ENGINEERS' FIELD BOOK No. 10403

Pholen Blvd
6" "23-69"

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from Center of Roadway for Cross-Sectioning

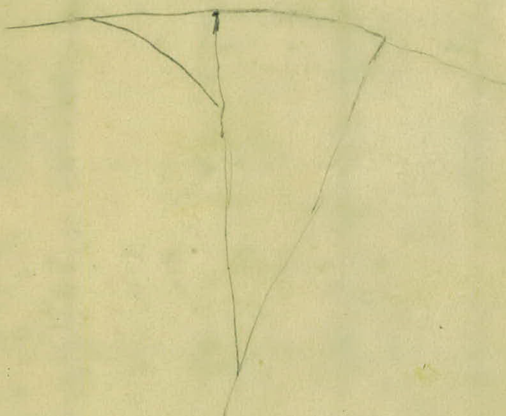
Roadway 16 feet wide. Side Slopes 1 on 1.

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.

111° – 22
5, 2



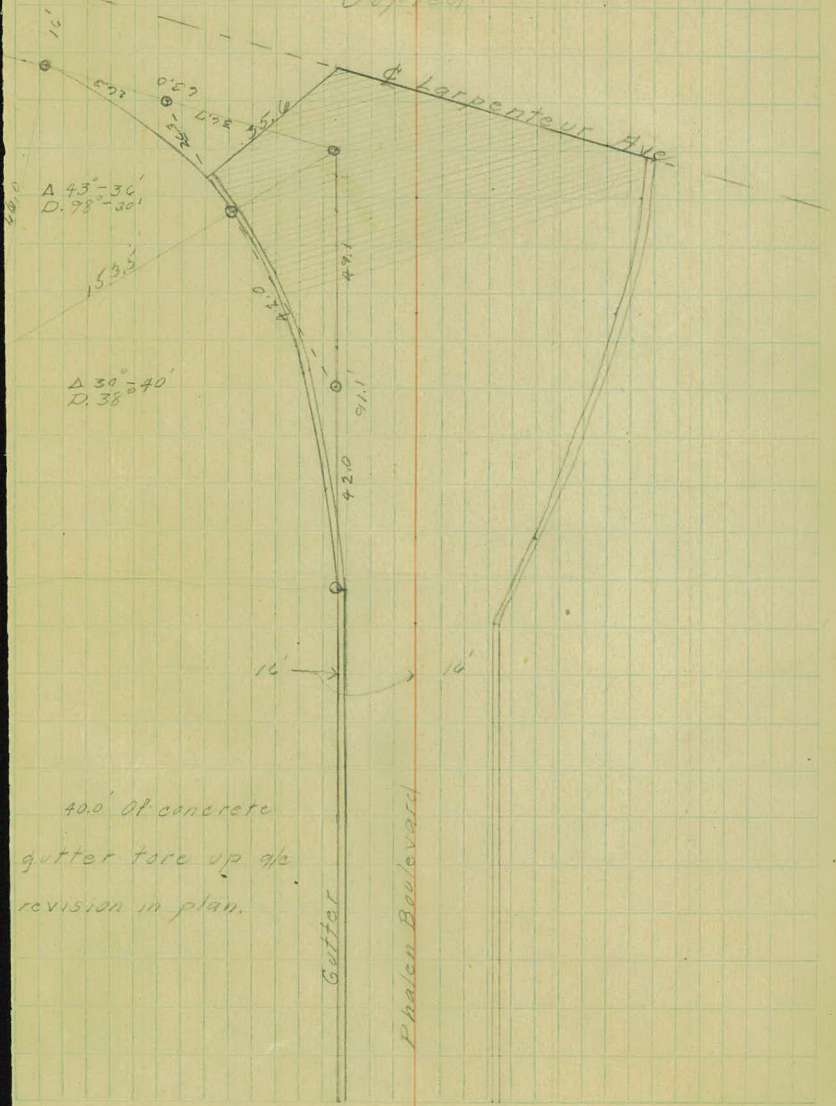
Index

Final Topography & Gutter Dimensions 35

Dist.	Defl.	Dist. along S. Tan.	Tangent Offset
2.9	0°-33'	2.89	0.03
8.0	2°-04'	10.89	0.39
8.0	3°-35'	18.86	1.18
8.0	5°-07'	26.69	2.39
8.0	6°-35'	34.47	3.98
8.0	8°-05'	42.18	5.99
8.0	9°-36'	49.79	8.42
8.0	11°-06'	57.30	11.24
8.0	12°-37'	64.80	14.50
8.0	14°-08'	72.15	18.17
6.5	15°-23'	78.00	21.46
		79.00	22.00
		85.40	26.90

Sketch showing how gutter was laid out on the left at End of Proj. L. Line

Copied



40.0' of concrete gutter tore up a/c revision in plan.

23-69

Sta.	Desc.	Defl. Angle Lt	Rt.
8+27.6	P.T.		
7+32.3	P.I.		
6+31.8	P.C.		
3+52.1	P.T.		
2+76.5	P.I.		23°15'
1+97.1	P.C.		
1+94.5	End Present Pav'm't Begin Project		
0+00			

Party { Deutsche, Johnson, Mahoney, Franke }

10-5-23 Cool Fair L-13

℄

L R

L. Line

Sta.	Defl.	Corr'd Dist
6 + 50	1° 22'	18.24
+ 75	3°-14½'	43.24'
7 + 00	5° 07'	68.29'
+ 25		
+ 50		
+ 75		
8 + 00		
+ 25		
+ 27.9		

Δ = 29° 22'
D = 15° 00
T = 100.4
L = 195.8'

Nail 16" Oak 52.3
RR Sp. in Rd.
Nail 12" Oak 86.1

Sp. in Rd.

Nail Oak 18" 30.3
RR Sp. Road.
Nail 14" Oak 31.25

Δ = 23° 15'
D = 15° 00' R
T = 78.8'
L = 155.0

Sta.	Defl.	Dist
		2.3
2 + 00	0°-10'.35	
+ 25	2° 03'	25.07
+ 50	3° 55'	50.1
+ 75	5° 48'	25.07
3 + 00	7° 40'	50.1
+ 25	9° 33'	25.07
+ 52.7	11° 37'	27.78

Pt. in conc base 25.95

Nail T.P. 25.3

Nail 12" Oak 32.5

23-69 Blue Tops for Conc. Gutter

Sta.	+S	H.I.	−S	Profile Gr. Plus .075 See P. 12 of 13 of Plans	Grade Rod. 19' L & R *=Except as
B.M.	11.44	182.72		171.28	
T.P.	2.71	173.69	11.74.	170.98	
B.M.			0.56	173.13	
T.P.	4.86	173.70	4.85	168.84	
			3.90	169.80	= Elev
			4.05	169.65	"
1+94.5				L 169.80	3.90
				R 169.65	4.05
				L 169.80	3.90
2+00				R 169.65	4.05
				L 169.59	4.11
2+25				R 169.52	4.18
2+50				169.39	4.31

VOID A/C Revision M

T.P.	4.72	173.56		168.84	
1+94.5				L 169.80	3.76 ✓
				R 169.65	3.91 ✓
2+00				L 169.70	3.86 ✓
				R 169.56	4.00 ✓
2+25				L 169.44	4.12 ✓
				R 169.37	4.19 ✓
2+50				L 169.34	4.22 ✓
				R 169.34	4.22 ✓
2+10.5	Std. Std. Co. Gutter Sec.			L 169.59	3.97 ✓
				R 169.49	4.07 ✓
2+75				168.53 − 69.75 = 69.28	4.28 ✓
3+00				168.53 − 69.75 = 169.25	4.31 ✓
3+25				168.52 − 69.75 = 69.27	4.29 ✓
3+50				68.55 − 69.75 = 69.30	4.26 ✓
+75				68.57 − 69.75 = 69.32	4.24 ✓
T.P.			4.72	168.84 ✓	

Carried on Page 4

Party { Doutsche / Johnson / Mahoney / Franks }
noted

10-4-23 2
Cool Fair

℄
L R

L. Line

Sp. 6" Elm 29'R Sta. 13+45

Sp. Tree 10" Oak 50'L Sta. 9+00

R.R. Sp. Tel. Pl. 50'R Sta 10+15

Sp. Tel pl. 15'R Sta. 3+70

of top of curb 17'L of Sta. 12+4^5 (New line)

" " " " 17'R " " " (" ")

Top of curb to surface of pavement = 0.5' (R.J.W. to R.E.D.) (Top of curb 0.5' Top of surface ℄)

169.80 − 0.5 = 169.30 Lt 17' = 169.15 − 17 Rt = Elev. of paving surface (169.65 − 0.5)

169.22 + (5") 0.42 = 169.64 = Elev " " @ crown pt. or ℄

Profile grade @ 2+50 = 168.64 + 0.75 = 169.39

169.80 − 169.39 = .41 / 2 = .20

169.65 − 169.39 = .26 / 2 = .13

VOID DATE – REVISION IN PB 499

Sp. Tel. Pl. 15'R Sta. 3+70

Dist L & R to Stk	Dist to Edge Pav'g L & R	Elev. L	Elev. R	Rod L	Rod R
20.46					
20.31	16.10	169.28	169.14	4.28	4.42
19.66	14.41	169.36	169.29	4.20	4.27
19.00	13.75	169.26	169.26	4.30	4.30
20.05	14.80	169.31	169.20	4.25	4.36

3' offset (bracketing the first column)

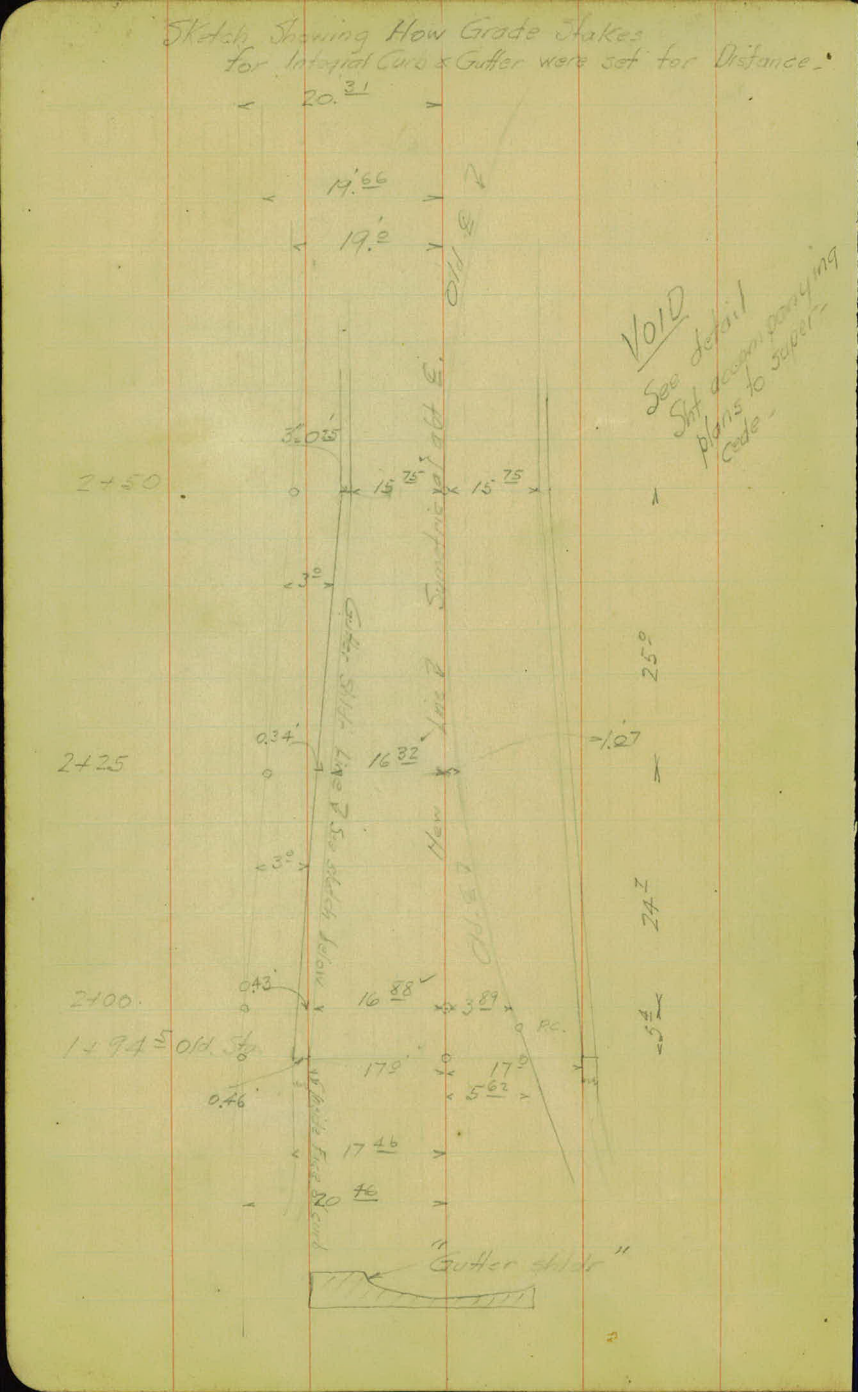
0.0 / 0

0.0 / 0

0.15 / 0

Sp. Tel. pl. 15'R Sta. 3+70 Quit to start other end Project

Sketch Showing How Grade Stakes for Integral Curb & Gutter were set for Distance.



Party { Deyncke / Johnson / Mahoney / Franke }

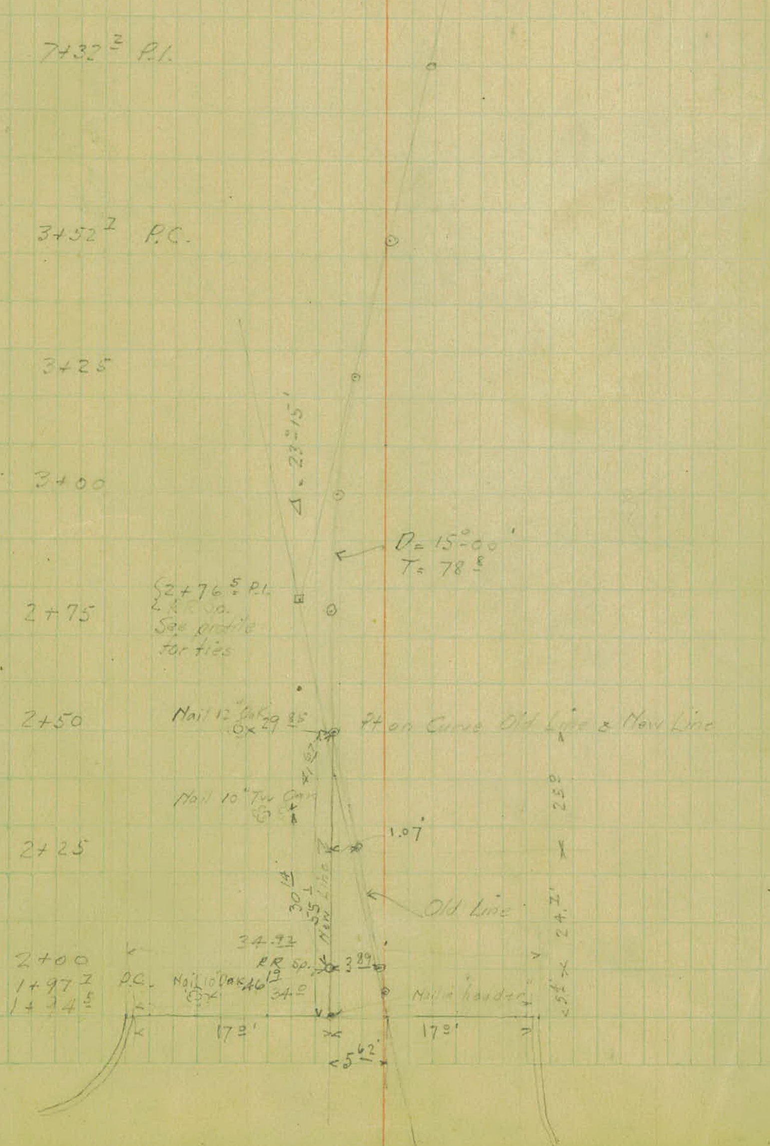
10-4-23
Cool Fair

℄

Lt Rt

L Line

Sketch showing manner of connecting City Paving with Project 23-69



23-69

Contd from Page 2
Blue Tops for Conc. Gutter

Sta.	+ S	H.I.	- S	Profile Grade +0.75 * Except as noted	Grade Rod
		173.56		68.6	
4+00		Contd fr. prec page.			
+ 25				68.62	
+ 50				68.65	
+ 75				68.68	
5+00				68.70	
+ 25				68.72	
+ 50				68.75	
+ 75				68.78	
6+00				68.80	
+ 25				68.82	
+ 50				68.85	
+ 75					
7+00					
+ 25					
+ 50					

Party { Deutsche
Johnson
Mahoney
Franke

10-7-23
Cold Windy

4

L R L. Line

(23-69) Blue Tops for Conc. Gutter

Sta.	+ 5	H.I.	- 5	Profile (old) Grade + 0.75	Grade Rod 19 L & R * Except
B.M.	0.13	194.18 ✓		194.05 ✓	
42+27				189.13 / 75 / 189.88	4.30
42+00				189.1 / 75 / 189.85	4.33
41+50				187.05 / 75 / 89.80	4.38
41+00				189.0 / 75 / 89.75	4.43
40+50				188.95 / 75 / 89.70	4.48
40+00				188.90 / 75 / 89.65	4.53
:		X-Sections 194.18			
42+39.8				189.1	
B.M.			0.13	194.05	
B.M.	0.61	194.66		194.05	
(e) 42+08.6				189.11 / 75 / 189.86	* 4.80
(f) 42+18		L around 25' Rad. at end. See Sketch Page 5a.		189.12 / 75 / 89.87	* 4.79
(g) 42+23.4				189.12 / 75 / 89.87	* 4.79
(h) 42+29.8				189.13 / 75 / 89.88	* 4.78
(F) 41+30		Bot. P.C. of Curve for Park. Area.		89.03 / 75 / 89.78	* 4.81
(K) 42+18		See sketch page 6		By L Reading 189.62	H.E. * 5.04
(J) 41+94.2				189.66	* 5.00
(H) ?				189.71	* 4.95
(G) 41+47.3				189.74	* 4.92
B.M.			0.61	194.05 ✓	

Same party page 4 - as noted.

℄

L R

L. Line

Sp. Lt Pl. 75' L Sta. 42+80

5.1 5.03 — 3.9/50, 4.3/33, 4.4/16, 4.4/8, 4.7/0, 4.9/8, 5.0/16, 5.0/18, 5.0/50 Top bk to Lake

5.1 5.08 — 4.1/50, 4.5/33, 4.[illegible]/16, 4.7/8, 4.8/0, 4.8/8, 5.1/16, 4.7/18, 4.6/33, 5.0/50 Top bk

5.1 5.13 — 4.4/50, 4.6/33, 4.7/16, 4.8/8, 4.8/0, 4.8/8, 4.9/16, 4.9/21, 5.4/33 Top bk

5.2 5.18 — 4.4/50, 4.7/33, 4.9/16, 4.9/8, 5.0/0, 4.8/8, 4.8/16, 5.0/20, 4.7/22, 4.8/27 Top bk

5.2 5.23 — 4.8/50, 4.7/33, 4.8/16, 4.8/8, 4.9/0, 4.8/8, 4.7/16, 5.0/25 Top bk

5.3 5.28 — 5.1/45, 4.8/33, 4.9/16, 4.9/8, 4.9/0, 4.9/8, 4.8/16, 5.0/25 " "

5.1 ℄ Rd. Lt. — 0.6/100, 2.9/70, 3.65/50, 4.8/0, 5.1/14, 4.3/18, 5.6/50, 5.9/57

Sp. Lt. Pl. 75' L Sta. 42+80

Sp Lt Pl. 75' L Sta. 42+80

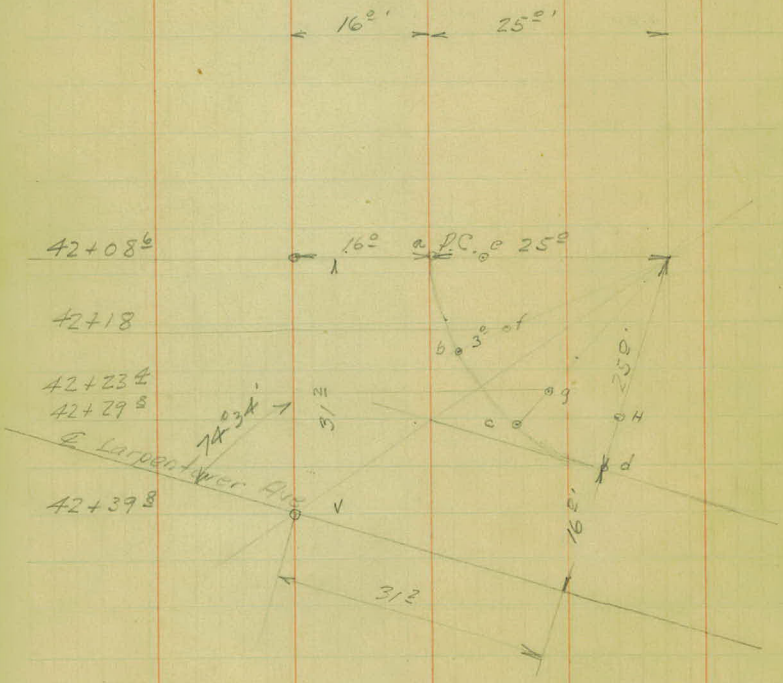
Sp. Lt. Pl. 75' L Sta. 42+80

5a

℄

Lt.

Sketch Showing Manner of Laying Out Radius for Gutter on Left at End of Project 23-69



Party { Deutsche
Johnsen
Mahoney
Franke

10-9-23
Warm Fair

6

Rt. &

L. Line

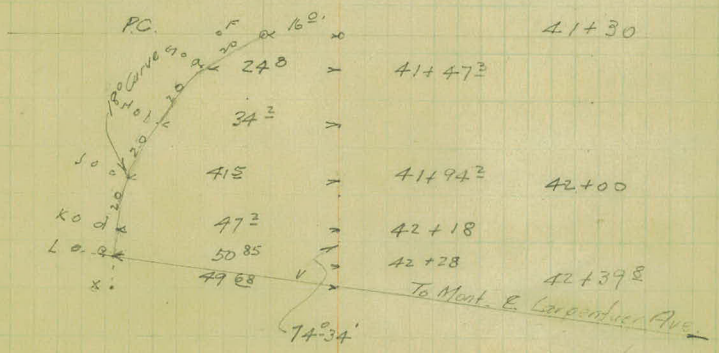
Sketch Showing Manner of Locating Parking Area at End of Project 23-69.

16°

40+00

F, G, H, J, K, L, = 3° from P.C, a, b, c, d, e respectively measured radially. 2 are driven to grade.

41+00



23-69. Blue Tops for Conc. Gutter

Sta.	+S	H.I.	-S	Profile Grade +0.75	Grade Rod.
B.M.	0.08	194.13		194.05	
				88.78 ✓ 75	
39+50				89.53	4.60
				87.90 ✓ 75	
39+00				88.65	5.48
				87.08 ✓ 75	
38+75				87.83	6.30
				86.14 75	
38+50				86.89	7.24
+25				85.18 75	8.20
				85.93	
38+00				84.21 75	9.17
				84.96	
+75				83.25 75	10.13
				82.29 75	
T.P. +50	2.53	185.57	11.09	83.04	11.09
				81.33 75	
+25				82.08	3.49
				80.37 75	
37+00				81.12	4.45
				79.41 75	
+75				80.16	5.41
				78.45 75	
+50				79.20	
				77.49 75	
+25				78.24	
				76.53 75	
36+00				77.28	
				75.45	
+75					
				74.97	
+50					
				74.55	
+25					
T.P.			2.53	74.31	
35+00					
				74.23	
+75					

Deutsche
Johnson
Mahoney
Franke

℄

10-10-23
Warm Fair

I

L R.

Sp. Tel. Pl. 75'L Sta. 42+80 L. Line

Top stk 19'L Sta. 37+50
(Stk marked. Grade 2° up.)

(" " " 2° up.)

To Suit

23-69. Data for use in revising grades.

Sta.		H.I. 194.13		E Elev.
			See page 7	
39+50				88.9
39				88.3
+75				87.9
+50				87.0
+25				85.9
38				84.7
+75				83.5
37 +50	BK.	185.57	See page 7	82.1
37+50				82.1
+25				80.8
37+00				79.4
+75				78.4
+50				77.7
+25				76.8
36+00				76.2
+75				75.6
+50				75.2
+25				74.8
35+00				74.4

Same party page 7

10-10-23
Warm. Fair.

8

16 L	℄	16 R
		L. Line
5.0	5.2	5.1
5.5	5.8	5.4
6.1	6.2	6.05
6.75	7.1	7.1
7.7	8.2	8.25
9.1	9.4	9.85
10.4	10.6	11.1
11.8	12.0	12.4
	3.45	
	4.8	
	6.2	
	7.2	
	7.9	
	8.8	
	9.4	
	10.0	
	10.4	
	10.8	
	11.2	

X Sections on the L. Line from Sta 39+50 to Sta 1+94.

Sta	+	H.I.	−	Profile Grade	+75 Topo Pts
B.M.	0.10	194.15 ✓		194.05 ✓	
+50				188.84	
+59.5				88.84	87.41
39				87.93	88.65
+50				86.13	86.87
38				84.38 ✓	85.05
T.P.	0.38	184.04 ✓	10.47	183.66	
+50				81.80	82.35
37		178.14		79.47 176.67 ✓	80.23
T.P.	1.47	(178.17)	7.37	(176.65)	
+50				77.75	78.20
36				75.85	76.44
+50				74.03	75.28
35				73.78	74.53
+50				73.36	74.11
B.M.	2.07	176.08 ✓	4.09	174.05 (174.03)	174.01 ✓
34				73.2	73.95

L. R.

L. Line

Spk. in Lt. Pl. 75' L. Sta. 42+80

5.3	5.0	5.4	5.4	(5.3)	5.3	5.1	5.4	8.6		
	33	16	8	5.2	7	14	24	53		
6.2	5.8	5.6			5.8	5.8	5.3	9.3		
	33	14		5.8	8	16	27	53		
8.0	7.0	6.8			7.1	7.1	7.3	9.7		
	33	14		7.1	8	14	29	38		
9.9	4.8	9.4	9.2	9.3	9.9	9.9	10.0	13.3		
	33	30	24	14	8	14	21	53		
2.3	00	3.6	2.0	1.7	1.6	2.2	8.8			
	33	29	22	16	2.0	16	20	33		
4.6	4.3	4.6	5.4	7.9	4.5	5.1	4.1	5.0	11.8	13.7
	33	25	22	19	16	4.8	12	14	17	27	33
0.6	2.3	2.0	0.6			0.7	1.0	7.5	12.8	
	33	14	12	0.4		14	18	29	38	
2.2	5.8	5.0	2.1			2.2	7.4	11.0	13.2	
	33	17	15	2.0		14	27	28	33	
3.5	7.2	6.6	3.5	3.0		3.1	4.8	9.5	12.5	
	33	21	17	13	3.0	17	22	32	36	
4.3	7.5	6.4	4.0	3.8		3.9	4.3	5.7	12.8	13.0
	33	25	20	16	3.8	14	20	28	32	46
4.7	7.3	6.8	4.7	4.5			4.6	5.1	11.2	12.3
	33	24	20	16	4.2		19	23	29	33

Spk. in Lt. Pl. 23' L. Sta. 34+80

2.9	5.6	3.4	3.0	2.9	2.6	3.0	3.3	4.4	5.3	9.5	9.9
	33	25	21	16		16	21	24	29	30	33

Sta.	+	H.I.	−	Profile Grade	Top of +75 Curb
		176.08			
+75				73.12	73.87
+50				73.05	73.80
+25				72.97	73.72
33				72.90	73.65
+75				72.82	73.57
+50				72.75	73.50
+25				72.76	73.51
32				72.76	73.51
+75				72.92	73.67.
+50				73.12	73.87
+25	5.1+	178.37 ✓	0.85	73.34 175.13 ✓	74.09
31				73.55	74.30
+75				73.61	74.36
+50				73.66	74.41
+25				73.56	74.31
30				73.40	74.15
+75				73.15	73.90
+50				72.90	73.65
+25				72.65	73.40
29				72.40	73.15
+75				72.15	72.90
+50				71.90	72.65
B.M. +25	+1.04	175.83 ✓	4.62	171.75 ✓ 71.08	171.77 72.43
28				71.49	72.24

L. Line

	L.	℄	R.
3.0	4.6/33 4.6/27 3.4/23 3.2/16	2.8	3.4/16 3.4/20 4.7/23 5.2/30 7.1/33
3.2	4.8/28 4.8/28 3.8/24 3.3/16	2.9	3.6/16 3.8/20 4.6/28 5.0/33
3.3	4.4/33 4.4/24 3.4/23 3.3/16	2.8	3.4/17 4.4/20 4.7/28 7.7/33
3.3	2.9/33 3.5/24 3.1/23 3.0/16	2.9	3.2/16 3.7/20 4.6/28 7.2/33
3.0	0.0/33 2.9/25 2.3/22 2.6/16	2.5	2.9/16 3.4/26 7.7/33
[illegible]			
4.8	0.2/33 5.0/24 4.6/19	4.5	5.0/14 4.2/17 5.6/23 10.6/33
4.7	0.7/33 2.3/30 4.4/24 4.4/19	4.7	5.0/8 4.7/15 4.6/19 9.9/33
5.0	0.0/33 1.0/30 3.1/25 5.0/22 4.7/8	4.7	5.0/8 4.3/25 7.5/33
5.5	4.0/33 4.9/28 5.1/14	5.0	5.4/14 5.2/20 6.0/26 8.1/33
6.0	3.8/33 3.8/27 4.6/19 6.2/7	6.1	6.0/8 6.3/16 5.9/19 6.1/33
6.5	6.4/33 6.3/23 4.8/17	6.8	6.8/12 6.2/20 4.1/33
Spk, in 6" Elm, 19' R. Sta 24+12			
4.3	4.5/33 4.6/16	4.5	4.6/16 4.0/29 10.2/38

Sta.	+	H.I.	−	Finish Grade	Cut
		175.83			
	+75			71.35	72.15
	+50			71.25	72.00
	+25			71.17	71.92
27				71.10	71.85
	+75			71.02	71.77
	+50			70.95	71.70
	+25			70.87	71.62
26				70.80	71.55
	+75			70.72	71.47
	+50			70.65	71.40
	+25			70.57	71.32
25				70.50	71.25
T.P.	4.90	175.67 ✓	4.06	171.77 ✓	
	+75			70.42	71.17
	+50			70.35	71.10
	+25			70.27	71.02
24				70.20	70.95
T.P.	3.94	174.71 ✓	6.90	170.77 ✓	
	+75			70.12	70.87
	+50			70.05	70.80
	+25			69.97	70.72
23				69.90	70.65
	+75			69.82	70.57
	+50			69.75	70.50
	+25			69.67	70.42
22				69.60	70.35

L. Line

4.5	6.0	5.3				4.6	4.6	3.3	3.3	10.2	
	33	16					15	23	28	32	
4.7		09	6.2	4.1	4.9	4.5	4.7	3.6	3.5	10.3	
		33	25	17	13		13	22	27	35	
	180.01										
4.8		5.7	5.4	5.0	5.6	5.2	4.8	3.7	3.9	10.3	
		50	35	17	10	9		12	25	29	37
	180.01										
5.0	4.0	4.0	3.9	3.9	4.7	4.7	4.6	4.8	3.0	3.0	10.5
	55	41	26	20	12	6	8	15	30	33	40
	180.01										
5.1	3.2	1.5	3.0	1.1	3.9	4.8	4.9	4.4	10.7		
	60	38	37	17	14	10	15	34	39		
5.2		6.0		0.7	4.2	4.1	4.7	3.0	4.0	4.8	10.5
		50		33	13	11	4	15	30	38	45
5.3					3.3	4.9	4.9	5.2	4.2	4.3	
					33	8	8	16	24	26	
8.3				0.9	4.0	7.9	7.9	8.2	7.5	7.8	
				45	32	19	8	16	31	35	
8.3	0.2	4.9	8.2				8.0	8.3	7.8	7.7	
	41	27	14				4	15	22	33	
8.5		5.0	7.0	8.0	8.3	8.4	8.2	8.3	8.1	7.8	
		35	25	18	15	6	8	14	20	34	
4.6				3.9	4.5		4.6	4.4	3.9	8.3	
				35	17		13	19	31	37	
4.8			5.1	5.7	5.0		4.5	4.3	4.7	8.7	
			33	24	9		6	15	29	36	
4.9			3.7	3.1	5.2		4.7	4.7	4.6	7.6	9.3
			33	27	15		8	19	29	32	38
5.1		4.0	0.5	4.7	5.1		4.7	4.8	4.5	7.7	9.2
		38	24	19	10		8	19	29	34	39

Sta	+	H.I	-	Profile Grade	Top of Curb
		174.71			
+75				69.52	70.27
+50				69.45	70.20
+25				69.37	70.12
21				69.30	70.05
+75				69.23	69.98
+50				69.17	69.92
+25				69.12	69.87
20				69.07	69.82
+75				69.04	69.79
+50				69.02	69.77
T.P.	4.37	173.75	5.33	169.38	
+25				69.00	69.75
19				69.01	69.76
+75				69.01	69.76
+50				69.02	69.77
+25				69.04	69.79
18				69.08	69.83
+75				69.12	69.87
+50				69.17	69.92
+25				69.23	69.98
17				69.30	70.05
+75				69.37	70.12
+50				69.45	70.20
+25				69.52	70.27

L. Line

184.88

	L.					R.					
5.2	7.0/41	7.0/31	4.3/19	5.5/12	5.1	4.8/8	5.1/17	4.6/22	4.5/29	8.0/33	9.3/38
5.4	3.0/50	6.5/37	4.2/27	5.8/18	5.3	5.1/6	5.4/15	4.6/24	7.3/32	9.4/35	
5.5	4.7/33	5.8/10			5.3	5.6/13	5.2/25	8.3/33	9.2/36		
5.6	7.3/33	7.0/18	5.8/7		5.5	5.8/12	5.8/29	7.9/32	9.1/37		
5.7	6.7/33	6.8/25	5.7/8		5.5	5.7/12	5.7/19	5.7/28	8.5/34		
4.8	5.4/33	4.9/9			4.4	4.7/13	4.6/21	6.4/30	7.3/37		
4.8	3.8/33	5.3/17	4.9/8		4.4	4.8/13	4.3/16	5.0/24	6.4/33		
4.7	3.4/33	3.7/27	4.8/18	4.5/12	4.2	4.5/11	4.1/13	4.9/19	6.9/35		
4.6	4.5/33	3.9/20	4.3/12		3.9	4.2/10	3.9/19	6.5/37			
4.5	4.7/33	3.6/16	4.3/12		4.0	4.1/14	4.5/24	5.8/33			
4.3	4.9/33	3.9/15	4.5/11		4.1	4.2/14	4.4/27	5.7/33			

Sta.	+	H.I.	−	Profile Grade Elev.	Top of Curb
		173.75			
19				69.66	70.35
+75				69.67	70.42
+50				69.75	70.50
+25				69.82	70.57
18				69.91	70.65
B.M.	4.71	175.99 ✓	2.47	171.28 ✓	171.28 ✓
+75				69.97	70.72
+50				70.05	70.80
+25				70.12	70.87
17				70.20	70.95
+75				70.27	71.02
+50				70.71	71.44
+25				71.24	71.99
13				72.30	73.05
+75				73.70	74.45
+50				75.10	75.85
T.P.	2.29	178.13 ✓	0.15	175.84 ✓	
+25				77.10	77.85
+07				78.44	77.19
T.P.	5.75	181.59 ✓	2.29	175.84 ✓	
12					

L. R.

L. Line

4.2 — 5.2 4.3 4.9 4.3 — 4.4 4.1 5.1
3.3 1.4 1.3 1.0 3.7 1.3 2.0 3.9

4.0 — 4.1 3.7 4.3 — 4.8 4.1 5.7
3.3 2.0 1.3 3.6 1.2 2.0 3.3

3.9 — 4.2 3.3 — 3.8 4.1 5.7
3.3 1.1 3.3 1.5 2.5 3.3

Sp. K. in 6" Elm 29 R. Sta. 134+45

5.9 — 6.3 6.1 5.6 — 5.4 5.9 5.8 7.0
3.3 2.0 1.2 5.3 1.1 1.6 2.5 3.3

5.8 — 5.7 5.3 — 5.4 5.9 5.8 6.9
3.3 1.4 5.2 1.1 2.0 2.7 3.3

5.3 — 5.2 5.1 — 5.3 5.7 6.2
3.3 1.4 4.9 1.6 2.0 3.3

3.7 — 5.4 4.9 4.4 — 4.2 4.6 4.7 5.2
3.3 2.7 1.4 4.1 1.3 2.0 2.7 3.9

0.6 — 4.0 2.3 1.3 1.6 — 1.2 1.8 2.3
3.3 2.7 1.7 1.1 1.2 2.1 3.3

1.0 — 3.3 2.1 1.7 1.6 — 1.6 1.9 3.7
3.3 2.0 1.7 1.6 1.7 2.5 3.3

+0.3 — 2.7 1.2 0.7 — 0.0 0.7 4.9 6.3
3.3 2.1 1.5 0.2 1.5 2.4 2.9 3.3

2.4

Sta	+	HI	−		
		181.59			
+84					
+64					
+41					
+20				78.47	77.12
+14.1				78.18	78.85
+15.25				78.11	76.84
11 +00				77.17	77.82
+75				75.78	76.53
+50				74.52	75.27
+25				73.50	74.25
10				72.59	73.34
T.P.	1.43	174.04 ✓	8.41	173.18 ✓	173.21 ✓
+75				71.93	72.67
+50				71.32	72.07
+35.9				71.08	71.23
+25				70.91	71.64
9				70.54	71.29
+75				70.19	70.94
+50				69.88	70.63
+25				69.61	70.36

	L.		R.
		0.5	
		0.3	
		0.6	
3.1	10.3/33, 3.8/14	3.4	3.5/21, 8.4/33
4.4	4.5/33, 4.8/21, 4.8/11	4.5	4.6/12, 4.9/22, 5.0/29, 6.2/33
7.1	8.7/33, 7.8/24, 7.0/8	6.6	4.8/15, 6.4/20, 4.9/30, 7.6/33
9.0	F.0.9/33, 11.6/33, 7.6/25, 9.0/7	8.7	8.8/17, 8.9/30, 9.6/33, F.0.4/20.6

5 pK. in Lt. po/a 33 R. 5 to 9 ± 95

	L.		R.
3.3	F.1.1/20.6, 5.9/33, 4.4/22, 3.7/21, 3.4/12	3.2	3.2/18, 3.4/29, 3.8/33, F.0.7/20.1
4.1	F.2.1/22.1, 7.5/33, 7.0/29, 4.9/21, 4.4/10	4.0	3.9/19, 4.5/33, F.0.6/20.9
4.4	7.1/33, 5.0/12	4.3	4.4/21, 4.5/33
4.7	F.3.0/23.0, 3.8/33, 6.0/25, 5.5/18	4.6	4.7/18, 4.7/29, 5.5/33, F.0.7/21.1

Sta	+	H.I.	−		
		174.64			
8				69.39	70.14
+75				69.20	69.95
+50				69.08	69.83
+25				68.98	69.73
7				68.94	69.69
+75				68.88	69.63
+50				68.85	69.60
+25				68.83	69.58
6				68.80	69.55
+75				68.78	69.53
+50				68.75	69.50
+25				68.73	69.48
5				68.70	69.45
+75				68.68	69.43
+50				68.65	69.40
+25				68.63	69.38
4				68.60	69.35
T.P	7.02	175.95 ✓	5.71	168.93 ✓	
+75				68.58	69.33
+50				68.55	69.30
+25				68.52	69.27
3				68.50	69.25

L ℄ R.

L. Line

5.2 179.90 HI
0.5/4.2 +2.0/33 0.0/33 3.1/28 0.0/24 5.7/18 6.5/12 5.1 5.0/15 5.6/29 7.3/33 F0.7/21.4

179.90
5.4 +1.0/40 1.0/33 0.0/28 5.6/20 6.0/13 5.3 5.1/12 5.8/25 9.2/30 10.3/33

5.5 179.90
1.7/40 2.5/33 4.3/27 0.0/26 2.4/25 6.2/20 6.0/12 5.4 5.4/10 5.7/17 5.2/24 9.3/28 9.8/33 F.0.6/23.4

5.7 F1.3/21.9 5.3/33 4.2/26 6.2/24 5.8/12 5.5 5.7/8 6.1/19 9.1/24 10.7/33 F.5.1/22.7

5.7 6.0/33 4.8/28 4.8/25 5.9/23 5.7/13 5.3 5.8/10 6.1/22 9.2/27 10.5/33

5.8 F1.2/21.1 6.2/33 4.6/28 4.8/23 6.1/20 5.7/11 5.4 5.7/7 6.0/14 6.4/24 9.3/30 9.7/33 F1.1/21.7

5.8 1.5/33 2.8/24 6.0/19 5.8/11 5.6 6.0/11 6.4/24 8.8/28 9.5/33

179.90
5.9 3.9/33 1.7/23 6.0/19 5.8/11 5.6 6.0/15 6.5/22 8.7/26 9.4/33

179.90
5.9 2.7/33 1.2/27 5.7/20 6.5/18 5.7/11 5.7 6.3/19 8.4/32 9.6/33

179.90
6.0 3.7/33 5.5/28 2.8/22 5.8/21 6.3/18 5.8/14 5.7 6.2/8 6.3/18 8.4/22 9.7/33

Spk. in Tel pole R Sta 3+70

7.4 4.6/33 4.7/27 7.7/19 7.2/11 7.3 7.5/19 10.3/24 11.3/33

7.5 4.1/33 4.8/24 7.7/19 7.3/13 7.2 7.6/13 7.4/21 10.1/26 11.1/33

Sta.	+	H.I.	−		
		175.95			
2 +50				68.70	
1 +94	Beginning of Proj			69.28	
			12.10	163.85	
T.P.	7.50	172.39	6.04	169.89	
B.M.			1.70	175.69	175.69

L. R

L. Line

7.3	2.4 / 33	4.7 / 25	7.2 / 19	9.9 / 11	7.0	7.8 / 20	10.1 / 27	10.9 / 33
6.7	1.2 / 33	4.0 / 20	6.6 / 17	6.2		6.6 / 17	7.4 / 27	9.7 / 33

Winter Elev. 10/23/23 Lake Phalen.

Sp.K. in Lt. pole 75' L. of Sta. 0+50

X Sections on the K.R. Line

From Sta. 12+05.7 to Sta.

Sta	+	H.I.	−		
B.M.	5.61	176.89 ✓		171.28 ✓	
12+05.7					
+25				177.10	177.85
+50				75.40	74.15
+75				73.71	74.44
13				72.12	72.87
+25				70.93	71.45
+50		✓		70.17	70.82
T.P.	2.56	173.83	5.61	171.28 ✓	
+75				69.83	70.58
14				69.80	70.55
+25				69.78	70.53
+50				69.75	70.56
+75				69.72	70.47
15				69.70	70.45
+25				69.68	70.47
+50				69.65	70.47
+75				69.62	70.37
16				69.60	70.35
+25				69.58	70.33
+50				69.55	70.32
+75				69.52	70.29
17				69.50	70.27
T.P.	4.44	174.14 ✓	4.11	169.72 ✓	

L R

K. P. Line

SPK in 2" Elm 23 ft [illegible] 13+48

	L						R				
1.5		6.6/33	2.7/25	2.3/19		2.1	2.3/14	2.8/23	3.2/35		
4.8		6.7/33	6.1/19	5.6/12		5.1	5.1/14	5.8/33			
6.7		8.6/33	7.6/17	6.5/10		6.1	6.1/33				
4.0	5.7/33	5.4/20	4.6/16	3.8/6		3.5	3.6/15	3.7/33			
4.0	4.7/28	6.2/23	5.6/19	4.7/12		4.3	4.5/12	4.5/18	6.8/27	6.8/33	
4.1	4.2/33	5.6/17	4.7/12	4.6/7		4.5	4.7/11	5.2/17	7.4/22	8.[illegible]/26	[illegible]/33
4.1	4.2/33	5.6/24	4.9/17	5.1/10	4.8/6	4.5	4.6/14	4.8/19	7.7/33		
4.2	4.7/33	4.9/27	5.0/19	4.8/10		4.6	4.7/12	5.1/18	6.3/24	5.5/33	
4.2	4.3/35	5.6/31	5.1/19	4.6/7		4.3	4.2/10	4.7/15	6.3/24	6.6/33	
4.3	5.6/33	4.9/28	4.8/17	4.6/9		4.4	4.7/10	5.0/19	6.7/22	3.[illegible]/33	

Nail in Tel pole R of Sta. 17+06

Stg.	+	H.I.	−		
		174.18			
+25				69.27	70.2
+50				69.25	70.2
+75				69.42	70.4
18				69.40	70.4
+25				69.37	70.3
+50				69.34	70.3
+75				69.32	70.3
19				69.30	70.3
+25				69.27	70.2
+50				69.25	70.2
+75				69.22	69.9
20				69.20	69.9
+25				69.17	69.9
+50				69.15	69.9
+75				69.12	69.9
21				69.10	69.9
+25				69.07	69.8
+50				69.05	69.8
+75				69.02	69.8
22				69.00	69.8
+25				68.97	69.8
+50				68.95	69.8
B.M.	3.70	173.45	4.45	169.73	169.75
+75				68.92	69.8

L — R

K. P. Line

4.7				5.5/33	5.1/19	5.3/14	4.9/8	4.6	4.8/8	5.4/16	7.2/19	8.7/24	9.2/33
4.8				7.4/33	5.4/25	5.6/15	5.0/6	4.8	5.1/8	5.6/15	8.8/24	9.3/33	
4.8				4.9/33	4.6/19	5.3/15	5.0/8	4.8	5.1/9	5.7/19	6.5/23	8.8/29	9.0/33
4.9				4.9/33	4.7/21	5.2/15	5.1/7	5.0	5.2/10	6.2/21	8.9/28	9.4/33	
4.9			6.5/33	4.9/30	4.7/18	5.4/15	4.9/9	4.6	5.0/10	5.6/17	7.6/24	9.3/33	
5.0	F.0.7 193		8.0/33	5.1/29	5.0/17	5.5/13	5.0/6	4.8	4.7/11	5.6/19	8.1/25	8.5/33	F.3.1 [illegible]
5.0			8.8/33	5.5/28	5.1/25	4.8/14	5.4/4	4.9	5.0/7	5.5/17	5.9/22	7.8/27	8.1/33
5.1	F.0.7 193		9.7/33	4.6/27	5.3/23	5.2/15	5.4/8	5.3	5.1/11	5.2/17	7.7/27	9.7/33	F.2.3 [illegible]
5.1				5.6/33	6.5/30	5.4/16	5.4/10	5.1	5.0/10	6.6/21	7.3/33		
5.2	F.1.7 18.5 "			7.4/33	6.3/25	5.9/18	5.4/7	4.7	4.7/33				
5.2				10.1/33	7.4/25	6.1/19	5.4/14	5.1	5.6/13	7.7/20	6.4/28	6.7/33	

Spk in Tree 100 R. [illegible] 22+10

Sta	+	H.I.	−		
		173.45			
23				168.79	69.[illegible]
+25				68.77	69.6
+50				68.75	69.[illegible]
+75				68.8[illegible]	69.5
24				68.80	69.5
+17					
+25				68.77	69.5
+50				68.75	69.6
+75				68.72	69.4
T.P.	7.10	173.73	6.82	166.63	
25				67.90	69.5
+25				68.67	69.4
+10					
				6	
+50				68.65	69.4
+75				68.62	69.3
26				68.60	69.30
+25				68.59	69.3
+50				68.70	69.5
+75				68.90	69.4
27				69.23	69.7
+25				69.66	70.4

L. R.

K. P. Line

4.6 Water 9.6/31 6.5/23 5.3/17 4.9/9 4.6 | 4.8/13 5.9/17 5.9/19 5.1/21 4.1/33

F.t. 4.6 Water 9.7/27 7.8/23 5.4/15 4.4 | 5.1/12 5.4/16 5.9/17 4.7/21 2.6/33

4.7 Water 9.7/24 6.2/14 5.4/12 4.8 | 5.0/11 5.7/18 5.7/19 4.5/21 0.3/33

4.7 Water 9.7/24 5.7/16 5.3/9 4.8 | 5.2/14 5.6/17 2.5/24 1.4/33

4.7 Water 9.7/41 8.5/27 5.8/13 5.2/8 4.8 | 5.6/12 6.2/14 Wall

4.8 Water 9.7/32 7.3/17 5.9/13 5.2/9 4.9 | 5.4/10 4.5/15 Wall

5.0 Water 10.0/24 8.8/21 6.2/13 5.5/9 5.1 | 5.4/10 4.1/16 6.7/18

5.0 Water 10.0/34 8.7/20 6.4/13 5.7/9 5.0 | 5.9/13 5.9/15 5.9/19 3.5/23

(190.31)

5.0 Water 10.0/36 8.3/22 6.4/14 6.0/12 5.5/7 4.7 | 4.7/5 5.1/15 6.2/22 6.2/24 3.1/28 7.6/41 5.4/53 F.1.6

5.1 Water 10.0/23 8.8/20 4.4/15 5.7/12 5.2/7 4.7 | 5.0/12 5.6/18 5.9/20 5.9/21 2.0/27 6.2/33 4.7/50 4.9

(190.31)

5.0 Water 10.0/27 7.5/24 6.5/15 5.4/21 5.3/11 4.8 | 4.9/8 5.2/12 6.0/15 5.4/17 4.2/38 5.1/50

(190.31)

4.5 Water 10.0/36 7.0/33 7.2/31 5.8/25 4.8/13 4.7 | 4.9/11 3.2/15 0.6/17 9.6/21 4.0/27 3.7/50

Sta	+	H.I.			
		123.73			
	+50			70.20	70.95
	+75			70.83	71.58
22				71.[illegible]	72.[illegible]
	+25			72.85	73.20
	+50			x 73.30	74.03
	+75			74.15	74.9[illegible]
T.P	12.79	185.94 ✓	0.38	173.45 ✓	
23				75.[illegible]	[illegible]
	+25			75.85	76.60
	+50			76.71	77.[illegible]
	+54				77.90
					78.30
30				[illegible]	77.15
					79.00
	+50			80.10	80.85
					81.70
31				81.80	82.55
					83.40
	+50			82.[illegible]	84.25
					85.10
T.P	8.31	191.72 ✓	2.53	183.41 ✓	
32				85.20	85.95
	+25			86.05	86.80

L. R. K. P. Line

Catch Basin 173.73

	L		R
3.5	5.5/33 4.5/17	3.8	3.5/11 3.1/14 0.4/18 4.8/28 (190.31) 4.1/35 4.8/46
2.1	4.8/33 4.5/24 3.1/11	2.1	1.8/4 2.1/13 1.3/17 4.8/34 (190.81) 4.3/37 0.0/42 0.0/46
.4	F 5.6/23.4 4.8/33 5.5/22 4.9/19 0.7/12 0.7/8	0.2	0.2/7 0.6/12 0.5/14 3.8/33 (190.31) 0.4/41 C 11.0/31.0
0.9	F 8.0/27 (173.73) 5.4/33 5.9/24 11.4/14 11.5/10	10.9	11.2/7 11.0/13 (190.31) 5.8/28 5.2/33 5.6/40 C 9.7/39.7
.2	F 0.0/28.5 (173.73) 5.2/33 5.4/22 4.4/19 9.8/12 9.8/10	9.2	9.5/7 9.6/13 2.0/22 1.7/33 2.5/40 C 6.7/24.7
5	F 1.5/31.8 (173.73) 2.0/33 5.3/27 7.4/10	7.1	7.2/4 7.7/13 4.1/19 4.0/24 5.1/28 5.6/33 C 3.0/33.0
.8	F 1.3/16.9 (173.73) 5.1/33 7.1/19 5.2/12 4.9/9	4.7	5.0/12 4.6/15 5.8/20 9.0/33 F 1.7/32.1
.1	F 0.4/16.9 10.1/33 4.6/18 4.0/11	3.5	4.2/14 8.6/21 11.8/33 F 0.0/32.0
2.4	F 1.8/17.7 5.6/33 3.8/21 3.0/10	2.7	3.3/9 5.7/17 7.0/23 8.5/33 F 5.8/28.8
6.5	F 1.0/16.0 4.7/33 5.1/17 7.3/13	7.0	7.4/9 7.0/13 8.2/25 9.5/33 F 2.1/23.0
5.6	2.3/33 2.7/14 6.1/10	5.9	6.1/12 6.3/22 6.5/33

Sta	+	H.I.	−	Elev.
		191.72		
+38				86.5
+50				87.65
+79				87.89
B.M.			3.90	187.82
				187.85

		L.			R.		
							K. P. Line
5.2	$\frac{5.2}{33}$	$\frac{5.6}{9}$	5.3	$\frac{5.5}{15}$	$\frac{5.0}{33}$		
3.8		$\frac{3.7}{33}$	3.3	$\frac{2.8}{33}$			

Final X-Sections Borrow Pit X on Right

K.P. Line Sta. 25+10 to Sta. 30+50

Station	+	H.I	−	Elev.
B.M.	4.71	174.46		169.75
T.P.	5.28	175.88	3.86	170.60
25+10				
25+25				
+50				
26				
+50				
27				
+50				
28				
+50				
T.P.	12.16	187.29	0.75	175.13
29				
+50				

W.A. Carlson
R.C. Grant
A.S. Nelson
M.S. Ahlberg
} Dec 4 1923.

℄ Right.

Spike in Tree for ✓ Sta 22+10

Same as original xsection.

(7.2)	6.32	6.45 / 16	6.4 / 35	2.5 / 40		H.I. 187.29 / 4.6 / 49 = T.S.
(7.2)	6.30	6.57 / 16	6.4 / 40			H.I. 187.29 / 4.4 / 53 = T.S
(7.3)	6.36	6.52 / 16	6.6 / 31	5.7 / 50	3.0 / 53	H.I. 187.29 / 1.2 / 66 = T.S.
(7.2)	6.20	6.46 / 16	6.1 / 28	6.0 / 50	3.0 / 54	H.I. 187.29 / 0.3 / 66. = T.S
(6.7)	5.75	5.53 / 16	5.0 / 25	4.5 / 45	0.7 / 49	H.I. 187.29 / 0.2 / 59 = T.S
(5.7) ~~(6.8)~~	5.01	4.93 / 16	4.8 / 25	4.6 / 39	0.3 / 45	H.I. 196.89 / 1.4 / 57. = T.S
(4.3)	4.00	3.48 / 16	3.2 / 21	2.9 / 34	0.0 / 39	H.I. 196.89 / 4.5 / 48 = T.S.
(14.0) (2.6)	13.28 / 2.5	13.21 / 16	12.9 / 28	11.0 / 31		96.89 = H.I. / 7.0 / 39 = T.S
(12.3)	11.35 / 2.5	11.51 / 16	11.5 / 24	2.5 / 33 = T.S.		
(10.6)	9.76 / 2.5	9.84 / 16	9.8 / 21	8.0 / 23	3.0 / 28 = T.S	

use this H.I. (14.0)

Station	+	H. I	−	Elev.
		187.29		
30+00				
30+50				
T.P.	11.89	196.89	2.29	185.00
T.P.	6.19	191.13	11.95	184.94
B.M. for check.			3.24	187.89.

184.94
6.19
191.13

Ⅱ Right.

(8.9)	8.03 / 2.5	8.13 / 16.	7.8 / 20	7.0 / 25	6.6 / 30	7.8 / 33
(7.2)	6.36 / 2.5	6.51 / 16.	6.3 / 19	6.9 / 23	10.2 / 31	

147.85 Near state highway.

X Sections on L.K.P. Line

Sta.	+	H.I.	−	Elev.	
B.M.	3.04	174.34 ✓		171.28 ✓	
13				169.93	
+25				170.0	
+33.8				70.05	70.80
+50				70.10	70.84
+75				70.17	70.92
14				70.05	70.80
+25				69.94	70.69
+50				69.83	70.57
+73	End of L.K.P. Line			69.82	70.47
B.M.			3.04	171.23 ✓	

L. R.

Spk in 6" Elm 29 R. Sta. 13+45

4.4 — 5.4/33 4.1/21 4.1/11 3.9 4.3/19 4.7/33

4.3 — 5.2/33 4.1/27 4.0/16 3.8 4.4/19 4.5/33

4.2 — 4.1/33 3.9/26 3.7 4.8/12 4.6/19 4.7/33

4.1 — 3.7/33 4.0 4.3/10 4.8/19 4.9/33

4.2 — 3.9/33 4.5 5.3/10 5.3/19 5.4/33

4.4 — 5.0/33 4.3/15 4.8 5.6/7 4.4/20 4.8/33

4.5 — 4.6/33 4.1/23 5.4/18 4.9/7 4.6 5.0/8 5.0/11 4.7/19 7.8/24 7.7/33

4.6 — 4.1/33 5.5/17 5.2/10 5.0 5.1/10 5.6/18 8.5/25 8.7/33

Spk in 6" Elm 29 R. Sta. 13+45

Final X Sections of borrow Pit on the N.P. Line from 3+0

Sta.	+	H.I.	−	Elev.
B.M.	3.90	173.65		169.75
T.P.	4.74	174.46	5.93	169.72
25+10				
+25			5.8	
+50				
26				
+50				
+55				
27				
+07				
+50				
28				
+50				
T.P.			0.99	173.47

R.

Spk. in Tree 100' Lt. Rt. of Sta. 22+10

Same as original X Section

(5.8) 5.8 | 6.2/14 | 5.7/20 | 5.9/26 | 5.1/37 | 0.8/42 | 189.97 8.7/44

(5.8) 5.8 | 5.7/15 | 5.7/24 | 5.1/40 | 0.8/40 | 189.97 7.4/48

5.4 | 5.9/20 | 5.2/37 | 189.97 12.0/47 | 4.6/57

5.3 | 5.5/11 | 6.1/15 | 5.8/36 | 1.5/44 | 189.97 4.7/77

5.7 | 5.7/14 | 5.3/23 | 4.3/29 | 0.8/33 | 189.97 4.9/41

5.4 | 5.2/13 | 0.0/25 | 189.97 4.9/33

5.4 | 5.2/12 | 4.4/24 | 0.0/30 | 189.97 4.5/38

4.5 | 4.1/24 | 0.0/30 | 189.97 3.8/37

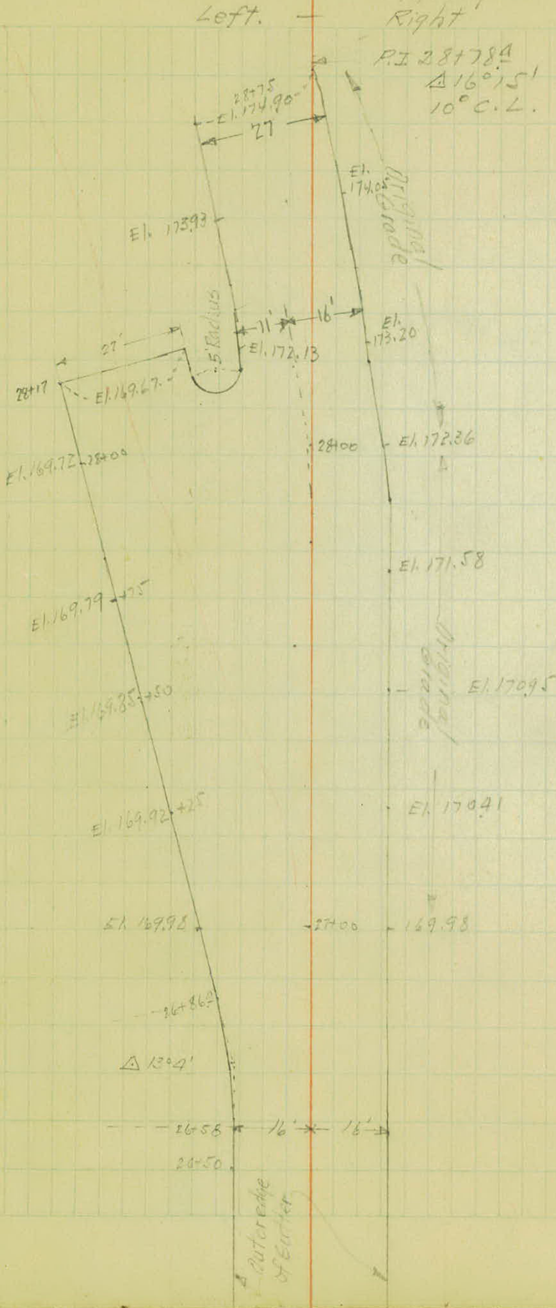
2.8 | 2.8/10 | 2.7/18 | 189.97 9.9/29 | 5.2/33

Same as original X Section

On Catch Basin R. 23+20

Grade Stakes as set for Top of Gutter.
@ Road Connection near
Sta 28+00 . K. P. Line.

	Left	Right
28+75	174.90	174.90
+50	173.93	174.05
+25	172.13	173.20
+17	169.67	
28+00	169.72	172.36
+75	169.79	171.58
+50	169.85	170.95
+25	169.92	170.41
27+00	169.98	169.98
+86.1	169.81	
+72.	169.65	
+58	169.52	
26+50	164.95	164.95

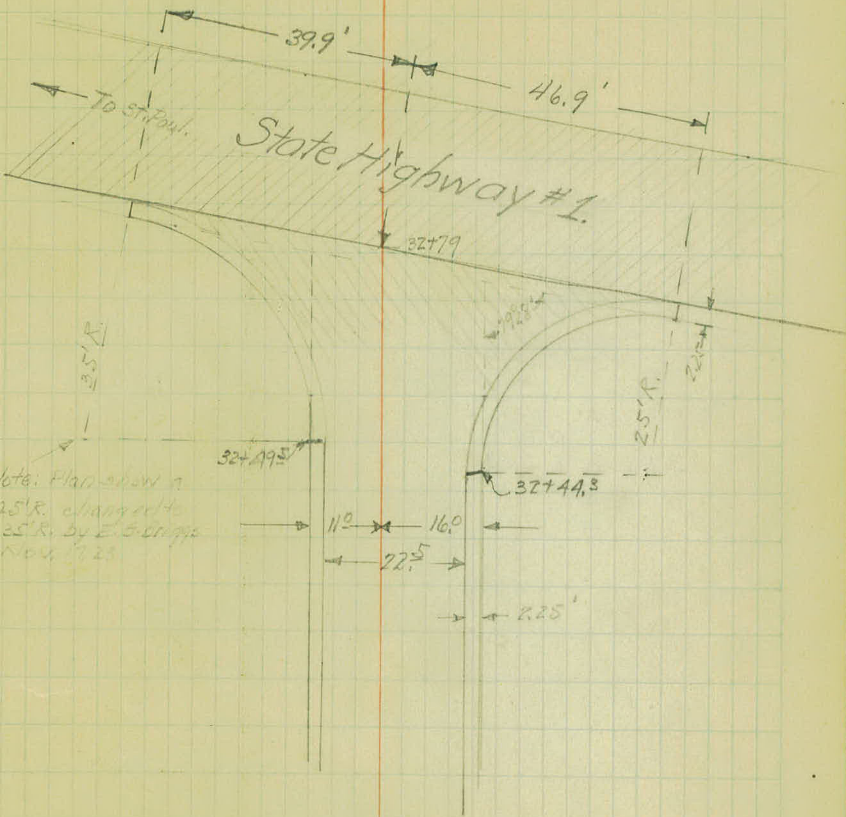

Left. — Right
P.I. 28+78.4
Δ 16°15'
10° C.L.
28+75
El. 174.90
27
El. 174.05
Old grade
El. 173.93
5' Radius
11'
16'
El. 173.20
El. 172.13
27'
28+17
El. 169.67
28+00
El. 172.36
El. 169.72
28+00
El. 171.58
El. 169.79
+75
Old grade
El. 170.95
El. 169.85
+50
El. 170.41
El. 169.92
+25
El. 169.98
27+00
169.98
26+86.9
Δ 13°4'
26+58
16'
16'
26+50
Outer edge of Gutter

Gutter Stakes @
Connection of K.F. Line to
State Highway #1. 4

Sta	H.I	Left	Right
	193.86		
		Elev.	
End of Radius Top of pavement		187.93	189.16
End of Radius Top of Gutter (outer edge)		188.01	189.24
Top of Pavement 32+79		188.45	
32+49.5 Beg of Radius Left		187.65	
32+44.3 Beg of Radius Right			187.46

	Grade Rod. L	R
0+40	5.06	
0+30		3.87
0+20	5.17	4.27
0+10	5.28	4.72
0+00	5.33	5.18
	5.41	5.60

W.A.C. ⊼
P.C. Rod Nov. 17, 23
Nelson Ch.
Alberg "



X Sections for Borrow Pit on Frost Ave - Right of Sta 22 K.P. Line

Station	+	H.I	−	Elev.
	4.74	174.49		169.25
	12.90	185.19	2.20	172.29
	3.9	187.9	1.19	184.00
		Jordan	18.2	169.7

174.5

Station	−	Elev. (assumed grade)
2+35	5.7	168.8
2+00	3.8	170.7
1+70	3.4	171.1
1+55	3.7	170.8
1+20	4.0	170.5
1+00	4.5	170.0
0+75	4.9	169.6
0+55	5.1	169.4
0+00 Top of Pavement	4.47	170.02

W.H. Carlson ⊼ Nov. 24. 23

P. Crane Rod

A. Nelson Ch.

M. Alberg "

spike in tree 100' R. sta 22+10 K.R. Line.

℄ of old Roadway.

= ℄ of Frost Ave

Electric Light Pole

R.R. spike 3+05 in pole about 6' up from base

℄ Base line for X-Sections.

			+8.0 / 80	+4.4 / 76	℄ Rd. / 60	+3.6 / 50	+1.8 / 39	+1.0 / 30	+2.2 / 12	0.0 / 0	
R.R. R/W	+10.0 / 100	+6.2 / 90	℄ Rd. / 70	+1.2 / 64	+7.9 / 57	+7.4 / 47	+3.7 / 33	+0.7 / 24	+0.3 / 8	0.0 / 0	
R.R. R/W.	+12.6 / 114	+9.2 / 106	℄ Rd. / 89	+6.8 / 78	+12.3 / 69	+12.0 / 61	+0.1 / 26	+3.4 / 22	+0.2 / 19	-0.9 / 11	0.0 / 0
+10.2 / 110	℄ Rd. / 96	+8.4 / 84	+13.7 / 76	+14.0 / 69	+13.6 / 44	+11.6 / 22	+3.7 / 21	+0.8 / 18	-0.4 / 6	0.0 / 0	
+14.5 / 125	℄ Rd. / 118	+12.2 / 100	+14.3 / 83	+15.0 / 62	+15.0 / 52	+14.0 / 22	+3.3 / 15	+1.0 / 11	-0.1 / 7	0.0 / 0	
℄ Rd. / 145	+16.3 / 135	+14.6 / 107	+14.9 / 72	+15.0 / 50	+12.7 / 26	+3.6 / 21	+0.7 / 14	+0.9 / 9	0.0 / 0		
+14.2 / 143	+7.4 / 100	+11.2 / 87	+8.5 / 50	+6.3 / 30	+3.6 / 21	+0.9 / 16	-0.5 / 5	0.0 / 0			
+4.6 / 135	+3.7 / 100	+1.2 / 74	-1.6 / 41	-1.1 / 19	0.0 / 0						

End of Radius 0+00

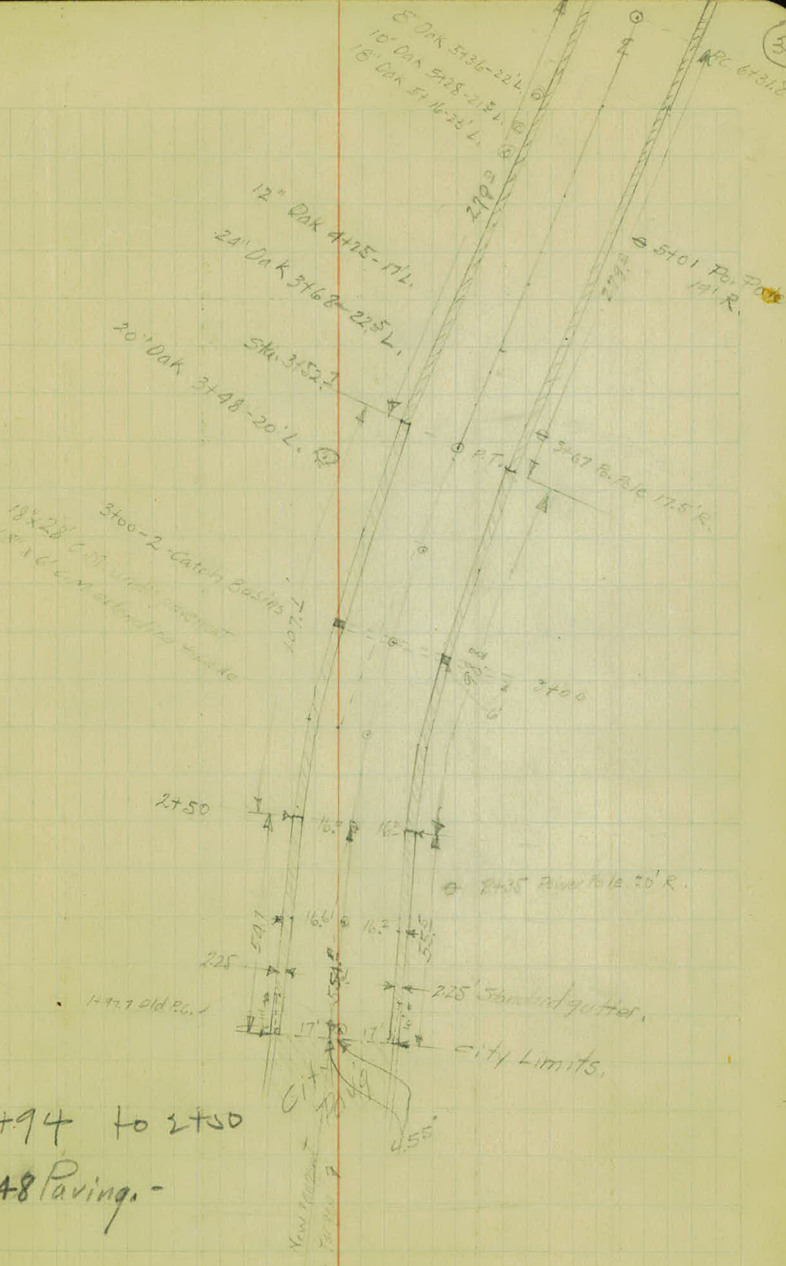
Paved

4.71 174.46 169.75

Sp. in Tree 100 R Sta 22+10

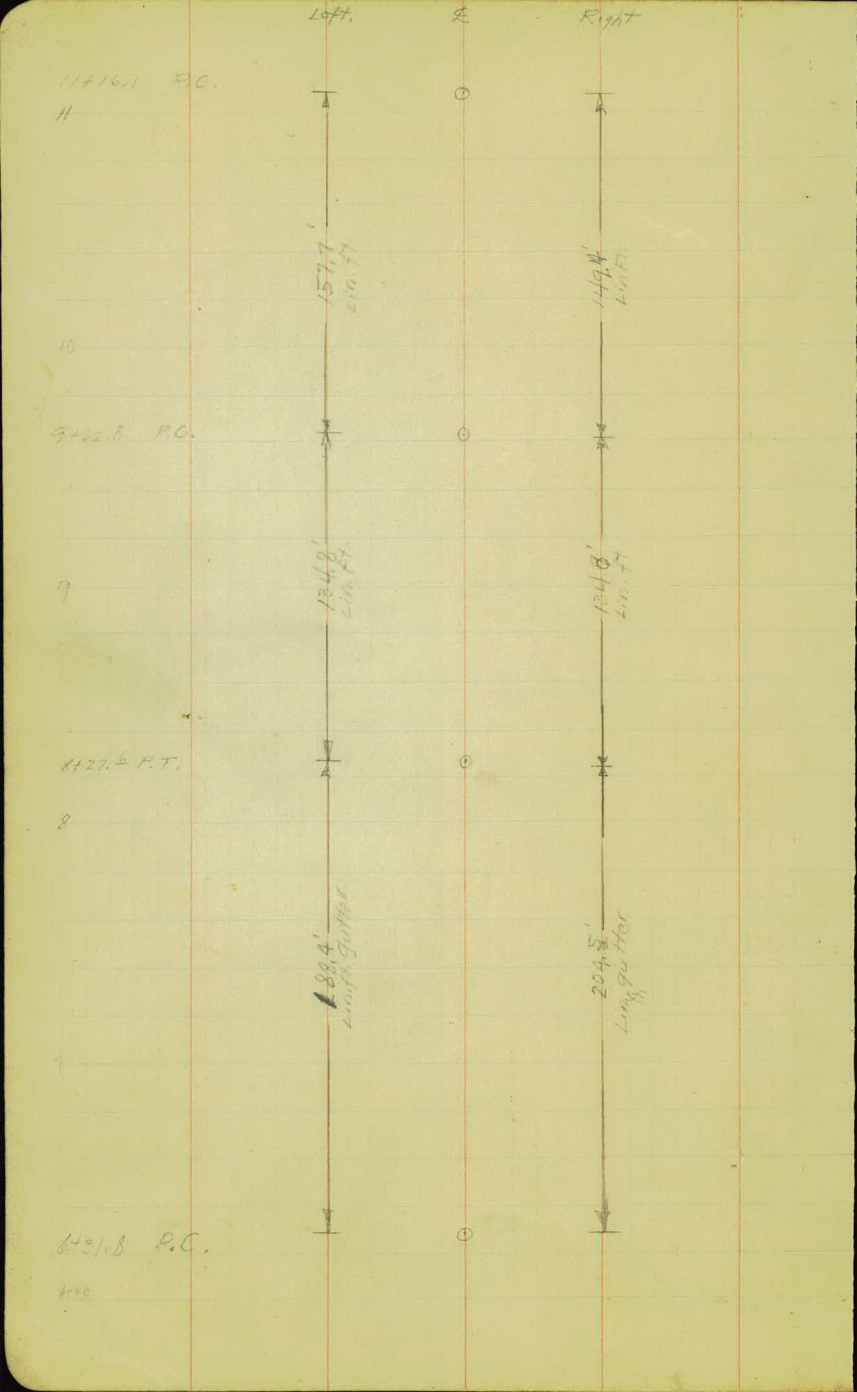
Final Topography.

Sta. 1+94.5 = City Limits to Sta



1+94 to 2+50

74.48 Paving. -


Left
℄
Right
11+16.1 P.C.
11
157.7'
Lin. Ft.
10
9+62.8 P.C.
9
134.8'
Lin. Ft.
8+27.6 P.T.
8
288.4'
Lin. Ft. Gutter
7
6+31.8 P.C.
6+00
134.8'
Lin. Ft.
254.5'
Lin. Ft. Gutter

P.5

11+07 Pi. Pole 26' R

10

P.6

9+73 Pi. Pole 24' L

8+93 Po. Pole - 26' R.

8+53 - 10" Oak 25' L

8+38 - 12" Oak 24' L

P.7

6+54 [illegible] Pole [illegible] L.

6+25 [illegible] 20.5 R.

12-6-23
23-69

Final Topog

Left & Right

Jorgenson
Parsons
Briggs
Eck

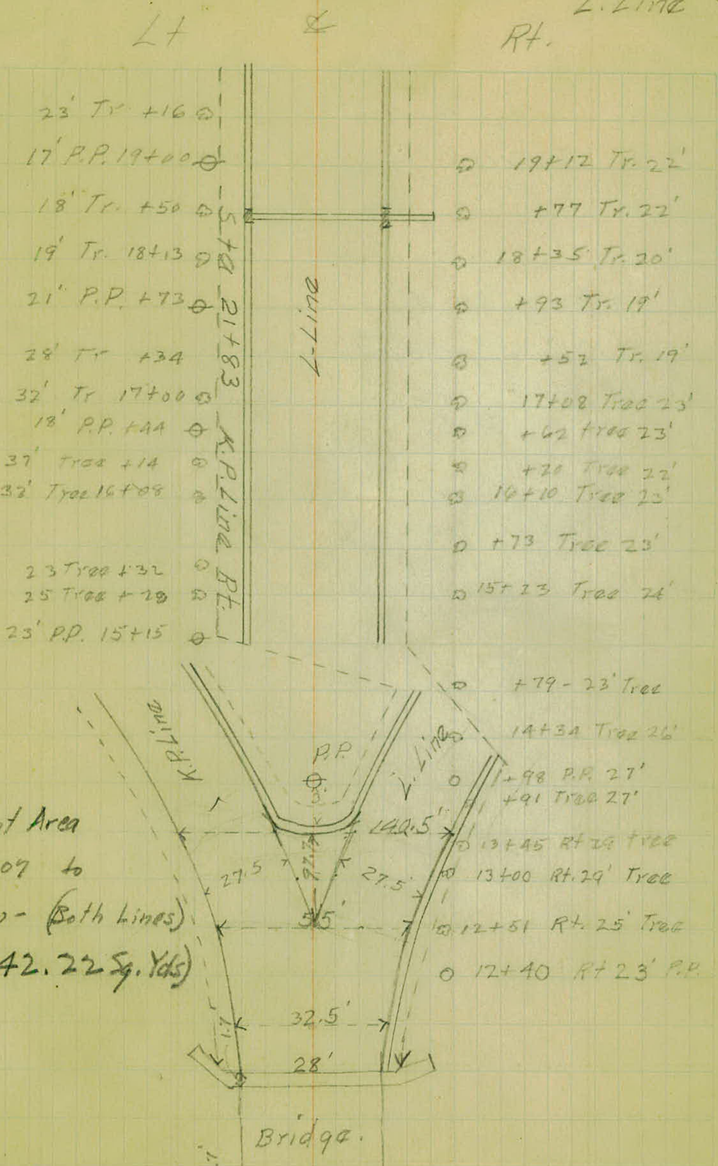
19+02 2 - C.B. R. & L. 18" X 42' C.M.C.

13+32

12+67

12+07 Bridge end.

11+20.1 Bridge end.
f 16.1 P.T.
11


Lt
℄
Rt.
23' Tr. +16
17' P.P. 19+00
18' Tr. +50
19' Tr. 18+13
21" P.P. +73
28' Tr. +34
32' Tr. 17+00
18' P.P. +44
37' Tree +14
33' Tree 16+08
23 Tree +32
25 Tree +20
23' P.P. 15+15
Sta 21+83 K.P. Line Rt.
L-Line
19+12 Tr. 22'
+77 Tr. 22'
18+35 Tr. 20'
+93 Tr. 19'
+52 Tr. 19'
17+08 Tree 23'
+62 Tree 23'
+20 Tree 22'
16+10 Tree 23'
+73 Tree 23'
15+23 Tree 24'
+79 - 23' Tree
14+34 Tree 26'
+98 P.P. 27'
+91 Tree 27'
13+45 Rt 29 tree
13+00 Rt. 29' Tree
12+51 Rt. 25' Tree
12+40 Rt 23' P.P.
K.P. Line
L. Line
P.P.
3'
140.5'
27.5
27.5
55'
32.5'
28'
Bridge.
28.6'
P.I.

Pavement Area
Sta. 12+07 to
Sta. 15+00 - (Both Lines)
(1942.22 Sq. Yds)

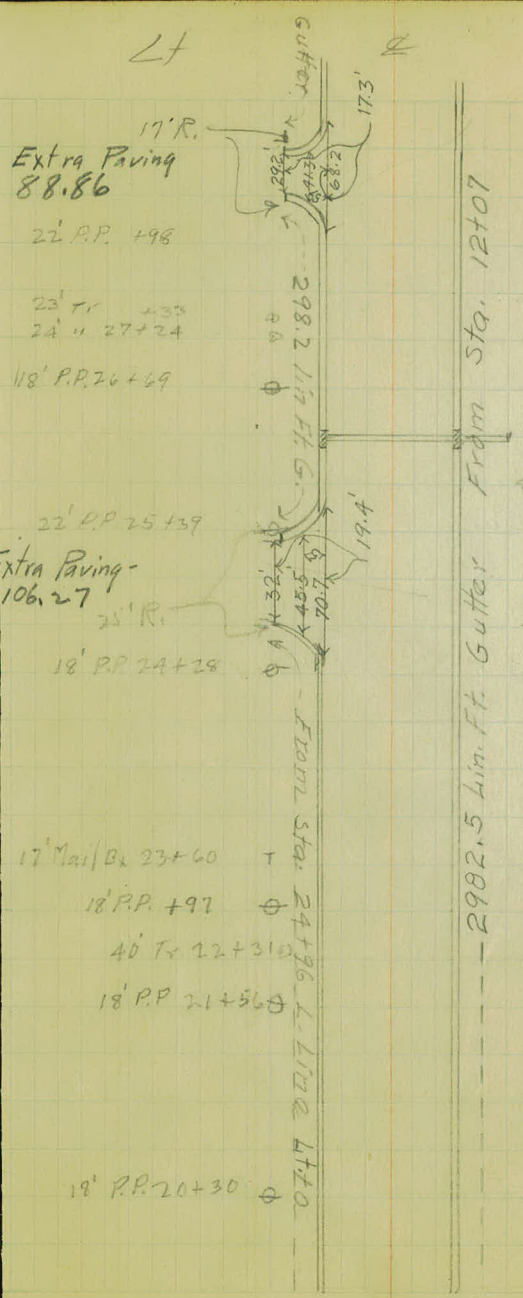
Extra Paving
11+00 to 11+20 = 1.5 Sq. Yd.

Topog.

+37	end Inter Lt.	
28+06	Inter edge start Lt.	
25+62	2-C.B. R & L.	18" X 52' C.M.C.
25+30	Inter end	
24+96	Intersection Lt. start.	

Note - C.B. stands for Catch basin.

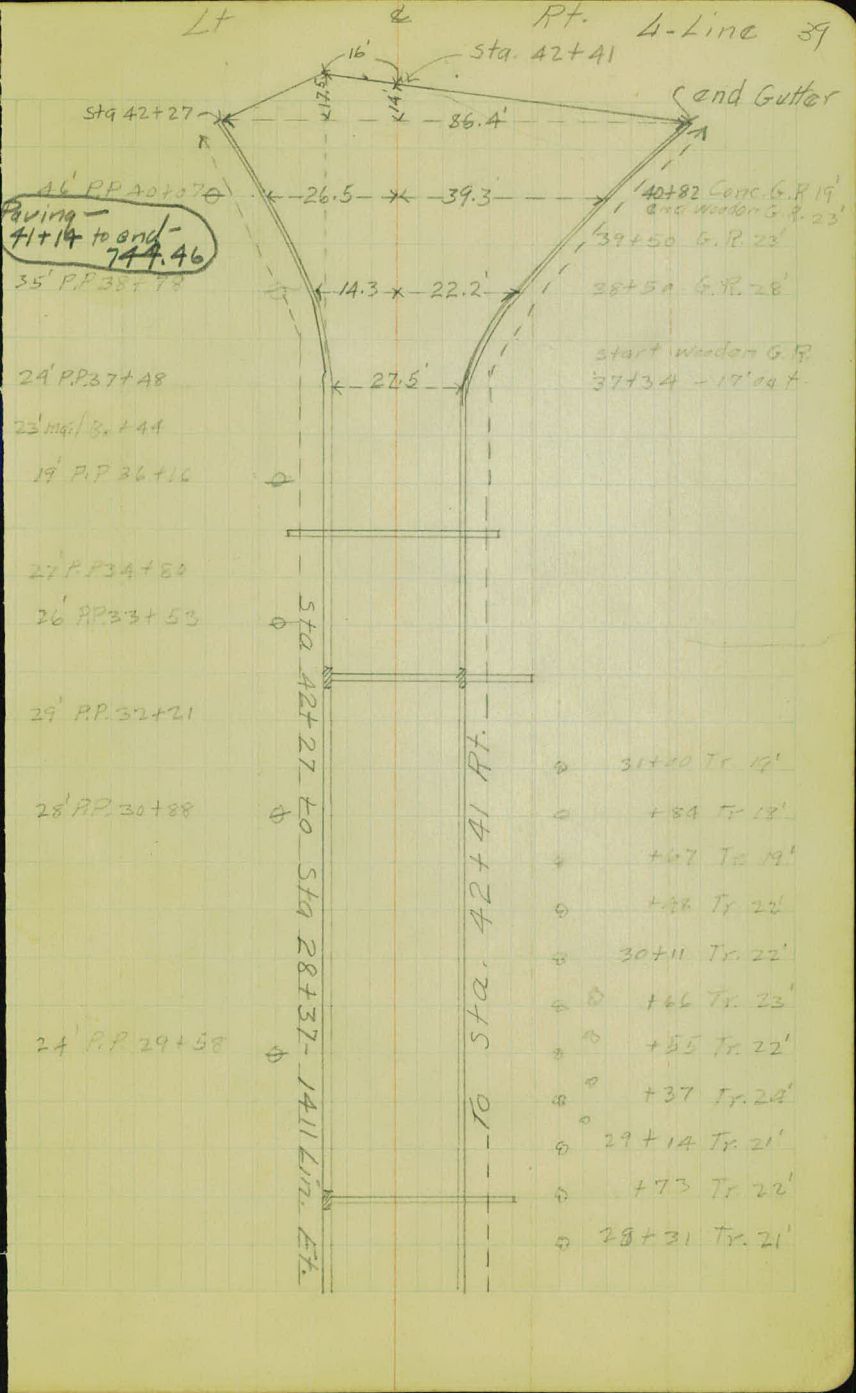
Lt ℄ L-Line Rt.



+89 Tr. 20'
+45 Tr. 19'
27+03 Tr. 19'
+59 Tr. 20'
26+18 Tr. 21'
+71 Tr. 27'
+38 Tr. 22'
25+00 Tr. 21'
+57 Tr. 20
+17 Tr. 18'
24+04 Tr. 22'
+74 Tr. 18'
23+31 Tr. 18'
+89 Tr. 20'
+47 Tr. 22'
22+05 Tr. 22'
+60 Tr. 21'
21+18 Tr. 20'
+75 Tr. 20'
20+35 Tr. 20'
+96 Tr. 21'
19+55 Tr. 22'

Topog

Sta 42+41 end.			
42+00			
41+50			
41+14			
35+42		Culv.	15" x 56' C.M.C.
32+52	2 - C.B. R & L.		18" X 42' C.M.C.
28+59	1 - C.B. Lt.		18" x 52' C.M.C.


Lt & Rt. 4-Line
16'
Sta. 42+41
End Gutter
Sta 42+27
42.7'
41.4'
86.4'
46' P.P. 40+87
26.5'
39.3'
40+82 Conc. G.R. 19'
and Wooden G.R. 23'
Paving — 41+14 to end — 744.46
39+50 G.R. 23'
35' P.P. 35+78
14.3'
22.2'
38+50 G.R. 28'
start Wooden G.R. 37+34 + 17'09 A.
24' P.P. 37+48
27.5'
23' Mail 8.+44
19' P.P. 36+16
27' P.P. 34+84
26' P.P. 33+53
Sta 42+27 to Sta 28+37 - 1411 Lin. Ft.
29' P.P. 32+21
31+20 Tr. 19'
+84 Tr. 18'
+47 Tr. 19'
+28 Tr. 22'
28' P.P. 30+88
30+11 Tr. 22'
+66 Tr. 23'
+55 Tr. 22'
+37 Tr. 24'
29+14 Tr. 21'
+73 Tr. 22'
24' P.P. 29+58
28+31 Tr. 21'
To Sta. 42+41 Rt.

12-7/23 Topog K.P. Line
23-69 cloudy & Cooler.

22+12 edge Frost Axe

21+83 edge Frost Axe

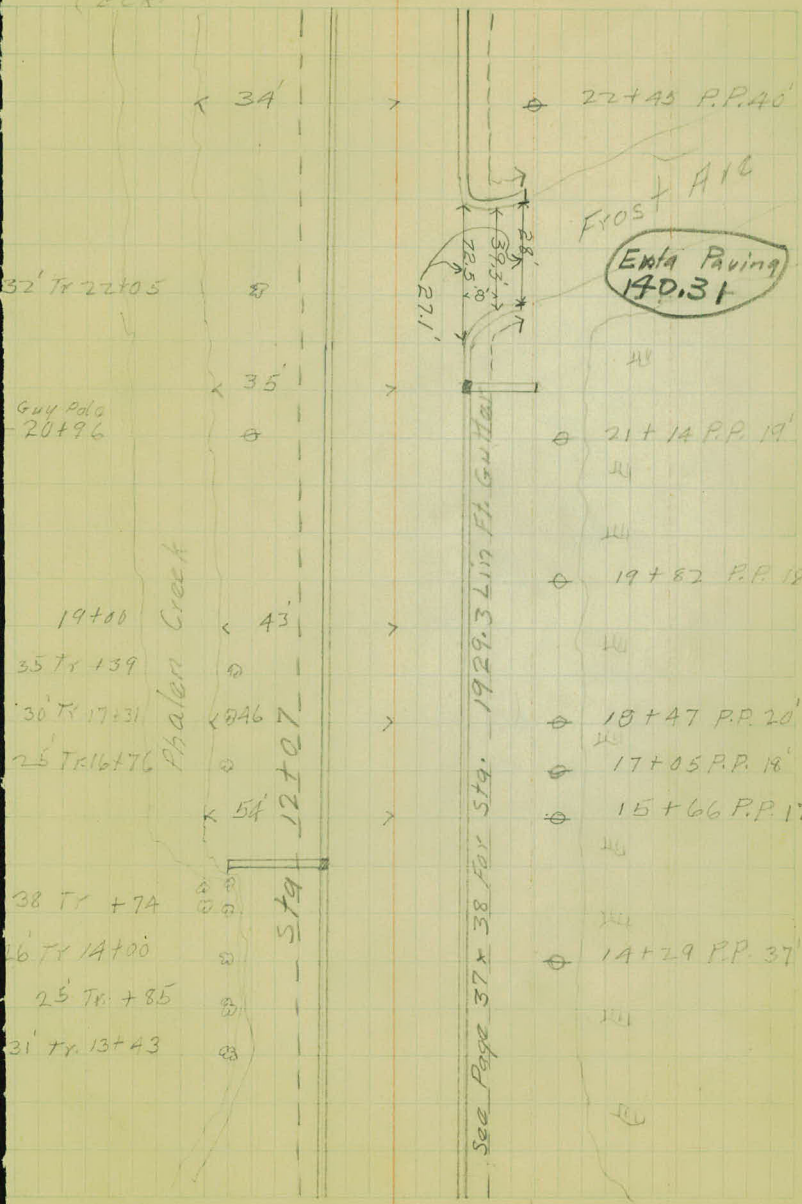
21+50 C.B. Rt 18" X 12' C.M.C.

14+88 1. C.B Lt. 18" X 18' C.M.C.

12+07

Jorgensen
Parsons
Briggs
E.C.K.

Lt & Rt K.P. Line



28+00

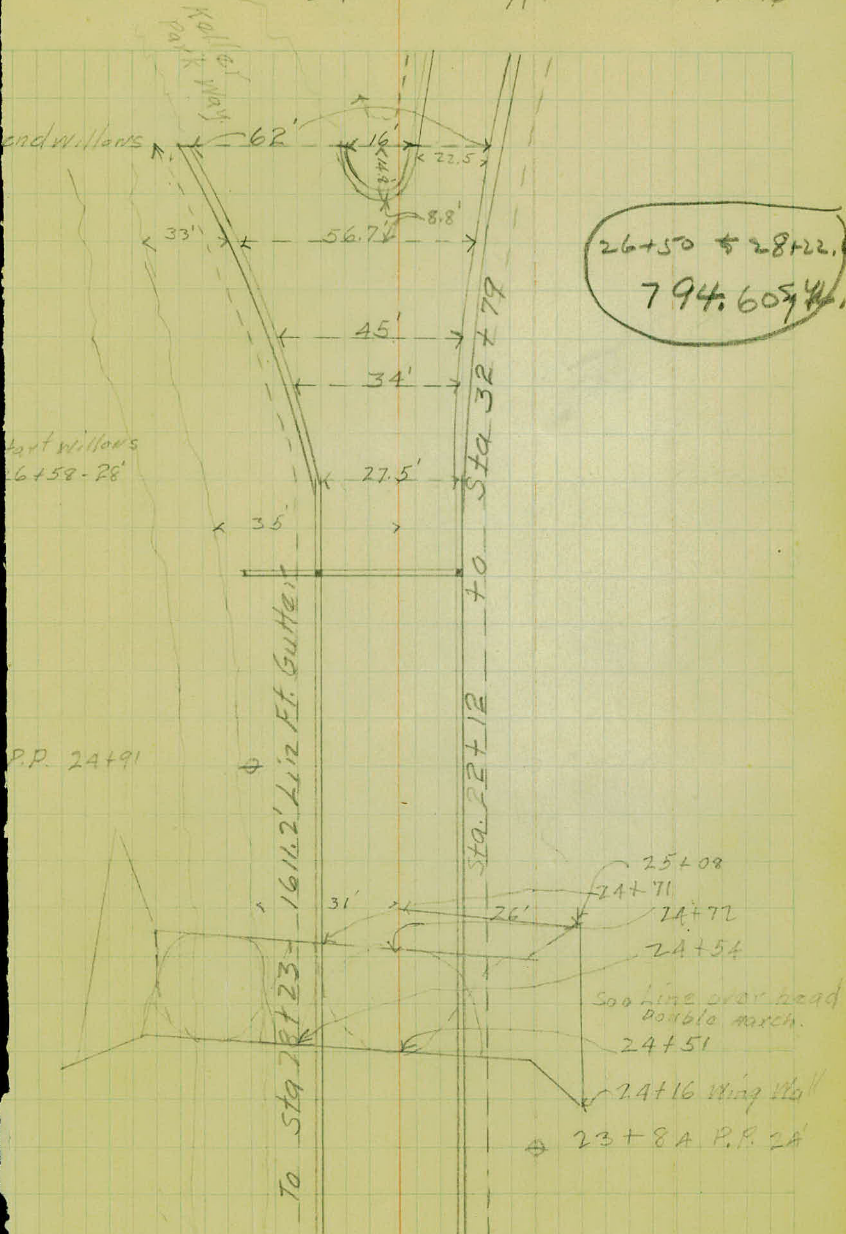
27+50

27+00

26+50

25+99 2. C.B. Rt. x Lt. 18" x 38' C.M.C.

Lt Rt. K.P. Line 41



+79

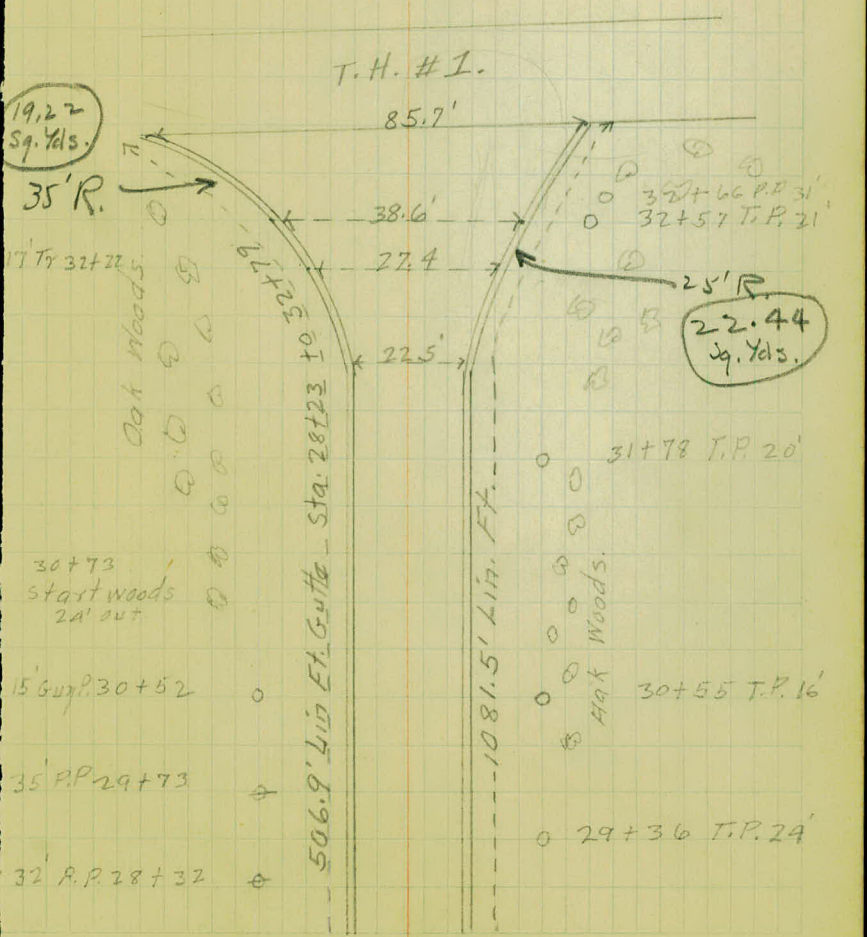
+68

+58

32+38

4t

℄ K.P. Line
Rt


T.H. #1.
85.7'
19,22 Sq. Yds.
35' R.
38.6'
27.4
22.5'
25' R
22.44 Sq. Yds.
32+66 P.P. 31'
32+57 T.P. 21'
17' Tr 32+22
Oak Woods
32+19
31+78 T.P. 20'
30+73 start woods 24' out
15' Guy P. 30+52
35' P.P. 29+73
32' P.P. 28+32
506.9' Lin. Ft. Gutter Sta. 28+23 to 32+19
1081.5' Lin. Ft.
Oak Woods
30+55 T.P. 16'
29+36 T.P. 24'

12-6-23 Final X Sec. K.P. Line

23-69	+S	H.I.	-S		
B.M.	8.67	179.95			171.28
12+05.7			0.5	79.5	
12+50			3.6	76.4	175.4
13			6.9	73.1	72.1
+50			8.8	71.2	70.2
14			9.3	70.7	69.8
T.P.	4.55	175.07	9.43	170.52	
+50			4.5	70.6	69.8
+99	Culv				
15			4.5	70.6	69.7
+50			4.5	70.6	69.7
16			4.5	70.6	69.6
+50			4.6	70.5	69.6
17			4.7	70.4	69.5
					169.72
+50			4.6	74.5	69.5

Note Final X Sec for Sta. 12+05.7, 12+50 - 13+00 same as these sta's on L. Line. See X Sec on L. Line

Lt ℄ (Jorgenson, Persons, Briggs, Ect. Rt. 46

Clear & Mild

Set in 6" Maple Rt. Sta. 137+45

14.6	11.4	8.9	9.1	9.3	9.2	(9.6)	8.6	8.6					
31	27	19	15.6	14.7	13.8		18	33					
	11.6	9.1	9.4	9.7	9.5	(10.2)	9.0	9.0					
	26	20	15.7	14.8	13.8		21	33					
7.9	4.3	4.6	4.9	4.7	(5.3)	4.6	4.7	4.5	4.1	6.2	8.9	7.9	
26	20	15.9	15	13.8		18	19.3	20.4	25	29	36	43	
				8.8									
				11.4									
7.5	7.0	4.3	4.7	4.9	4.8	(5.4)	4.7	4.9	4.7	4.5	9.5	9.8	
32	26	20	15.9	14.8	13.8		13.8	14.9	16.1	20	28	33	
7.2	5.9	4.4	4.6	4.9	4.7	(5.4)	4.7	4.9	4.6	4.5	7.0	8.1	
28	24	20	15.9	14.8	13.8		13.8	14.8	16	20	26	30	
6.0	5.8	4.9	4.7	4.9	4.8	(5.3)	4.8	4.9	4.7	4.5	6.9	7.3	
29	24	20	15.9	14.8	13.8		13.8	15	16.2	20	24	29	
6.5	6.4	4.8	4.7	5.0	4.8	(5.3)	4.9	5.2	4.8	4.5	7.6	7.7	
28	24	20	16	14.8	13.8		13.8	14.9	16	19	25	31	
6.5	5.9	4.7	4.8	5.1	4.9	(5.4)	5.0	5.1	4.9	4.7	8.3	8.8	
30	24	20	15.9	14.7	13.8		13.8	15.2	16.2	20	26	30	
T.P. Rt 17+06													
6.0	5.8	4.6	4.8	5.1	5.0	(5.6)	4.9	5.7	5.0	4.9	9.8	10.0	
29	24	20	15.8	14.7	13.8		13.8	15	16	20	28	31	

	+S	H.I. 175.07	-S		
18			4.8	70.3 ✓	69.4
+50			4.8	70.3 ✓	69.4
19			4.9	70.2 ✓	69.3
+50			4.8	70.3 ✓	69.3
20			4.9	70.2 ✓	69.2
+50			4.9	70.2 ✓	69.2
21		✓	5.0	70.1 ✓	69.1
T.P.	4.58	174.45	5.20	169.87 ✓	
+50			4.6	69.9 ✓	69.1
+51	Culv.				
22			4.4	70.1 ✓	69.0
B.M.			4.71	169.74 ✓	169.75
+50			4.5	70.0 ✓	69.0
23			4.6	69.9 ✓	68.9
+50			4.7	69.8 ✓	68.9

Lt ℄ Rt.

7.1/28 6.2/23 4.9/19 4.8/16 5.2/14.5 5.0/13.8 (5.7) 5.1/13.8 5.2/15.2 5.0/16.3 4.9/20 9.8/27 10.1/31

5.4/26 5.3/23 4.7/20 5.0/16 5.2/14.6 5.1/13.7 (5.7) 5.1/13.8 5.2/15.2 5.0/16.3 4.8/20 9.2/28 9.8/32

5.6/26 5.4/22 4.7/20 5.0/15.8 5.2/14.7 5.1/13.8 (5.8) 5.1/13.8 5.3/15 5.1/16.2 4.0/20 9.7/29 10.0/32

5.7/28 5.1/24 4.8/20 5.0/15.9 5.3/14.7 5.1/13.8 (5.8) 5.1/14 5.3/15 5.1/16.2 5.0/20 9.0/25 9.9/30

6.6/27 5.2/24 4.8/20 5.1/15.7 5.4/14.5 5.2/13.8 (5.9) 5.2/13.8 5.4/15.4 5.1/16.4 4.9/20 8.5/25 9.0/30

6.4/25 5.7/23 4.8/20 5.2/15.7 5.4/14.7 5.2/13.8 (5.9) 5.3/13.8 5.4/15.2 5.3/16.3 5.1/20 5.1/26 8.8/30

6.4/26 6.0/24 4.9/20 5.2/15.6 5.4/14.5 5.3/13.8 (6.0) 5.3/14 5.4/15.2 5.2/16.2 5.1/20 7.6/24 8.6/28

5.9/28 5.4/23 4.3/20 4.6/16 4.9/15 4.7/13.8 (5.4) 4.7/13.8 4.9/14.7 4.6/15.7 4.3/20 7.0/27 7.7/32

7.4/11 Rt. end Fill Rt 21+75

6.6/29 5.6/24 4.4/20 4.7/15.8 5.0 4.0/14.7 4.8/13.8 (5.5) 4.4/17 4.5/41 4.6/61 5.5/74

Cut to 22+20

Spk in tree 100' Rt 22+10

9.8/32 5.9/26 4.6/20 4.8/16 5.0/14.7 4.8/13.8 (5.5) 4.9/13.8 5.0/14.6 4.8/15.6 4.8/19 6.4/22 7.0/31 6.7/53 5.2/60

10.8/34 7.5/28 4.5/20 4.8/15.8 5.1/14.7 4.9/13.8 (5.6) 4.9/13.8 5.1/15 4.9/16 4.6/20 6.8/27 6.6/38 5.9/50 5.5/52

Ice.

11.0/29 4.6/20 4.9/15.9 5.1/14.8 5.0/13.8 (5.6) 5.0/13.8 5.1/14.9 4.9/16 4.5/20 4.8/27 5.7/35 5.2/40 5.7/4.3

	+S	H.I. 174.45	−S		
24			4.7	698 ✓	68.8
+17			4.8	69.7 ✓	68.8
+50		✓	4.8	69.7 ✓	68.8
T.P.	5.66	176.25	3.86	170.59 ✓	
+75			6.6	69.7 ✓	68.7
25+10			6.7	69.6 ✓	68.7
25+00			6.7	69.6 ✓	68.7
+50			6.7	69.6 ✓	68.7
26			6.8	69.5 ✓	68.6
26+00	Culv.		~~6.6~~		
+50			6.6	69.7 ✓	68.7
27			6.1	70.2 ✓	69.2
+50			5.4	70.9 ✓	70.2
28			4.3	72.0 ✓	71.6

Lt ℄ Rt.

Ice.
10.9/31 9.5/28 4.8/20 5.0/15.6 5.2/14.6 5.0/13.8 (5.7) 5.0/14.2 5.2/15.2 4.9/16.2 4.4/21 4.1/31 2.4/40 2.4/43

W. Wall.

Ice
10.9/31 9.8/29 4.9/20 5.0/16 5.3/15 5.1/14 (5.7) 5.0/13.8 5.2/14.6 5.0/15.6 4.3/25 7.1/25

Ice
32 (11.0/22) 9.8/20 5.0/15.9 5.3/15 5.1/13.8 (5.7) 5.1/13.8 5.2/15 5.0/16

12.1/29 6.1/20 6.8/16 7.1/14.6 6.9/13.8 (7.6) 6.9/13.7 7.1/14.6 6.8/15.7

Ice.
12.6/32 11.3/27 6.6/20 6.9/16.3 7.1/15 6.9/13.8 (7.6) 6.9/13.7 7.1/14.7 6.8/15.8 6.6/21 6.1/25 2.6/33

12.6/30 6.6/20 6.9/16.3 7.2/15 6.9/13.8 (7.6) 6.9/13.7 7.1/14.7 6.8/15.8 6.2/25

12.6/29 6.4/20 6.9/16 7.1/15 6.9/14 (7.6) 6.9/13.8 7.1/14.9 6.9/16 7.0/33

12.6/30 6.8/21 7.0/16.7 7.3/15.7 7.1/14.6 (7.7) 7.0/13.8 7.2/14.2 6.9/15.5 6.8/33

11.4
Inv.
12.6/33 8.8/27 6.5/20 6.8/16.2 7.0/16.2 6.8/13.9 (7.6) 6.8/13.7 7.0/14.6 6.7/15.8 6.5/24 6.6/33

12.0/35 6.0/26 6.3/22.3 6.6/21.3 6.4/20.3 (7.1) 6.3/13.8 6.4/14.8 6.2/15.9 5.4/23 5.2/33

9.7/43 6.2/37 6.4/33.4 6.6/32.5 6.5/31.4 5.7/15 (6.1) 5.5/13.8 5.6/15 5.3/15.9 4.9/23 4.9/33

8.2/57 6.5/52 6.5/47.3 6.8/46.7 6.6/46.3 5.9/23.9 5.1/12.6 (4.7) 4.0/12 4.1/13 3.9/14 3.6/20 3.3/30

	+S	H.I.	-S		
		176.25			
28+50			2.4	73.9	73.3
T.P.	11.17	186.47	0.95	175.30	
29			10.6	75.9	75.0
+50			9.0	77.5	76.7
30			7.3	79.2	78.4
+50			5.6	80.9	80.1
31			3.8	82.7	81.8
T.P.	9.67	192.61	3.53	182.94	
+50			8.3	84.3	83.5
32			6.6	86.0	85.2
+25			5.8	86.8	86.1
+38			5.3	87.3	86.5
+79			4.2	88.4	87.9
B.M.			4.80	187.81	187.82

Lt & Rt

7.4 6.9 2.1 2.5 2.7 2.6 (3.0) 2.4 2.5 2.3 2.0
30 27 18 13.4 12.6 11.3 11.3 12.4 13.4 25

18.6 17.0 10.3 10.8 11.1 10.7 (11.5) 10.8 11.0 10.8 10.3
28 20 17.4 13.4 12.5 11.3 11.3 12.3 13.3 19

18.5 12.0 8.8 9.2 9.4 9.2 (9.8) 9.2 9.4 9.1 8.8
30 22 18 13.7 12.6 11.6 11.3 12.4 13.2 18

18.8 12.0 7.1 7.4 7.7 7.5 (8.1) 7.4 7.6 7.4 6.9 6.8 7.2
35 25 18 13.7 12.7 11.5 11.3 12.3 13.2 18 25 30

7.6 6.3 6.7 6.9 6.7 (6.4) 6.8 6.0 5.7 5.3 8.8
22 17 13.6 13.1 12.2 11.3 12.3 13.3 18 27

8.8 7.2 3.5 4.0 4.2 4.0 (4.7) 4.9 4.7 4.9 3.7 12.3
30 25 18 13.8 12.8 11.8 11.3 12.5 13.4 18 30

11.0 10.7 8.9 8.5 8.8 8.5 (9.1) 8.5 8.7 8.5 8.1 14.3
27 21 17 13.6 12.5 11.4 11.3 12.3 13.3 17.4 27

5.6 7.5 7.8 6.4 6.8 7.0 6.8 (7.4) 6.8 7.9 6.7 6.1 8.7 9.4
34 29 20 18 13.8 12.4 11.4 11.3 12.5 13.5 18 22 26

3.6 6.0 6.8 6.7 6.0 (6.5) 6.0 6.1 5.8 5.3 6.8 6.8
31 26 13.6 12.5 11.3 11.3 12.3 13.3 18 21 25

2.9 2.8 5.8 6.0 5.9 6.5 5.7 5.6 (6.1) 5.5 5.6 5.4 4.8 6.1 6.0
33 30 28 21 18 13.8 12.9 11.9 11.3 12.2 13.3 17 21 23

4.7 (4.7) 3.4
32 44

Final / X Sec.

Jorgenson, Peirsons, Briggs, Eck.

23-69	+ S	H.I.	℄ Rod − S	Elv.	
B.M.	0.59	176.28			175.69
1+94			6.5	69.8	69.3
2+50			6.8	69.5	68.7
3			6.9	69.4	68.5
+00	Culv.				
+50			6.8	69.5	68.6
T.P.					168.93
4			6.8	69.5	68.6
T.P.	5.52	174.87	6.93	169.35	
+50			5.3	69.6	68.7
5			5.3	69.6	68.7
+50			5.2	69.7	68.8
6			5.1	69.8	68.8
+50			5.0	69.9	68.9
7			4.9	70.0	68.9

12/5/23 Clear & Mild L.K.R. Line.

Spike in Pole Lt Sta 0+75

3.4	4.4	6.4	6.9	6.8	(10)	6.9	06.9	6.5	6.5	6.3	7.1	7.5	
26	23	17.4	16.9	16.8		15.1	16.9	17	17.4	21.5	24	26	
4.1	6.1	6.9	7.1	7.0	(9)	7.1	7.3	7.0	6.8	10.5	11.0		
27	21	16	15	14		14	15	16.2	20	26	30		
4.6	5.3	6.5	7.1	7.9	7.2	(8)	7.3		7.4	7.2	7.1	7.1	
30	29	23	16	14.8	13.7		13.8		14.7	15.9	19	26	
							11.4						
5.1	5.7	6.5	7.0	7.3	7.1	(7)	INV. 22'		7.1	7.7	7.0	6.7	10.9
29	28	24	16.1	15	13.8				13.9	14.8	15.9	19	26

Spike in Pole Rt Sta 3+70

1.3	3.8	6.7	7.0	7.2	7.9	(11)	7.0	7.2	6.9	6.7	10.7		
29	26	20	16.2	15	14		13.8	14.8	15.9	19.6	25		
0.6	5.5	5.2	5.5	5.7	5.5	(62)	5.6	5.7	5.5	5.2	9.2		
28	22	20	15.9	14.9	14		13.8	14.9	15.8	20	26		
0.0	5.2	5.1	5.5	5.6	5.5	(63)	5.5	5.7	5.4	5.2	8.9	9.4	
31	23	19.8	15.9	14.7	13.8		13.8	14.8	15.9	20	26	31	
2.3	2.8	4.2	5.0	5.4	5.4	5.4	(61)	5.5	5.6	5.4	5.2	7.2	6.7	9.1
32	28	26	21	16	14.9	13.8		13.8	14.7	15.8	20	23	24	28
4.9	4.9	5.6	5.8	5.0	5.3	5.5	5.4	(61)	5.5	5.6	5.3	5.2	7.0	7.0	9.2
28	26	25	21	20	15.9	14.7	13.8		13.8	14.7	15.6	19.6	23	26	29
4.9	5.0	5.8	4.9	5.2	5.5	5.3	(60)	5.3	5.5	5.2	4.8	9.2	9.8	
28	26	25	20	15.9	14.7	13.8		13.8	14.7	15.7	20	26	30	
5.4	6.2	4.8	5.1	5.4	5.2	(60)	5.2		5.4	5.2	4.9	9.6	10.6	
32	24	20	15.8	14.8	13.8		13.8		14.9	15.9	20	26	30	

	+ S	H.I.	- S	Elev.	
		174.87			
7+50			4.9	70.0 ✓	69.1
7 75			4.7	70.2 ✓	69.2
8			4.6	70.3 ✓	69.4
+50			4.2	70.7 ✓	69.9
+75			3.9	71.0 ✓	70.2
9+00			3.4	71.5 ✓	70.5
+50			2.6	72.3 ✓	71.3
T.P.	9.38	182.58 ✓	1.67	173.20 ✓	173.21
10			9.1	73.5 ✓	72.6
+50			7.0	75.6 ✓	74.5
11			4.4	78.2 ✓	77.2
+20	Bridge abut.		3.3	79.3 ✓	78.5
T.P.	3.26	180.72 ✓	5.12	177.46 ✓	
12+07	Bridge abut.		1.5	79.5 ✓ 79.2	78.4

℄

Lt. Rt.

+2.3/31 0.0/29 4.4/25 5.0/15.7 5.3/14.6 5.1/13.8 (5.8) 5.1/13.8 5.2/14.8 5.0/15.7 4.7/20 7.0/25 9.6/28 9.9/32

+4.5/34 0.0/31 4.3/26 4.9/16 5.2/14.9 5.0/13.8 (5.7) 5.0/13.8 5.1/14.6 4.9/15.9 4.7/20 5.5/21 5.8/25

+4.6 0.0/30 4.4/25 4.4/20 4.8/15.7 5.0/14.6 4.8/13.7 (5.5) 4.9/13.8 5.0/14.8 4.8/15.7 4.6/19 5.4/22 5.7/27

5.2/29 5.7/25 4.0/20 4.3/15.8 4.5/14.7 4.3/13.8 (5.0) 4.3/13.8 4.5/14.8 4.3/15.9 3.9/20 4.8/24 5.1/30

5.7/33 4.0/21 4.0/15.7 4.3/14.7 4.1/13.8 (4.7) 4.0/13.8 4.1/14.8 3.9/15.8 3.7/19.6 4.6/22 4.2/30

7.6/34 7.2/28 3.4/20 3.7/16 3.9/14.9 3.8/13.8 (4.4) 3.7/13.8 3.8/14.7 3.6/15.7 3.5/20 4.2/22 4.4/28

4.5/28 4.3/25 2.4/20 2.9/15.9 3.1/14.8 2.9/13.8 (3.6) 2.9/13.8 3.1/14.8 2.9/15.8 2.7/20 3.6/23 3.6/28

P. Rt. 9 + 9.5

10.7/28 10.4/25 9.0/20 9.2/15.9 9.5/14.8 9.3/13.8 (10.0) 9.3/13.8 9.5/14.8 9.3/15.8 9.1/20 9.7/23 10.0/29

9.4/31 8.5/25 6.9/20 7.2/15.8 7.5/14.7 7.3/13.8 (8.1) 7.4/13.8 7.6/14.8 7.3/16 7.0/20 7.8/24 7.9/29

6.1/23 4.3/20 4.6/15.9 4.8/14.7 4.7/13.8 (5.4) 4.6/13.7 4.8/14.8 4.6/15.9 3.8/22 5.0/25 5.8/28

9.5/33 9.0/27 3.2/17 3.3/16 3.3/14.4 (4.1) 3.2/14.2 3.2/16 3.2/22 10.5/32 11.3/38

13.9/38 11.4/32 1.3/16.3 1.5/15.2 1.4/14 (2.3) 1.5/14 1.6/15 1.4/16.3 1.6/24 7.4/32 9.3/40

	+ S	H.I.	- S		
		180.72			
12+25			2.6	78.1	77.1
+50			4.4	76.3	75.4
13			7.7	73.0	72.3
T.P.	4.66	175.94	9.44	171.28	
+50			4.4	71.5	70.7
14			4.8	71.1	70.2
+50			4.8	71.1	70.1
15			5.0	70.9	69.9
B.M.	✓		9.44	171.28	171.28
+50			5.1	70.8	69.8
16			5.2	70.7	69.6
+50			5.4	70.5	69.3
17			5.5	70.4	69.3
+50			5.8	70.1	69.2
T.P.	5.17	175.15	5.96	169.98	

Lt & Rt

10.4 7.9 2.3 3.8 3.0 2.8 (3.6) 2.7 2.9 2.7 2.3 5.6 7.9 8.8
39 27 20 16.8 15.7 14.5 13.7 14.9 16 24 30 38 46

8.6 5.8 4.0 4.6 4.8 4.7 (5.3) 4.6 4.8 4.5 4.9 7.1 7.3
38 26 22 18.7 17.5 16.9 13.8 14.9 15.9 20 27 31

11.2 11.0 8.3 8.3 8.5 8.3 (8.4) 7.7 7.9 7.6 7.4 9.2 9.8
44 41 34 30 29 27.9 13.7 14.9 15.8 20 27 32

4.8 4.6 (5.3) 4.5 4.7 4.5 4.2 5.0 6.1
33 16 13.7 14.7 15.8 20 24 33

5.1 4.8 (5.7) 5.1 5.2 5.0 4.8 5.4 6.1
50 20 13.8 14.7 15.7 20 25 30

6.1 5.8 4.8 5.1 5.3 5.2 (5.8) 5.2 5.4 5.1 4.8 5.1 6.8 7.1
35 27 24 20 19.3 18.3 13.7 14.8 15.7 20 25 32 34

6.2 5.7 4.7 5.1 5.3 5.3 (6.0) 5.4 5.5 5.3 5.1 6.8 7.4
26 23 20 16 15 14 14 14.9 15.9 23 30 34

Spk in 6" Flm 13+45

7.0 6.6 5.6 5.6 5.7 5.5 (6.1) 5.5 5.7 5.5 5.2 7.6 8.2
33 28 22 16 15 14 13.8 14.8 15.8 20 31 34

7.4 7.0 5.3 5.6 5.8 5.7 (6.3) 5.6 5.8 5.5 5.3 6.5 7.3
32 26 20 15.4 15 13.8 13.8 14.9 16 21 28 34

7.0 6.5 5.4 5.7 6.0 5.7 (6.4) 5.8 6.0 5.8 5.5 6.7 6.7
30 25 20 15.9 14.8 13.8 13.8 15 16 20 26 30

6.4 6.0 6.8 6.0 5.8 (6.6) 5.9 6.1 5.9 5.5 6.7 7.5
27 22 19 15 13.9 13.8 14.8 15.7 20 27 31

6.0 5.6 5.6 6.3 6.2 6.0 (6.7) 6.0 6.2 6.0 5.9 6.8
30 26 21 16 15 13.8 13.8 14.9 16 21 25

	+S	HI 175.15	−S ∠ Rod		
18+00			5.1	70.1 ✓	69.1
+50			5.3	69.9 ✓	69.0
19			5.3	69.9 ✓	69.0
19+02	Culv.				
+50			5.1	70.1 ✓	69.0
20			5.0	70.2 ✓	69.1
+50			4.9	70.2 ✓	69.2
21			5.0	70.2 ✓	69.3
+50			4.9	70.3 ✓	69.5
22			4.7	70.5 ✓	69.6
+50			4.5	70.7 ✓	69.8
23			4.4	70.8 ✓	69.9
T.P.	6.15	176.80 ✓	4.50	170.65 ✓	
+50			5.9	70.9 ✓	70.1
24			5.7	71.1 ✓	70.2

4.3 5.4 5.0 5.3 5.5 5.9 (6.1) 5.4 5.6 5.9 5.1 6.4 6.9
34 32 20 16 15 13.8 13.8 14.8 15.7 20 26 28

5.4 5.9 6.1 6.0 5.1 5.3 5.6 5.4 (6.2) 5.4 5.6 5.9 5.3 6.6 7.0
18 26 27 23 20 16 15 13.8 13.8 15 16 20 25 29

5.9 6.5 7.0 6.6 5.2 5.4 5.6 6.5 (6.3) 5.5 5.6 5.9 5.1 6.8 8.0
45 42 35 22 20 16 15 13.8 13.8 14.8 15.9 20 28 33
8.9
14.8

7.2 6.9 5.2 5.3 5.6 5.4 (6.3) 5.4 5.6 5.4 5.2 7.7 8.9
32 25 20 16 14.9 13.8 13.8 14.9 15.9 20 31 36

7.3 7.1 5.1 5.3 5.6 5.4 (6.1) 5.4 5.6 5.3 4.9 6.1
30 25 20 15.9 14.8 13.8 13.8 14.9 15.9 20 28

7.4 6.8 5.2 5.2 5.3 5.3 (6.0) 5.3 5.3 5.2 5.0 5.6 7.2 10.1
35 26 20 15.7 14.9 13.8 13.8 14.8 15.9 20 26 34 39

11.6 8.0 4.9 4.8 5.1 5.4 (5.9) 5.2 5.1 4.7 5.1 8.7
35 33 26 15.7 15.9 14.9 13.8 13.7 14.6 15.9 20 26 32

14.0 8.0 4.7 5.0 5.3 5.2 (5.7) 5.1 5.2 4.9 4.6 5.1 8.5
33 28 24 15.7 14.7 13.8 13.8 14.9 15.9 20 24 34

11.5 4.9 4.6 4.8 5.0 4.8 (5.6) 4.9 5.0 4.8 4.4 5.9 4.7
39 31 20 15.7 14.6 13.8 13.8 14.9 15.9 20 27 28

3.7 4.4 4.4 4.7 4.9 4.7 (5.4) 4.7 4.9 4.6 4.4 5.2 4.9
32 26 19 13.8 14.9 13.8 13.8 15 16 20 26 29

5.5 4.7 4.1 4.6 4.8 4.6 (5.3) 4.6 4.8 4.6 4.2 5.5 5.3 8.6
41 33 20 16 15 13.8 13.8 14.8 15.9 20 23 27 34

5.4 5.6 6.1 6.3 6.1 (6.1) 6.1 6.3 6.0 5.9 7.2 6.1 6.1
30 20 16 14.9 13.8 13.8 14.7 15.8 19.8 22 28 30

2.7 2.7 5.4 5.9 6.0 5.9 (6.6) 5.9 6.1 5.9 5.7 6.7 6.8 5.8
30 27 23 16 15 13.8 13.8 15 16 20 25 27 30

	+S	H.I.	Rod −S		
		176.80			
24+50			5.6	71.2	70.4
+75			5.6	71.2	70.4
25			5.4	71.4	70.5
+25			5.2	71.6	70.6
+50			5.2	71.6	70.7
+62	Culv				
26+00			5.2	71.6	70.8
+50			5.0	71.8	71.0
27			4.9	71.9	71.1
+50			4.7	72.1	71.3
28			4.4	72.4	71.5
B.M.			5.06	171.74	171.77
+50			4.1	72.7	71.9
+58	Culv.				
29			3.6	73.2	72.4
T.P.	5.42	179.02	3.20	173.60	
+50			5.3	73.7	72.9

LT ℄ RT.

+1.5 0.0 5.5 5.8 6.0 5.8 (6.4) 5.9 6.0 6.7 5.5 6.5 5.8
31 29 22 16 15 13.8 13.8 14.9 15.9 20 25 33

+1.1 2.4 5.4 5.7 5.9 5.8 (6.4) 5.8 5.9 5.7 5.3 5.9 5.6
4.9 31 26 16 15 13.8 13.8 14.7 15.8 20 26 33

3.1 4.7 5.1 (6.3) 5.6 5.8 5.6 5.3 5.5 5.2
4.8 34 13.8 13.8 14.9 15.9 23 31 34

4.5 4.7 5.0 (6.2) 5.5 5.7 5.5 5.2 5.3 5.7
43 33 13.8 13.8 14.9 15.9 20 34 36

+6.9 0.0 4.8 5.3 5.6 5.4 (6.1) 5.4 5.6 5.4 5.1 5.4
40 31 25 15.9 14.8 13.8 13.8 14.8 15.8 20 33

9.3
INV

+5.4 0.0 0.0 4.6 5.2 5.5 5.3 (6.0) 5.4 5.5 5.2 5.0 4.7
40 34 28 23 15.9 14.8 13.8 13.8 14.8 15.7 20 30

+3.9 0.0 4.8 5.1 5.4 5.2 (5.8) 5.2 5.3 5.1 4.7 4.3
34 29 25 15.9 14.8 13.8 13.8 14.8 15.9 20 28

4.2 4.6 4.7 5.0 5.2 5.1 (5.7) 5.1 5.2 5.0 4.7 4.4
30 28 20 15.9 14.9 13.8 13.8 14.9 16 21 27

5.3 5.0 4.5 4.9 5.1 4.9 (5.3) 4.9 5.1 4.8 4.6 4.2 4.9
14 30 20 15.9 14.9 13.8 13.7 15 16 20 27 29

4.5 4.1 4.4 4.7 4.6 (5.3) 4.7 4.9 4.6 4.3
41 31 22 20 13.8 13.8 14 16 20

spt 6" Elm. Rt. sta 24+12

0.5 2.8 3.7 4.2 4.5 4.4 (4.9) 4.2 4.4 4.2 4.0 4.4 4.8
54 48 29 16 15 13.8 13.8 15 15.9 20 24 32

8.70
INV

1.5 3.5 3.3 3.8 4.0 3.9 (4.4) 3.9 4.0 3.8 3.6 4.5 4.6
49 41 24 15.8 14.8 13.8 13.8 14.9 16 20 25 32

0.7 5.1 5.6 5.1 5.4 5.6 5.4 (6.1) 5.4 5.6 5.4 5.2 6.2 6.3
38 32 25 21 16 15 14 13.8 14.9 15.9 20 22 25

	+S	H.I	-S		
		179.02			
30			4.8	74.2	73.4
+50			4.6	74.4	73.7
31			4.6	74.4	73.6
+50			4.9	74.1	73.1
32			5.3	73.7	72.8
+50			5.4	73.6	72.8
+51	Culv.				
33			5.3	73.7	72.9
+50			5.0	74.0	73.1
34			5.0	74.0	73.2
+50			4.8	74.2	73.4
B.M.			5.03	173.99	174.01
35			4.3	74.7	73.8
+45	Culv.				
+50			3.6	75.4	74.6
T.P.	10.55	186.87	2.70	176.32	

Lt & Rt.

+4.3 1.0 4.7 4.9 5.2 5.0 (5.0) 5.0 5.2 4.9 4.5 5.1
39 31 25 16 14.8 13.8 13.8 14.8 15.8 20 25

+5.9 0.0 4.2 4.5 4.7 4.9 4.8 (5.3) 4.8 5.0 4.7 4.4 8.6
43 35 29 21 16 14.9 13.8 13.8 15 16 20 27

+3.2 1.0 4.4 4.6 4.8 5.0 4.8 (5.4) 4.8 5.0 4.8 4.4 5.2 7.4
39 32 27 20 15.9 14.9 13.8 13.8 14.8 15.7 20 23 30

+1.6 0.0 4.8 4.8 5.2 5.4 5.3 (5.1) 5.2 5.4 5.2 4.8 5.8 7.4
39 37 32 20 16 15 14 13.8 14.8 15.9 20 25 28

2.8 5.4 5.6 6.4 5.2 5.5 5.7 5.6 (5.6) 5.6 5.7 5.5 5.3 7.0
49 46 38 25 20 16.1 15 13.8 13.8 14.8 15.8 20 25

7.2 7.2 5.3 5.6 5.8 5.7 (6.2) 5.6 5.8 5.6 5.2 7.1 10.2
29 26 20 16 14.9 13.8 13.8 14.9 16 20 26
10.2 INV.

7.6 7.4 5.2 5.4 5.6 5.5 (6.1) 5.5 5.7 5.4 5.1 7.3 7.5
28 26 20 16.1 15 14 13.8 14.8 15.9 20 24 29

7.4 6.4 4.9 5.2 5.5 5.4 (5.4) 5.4 5.6 5.2 5.1 8.0 8.1
26 23 20 16.2 14.9 13.8 13.8 14.8 16 20 25 28

8.7 8.3 4.9 5.2 5.4 5.3 (5.8) 5.2 5.4 5.1 4.9 7.4 7.9
33 27 20 16 15 13.8 13.8 14.9 15.9 20 25 28

8.1 7.7 4.7 5.0 5.3 5.1 (5.0) 5.0 5.2 4.9 4.7 7.4 8.0
31 24 20 15.8 14.9 13.7 13.8 14.9 16 20 25 26

Spt in Pole Lt 34 +80
8.0 7.6 4.3 4.6 4.8 4.7 (5.3) 4.7 4.8 4.5 4.2 7.0 9.5
31 25 20 16 14.9 13.8 13.8 15 16 20 24 27
no opening 16.A INV

8.2 8.0 3.A 3.9 A.1 3.9 (4.4) 3.9 4.0 3.7 3.5 9.5 10.8
31 28 20 16 15 13.8 13.8 15 16 20 29 31

	+S	H.I. 186.87	℄ Rod − S.		
36			10.2	76.7	75.9
+50			8.6	78.3	77.5
37			6.8	80.1	79.5
+50			4.3	82.6	81.8
38			1.9	85.0	84.3
T.P.	9.75	194.75	1.87	185.00	
+50			7.7	87.1	86.1
39			6.0	88.8	87.9
+50			5.2	89.6	88.8
40			4.9	89.9	89.9
+50			4.9	89.9	89.0
41			4.9	89.9	89.0
+50			4.8	90.0	89.1

Lt ℄ Rt.

14.0	10.2	14.9	20.7	10.5	(11.0) 10.6	10.7	14.5	20.0	12.0	20.7
27	20	11	15	13.8	13.8	14.9	15.9	20	23	36
10.9	11.1	9.7	8.8	9.1	8.9 (9.4) 9.0	9.2	8.9	8.3	12.0	22.1
31	26	21	16	14.9	13.8 13.8	14.9	15.9	20	25	38
7.6	7.5	6.6	6.9	7.1	6.7 (7.4) 7.1	7.3	7.0	6.6	12.0	21.9
30	25	20	16.3	15	13.8 13.8	15	16	20	28	41
2.7	3.0	4.1	4.7	5.0	4.7 (5.1) 4.5	4.6	4.4	4.1	8.1	9.2
29	24	23	16.2	15	13.8 13.8	15	16	20	25	29
2.2	2.0	2.4	2.1	2.3	2.1 (2.6) 2.1	2.3	2.0	2.0	2.7	2.8
33	32	30	26	16.3	15 13.8 13.8	15	16.2	21	23	25
7.7	7.5	7.7	8.0	8.3	8.1 (7.7) 8.0	8.2	8.0	7.7	7.3	8.1
37	33	21	16	14.9	13.9 13.8	14.8	15.9	20	27	30
3.4	6.4	6.0	6.3	6.4	6.2 (6.9) 6.3	6.5	6.3	5.8	6.0
37	33	19	16.4	15.4	14 13.8	14.8	15.8	20	26
3.8	5.9	5.4	5.4	5.6	5.4 (6.0) 5.4	5.6	5.3	5.2	5.6
40	38	20	16.2	15.2	14.2 13.8	14.8	15.7	22	23
5.4	5.2	5.2	6.4	5.2	(5.9) 5.2	5.4	5.1	5.0	5.6
38	22	16	14.9	13.8	13.8	14.8	16	20	23
5.2	5.1	5.1	5.3	5.1	(5.8) 5.2	5.4	5.1	5.1	5.4
40	27	16.2	14.9	13.8	13.9	14.9	15.9	21	22
5.1	5.1	5.1	5.3	5.1	(5.8) 5.1	5.3	5.1	5.0	5.2
41	28	16	15	14	13.8	14.9	16	20	26
5.2	5.1	5.0	5.3	5.1	(5.7) 5.1	5.3	5.1	5.1	5.0	6.3	7.4
40	23	16.3	15.3	14.4	21.5	22.8	24	28	32	34

194.75

42		4.8	90.0 ✓	89.1
+41.	End. Para.	4.9	89.9 ✓	89.1
+47	end Cut			
B.M.		0.75	194.00 ✓	194.05

End days work 12/5/23

4.9	4.8	4.9	5.2	5.0	4.8	5.7	4.9	5.2	5.4	5.2	4.9	5.0	7.5	
50	35	29	27.7	26.7	14		15	39.4	40.4	41.5	47	50	55	

4.6	4.7	4.8	5.7	5.0	5.1	6.0	6.12
45	24	14		17	32	46	50

Spl T.P. Lt. 42+80

Alignment on the L. K. P Line.

14+73.0 P. T. = 14+73.0 on the K. P. Line

13+61.5 P. I. Δ III° 22' ✓

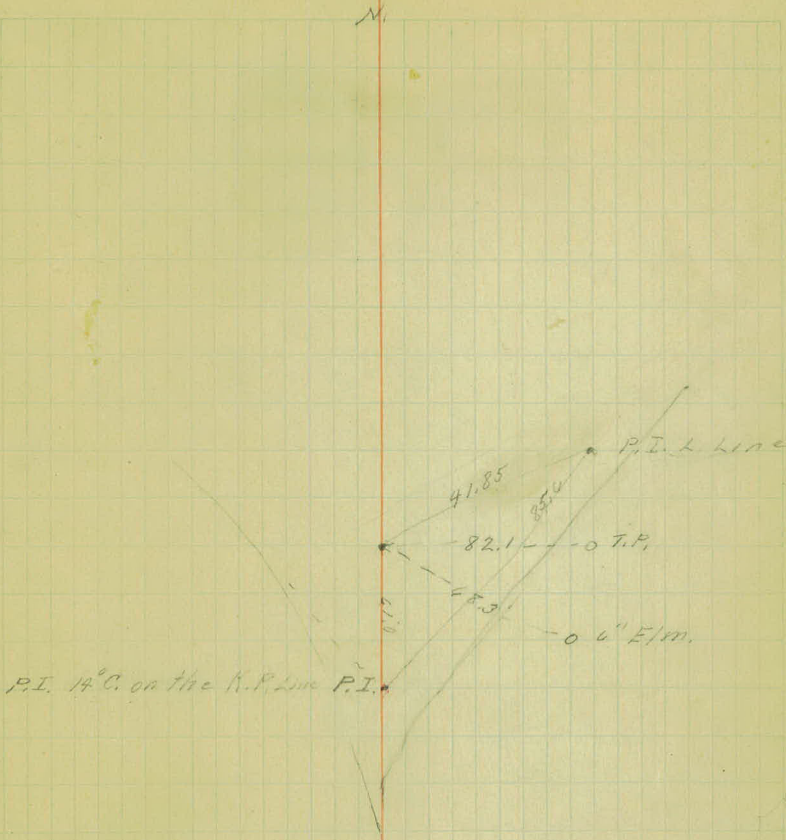
D 80

T. 111.5

L. 139.2

13+33.3 P. C.

12+82.3 = 14+96.9 on the Line


N.
P.I. L Line
41.85
85.4
82.1
T.P.
48.3
6" Elm.
P.I. 14°C. on the K.P. Line P.I.

Alignment on the K. P. line
From Sta 12+05.7 to End of Proj.

Sta.	Point	left	Right	
19+53.0	P.T.			Δ 8°-48'
				D. 4°-L.
18+42.2	P.I.	8°-48'		T. 110.2'
				L. 220.6'
17+33.0 ✓	P.C.			
13+77.7	P.T.			Δ 27°-07'
				D. 14° L.
13+05.4	P.I.	27°-07'		T. 98.9'
				L. 193.7'
12+05.7	P.C.	= 12+05.7 On the L. line		

K.P. Line

R.P.

40.0

28.8

5" Stump

16.27

30.67

6" Will

17+33
+50 6°-20.4'
+25 6°-50.4'
18
+25 1°-20.4'
+50 1°-50.4'
+75 2°-20.4'
19 2°-50.4'
+25 3°-20.4'
+50 3°-50.4'
+75 4°-20.4'

13+79.4 cc Cor.
+75 1°-42.5'
+50 3°-27.5'
+25 5°-12.5'
13 6°-57.5'
+75 8°-42.5'
+50 10°-27.5'
+25 12°-12.5'
12+05.7 13°-33.5'

℄ 2" Elm

48.62

31.62 ℄ 5" Elm

R. Hub.

Sta	Point	Left	Right	
26+13.7	P. T. = 26+15.6			Δ 27°-38'
				D 20°- R.
25+46.0	P. I.		27°-38'	T, 70.8'
				L. 138.2'
24+75.2	P.C.			
		70.8 47 118		
24+74.5 07	P. I			Δ 70°-00'
				D 45°-R.
24+33.1	P. I.		40°-00'	T 47.5'
				L. 88.7'
23+85.6	P.C.			
Eq. 22+83.4	P. T. = 22+85.6			Δ 22°-10'
				D. 20°-L.
22+29.2 2039	P.I.	22°-10' 22 1/4		T. 56.4'
				L. 110.8
21+72.8	P.C.			

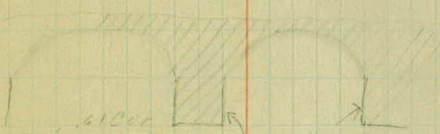
K. P. Line

24 + 75.2		.12 Cor.
25	2° - 28.8'	
+25	4° - 58.8'	
+50	7° - 28.8'	
+75	9° - 58.8'	
26	12° - 28.8'	
+13.4	13° - 49'	

27.58 o Tel. pole

54.05

o Fence post



23 + 55.6		.61 Cor.
24	1° - 14.4'	
+25	7° - 51.9'	
+50	14° - 29.4'	
+74.5	20° - 11'	

17.2

32.45

54.45

o Tel. pole

Tel. pole o

23.6

59.790 x

G.R. Post

21 + 72.8		.12 Cor.
+75	0° - 13.2'	
22	2° - 43.2'	
+25	5° - 13.2	
+50	7° - 43.2	
+75	10° - 13.2	
+83.6	11° - 05'	

4" Tree o 44.1

Sta.	Point	Lett	Right	
32+71.3	P.O.T.	End of K.R. Line.		
29+59.0	P.T.			Δ 16°-15'
				D 10°-0
28+78.4	P.I	16°-15'		T. 81.9'
				L 162.5'
27+74.5	P.C.			

K. P. Line

T.P. o o T.P.

14.05' 3.1'

27+96.5		.03 Cor.
28	0°-10.5	
+25	1°-25.5	
+50	2°-40.5	
+75	3°-55.5	
29	5°-10.5	
+25	6°-25.5	
+50	7°-40.5	
+59.0	8°-07.5	

	3,3V	146,83		143,51
	1,87	143,18	5,5V	141,31
	0,55	139,13	4,6V	138,58
			4,19	134,94
	V10	130,75	10,48	128,65

0+00		3,3
-327		
~~0-50~~		3,9
-50		4,75
1		6,5
-150		10,6
1944		13,0
		14,55 Bv.
		2,5 Sz.
		3,3 1944

Hyd. 1st South of Comox River Bird
" N.W. Otis

Transit Notes.

Sta.	Desc.	Deft. Angle Lt.	Rt.
32+73.9	P.C.		
33+95.8	P.I.		19°-18'
35+15.2	P.T.		
36+35.4	P.C.		
37+69	P.I.	36°-09'	
EQ 38+93.8 / 38+94.2	P.T.		
42+31.8	P.O.T.	End Project.	

Party { Deutsche, Johnson, Mahoney, Franke }

℄

10-10-23 Warm Fair

71

Rt. Lt.

Sta.	Defl.	Corr'd Dist.
35+00	0°36'	15.21
34+75	1°36'	25.02
+50	2-36	"
+25	3-36	"
34+00	4-36	"
+75	5-36	"
+50	6-36	"
+25	7-36	"
33+00	8-36	"
+75	9-36	"
P.C. 32+73.9	9°39'	1.10'

Δ = 19°18' T = 121.9

D = 8°00' L = 241.3

Oak Tree

30.8

26.35

Elm Tree

Sta.	Defl.	Corr'd. Dist.
38+75	1°17'	18.34
+50	3°02'	25.04
+25	4°47'	"
38+00	6°32'	"
+75	8°17'	"
+50	10°02'	"
+25	11°47'	"
37+00	13°32'	"
+75	15°17'	"
+50	17°02'	"
P.C. 36+35.2	18°04'30"	14.92'

Δ = 36°09' T = 133.9'

D = 14°00 L = 258.2'

Nail Grd. Rl. Post

39.26

Tack plug Lt edge rd.

55.3

Nail Grd. Rl. Post

Tack Hub P.C. 121.4

End Project 23-69.

See Profile - Ties check O.K.

Nail T.P. Nail T.P.

Sta.	Point	Lt.	Rt	
20+79.5	P.C.			Δ 16°-57'
				D. 7°-00'
21+99.5	P.I.	16°-57'		T. 122.0
				L. 242.0
23+19.4	P.T.			
24+89.4	P.C.			Δ 13°-30'
				D 7°-00'
26+59.0	P.I.	13°-30'		T. 169.6'
				L. 337.5'
28+26.9	P.T.			
28+55.1	P.C.			Δ 19°-05'
				D 10°-00'
29+31.5	P.I.	19°-05'		T. 96.4'
				L. 190.8
30+25.9	P.T.			

5" Elm ʘ		20 + 77.5	
		21	0° - 47.3'
	49.6'	+ 25	1° - 39.8'
		+ 50	2° - 32.3'
		+ 75	3° - 24.8'
		22	4° - 17.3'
	54.0'	+ 25	5° - 09.8'
		+ 50	6° - 02.3'
5" Elm ʘ		+ 75	6° - 54.8'
		23	7° - 47.3'
		+ 17.4	8° - 28.5
6" Elm ʘ		24 + 27.4	
		25	0° - 13'
	51.5'	+ 25	0° - 43'
		+ 50	1° - 13'
	50.3'	+ 75	1° - 43'
		26	2° - 13'
5" Elm ʘ		+ 25	2° - 43'
		+ 50	3° - 13'
		+ 75	3° - 43'
		27	4° - 13'
		+ 25	4° - 43'
		+ 50	5° - 13'
		+ 75	5° - 43'
		28	6° - 13'
		+ 22.9	6° - 45
		28 + 35.1	.08 c.
		+ 50	0° - 45'
6" Elm ʘ		+ 75	2° - 00'
	34.0	29	3° - 15'
		+ 25	4° - 30'
		+ 50	5° - 45'
		+ 75	7° - 00'
	37.0	30	8° - 15'
		+ 25.9	9° - 32 1/2'
3" Oak ʘ			

Sta	Point	Lt.	Rt.	
12+48.3	P.C.			Δ 41°-30'
				D. 18°
13+89.7	P. I.	41°-30'		T 121.1
				L 230.6
14+92.9	P. T.			
15+01.4	P.C.			Δ 43°-40'
				D. 20°
16+17.0	P. I.	43°-40'		T. 115.4'
				L. 218.3
17+19.9	P. T			
18+14.7	P.C.			Δ 19°-03'
				D 10°-00
19+11.0	P. I.	19°-03'		T. 90.3
				L. 190.5'
20+05.2	P. T.			

			.10 Cor.
6" Elm. ⊙		12+63.3	
		+75	0° - 36'
	48.7	13	2° - 51'
		+25	5° - 06'
		+50	7° - 21'
	50.9	+75	9° - 36'
T.P. ⊙		14	11° - 51'
		+25	14° - 06'
		+50	16° - 21'
		+75	18° - 36'
		+95.7	20° - 45'

		.12 Cor.
	15+01.6	
	+25	2° - 20 1/2'
	+50	4° - 50 1/2'
12" Oak	+75	7° - 20 1/2'
18.1' ⊙	16	9° - 50 1/2'
	+25	12° - 20 1/2'
	+50	14° - 50 1/2'
38.0	+75	17° - 20 1/2'
	17	19° - 50 1/2'
12" Oak ⊙	+19.9	21° - 50'

5" Elm. ⊙		18+14.7	
		+25	0° - 31'
	47.7	+50	1° - 46'
		+75	3° - 01'
		19	4° - 16'
		+25	5° - 31'
	30.0	+50	6° - 46'
		+75	8° - 01'
5" Elm ⊙		20	9° - 16'
		+05.2	9° - 31 1/2'

Sta.	Point	Lt.	Rt.	
1+97.7	P.C.			Δ 23°-15'
				D. 15°
2+74.5	P.I.	23°-15'		T. 188'
				L. 355.0'
3+52.7	P.T.			
4+31.6	P.C.			Δ 29°-22'
				D. 15°
7+53.2	P.I.		29°-22'	T 100.4'
				L. 195.8
9+29.0	P.T.			
9+62.8	P.C.			Δ 15°-20'
				D 10°
10+70.0	P.I.	15°-20'		T. 77.2'
				L.C. 153.3
11+16.1	P.T.			

See page 3 for Alignment from Sta. 1+94.5 to Sta. 2+50.

.07 Cor

2+77.7

B 14" Oak

31.35

2+80	0° - 10'
+25	2° - 02½'
+50	3° - 55'
+75	5° - 47½'
3	7° - 40'
+25	9° - 32½
+52.7	11° - 8° ½

30.4

C 18" Oak

A 12" Oak

.07 Cor

36.1

6+31.8	
+50	1° - 22'
+75	3° - 14½'
7	5° - 07'
+25	6° - 59½
+50	8° - 52'
+75	10° - 44½
8	12° - 37'
+27.6	14° - 41

54.3 B 16" Oak

Tel. pole O

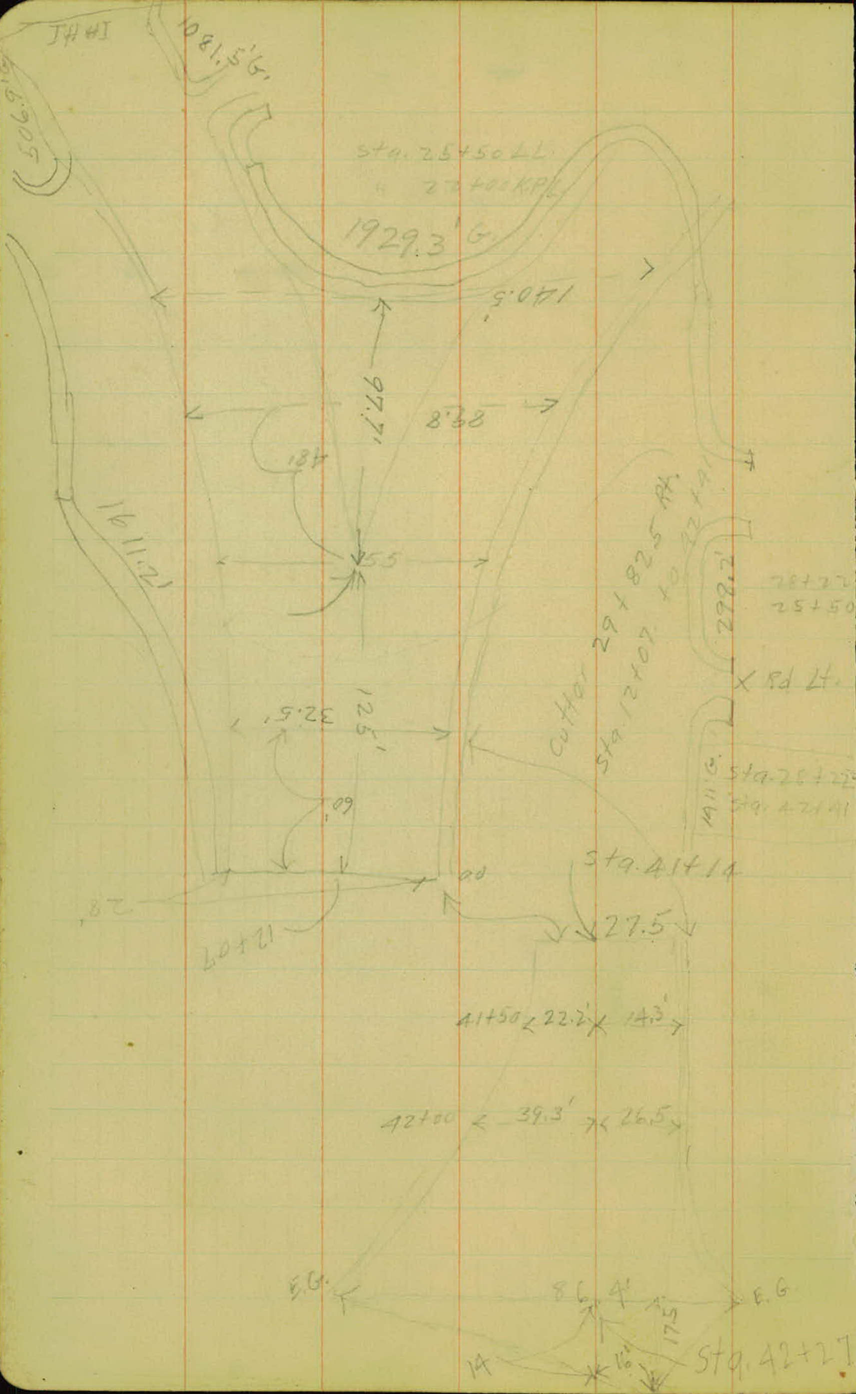
57.05

.23 Cor

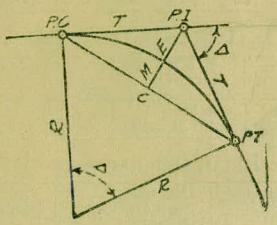
9+62.8	
+75	0° - 36.6'
10	1° - 51.6'
+25	3° - 06.6'
+50	4° - 21.6'
+75	5° - 36.6'
11	6° - 51.6'
+16.1	7° - 40

18'

Tel. pole O


1081.5' G.
Sta. 25+50 Lt.
1929.3' G.
140.5'
97.7'
88.8'
48'
55
1611.2'
Cotter 29+82.5 Rt.
Sta. 12+07
292.2'
X Rd Lt.
32.5'
125'
60'
Sta. 41+14
28'
12+07
27.5
41+50
22.2'
14.3'
42+00
39.3'
26.5
E.G.
86.4'
E.G
17.5
14
16'
Sta. 42+27

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	7/16	1/2	9/16	5/8	11/16
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729	

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

Table III.—Radii, Ordinates and Deflections.

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

Note. Chord Deflection=2 times tangent deflection.

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10′	58.34	.30	10′	560.11	27.31	10′	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	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×$2\frac{1}{2}$ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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

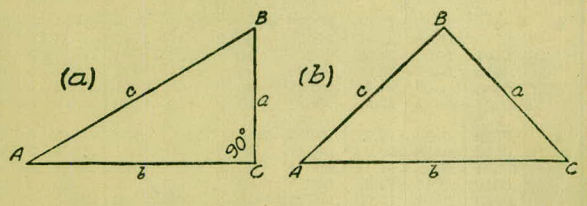
cos. $A=\frac{b}{c}$

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

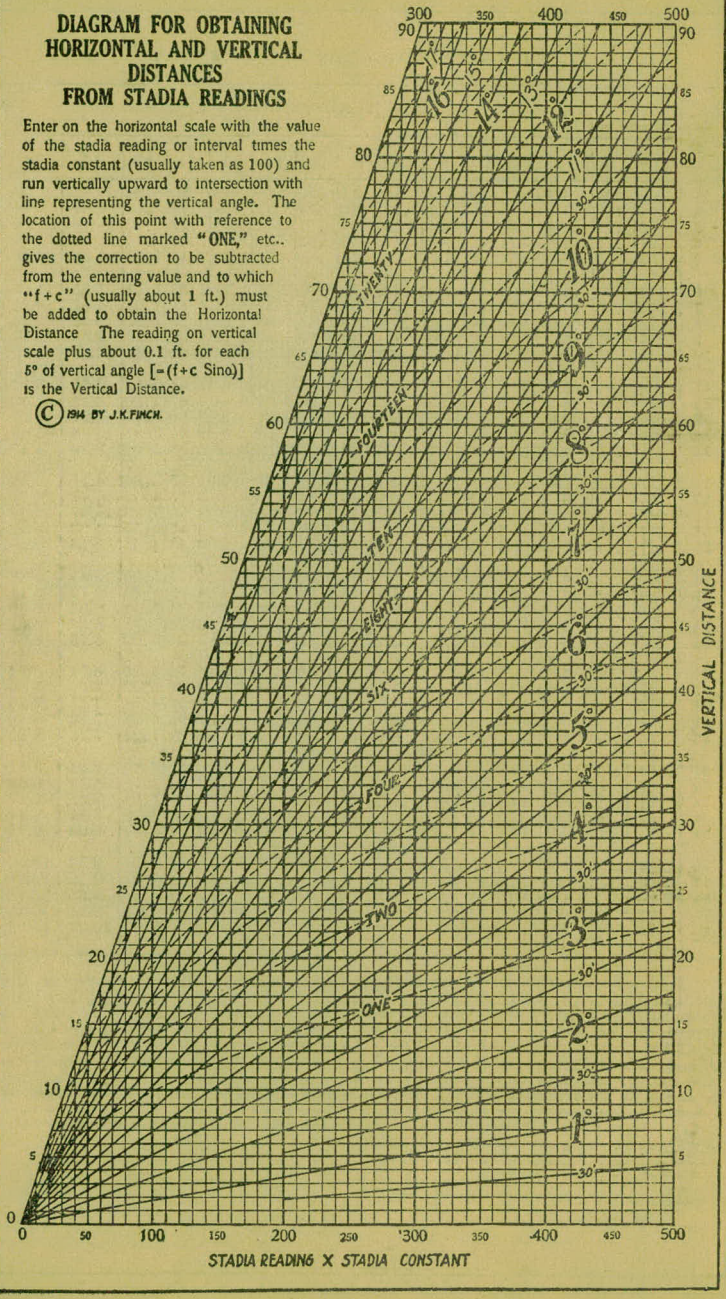
Table IX.—Calculation of Earthwork.

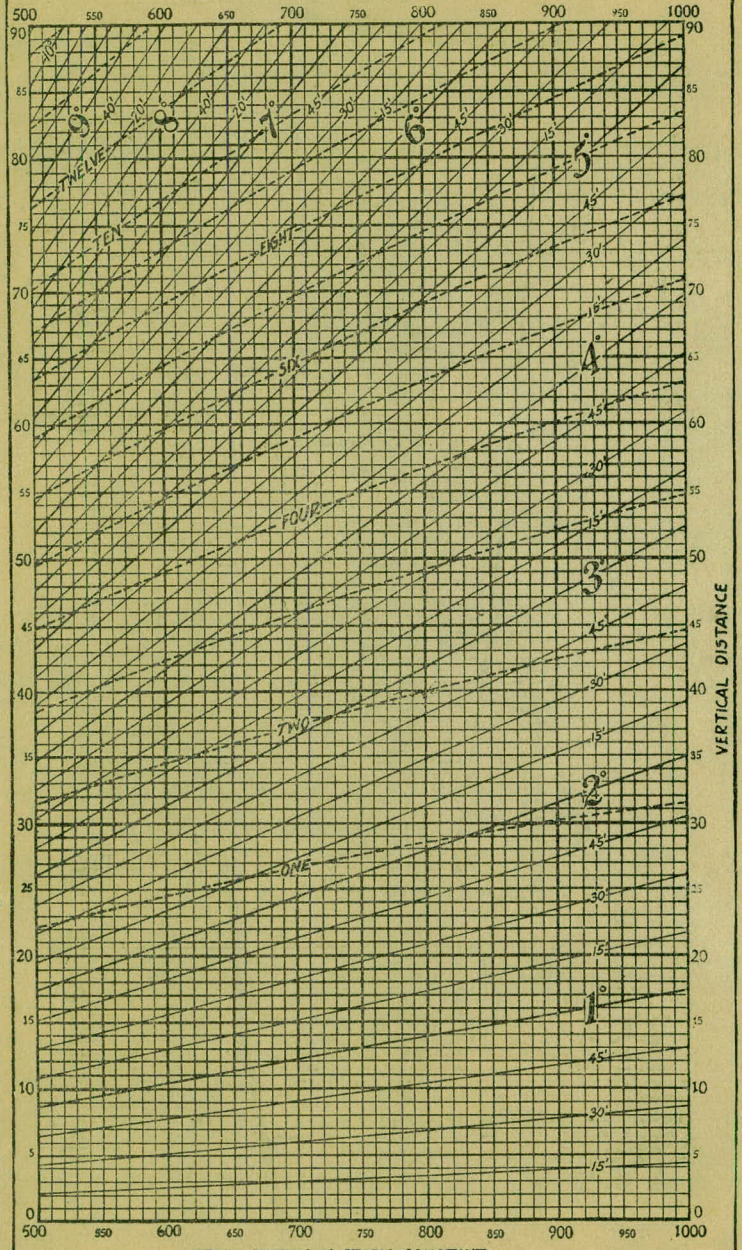
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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

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

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the 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.




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

	194.13	Rod.
40	89.65	4.48
40+50	89.70	4.43
41	89.75	4.38

41+50

42+00

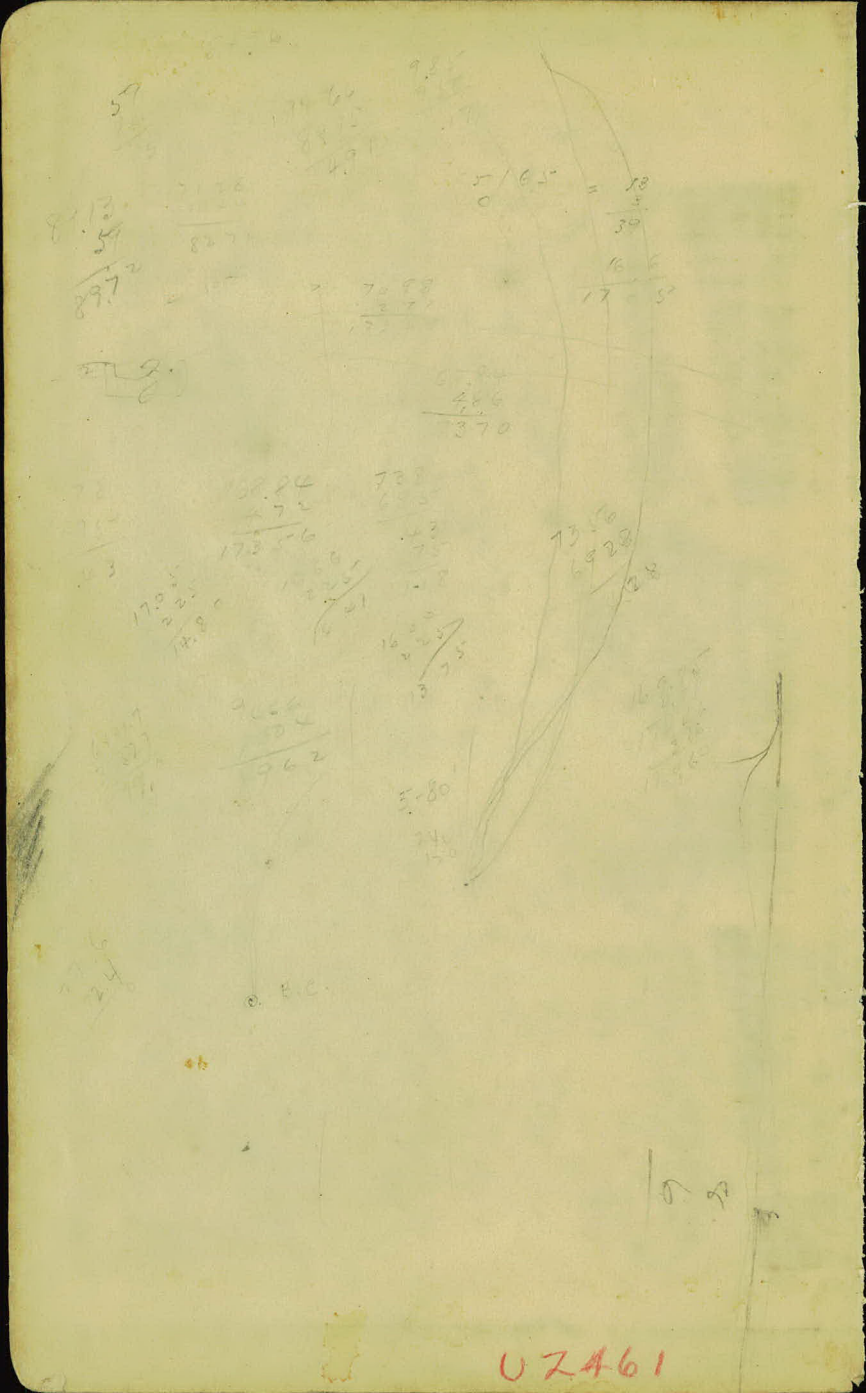
171.28
7.81
179.09

179.09
76.86
2.23

179.09
76.15
2.94

179.09
77.85
1.24
1.7

1.75
1.75
3.5



U2461

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	26.2	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.

Made in Germany.