OFFICE OF

RAMSEY COUNTY ENGINEER

CONSTRUCTION

FROST AVENUE

CO. PROJ. 23-68

FILE NO. "3"

ENGINEERS'

FIELD BOOK

NO. R-705

Frost Ave

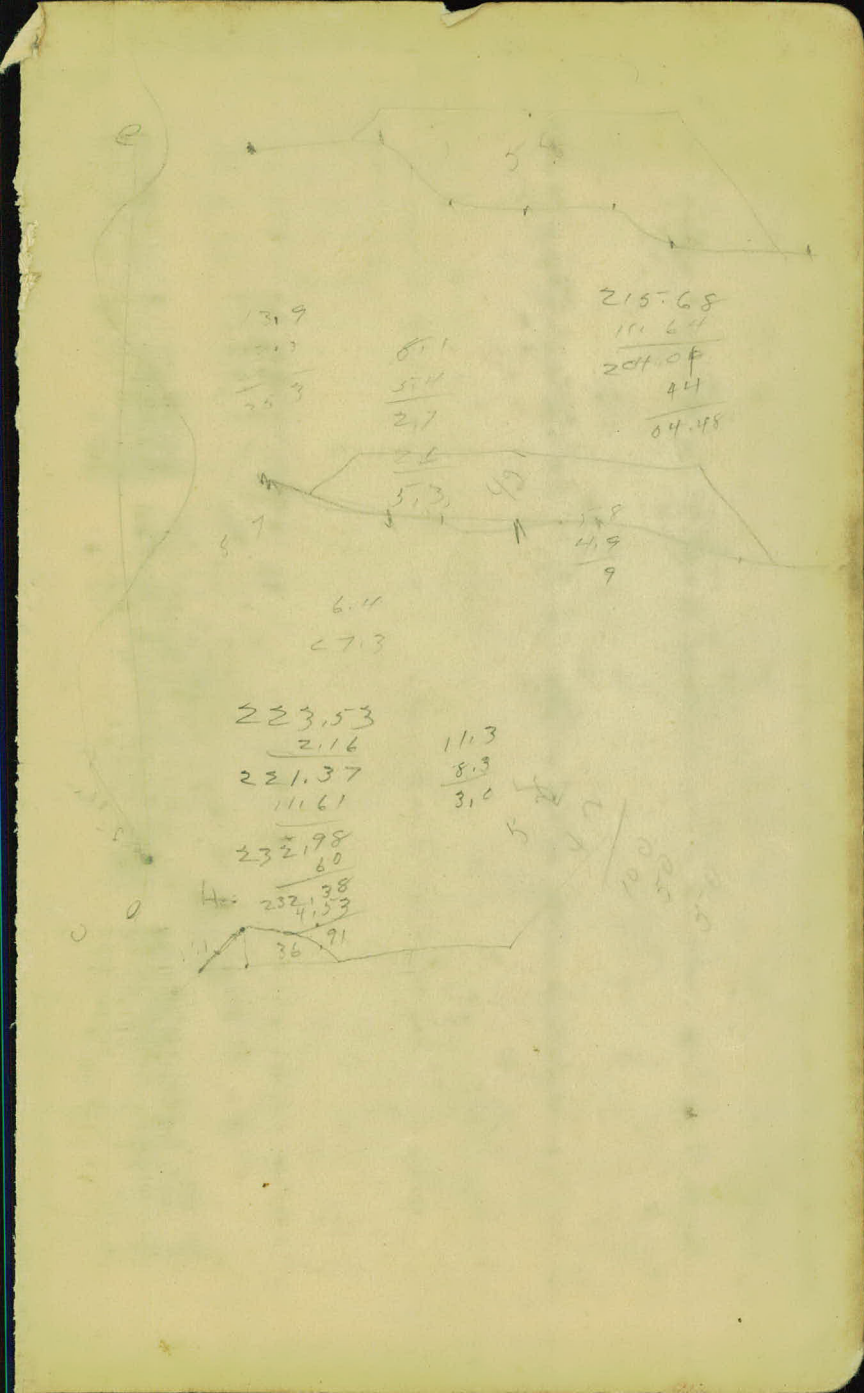
"3" 23 18

Distances from Center of Roadway for Cross-Sectioning

Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be 30.6+(20—16)÷2 or 2 ft. added to 30.6 =32.6. For slopes of 1 on 1½ see inside of back cover.



INDEX

P.P. to	p.p.	DESCRIPTION.	Sta to	Sta
1	2	Location of line ties.	00	102
5		Levels & Benches McMenemy-Rice	0	50
6	10	Slope stakes & Xsections	0	24
10	18	Slope stakes & Xsections	24	76
18	23	" " "	76	102
56	72	Final X sec.	0	102+
73	76	Topog.	0	61+
24	24	Grade stakes	44	50
25	25	Culvert stakes	Project	
42	44	Topog	61+	102+

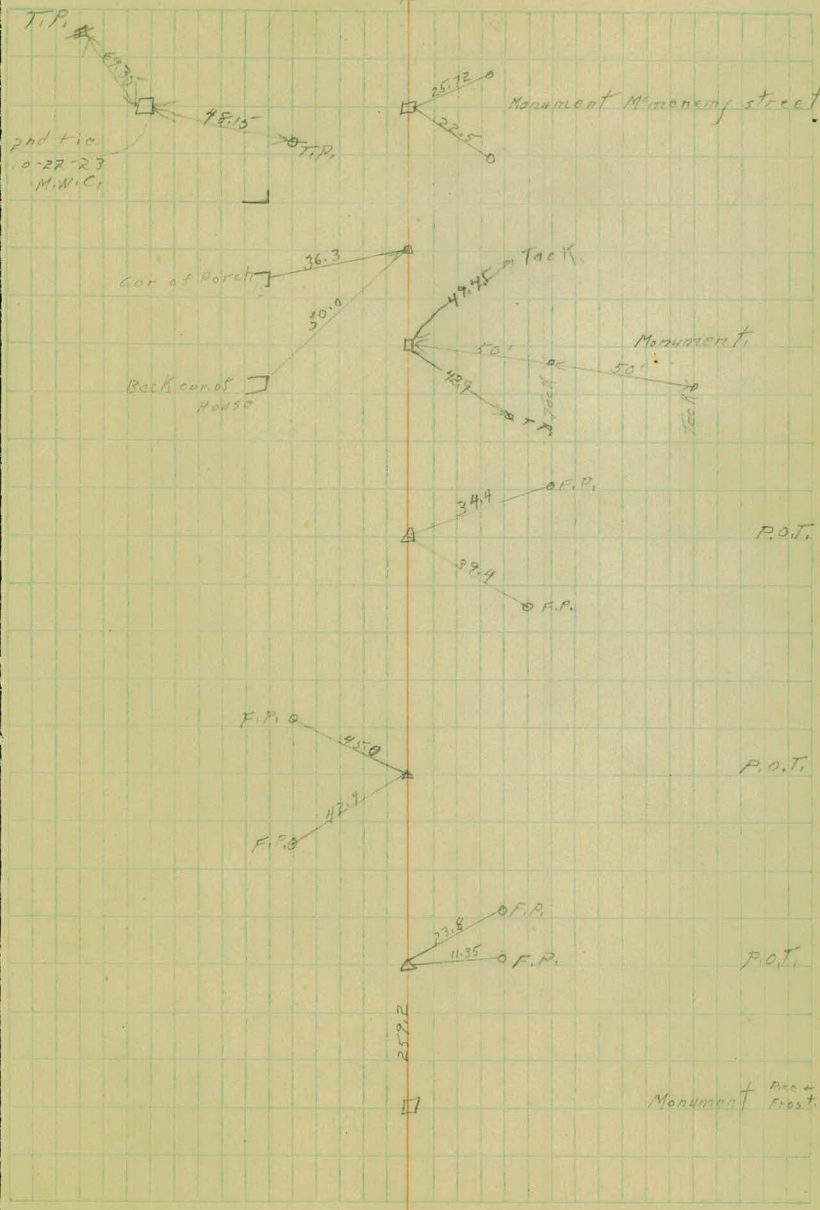
Transit Notes

Early survey of Eel River Bridge

Sta		Δ Rt	Δ Lt	
Equd. 50+44.2 = 50+49.2	P.I.		00°-47'	Short 5 ft
48+10.2	P.O.T.			
29+15.4	Monument P.O.T.			
21+28.7	P.O.T.			
12+50.8	P.O.T.			
2+59.2	P.O.T.			
0+00	Monument			

Location of Line

Lt. & Rt.



Transit Notes

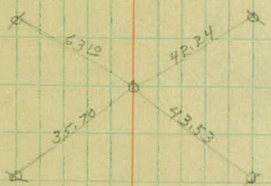
Sta	Δ Rt	Δ Lt
102+86	Monument End of project	
95+00	P.O.T.	
76+65.8	P.I.	00° -03'

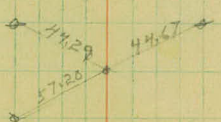
9/6/23
Cloudy - Raining

Carley
Parsons
Briggs
Beck

2

Lt ℄ Rt





8/13/23

B.Mark's set 23-68

	+	H.I.	−	Elev.	
B.M.	7.33	221.87			(214.54)
B.M.			7.74		(214.13)
T.P.	0.55	210.52	11.90	209.97	
T.P.	0.48	199.41	11.59	198.93	
T.P.	0.21	188.35	11.27	188.14	
T.P.	2.86	182.09	9.12	179.23	
✓ B.M.			1.18		(180.91)
T.P.	4.11	185.87	0.33	181.76	
✓ B.M.			9.15		(176.72)
T.P.	12.12	197.19	0.80	185.07	
T.P.	10.13	203.40	3.92	193.27	
T.P.	12.12	214.95	0.57	202.83	
✓ B.M.			5.83		(209.12)
T.P.	7.66	222.12	0.49	214.46	
T.P.	0.84	213.64	9.32	212.80	
✓ B.M.	3.24	201.86	12.02		(201.62)
T.P.	0.58	194.19	11.25	193.61	
T.P.	1.05	184.06	11.18	183.01	
T.P.	1.66	174.22	11.50	172.56	
✓ B.M.			6.31		(167.91)
T.P.	4.93	178.28	0.87	173.35	
	69.87				
B.M.			10.70		(167.58)
			116.83		

116.83 − 69.87 = 46.96 ✓

214.54 − 167.58 = 46.96 ✓

Carley
Persons
Eck
Briggs

Fair - Sulphur

Spike in tele. pole on S.W. corner McMenemy & Frost

" " " " " " " 40' Farther from ℄

R.R. spike in White birch tree 60' Rt. of sta 93+10

Top of F.P. on ℄ fence 4th post 53' ℄ of sta 37+27

Spike in tele. pole R of sta 24+15.

Top of F.P. 35' ℄ of sta 12+35

Spike in tele pole Rt of sta 8+45 35'

Top of monument ℄ Rick str 0+00

8/13/23

Xsec from slope stakes
23-68-

Sta.	+	H.I.	−	Elev	Grade
B.M.	10.92	178.50 ✓	✓		(167.58) ✓
0+26			10.5	68.0 ✓	✓ 67.7
+38			9.9	68.6 ✓	✓ 67.9
1			6.7	71.8 ✓	✓ 68.4
+33					
+33			5.0	73.5 ✓	✓ 68.7
2			4.8	73.7 ✓	✓ 67.3
3			4.2	74.3 ✓	✓ 70.2
T.P.	2.34	177.35 ✓ ✓	3.49	175.01 ✓	✓
3+50			4.5	72.9 ✓	✓ 70.9
4			4.8	72.6 ✓	✓ 72.1
T.P.	1.54	173.59 ✓ ✓	5.30	172.05 ✓	✓
5					76.1
T.P.	4.94	176.08 ✓ ✓	2.45	171.14 ✓	✓
+38			4.8	71.3 ✓	✓ 78.0
6			5.2	70.9 ✓	✓ 81.1
T.P.	4.10	174.12 ✓ ✓	6.06	170.02 ✓	✓
+50			4.6	69.5 ✓	83.6

Corley
Parsons
Fick
Briggs

L — L — R

Fair-Windy

Top of monument on L Rice str. sta 0+00

10.8

8.6/35 8.6/25 9.8/13 10.3/10 11.1/7 13.0/19 9.2/23 8.6/27 8.1/33

10.6

8.3/35 8.3/27 10.0/10 10.6/10 9.9/16 4.7/21 0.7/26 0.7/35

10.1

C35 (6.6/21.5) 6.4/33 7.0/12 7.1/10 7.1/15 6.7/16 4.7/20 4.8/29 5.1/35 (5.4/26.7) <47

9.8

5.6/35 5.1/19 5.0/9 5.7/12 4.0/16 6.4/20 7.9/29 8.6/40

9.7

C67 (3.5/28.7) 2.0/33 3.1/20 3.9/11 5.7/13 6.7/33 (6.5/24.7) <27

8.3

C56 (2.7/27.6) 2.1/33 3.7/22 4.0/14 6.2/10 7.7/19 10.0/33 (8.3/22.0) 0+0

10.2

1.3/38 3.4/25 4.0/14 6.9/9 8.8/20 11.9/33

5.3

174.2 (C21.1/24.1) 2.1/33 4.4/16 6.5/10 8.8/13 10.5/22 12.3/32 (F5.4/22.1) 166.7

×2.5

171.3 (P5.2/18.8) 0.7/33 1.8/16 4.4/8 9.0/14 10.1/23 11.0/30 (F17.5/37.5) 161.1

Block the

×1.9

1.3/33 4.3/15 5.4/8 5.6/30

×5.0

172.3 (F8.8/27.2) 3.3/33 5.1/20 5.1/12 5.0/9 5.4/12 6.9/33 (F12.2/33.3) 168.9

×9.1

4.7/33 4.4/26 4.6/16 5.4/8 7.4/14 9.4/33

Sta		H.I		Elev	Grade
	4.10	174.12			
7			5.0	69.1	86.1
+31			5.3	68.8	87.6
+77			5.0	69.1	89.9
T.P.	4.07	173.69	4.50	169.62	
8			4.9	68.8	91.1
+50			5.7	68.0	92.7
B.M.	5.00	172.91	5.78	167.91	167.91
+73.5			7.8	65.1	93.0
9			5.4	67.5	93.0
T.P.	3.27	176.17	0.01	172.90	
End of Bridge +77.8			2.6	73.6	93.0
T.P.	4.08	179.10	1.15	175.02	
10			2.4	76.7	93.2
T.P.	11.66	185.90	1.86	177.24	
+29			9.2	79.7	93.7
11			0.2	88.7	94.9
T.P.			5.13	183.77	

L Z R

166.3 F19.8 44.7 — 7.8/36 7.7/22 5.0/15 +12.0 5.9/7 8.4/15 9.5/25 8.9/38 — F21.0 46.5 — 165.1

5.5/38 4.6/24 5.2/19 4.8/12 +13.3 5.3/5 4.7/7 4.8/24 5.3/33

0.0/35 0.0/29 5.1/22 4.7/13 +5.8 5.5/16 4.9/8 6.6/12 7.4/23 5.8/33

173.3 F20.8 41.7 — 0.5/39 0.8/28 4.5/23 5.1/16 4.6/14 +7.4 5.1/5 5.0/8 7.2/12 9.6/32 12.2/53 — F30.4 60.6 — 160.7

7.9/48 7.2/34 6.9/27 6.3/20 5.5/15 +19.0 5.9/9 8.1/13 8.9/17 10.1/40

9.7/50 10.1/27 5.2/15 5.5/8 +2.01 13.7/15 14.0/29 14.2/41 14.5/51

Bridge

F20.4 8.5/43.1 — 8.5/49 7.8/35 3.0/22 +16.8 3.7/5 9.3/17 10.0/27 11.0/32 11.1/46 — 10.8/52.4 F27.6

21.6 6.5/45.9 — 6.5/50 5.6/33 3.1/25 +14.1 3.1/7 8.7/16 9.0/36 7.6/48 — 7.6/47.4 F21.7

10.7/39 9.8/31 8.5/20 +4.8 8.2/14 8.9/24 7.4/47

F11.8 5.6/32.7 — 7.0/45 6.1/37 4.6/24 2.5/16 +6.0 0.3/23 0.0/33 0.3/49 — 0.3/24.8 F7.2

Nail in stump to R of sta 10+50

8/14/23 Slope stakes + Xsections 23-68

Sta	+	H.I.	—	Elev	Grade
T.P.	11.47	195.24		183.77	
11+25			4.1	91.1	95.3
T.P.	11.52	204.94	1.87	193.42	
			6.8	98.1	
12		204.90	18.8	88.1	96.6
B.M.	3.28	203.00	3.28	201.66	201.62
T.P.	9.82	219.01	0.81	204.19	
		213.91		204.04	
12+42			13.0	201.0	97.3
				200.9	
13			9.4	04.6	98.3
				04.5	
+50			7.3	06.7	99.1
				06.6	
14		217.24	5.9	08.1	200.0
T.P.	8.68	217.34	5.35	208.66	
				08.0	
+14			5.2	208.54	200.2
				09.0	
15			7.7	09.6	01.7
				09.5	
+79			8.8	08.5	02.9
				08.4	
16		210.73	9.0	08.3	03.2
T.P.	2.20	210.83	8.71	208.63	
				208.53	
+40			3.9	06.9	03.7
				06.8	
17			6.6	04.8	04.3
				04.7	

Fair Hall

Carley
Parsons
Eck
Briggs

Lt. & Rt.

Mail slot stamp Rt of sta 10+50

3.7/38 3.1/29 2.1/14 4.3/11 (3.1) 3.7/10 4.0/17 0.9/22 1.0/36 1.0/45

(4.5) 4.7 0.6 20.3/26.0 20.9/41 (20.7/32.9) c10.9

c2.6 (5.7/24.6) 7.6/39 6.7/33 4.6/16 7.5/10 7 21

chg. cut 13.0/35.0

Top of F.P. 1 of sta 12+35

(16.3) 12.1 10.7 8.2 8.1

16.3/34 14.1/12 13.2/8 8/8 18 27 35

(8.7) 8.9 9.7 9.6 7.8 5.9

c6.4 (9.3/28.4) 9.5/33 8.3/9 9.6/5 11 14 22 27 40 (7.3/30.4) c8.4

(4.9) 7.4 8.4 7.5 5.1

5.3/34 4.0/13 7.5/7 10 17 27 39

(14.0) 5.9 7.2 5.7

c11.0 (3.0/33.0) 2.9/33 0.8/15 5.7/6 15 30 39 (5.6/29.4) c7.4

(17.1) 8.7 8.6

5.6/33 5.0/30 9.2/26 9.2/12 18 38

(5.6) 7.0 9.6 8.6

c12.2 (3.4/34.2) 3.4/34.2 3.2/33 2.6/26 8.3/18 7 20 34 (9.2/28.4) c6.4

(4.4) 8.7 8.7 8.6

9.5/34 8.4/24 9.0/19 9.4/13 18 26 38

(14.1) 8.0 8.3 8.0

c2.6 (11.5/24.6) 12.4/33 10.4/19 9.4/9 10 20 33 (8.8/27.3) c5.3

(7.1) 3.0 2.3 2.5

11.8/35 8.0/13 4.6/5 8 20 34

(6.5) 11.9 10.2 5.1 5.2 3.9

c6.5 (19.7.8/24.5) 195.0/33 196.0/30 18 12 12 30 36 (5.1/23.4) c1.4

Sta	+	H.I.	−	Elev	Grade
	2.20	210.83			
17+50		205.58	8.8	01.9	04.5
T.P.	2.47	205.68	7.62	203.21 203.11	
18			5.72	00.5 200.4	04.8
+44		211.94	6.1	99.7 199.6	04.8
T.P.	6.61	212.04	0.25	205.43 205.33	
19		220.33	6.4	03.6 205.5	04.9
T.P.	9.39	220.43	11.00	211.04 210.94	
+50			7.3	13.1 13.0	04.7
20		227.28	4.6	15.4 15.3	04.6
T.P.	11.21	227.38	4.26	216.17 216.07	
21			8.6	18.8 18.7	03.8
+50			8.7	18.7 18.6	03.8
22		219.23	10.2	17.2 17.1	02.8
T.P.	2.93	219.33	10.98	216.40 216.30	
+50			4.3	15.0 14.9	02.3
23			5.3	14.0 13.9	04.8

LT. RT.

6.3

93.7 / 32 | 196.1 / 18 | 198.7 / 9 | 7.3 / 7 | 6.8 / 13 | 6.6 / 21 | 6.4 / 31 | 5.8 / 35

F11.4 (12.3 / 32.1) | 12.4 / 33 | 10.4 / 11 | 10.0 | 2.7 / 12 | 2.5 / 16 | 2.7 / 21 | 2.8 / 27 | 3.2 / 35 | 3.3 / 38 | (2.4 / 20.5) F1.5

10.9

13.3 / 33 | 12.3 / 17 | 10.8 / 8 | 2.0 / 10 | 1.8 / 21 | 2.3 / 30 | 3.8 / 34

7.1

F1.8 (8.9 / 15.7) | 12.7 / 33 | 10.6 / 24 | 8.0 / 10 | 3.8 / 9 | 3.7 / 17 | 3.2 / 21 | 3.7 / 35 | (3.3 / 24.8) C2.8

15.7

12.8 / 33 | 9.6 / 13 | 7.9 / 3 | 7.8 / 11 | 8.3 / 28 | 6.5 / 31 | 6.5 / 37

15.8

C11.8 (4.0 / 33.8) | 3.0 / 33 | 2.9 / 22 | 2.1 / 6 | 4.4 / 1 | 5.4 / 25 | 2.4 / 31 | 2.2 / 33 | (2.5 / 35.3) C13.3

23.6

C19.4 (4.2 / 41.4) | 4.2 / 40 | 4.2 / 31 | 4.1 / 27 | 4.0 / 10 | 8.6 / 3 | 9.9 / 7 | 9.1 / 22 | 5.8 / 30 | 6.0 / 33 | (6.6 / 39.0) C17.0

24.1

5.0 / 40 | 5.0 / 34 | 5.3 / 21 | 6.0 / 5 | 9.0 / 17 | 9.0 / 20 | 7.5 / 24 | 8.5 / 33 | 8.9 / 40

24.4

C16.8 (7.8 / 38.8) | 7.8 / 33 | 8.1 / 27 | 8.5 / 15 | 9.1 / 4 | 10.2 / 2 | 10.4 / 14 | 10.4 / 22 | 11.1 / 25 | 11.6 / 33 | (12.0 / 34.6) C12.6

17.0

2.6 / 40 | 2.7 / 33 | 2.9 / 25 | 3.7 / 7 | 4.6 / 15 | 4.9 / 26 | 5.7 / 34 | 5.7 / 40

17.5

C13.7 (3.8 / 33.5) | 3.8 / 36 | 3.8 / 33 | 3.9 / 26 | 4.2 / 10 | 5.3 / 5 | 6.0 / 13 | 6.9 / 30 | 6.5 / 34 | 7.3 / 39 | (6.5 / 33) C11.0

Sta	+	H.I.	−	Elev	Grade
	2.93	219.23 / 219.33			
23+50			7.4	11.8	01.3
24			11.1	08.2 / 08.1	00.8
BM.			10.16	209.17 / 209.07	209.12

Lt. ℄ Rt.

18.0

4.5	4.4	4.1	4.7	5.7	7.2	8.1	8.6	9.2	9.6
36	33	27	16	7	5	13	27	33	36

18.5

c.99	8.6	8.6	8.6	8.6	9.8	11.3	11.3	11.8	12.0	12.8	13.3	12.5	c6.0
	319	36	33	26	7	4	9	14	24	33	36	280	

Spike in tele pole R of sta 23+90

8/16/23 Xsections & slope stakes 23-68

Sta	+	H.I.	−	Elev.	Grade
BM.	0.29	209.41			209.12
24+50			5.6	203.8	200.3
25			8.2	201.2	99.8
T.P.	0.22	202.20	7.43	201.98	
26			4.4	97.8	98.8
27			6.9	95.3	97.8
28			9.8	92.4	96.8
T.P.	4.93	198.13	9.00	193.20	
29			5.6	92.5	93.8
30			5.5	92.6	94.0
31			5.1	93.0	94.7
32			4.6	93.5	94.6
33			4.3	93.8	93.9
34			5.1	93.0	92.0
T.P.	2.10	195.97	4.26	193.87	
50			4.2	91.8	90.7

Carlos Persons Eck Briggs

Fair-Hot Lt. & Rt.

Spike in tele pole R of Sta R4+00

9.1

5.1/33 5.0/29 5.4/20 6.4/15 6.4/5 5.7/8 5.2/15 5.3/24 5.4/27 5.5/33

9.0

C0.8 8.8/22.8 8.5/33 8.8/27 8.7/9 9.1/4 9.1/8 8.6/20 9.2/26 9.6/28 9.6/33 9.1/22.5 C0.5

3.4

F1.9 5.3/20.1 5.5/33 5.0/13 5.5/11 4.9/10 5.4/4 4.0/6 4.0/14 4.6/18 4.6/20 4.4/23 5.4/26 5.5/33 4.3/21.1 F0.9

4.4

F2.8 7.2/17.2 8.0/33 7.3/13 7.6/11 7.5/5 6.5/5 6.5/14 7.7/17 6.9/18 7.2/33 7.8/17.8 F3.2

5.4

F4.4 9.8/19.6 9.8/33 10.0/12 9.4/11 9.2/10 9.2/22 9.4/24 9.5/33 9.0/18.4 F3.6

2.3

F3.4 5.7/18.1 5.6/33 5.9/14 5.6/13 5.8/6 5.5/8 5.2/21 5.5/25 5.5/33 5.3/17.5 F3.0

4.1

F1.0 5.1/21.0 4.7/33 4.9/16 5.8/14 5.4/13 5.0/8 5.3/21 5.3/33 5.1/21.0 F1.0

0.4

F1.3 4.7/20.7 5.1/35 4.9/16 5.7/14 5.2/13 5.2/8 5.0/18 5.1/33 5.2/20.2 F1.8

3.3

F0.8 4.3/21.7 4.3/33 4.3/22 4.7/11 5.0/6 4.8/7 5.8/15 5.1/17 5.3/20 5.7/23 5.5/16.0 F3.0

4.N

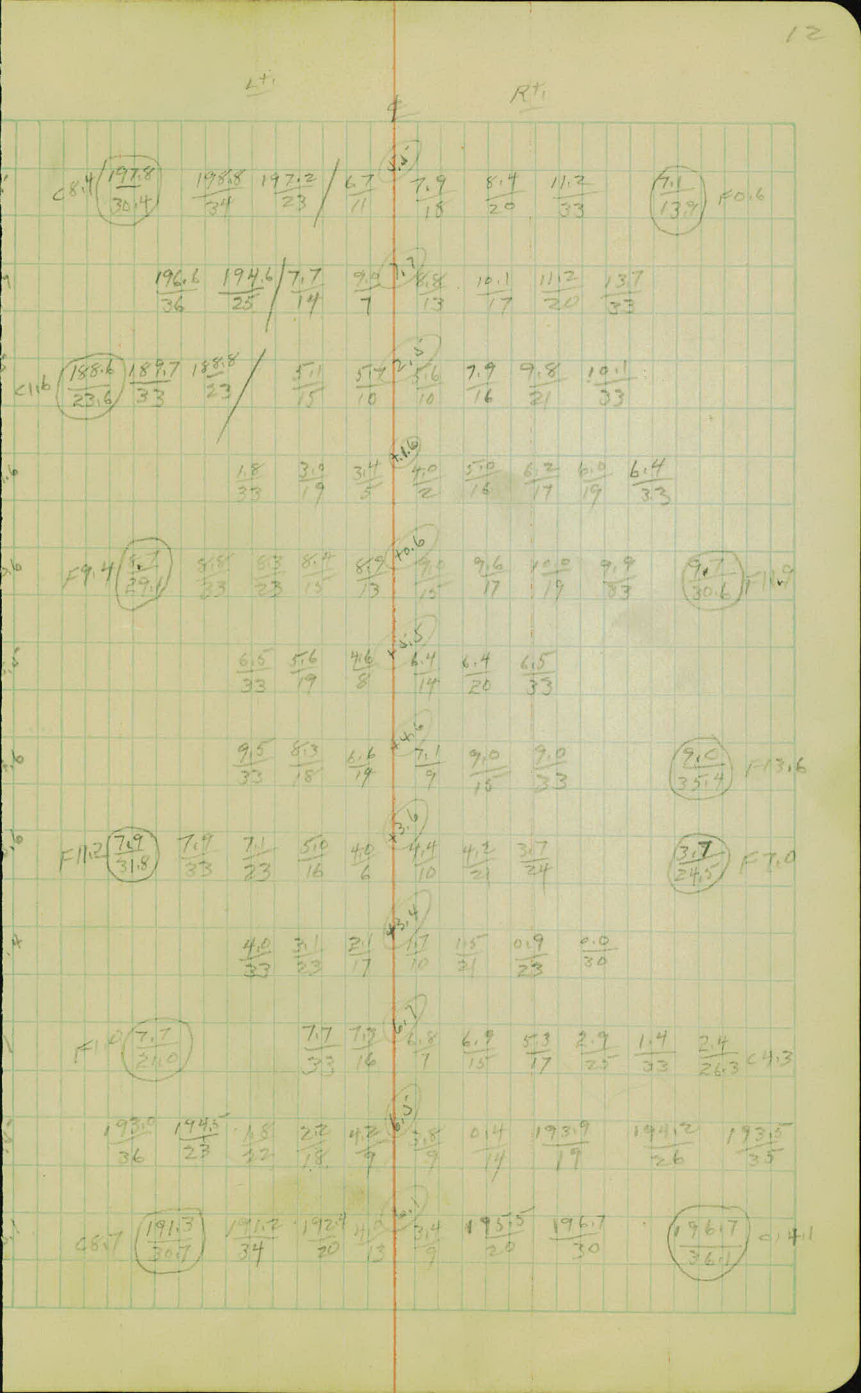
C0.9 3.3/22.9 3.4/33 3.2/19 3.9/17 3.5/16 4.0/8 3.9/5 5.0/14 4.5/16 4.7/19 5.1/20 5.1/21.1 F0.9

6.1

C3.2 2.9/25.3 2.6/33 3.0/21 3.7/19 4.4/10 5.1/6 6.6/18 7.4/20 7.2/20.9 F1.1

1995/34 1951/19 / 4.2 5.3/11 3.8/6 5.5/17 6.0/19 7.7/33

Sta	+	H.I.	−	Elev	Grade
	2.10	195.97			
35			6.7	89.3	89.5
+50			9.0	87.0	88.3
T.P.	1.98	189.50	8.45	187.52	
36			5.5	184.0	87.0
T.P.	4.73	184.16	10.07	179.43	
+50			4.3	79.9	85.8
37			8.4	175.8	84.8
B.M.	1.97	178.69	7.48	176.68	176.72
+27			4.1	74.6	84.2
38			5.8	72.9	83.3
39			3.9	74.8	82.3
39 +50			1.9	77.3	82.1
T.P.	10.01	188.68	0.02	178.67	
40			6.5	82.2	82.0
+62			4.3	84.4	82.2
41			3.5	85.2	82.6
T.P.	2.57	185.87	5.38	183.30	


L+1
R+1
C8.4
197.8 / 30.4
198.8 / 34
197.2 / 23
6.7 / 11
7.9 / 18
8.4 / 20
11.2 / 33
7.1 / 13.9
F0.6
196.6 / 36
194.6 / 25
7.7 / 14
9.0 / 7
8.8 / 13
10.1 / 17
11.2 / 20
13.7 / 33
C11.6
188.6 / 23.6
189.7 / 33
188.8 / 23
5.1 / 15
5.4 / 10
5.6 / 10
7.9 / 16
9.8 / 21
10.1 / 33
1.8 / 33
3.9 / 19
3.4 / 5
4.0 / 2
5.0 / 16
6.2 / 17
6.0 / 19
6.4 / 33
F9.4
5.7 / 29.1
5.8 / 33
6.3 / 23
8.4 / 19
8.9 / 13
9.0 / 15
9.6 / 17
10.0 / 19
9.9 / 33
9.7 / 30.6
F11.9
6.5 / 33
5.6 / 19
4.6 / 8
6.4 / 14
6.4 / 20
6.5 / 33
9.5 / 33
8.3 / 18
6.6 / 19
7.1 / 9
9.0 / 15
9.0 / 33
9.6 / 35.4
F13.6
F11.2
7.9 / 31.8
7.9 / 33
7.1 / 23
5.0 / 16
4.0 / 6
4.4 / 10
4.2 / 21
3.7 / 24
3.7 / 24.5
F7.0
4.0 / 33
3.1 / 23
2.1 / 17
1.7 / 10
1.5 / 21
0.9 / 23
0.0 / 30
F10
7.7 / 31.0
7.7 / 33
7.9 / 16
6.8 / 7
6.9 / 15
5.3 / 17
2.9 / 25
1.4 / 33
2.4 / 26.3
C4.3
193.0 / 36
194.5 / 23
1.8 / 22
2.2 / 18
4.2 / 9
3.8 / 9
0.14 / 14
193.9 / 19
194.2 / 26
193.5 / 35
C8.7
191.3 / 30.7
191.2 / 34
192.9 / 20
4.8 / 13
3.4 / 9
195.5 / 20
196.7 / 30
196.7 / 34.1
C14.1

Sta	+	H.I.	−	Elev	Grade
	2.57	185.87			
41+75			3.8	82.1	83.9
42			5.4	80.5	84.5
T.P.	4.70	182.26	8.31	177.56	
43			6.2	76.1	87.6
BM	1.32	182.23	1.32	180.94	180.91
T.P.	5.38	187.55	0.06	182.17	
43+66			6.9	80.7	90.3
44			3.3	184.3	192.0
BM	4.35	185.26		180.91	
T.P.	10.46	194.70	1.01	184.25	
44+50			3.5	91.2	94.5
T.P.	12.25	206.00	0.95	193.75	
45			8.6	97.4	197.0
T.P.	12.11	216.21	1.90	204.10	
+73			12.2	04.0	200.7
46			10.0	06.2	202.0
T.P.	8.97	221.11	4.07	212.14	
47			8.8	12.3	06.8
+50			7.0	14.1	08.5

Lt ℄ Rt

2.0

171.5/33 172.8/23 5.7/8 4.0/12 2.7/15 189.2/30 190.5/33

F16.0 (168.4/89) 168.3/33 170.9/21 | 5.9/4 5.7/10 9.9/19 6.7/29 5.8/33 (8.8/25.1) T.4

4 +6.3

F15.0 (9.6/37.5) 9.4/36 9.6/25 4.7/15 4.7/1 | 167.2/19 164.7/33 (63.91/39.3) F23.7

Spike in white birch tree Rt of sta 43+10

+2.3

168.6/42 170.4/20 5.5/17 10.9/24 9.1/34 7.7/37

4.4

1.3/11 1.8/19 4.2/24 3.9/34 2.3/40 (4.8/27.8) F9.2

Spike in birch tree Rt of sta 43+10

0.2

4.1/37 6.9/17 2.9/4 1.7/5 1.9/18 3.2/22 2.1/26 2.6/33

9.0

C21.1 (6.9/24.1) 6.3/35 7.1/19 5.7/9 9.0/6 8.2/11 8.6/17 0.6/25 0.4/33 (0.5/30.5) C8.5

5.5

217.9/37 214.5/18 12.2/6 11.9/15 3.7/22 2.3/33

4.2

C17.9 (219.9/40.1) 219.3/35 218.0/24 | 9.6/8 9.9/14 3.4/21 3.4/29 3.4/35 (3.4/32.8) C10.8

4.3

C15.0 (221.8/37.0) 222.6/33 | 4.1/19 8.4/9 9.4/12 4.3/17 4.7/25 4.8/30 (4.8/31.5) C9.5

2.6

1.8/37 2.4/22 4.2/16 7.0/10 6.9/12 6.5/13 7.8/25 6.9/29 6.9/35

Sta	+	H.I.	−	Elev	Grade
	8.97	221.11			
48			5.0	16.1	10.3
48+50			3.1	18.0	11.4
T.P.	3.74	222.41	2.44	218.67	
49			3.9	18.5	12.1
49+50			5.1	17.3	12.4
T.P.	3.09	217.70	7.80	214.61	
50			3.2	14.5	12.6
B.M.			3.14	214.56	214.54

Lt. ✱ Rt.

						10.8						
C 9.4	1.4 / 31.4	1.4 / 33	1.4 / 31	2.4 / 23	3.2 / 16	5.0 / 11	5.3 / 12	5.8 / 26	6.0 / 33	5.8 / 27.0	C 5.0	
						9.7						
				2.3 / 37	3.0 / 14	3.4 / 14	2.1 / 17	2.0 / 21.9	2.0 / 33			
						16.3						
C 6.6	3.7 / 28.6		3.8 / 33	3.4 / 24	3.5 / 10	4.8 / 12	0.1 / 27	1.2 / 33		0.9 / 31.4	C 9.4	
						10.0						
		10.4 / 35	8.6 / 26	7.4 / 27	5.3 / 12	5.6 / 12	4.7 / 16	5.4 / 33				
						5.1						
F 0.9	4.2 / 13	9.4 / 33	9.1 / 29	7.3 / 23	4.6 / 14	3.2 / 7	3.3 / 10	3.3 / 15	3.5 / 29	3.5 / 33	3.4 / 33.7	C 1.7

Spike in pole on S. W. Cor. of McMenemy

Sta	+	H.I.	−	E/eV	Grade
B.M.	3.08	217.62			214.54
50+22			4.0	13.6	12.7
51			2.7	14.9	13.6
T.P.	10.64	226.79	1.47	216.15	
+50			9.2	17.6	14.6
52			6.5	20.3	16.0
T.P.	9.15	231.57	4.37	222.42	
53			9.0	22.6	18.9
+42			8.8	22.8	19.6
54			9.3	22.3	20.0
+62			10.7	20.9	19.6
T.P.	2.35	221.82	12.10	219.47	
55			2.5	19.3	19.1
56			6.0	15.8	16.4
+50			6.2	15.6	14.9
57			7.8	14.0	13.7
T.P.	2.31	215.56	8.57	213.25	

LT1 — RT1

spike in S.W. Tele pole cor McMenamy & Frost St.

		9.6 / 33	7.4 / 21	4.2 / 8	3.7 / 10	4.3 / 12	3.5 / 15	3.5 / 29	3.5 / 35	
C0.4	3.6 / 22.4	2.7 / 33	3.6 / 19	3.6 / 13	3.0 / 10	4.1 / 18	4.5 / 27	4.2 / 35	4.5 / 21.5	F0.5
		6.4 / 36	6.8 / 28	7.5 / 22	9.2 / 19	9.5 / 13	9.9 / 7	9.10 / 10	9.3 / 14	8.2 / 33
C9.3	1.5 / 31.3	1.5 / 30	2.2 / 20	7.1 / 13	6.6 / 11	4.7 / 13	4.7 / 33		4.6 / 28.2	C6.2
C13.7	23.2.6 / 35.7	23.2.6 / 33	0.2 / 27	9.0 / 13	9.2 / 9	4.8 / 15	6.7 / 33		6.4 / 28.3	C6.3
		23.3.0 / 33	23.2.7 / 26	8.9 / 14	8.7 / 8	2.9 / 16	4.4 / 34			
C9.4	2.2 / 31.4	2.0 / 86	2.7 / 24	9.4 / 14	9.4 / 7	6.0 / 13	6.5 / 35		6.5 / 27.1	C5.1
		8.5 / 33	9.1 / 24	10.9 / 18	11.0 / 11	10.12 / 15	9.9 / 33			
OP	2.7 / 22	2.4 / 34	2.9 / 3	2.7 / 16	3.3 / 9	6.2 / 16	6.9 / 25	7.2 / 33	6.5 / 18.7	F3.8
FD.19	6.3 / 21.1	8.8 / 36	7.4 / 27	5.9 / 17	6.2 / 5	9.7 / 16	11.2 / 20	12.1 / 27	11.8 / 23.6	F6.4
		6.2 / 33	4.6 / 26	6.3 / 22	6.1 / 13	7.4 / 6	7.0 / 14	8.4 / 22	9.1 / 29	
C0.7	7.4 / 22.7	6.3 / 33	6.8 / 28	7.7 / 22	7.6 / 16	7.8 / 11	6.6 / 14	7.7 / 23	8.2 / 31	8.3 / 33	7.6 / 22.5	C0.5

137
11.9
1.8

Sta	+	H.I.	−	Elev	Grade
	2.31	215.56			
58			5.1	10.5	11.9 13.7
T.P.	2.88	211.82	6.62	208.94	11.9
59			5.4	06.4	11.1
60			5.4	06.4	11.0
T.P.	7.73	214.95	4.60	207.22	
1 +70			5.9	09.1	11.0
61			5.6	09.4 09.3	11.0
+80			6.1	08.9 08.8	11.0
62			6.3	08.7 08.6	11.0
T.P.	4.34	212.18	7.11	207.84	
+50			4.5	07.7	11.0
63			5.0	07.2	11.0
+50					11.0
64			4.0	08.2	11.1
B.M.	10.26	220.14	2.30	209.88	209.57
65			8.9	11.2	11.6

Lt Rt

F3.2 5.1/17.8 — 8.0/33 7.7/31 5.7/25 5.1/17 — 3.7 — 6.3/16 8.2/22 8.9/33 — 8.3/22.6 F6.4

F1.4

F3.0 3.7/17.5 — 6.5/30 3.6/18 — 6.7 — 11.7/15 13.9/31 — 19.7.4/35.7 F13.8

F3.0 3.8/17.8 — 2.9/33 3.4/30 3.8/16 4.4/3 — 4.8 — 12.2/17 — 19.4.9/37 — 19.4.6/39.6 F18.8

2.4/34 2.6/31 5.1/24 5.8/17 — 4.0 — 8.4/15 11.3/26

F1.4 5.3/20.6 — 2.0/34 3.0/30 4.8/25 5.2/14 — 4.0 — 5.5/9 7.2/18 10.7/34 — 7.1/17.8 F3.2

4.5/33 4.5/29 5.5/23 5.4/14 — 4.0 — 6.5/15 7.8/29 7.8/33

F2.0 6.0/18.8 — 7.3/27 5.9/19 5.8/11 — 4.0 — 6.0/10 7.0/33 — 6.2/16.3 F2.2

8.7/31 7.6/26 4.6/18 — 4.2 — 4.9/7 4.3/10 5.5/27

F1.2 8.4/24.8 — 9.2/31 8.9/27 5.6/16 — 1.2 — 5.4/10 4.5/12 4.5/31 — 4.1/24.9 C 2.9

F3.4 4.5/18.1 — 3.8/38 4.6/22 3.6/12 — 1.2 — 5.3/17 5.0/19 5.1/28 — 5.1/19.0

F3.4 4.5/18.1 — 3.8/38 4.6/22 3.6/12 — 1.2 — 5.3/17 5.0/19 5.1/18 — 5.1/19.0

Elevations from here on Raised 0.3' Feet Errors

On Tie to pole Lt of 5 to 64+

D.10 8.5/33 — 7.9/33 8.2/31 8.8/17 — 8.5 — 10.2/11 11.6/17 13.0/33 — 11.7/17.8 F3.7

8/24/23 Slope stakes & Xsections

Sta.	+	H.I.	−	Flev	Grade
	10.26	220.14			
66			5.7	14.4	12.6
67			3.9	16.2	14.0
T.P.	10.46	220.34	10.26	209.88	
68			4.9	15.4	15.4
T.P.	6.78	222.86	4.26	216.08	
69			6.0	16.9	16.8
70			4.3	18.6	18.2
71			3.3	19.6	19.4
T.P.	3.73	223.37	2.82	220.04	
72			5.2	20.2	20.0
73			5.5	19.9	20.1
+52			6.1	19.3	20.0
74		223.68	6.4	19.0	19.5
T.P.	4.74	223.78	6.43	218.94	
75			4.5	19.3 / 19.2	17.5
76			6.8	17.0 / 16.9	14.8

LT

RT (Corley, Parsons, Eck, Briggs)

C1.9	5.6 / 23.9	0.8 / 31	0.8 / 31	5.6 / 24	5.5 / 15	7.5	5.8 / 9	3.7 / 14	4.3 / 24	5.5 / 34	4.4 / 25.1	C3.1
C2.2	3.8 / 24.2	2.5 / 33	2.7 / 26	4.0 / 23	4.0 / 16	6.1	4.1 / 7	2.8 / 10	3.5 / 18	5.2 / 34	4.3 / 23.8	C1.8
B.M.												
0.0	4.9 / 22.10	4.7 / 35	5.3 / 24	4.8 / 16	4.2 / 7	4.9	5.4 / 6	7.3 / 11	8.0 / 16	8.8 / 30	8.8 / 33	8.1 / 17.8	F3.2
C0.5	5.6 / 22.5	4.6 / 34	5.4 / 23	6.2 / 20	5.5 / 8	6.1	6.3 / 5	8.5 / 11	9.1 / 16	11.0 / 24	12.3 / 30	8.7 / 16.9	F2.6
C1.0	3.7 / 23.0	2.3 / 34	3.3 / 24	4.0 / 21	4.1 / 14	3.7	4.8 / 11	5.3 / 23	5.6 / 29			5.1 / 21.6	F0.4
F0.4	3.6 / 21.9	2.9 / 33	3.2 / 31	3.5 / 23	3.2 / 16	2.7 / 8	3.2 / 9	1.4 / 13	1.8 / 26	0.6 / 34		0.9 / 24.6	C2.6
0.0	5.4 / 22.10	5.6 / 33	5.7 / 28	5.5 / 18	4.7 / 8	5.4	5.7 / 5	5.7 / 17	4.3 / 27	4.9 / 35		5.0 / 22.4	C0.4
F0.6	5.9 / 21.4	226.6 / 36	0.2 / 33	4.6 / 28	6.0 / 17	5.3	5.7 / 10	3.0 / 15	3.5 / 22	4.4 / 33		3.9 / 27.4	C1.4
		6.9 / 39	5.9 / 29	6.4 / 18	5.7 / 9	5.4	6.2 / 9	5.6 / 14	5.7 / 20	6.8 / 33			
F1.0	6.8 / 21.10	3.2 / 36	5.5 / 31	6.3 / 23	6.5 / 16	6.1 / 7	5.9	7.5 / 13	8.3 / 19	8.6 / 28		8.0 / 16.3	F3.2
C2.3	4.0 / 21.13	3.1 / 33	3.5 / 26	4.6 / 23	5.3 / 21	4.9 / 15	4.3 / 6	5.2	5.4 / 11	5.3 / 14	6.1 / 27	6.0 / 22.3	C0.3
C3.9	5.1 / 23.9	1.6 / 35	4.4 / 28	7.2 / 21	7.2 / 14	5.0	7.2 / II	1.1 / 21	0.6 / 28	4.5 / 33		0.5 / 30.5	C8.5

Sta	+	H.I.	−	Elev	Grade
	4.74	223.78 223.68			
76+21			7.5	16.0 15.9	14.0
+41			8.8	15.0	14.0
B.M.			7.00	216.78 216.68	216.74

L ℄ R

1.8 / 33	8.2 / 18	8.3 / 15	9.8 / 8	8.2 / 16	2.5 / 21	0.0 / 24	0.0 / 33

8.5 / 33	8.2 / 22	9.1 / 13	9.4 / 9	10.6 / 14	10.4 / 21	9.4 / 25	9.4 / 33

Spike in Elec pole 16' R' of 77406

Moved to conc. post of school steps

New. Elev 217.91 W.
217.61 E.

11-1-23 – m.m. Carley

Xsections + Slope Stakes
23-68

Sta.	+	H.I.	−	Elev	Grade
B.M.	8.36	215.88			207.52
Moved B.M.			3.00		212.88
102+64			10.5	05.4	05.0
+54			10.6	05.3	05.4
+48			10.3	05.6	05.7
102			8.0	07.9	07.8
+10			3.5	12.4	11.8
101			3.1	12.8	12.2
T.P.	9.29	224.11	1.06	214.82	
+50			10.0	14.1	14.4
100			8.4	15.7	16.6
+50			6.4	17.7	18.8
99			3.7	20.4	21.0
T.P.	11.57	234.17	1.49	222.62	
+50			11.6	22.6	23.1

Party Carley
Persons
Briggs
Eck

19

Lt ℄ Rt

9/25/23 Cloudy - Cool

.On guy pole 12' Rt of sta 102+65

B.M. Moved to 10" oak tree 40' Rt of sta 102+20 9-25-23 M.W.C.

$\frac{12.7}{28}$ $\frac{11.5}{15}$ $\boxed{10.9}$ $\frac{11.1}{11}$ $\frac{10.9}{17}$ $\frac{10.9}{25}$ $\frac{8.3}{33}$

$\frac{8.7}{33}$ $\frac{8.7}{16}$ $\frac{11.0}{12}$ $\boxed{10.5}$ $\frac{10.9}{11}$ $\frac{10.6}{16}$ $\frac{9.7}{18}$ $\frac{8.6}{21}$ $\frac{7.6}{33}$

$\frac{8.3}{33}$ $\frac{8.3}{17}$ $\frac{10.8}{13}$ $\boxed{10.2}$ $\frac{10.5}{14}$ $\frac{8.7}{16}$ $\frac{4.8}{25}$ $\frac{3.3}{33}$

C31.0 $\boxed{\frac{5.1}{25.0}}$ $\frac{5.3}{33}$ $\frac{5.1}{22}$ $\frac{4.4}{15}$ $\frac{8.7}{10}$ $\boxed{8.1}$ $\frac{8.1}{10}$ $\frac{8.0}{21}$ $\frac{3.5}{27}$ $\frac{3.4}{33}$ $\boxed{\frac{7.4}{22.7}}$ C0.7

$\frac{1.6}{33}$ $\frac{1.6}{28}$ $\frac{2.1}{18}$ $\frac{3.8}{14}$ $\frac{4.2}{12}$ $\frac{4.2}{9}$ $\frac{3.8}{8}$ $\boxed{4.1}$ $\frac{3.7}{8}$ $\frac{3.9}{13}$ $\frac{3.6}{15}$ $\frac{3.6}{33}$

C0.9 $\boxed{\frac{2.8}{22.9}}$ $\frac{1.6}{33}$ $\frac{3.4}{17}$ $\frac{3.8}{14}$ $\frac{3.4}{9}$ $\boxed{3.7}$ $\frac{3.4}{10}$ $\frac{3.9}{20}$ $\frac{4.0}{33}$ $\boxed{\frac{3.9}{21.8}}$ F0.2

$\frac{9.5}{33}$ $\frac{10.2}{14}$ $\boxed{9.7}$ $\frac{10.0}{5}$ $\frac{9.7}{8}$ $\frac{11.8}{12}$ $\frac{12.8}{33}$

F1.1 $\boxed{\frac{8.8}{30.9}}$ $\frac{9.0}{33}$ $\frac{8.9}{16}$ $\boxed{7.5}$ $\frac{8.6}{7}$ $\frac{11.2}{12}$ $\frac{12.3}{33}$ $\boxed{\frac{12.1}{19.6}}$ F4.4

$\frac{7.0}{33}$ $\frac{7.1}{19}$ $\boxed{5.3}$ $\frac{6.6}{7}$ $\frac{10.4}{16}$ $\frac{11.7}{22}$ $\frac{12.8}{33}$

F0.4 $\boxed{\frac{3.5}{21.6}}$ $\frac{2.8}{33}$ $\frac{3.6}{22}$ $\frac{4.3}{11}$ $\boxed{3.1}$ $\frac{4.2}{9}$ $\frac{3.3}{14}$ $\frac{7.1}{22}$ $\frac{8.7}{33}$ $\boxed{\frac{5.9}{17.2}}$ F2.8

$\frac{5.6}{33}$ $\frac{5.6}{27}$ $\frac{11.9}{15}$ $\boxed{11.1}$ $\frac{11.8}{12}$ $\frac{12.1}{23}$ $\frac{12.1}{26}$ $\frac{10.7}{28}$ $\frac{11.8}{33}$

Sta	+	H.I.	−	Elev	Grade
	11.57	234.19			
98			10.0	24.2	25.1
+10			7.6	26.6	27.6
97			7.4	26.8	28.0
96			5.7	28.5	29.8
+45			5.2	29.0	30.5
95			4.4	29.8	30.7
94			4.5	29.7	30.7
+65			5.2	29.0	30.5
93			5.5	28.7	30.2
T.P.1	7.48	237.13	4.54	229.65	
+50			7.7	29.4	30.0
92			7.3	29.8	29.7
+50			6.3	30.8	29.5

Lt Rt

C8.0 (1.1 / 30.0)

1.0/33 1.0/30 9.7/20 9.6/8 (9.1) 9.6/6 10.4/23 5.9/30 6.5/33 (10.3/20.8) F1.2

1.7/33 2.1/23 7.4/15 (6.0) 7.6/20 3.7/28 4.5/33

C1.4 (4.8/23.4)

1.6/33 1.6/30 7.2/19 (6.2) 7.7/17 4.0/25 4.4/30 (5.0/28.2) C1.2

F1.4 (5.8/20.6)

2.6/33 1.7/30 5.8/22 (6.5) 6.2/22 2.4/30 3.0/33 (6.3/20.1) F1.9

3.2/33 2.7/31 5.3/25 5.5/13 (3.7) 4.8/12 3.8/16 4.4/33

F0.9 (4.4/21.1)

4.4/33 (3.8) 5.1/17 5.7/33 (5.2/20.2) F1.7

F1.7 (5.2/20.3)

5.5/33 5.5/14 5.1/10 (3.5) 5.0/12 5.8/33 (5.2/20.3) F1.7

5.3/33 4.9/12 (3.7) 5.5/17 4.0/22 3.8/33

F1.8 (5.8/20.2)

4.8/33 4.4/25 6.0/19 5.8/14 (4.0) 5.2/24 2.8/30 2.9/33 (5.2/20.8) F1.2

6.8/33 6.1/28 8.2/20 (7.1) 7.5/22 5.5/33

C0.1 (7.3/22.1)

5.0/33 3.6/31 7.3/22 (7.4) 6.5/26 6.0/31 (6.8/22.6) C0.6

3.6/33 3.5/27 4.3/17 6.1/14 (7.6) 6.5/5 6.8/24 4.7/30 4.7/33

Sta	+	HI	−	Elev	
	7.48	237.13			
91			6.6	30.5	29.2
90			7.8	29.3	28.7
+45			9.9	27.2	28.4
B.M.	5.77	232.58	10.30	226.83	226.81
89			7.0	25.6	28.2
+50			7.5	25.1	28.0
88			7.1	25.5	27.7
+60			6.0	26.6	27.5
87			5.8	26.8	27.2
86			6.5	26.1	26.7
+50			7.2	25.4	26.4
85			8.4	24.2	26.2
84			9.0	23.6	25.7

LT & RT

C4.4	3.5 / 26.4	3.5 / 36	3.4 / 26	4.6 / 19	3.9 / 3	7.9	7.0 / 19	4.12 / 25	4.13 / 33	5.5 / 24.4 C2.4
C2.1	6.3 / 24.1	6.5 / 33	6.3 / 29	6.7 / 16	6.3 / 2	8.X	8.16 / 23	4.9 / 32	4.9 / 33	7.0 / 21.4 F0.6
		10.9 / 33	10.7 / 19	10.12 / 12		7	10.7 / 21	8.5 / 25	8.3 / 33	

C10 18.11 18.0 M -50' RT 5 to 8 9 4 12

F4.2	8.16 / 19.3	8.1 / 33	8.5 / 26	8.12 / 17	7.11 / 11	X	7.11 / 5	8.9 / 10	9.6 / 29	9.5 / 33	9.6 / 21.8 F5.2
		7.12 / 33	8.5 / 25	8.8 / 18	8.10 / 12	4.6	8.16 / 7	10.1 / 12	10.9 / 18	11.4 / 33	
F1.10	5.9 / 21.10		5.4 / 33	5.8 / 19	7.14 / 15	4.9	7.12 / 10	8.14 / 18	9.11 / 33		8.15 / 18.4 F3.6
		4.16 / 33	4.6 / 26	4.9 / 17	6.2 / 13	5.11	6.6 / 5	7.12 / 22	6.4 / 27	6.8 / 33	
C2.1	3.5 / 24.11	3.3 / 37	3.6 / 21	4.7 / 19	4.4 / 4	5.4	6.8 / 4	6.6 / 23	4.17 / 29	4.6 / 33	6.8 / 20.6 F1.4
C1.5	4.4 / 23.4	5.1 / 33	4.4 / 23	6.3 / 20	5.11 / 1	5.9	7.12 / 21	2.15 / 29	3.15 / 33		7.13 / 20.6 F1.4
		9.11 / 33	8.14 / 25	7.15 / 13		6.2	8.10 / 5	7.16 / 23	2.18 / 30	2.18 / 33	
F3.2	9.6 / 17.8		10.13 / 31	9.5 / 24	9.12 / 12	6.4	8.18 / 10	6.16 / 25	3.15 / 33		9.10 / 18.9 F2.6
	F4.6										
	Water 11.15 / 19.9		11.17 / 20	9.7 / 11		6.9	9.5 / 10	10.12 / 12	9.13 / 33		9.9 / 17.15 F3.10

Sta	+	H.I.	−	Elev	
	5.77	232.58			
T.P.	5.10	228.51	9.17	223.41	
83			4.6	23.9	23.3
T.P.	5.16	228.93	4.74	223.77	
82			5.0	23.9	23.1
+25			4.6	24.3	23.0
81			4.6	24.3	23.0
T.P.	6.48	230.61	4.80	224.13	
+52			6.3	24.3	23.0
80			5.8	24.8	24.8
79			5.6	25.0	23.1
+88			5.8	24.8	22.7
78			9.2	21.4	19.8
T.P.	0.88	220.08	11.41	219.20	
+17			3.6	16.5	15.8
+06			4.2	15.9	15.3

14 & 24

Water F4.6 shoulder 7.8/13 8.3/16 5.6/6 5.7/10 7.2/14 6.8/33 7.4/19.3 F4.2

F2.3 shoulder 6.1/13 3.0 9.1/20 5.8/12 5.5/8 8.2/17 7.8/26 7.1/33 8.2/19.0 F4.4

8.4/28 5.0/13 5.0/12 6.8/16 6.0/31 6.0/33

F4.2 8.1/19.3 8.3/19 5.7/12 3.9 4.9/12 6.4/18 5.9/33 6.3/16.6 F2.4

8.4/33 8.3/27 8.0/16 6.6/11 3.0 6.5/19 7.3/19 5.5/23 4.4/33

C1.6 4.8/23.0 5.2/33 5.2/25 4.2/17 6.6/11 3.8 6.3/20 1.8/28 1.8/30 5.8/22.0 9.0

C4.6 2.9/26.6 2.7/33 2.9/27 5.3/11 4.5 5.9/14 5.5/20 1.1/28 1.1/28 1.5/33 1.2/28.3 C6.3

1.9/33 2.6/21 6.0/11 7.9 4.1/10 6.4/18 0.9/28 1.1/33

C9.8 1.0/31.8 1.0/33 1.0/26 9.2/13 10.8 9.2/11 9.2/17 2.6/28 2.8/33 3.0/29.8 C7.8

(227.6/31) (227.3/27) 2.9/17 3.5/10 4.3 4.5/12 3.6/18 (226.1/32)

(226.2/33) (223.3/25) 4.2/12 4.8 5.0/15 22 (220.0/26)

Sta	+	H.I.	−	Elev	
	0.88	220.08			
77			4.5	135.6	15.1
76+89			4.9	135.2	14.7
76+65.8			6.2	133.9	14.1
B.M.			3.66	216.42	(216.44)

Original B.M. elevations
use in last half mile.

Lt & Rt

c4.8 | 6.2 / 26.8 | 0.0 / 33 | 0.7 / 22 | 4.0 / 14 | 5.0 | 5.6 / 12 | 4.9 / 21 | 4.7 / 33 | 4.7 / 22.8 | c0.8

5.3 / 36 | 5.7 / 19 | 5.4 | 6.7 / 16 | 9.7 / 30 | 10.0 / 33

7.6 / 33 | 6.0 | 5.2 / 33 | & Edge of Str.

spike in tele pole -16' Rt of sta 77+06

coming from the west Elev = 16.74

Grade stakes

Sta	+	H.I.	−	Elev	Grade
B.M.	4.02	218.56			214.54
50					212.6
49					12.1
48					10.3
47					06.8
T.P.	0.75	210.64	8.67	209.89	
46					02.0
T.P.	0.69	200.91	10.42	200.22	
45					197.0
44					192.0

9/6/23
Fair-Hot

Carley
Perseus
Briggs
Fox

24

Spike in S.W. for P.C. Monday 5th.

8/23/23

Culvert stakes

Sta		Old Length	Rt	Lt	New Ext R	New Ext L
8+90		65'	25'	40'	37.5	40'
18+20	Removed 12" x 24' c.M.C.				19.0	31°
38+15	No culvert in place				34±	37.±
43+00	No culvert in place				37.5	51.5
6+85	Removed	c.M.C.			49.5	46.5
81+50					19.0	21.0

130
65
65

225 33
4 53
220 90

68
37.5
51.5

Carley
Persons
Eck
Briggs

25

Old Inv.	New Inv.	Old Ql.	New Ql.	
157.84	L 159.04	156.04	R 154.92	Total ext. 77.5 L
	R 200.46		L 193.70	Total Length 50' L of 53+1.6'
	170.13		169.23	Total Length 72' L
	172.60		163.91	Total Length 88' L
	166.57		164.12	Total Length 96' L
	220.90		219.70	40'

10-11-23 Fair-Warn

23-68

Xsections of King at Courtland St.

Sta	+	H.I.	−	Elev.
B.M.1	1.92	211.04		209.12
0+00				
+20			5.6	205.4
+28			5.9	205.1
+50			6.9	204.1
+75			7.7	203.3
1			8.4	202.6
+50			9.8	201.2

Final Xsec.

210.39

0+28			9.9	
+50			9.2	
+75			8.4 8.4	
1+00			7.9	

Carley
Parsons
Bridges
Eck

Party

Rt of sta 24+15.4

26

℄ Rt

West to Falk, Falo, Rt of sta 23+90

sta 0+00 = Monument sta 24+15.4

℄ of Frost Ave.

		7.3 / 35	6.6 / 22	3.7 / 17	3.0 / 36	
	5.3 / 32	7.4 / 25	6.6 / 15	5.2 / 5	4.2 / 14	2.6 / 34
	9.3 / 31	8.3 / 20	7.7 / 14	7.0 / 8	6.6 / 14	4.9 / 32
	10.7 / 33	9.2 / 20	8.8 / 10	7.9 / 8	8.2 / 11	7.5 / 13	6.3 / 33
11.1 / 33	10.2 / 32	10.5 / 16	9.6 / 9	8.4 / 9	9.1 / 14	8.1 / 15	7.3 / 33
12.2 / 24	12.0 / 20	11.3 / 9	10.6 / 6	10.4 / 9	10.8 / 13	9.9 / 15	8.7 / 33

3.4 / 17	3.6 / 11	10.3 / 5	(5.3)	10.0 / 12	10.5 / 18	6.3 / 23	6.9 / 27
7.7 / 22	7.7 / 19	10.7 / 16	9.8 / 8	(6.3)	9.8 / 6	5.3 / 10	5.0 / 14
8.8 / 22	8.6 / 17	9.6 / 15	8.9 / 11	(7.2)	8.2 / 7	7.5 / 8	7.4 / 10
	9.8 / 23	9.5 / 17	8.5 / 13	(7.8)	7.8 / 7	8.3 / 9	8.3 / 11

23-68 Xsections 0.17 Left.
to correct city borrow, sta 14-16

Sta	+	H.I.	−	Elev
B.M.	7.03	210.65		203.62
T.P.	5.29	215.71	0.23	210.42
14+14				
15				
T.P.	1.80	216.56	0.95	214.76
+79				
16				

VOID

No change in sections.

M.M.C.

10-16-23
Fair-cool

Party - Farley
Persons
Briggs
Eck

27

Lt & Rt

Top of fence post Lt of sta 12+35

4.1 / 33	3.7 / 29	1.7 / 27	6.7 / 10
1.6 / 33	1.0 / 26	5.7 / 11	6.3 / 6
8.8 / 32	7.7 / 24	8.7 / 19	8.4 / 26

These sections taken account of city moving dirt from Left after first Xsections were taken. Ground on the right remains as taken the first time.

M.W.C. - 10-16-23

Grade stakes Sta 62-74

Sta	+	H.I.	−	Elev	Profile Grade
B.M.	7.12	217.00			209.88
62					11.0
63					11.0
64					11.1
65					11.6
66					12.6
67					14.0
68					15.4
TP	16.10	225.50	1.60	215.40	
69		6.95 / 218.55			16.8
70		2.73 / 221.28			18.7
71					19.4
72					20.0
73					20.1
74					19.5
BM.					216.74

10-22-27
Fair - cool.

Party { Carley, Parsons, Briggs, Eck

Grade Rod: Lt | ℄ | Rt

Spike in telephone pole Lt of sta 64+50

6.0 ✓

6.0 ✓

5.9 ✓

5.4 ✓

4.4 ✓

3.0 ✓

1.6 ✓

8.7 ✓

7.3 ✓

6.1 ✓

5.5 ✓

5.4

6.0

spike in elec pole 16' Rt sta 77+06

23-68 Grade Stakes

Sta 50 - 42+50

Sta	+	H.I.	−	Elev	Grade
B.M.	0.07	214.61			214.54
50					212.6
49					121
48					10.3
47					08.8
T.P.	1.79	208.64	7.76	206.85	
46					02.0
45					197.0
T.P.	1.17	198.25	11.56	197.08	
44					92.0
43					87.6
+50					85.91
B.M.	7.38	221.92			214.54
51					13.6
52					16.0
	8.57	227.50	2.99	218.93	
53					185.9
54					20.0

10-20-23
Cloudy-cold.

Party { Carley, Parsons, Briggs, Eck

S.W. Cor. of McInerney & Frost,

2.07

2.05

4.3

7.8

6.6

11.6

6.2

10.7

8.3

5.9

3.0

1.9

23-68 Grade sta 88 sta 102+86

Sta		+	H.I.	−	Elev	Grade
B.M.		3.96	216.84			212.88
102						07.8
101						12.2
100						16.4
99	TP.	11.58	228.32	0.40	216.74	21.0
98						25.1
97						28.0
96	TP.	7.44	235.42	0.34	227.98	29.8
95						30.7
94						30.7
93						30.2
92						29.7
91						29.2
	TP.	2.89	232.10	6.21	229.21	
90						28.7
	B.M.			5.30	226.80	226.81
89						28.2
88						27.7
87						27.2
86						26.7

10-27-23
cloudy – cold.

Grade
Rod.

Party: [illegible] ley
persons
Riggs
Eck

Weir in 12" oak 40' Rt of s la 102+20

9.0 L
4.6 L
0.4 L
7.3 L
3.2 L
0.3 L
5.6 L
4.7 L
4.7 L
5.2 L
5.7 L
6.2 L
3.4 L

Weir in 18" B. oak 50' Rt of la 89+12

3.9 R
4.4 L
4.9 R
5.4 L

23-68 Grade sta 40 + 00 to 10 + 17

Sta.	+	H.I.	−	Elev	Grade
B.M.	1.22	202.84			201.62
10					93.2
11					94.9
12					96.6
13					98.3
14 TP	5.07	205.09	2.82	00.02	0.00
15					01.7
16					03.2
17					04.3
B.M.	3.27	221.18			217.91
76					14.8
75					17.5
74					19.5

10-30-23

Grade Red.

Conley
Persons
Briggs
Eck

Top of F.P. 44 of 3 Fa. 1931

9.6
7.9
6.2
4.5
2.8
3.4
1.9
0.8

6.4
3.7
1.7

Grade - Stakes - sta 39+0 42

Sta	+	H.I.	−	Elev	Grade
B.M.	10.64	187.36			176.72
38+50					82.7
39					82.3
40					82.0
TP	5.20	187.88	4.68	182.68	
41					82.6
42					84.5

10-30-73
Fair

Party - Conley
Sanders
Rodi
Fish

Grading
Rodi

top of RR on fence Lt s to 37+27

4.7 L

5.1 L 4.5 L

5.4 L

5.2 L

3.4

23-68 Grade stakes sta 77-84

Sta	+	H.I.	−	Elev	Grade
B.M.					
T.P.			11.87	216.38	
77					15.4
+50					17.2
78					19.2
+50					20.9
79					22.2
+50					23.17
80					23.9
+50					24.5
81					24.7
T.P.	3.56	228.25	6.18	224.69	
+50					24.7
82					24.9
+50					25.1
83					25.3
+50					25.5
84					25.7
8	4.06	230.87			226.81

11-1-33
Fair-cold.

Party { Conley
Parsons
Briggs
Eck

Spike in elec. pole Lt of sta 77+06

12.9

11.1 ✓

8.1 ✓

7.4 ✓

6.1 ✓

5.1 ✓

4.4

3.8 ✓

3.6 ✓

6.2 ✓

6.0 ✓

5.8 ✓

5.6

5.4

5.2

Tree 89+75

8.5 — 26.2 — 41.7

8.6 — 26.1 — 41.2

2268

23-68 Grade stakes Edgerton str. West

Sta	+	H.I	−	Elev	Grade
B.M.					217.91
76					14.8
75					17.5
74					19.5
73					20.1
72					20.0
71					19.4
70					18.2
69					16.8
68					15.4
67					14.0
66					12.6
B.M.					209.88

11-6-23
Fair - warm

Party { Carley
Persons
Briggs
Eck

Top of conc. post at school steps.

Spike in tele. pole Lt of sta 64+50

23-68 Grade stakes sta 46 to 56+25

Sta	+	H.I	−	Elev	Grade
B.M.1	10.30	224.84			214.54
56+25					15.7
56					16.4
+50					17.5
55					18.3
+50					18.5
54					18.9
+50					18.5
53					18.0
+50					17.1
52					15.9
+75					15.2
51					13.6
At B.M.1	0.10	214.64	10.30	214.54	
+50					12.0
50					12.6
+50					12.3
49					11.7
+50					10.9
48					09.7
+50					08.2
47					06.6
+50					04.3
46					02.0

11-6-23
Fair-Warm

Party { Carley, Persons, Briggs, Eck

On guy pole S.W. Cor. McClaneany 5th.

7.3
.5
3
9
3
8
7
9
Not set.
1.2

2.0
3
9
1
.9
.4
.0
2.3
12.6

23-68.

Grade Sta Kos sta 51 to 62

Sta	+	H.I	—	Elev	Grade
B.M.	6.30	216.18			209.88
62					11.0
61					11.0
60					11.0
59					11.1
58					11.9
57					13.7
T.P.	9.81	224.49	1.50	214.68	
56					16.4
55					18.3
54					18.9
53					18.0
52					15.9
51					13.6
B.M.			10.01	214.48	214.54

11-8-23
Fair - cold

party { Earley
Persons
BI-1995
Eck

Spike in tele. pole Lt of s to 6+45.0

5.2 L
5.2 L
5.1 L
4.3 L
2.5 L
8.1 L
6.2 L
5.6 L
6.5 L
8.6 L
10.9 L

Spike in guy pole B.W. Car M Simmons Sty

23.65 Grade Sta 16 to Sta 5

Sta	+	H.I.	−	Elev	Grade
B.M	1.00	202.62			201.62
TP1	4.55	205.50	1.67	200.95	
16					03.2
15					01.7
14					00.0
13					98.3
12					96.6
11					94.9
10					93.2
TP1	0.48	195.68	10.30	195.20	
09					93.0
08					91.1
07					86.1
TP1	0.86	186.63	9.91	185.77	
06					81.1
05					76.1

2.3
3.8
5.5
7.2
8.9
10.6
12.3

4.6
7.5 – 8.5
5.5 – 5.0
10.5

45.7
4 4
91.1

81.6
3 0
81.6

End of Bridge 1

205.5
12 3
93.2

Sta	+	H.I.	−	F.+V	
B.M.	0.25	201.87			201.62
T.P.	1.35	194.27	8.95	192.92	
8+35					92.5
8					91.1
7					86.1
T.P.	1.24	186.09	9.42	184.85	
6					81.1
5					76.1
T.P.	1.78	177.89	9.98	176.11	
4					72.1
B.M.	4.71	206.33			201.62
17					04.3
18					04.8
19					04.9

11-15-23
cloudy - cool

Temp 4 P.M. 12+3-0 A.M.

18

3.2 - 3.0

7.2 - 8.6

50 - 47

10.0 -

5.8

2.8

1.5

1.4

Sta		+	H.I	−	Elev.	
B.M.		11.00	187.72			176.72
45						97.0
44						92.0
43						87.6
42						84.5
41						82.6
40						82.0
39						82.3
38						83.3
37	TP.	8.05	194.35	1.42	186.30	84.8
36						87.0
35						89.5
34						92.0
33						93.9
32	TP.	3.26	197.09	0.52	193.83	94.6
31						94.7
30						94.0
29						95.8
28	TP.	8.58	201.40	4.27	192.82	96.8
27						97.8
26						98.8
25						99.8
24		6.57	206.37	1.60	199.80	00.8
23		9.19	213.71	18.5	204.52	01.8
22						02.8
21						03.8

5.7
5.4
4.4
2.9
3.4
4.9
2.4
0.5
2.5
2.4
3.1
2.3
4.6
3.6
2.6
1.6
2.4 = +3.1
4.6 = 0.2
1.6

13.9
3.9.12
4.5

Grade stakes - sta 19 to 32

Sta		+	H.I.	-	Elev.	
B.M.		1.40	210.52			209.12
19						04.9
20						04.6
21						03.8
22						02.8
23						02.05
24						00.8
25	TP	3.08	203.09	10.51	200.01	99.8
26						98.8
27						97.8
28						96.8
29	TP	4.08	200.41	6.76	196.33	95.8
30						95.0
31						94.7
32						94.6
33						94.5

11-30-27

Barley
Variety

5.9 3.9
6.7 4.7
7.7 5.7
8.4 6.4
9.7 7.7
10.7 10.5 5
4.3 3.8
5.3 4.8
6.3 5.8
7.3 6.8
5.4 4.9
5.7 5.2
5.8 5.3
5.9

12/4/23
23-68

74+62 ℄ school Entrance Lt. 12" x 20' C.M.P. ✓

73+61 Fence Rt.
73+39 T.P. Lt.
72+12 T.P. Lt.
72+00 End Fence Lt.
71
70+84 T.P. Lt.
70+11 End Fence Rt

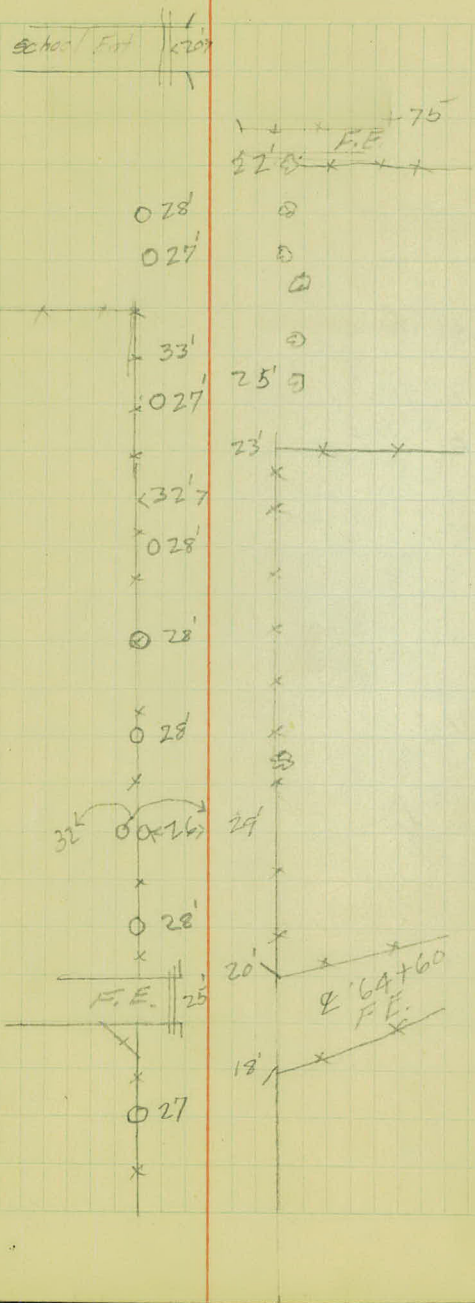
69+54 T.P.

68+17 T.P. Lt.

66+86 T.P. Lt.

65+62 T.P's Lt

64+33 T.P. Lt.
63+82 Fence Rt
63+55 ℄ F.E. Lt. Cul. 15" x 25' R.C. ✓
+38 Fence Rt.
63+09 T.P.


School F.H.
20'
F.E.
75'
22'
28'
27'
33'
25'
27'
23'
32'
28'
28'
28'
32'
26'
29'
28'
F.E.
25'
20'
64+60
F.E.
18'
27

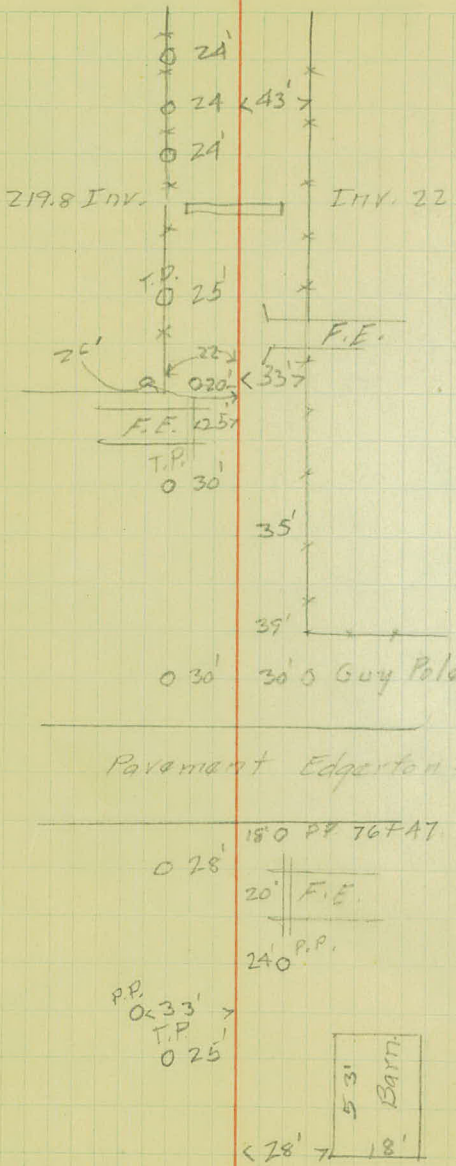
84+97 T. P. Lt.
83+64 T. P. Lt.
82+29 T. P. Lt.
81+52 X Culv. 24" x 40' P.3. ✓

80+90 T. P. Lt.
80+79 ℄ F. E. Rt.
79+74 start Fence Lt & T. P's.
79+12 ℄ F. E. Lt. Culv. 15" x 25' P.2. ✓
78+61 T. P. Lt.
78+50

77+23 start Fence Rt.
77+04 T. P. Lt.
76+76 Edge Pavement.

76+56 Edge Edgerton St. Pavement ✓
76+16 T. P. Lt.
75+31 ℄ F. E. Rt. 12" x 16' C.M.C.
75+06 P. P. Rt.
75+04 P. P. Lt.
74+82 T. P. Lt.

74+51 start Barn Rt.


24'
24
43'
24'
219.8 Inv.
Inv. 220.4
T.P.
25'
F.E.
22
20'
33'
F.E.
25'
T.P.
30'
35'
39'
30'
30' Guy Pole
Pavement Edgerton St.
150 PP 76FA7
28'
20'
F.E.
24'
P.P.
P.P.
33'
T.P.
25'
53'
Barn
28'
18'

102+65 Culv. 18" X 35' P.1. ✓

102+50 T.P. Lt. Guy Pole Rt.

101+16 T.P Lt. Installed 12-8-23

100+94 F.E. & Lt 12" x 29' C.M.C. not yet ins ✓

99+81 T.P

98+44 T.P. Lt.

97+10 T.P.

95+74 T.P. Lt.

94+51 T.P. Lt

93+14 T.P. & Lt.

91+73 T.P. Lt.

91+65 End Fence Rt.

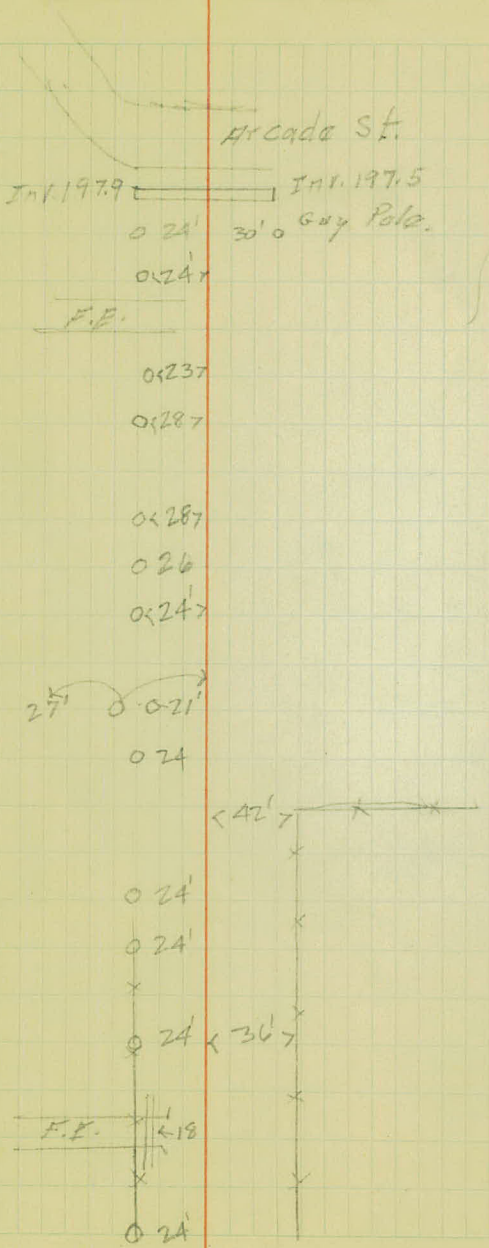
90+39 T.P. Lt

88+95 T.P. Lt. & End Fence Lt.

87+64 T.P. Lt.

86+39 & F.E. Lt. Culv. 15" x 30' P.1. ✓

86+25 T.P. Lt


Arcade St.
Int. 197.9
Int. 197.5
30' o Guy Pole.
o 24'
o 24'
F.E.
o 23'
o 28'
o 28'
o 26
o 24'
27'
o 21'
o 24
42'
o 24'
o 24'
o 24'
36'
F.E.
18'
o 24'

Grade - Stakes
23-68

Sta	+	H.I.	−	Elev	Grade
B.M.	4.75	172.33			167.58
1					68.4
2					69.3
3					70.2
T.P.	7.04	178.31	1.06	171.27	
4					72.1
5					76.1

9-25-[illegible] Cloudy

[illegible] Ky [illegible] sams

Briggs Ecr

Top of main stockade

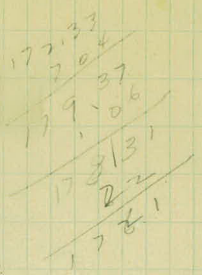
3.9 ↵

30 ↵

2.1 ↵

6.2 ↵

2.2 ↵



23-68 Final Specifications

Sta	+	H.I.	−	Elev	
B.M.	2.87	215.75			212.88
102+64			10.4	05.4	205.0
+54			10.4	05.4	05.4
+48			10.1	05.7	05.7
102			7.8	08.0	07.8
+10			3.6	12.2	11.8
101			3.0	12.8	12.2
+50			1.3	14.5	14.4
T.P.	10.51	224.33	1.93	213.82	
100			7.8	16.5	16.6
+50			5.7	18.6	18.8
99			3.2	21.1	21.0
T.P.	10.94	231.97	3.30	221.03	
+50			8.7	23.3	23.1
98			6.9	25.1	25.1

11-10-23

Foil-Warm 47

Party 15+

Carley
Parsons
Briggs
Eck

56

10" oak tree 40' R+ (10.8) 5 to 10 2 + 20

13.1 / 22	12.0 / 19	11.1 / 13		10.8 / 13	11.2 / 17	11.0 / 21	10.0 / 25	8.9 / 28

(10.4)

8.7 / 22	11.6 / 19	11.4 / 14	10.7 / 12	10.5 / 12	11.0 / 20	8.2 / 23	3.2 / 30	4.8 / 35

(10.1)

7.8 / 22	11.4 / 18	11.3 / 13	10.3 / 10	10.2 / 12	10.8 / 15	10.8 / 20	4.9 / 26	3.9 / 30

(8.0)

4.8 / 25	9.6 / 19	9.4 / 15	7.7 / 11	8.0 / 12	8.7 / 16	9.0 / 20	3.3 / 28

(4.0)

1.8 / 22	3.2 / 18	4.8 / 14	3.6 / 10	3.7 / 12	4.4 / 14	4.7 / 20	3.5 / 22

(3.6)

3.0 / 20	3.0 / 18	4.5 / 14	3.3 / 10	3.2 / 12	3.9 / 14	4.2 / 20	3.7 / 21

(1.4)

1.6 / 19	2.7 / 18	2.1 / 13	1.4 / 12	1.1 / 12	4.0 / 19	4.7 / 29

(7.7)

9.0 / 21	9.8 / 19	9.4 / 15	7.9 / 11	7.8 / 13	12.1 / 21	13.1 / 30

(5.5)

7.4 / 21	8.2 / 20	7.3 / 15	5.8 / 13	5.5 / 12	11.4 / 20

(3.3)

4.0 / 21	5.3 / 19	5.1 / 15	3.5 / 12	3.3 / 12	6.7 / 19

Cut ends 38475 R+

(8.9)

4.0 / 24	10.5 / 18	10.2 / 14	8.9 / 12	8.9 / 12	10.2 / 16	10.2 / 26	8.8 / 28	8.5 / 30

+7.7

(232.8 / 28)

(6.9)

4.2 / 25	8.3 / 20	8.6 / 15	6.9 / 12	7.1 / 12	8.1 / 16	8.8 / 25	3.9 / 32

Sta	+	H.I.	−	E/CV	
	10.94	231.97			
7+10			4.3	27.7	227.6
97			4.0	28.0	28.0
T.P.	7.34	235.46	3.85	228.12	
96			5.6	29.9	29.8
7+45			5.0	30.5	30.5
95			4.7	30.8	30.7
94			4.8	30.7	30.7
7+65			5.0	30.5	30.5
93			5.2	30.3	30.2
7+50			5.5	30.0	30.0
T.P.	3.48	233.43	5.51	229.95	
92			3.5	29.9	29.7
7+50			3.7	29.7	29.5
91			4.0	29.4	29.2

LT & RT

+6.0

(232.6 / 29) 1.1/25 5.9/20 5.9/16 4.2/12 | (4.4) 4.1/12 5.9/15 6.0/22 2.2/28

+4.5

(232.5 / 29) 0.9/28 5.6/21 5.5/15 3.9/12 | (4.0) 4.1/12 5.5/15 5.6/21 1.7/26

3.1/29 5.5/26 7.4/23 7.7/15 5.8/12 | (5.7) 5.8/12 7.5/15 7.5/23 4.4/29 4.1/32

6.6/23 7.3/22 6.3/15 5.1/12 | (5.0) 5.0/12 6.5/15 6.7/23 5.6/25

5.7/32 6.9/20 6.1/15 4.7/12 | (4.8) 5.1/12 6.5/15 6.9/20 6.6/22

6.5/20 6.8/19 6.7/16 4.8/12 | (4.8) 4.8/12 6.9/15 6.9/19 6.5/20

6.3/20 6.8/19 6.7/15 5.0/12 | (5.0) 5.0/12 6.9/15 7.1/20 6.2/21 5.4/26

7.2/19 7.1/16 5.3/12 | (5.3) 5.2/12 6.8/15 7.1/20 6.6/21 5.8/27 3.7/30

6.3/21 7.0/19 6.6/15 5.4/12 | (5.5) 5.5/12 6.5/15 6.9/20 5.8/23 5.1/27 3.9/30

3.2/24 3.5/22 4.7/20 4.6/15 3.5/12 | (3.7) 3.4/12 4.5/16 4.8/22 3.2/24 2.5/29 1.1/30

+4.4

(233.7 / 26) 5.4/20 5.0/16 4.1/13 | (3.9) 4.1/12 5.1/16 5.3/20 3.0/24 2.1/27 1.0/29

0.0/27 5.4/21 5.4/17 4.2/12 | (4.2) 4.2/12 5.1/16 5.2/20 1.9/25 0.8/28

Sta		+	H.I	−	Elev	
		3.48	233.43			
90				4.8	28.6	228.7
	+45			5.1	28.3	28.4
	B.M.	6.64	233.45	6.64	226.79	226.81
89				5.3	28.2	28.2
	+50			5.4	28.1	28.0
88				5.6	27.9	27.7
	+60			6.0	27.5	27.5
87				6.2	27.3	27.2
86				6.7	26.8	26.7
	T.P.	3.32	230.09	6.68	226.77	
	+50			3.6	26.5	26.4
85				3.8	26.3	26.2
84				4.4	25.7	25.7
83				5.1	25.0	25.3

Lt ℄ Rt

(4.7)

2.7/24 6.5/20 6.3/15 4.9/12 4.8/12 5.6/15 6.3/22 2.8/28 1.1/30

(5.0)

7.4/21 7.6/20 6.8/15 5.3/12 5.5/13 6.8/17 6.9/23 5.0/26

cut begins 8.9+35

Cut ends 8.8+50

0.17 15" 18.0 AK 5.0' Rt 8.9+12

(5.3)

9.7/21 5.4/13 5.2/12 10.5/22

(5.5)

9.4/25 9.3/22 5.3/13 5.5/12 11.8/22

(5.8)

7.0/21 8.7/19 7.7/16 5.7/11 5.6/12 9.2/19

(6.0)

5.8/22 8.9/19 6.1/12 6.0/12 7.9/16 7.8/23 6.8/25

(6.3)

4.1/24 9.1/19 6.2/12 6.1/10 7.7/14 8.3/22 6.5/20 4.9/29

(6.1)

5.3/24 9.7/20 9.2/17 6.7/12 6.8/11 8.6/14 8.6/19 7.4/23 3.5/28

(3.7)

5.5/20 6.8/20 6.1/16 3.7/11 3.7/12 5.9/16 5.5/32 0.4/30

51

cut begins 8.5+20 Lt

(3.9) 3.8

7.2/18 3.8/13 4.8/12 6.5/16 5.8/25 11/33

cut begins 8.4+75 Rt

(4.4)

9.1/20 4.7/14 4.4/12 7.4/18

(4.8)

9.5/20 5.1/14 5.1/13 8.9/19

Sta.	+	H.I	−	Elev	
	3.32	230.09			
82			5.2	24.9	225.1
+23			5.2	24.9	25.0
81			5.4	24.7	25.0
+52			5.5	24.6	25.0
80			5.8	24.3	24.8
79			8.0	22.1	23.1
+88			8.3	21.8	22.7
TP	0.55	225.88	4.76	225.33	
78			6.9	19.0	19.8
+17			10.2	15.7	15.8
+06			10.6	15.3	15.2
77			11.1	14.8	15.1
+89			11.8	14.1	14.7
B.M.			8.17	217.71	217.71

Lt ℄ Rt

(5.0)

9.9 / 19 — 5.4 / 14 — 5.2 / 13 — 9.3 / 20

(5.1)

9.6 / 20 — 5.4 / 14 — 5.4 / 13 — 7.9 / 17

(5.1)

9.3 / 19 — 5.4 / 13 — 5.5 / 13 — 7.4 / 17

Cut ends 80 + 6.5

(6.1)

Cut ends 7.4 / 20 — 6.8 / 15 — 5.4 / 12 — 5.9 / 12 — 6.7 / 15 — 7.0 / 18 — 4.0 / 24

(5.3)

4.3 / 24 — 6.9 / 19 — 6.7 / 16 — 5.7 / 13 — 5.9 / 11 — 7.2 / 15 — 7.4 / 18 — 0.9 / 28

(7.0)

2.2 / 27 — 4.6 / 22 — 9.3 / 17 — 9.0 / 15 — 7.7 / 11 — 8.1 / 12 — 9.3 / 15 — 9.8 / 18 — 7.5 / 20 — 0.8 / 28

(7.4)

1.6 / 29 — 9.2 / 18 — 9.1 / 15 — 8.1 / 12 — 8.5 / 12 — 9.7 / 14 — 10.1 / 17 — 7.4 / 20 — 0.6 / 28

Nail in hole pole Lt 79+75

(229.5 / 32) +9.7 — 8.3 / 18 — 8.1 / 15 — 6.9 / 12 — (6.1) — 7.0 / 11 — 8.0 / 14 — 8.5 / 17 — (228.4 / 30) +8.6

(10.2)

227.6 / 36 +11.8 — 11.5 / 19 — 11.7 / 16 — 10.2 / 12 — 10.7 / 17 — 11.7 / 15 — 12.0 / 19 — (226.3 / 32) +10.5

(10.6)

(226.9 / 35) +11.6 — 11.7 / 19 — 11.7 / 16 — 10.4 / 13 — 11.0 / 12 — 12.1 / 15 — 12.4 / 19 — (224.1 / 31) +8.8

(10.8)

4.6 / 33 — 5.3 / 29 — 11.9 / 20 — 11.9 / 19 — 10.8 / 15 — 11.4 / 12 — 12.5 / 18 — 12.5 / 19 — 9.6 / 25

784 89 C.M. pipe Invert Lt 213.1 Out Let 211.6

12.8 / 25 — 11.1 / 18 — (11.3) — 12.6 / 17 — 14.3 / 23

Top of cor. post at school steps.

Coming from the west this B.M. Elev = 217.97

See page 23

Sta	+	H.I.	−	Elev	
B.M.	4.86	222.77			217.91
+41			8.5	14.3	214.0
+21			8.1	14.7	14.0
76			7.8	15.0	14.8
75			5.1	17.7	17.5
74			3.3	19.5	19.5
+52			3.0	19.8	20.0
73			2.5	20.3	20.1
T.P.	4.31	224.84	2.24	220.53	
72			4.4	20.4	20.0
71			5.1	19.7	19.4
70			6.0	18.8	18.2
69			7.9	16.9	16.8

11-13-23
Rainy-wet LT & RT Same-party

Comp post school base steps

8.6

7.3/29 8.5/24 9.4/21 8.4/20 8.3/12 (8.8) 9.2/12 11.0/17 10.9/27 10.8/26

C. M. pipe Xdrain (8.8) Invert 214.5 LT Outlet 213.6 RT 224.2

7.8/28 9.3/21 9.2/15 8.1/12 8.7/11 9.9/14 10.1/18 0.7/31 34

(8.0)

4.3/26 8.0/21 9.1/15 7.7/12 8.1/11 9.4/14 9.7/19 0.6/30

(5.3)

3.0/26 7.0/21 6.4/16 5.2/12 5.5/11 7.2/19 5.2/21

cut begins 71+50

(3.3)

4.2/22 5.0/21 4.6/15 3.3/12 3.5/11 5.4/17

cut ends 73+85

(3.8)

4.0/22 5.3/21 4.5/15 2.9/11 3.2/11 4.6/14 5.3/18 3.3/20

(6.7)

3.5/21 5.0/19 4.3/15 2.5/12 2.7/12 4.6/15 5.0/19 1.3/23

(4.8)

5.1/22 6.9/20 6.3/16 4.6/12 5.0/12 6.8/15 7.0/19 5.8/21 4.5/24

(5.4)

5.7/22 7.1/21 6.4/16 5.0/12 5.4/12 7.1/15 7.3/19 3.0/24

(6.6)

5.9/22 7.7/21 7.2/15 5.8/12 6.6/11 7.9/15 8.4/19 7.5/21

cut begins 69+90

(8.0)

7.5/23 9.7/20 9.5/17 7.8/12 7.8/12 10.5/17

Sta	+	H.I	−	Elev	
	4.31	224.84			
68			9.2	15.6	215.4
67			10.5	14.3	14.0
T.P.	5.90	220.53 ✓	10.21	214.63 ✓	
66			7.7	12.8	12.6
65		✓	8.6	11.9 ✓	11.6
B.M.	5.80	215.68	10.61	209.92	209.88
64			4.5	11.2	11.1
+50					11.0
63			4.6	11.1	11.0
+50			4.7	11.0	11.0
62			4.6	11.1	11.0
+80			4.5	11.2	11.0
61			4.4	11.3	11.0
+70			4.5	11.2	11.0

Lt & Rt

(9.4)

9.7/22 11.3/21 10.6/17 9.0/12 9.6/12 12.3/18

cut ends 67+85

(10.8)

7.6/25 12.1/21 12.0/17 10.6/12 11.0/12 11.9/16 12.5/21 9.1/24

(7.9)

1.4/30 5.9/24 8.8/20 8.0/17 7.7/12 7.9/11 9.0/16 9.0/23 4.8/26

(8.9)

9.2/22 10.8/20 10.5/16 8.5/11 9.4/14 12.3/20

cut begins 65+2.5

Work into hole pole Lt of sta. 64+

cut begins 64+75

(4.6)

8.0/17 4.6/12 4.8/15 5.6/20

Drive ways Rt & L

(4.7)

12.0/25 4.9/14 4.8/13 7.7/17

(4.7)

9.6/21 4.9/13 5.0/13 7.8/17

(4.7)

6.8/16 4.6/13 4.6/13 7.0/17

(4.7)

6.4/19 6.3/16 4.7/13 4.7/13 7.6/17

(4.7)

6.2/20 6.0/15 4.5/12 7.5/14 8.0/19

(4.7)

6.5/21 6.5/17 11.3/13 4.8/14 11.5/23

Sta	+	H.I	−	Elev	
	5.80	215.68			
60			4.7	11.0	211.0
59			4.5	11.2	11.1
T.P.	9.22	220.30	4.60	211.08	
58			8.4	11.9	11.9
57			6.4	13.9	13.7
+50			4.9	15.4	14.9
56			3.9	16.4	16.4
55			1.7	18.6	19.1
T.P.	5.58	223.53	2.35	217.95	
+62			4.4	19.1	19.6
54			4.3	19.3	20.0
+42			4.5	19.0	19.6
53			5.4	18.1	18.9
52			7.4	16.1	16.0

Lt ℄ Rt

(4.7)

7.8/22 7.8/18 4.7/13 4.7/15 (1941.6/40) +6.4

(4.6)

8.6/23 7.6/18 4.6/12 4.8/16 (1973/36) -2.8

(8.4)

10.8/26 10.0/24 10.8/23 10.2/19 8.3/13 8.5/15 12.2/22 12.6/28

C+ Ends 57+90

(6.6)

6.0/23 7.7/24 7.5/18 6.0/14 6.3/12 7.7/16 7.9/20 6.1/23

(5.4)

4.8/22 6.2/20 6.0/17 4.7/14 5.2/12 7.0/17 7.4/20 6.5/21

(3.9)

5.1/24 4.8/21 5.5/20 5.3/17 4.0/12 3.9/13 9.8/22

36.9

(1.2)

1.5/27 1.7/23 3.2/19 3.1/17 1.7/12 2.0/12 4.6/19 5.8/24

C+ Ends 54+75

(3.9)

0.5/31 2.8/28 6.3/20 6.0/16 4.5/12 4.5/11 6.0/15 6.0/18 1.9/24

+9.4

(2294/31.5) 5.6/19 5.5/16 4.2/12 4.1/11 5.8/14 6.2/18 (2250/26.8) +5.0

+13.1

(2333/35) 6.1/18 5.8/15 4.5/11 4.7/12 6.0/15 6.15/18 (2275/29.5) +7.9

+6.3

+13.3

(2322/37) 7.2/19 7.1/15 5.3/11 5.6/11 7.0/14 7.4/19 (2252/28)

+9.8

(2258/32) 9.2/19 9.1/14 7.6/11 7.2/12 8.5/14 9.3/20 1.2/29

(9.5)

Sta	+	H.I	−	Elev	
	5.58	223.53			
+50			8.6	14.9	14.6
51			9.7	13.8	213.6
+22					
B.M.			8.96	214.57 ✓	214.54

~~Lt~~ ℄ Rt

(8.9)

3.4 / 27	10.4 / 19	10.5 / 16	8.6 / 9	8.7 / 12	10.2 / 15	10.5 / 18	5.6 / 24

(9.9)

9.5 / 20	11.5 / 18	11.4 / 15	9.6 / 11	9.5 / 12	11.0 / 16	11.4 / 19	10.3 / 21

Cut begins Rt + Lt 50+63

R.R. spike in guy pole Cor McInerney Str.

Sta	+	H.I	−	Elev	
B.M.	7.97	175.55 ✓			167.58
0+26			8.4 ✓	67.2	7.9
0+21	XD train				
+38			8.2	67.4	7.7
1			7.5	68.1	7.2
+33			7.4	68.2	6.9
2			6.4	69.2	6.3
3			4.9	70.7	5.4
+50			11.3	71.3	4.7
4			3.3	72.3	3.5
T.P.	3 2.72	177.59	1.68	173.87 ✓	
5			1.6	75.0	1.5
T.P.	9.93	187.36	0.16	179.43 ✓	
+38			9.2	77.2	9.4
6			6.3	80.1	6.3
+50			4.4	82.0	3.8
+90	P3 Culv.				to sta 11+00

Note - From sta 4+00 Add one foot to all elev. readings. Mistake made by Carley in Turning.

5.8 5.7 / 7.73 / 66.60

Lt

℄

Rt

66.04 / 2.95 / 68.99

65

Top of monument - Rice St.

5.6/33 5.8/23 9.6/19 9.4/15 8.2/13 8.4/16 16.2/21 10.2/25 9.3/28 9.3/31

15" X "Conc culvert

Lt-17' Invert 165.80 Outlet

Rt 23' 164.00

5.3/33 5.5/23 9.9/18 8.9/13 8.4/11 8.3/13 10.2/17 10.1/20 4.0/28 0.0/30 (177.8/32)

3.7/33 3.5/26 9.0/18 8.9/14 7.6/11 7.6/11 8.7/14 9.2/18 7.1/21 2.6/26 3.0/32

2.4/33 2.3/27 9.0/18 8.6/14 7.4/11 7.5/11 8.9/15 9.2/19 4.4/26 5.4/33

(175.9/28) 8.4/17 7.9/14 6.3/11 6.5/12 7.8/15 8.2/19 2.4/25 3.6/33

(176.2/29) 6.4/20 6.3/17 5.0/13 5.1/13 5.8/15 5.8/19 4.5/22 6.0/26 7.3/33

0.0/33 0.0/29 5.9/21 5.3/16 4.4/13 4.6/13 8.6/21 10.2/33

0.2/33 1.3/26 4.8/17 4.5/16 3.3/12 3.6/13 7.4/19 8.9/23 10.8/33

5.0/31 5.1/24 1.4/16 2.0/15 16.3/38

13.1/33 14.3/25 9.0/17 9.3/17 16.2/30

176.1 176.0

(162.1/33) (162.0/30) 7.5/20 6.1/17 6.3/16 (169.0/31) (168.4/34)

166.8 166.8

(156.8/45) (156.8/41) 6.2/21 3.9/15 4.2/16 (165.4/40) (162.7/46)

Inv 166.83 Inv 165.0

Sta	+	H.I.	−	Elev	
	9.93	186.36			
7			1.8	84.6	1.3
T.P.	9.78	196.51	0.63	186.73	
+31			9.5	86.0	8.9
+77			7.4	88.1	6.6
8			6.4	89.1	5.4
+50			4.4	91.1	3.8
Fnd 18" Iron +73 I			3.4	92.1	3.5
9					
Fnd 18" Iron +77.8 I			3.7	91.8	3.5
10			3.3	92.2	3.3
+24			2.9	91.6	2.8
T.P.	11.68	204.65 ✓	3.65	192.97 ✓ +9+1.86	
11			9.7	94.95	9.7
+25			9.2	95.5	9.4

Note: Checked above T.P. New Elv checks original B.Ms.

17 8 15

(165.2 / 53) (161.5 / 51) (166.3 / 47) 7.4/21 1.6/15 11.9/15 1 (169.0/34) (164.5/42) (163.9/46)

167.–
(157.7/56) (157.7/44) (158.5/47) 13.5/27 9.2/17 9.7/14 (169.0/38) (167.5/41) (166.6/49)

16–.–
(163.6/49) (163.7/42) (164.5/40) 10.5/23 7.3/15 8.1/13 (165.7/43) (161.4/54) (160.5/60)

172.–
(162.5/49) (162.2/44) (162.9/47) 6.3/16 6.4/12 (166.4/41) (165.2/45) (167.1/54) (159.6/62)

16–.–
(155.2/60) (155.3/55) (156.3/48) 4.0/15 4.7/12 (167.0/44) (165.8/49) (161.2/61) (161.2/39)

16–.–
(152.3/59) (154/52) 3.9/15 4.1/12 (167.6/45) (165.2/53) (157.4/68) (157.1/74)

Bi-[illegible]e

Wo[illegible]e
100 Ru[illegible]

169.1
(159.1/52) 170.–
(160.5/44) (162.1/38) 3.4/12 3.7/13 (166.6/46) (165.4/56)

17–.–
(160.8/53) (162.6/48) (164.6/39) (164.9/36) 3.0/14 3.5/13 ?

176.–
(166.6/24) (166.4/40) (166.6/37) 2.9/15 2.9/14

21.5/36 18.6/24 12.0/14 9.5/11 9.7/13 12.0/17 14.2/21 15.0/33

13.9/33 13.2/29 14.0/26 11.4/16 9.2/10 9.4/12 12.1/18 12.3/22 10.1/24 8.4/31

23-68 12/3/23 Final X sec. Jorgenson
clear ☀ Mild Parsons
+S H.I - ℄ Rod Briggs
204.65 Eck.
Elv.

12			8.1	96.6	8.6
B.M.			3.00	201.62	201.62
+42			7.4	97.3	7.3
13			6.6	98.1	6.3
+50			5.8	98.9	5.5
14			4.8	99.9	4.6
+14			4.5	200.2	4.4
15			3.2	01.5	2.9
+79			1.9	2.8	1.7
T.P.	7.10	210.06 ✓	1.69	202.96 ✓	
16			7.1	203.0	6.9
+40			6.8	03.3	6.4
17			5.9	4.2	5.8
+50			5.6	4.5	5.6

Lt. 2 Rt

6.4	5.4	9.3	9.1	8.1	7.9	8.9	8.8	0.0	+5.2	+5.2
33	24	21	16	12	12	15	18	26	32	32

Top of fence post Lt sta 12+35

7.7	6.5	8.7	8.4	7.6	7.4	8.9	8.5	0.0	+4.3
30	26	23	14	12	11	15	18	27	32

0.0	+0.2	7.8	7.8	6.3	6.5	7.3	7.5	0.0	+2.1
30	28	21	15	12	13	15	20	29	31

+3.6	0.0	6.9	6.8	5.5	5.6	6.9	7.3	0.0	+2.6
31	27	19	15	12	13	16	20	28	31

+5.7	0.0	6.1	6.1	4.5	4.7	5.9	6.0	0.0	+3.0
33	27	20	15	11	12	15	21	28	30

+6.1	0.0	6.0	6.0	4.5	4.6	5.5	6.0	0.0	+3.8
33	26	19	14	11	13	15	21	28	31

+8.8	0.0	4.9	4.8	3.2	3.2	4.1	4.5	0.0	+4.0
35	25	19	15	11	13	18	23	28	32

+7.0	3.4	3.3	2.1	2.0	3.6	3.7	0.0	+3.7
28	20	14	11	12	17	22	27	31

3.9	8.7	8.4	7.1	7.3	8.5	9.2	1.6
25	21	15	12	12	15	21	31

10.2	9.3	10.0	8.7	6.6	6.9	8.4	8.4	1.7
27	24	23	16	11	13	18	21	29

13.4	12.1	6.0	5.7	7.2	7.2	5.0	4.6
28	24	13	13	17	21	24	28

15.9	12.0	5.7	5.6	6.8	6.9	6.1
29	24	14	14	20	25	28

Note. Readings on top of bank mark at check 40 to C.L. Water marks on stakes

23-68	+S	H.I 210.06	-S.	E/V.	
18			5.4	4.7	5.3
18+18	Cul v.				
+44			5.2	4.9	5.3
19			5.1	5.0	5.1
+50			5.4	4.7	5.4
20			5.5	4.6	5.5
21			6.2	3.9	6.3
+50			6.6	3.5	6.8
22			7.3	2.8	7.3
+50			7.8	2.3	7.8
23			8.0	2.1	8.3
23+50			8.4	1.7	8.8
24			9.0	1.1	9.3
B.M.				209.17	

Lt & Rt.

16.5	12.0	5.5		5.4	7.5	10.1	10.0		
32	25	14		14	23	36	42		
193.0				Inv 196.3					
Inv.									
17.7	12.0	5.2		5.5	6.7	9.0			
30	21	13		13	26	35			
9.3	7.8	5.1		5.0	6.7	6.7	1.5		
27	19	13		14	18	23	29		
2.0	1.5	7.3	7.0	5.6	5.5	7.0	7.4	0.0	+3.8
31	27	19	15	12	12	16	21	29	33
+5.8	0.0	7.6	7.4	5.4	5.7	8.0	8.0	0.0	+7.1
34	28	19	15	12	11	15	20	29	37
+13.1	0.0	7.7	7.1	6.1	6.2	8.1	8.6	0.0	+10.6
42	29	19	14	11	11	14	19	28	39
+12.0	0.0	8.0	8.0	6.6	6.6	8.7	8.8	0.0	+8.6
41.	29	19	15	11	10	14	19	28	37.5
+9.6	0.0	8.7	8.4	7.1	7.1	8.7	9.0	0.0	+5.5
39	29	19	15	12	10	14	18	29	34.5
+7.2	0.0	9.5	9.4	7.9	7.9	9.1	9.4	0.0+	3.6
37.5	31	20	16	12	12	14	19	30	34
+5.5	0.0	10.2	10.0	8.2	8.2	9.3	9.5	0.0	+2.7
36	31	19	15	11	12	15	20	30	33
5.7	0.0	10.5	10.4	8.7	8.3	9.9	10.0	+0.1	
35	30	19	15	11	12	16	20	31	
+11.1	10.9	10.7	9.2		9.3	10.6	10.6	3.0	
32.5	20	15	11		12	16	20	28	

Spike in T.P. Rt. Stg. 23+90

		210.06			
T.P.	8.81	210.39 ✓	8.48	201.58 ✓	
B.M			1.20	209.19	209.17
~~24+50~~					
T.P.	0.16	201.74 ✓	8.81	201.58 ✓	
24+50			1.5	200.2	1.4
25			2.0	199.7	1.9
26			2.3	99.4	2.9
27			3.7	98.0	3.9
28			4.8	96.9	4.9
29			5.6	96.1	5.9
30			6.1	95.6	7.7
31			6.5	95.2	7.0
32			6.8	94.9	7.1
33			7.0	94.7	7.8
34			8.8	92.9	9.7

~~+2.4~~ 0.0 3.4 3.0 1.6 / 28 25 20 15 12

1.5 2.9 2.6 0.0 +1.8 / 13 17 23 26 28

1.2 0.9 4.0 3.6 2.0 / 27 23 20 16 11

2.1 3.7 3.6 1.1 1.7 / 12 17 21 23 26

4.9 5.0 2.4 / 24 20 15

2.5 4.7 4.9 4.0 4.1 / 12 16 20 21 24

7.2 6.7 3.4 / 26 18 14

3.7 6.4 6.2 / 13 19 24

9.3 9.0 4.5 / 27 20 14

4.8 8.7 8.7 / 12 19 22

9.2 8.9 5.5 / 28 19 14

5.7 6.7 8.7 / 13 19 22

9.2 8.7 9.5 9.4 6.1 / 28 22 20 17 12

6.0 8.4 8.7 8.0 / 12 18 21 22

8.6 8.3 9.5 9.5 6.4 / 28 21 19 16 12

6.7 8.7 8.8 8.0 / 12 16 20 21

8.2 7.9 9.0 9.0 6.8 / 29 21 19 15 11

7.0 8.4 8.4 8.4 / 12 17 20 21

6.9 6.8 9.7 9.6 7.1 / 28 24 20 16 11

7.3 9.3 8.7 / 14 18 21

6.7 6.1 10.7 9.8 8.8 / 30 26 21 14 12

9.0 10.7 10.9 / 15 18 23

	+S	H.I 201.74	−S to Rod	Elv.	
T.P.	1.65	194.47 ✓	8.92	192.82 ✓	
35			3.7	90.8	5.0
+50			4.7	89.8	6.2
36			5.6	88.9	7.5
Cut on at +39-Lt.					
+50			6.9	87.6	8.7
37			8.2	86.3	9.7
T.P.	1.86	187.63 ✓	8.70	185.77 ✓	
B.M.			10.90	76.73	176.7
+27			1.9	85.7	3.4
38			3.0	84.6	4.3
+14					
39			4.8	82.8	5.3
T.P.	End Das Work.		7.84	179.79 ✓	
+50	9.95	189.74 ✓	7.1	82.6	7.6
40			7.3	82.4	7.7
+62			6.9	82.8	7.5
41			7.0	82.7	7.1
End Cut Lt +59					

Lt ← Rt

+3.2	0.0	5.6	4.9	3.7		3.8		7.6	8.0				
31	28	23	15	12		15		20	25				
+1.2	0.0	7.0	6.8	4.6		5.7		10.5	17.6				
31	30	22	16	13		18		26	34				
1.9	5.6	9.4	9.3	5.6		5.8		12.0	15.3				
30	26	22	18	12		19		27	32				
12.9	12.8	7.2				6.8		12.0	16.8				
28	24	15				21		28	34				
18.6	12.0	8.3				8.1		12.0	20.0				
30	20	15				22		27	38				

Fence Post Top.

15.3	12.0	2.0				1.9		12.0	15.8				
39	29	16				21		34	40				
18.4	12.0	2.9				3.1		12.9	17.4				
42	29	17				17		30	41				

18.6
Inv 169.0 Inv. Rt. 18.0

17.0	12.0	4.9				4.7		12.6					
32	25	14				15		27					

F. Post Lt. Sta. 39+60

		4.6	7.4			6.9		11.9	11.4				
		26	14			14		20	28				
8.8	8.8	9.6	7.5			7.5		8.2	9.6	3.5			
24	21	19	12			12		15	19	26			
+3.9	0.0	8.5	8.4	6.9		7.0		8.7	8.9	0.0	+5.4		
30	26	18	15	12		12		15	18	28	32		
+1.6	0.0	8.5	8.2	7.1		7.0		8.5	9.0	0.0	+7.8		
30	28	17	15	12		12		16	20	29	34		

12/4/23

23-68	+S	H.I. 189.74	−S ℄ Rod.	Elv.	
+75			6.0	83.7	5.8
42			5.2	84.5	5.2
+86	Cut.				
43			0.9	88.8	4.1
B.M.			8.88	180.86	180.9
T.P.	10.82	200.21 ✓	0.35	189.39 ✓	
+66			8.3	91.9	9.9
44			7.0	93.2	8.2
+50	start cut Rt.		5.2	95.0	5.7
+79	start cut Lt.				
45			2.7	97.5	3.2
T.P.	11.16	210.94 ✓	0.43	199.78 ✓	
+73			10.1	200.8	10.2
46			8.9	02.0	8.9
47			4.7	06.2	4.1
T.P.	8.65	216.67 ✓	2.92	208.02 ✓	
+50			4.7	08.0	8.2
48			7.4	9 B	6.3

Clear & Mild.

Jorgenson
Persons
Briggs
Eck.

17.1 / 30	12.0 / 21	6.9 / 13	5.9 / 12	7.3 / 17	7.5 / 20	0.0 / 28	+0.3 / 30	
21.4 / 38	12.0 / 25	5.0 / 15	5.3 / 16	11.9 / 26				
Ent. 26.0		16.3.7	18.6	Ent Cult 17				
27.2 / 43	23.5 / 49	12.0 / 31	8.8 / 16	0.6 / 16	12.0 / 32	17.0 / 39		
Sp. white birch Area PA 43 x 10								
31.8 / 54	29.4 / 46	23.8 / 37	12.0 / 21	8.7 / 17	8.3 / 15	12.0 / 20	21.5 / 33	
28.4 / 53	27.3 / 47	22.7 / 39	12.0 / 25	7.1 / 18	7.2 / 15	12.0 / 21	17.2 / 29	
		14.5 / 32	12.0 / 28	5.1 / 17	5.3 / 14	7.6 / 21	7.9 / 27	
0.8 / 32	0.8 / 26	4.3 / 22	4.0 / 18	2.3 / 15	3.6 / 13	4.1 / 17	4.6 / 20	0.9 / 25	+4.5 / 30
+4.7 / 38	0.0 / 32	11.4 / 20	11.1 / 16	10.0 / 14	10.0 / 13	11.2 / 15	11.7 / 20	3.0 / 29	+3.3 / 33.5
+8.8 / 38.5	0.0 / 31.5	10.3 / 20	10.7 / 16	9.0 / 13	8.6 / 12	10.0 / 14	10.3 / 19	4.0 / 31	+1.8 / 32
+4.7 / 36	0.0 / 27.5	6.4 / 20	6.9 / 15	4.3 / 13	4.8 / 12	6.5 / 14	6.5 / 19	0.0 / 25	+4.8 / 30
+2.6 / 32.5	0.0 / 31	9.3 / 18	9.7 / 16	8.4 / 12	8.9 / 12	9.9 / 14	10.3 / 19	7.6 / 29	
+2.5 / 27	0.0 / 25	9.3 / 17	8.3 / 14	7.0 / 12	7.0 / 12	8.3 / 14	9.1 / 19	2.0 / 29	

	+S	H.I. 216.67	-S	Elv.	
+50			6.2	10.5	5.3
49			5.3	11.4	4.6
+12			5.0	11.7	
+16			5.0	11.7	
+50			4.7	12.0	4.3
50					
B.M.			2.15	214.52	214.54
50			4.2	12.5	4.1
+22			3.8	12.9	4.0
+26	Culv.				
+65	Culv.				

Lt ℄ Rt

+1.7 / 28 | 0.0 / 26 | 7.8 / 17 | 7.8 / 14 | 6.1 / 11

6.1 / 11 | 7.8 / 15 | 8.0 / 19 | 0.0 / 28 | +2.5 / 30

+2.0 / 28 | 5.0 / 25.5 | 6.5 / 17 | 6.3 / 13 | 5.2 / 11

5.1 / 12 | 6.7 / 15 | 7.0 / 19 | 0.0 / 27 | +4.1 / 32

+0.7 / 57 | +1.7 / 38 | +1.9 / 28 | 0.0 / 25 | 5.8 / 16 | 5.9 / 14 | 5.1 / 11

5.1 / 12 | 6.7 / 15 | 7.0 / 19 | 0.0 / 27 | +3.4 / 31

1.5 / 60 | 4.1 / 24 | 5.8 / 14 | 5.0 / 11

5.4 / 12 | 6.7 / 16 | 6.9 / 19 | 0.0 / 27 | +3.2 / 30.5

3.0 / 33 | 3.1 / 20 | 4.5 / 17 | 4.6 / 12

4.6 / 13 | 6.0 / 16 | 6.3 / 20 | 0.0 / 27 | +0.4 / 28

Sp. in S. W. T. P. Cor. McMenamy Farm

8.6 / 32 | 8.3 / 29 | 6.8 / 25 | 3.6 / 21

4.0 / 19 | 5.5 / 17 | 5.8 / 22 | 2.4 / 23 | 2.5 / 28

7.8 / 29 | 5.8 / 22 | 3.5 / 16

3.8 / 16 | 3.6 / 19 | 5.5 / 21 | 5.6 / 26 | 3.6 / 27 | 3.3 / 29

Inv. 6.2

5.4

Inv.

7.2 Inv. 209.4

5.9

Inv. 210.8

12/4/23 Topog. (Jorgenson Persons Bridges Eck.

23-68

13

11+20 start B/w Fence Lt.

8+90 Culv. 3' x 129' P3 ✓

8+52 T.P.

9+79 End over head Xing.

8+73 start over head Xing

+90 Culv. 24" x 88' P3 ✓

6+74 T.P.

5+27 Barn

5+06 T.P.

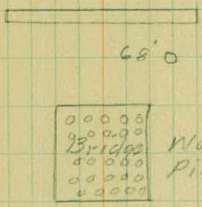
4+00 mail box

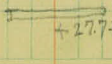
3+33 T.P.

+59 T.P.

0+21 Culv. 15" x 40' P1 Culv. ✓


36'
39'


69'
Bridge
Wooden Pile 5 sets
Piling 5 Piles across
30'
30'
18'
32'
Bent
30'
29'
22'
29' T.P.
T.P
29'


+27.70 Mail Box
+28

41

40

39

38+13 Culv. 24" x 72' P.3 ✓

38

37+30 start Fence Lt.

25+82 ℄ F.E Culv. 15" x 25' P.1. ✓

24+20 ℄ Cortland Culv. 18" x 30' P.1. ✓

24 End Fence Rt -

23+96 T.P.

20+25 End B/W Fence Lt.

20

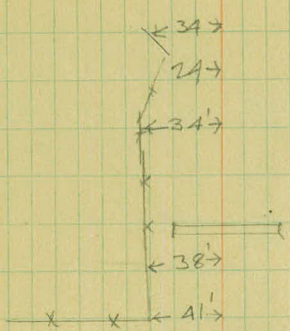
19.

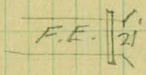
18+18 Culv. 24" x 56' P.3 ✓

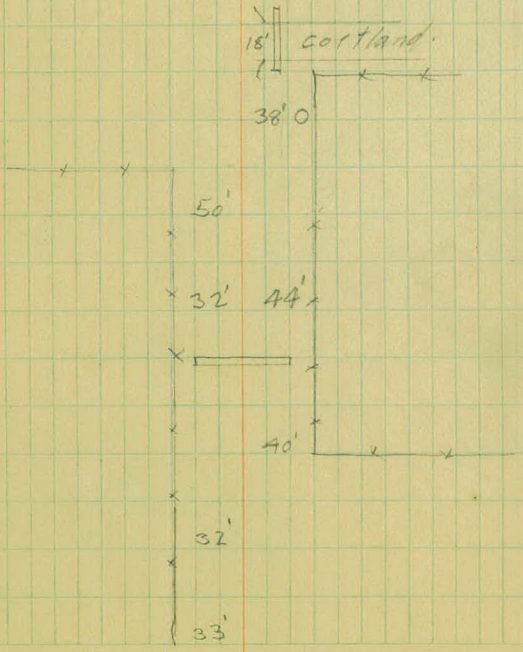
17+15 start Fence Rt. B/W.

16+00

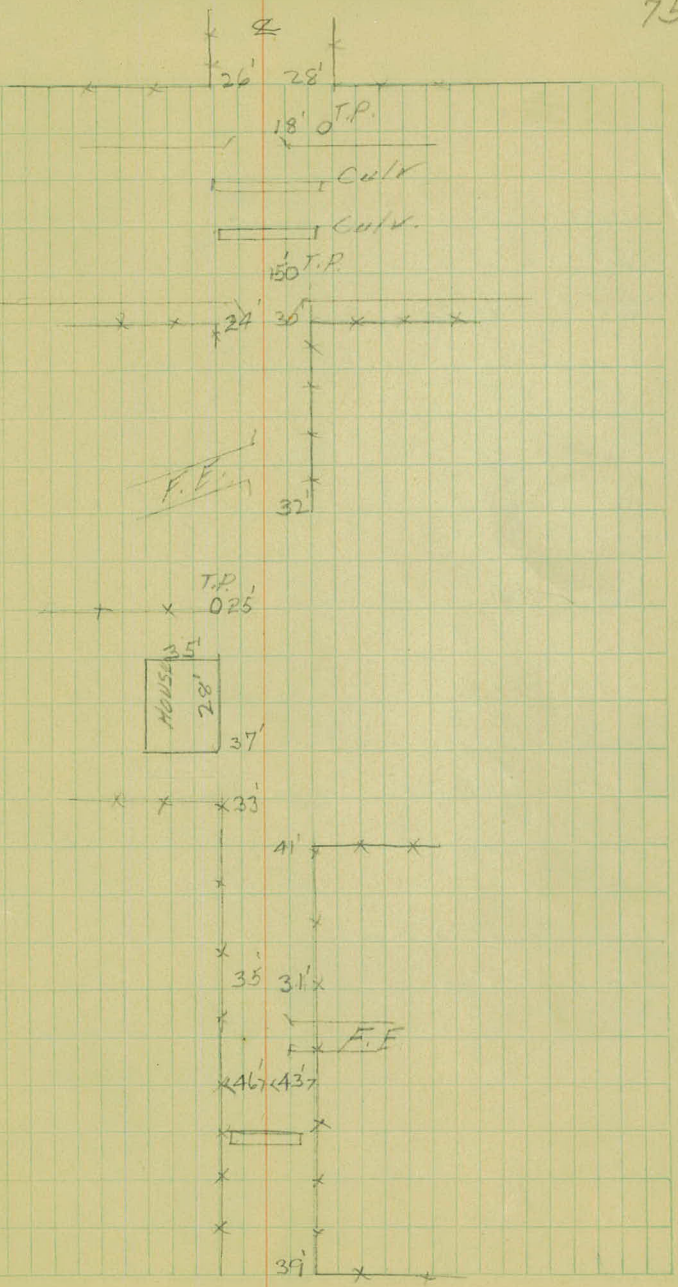
14+00


34'
24'
34'
38'
41'


F.E.
21'


18'
Cortland
38' 0
50'
32'
44'
40'
32'
33'

+74	Fence Rt & Lt.	
+68	T.P.	
50+65	Culv.	18" X 35' P.1
50+25	Culv.	18" X 40' P.1
+28	T.P.	
50+15	X Fence	
49+46	℄ F.E.	
49+00	start Fence Rt.	
48+28	T.P. & Fence	
47+77	Edge House	
47+65	End Fence Lt.	
45+73	End Fence Rt.	
45		
44+59	F.E. Rt.	
42+83	Culv.	24" X 88' P.3
41+48	Fence Rt	


℄
26'
28'
18'
T.P.
Curb
Curb
150'
T.P.
24'
30'
F.E.
32'
T.P.
25'
35'
HOUSE
28'
37'
33'
41'
35'
31'
F.F
46'
43'
39'

61+77 T.P.
61+02 start Fence Rt
60+50 T.P.
60+29 Fence Lt.
59+23 T.P.

58+35 End Fence Rt
57+90 T.P. Lt.

56+61 T.P.

55+26 T.P.

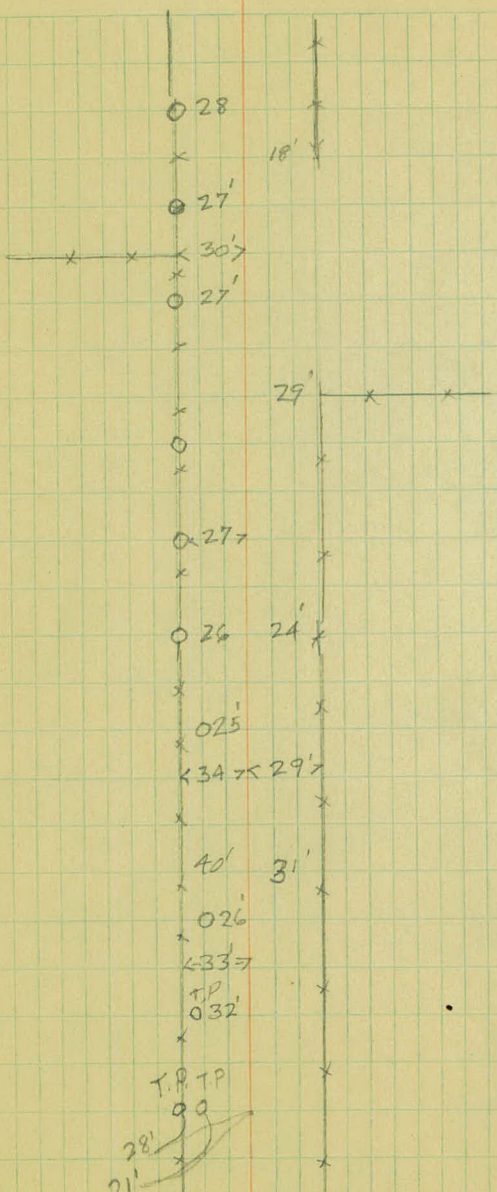
+10 T.P.
54

53
52+79 T.P.

+76 T.P.

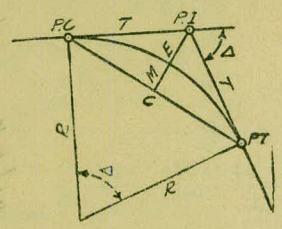
51 T.P's, Lt.
51

continued ~~to~~ page 42



	+	H.I.	−	Elev	Grade
BM1	2.23	211.80			209.57
TP1	10.09	220.99	0.90	210.90	
TP2	5.26	225.48	0.77	220.22	
BM2			11.35	214.13	
		226.14			
TP3	6.30	224.49	11.95	218.19	
BM3					216.44

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=R tan $\frac{\Delta}{2}$ (3) Length of Curve=L=100$\frac{\Delta}{D}$ (4)

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

External=E=T tan $\frac{\Delta}{4}$ (7) =R÷cos. $\frac{\Delta}{2}$—R (8)=R exsec $\frac{\Delta}{2}$ (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 $(54.50\div100)^2$=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2\div(2\times688.26)$=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	9	637.28	1.965	7.846	2.70
40	3437.87	.364	1.454	0.50	20	614.56	2.037	8.136	2.80
50	3125.36	.400	1.600	0.55	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	10	573.69	2.183	8.716	3.00
20	2455.70	.509	2.036	0.70	30	546.44	2.292	9.150	3.15
30	2292.01	.545	2.181	0.75	11	521.67	2.402	9.585	3.30
40	2148.79	.582	2.327	0.80	30	499.06	2.511	10.02	3.45
50	2022.41	.618	2.472	0.85	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	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

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

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

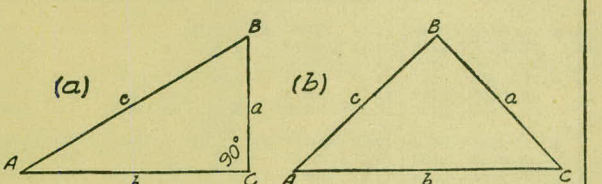
cos. $A=\frac{b}{c}$

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

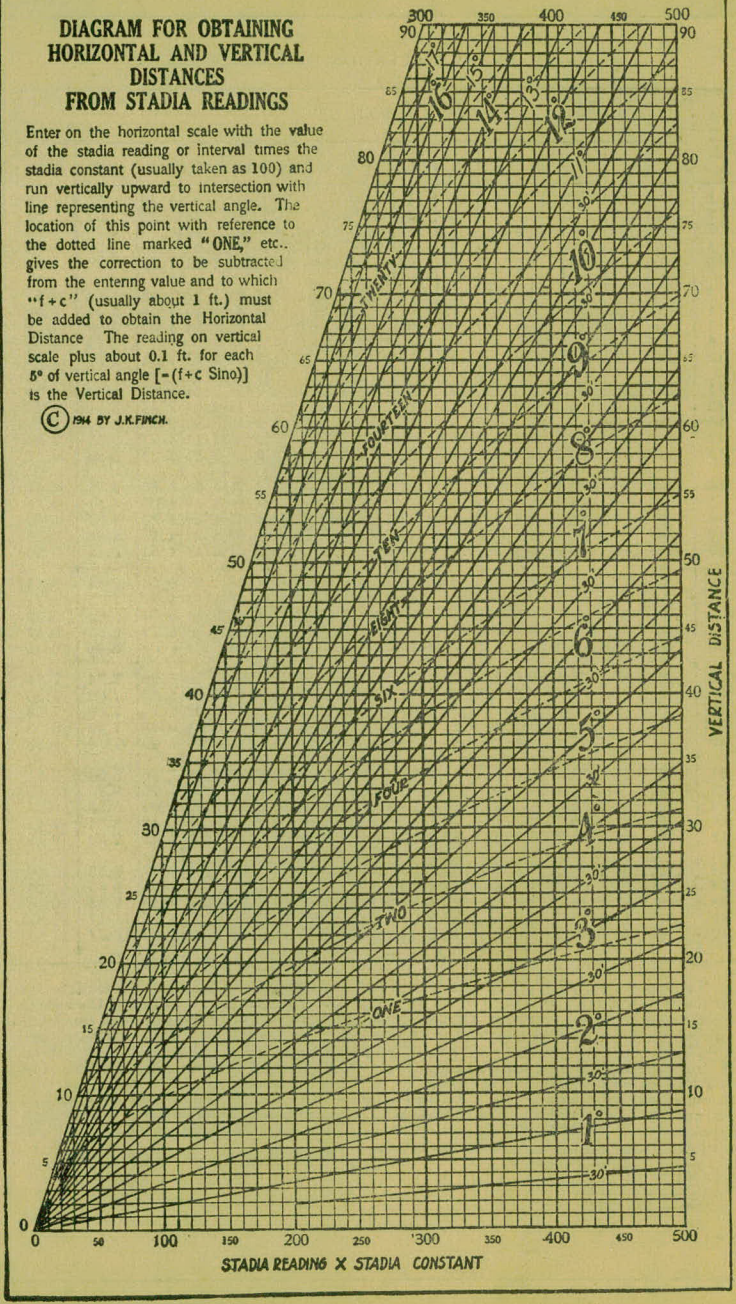
Table IX.—Calculation of Earthwork.

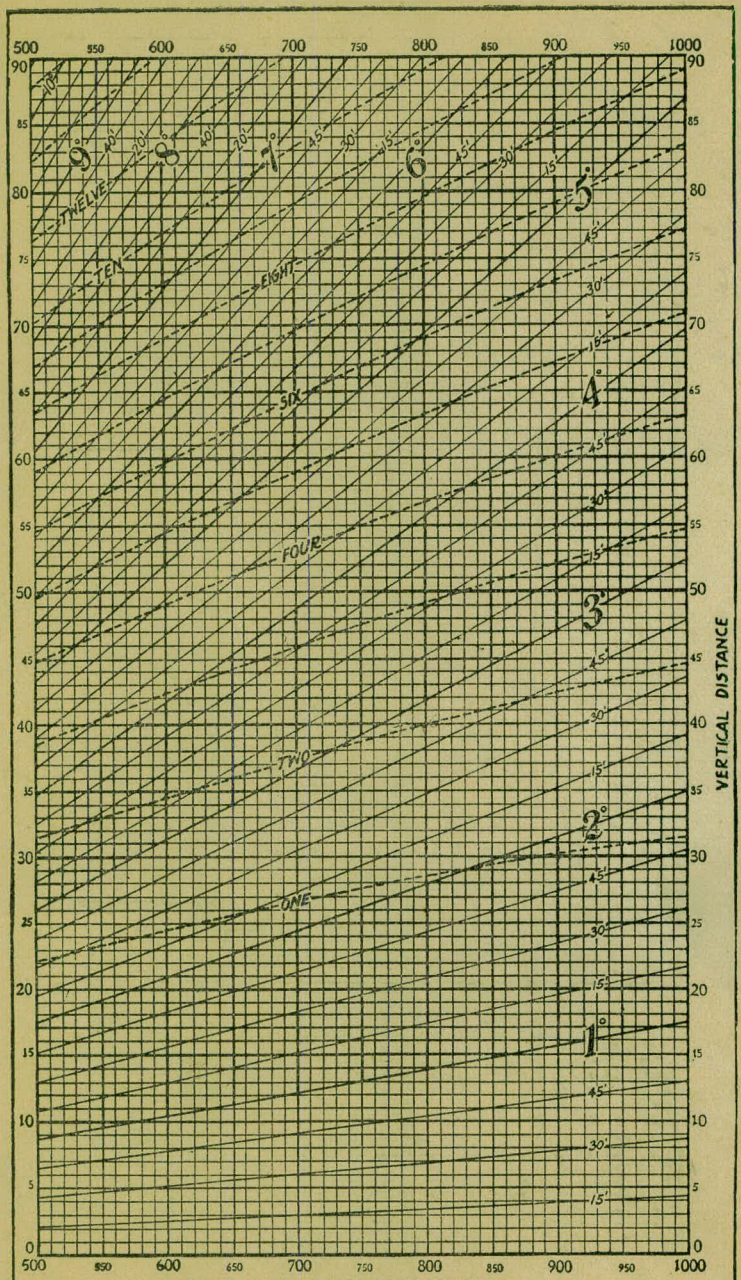
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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 entering 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.

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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° 40' 20'
8° 40' 20'
7° 45' 30' 15'
6° 45' 30' 15'
5° 45' 30' 15'
4° 45' 30' 15'
3° 45' 30' 15'
2° 45' 30' 15'
1° 45' 30' 15'
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT

8A-6

167.58
10.30
177.88
0.06
177.82
11.55
189.37
0.55
188.82
14.50
200.32
7.45
192.87

200.32
3.33
196.99
7.57
204.56

207.52
3.60
211.12
13.20
197.92

226.83
4.95
231.78
12.00
219.78

7.2
.15
360
72
1.080

6
2|7.2
3.6
3
10.8
14.
6.8

87.6
63.9
23.7

6.4
.15
320
64
.960

2|6.8
3.4
3
10.2
14
24.2

.13
204
68
.884

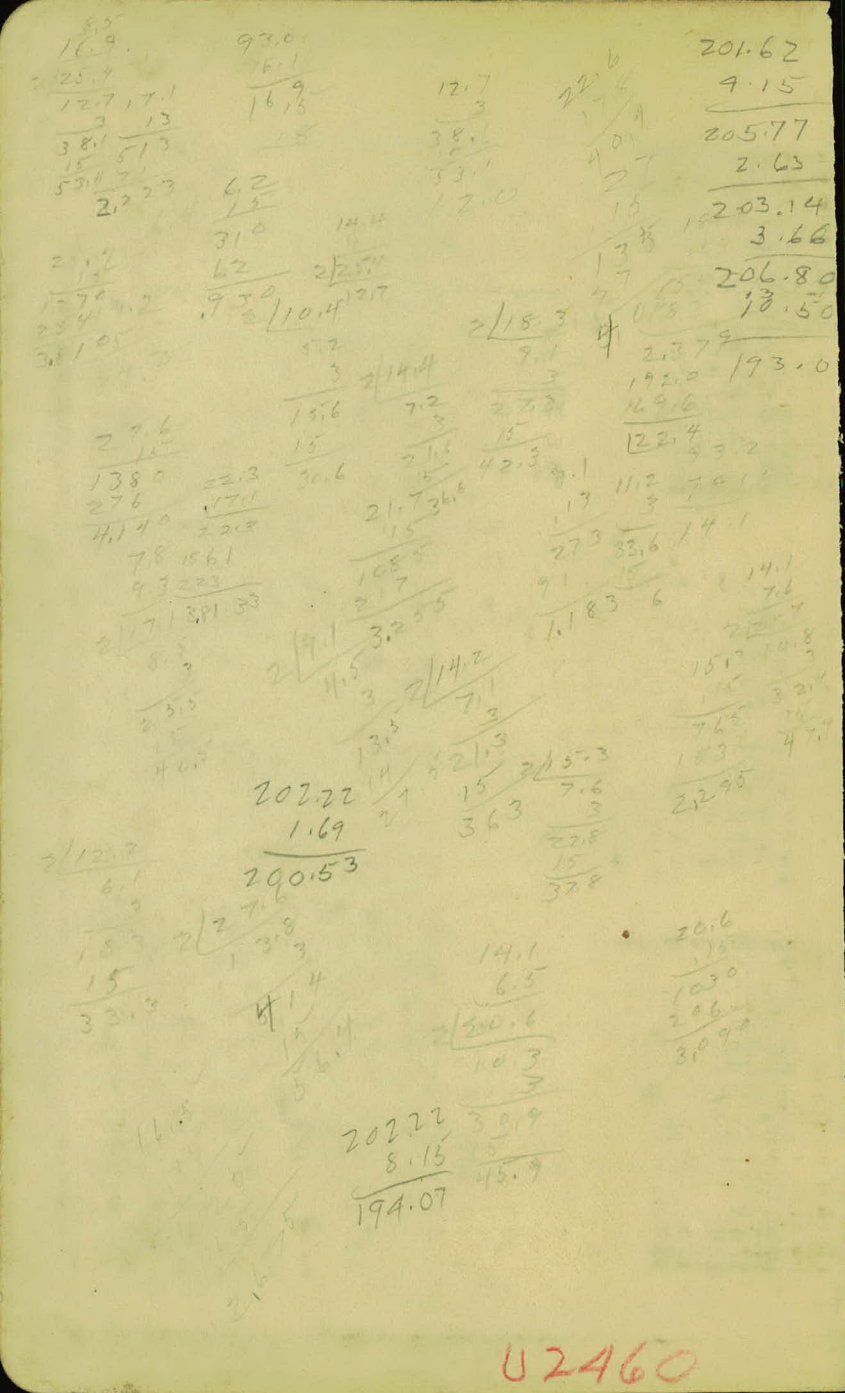
70.
69

5.7
6.1
2|11.8
5.9
3
17.7
15
32.7

11.8
.15
590
118
1.770

1.8

Blue tops sta -19-17-Fu+
sta -24 - 32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203.14
3.66
206.80
13.50
193.0
202.22
1.69
200.53
202.22
8.15
194.07

U2460

1st day — Nov. 26, 1923

Proj. 23-68

1	2	3	4	5	7	10	11	15
5.06	4.64	4.89	4.80	4.44	4.22	4.64	4.64	4.64
10	11	12	5	11	12	10	12	7
50.6	51.04	58.68	24.0	48.84	50.64	46.4	55.68	32.48

1	2	3	4	5	6	7	9	10	11	15	16
4.80	7.33	5.62	4.80	4.88	4.95	4.85	4.95	6.96	7.09	4.80	5.21
29	50	56	26	48	3	43	1	50	53	46	26
139.2	366.5	314.72	124.8	234.24	14.85	208.55	4.95	348.0	375.77	220.8	135.46

Rec. 4 & 5

1
6.07
24
145.68

Total- 3051.88 ✓

3052

Continuing Proj. 23-68 12-6-23

Furnish & Load	—	3052	C.Y.	@	0.90	=	2746.80 ✓
Haul to Mile Point	—	3052	C.Y.	@	0.22	=	671.44 ✓
Haul beyond Mile Point	—	10682	C.Y.M.	@	0.22	=	2350.04 ✓
Shaping & Compacting-Man Hrs.		62	Man hrs.	@	0.54	=	31.00 ✓
" " Main Terrace	—	72	" "	@	1.00	=	72.00 ✓
							5871.28
							(5208.28)
							663.00

Furnish & Load	(2794.50)	-47.70 ✓
Haul to Mile Point	(683.10)	-11.66
Haul beyond Mile Point	(1175.68)	+1174.36
Shaping & Compacting-Man Hrs.	(98.00)	-67.00
" " Main Terrace	(457.00)	-385.00
	(5208.28)	-511.36

+1174.36

+1174.36

3052

3.5

15260

9156

10682.0

+1174.36

-511.36

+663.00

3105

3052

53

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.

For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	25.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9 + (20—16) ÷ 2 or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.

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