.6/9.0 6.4/14.0 4.1/19.5 ×3.4/25.3 3.0/30.0 3.0/33.0

7.7/33.0 7.4/27.0 ×6.4/18.0 5.4/7.5 | 5.2 | 6.0/9.0 7.0/13.0 5.8/19.0 5.9/33.0

6.8/33.0 7.0/25.0 6.4/17.4 5.9/12.5 | 5.1 | 5.6/10.0 7.1/15.0 ×7.2/18.9 7.1/22.0 7.7/33.0

4.5/33.0 4.9/25.0 ×5.4/17.4 5.2/15.0 4.5/9.6 | 4.2 | 4.5/9.6 4.6/12.0 5.5/14.0 5.6/16.0 ×5.3/17.2 5.5/33.0

6.0/33.0 ×5.7/16.0 5.7/12.0 | 5.0 | 5.7/12.0 ×6.5/17.2 7.7/33.0

Station	+	H.I.	—	Grade	Grade To
		256.23			
195+00				51.8	5.8 / 50.
196+00				51.6	5.
201+90			8.59		
B.M	5.68	253.32 ✓	?	247.64 ✓	
197+00				51.0	2.4 / 50.7
198+00				50.2	3.0 / 50.3
199+00				49.5	3.9 / 49.6
200+00				48.2	5.0 / 48.3
201+00				47.4	6.1 / 47.3
202+00				46.9	6.1 / 46.7
B.M.	4.75	252.39 ✓	5.68	247.64 ✓	
203+00				47.0	5.6 / 46.8
204+00				47.6	5.1 / 47.3
205+00				47.9	4.6 / 47.8
206+00				49.2	3.8 / 48.6
207+00				50.2	3.4 / 50.0
T.P.	9.37	260.02 ✓	1.74	250.65 ✓	
208+00				51.6	1.0 / 51.4
209+00				53.5	6.9 / 53.1
+50				54.3	
210+00				55.4	5.2 / 54.9
+30					
B.M	9.19	268.80 ✓	0.41	259.61 ✓	
211+00				57.1	12.3 / 56.5
+50				57.8	
212+00				58.8	10.6 / 58.2

L — ℄ — R

5.1/33.0, 6.?/27.0, 6.1/23.0, 5.3/16.0 (x), 5.0/14.5 — 4.4 — 4.8/11.0, 5.3/21.0 (x), 6.0/33.0

5.4/30.5, 6.5/27.5, 6.5/23.0, 6.3/18.0 (x), 5.5/15.0, 5.0/9.5 — 4.6 — 5.0/11.0, 5.0/15.0, 5.2/16.8 (x), 5.4/24.0, 5.6/33.0

4.9/33.0, 4.4/23.5, 3.9/18.3 (x), 3.3/14.5, 2.4/7.5 — 2.3 — 2.4/5.0, 2.6/15.0, 2.9/16.8 (x), 3.4/22.5, 3.8/33.0

4.4/33.0, 4.0/25.0, 3.4/19.5, 3.9/17.4 (x), 3.9/16.5, 3.1/7.0 — 3.1 — 3.2/10.0, 3.0/16.0 (x), 3.2/19.0, 3.2/23.0, 2.6/33.0

5.4/33.0, 4.9/24.0, 5.4/22.0, 5.2/18.0 (x), 3.9/6.0 — 3.8 — 3.9/7.8, 4.4/12.0, 4.7/14.5, 4.5/16.9 (x), 4.0/23.0, 2.3/33.0

9.1/33.0, 8.8/25.0, 7.9/20.4 (x), 7.3/17.0, 5.8/14.0 — 5.1 — 6.1/12.0, 7.1/17.0, 7.1/19.2 (x), 7.3/24.5, 7.3/33.0

7.0/33.0, 7.0/22.5, 7.6/20.5, 7.8/18.5 (x), 6.9/13.5, 6.1/6.8 — 5.9 — 6.1/5.5, 6.4/12.0, 6.8/17.1 (x), 6.9/22.5, 6.1/33.0

7.3/33.0, 7.1/24.0, 8.1/21.5, 7.9/18.0 (x), 7.2/13.5, 6.6/9.0 — 6.4 — 6.6/10.0, 7.1/14.0, 7.4/17.2 (x), 7.7/20.5, 7.0/24.0, 6.2/33.0

8.2/33.0, 8.1/24.0, 7.8/18.1 (x), 6.1/12.5, 5.6/6.3 — 5.4 — 5.6/12.0, 6.6/17.5 (x), 7.2/20.0, 6.4/24.0, 5.6/33.0

6.4/33.0, 6.7/27.0, 7.6/24.0, 7.7/20.7 (x), 7.9/19.0, 6.0/14.0, 5.1/8.5 — 4.8 — 5.1/6.0, 5.5/11.4, 7.5/16.8, 7.8/20.1 (x), 8.8/22.6, 8.5/25.0, 7.5/28.0, 7.3/33.0

5.6/33.0, 6.0/27.0, 7.5/24.0, 7.3/20.1 (x), 7.3/18.5, 5.6/14.5, 4.6/7.6 — 4.5 — 4.6/6.0, 5.0/12.0, 7.5/17.7, 7.5/20.4 (x), 7.6/26.0, 7.6/33.0

1.9/33.0, 6.2/29.0, 6.3/25.5, 5.7/23.0, 5.8/19.0 (x), 4.3/15.6, 3.8/11.0 — 3.2 — 3.8/11.5, 5.6/17.6, 5.7/18.9 (x), 5.2/20.0, 6.3/33.0

3.7/33.0, 5.0/26.0, 5.0/19.9 (x), 4.1/17.5, 2.8/12.5, 2.4/8.0 — 2.2 — 2.4/5.0, 3.1/12.0, 5.1/17.0, 5.4/20.5 (x), 4.3/27.0, 6.3/33.0

11.5/33.0, 11.6/20.5 (x), 11.1/17.7, 8.4/11.7 — 8.4 — 8.6/7.3, 9.2/12.0, 11.8/16.0, 12.2/21.4 (x), 13.1/33.0

8.2/33.0, 8.6/24.0, 8.3/18.1 (x), 7.3/14.5, 6.9/9.4 — 6.5 — 6.9/10.3, 7.3/12.0, 9.0/17.0, 9.3/19.2 (x), 9.1/25.0, 9.3/33.0

4.4/33.0, 6.5/27.0, 6.4/19.5, 6.4/13.0 — 5.7 — 6.5/12.0, 6.8/23.0, 6.4/33.0

0.6/33.0, 2.3/25.9 (x), 3.8/23.0, 4.4/16.5, 5.2/13.0, 4.7/7.0 — 4.6 — 5.1/13.0, 3.8/23.0, 3.8/24.4 (x), 3.1/33.0

4.8/33.0, 5.0/30.8 (x), 5.1/27.0, 7.4/26.0, 9.9/23.0, 12.4/17.8, 12.3/10.0 — 11.7 — 12.3/9.0, 12.7/13.5, 12.4/21.0, 8.8/26.0, 7.9/27.4 (x), 5.5/30.0, 5.7/33.0

3.7/33.0, 4.2/30.5, 9.4/25.0, 11.2/20.0, 12.1/16.0 — 11.0 — 11.6/14.5, 9.6/21.5, 4.3/27.0, 4.5/33.0

4.3/33.0, 6.3/30.0, 8.1/25.5 (x), 8.3/24.0, 10.8/21.5, 11.4/17.0, 10.6/9.8 — 10.0 — 10.5/13.5, 9.7/17.5, 5.5/23.0, 3.2/25.0, 3.1/30.5 (x), 3.7/33.0

Station	+	H.I. 268.80	−	Grade	Rod
212+30				59.3	
213+00				60.2	9.2 / 59.6
+50				60.3	
214+00				60.3	9.6 / 60.2

h E R

4.2	4.1	7.9	10.3	11.0	9.8		9.7	9.4	8.1	3.0	3.3		
33.0	29.5	25.0	21.0	16.0	6.0	9.5	11.0	20.0	24.5	29.0	33.0		
5.2	4.9	10.6	10.6	9.2	9.2	8.8	9.2	8.9	6.6	4.1	4.2	4.7	
33.0	27.8	21.5	16.0	13.0	9.6	6.5	8.6	11.0	15.0	22.0	26.0	28.0	33.0
	5.8	6.1	7.9	9.1	8.6		9.7	7.9	5.9				
	33.0	24.5	19.0	13.5	8.0	8.5	13.5	19.0	33.0				
6.5	6.3	6.3	8.7	9.1	8.6		8.6	8.4	7.2	7.0	6.1		
33.0	25.3	24.0	19.0	15.0	6.5	8.5	10.5	15.0	23.5	29.6	33.4		

X Sections for fine grading
Station 90 — 101 + 74.3

Station					
B.M.	3.56	239.16			235.60
90+00				234.40	4.75
+25				34.35	4.80
+50				34.25	4.90
+75				34.20	4.95
91+00				34.10	5.05
+25				34.05	5.10
+50				33.95	5.20
+75				33.90	5.25
92+00				33.80	5.35
+25				33.70	5.45
+50				33.60	5.55
+75				33.45	5.70
93+00				33.30	5.85
+25				33.15	6.00
+50				32.95	6.20
+75				32.75	6.40
94+00				32.50	6.65
T.P	3.00	235.50	6.66	232.50	
+25				32.25	3.25
+50				32.00	3.50
+75				31.75	3.75
95+00				31.50	4.00
+25				31.25	4.25
+50				31.05	4.45

h

4.70	+0.15
12.0	
4.85	+0.05
4.95	+0.05
12.00	
5.05	0.0
12.0	
5.00	+0.15
12.0	
5.05	+0.15
12.0	
5.15	+0.15
12.0	
5.30	+0.05
12.0	
5.50	−0.05
12.0	5/00
5.70	−0.15
12.0	
5.95	−0.3
12.0	
6.05	−0.25
12.0	
6.25	−0.3
12.0	
6.45	−0.3
12.0	
6.50	−0.2
12.0	
6.70	−0.2
12.0	2/00
7.05	−0.3
12.0	

3.5	−0.15
12.0	
3.75	−0.15
12.0	
4.05	−0.2
12.0	
4.2	−0.1
12.0	
4.4	−0.05
12.0	5/00
4.55	0.0
12.0	

d

4.65	+0.1
4.70	+0.1
4.80	+0.1
5.05	+0.1 3/00
4.95	+0.1
4.95	+0.15
5.05	+0.15
5.20	+0.05
5.30	+0.05
5.45	−0.2
5.95	−0.35
6.05	−0.35
6.05	−0.15
6.00	−0.15
6.15	−0.05
6.25	+0.05
6.35	0.0 4/00
6.45	

3.40	−0.15
3.6	−0.1
3.85	−0.1
4.0	0.0
4.2	+0.05
4.4	+0.05

p

4.6	+0.25
12.0	
4.6	+0.3
12.0	
4.65	+0.35
12.0	
4.80	+0.25
12.0	
4.85	+0.3
12.0	
4.75	+0.45
12.0	
5.15	+0.15
12.0	
5.25	+0.1
12.0	
5.40	+0.05
12.0	
5.60	−0.05
12.0	
5.70	−0.05
12.0	
5.80	0.0
12.0	
6.00	−0.05
12.0	
6.20	−0.1
12.0	
6.40	−0.1
12.0	
6.60	−0.1 4/00
12.0	
6.55	+0.2
12.0	

3.30	+0.05 8/00
12.0	
3.7	−0.1
12.0	
3.95	−0.1
12.0	
4.15	−0.05
12.0	
4.35	0.0
12.0	
4.35	+0.2
12.0	

Station	+	H.I.	−	Grade	
		235.50			
95+75				30.90	4.60
96+00				30.70	4.80
+25				30.60	4.90
+50				30.50	5.00
+75				30.50	5.00
97+00				30.40	5.10
+25				30.40	5.10
+50				30.35	5.15
+75				30.35	5.15
98+00				30.30	5.20
+25				30.30	5.20
+50				30.25	5.25
+75				30.25	5.25
98+96.5				30.20	5.30
99+33.5				30.15	5.35
+71.5				30.15	5.35
100+08.5				30.10	5.40
T.P.	4.39	234.59	5.30	230.20	
+46.5				30.05	4.55
+75				30.05	4.55
101+00				30.00	4.60
+36.5				29.95	4.65
+74.5				29.95	4.65

4.20	0.0		-0.1		+0.25	4.45		
12.0			4.7	3/00		12.0		
5.00	-0.1		+0.05		+0.35	4.55		
12.0		4/00	4.75			12.0		
5.15	-0.15		+0.15		+0.30	4.70		
12.0		5/00	4.72			12.0		
5.15	-0.4		+0.1		+0.35	4.75		
12.0		2/00	4.98			12.0		
5.0	+0.1		+0.05		+0.2	4.90		
12.0			4.95			12.0		
5.05	+0.15		+0.05		+0.25	4.95		
12.0			5.05			12.0		
5.2	0.0		-0.1		+0.15	5.05		
12.0			5.70	4/00		12.0		
5.15	+0.1		-0.05		+0.15	5.1		
12.0		4/00	5.2	3/00		12.0		
5.20	+0.05		0.0		+0.2	5.05		
12.0			5.15			12.0		
5.2	+0.1		0.0		+0.25	5.05		
12.0			5.2			12.0		
5.25	+0.05		+0.05		+0.15	5.15		
12.0			5.15			12.0		
5.25	+0.1		0.0		+0.2	5.15		
12.0			5.25			12.0		
5.35	0.0		-0.05		+0.2	5.55		
12.0			5.30			12.0		
5.40	0.0		-1.0		+0.05	5.35		
12.0			5.4			12.0		
5.3	0.0		0.0		-0.05	5.5		5.45
10.0			5.35			10.0		
5.4	-0.25		-0.05		+0.05	5.5		5.55
10.0			5.40	5/00		10.0		
5.15	-0.05		-0.05		-0.05	5.75		5.70
10.0			5.45			10.0		
4.10	-0.05		-0.1		+0.15	4.55		5.00
10.0			4.65	4/00		10.0		
4.20	-0.1		-0.15		+0.05	4.7		5.00
10.0			4.70			10.0		
4.35	-0.2		0.0		+0.2	4.85		5.05
10.0			4.68			10.0		
4.05	+0.25		+0.1		+0.25	4.45		5.10
12.0		3/00	4.52			10.0		
4.30	+0.05		+0.15		+0.15	4.85		4.95
12.0			4.50			10.0		

X sections for fine grading

Sta. 77+18½ — 89+67.25

Station	+	H.I.	—		Elevation
B.M.	2.11	252.77			250.66
77+18½				245.9	6.85
+43.6				46.5	6.25
+68.6				46.9	5.85
+93.6				47.35	5.40
78+25				47.70	5.05
+50				47.90	4.85
+75				48.00	4.75
79+00				48.00	4.75
+25				47.95	4.80
+50				47.90	4.85
+90				47.80	4.95
80+13				47.75	5.00
+43				47.70	5.05
+75				47.65	5.10
81+00				47.60	5.15
+25				47.55	5.20
+50				47.50	5.25
+75				47.45	5.30
82+00				47.40	5.35
T.P	2.64	250.71	4.70	246.07	
+25				47.35	3.35
+50				47.30	3.40
+75				47.25	3.45
83+00				47.20	3.50

7.05	7.25 −0.2	6.65 +0.2	6.50 +0.15 → 6.65
6.35	6.20 +0.15	6.20 +0.05	6.20 −0.05 → 6.15
5.95	5.90 +0.05	5.85 +0.05	5.70 +0.15 → 5.85
	5.70 −0.2	5.85 +0.05	5.60 −0.1
	5.50 +0.15	5.35 +0.5	5.30 −0.5
	5.40 −0.15	5.40 −0.05	5.15 +0.2
	5.25 −0.2	5.25 −0.2	5.2 −0.35
	5.20 −0.05	5.20 −0.15	5.10 −0.25
	5.15 −0.1	5.05 −0.05	4.95 −0.05
	4.95 0.0	5.00 −0.05	4.95 —
	5.05 —	5.00 −0.05	5.25 +0.2
	4.95 +0.2	5.10 −0.1	5.05 +0.05
5.15	5.15 +0.15	5.00 −0.1	5.05 → 5.05
5.25	5.15 +0.1	5.15 +0.2	4.95 → 4.95
5.35	5.05 +0.3	5.35 +0.15	4.95 → 4.95
5.40	5.15 −0.1	5.50 +0.2	5.00 → 5.00
5.45	5.30 +0.25	5.70 +0.15	5.05 → 5.05
5.50	5.30 +0.3	5.85 +0.2	5.10 → 5.10
5.55	5.30 +0.25	5.85 +0.05	5.15 → 5.15
3.55	3.55 0.0	3.35 0.0	3.3 −0.15 → 3.15
3.60	3.7 −0.1	3.5 0.0	3.3 −0.1 → 3.20
3.65	3.75 −0.1	3.7 +0.15	3.3 −0.05 → 3.25
3.70	3.60 −0.1	3.85 +0.15	3.15 +0.15 → 3.30

Station	+	H.I. 250.71	−	Grade	
83+25				47.10	3.60
+50				46.90	3.80
+75				46.65	4.05
84+00				46.30	4.40
+25				45.85	4.85
+50				45.30	5.40
+75				44.70	6.00
85+00				44.00	6.70
+25				43.25	7.45
+50				42.50	8.20
+75				41.75	8.95
86+00				41.00	9.70
+25				40.25	10.45
+50				39.50	11.20
+75				38.75	11.95
87+00				38.00	12.70
T.P	1.82	240.34	12.19	238.52	
+25				37.30	3.05
+50				36.70	3.65
+75				36.00	4.35
88+00				35.80	4.55
+25				35.55	4.80
+50				35.35	5.00
+75				35.25	5.10

h	c	P	
3.80	3.85 -0.05	-0.05 3.65	-0.1 3.3 3.4
4.00	-0.1	+0.05 3.75	+0.2 3.4 3.6
4.25	-0.15	-0.05 4.10	+0.05 3.8 3.85
4.60	4.70 -0.1	+0.05 4.35	+0.1 4.0 4.20
5.05	5.2 -0.15	-0.05 4.9	4.65 4.65
5.60	5.80 -0.2	-0.1 5.55	-0.15 5.35 5.20
6.20	6.35 -0.15	-0.2 6.2	-0.3 6.10 5.80
6.90	6.95 -0.05	-0.05 6.95	-0.15 6.65 6.50
7.65	7.70 -0.05	-0.05 7.4	-0.1 7.35 7.25
8.40	8.35 +0.05	+0.05 8.15	-0.1 8.1 8.00
9.15	8.95 +0.2	+0.05 8.9	-0.15 8.9 8.75
9.90	9.70 +0.15	+0.1 9.6	-0.05 9.55 9.50
10.65	10.75 -0.1	+0.1 10.35	-0.1 10.35 10.25
11.40	11.4 0.0	0.0 11.2	-0.1 11.1 11.00
12.15	12.25 +0.1	0.0 11.95	-0.05 11.8 11.75
12.90	12.65 +0.25	+0.25 12.45	+0.2 12.3 12.50
3.25	2.8 +0.45	+0.35 2.7	+0.3 2.55 2.85
3.85	3.6 +0.25	+0.25 3.2	+0.25 3.2 3.45
(4.55)	4.2 +0.15	+0.25 4.1	+0.15 4.0 4.15
4.75	-0.15	-0.5 4.6	-0.15 4.5 4.35
(5.00)	5.25 -0.25	-0.3 5.1	-0.3 4.9 4.60
(5.20)	5.05 -0.25	-0.35 5.35	-0.25 5.05 4.80
(5.30)	5.4 -0.40	-0.40 5.5	-0.40 5.0 4.90

Station	+	H.I. 240.30	−	Grade	
88+92				35.30	5.05
89+11				34.65	5.70
+37.25				34.60	5.75
+67.25				34.50	5.85

	L			℄			R		
(5.25)	5.85 / 10.0	-0.6		5.35	-0.3	-0.5	5.35 / 10.0		(4.86)
5.80/	5.90 / 10.0	-0.1	8 / 00	5.5	+0.2	+0.1	5.50 / 10.0		\5.60
5.85/	5.90 / 10.0	-0.05	8 / 00	5.6	+0.15	+0.05	5.65 / 10.0		\5.70
	6.00 / 10.0	-0.05	7 / 00	5.75	+0.1		5.6 / 10.0	+0.15	

X sections for fine Grading

Sta. 165+50 — 209+75

Station	+	H.I.	−	Elev.	
B.M	2.67	256.83		254.16	
165+50				52.40	4.45
+75				52.20	4.65
166+00				52.20	4.65
+25				52.20	4.65
+50				52.15	4.70
+75				52.15	4.70
167+00				52.10	4.75
+25				52.10	4.75
+50				52.05	4.80
+75				52.05	4.80
168+00				52.00	4.85
+25				52.00	4.85
+50				51.95	4.90
+75				51.95	4.90
169+00				51.90	4.95
+25				51.90	4.95
+50				51.85	5.00
+75				51.85	5.00
170+00				51.80	5.05
T.P.	4.51	256.36	4.98	251.85	
+25				51.80	4.55
+50				51.75	4.60
+75				51.75	4.60
171+00				51.70	4.65

K.	L	P
4.75 -0.2	-0.05	0.0
10.0	4.5	4.55
4.75 0.0	-0.2	-0.2 4.75
10.0	4.85	10.0
4.9 -0.15	-0.2	-0.1 4.85
10.0	4.85	10.0
4.9 -0.15	-0.25	0.0 4.75
10.0	4.9	10.0
5.1 -0.3	-0.05	-0.05 4.85
10.0	4.75	10.0
5.2 -0.4	-0.15	-0.15 4.95
10.0	4.85	10.0
5.1 -0.15	-0.25	-0.05 4.90
10.0	5.0	10.0
4.95 -0.1	-0.1	+0.05 4.8
10.0	4.85	4
		00 10.0
4.9 0.0	0.0	+0.1 4.8
10.0	4.8	10.0
5.0 -0.1	-0.05	+0.1 4.8
10.0	4.85 4	10.0
	00	
5.0 -0.05	-0.15	+0.05 4.9
10.0	5.0	2 10.0
		00
5.0 -0.05	-0.15	-0.05 5.0
10.0	5.0	10.0
5.1 -0.1	-0.2	0.0 5.0
10.0	5.1	10.0
5.25 -0.5	-0.3	-0.2 5.2
10.0	5.2	10.0
5.25 -0.2	-0.3	-0.25 5.3
10.0	5.25	10.0
5.35 -0.3	-0.2	-0.2 5.25
10.0	5.15	10.0
5.3 -0.2	-0.1	-0.1 5.30
10.0	5.10	10.0
5.25 -0.15	0.0	+0.1 5.0
10.0	5.0	10.0
5.25 -0.1	-0.15	-0.05 5.2
10.0	5.2	10.0
4.95 -0.3	-0.3	-0.15 4.8
10.0	4.95	10.0
4.95 0.25	-0.1	-0.25 4.95
10.0	4.70	10.0
4.95 -0.25	-0.2	-0.25 4.95
10.0	4.9	10.0
5.4 -0.25	-0.15	-0.15 4.9
10.0	4.9	10.0

Station	+	H.I.	−	Elev.	
		256.36			
171+35				51.65	4.70
+68.65				51.65	4.70
+93.65				51.60	4.75
172+18.65				51.60	4.75
+43.65				51.55	4.80
+68.65				51.55	4.80
+93.65				51.50	4.85
B.M.	3.91	256.14		252.23	
173+18.65				51.50	4.65
+43.65				51.45	4.70
+70				51.45	4.70
174+00				51.40	4.75
+25				51.40	4.75
+50				51.35	4.80
+75				51.35	4.80
175+00				51.30	4.85
+25				51.30	4.85
+50				51.25	4.90
+75				51.25	4.90
176+00				51.20	4.95
+25				51.15	5.00
+50				51.00	5.15
+75				50.80	5.35
177+00				50.60	5.55

	S			E			P	
	5.10	-0.2		-0.15		-0.15	4.75	
	5.05	-0.25		-0.35		-0.3	5.1	
4.70	5.00	-0.3		-0.15		-0.15	5.0	4.85
4.65	4.8	-0.15		-0.05		-0.1	4.85	4.85
4.60	4.7	-0.1	4/00	+0.05	5/00	-0.05	5.05	5.00
4.55	4.6	-0.05		00		-0.1	5.15	5.05
4.50	4.4	-0.1		-0.05		0.0	5.2	5.20
4.20	4.35	-0.15		-0.05		-0.05	5.15	5.10
4.15	4.25	-0.05	7/00	+0.1		+0.1	5.25	5.25
4.15	4.25	-0.1	4/00	+0.05		+0.05	5.2	5.25
4.20	4.3	-0.1		-0.1		0.0	5.3	5.30
4.20	4.35	-0.15	4/00	+0.1		0.0	5.3	5.30
4.25	4.4	+0.05		+0.15		+0.1	5.25	5.35
4.25	4.30	+0.05		+0.15		+0.2	5.15	5.35
4.30	4.40	-0.1	7/00	+0.15		+0.1	5.2	5.40
4.30	4.5	-0.2	2/00	+0.05		+0.1	5.3	5.40
4.35	4.50	-0.15		0.0		+0.05	5.4	5.45
4.35	4.4	-0.05	9/00	+0.2		+0.05	5.4	5.45
4.40	4.3	-0.1	4/00	+0.05		+0.05	5.45	5.50
4.45	4.50	-0.05	5/00	+0.05		0.0	5.5	5.55
4.60	4.6	0.0		+0.1		0.0	5.7	5.70
4.80	4.95	-0.15	3/00	+0.05		+0.05	5.75	5.90
5.00	5.10	+0.1	4/00	+0.05		+0.2	5.90	6.10

Station	+	H.I. 256.14	−	Grade	
177+25				50.30	5.85
+50				49.85	6.30
+75				49.45	6.70
178+00				48.90	7.25
+37.55				48.05	8.10
+62.55				47.50	8.65
B.M	7.86	249.05		241.19	
+87.55				46.95	2.10
179+12.55				46.40	2.65
+50				45.60	3.45
+75				45.05	4.00
180+00				44.50	4.55
B.M	7.62	248.81		241.19	
+25				43.95	4.85
+50				43.50	5.30
+75				43.05	5.75
181+00				42.70	6.10
+25				42.35	6.45
+50				42.05	6.75
+75				41.85	6.95
182+00				41.65	7.15
+25				41.50	7.30
+50				41.40	7.40
+75				41.40	7.40

h		c		R	
5.30	5.5 -0.2	7/00 5.8	+0.05	+0.2 6.2	6.40
5.75	6.0 -0.25	6.3	0.0	-0.1 6.95	6.85
6.15	6.55 -0.4	6.85	-0.15	-0.15 7.4	7.25
6.70	7.10 -0.4	7.60	-0.35	-0.30 7.90	7.80
7.55	7.90 -0.35	8.55	-0.45	-0.35 9.2	8.65
8.20	8.75 -0.55	9.20	-0.55	-0.5 9.6	9.10
1.75	2.20 -0.45	2.65	-0.55	-0.4 2.85	2.45
2.40	2.75 -0.35	3.25	-0.4	-0.605 3.55	2.90
3.30	3.70 -0.6	3.85	-0.4	-0.6 4.2	3.60
3.95	4.26 -0.25	4.5	-0.15	-0.3 4.8	4.10
4.60	4.8 -0.2	4.6	-0.05	-0.15 4.8	4.65
	4.05 0.0	4.75	+0.1	+0.1 4.85	
	5.3 +0.1	5.2	+0.1	+0.2 5.4	
	5.65 +0.2	5.55	+0.2	+0.25 5.6	
	6.05 +0.15	6.0	+0.1	+0.2 6.0	
	6.5 +0.05	6.45	0.0	+0.05 6.5	
	6.85 0.0	6.75	0.0	0.0 6.85	
	7.1 -0.05	7.05	-0.1	-0.05 7.1	
	7.35 0.0	7.25	-0.1	0.0 7.25	
	7.3 +0.1	7.35 4/00	-0.05	+0.1 7.3	
	7.5 0.0	7.45	-0.05	-0.05 7.55	
	7.4 +0.1	7.35	+0.05	+0.25 7.25	

Station	+	H.I. 248.91	−	Grade	
183+06				41.40	7.40
+43.5				41.55	7.25
+81.0				41.75	7.05
184+18.5				42.05	6.75
B.M.	9.32	249.49		240.17	
+56.0				42.40	7.10
+75				42.60	6.90
185+00				42.80	6.70
+25				43.05	6.45
+50				43.25	6.25
+75				43.50	6.00
186+00				43.70	5.80
+25				43.95	5.55
+50				44.15	5.35
+75				44.40	5.10
187+00				44.60	4.90
+25				44.85	4.65
+50				45.05	4.45
+75				45.30	4.20
188+00				45.50	4.00
+25				45.70	3.80
+50				45.85	3.65
+75				46.05	3.45
189+00				46.20	3.30

	L			℄			R		
	7.5/10.0	0.0		7.4	0.0		+0.3	7.2/10.0	
7.35	7.55/10.0	-0.2		7.35	-0.1		-0.05	7.25/10.0	7.20
7.25	7.45/10.0	-0.2		7.25	-0.2		-0.3	7.15/10.0	6.85
7.05	7.15/10.0	-0.1		6.85	-0.1		-0.05	6.5/10.0	6.45
7.55	7.5/10.0	+0.05		7.10	0.0		-0.2	6.85/10.0	6.65
7.35	7.35/10.0	0.0		7.05	-0.15		-0.2	6.65/10.0	6.45
7.15	7.3/10.0	-0.15		6.85	-0.15		-0.2	6.45/10.0	6.25
6.90	7.0/10.0	-0.1		6.65	-0.2		-0.2	6.2/10.0	6.00
6.70	6.6/10.0	+0.1		6.2	+0.05	4/00	-0.1	5.9/10.0	5.80
6.45	6.35/10.0	+0.1		5.9	+0.1	7/00	-0.05	5.6/10.0	5.55
6.25	6.2/10.0	+0.05		5.75	+0.05	4/00	-0.1	5.45/10.0	5.35
6.00	6.0/10.0	0.0		5.6	-0.05		-0.1	5.2/10.0	5.10
5.80	5.7/10.0	+0.1		5.75	+0.1	5/00	-0.1	5.0/10.0	4.90
5.55	5.5/10.0	0.0		5.05	+0.05	3/00	-0.15	4.8/10.0	4.65
5.35	5.25/10.0	+0.1		4.85	+0.05	2/00	-0.2	4.65/10.0	4.45
5.10	4.85/10.0	+0.25	2/00	4.7	-0.05		-0.2	4.4/10.0	4.20
4.90	4.85/10.0	+0.05	5/00	4.5	-0.05		-0.2	4.2/10.0	4.00
4.65	4.7/10.0	-0.05		4.2	0.0		-0.25	4.0/10.0	3.75
4.45	4.6/10.0	-0.15		4.1	-0.1		-0.2	3.75/10.0	3.55
4.25	4.55/10.0	-0.3		3.9	-0.1		-0.2	3.55/10.0	3.35
4.10	4.45/10.0	-0.35		3.[illegible]	-0.15		-0.1	3.3/10.0	3.20
3.90	4.35/10.0	-0.45		3.75	-0.3		-0.2	3.2/10.0	3.00
3.75	4.05/10.0	-0.30		3.5	-0.2		-0.2	3.05/10.0	2.85

Station	+	H.I. 249.49	−	Grade	
T.P.	5.26	252.23	2.52	246.97	
189+25				46.45	5.80
+ 50				46.65	5.60
+ 75				46.90	5.35
190+00				47.10	5.25
+ 25				47.35	4.90
+ 50				47.55	4.70
+ 89.5 V				47.90	4.35
191+27.9				48.25	4.00
B.M.	4.71	254.56		249.85	
+44.5				48.60	5.95
192+02				48.90	5.65
+37.5 V				49.25	5.30
+80				49.60	4.95
193+20				49.95	4.60
+ 50				50.20	4.35
+ 75				50.40	4.15
194+00				50.55	4.00
+25				50.65	3.90
+50				50.80	3.75
+75				50.90	3.65
195+00				50.95	3.60
+25				51.00	3.55
+50				51.05	3.50

6.25	6.35 −0.1	−0.05	−0.15 5.35	5.35
6.05	6.15 −0.1	+0.1	−0.05	5.15
5.80	5.9 −0.1	0.0	−0.05 4.95	4.90
5.70	5.85 −0.15	+0.05	+0.05 4.75	4.80
5.35	5.55 −0.2	+0.15	−0.1 4.55	4.45
5.15	5.2 −0.05	+0.15	−0.05 4.3	4.25
4.80	4.75 +0.05	+0.1	−0.1 4.0	3.90
4.30	4.50 −0.2	+0.1	−0.1 3.8	3.70
6.15	6.3 −0.15	−0.05	−0.25 6.0	5.75
5.75	6.0 −0.25	−0.1	−0.2 5.8	5.60
	5.2 0.0	0.0	+0.1 5.3	
	5.1 −0.05	0.0	+0.2 4.85	
	4.75 −0.25	−0.2	+0.05 4.65	
	4.35 −0.4	−0.35	−0.05 4.5	
	4.05 −0.4	−0.4	−0.2 4.05	
	4.35 0.35	−0.25	−0.25 4.35	
	4.35 −0.3	−0.35	−0.2 4.35	
	4.35 −0.7	−0.55	−0.45 4.3	
	4.35 −0.3	−0.4	−0.45 4.2	
	3.85 −0.25	−0.2	−0.3 4.0	
	3.8 −0.15	−0.1	−0.15 3.8	
	3.85 −0.25	−0.2	−0.25 3.85	

Station	+	H.I.	−	Grade	
		254.56			
195+75				51.05	3.50
196+00				51.05	3.50
T.P	3.71	254.55		250.84	
+25				51.00	3.55
+50				50.95	3.60
+75				50.90	3.65
197+00				50.80	3.75
+25				50.70	3.85
+50				50.55	4.00
+75				50.40	4.15
198+00				50.20	4.35
+25				50.05	4.50
+50				49.80	4.75
+75				49.60	4.95
199+00				49.30	5.25
+75				49.05	5.50
+50				48.80	5.75
+75				48.55	6.00
200+00				48.30	6.25
+25				48.05	6.50
+50				47.75	6.80
+75				47.50	7.05
201+00				47.20	7.35
T.P	3.55	251.33	6.77	47.78	

L		℄		R	
3.75 / 10.0	-0.15	3.15	-0.35	-0.2	3.8 / 10.0
3.6 / 10.0	0.0	3.55	-0.05 4/00	+0.1	3.5 / 10.0
3.60 / 10.0	+0.05 5/00	3.6	-0.05 2/00	+0.2	2.45 / 10.0
3.7 / 10.0	0.0	3.7	-0.1 4/00	+0.2	3.5 / 10.0
3.65 / 10.0	+0.1 5/00	3.75	-0.1	0.0	3.75 / 10.0
3.80 / 10.0	+0.05	3.65	+0.1	+0.05	3.80 / 10.0
4.05 / 10.0	-0.1 6/00	3.7	+0.15	+0.1	3.85 / 10.0
4.05 / 10.0	+0.05	3.85	+0.15	+0.25	3.85 / 10.0
4.25 / 10.0	0.0	4.0	+0.15	+0.25	4.00 / 10.0
4.45 / 10.0	0.0	4.4	-0.05 5/00	+0.05	4.4 / 10.0
4.65 / 10.0	-0.05	4.6	-0.1	0.0	4.6 / 10.0
4.9 / 10.0	-0.05	4.9	-0.15	-0.1	4.95 / 10.0
5.15 / 10.0	-0.1	5.10	-0.05	-0.2	5.25 / 10.0
5.4 / 10.0	-0.05	5.25	0.0	-0.05	5.4 / 10.0
5.75 / 10.0	-0.15	5.65	-0.15	-0.2	5.8 / 10.0
6.10 / 10.0	-0.25	5.95	-0.2	0.0	5.85 / 10.0
6.30 / 10.0	-0.2	6.15	-0.1	-0.1	6.2 / 10.0
6.6 / 10.0	-0.25	6.4	-0.15	-0.1	6.45 / 10.0
7.0 / 10.0	-0.4	6.75	-0.25	-0.3	6.9 / 10.0
7.1 / 10.0	-0.3	7.0	-0.2	-0.2	7.1 / 10.0
7.35 / 10.0	-0.2	7.15	-0.1	-0.1	7.25 / 10.0
7.5 / 10.0	-0.05 5/00	7.30	+0.05	+0.05	7.40 / 10.0

Station	+	H.I. 251.33	−	Grade	
201+25				47.10	4.25
+50				46.95	4.40
+75				46.85	4.50
202+00				46.70	4.65
+25				46.65	4.70
+50				46.65	4.70
+75				46.70	4.65
203+00				46.80	4.55
+25				46.95	4.40
+50				47.05	4.30
+75				47.20	4.15
204+00				47.30	4.05
+25				47.45	3.90
+50				47.55	3.80
+75				47.70	3.65
205+00				47.80	3.55
+25				47.95	3.40
+50				48.05	3.30
T.P.	5.35	254.23	2.45	249.88	
+75				48.35	5.90
206+00				48.60	5.65
+25				48.90	5.35
+50				49.25	5.00
+75				49.60	4.65

L			℄			R	
4.4 / 10.0	-0.05	7/00	+0.1	4.15		+0.05	4.3 / 10.0
4.45 / 10.0	+0.05		+0.1	4.3		+0.1	4.4 / 10.0
4.45 / 10.0	+0.15		+0.15	4.35		+0.1	4.5 / 10.0
4.55 / 10.0	+0.2		+0.15	4.5		+0.2	4.55 / 10.0
4.65 / 10.0	+0.15		+0.35	4.35		+0.2	4.6 / 10.0
4.70 / 10.0	+0.1		+0.3	4.4		+0.2	4.60 / 10.0
4.85 / 10.0	-0.1	4/00	+0.05	4.6		+0.2	4.55 / 10.0
4.70 / 10.0	-0.05	8/00	+0.15	4.4		+0.25	4.4 / 10.0
4.65 / 10.0	-0.15	4/00	+0.1	4.3		+0.2	4.3 / 10.0
4.55 / 10.0	-0.15	4/00	+0.1	4.2		0.0	4.4 / 10.0
4.80 / 10.0	-0.05	7/00	+0.1	4.05 / 10.0	7/00	-0.05	4.3 / 10.0
4.15 / 10.0	0.0		+0.2	3.85	9/00	-0.05	4.2 / 10.0
4.15 / 10.0	-0.15	4/00	+0.1	3.8		0.0	4.0 / 10.0
4.1 / 10.0	-0.2	4/00	+0.1	3.7		0.0	3.9 / 10.0
3.95 / 10.0	-0.2		0.0	3.65		-0.5	3.8 / 10.0
3.75 / 10.0	-0.1		-0.05	3.60		-0.1	3.75 / 10.0
3.5 / 10.0	0.0		-0.05	3.45		0.0	3.50 / 10.0
3.35 / 10.0	+0.05		0.0	3.30		+0.15	3.25 / 10.0
5.95 / 10.0	+0.05		0.0	5.9		+0.2	5.9 / 10.0
5.75 / 10.0	0.0		-0.15	5.8	4/00	+0.2	5.55 / 10.0
5.4 / 10.0	+0.05	8/00	-0.15	5.5	5/00	+0.15	5.30 / 10.0
5.25 / 10.0	-0.15		-0.2	5.2	9/00	+0.05	5.05 / 10.0
4.95 / 10.0	-0.2		-0.25	4.9		-0.1	4.85 / 10.0

Station	+	H.I. 254.20	−	Grade	
207+00				50.00	4.25
+25				50.35	3.90
+50				50.70	3.55
+75				51.05	3.20
208+00				51.40	2.85
+25				51.80	2.45
+50				52.25	2.00
+75				52.65	1.60
209+00				53.10	1.15
+25				53.55	0.70
+50				53.95	0.30
+75				54.40	(−0.15)

No X-sections for fine grading from Sta. 209+75 to 214+00. This stretch was not finished by Sub Contractor. Owing to condition of Sub. grade and McCree + Co. Ordered same left unfinished for hauling convenience.

L C R

4.55 −0.2 → 4.35 / 10.0

4.20 +0.2 → 4.40 / 10.0

3.7 −0.25 → 3.45 / 10.0

3.4 −0.1 → 3.3 / 10.0

2.85 +0.1 → 2.95 / 10.0

2.45 +0.1 → 2.55 / 10.0

2.05 +0.05 → 2.1 / 10.0 — 5 / 00

1.75 −0.05 → 1.7 / 10.0 — 5 / 00

1.2 +0.05 → 1.25 / 10.0 — 5 / 00

0.75 +0.05 → 0.8 / 10.0 — 8 / 00

0.45 −0.05 → 0.4 / 10.0

0.15 +0.1 → 0.25 / 10.0

4.4 −0.15 → 4.25 / 10.0

4.0 −0.1 → 3.9 / 10.0

3.7 −0.15 → 3.55 / 10.0

3.2 0.0 → 3.2 / 10.0

2.55 0.0 → 2.55 / 10.0

2.45 0.0 → 2.45 / 10.0

2.05 −0.05 → 2.0 / 10.0

1.55 +0.05 → 1.6 / 10.0

1.20 −0.05 → 1.15 / 10.0 — 4 / 00

0.85 −0.15 → 0.7 / 10.0

0.5 −0.2 → 0.3 / 10.0

0.15 0.0 → 0.15 / 10.0

−0.2 → 4.55 / 10.0

−0.05 → 4.05 / 10.0

−0.1 → 3.75 / 10.0

+0.1 → 3.2 / 10.0

−0.05 → 3.0 / 10.0

−0.05 → 2.6 / 10.0

−0.05 → 2.15 / 10.0

+0.1 → 1.6 / 10.0

+0.1 → 1.15 / 10.0

0.0 → 0.8 / 10.0

−0.1 → 0.5 / 10.0

+0.25 → 0.0 / 10.0

X-Sections for Fine Grading.

Station 277+68 —

Station	+	H.I.	−	Grade	
B.M.	3.93	252.76		(248.93)	
277+68				48.05	4.70
+50				48.05	4.70
277+00				48.1	4.65
+75				48.10	4.65
+50				48.10	4.65
+25				48.10	4.65
276+00				48.10	4.65
+75				48.05	4.70
+50				47.95	4.80
+25				47.90	4.85
275+00				47.8	4.95
+75				47.7	5.05
+50				47.6	5.15
+25				47.5	5.25
274+00				47.4	5.35
+75				47.3	5.45
+50				47.2	5.55
+25				47.1	5.65
273+00				47.0	5.75
+75				46.9	5.85
+50				46.8	5.95
+25				46.7	6.05
T.P.	3.85	250.57		(246.72)	
272+00				46.6	3.95

L.			C			R	
4.95/10.0	-0.15		5.0	-0.3		-0.1	4.9/10.0
5.0/10.0	-0.2		4.95	-0.25	9/00	+0.05	4.75/10.0
4.65/10.0	-0.1		4.8	-0.15		0.0	4.75/10.0
4.8/10.0	-0.15		4.7	-0.05	4/00	+0.1	4.65/10.0
4.7/10.0	+0.05		4.55	+0.1		+0.1	4.65/10.0
4.6/10.0	-0.05	5/00	4.6	+0.05		+0.05	4.7/10.0
4.75/10.0	0.0		4.65	0.0		0.0	4.75/10.0
4.9/10.0	-0.1		4.7	0.0		-0.05	4.85/10.0
4.95/10.0	-0.05		4.9	-0.1		-0.05	4.95/10.0
5.25/10.0	-0.3		5.1	-0.25		-0.05	5.0/10.0
5.05/10.0	0.0		5.1	-0.15		-0.1	5.15/10.0
5.35/10.0	-0.2		5.05	0.0		+0.1	5.05/10.0
5.35/10.0	-0.1		5.15	0.0		+0.1	5.15/10.0
5.35/10.0	0.0		5.3	-0.05	4/00	+0.1	5.25/10.0
5.30/10.0	+0.15	4/00	5.4	-0.05		-0.05	5.5/10.0
5.6/10.0	-0.05		5.5	-0.05	4/00	+0.1	5.45/10.0
5.7/10.0	-0.05	5/00	5.5	+0.05		+0.15	5.5/10.0
5.65/10.0	+0.1		5.55	+0.1		+0.05	5.7/10.0
5.9/10.0	-0.05	7/00	5.65	+0.1		+0.25	5.6/10.0
5.9/10.0	+0.05		5.75	+0.1		+0.1	5.85/10.0
6.05/10.0	0.0		6.05	+0.1		+0.05	6.00/10.0
6.00/10.0	+0.15		6.0	+0.05		+0.2	5.95/10.0
4.05/10.0	0.0		3.9	+0.05		+0.15	3.9/10.0

Station	+	H.I.	—	Elev	
		250.57			
271+75				46.50	4.05
+50				46.40	4.15
+25				46.30	4.25
271+00				46.20	4.35
+75				46.10	4.45
+50				46.00	4.55
+25				45.90	4.65
270+00				45.80	4.75
+75				45.70	4.85
+50				45.60	4.95
+25				45.50	5.05
269+00				45.40	5.15
+75				45.30	5.25
+50				45.20	5.35
+25				45.10	5.45
268+00				45.00	5.55
+75				44.90	5.65
+50				44.80	5.75
+25				44.70	5.85
267+00				44.60	5.95
T.P	3.90	248.48		244.52	
+75				44.50	4.00
+50				44.40	4.10
+25				44.30	4.20

k	£	R
4.15 0.0 10.0	-0.15 4.2	+0.05 4.1 10.0
4.15 +0.1 10.0	-0.05 4.2	-0.05 4.3 10.0
4.5 -0.15 10.0	-0.05 4.3	0.0 4.35 10.0
4.5 -0.05 10.0	-0.05 4.4	+0.1 4.35 10.0
4.4 +0.15 10.0	0.0 4.45	+0.25 4.3 10.0
4.3 +0.15 10.0	0.0 4.25	+0.15 4.5 10.0
4.7 +0.05 10.0	+0.05 4.6	+0.05 4.7 10.0
4.8 +0.05 10.0	-0.1 4.85	+0.05 4.8 10.0
5.05 -0.1 10.0	-0.15 5.0	-0.05 5.0 10.0
5.05 0.0 10.0	-0.15 5.1	-0.25 5.3 10.0
5.2 -0.05 10.0	-0.05 5.1	-0.2 5.35 10.0
5.35 -0.1 10.0	-0.1 5.25	0.0 5.25 10.0
5.5 -0.15 10.0	0.0 5.25	+0.05 5.2 10.0
5.6 -0.15 10.0	-0.1 5.45	+0.05 5.4 10.0
5.7 -0.15 10.0	-0.05 5.5	-0.05 5.6 10.0
5.85 -0.2 10.0	-0.05 5.6	0.0 5.65 10.0
5.95 -0.2 10.0	-0.15 5.8	-0.05 5.8 10.0
6.0 -0.15 10.0	-0.1 5.85	-0.2 6.05 10.0
6.1 -0.15 10.0	-0.2 6.05	-0.25 6.2 10.0
6.25 -0.2 10.0	-0.2 6.15	-0.25 6.3 10.0
4.15 -0.05 10.0	-0.2 4.1	-0.25 4.95 10.0
4.25 -0.05 10.0	0.0 4.1	-0.2 4.1 10.0
4.35 -0.05 10.0	-0.05 4.25	-0.05 4.35 10.0

Station	+	H.I. 248.38	−	Elev	
266+00				44.20	4.30
+75				44.10	4.40
+50				44.00	4.50
+25				43.90	4.60
265+00				43.80	4.70
+75				43.70	4.80
+50				43.60	4.90
+25				43.50	5.00
264+00				43.40	5.10
B.M.	2.31	249.18		246.87	
+75				43.35	5.85
+50				43.30	5.90
+25				43.30	5.90
263+00				43.30	5.90
+75				43.40	5.80
+50				43.55	5.65
+25				43.70	5.50
262+00				43.95	5.25
+75				44.20	5.00
+50				44.50	4.70
+25				44.80	4.40
261+00				45.20	4.00
+75				45.55	3.65
+50				45.95	3.25

h		L		R	
4.4	0.0		0.0		+0.05
10.0		4.3		4.35	
10.0				10.0	
4.7	-0.2	4.5	-0.05	0.0	
10.0				4.5	
10.0				10.0	
4.75	-0.15	4.6	-0.1	0.0	
10.0				4.6	
10.0				10.0	
4.85	-0.15	4.75	-0.15	-0.05	
10.0				4.75	
10.0				10.0	
4.85	-0.05	4.95	-0.25	-0.1	
10.0				4.7	
10.0				10.0	
4.95	-0.05	4.9	-0.1	0.0	
10.0				4.9	
10.0				10.0	
5.15	-0.15	5.1	0.0	+0.05	
10.0				4.95	
10.0				10.0	
5.15	-0.05	5.15	-0.15	-0.15	
10.0				5.25	
10.0				10.0	
5.3	-0.1	5.25	+0.05	-0.15	
10.0				5.35	
	4		3		
	40		40		
5.1	+0.15	5.15	0.0	-0.1	
10.0				6.05	
				10.0	
5.7	+0.3	5.7	+0.2	+0.05	
10.0				5.85	
				10.0	
5.85	+0.05	5.85	+0.05	0.0	
10.0				6.0	
				10.0	
5.6	+0.2	5.6	+0.25	+0.2	
10.0				5.8	
				10.0	
5.45	+0.25	5.45	+0.35	+0.3	
10.0				5.6	
				10.0	
5.75	0.0	5.8	+0.35	+0.15	
10.0				5.7	
				10.0	
5.45	+0.15	5.35	+0.25	+0.3	
10.0				5.3	
				10.0	
5.25	+0.1	5.25	+0.15	+0.4	
10.0				4.95	
				10.0	
5.05	+0.05	5.1	+0.1	+0.35	
10.0				4.75	
				10.0	
4.9	-0.1	4.9	+0.1	+0.3	
10.0				4.5	
	5				
	40				
4.4	+0.1	4.6	+0.15	+0.2	
10.0				4.3	
				10.0	
4.1	0.0	3.95	+0.05	0.0	
10.0				4.1	
				10.0	
3.85	+0.1	3.85	+0.15	-0.1	
10.0				3.85	
				10.0	
3.7	-0.05	3.75	+0.1	-0.1	
10.0				3.45	
	7		5		
	40		40		

Station	+	H.I. 249.18	−	Elev.	
260+75				46.30	2.90
260+00				46.65	2.55
B.M.	8.87	254.31		(245.44)	
+75				47.05	7.25
+50				47.40	6.90
+25				47.75	6.55
259+00				48.10	6.20
+75				48.50	5.80
+50				48.85	5.45
+25				49.20	5.10
258+00				49.60	4.70
+75				49.95	4.35
+50				50.25	4.05
+25				50.55	3.75
257+00				50.80	3.50
+75				51.00	3.30
+50				51.20	3.10
+25				51.40	2.90
256+00				51.50	2.80
T.P.	+2.47	255.62	2.10	253.15	
+75				51.65	3.95
+50				51.70	3.90
+25				51.75	3.85
255+00				51.75	3.85

L.		℄		R.	
2.95 / 10.0	+0.05	2.9	0.0	-0.05	3.05 / 10.0
2.6 / 10.0	+0.05	2.55	0.0	-0.05	2.7 / 10.0
7.35 / 10.0	0.0	7.25	0.0	0.0	7.35 / 10.0
6.95 / 10.0	+0.05	6.85	+0.05	+0.15	6.85 / 10.0
6.55 / 10.0	+0.1	6.45	+0.1	+0.1	6.55 / 10.0
6.2 / 10.0	+0.1	6.2	0.0	+0.2	6.1 / 10.0
5.75 / 10.0	+0.15	5.75	+0.05	+0.2	5.7 / 10.0
5.4 / 10.0	+0.15	5.35	+0.1	+0.25	5.3 / 10.0
5.05 / 10.0	+0.15	4.95	+0.15	+0.2	5.0 / 10.0
4.8 / 10.0	0.0	4.6	+0.1	+0.2	4.6 / 10.0
4.45 / 10.0	0.0	4.45	-0.1	-0.05	4.5 / 10.0
4.1 / 10.0	+0.05 7 / 00	4.15	-0.1	-0.05	4.2 / 10.0
3.95 / 10.0	-0.1	3.85	-0.1	0.0	3.85 / 10.0
3.85 / 10.0	-0.25	3.75	-0.25	-0.15	3.75 / 10.0
3.6 / 10.0	-0.2	3.65	-0.35	-0.15	3.55 / 10.0
3.3 / 10.0	-0.1	3.3	-0.2	-0.15	3.35 / 10.0
3.15 / 10.0	-0.15	3.0	-0.1	-0.15	3.15 / 10.0
2.9 / 10.0	0.0	2.85	-0.05	0.0	2.9 / 10.0
4.05 / 10.0	0.0	3.95	0.0	-0.05	4.10 / 10.0
4.05 / 10.0	-0.05	3.9	0.0	0.0	4.0 / 10.0
3.75 / 10.0	+0.1	3.65	+0.2	+0.25	3.7 / 10.0
3.6 / 10.0	+0.35	3.6	+0.25	+0.2	3.75 / 10.0

Station	+	H.I. 255.62	−	Elev	
254+75				51.75	3.85
+50				51.70	3.90
+25				51.65	3.95
254+00				51.50	4.10
+75				51.40	4.20
+50				51.25	4.35
+25				51.15	4.45
253+00				51.00	4.60
+75				50.90	4.70
+50				50.75	4.85
+25				50.65	4.95
252+00				50.50	5.10
+75				50.40	5.20
+50				50.25	5.35
+25				50.15	5.45
251+00				50.00	5.60
+75				50.15	5.45
+50				50.35	5.25
+25				50.40	5.20
250+00				50.70	4.90
B.M.	6.38	256.43		250.05	
+75				51.25	5.20
+50				51.75	4.70
+25				52.20	4.25

L.		C.		R.	
3.7/10.0	+0.25	3.6	+0.25	+0.3	3.65/10.0
3.7/10.0	+0.3	3.65	+0.25	+0.2	3.6/10.0
3.8/10.0	+0.25	3.75	+0.2	+0.25	3.8/10.0
4.05/10.0	+0.15	4.05	+0.05	+0.1	4.1/10.0
4.3/10.0	0.0	4.3	-0.1	-0.05	4.35/10.0
4.4/10.0	+0.05	4.35	0.0	-0.1	4.55/10.0
4.55/10.0	0.0	4.6	-0.15	-0.1	4.65/10.0
4.75/10.0	-0.05	4.75	-0.15	-0.05	4.75/10.0
4.95/10.0	-0.15	5.00	-0.3	-0.15	4.95/10.0
5.15/10.0	-0.2	5.2	-0.65	-0.15	5.1/10.0
5.2/10.0	-0.15	5.3	-0.35	-0.15	5.2/10.0
5.2/10.0	0.0	5.2	-0.1	0.0	5.2/10.0
5.3/10.0	0.0	5.3	-0.1	0.0	5.3/10.0
5.45/10.0	0.0	5.55	-0.2	0.0	5.45/10.0
5.5/10.0	+0.05 8/00	5.6	-0.15	-0.05	5.6/10.0
5.5/10.0	+0.2	5.55	+0.05	+0.1	5.6/10.0
5.45/10.0	+0.1	5.45	0.0	+0.05	5.5/10.0
5.35/10.0	0.0	5.25	0.0	-0.1	5.45/10.0
5.10/10.0	+0.2	5.00	+0.2	0.0	5.3/10.0
4.9/10.0	+0.1	4.85	+0.05	0.0	5.0/10.0
5.35/10.0	-0.05	5.3	-0.1	-0.2	5.5/10.0
4.95/10.0	-0.15	5.0	-0.3	-0.25	5.05/10.0
4.4/10.0	-0.05	4.4	-0.15	+0.05 8/60	4.8/10.0

Station	+	H.I	—	Elev	
		256.43			
249+00				52.65	3.80
+75				53.05	3.40
+50				53.35	3.10
+25				53.70	2.75
248+00				54.00	2.45
+75				54.35	2.10
+50				54.65	1.80
+25				55.00	1.45
247+00				55.30	1.15
+75				55.65	0.80
T.P	7.40	262.67	1.16	255.27	
+50				55.95	6.70
+25				56.25	6.40
246+00				56.55	6.10
B.M.	4.64	263.34		258.70	
+75				56.85	6.50
+50				57.10	6.25
+25				57.35	6.00
245+00				57.60	5.75
+75				57.80	5.55
+50				58.00	5.35
+25				58.20	5.15
244+00				58.40	4.95

K	E	R
3.85 +0.05	0.0	+0.05 3.85
3.4 +0.1 7/00	3.8 -0.15	+0.1 3.4
3.10 +0.1	3.55 +0.05 7/00	+0.2 3.0
2.65 +0.2	3.05 +0.05	+0.1 2.75
2.3 +0.25	2.7 0,0	+0.05 2.5
2.00 +0.2	2.45 0.0	0,0 2.2
1.8 +0.1	2.10 0,0	+0.05 1.85
1.4 +0.15	1.8 0.0	+0.15 1.4
1.3 -0.05	1.25 -0.1 4/00	+0.2 1.05
1.0 -0.1	1.20 -0.4 9/00	+0.1 0.8
6.6 +0.2	-0.05	+0.2 6.6
6.35 +0.15 3/00	6.75 +0.1 7/00	+0.3 6.2
5.95 +0.25	6.2 +0.15	+0.3 5.9
	5.95	
6.35 +0.25	6.35 +0.15	+0.2 6.4
6.25 +0.1	6.2 +0.05	+0.3 6.05
6.0 +0.1	5.95 +0.05	+0.4 5.7
5.8 +0.05 5/00	5.8 -0.05 3/00	+0.15 5.7
5.6 +0.05	5.55 0.0	+0.25 5.4
5.35 +0.1	5.5 +0.05 5/00	-0.05 5.10
5.1 +0.25	5.0 +0.15	+0.25 5.00
4.85 +0.1	4.9 +0.05	+0.2 4.85

Station	+	H.I. 263.30	−	Elev.	
243+75				58.55	4.80
+50				58.70	4.65
+25				58.90	4.45
243+00				59.00	4.35
+75				59.15	4.20
+50				59.25	4.10
+25				59.40	3.95
242+00				59.50	3.85
T.P.	4.83	263.26	4.91	(258.43)	
+75				59.60	3.65
+50				59.75	3.50
+25				59.85	3.40
241+00				59.95	3.30
+75				60.00	3.25
+50				60.10	3.15
+25				60.15	3.10
240+00				60.20	3.05
+75				60.25	3.00
+50				60.30	2.95
+25				60.35	2.90
239+00				60.40	2.85
+75				60.45	2.80
+50				60.45	2.80
+25				60.45	2.80

L			Z			R	
4.7/10.0	+0.2		4.75	+0.05		+0.2	4.7/10.0
4.6/10.0	+0.15		4.6	+0.05		+0.15	4.6/10.0
4.5/10.0	+0.05		4.3	+0.15		+0.1	4.45/10.0
4.4/10.0	+0.05		4.3	+0.05		+0.1	4.35/10.0
4.35/10.0	−0.05	5/00	4.15	+0.05		0.0	4.3/10.0
4.30/10.0	−0.1		4.10	0.0		0.0	4.2/10.0
4.10/10.0	−0.05		4.0	−0.05		−0.1	4.15/10.0
4.0/10.0	−0.05	5/00	3.8	+0.05	5/00	−0.05	4.0/10.0
3.65/10.0	+0.1		3.6	+0.05	4/00	−0.1	3.85/10.0
3.55/10.0	+0.05		3.4	+0.1		0.0	3.6/10.0
3.4/10.0	+0.1		3.35	+0.05		+0.1	3.4/10.0
3.25/10.0	+0.15		3.10	+0.2		+0.15	3.25/10.0
3.05/10.0	+0.3		3.0	+0.25		+0.35	3.0/10.0
3.0/10.0	+0.25		3.05	+0.1		+0.4	2.85/10.0
3.0/10.0	+0.2		2.95	+0.15		+0.15	3.05/10.0
2.9	+0.25		2.9	+0.15		+0.1	3.05/10.0
3.05/10.0	+0.05		2.95	+0.05		+0.25	2.95/10.0
[illegible]	+0.05		2.9	+0.05		+0.1	2.95/10.0
[illegible]	+0.1	5/00	3.0	−0.1	4/00	+0.2	2.8/10.0
2.9/10.0	+0.05	5/00	2.9	−0.05	4/00	+0.1	2.80/10.0
2.85/10.0	+0.05	9/00	3.05	−0.25		−0.05	2.95/10.0
[illegible]	−0.1		3.05	−0.25		−0.2	3.1/10.0
[illegible]	−0.15		3.1	−0.3		−0.15	3.05/10.0

Station	+	H.I. 263.26	−	Elev.	
238+00				60.40	2.85
+75				60.35	2.90
+50				60.25	3.00
+25				60.15	3.10
237+00				60.00	3.25
+75				59.85	3.40
+50				59.70	3.55
+25				59.55	3.70
236+00				59.40	3.85
+75				59.25	4.00
+50				59.10	4.15
+25				58.95	4.30
235+00				58.80	4.45
T.P.	2.89	261.85		258.96	
+75				58.65	3.20
+50				58.50	3.35
+25				58.35	3.50
234+00				58.20	3.65
+75				58.10	3.75
+50				57.95	3.90
+25				57.85	4.00
233+00				57.70	4.15
+75				57.60	4.25
+50				57.45	4.40

S. ℄ P

S (faint)	S		℄ (faint)	℄		P	P (faint)
3.0/10.0	−0.05		3.05	−0.2		−0.25	3.2/10.0
2.9/10.0	+0.1		2.9	0.0		0.0	3.0/10.0
2.9/10.0	+0.2	4/00	3.1	−0.1		0.0	3.1/10.0
3.15/10.0	−0.3		3.3	−0.2		−0.2	3.4/10.0
3.3/10.0	+0.05	8/00	3.4	−0.15		−0.1	3.45/10.0
3.3/10.0	+0.2	3/00	3.45	−0.05	5/00	+0.05	3.45/10.0
3.4/10.0	+0.25		3.55	0.0		+0.15	3.5/10.0
3.6/10.0	+0.2		3.7	0.0		+0.2	3.6/10.0
3.9/10.0	+0.05		3.85	0.0		+0.05	3.9/10.0
4.05/10.0	+0.05	8/00	4.15	−0.15	5/00	+0.15	3.95/10.0
4.15/10.0	+0.1	5/00	4.25	−0.1	7/00	+0.05	4.2/10.0
4.4/10.0	0.0		4.35	−0.05	4/00	+0.1	4.3/10.0
4.5/10.0	+0.05		4.45	0.0		+0.15	4.4/10.0

S (faint)	S		℄ (faint)	℄		P	P (faint)
3.35/10.0	−0.05		3.3	−0.1	5/00	+0.1	3.2/10.0
3.4/10.0	+0.05	5/00	3.4	−0.05		−0.1	3.55/10.0
3.65/10.0	−0.05		3.55	−0.25		0.0	3.6/10.0
3.7/10.0	+0.05	5/00	3.7	−0.05		−0.05	3.8/10.0
3.85/10.0	0.0		3.9	−0.15		−0.1	3.95/10.0
4.1/10.0	−0.1		4.05	−0.15		−0.15	4.15/10.0
4.1/10.0	0.0		4.15	−0.15		−0.1	4.2/10.0
4.4/10.0	+0.25	3/00	4.2	−0.05	5/00	+0.05	4.2/10.0
4.25/10.0	+0.1		4.4	+0.05		+0.05	4.3/10.0
4.3/10.0	+0.2	4/00	4.5	−0.1	3/00	+0.25	4.75/10.0

Station	+	H.I. 261.85	−	Elev.	
732+25				57.35	4.50
732+00				57.20	4.65
+75				57.10	4.75
+50				56.95	4.90
+25				56.85	5.00
731 +00				56.70	5.15
+75				56.55	5.30
+50				56.45	5.40
+25				56.30	5.55
730 +00				56.15	5.70
+75				56.00	5.85
+50				55.85	6.00
+25				55.70	6.15
729+00				55.50	6.35
+75				55.35	6.50
+50				55.15	6.70
+25				55.00	6.85
728 +00				54.80	7.05
T.P	4.53	257.15		252.62	
+75				54.65	2.50
+50				54.45	2.70
+25				54.30	2.85
727 +00				54.10	3.05
+75				53.95	3.20

4.45	+0.15			+0.05		+0.3	4.8	
4.6	+0.15			+0.15		+0.25	4.5	
4.75	+0.1			+0.05		+0.25	4.4	
4.85	+0.15			+0.1		+0.3	4.7	
5.05	+0.05	7/00		-0.1	5/00	+0.1	5.0	
5.0	+0.25		7/00	-0.05		+0.25	5.0	
5.15	+0.25	3/00		-0.1	7/00	+0.05	5.35	
5.5	0.0			0.0		+0.1	5.6	
5.4	+0.25			+0.15		0.0	5.65	
5.7	+0.1			0.0		+0.15	5.85	
5.85	+0.1	3/00		-0.1	7/00	+0.5	5.9	
6.05	+0.05	5/00		-0.05	3/00	+0.15	5.95	
6.3	-0.05			-0.15		0.0	6.25	
6.35	+0.1			+0.05		+0.3	6.15	
6.45	+0.15			+0.1		+0.25	6.35	
6.4	0.0			+0.15		+0.05	6.75	
6.65	+0.1			+0.15		0.0	6.95	
7.1	+0.05			+0.15		+0.05	7.1	

2.5	+0.1			+0.05	4/00	-0.1	2.7	
2.85	-0.05	7/00		+0.1		+0.05	2.75	
3.10	-0.15			-0.1	7/00	+0.5	2.9	
3.4	-0.25			-0.05		-0.05	3.2	
3.55	-0.25			-0.2		-0.1	3.4	

Station	+	H.I. 257.15	−	Elev.	
726+50				53.75	3.40
+25				53.60	3.55
726+00				53.40	3.75
+75				53.25	3.90
+50				53.05	4.10
+25				52.90	4.25
725+00				52.70	4.45
+75				52.55	4.60
+50				52.40	4.75
+25				52.30	4.85
724+00				52.20	4.95
T.P	5.09	257.23	5.01	(252.14)	
+75				52.20	5.05
+50				52.15	5.10
+25				52.15	5.10
723+00				52.20	5.05
+75				52.25	5.00
+50				52.30	4.95
+25				52.35	4.90
722+00				52.40	4.85
+75				52.50	4.75
+50				52.60	4.65
+25				52.75	4.50
721+00				52.90	4.35

3.7 -0.2 / 10.0	-0.2 / 3.6	0.0 / 3.5 / 10.0
3.75 -0.1 / 10.0	-0.2 / 3.75	-0.15 / 3.8 / 10.0
3.80 -0.05 / 10.0	+0.1 / 3.85	+0.5 / 3.8 / 10.0
4.0 -0.1 / 10.0	-0.1 / 4.0	-0.2 / 4.2 / 10.0
4.4 -0.2 / 10.0	-0.2 / 4.3	-0.1 / 4.3 / 10.0
4.55 -0.2 / 10.0	-0.05 / 4.8	-0.2 / 4.55 / 10.0
4.6 -0.05 / 10.0	-0.05 / 4.5 / 11/100	+0.1 / 4.45 / 10.0
4.25 -0.05 / 10.0	0.0 / 4.6	+0.15 / 4.55 / 10.0
4.7 +0.15 / 10.0	0.0 / 4.75	+0.1 / 4.75 / 10.0
4.7 +0.25 / 10.0	+0.05 / 4.8	+0.1 / 4.85 / 10.0
4.8 +0.25 / 10.0	+0.05 / 4.	0.0 / 5.0 / 10.0
5.0 +0.15 / 10.0	+0.05 / 5.0	0.0 / 5.1 / 10.0
5.1 +0.05 / 10.0	0.0 / 5.1	+0.15 / 5.05 / 10.0
5.2 0.0 / 10.0	+0.15 / 4.95	+0.15 / 5.05 / 10.0
5.2 −0.05 / 10.0 5/100	+0.05 / 5.0	+0.05 / 5.1 / 100
5.2 −0.1 / 100 4/100	+0.05 / 4.95 5/100	-0.05 / 5.10 / 10.0
5.3 −0.25 / 10.0 2/100	+0.05 / 5.0 5/100	-0.05 / 5.10 / 10.0
5.4 0.0 / 10.0	+0.05 / 4.95	+0.1 / 4.9 / 10.0
4.85 +0.1 / 10.0	+0.15 / 4.7	+0.15 / 4.8 / 10.0
4.75 +0.1 / 10.0	+0.2 / 4.55	+0.2 / 4.65 / 10.0
4.7 +0.05 / 10.0	+0.2 / 4.45	+0.15 / 4.6 / 10.0
4.85 +0.05 / 10.0	+0.2 / 4.3	+0.1 / 4.5 / 10.0
4.3 +0.15 / 10.0	+0.15 / 4.4	+0.05 / 4.4 / 10.0

Station	+	H.I. 257.23	—	Elev.	
220+75				53.25	4.00
+50				53.45	3.80
+25				53.75	3.50
220+00				54.10	3.15
219+75				254.50	2.75

5		2		P	
4.15	-0.05	4.05	-0.05	4.2	-0.1
10.0				10.0	
3.85	+0.05	3.80	0.0	3.95	-0.05
10.0				10.0	
3.6	0.0	3.85	+0.05	3.6	0.0
10.0				10.0	
3.8	-0.05	3.15	0.0	3.95	+0.2
10.0				10.0	
2.70	+0.15	2.70	+0.05	2.75	+0.1
10.0				10.0	

Final - Topography

23-52

Carley
Parsons
Brigs
Eck.

Date	— sta	to sta
11-16-23	—277	11 221

5 to

277

276

275

274

273

272

271

270

Lt ℄ Rt

2' Tr 77+35 | 277+15 Tr 30'

+95 Tr 31' | ‹34›‹34› | 276+62 T.P. 23' Rt

+33 Tr 30'

276+18 R.R. 26'

5+39 Tr 23 | ‹34› | 275+19 T.P. 23'

74+19 Tr 24'

274+10 P.P. 28'

273+88 T.P. 23'

73+40 Tr 25

72+75 Tr 23' | 272+50 T.P. 23'

72+48 | 272+23 C.M.P. 30'×15" 23' Rt X-road

72+21 ℄ Rd. | ‹23›

& T. 272+04 T.P. 23'

70+38 Start Fence ‹36›

70+37 Tr 26' | 70+98 Tr 32'

5 to

269

268

267

266

265

264

263

262

Lt ℄ Rt

69+82 Tr. 34'
+74 " 35

69+66 Tr. 28'

269+57 T.P. 23'

69+23 Tr. 29'

269+24 C.M.P. 30' X 12"
20' Rt private ent.

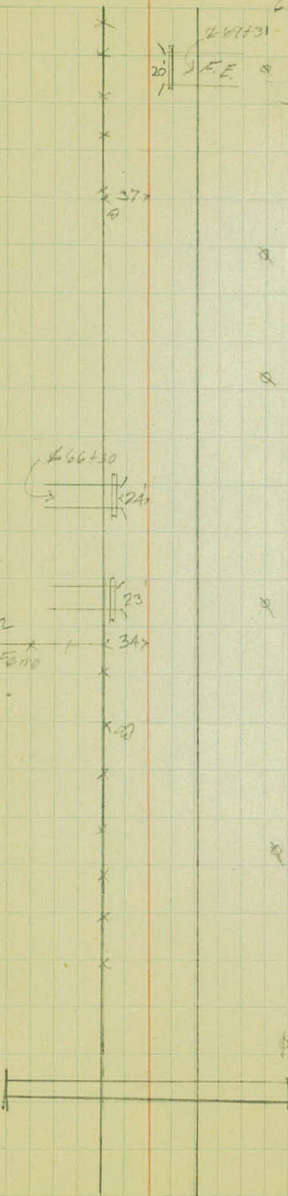
68+94 end Fence
68+88 Tr 34'
68+30 Tr. 33'

68+32 Tr. 28'
68+26 " 28'

268+12 T.P. 23'

267+28 T.P. 23'

266+30 C.M.P. 26' X 12"
23' Lt private ent.



265+68 C.M.P. 26' X 12"
23' Lt private ent.

265+49 T.P. 24

65+62
start Fence

64+78 Tr 30'

263+92 T.P. 27'

262+55 T.P. 27'

262+22 - Conc. Culvert
P.3 - 24" X 64' 29' Rt 35 Lt

54a

261

260

259

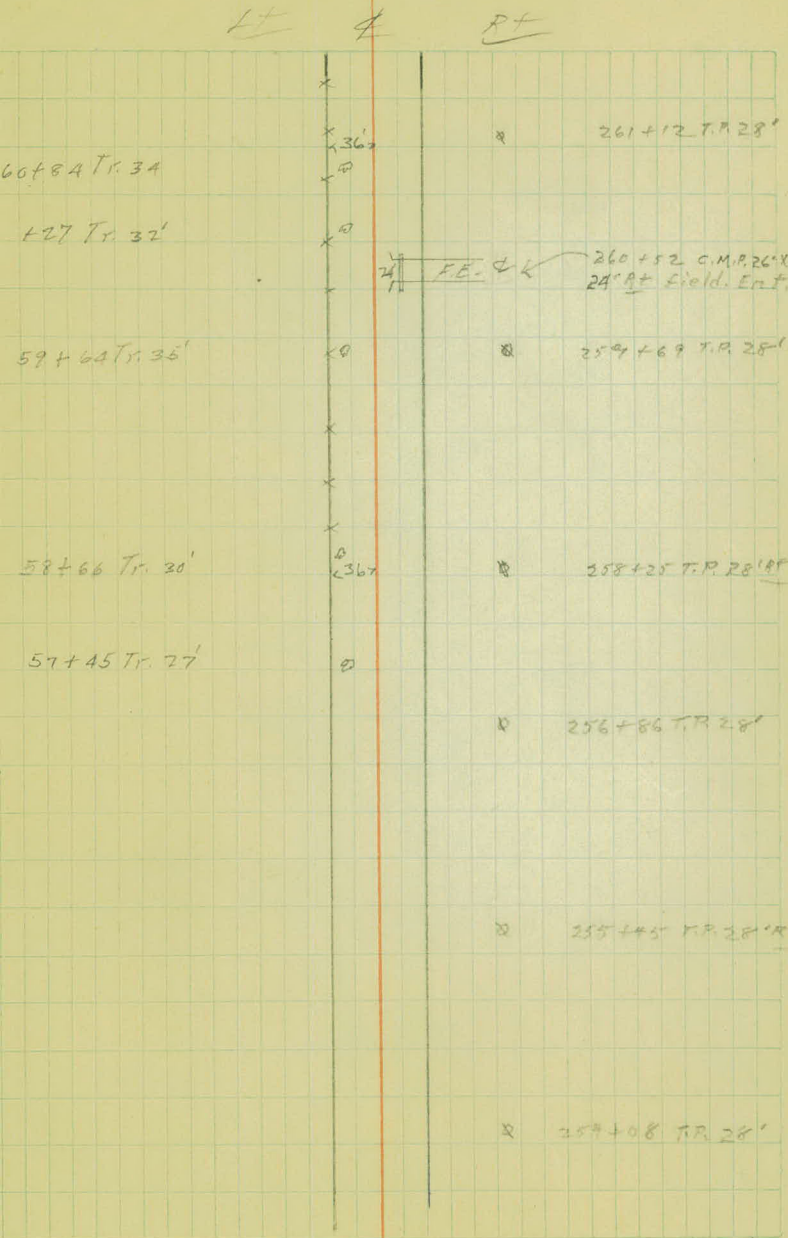
258

257

256

255

254


Lt
℄
Rt
36'
261+12 T.P. 28'
60+84 Tr. 34
+27 Tr. 32'
24'
F.E.
260+52 C.M.P. 26"X12"
24" Rt Field. Ent.
59+64 Tr. 35'
259+69 T.P. 28'
58+66 Tr. 30'
36'
258+25 T.P. 28' Rt
57+45 Tr. 27'
256+86 T.P. 28'
255+45 T.P. 28' Rt
254+08 T.P. 28'

5th

253

252

251

250

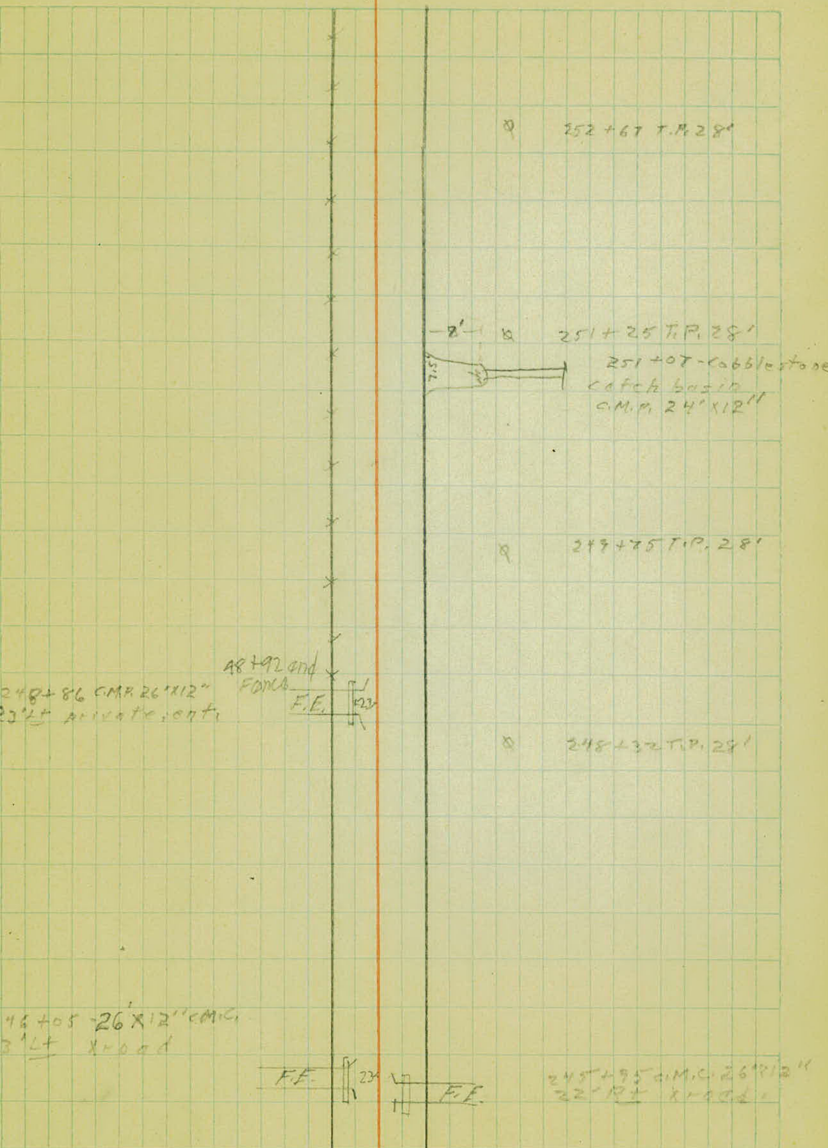
249

248

247

246

Lt ℄ Rt


252+67 T.P. 28'
—8'—
251+25 T.P. 28'
7.5'
251+07 - cobblestone
catch basin
C.M.P. 24"x12"
249+75 T.P. 28'
48+92 end
Fence
F.E.
23'
248+86 C.M.P. 26"x12"
23' Lt private ent.
248+32 T.P. 28'
46+05 26"x12" C.M.C.
3' Lt X-road
F.E.
23'
F.E.
245+95 C.M.C. 26"x12"
22' Rt X-road

5+a

245

244

243

242

241

240

239

238

Lt ℄ Rt

45+75 Start row
Trees 32'

244+33 T.P. 28'

243+93 T.P. 28'

241+79 T.P. 28'

no Culv. F.E. F.E.

241+50 C.M.P. 26'+12"
23' Rt field ent.

240+93 T.P. 28'

239+15 T.P. 28'

end Trees 35'

5+a

237

236

235

234

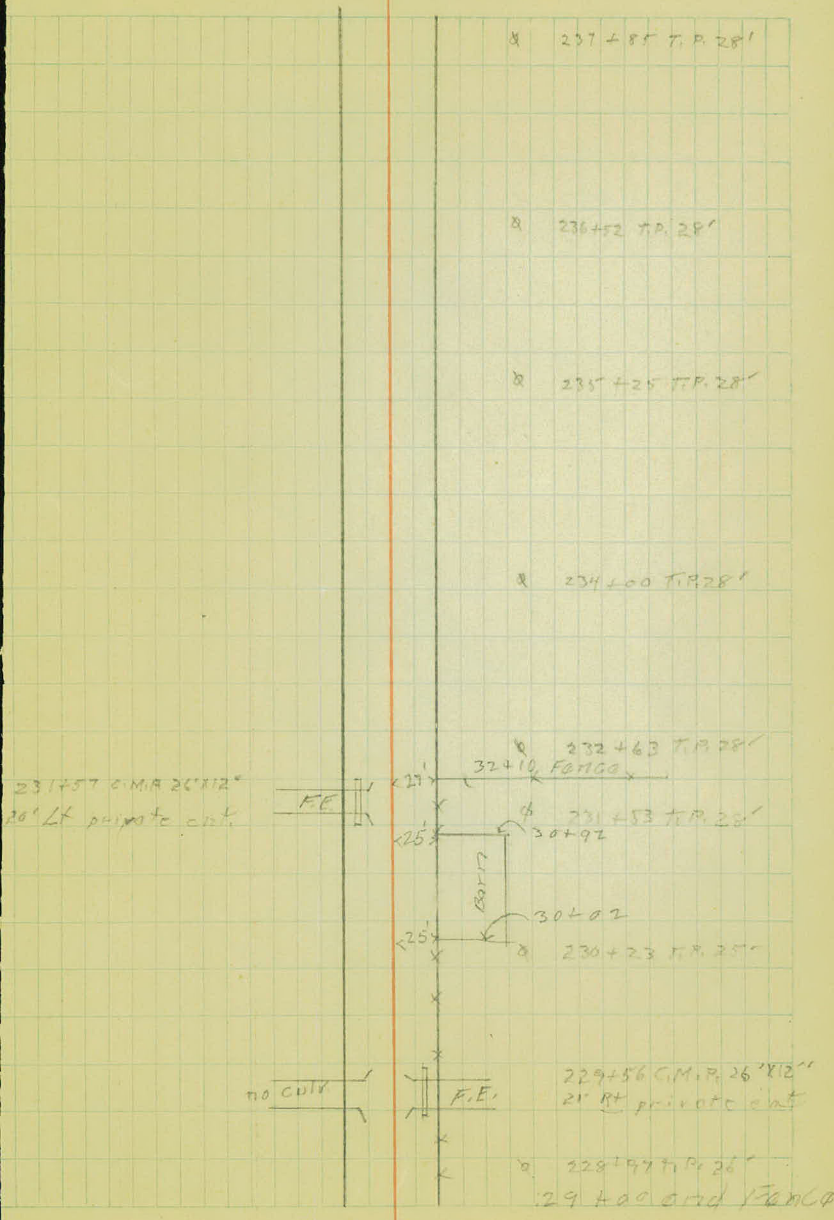
233

231

230

229

Lt ℄ Rt



237+85 T.P. 28'
236+52 T.P. 28'
235+25 T.P. 28'
234+00 T.P. 28'
232+63 T.P. 28'
32+10 Fence
231+57 C.M.P. 26'X12"
20' Lt private ent.
F.E.
<27'
231+53 T.P. 28'
<25'
30+92
Barn
30+02
<25'
230+23 T.P. 25'
229+56 C.M.P. 26'X12"
21' Rt private ent
no culv
F.E.
228+97 T.P. 26'
29+00 end Fence

5 to

228

227

226

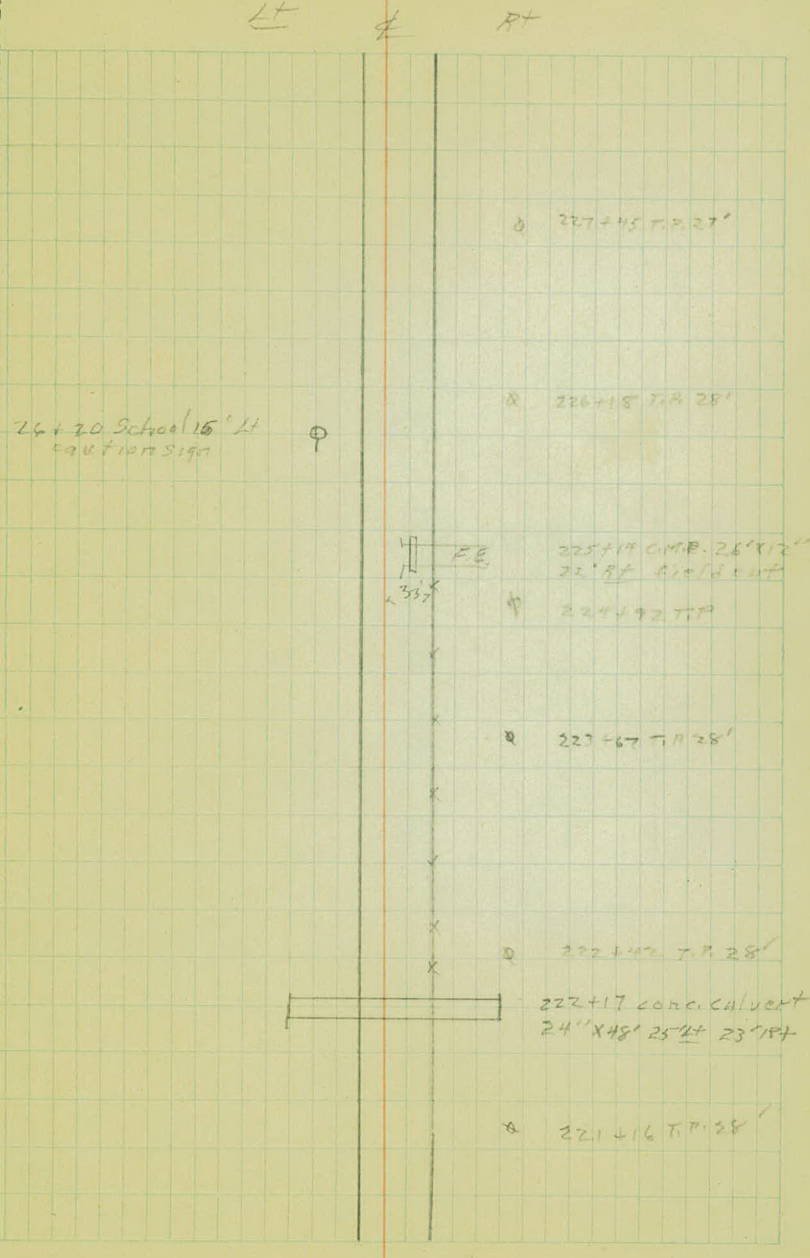
225

224

223

222

221



Lt
℄
Rt
227+45 T.P. 27'
226+18 T.P. 28'
26+30 School 15' Lt
caution sign
F.E.
225+14 C.M.P. 26'X12"
21' Rt field cut
33'
224+92 T.P.
223+67 T.P. 28'
222+42 T.P. 28'
222+17 conc. culvert
24" X48' 25' Lt 23' Rt
221+16 T.P. 28'

5th

220

219

218

217

216

215

214

213

Lt ℄ Rt

P.I. 24' x 48'

County Rd E.

19+47 ℄

< 23' >

+31 County Rd sign P 23'

+27 T.P. 34'

0 18+76 T.P. 27'

℄ 18+40

23'

12" x 27' C.M.C. school Ent

0 17+44 T.P. 28'

℄ 17+19 Lt.

22'

12" x 28' C.M.C.

00 15+96 T.P. 25' & 31'

0 14+50 T.P. 28'

13+32 shool caution sign 21'

5 to a

212

211

210

209

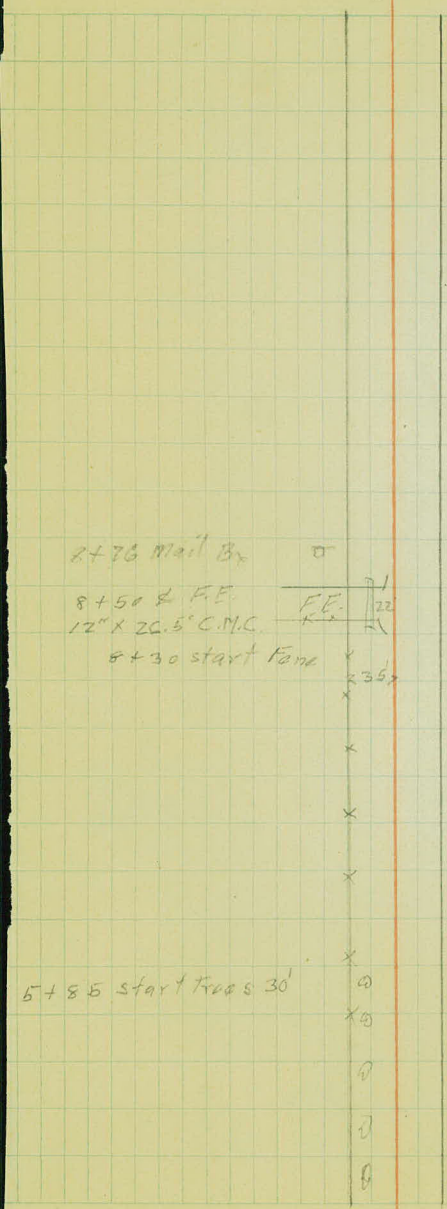
208

207

206

205

Lt ℄ Rt



0 12+97 T.P. 28'

0 11+55 T.P. 28'

0 10+32 T.P. 28'

0 8+92 T.P. 28'

℄ 207+54 T.P. 28'

℄ 206+10 T.P. 28'

℄ 204+73 T.P. 28'

Std

204

203

202

201

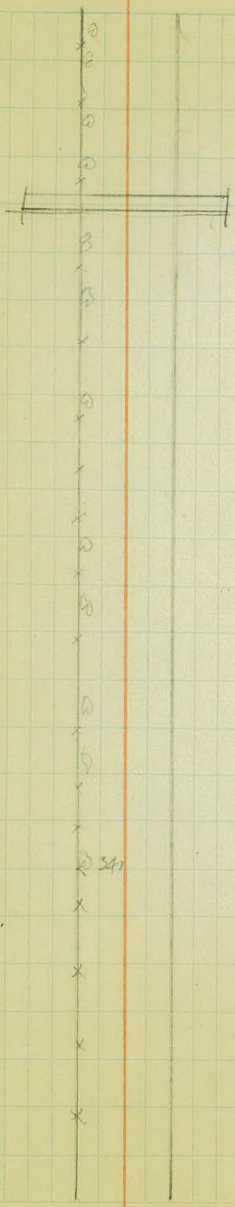
200

199

198

197

Lt. ℄ Rt



℄ 203+27 T.P. 28'

203+05 Conc. Culvert 24"x40' 19' Rt 21' Lt Drains Lt

℄ 201+92 T.P. 28'

℄ 200+47 T.P. 28'

℄ 199+05 T.P. 28'

98+80 End Piers 28'

℄ 197+65 T.P. 28'

℄ 196+25 T.P. 28'

Sta

196

195

194

193

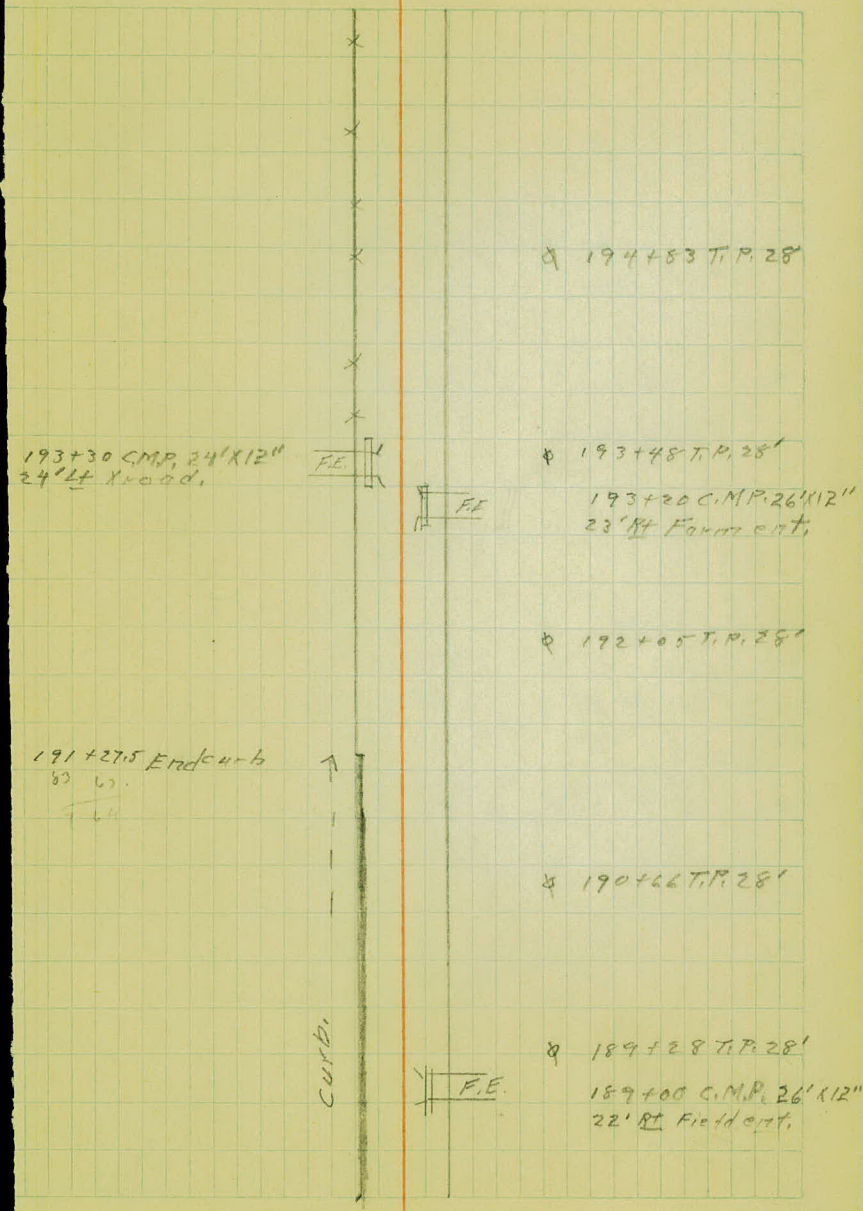
192

191

190

189

Lt ℄ Rt


194+83 T. P. 28'
193+30 C.M.P. 24"X12"
24' Lt Road.
F.E.
193+48 T. P. 28'
F.E.
193+20 C.M.P. 26"X12"
23' Rt Farm Cnt.
192+05 T. P. 28'
191+27.5 End curb
190+66 T.P. 28'
curb.
189+28 T.P. 28'
F.E.
189+00 C.M.P. 26"X12"
22' Rt Field Cnt.

57a

188

187

186

185

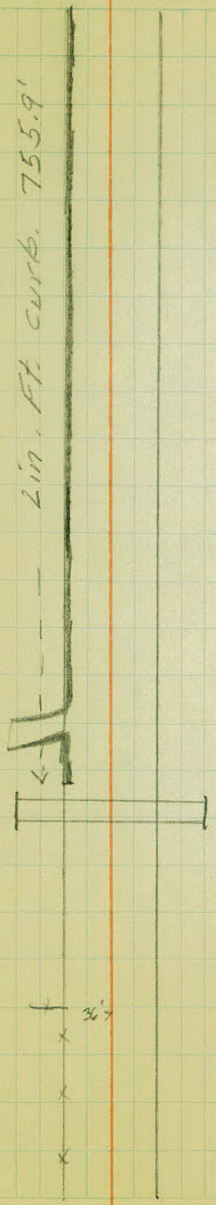
184

183

182

181

Lt & Rt



187+85 T.P. 28'

186+52 T.P. 28'

185+19 T.P. 28'

183+75 T.P.

182+79 Conc culvert 24"X48' - 22' Lt 26 Rt
Drains Rt.

182+48 T.P. 28'

181+16 T.P. 28'

Sta

180

179

178

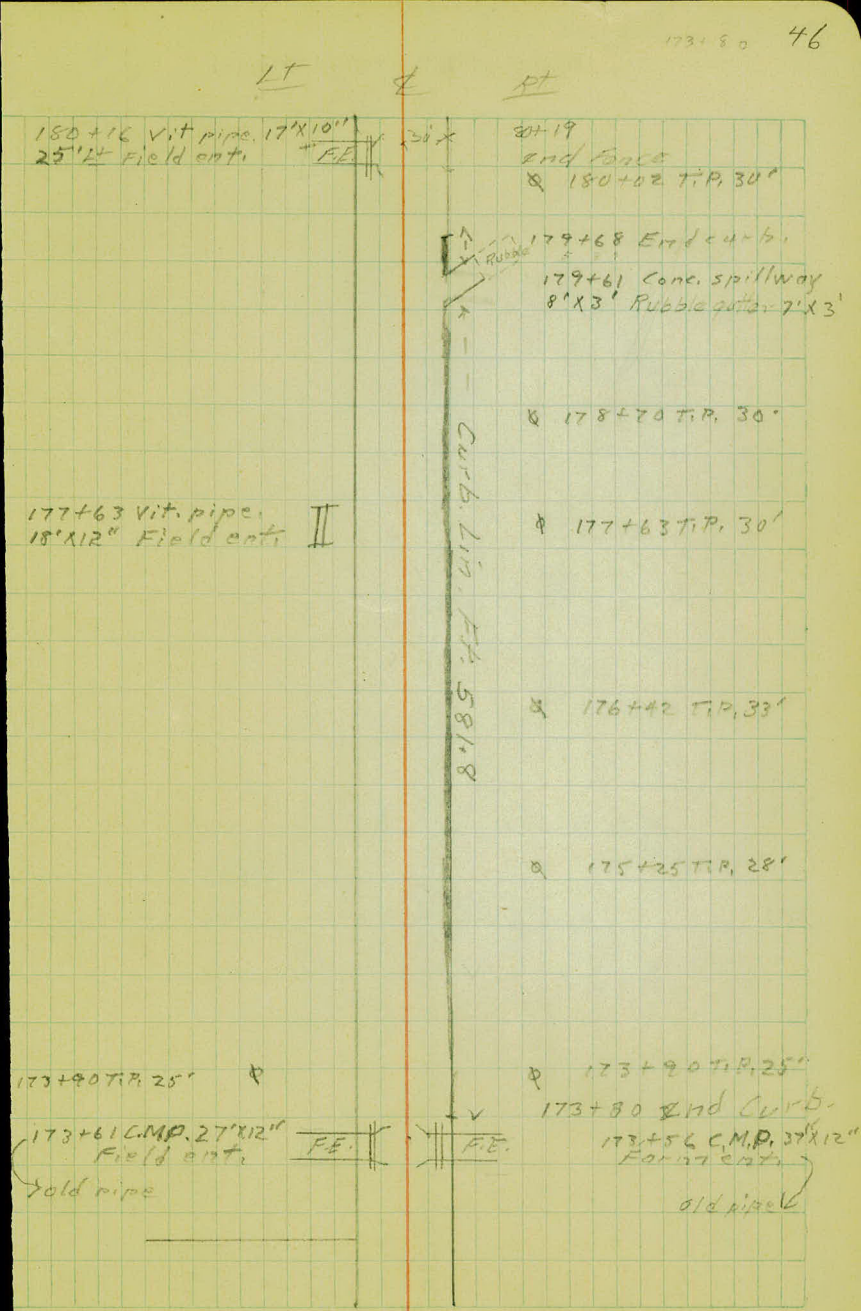
177

176

175

174

173


Lt
℄
Rt
180+16 Vit pipe. 17"X10"
25' Lt Field ent.
F.E.
30+19
end fence
℄ 180+02 T.P. 30'
179+68 End c-u-b.
Rubble
179+61 Conc. spillway
8'X3' Rubble gutter 7'X3'
178+70 T.P. 30'
177+63 Vit. pipe.
18"X12" Field ent.
II
177+63 T.P. 30'
Curb Line Ft. 581.8
176+42 T.P. 33'
175+25 T.P. 28'
173+90 T.P. 25'
173+90 T.P. 25'
173+80 End Curb.
173+61 C.M.P. 27"X12"
Field ent.
F.E.
F.E.
173+56 C.M.P. 37½"X12"
For 177 ent.
old pipe
old pipe

Sta

172

171

170

169

165

167

166

165

Lt ℄ Rt

not placed
172+19 C.M.P. 12"X15" II
Field cnt. 72+37 Start Fence

33'

℄ 172+79 T.P. 28'

171+84 conc culvert
24"X48' -20 Lt -28' Rt.
Drains Rt.

℄ 171+76 T.P. 28'

℄ 170+56 T.P. 28'

℄ 169+34 T.P. 28'

℄ 168+12 T.P. 28'

℄ 166+84 T.P. 28'

165+67 T.P. 16'
165+59 T.P. 12'
165+45 T.P. 16'

℄
℄
℄

county Rd D.

165+03 conc. culvert
24"X40' -21' Lt 19' Rt
Drains Lt

Sta

164

163

162

161

160

159

158

157

Lt ℄ Rt

164+65 T.P. 28'

64+81 start trees 34

163+77 T.P. 25'

163+65 T.P. 28'

162+62 T.P. 28'

62+0 bend trees 34

162+56 T.P. 25'

161+63 T.P. 28'

161+48 T.P. 23'

160+74 T.P. 28'

160+25 T.P. 23'

159+75 T.P. 28'

159+18 T.P. 26'

58+50

158+72 T.P. 28'

57+81 Fence

30'

157+87 T.P. 25'

157+49 T.P. 28'

157+78 C.M.P. 26"x12"

23' Rt field entrance

F.E.

37a

156

155

154

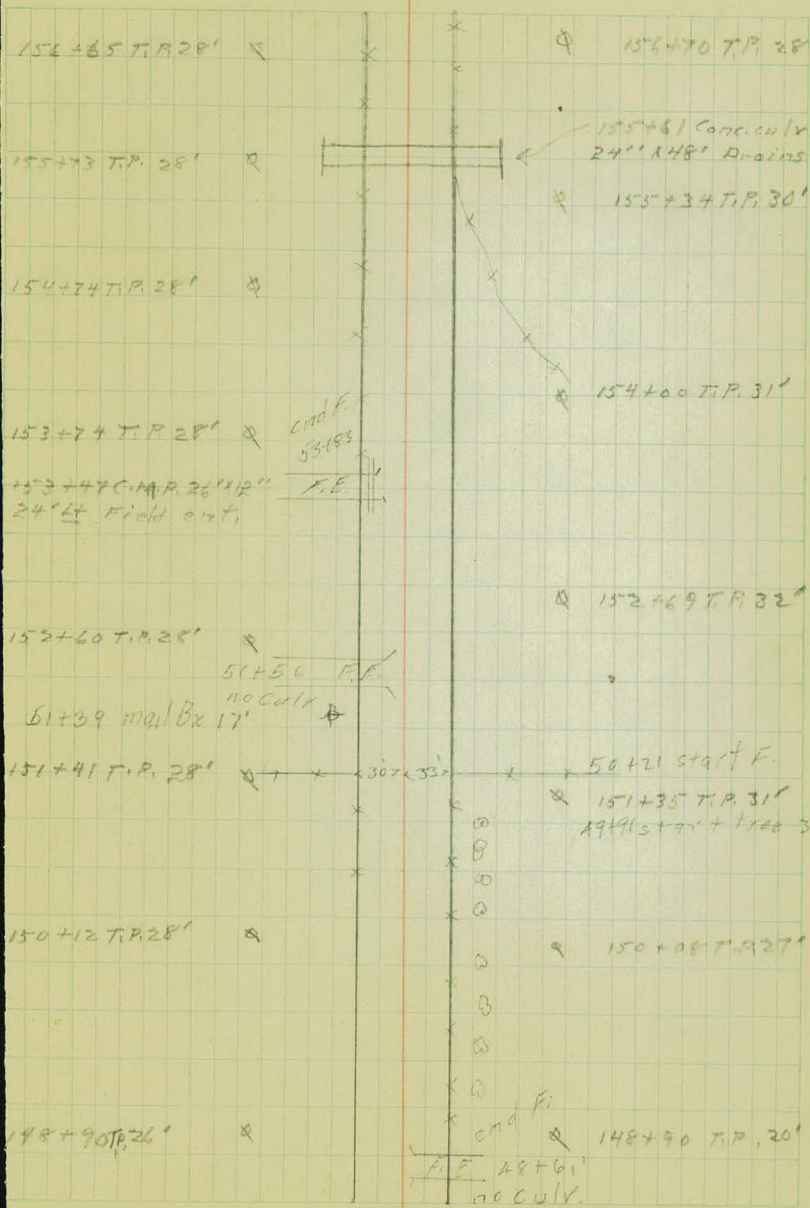
153

152

151

150

149


156+85 T.P. 28'
156+70 T.P. 28'
155+81 Conc. culv. 24" x 48' Drains Left
155+73 T.P. 28'
155+34 T.P. 30'
154+74 T.P. 28'
154+00 T.P. 31'
153+74 T.P. 28'
end F. 53+83
F.E.
153+47 C.M.P. 36" x 72" 24" Lt. Field Cmt.
152+69 T.P. 32'
152+60 T.P. 28'
51+56 F.E.
no Culv
61+39 mail Box 17'
151+41 T.P. 28'
30' x 33'
50+21 start F.
151+35 T.P. 31'
49+91 start Fill 36'
150+12 T.P. 28'
150+08 T.P. 27'
148+90 T.P. 26'
end Fi
148+90 T.P. 20'
F.E. 48+61'
no Culv.

Sta

148

1
147

146

145

144

143

142

141

Lt & Rt

148+27 T.P. 28'

147+30 T.P. 28'

146+50 C.M.P. 26" X 12" 24' Lt Field end

146+28 T.P. 28'

145+31 T.P. 28'

144+26 T.P. 28'

143+31 T.P. 28'

142+22 T.P. 28'

141+21 T.P. 28'

148+16 Conc. curv. 24" X 48' Drains Rt

147+60 T.P. 20' Rt

146+40 T.P. 21'

45+49 end trees 30'

145+16 T.P. 22'

144+89 C.M.P. 26" X 12" 24' Rt. Field end

143+86 T.P. 24'

141+06 T.P. 26'

Sta

140

139

138

137

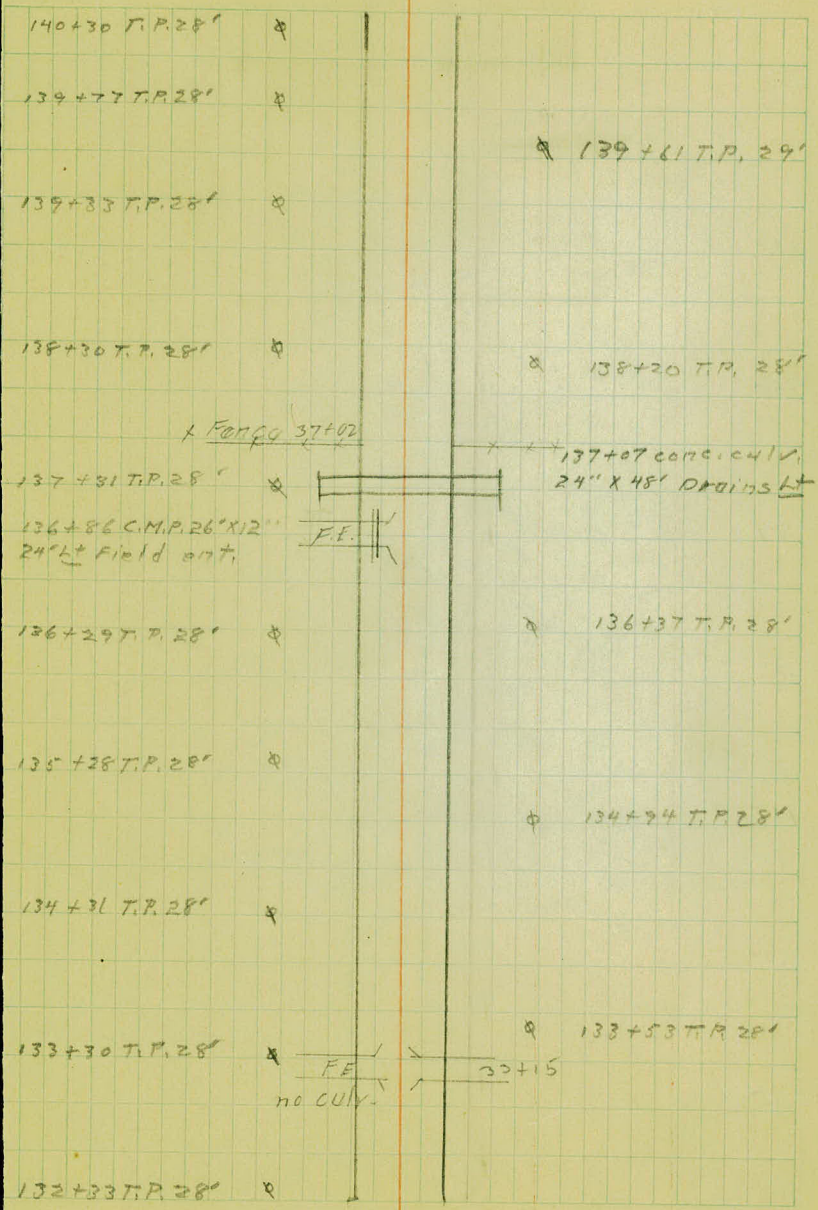
136

135

134

133

Lt ℄ Rt


140+30 T.P. 28'
139+77 T.P. 28'
139+61 T.P. 29'
139+33 T.P. 28'
138+30 T.P. 28'
138+20 T.P. 28'
Forgo 37+02
137+31 T.P. 28'
137+07 conc. c4l V. 24" X 48" Drains Lt
136+86 C.M.P. 26"X12" 24" Lt Field cnt.
F.E.
136+29 T.P. 28'
136+37 T.P. 28'
135+28 T.P. 28'
134+94 T.P. 28'
134+31 T.P. 28'
133+30 T.P. 28'
133+53 T.P. 28'
F.E.
33+15
no CULV.
132+33 T.P. 28'

3 to

132

131

130

129

128

127

126

125

Lt ℄ Rt

132+07 T.P. 28'

131+30 T.P. 28'

130+61 T.P. 28'

130+30 T.P. 28'

129+30 T.P. 28'

129+42 T.P. 33'

128+40 Corr. Culv.
24" X 56 Drains Left

128+32 T.P. 28'

127+30 T.P. 28'

127+24 T.P. 28'

126+32 T.P. 28'

25+53 F.E.
no culv

125+73 T.P. 28'

25+47 mail Bx 13'

Beg. of curb Lt.
125+43

125+29 T.P. 28'

5th

124

123

122

121

120

119

118

117

Lt ℄ Rt

244' Lt curb

124+30 T.P. 28' (Lt)

124+30 T.P. 28' (Rt)

123+33 T.P. 28' (Lt)

123+02 Conc spillway
7' x 2.5' End of curb.

122+87 T.P. 28' (Rt)

122+30 T.P. 28' (Lt)

22+10 start tree 33'

122+20 C.M.P. 26' x 12"
22' Rt private ent.

F.E.

121+46 T.P. 28' (Rt)

121+30 T.P. 28' (Lt)

120+33 T.P. 28' (Lt)

120+20 T.P. 28' (Rt)

Lt. end drained by vit. pipe
See Mr. Long

119+34 T.P. 28' (Lt)

118+92 Conc. Culv.
24" x ? Drains Lt

118+7 T.P. 28' (Rt)

118+33 T.P. 28' (Lt)

117+48 T.P. 28' (Rt)

117+33 T.P. 28' (Lt)

16' school caution sign
16+78

Std

116

115

114

113

112

111

110

109

Lt ℄ Rt

116+34 T.P. 28'

116+17 T.P. 30'

115+35 T.P. 28'

114+78 T.P. 29'

114+33 T.P. 28'

113+43 T.P. 29'

113+34 T.P. 28'

112+34 T.P. 28.

111+88 T.P. 28'

111+64 T.P. 28'

111+64 C.M.P. 26'x12''
21' Rt school entr

111+01 T.P. 28'

℄ 10+62 no culv. Co. Rd. C

10+42 T.P. 27'

10+30 P.P. 22'

19' F.E. 9+68

9+75 Guy P. 28'

12"x26' C.M.C

9+51 T.P. 28'

574

108

107

106

105

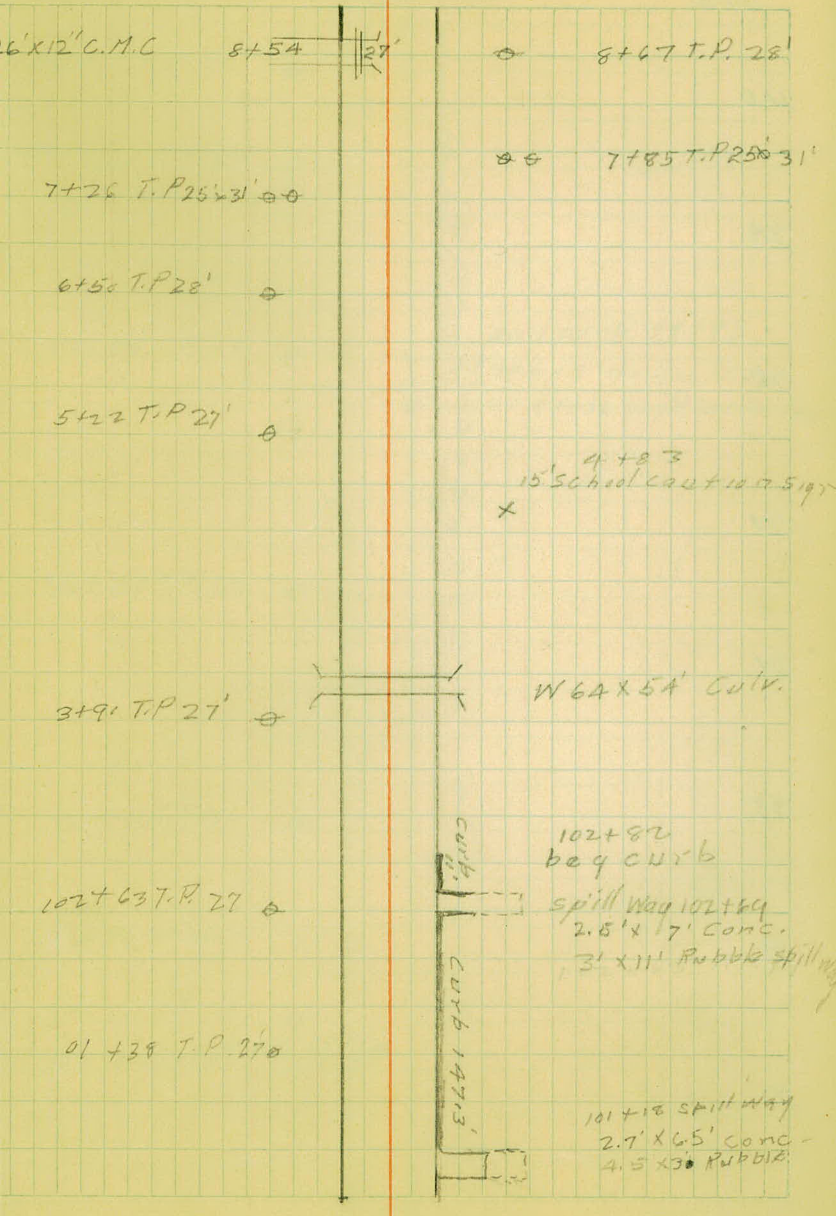
104

103

102

101

Lt ℄ Rt.


6'x12" C.M.C 8+54
27'
8+67 T.P. 28'
7+85 T.P. 25&30 31'
7+26 T.P 25&31'
6+50 T.P 28'
5+22 T.P 27'
4+83
15' School caution sign
W 64 x 54' Culv.
3+91 T.P 27'
curb
102+82
beg curb
102+63 T.P. 27
spill way 102+69
2.5' x 7' Conc.
3' x 11' Rubble spill way
curb 147.3'
01+38 T.P. 27
101+18 spill way
2.7' x 6.5' conc.
4.5 x 30 Rubble

61
60
59
8
7
6
5
4
3
2
1
50
49
8
7
6
5
4
3
2
1
40
39
8

White Bear Ave
62+00

℄

61+95 T.P. 41'x51'
61+01 Culv. 24"x48' Conc. C.
61+00 Spillway
2.7'x7' Conc.
3'x6' Rubble
60+80 T.P. 36'
curb 108'
End curb 59+91'
59+61 T.P. 33'
22' 59+32 - 12"x26' C.M.C.
58+16 T.P. 30'
56+68 T.P. 29'
55+41 T.P. 28'
12"x26' C.M.C. 54+91 F.E. 22'
54+07 T.P. 28
53+03 T.P. 28'
15"x32' C.M.C. 52+86 21' 21' South St. to Rd B. 15"x32.5' C.M.C.
52+27 T.P. 28'
51+30 T.P. 28'
50+19 T.P. 29'
48+90 T.P. 29'
48+40 33' F.E. 48+83 no Culv.
47+50 T.P. 29'
46+31 T.P. 29
45+01 T.P. 29'
43+70 T.P. 29'
42+68 33'
42+50 R.R. Xing 15'
42+64 36"x67' C.M.C.
42+41 T.P. Sign 29'
39'
41+23 T.P. 28'
40+13 T.P. 28
39+14 Guy Pole 28'
39+14 T.P. 29'
R.R. R/W 39+14
38+21 T.P. 21'
500 R.R.
38+57 = 38+67
38+23
38+39 R.R. Sign 13
R.R. R/W

37
6
5
4
3
2
1
30
29
28
27
6
5
4
3
2
1
20
19
8
7
6
5
4
3

37+20 T.P. 28'

36+31 T.P. 28'

35+19 T.P. 28'

34+15 T.P. 28'

32+70 T.P. 28'

12"X26.5' C.M.C. 31+79 F.E.

31+23 T.P. 28'

29+84 T.P. 28'

29+18 pavement 20' wide

28+65 T.P. 28'

28+17 pavement 24' wide

27+77 T.P. 28'

27+02 T.P. 24'&28'

15"X55' C.M.C. 26+36 First Ave

25+75 T.P. 24&31

24+91 T.P 28'

23+61 T.P. 28'

22+49 T.P. 28'

21+34 T.P. 28'

19+97 T.P. 28'

18+73 T.P 28'

17+36 T.P. 28'

16+04 T.P. 28'

14+75 T.P. 28'

41' — 38+15 W/W Fence Post Farm

39

15"X26.5' C.M.C.

23 C.E. 33+39 camatary

36' 32+02 end W/W Fence

21 — 19 — 31+51 - 12"X26.5' C.M.C.

31+13 start conc. wall and Rubble gutter 8.5' wide

8.5'

Rubble gutter

conc wall

29+18 Rubble gutter 7.5' wide

28+57 end Rubble gutter start conc gutter 5.8' wide

27+91 gutter 4' wide

452' conc. 259' Rubble

26+16 P.P 15'

25+67 steps.

51' curb

24+43' gutter 3' wide and wall.

23+92 end conc gutter 00 Ft wide

33' 23+70 end Fence

23+20 T.P. 32'

22+20 T.P 31'

21+19 T.P. 31'

20+23 T.P. 31'

19+20 T.P. 31'

18+39 T.P 31'

17+22 T.P. 32'

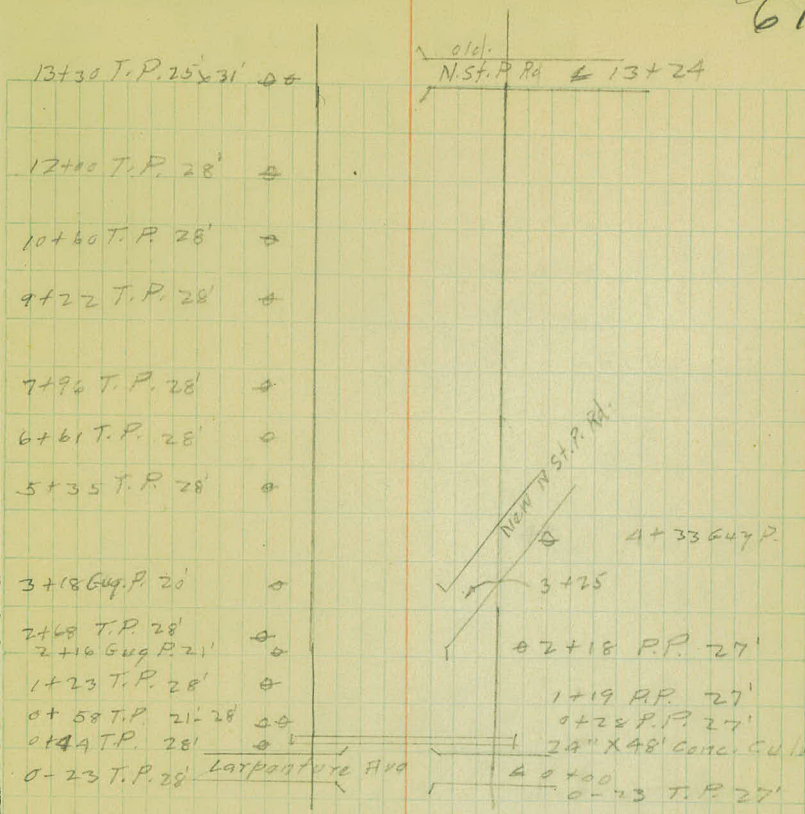
15+28 T.P. 31'

23 F.E. 14+53 15"X26.5' C.M.C

30' 13+46 end W/W Fence

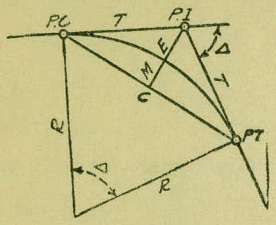
14+45 T.P. 37'

13
12
11
10
9
8
7
6
5
4
3
2
1
0
-33 end Pavement.


13+30 T.P. 25'x31'
12+80 T.P. 28'
10+60 T.P. 28'
9+22 T.P. 28'
7+94 T.P. 28'
6+61 T.P. 28'
5+35 T.P. 28'
3+18 Guy P. 20'
2+68 T.P. 28'
2+16 Guy P. 21'
1+23 T.P. 28'
0+58 T.P. 21'-28'
0+44 T.P. 28'
0-23 T.P. 28'
Larpenteur Ave
Old N.St.P. Rd
℄ 13+24
New N.St.P. Rd.
4+33 Guy P.
3+25
2+18 P.P. 27'
1+19 P.P. 27'
0+28 P.P. 27'
24" X 48' Conc. Culv.
4 0+00
0-23 T.P. 27'

31 + 13
23 + 92
7 + 21
7 + 1
10

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

Radius=R=$\frac{50}{\text{sin. } D/2}$ (1) Degree of Curve=D and sin. $\frac{D}{2}=\frac{50}{R}$ (2)

Tangent=T=Rtan$\frac{\Delta}{2}$ (3) Length of Curve=L=100$\frac{\Delta}{D}$ (4)

Middle ordinate=M= R(1—cos. $\frac{\Delta}{2}$) (5) =Rvers $\frac{\Delta}{2}$ (6)

External=E=Ttan$\frac{\Delta}{4}$ (7) =R÷cos.$\frac{\Delta}{2}$—R(8)=Rexsec$\frac{\Delta}{2}$(9)

Long Chord=C=2 R sin.$\frac{\Delta}{2}$ (10) Δ=Central Angle

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161+60.35 to find Sta. of P. C. and P. T. Δ=62° 10′ D=8° 20′. From Table IV for 1° curve T=3454.1 and÷8⅓=414.49 ft. From Table V correction=.36 or T=414.85 ft. P. C.=Sta. P.I.—T=157+45.50. Also from (4) L=746.00 and P. T.=Sta. P. C.+L=164+91.50.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 (54.50÷100)²=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus (54.50)²÷(2 x 688.26)=2.16 ft.

Deflections.—Deflection angle=½ D for 100 ft., ¼ D for 50 ft., etc. For c ft.=(in minutes) .3 x C x D° or=defl. for 1 ft. from Table III x C. For Sta. 158 of above curve=.3 x 54.5 x 8⅓=136.2′ or 2° 16.2′, or=2.50 x 54.5=136.2′ from Table III. For Sta. 159 deflection angle=2° 16.2′+8° 20′÷2=6° 26.2′, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve E=960.6 for 8° 20′=960.6÷8⅓=91.27 and from Table V correction=.10 or E=91.37 ft. Or suppose Δ=32° and E is measured and found to be 42 ft. What is D? From Table IV E=230.9 and÷42=5.5 or D=5° 30′.

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. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10′	34377.5	.036	.145	0.05′	7°	819.02	1.528	6.105	2.10′
20	17188.8	.073	.291	0.10	20′	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25	8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central 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	1252.3	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.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central 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.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central 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.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central 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	5808.2	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 Tangents and Externals.

These corrections are to be added to the approximate values, found by dividing the tangent, or external, for a 1° curve (Table IV) by the degree of curve, in order to obtain the true tangents, or externals. Intermediate values may be obtained by interpolation.

For Tangents Add

Central Angle	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

For Externals Add

Central Angle.	Degree of 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
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

Table VI.--Corrections for Sub-Chords and Long Chords.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

Note.—When a chord of less than 100 ft. is used the corrections given in the above table should be added to the nominal length of chord to get the length which should be used in order that the 100 ft. points will check with those obtained by using the standard 100 ft. chord. Thus in locating a 14° curve by 25 ft. chords measure 25′.06 for each chord. Long chords are useful in passing obstacles.

Table VII.--Middle Ordinates for Rails in Feet.

Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS.						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.037	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

SLOPE REDUCTIONS.

When distances are measured on a slope they may be reduced to the equivalent horizontal distance by the following approximate rule:—subtract from the slope distance the square of the rise divided by twice the slope distance. Thus for a slope distance of 250.3 ft. and a rise of 15 ft. correction=$15^2 \div 2 \times 250.3$=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20′ from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286× 2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$

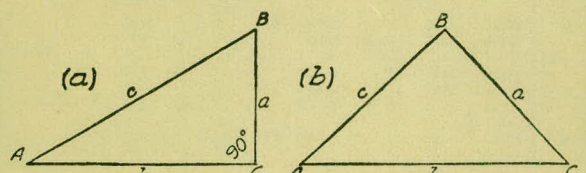
cos. $A=\frac{b}{c}$

tan. $A=\frac{a}{b}$

cot. $A=\frac{b}{a}$

sec. $A=\frac{c}{b}$

cosec. $A=\frac{c}{a}$



Formula for Solving Triangles.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $b=c \cos. A$
Given	**Sought.**	**Oblique triangles. See fig. (b).**
A, B, a	b	$b=\frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B=\frac{b \sin. A}{a}$
a, b, C	$A-B$	$\tan. \frac{1}{2}(A-B)=\frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
a, b, c	A	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{b c}}$, $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{b c}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$, $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)\,s}}{b c}$
A, B, C, a	area	$\text{area}=\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area}=\frac{1}{2} b c \sin. A$
a, b, c	area	$s=\frac{1}{2}(a+b+c)$, $\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
°						°					
0	0	0	00	1	90	8	.1392	.1405	7.115	.99027	82
10	.0029	.0029	343.8	I	50	10	.1421	.1435	6.968	.98986	50
20	.0058	.0058	171.9	.99998	40	20	.1449	.1465	6.827	.98944	40
30	.0087	.0087	114.6	.99996	30	30	.1478	.1495	6.691	.98902	30
40	.0116	.0116	85.94	.99993	20	40	.1507	.1524	6.561	.98858	20
50	.0145	.0145	68.75	.99989	10	50	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.99985	89	9	.1564	.1584	6.314	.98769	81
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.99939	88	10	.1736	.1763	5.671	.98481	80
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.99863	87	11	.1908	.1944	5.145	.98163	79
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.99756	86	12	.2079	.2126	4.705	.97815	78
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.574	.97692	40
30	.0785	.0787	12.71	.99692	30	30	.2164	.2217	4.511	.97630	30
40	.0814	.0816	12.25	.99668	20	40	.2193	.2247	4.449	.97566	20
50	.0843	.0846	11.83	.99644	10	50	.2221	.2278	4.390	.97502	10
5	.0872	.0875	11.43	.99619	85	13	.2250	.2309	4.331	.97437	77
10	.0901	.0904	11.06	.99594	50	10	.2278	.2339	4.275	.97371	50
20	.0929	.0934	10.71	.99567	40	20	.2306	.2370	4.219	.97304	40
30	.0958	.0963	10.39	.99540	30	30	.2334	.2401	4.165	.97237	30
40	.0987	.0992	10.08	.99511	20	40	.2363	.2432	4.113	.97169	20
50	.1016	.1022	9.788	.99482	10	50	.2391	.2462	4.061	.97100	10
6	.1045	.1051	9.514	.99452	84	14	.2419	.2493	4.011	.97030	76
10	.1074	.1080	9.255	.99421	50	10	.2447	.2524	3.962	.96959	50
20	.1103	.1110	9.010	.99390	40	20	.2476	.2555	3.914	.96887	40
30	.1132	.1139	8.777	.99357	30	30	.2504	.2586	3.867	.96815	30
40	.1161	.1169	8.556	.99324	20	40	.2532	.2617	3.821	.96742	20
50	.1190	.1198	8.345	.99290	10	50	.2560	.2648	3.776	.96667	10
7	.1219	.1228	8.144	.99255	83	15	.2588	.2679	3.732	.96593	75
10	.1248	.1257	7.953	.99219	50	10	.2616	.2711	3.689	.96517	50
20	.1276	.1287	7.770	.99182	40	20	.2644	.2742	3.647	.96440	40
30	.1305	.1317	7.596	.99144	30	30	.2672	.2773	3.606	.96363	30
40	.1334	.1346	7.429	.99106	20	40	.2700	.2805	3.566	.96285	20
50	.1363	.1376	7.269	.99067	10	50	.2728	.2836	3.526	.96206	10
					82						74
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
o/						o/					
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.669	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	69	29	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	68	30	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	67	31	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
°						°					
32	.5299	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.6713	1.030	.71732	50
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											°
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

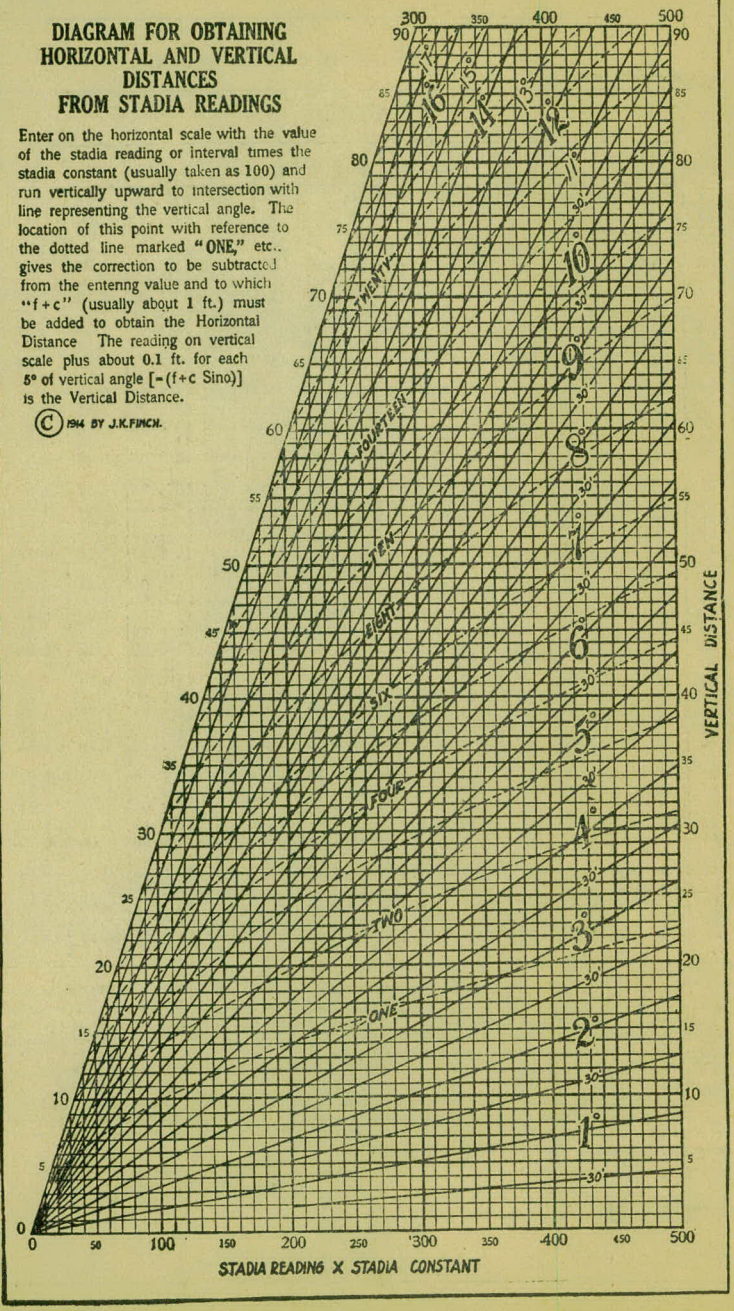
Table IX.—Calculation of Earthwork.

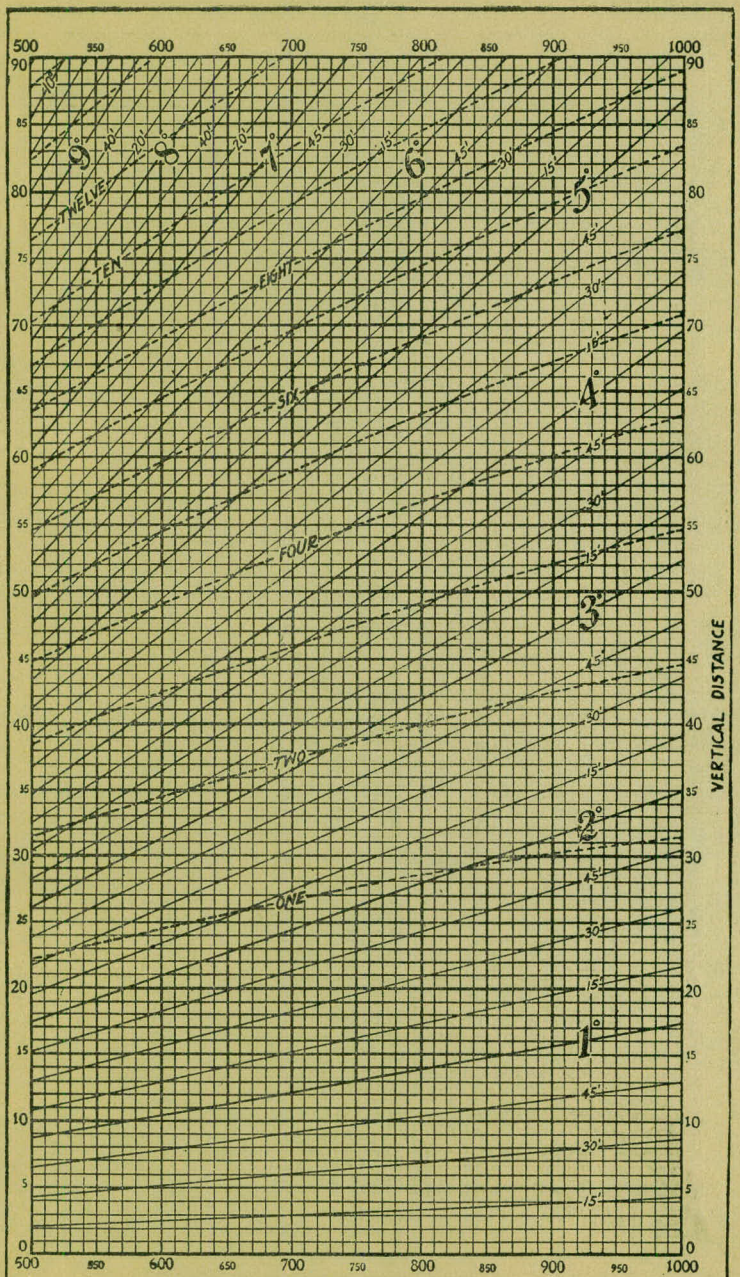
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if w =16.2 and h =5.3, cu. yds. =1.48+.028+.089 =1.597 cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one half and multiply result by 2, if both w and h are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills) =h, and ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entenng value and to which "f + c" (usually about 1 ft.) must be added to obtain the Horizontal Distance The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [= (f+c Sino)] is the Vertical Distance.




500
550
600
650
700
750
800
850
900
950
1000
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
TWELVE
TEN
EIGHT
SIX
FOUR
TWO
ONE
9°
8°
7°
6°
5°
4°
3°
2°
1°
10'
40'
30'
20'
45'
30'
15'
45'
30'
15'
45'
30'
15'
45'
30'
15'
45'
30'
15'
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

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

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