

WAPSIE CHANGE
LOGAN AVE TILE
PRELIM. SURVEY - HUDSON EAGLE CENTER

ENGINEERS'
FIELD BOOK
No. 10404

22

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.

II	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 $30.6 + (20 - 16) \div 2$ or 2 ft. added to 30.6 = 32.6. For slopes of 1 on 1½ see inside of back cover.

Copyright, 1914, by Eugene Dietzgen Co.

Wapsie Change

Logan Ave. Tile

Preliminary Survey

Hudson - Eagle Center

Tile Construction

on
Eagle Center Road.

Book I.

Transit Notes - Hudson to Eagle Center Road

Page 20-

Property of
County Engineers Office
Court House
Waterloo Iowa

entered 1922 C.P.H.

Channel Change Wapsie River 1-6
File Grades Logan Ave Road Between Sec. 11-12 9-16

PRELIM. SURVEY - Eagle Center - Hudson R.
From Sta 0+00 = 2 Mi S. of Center of Orange
Twp. 3 Mi. N. to Twp Line 2 Mi. E. of Hudson.

Bench Mark Levels 18-20

B.M. Adjustment Sheet 40

Prelim. Transit Notes Sta 0+00 to 1+15 - 25 - 39

Prelim. Cross Sections " " " " 42-6

Corner Stone Sec. 17-18-19-20 Lincoln Twp. 76

Wapsie River survey 7-31-19

	Dist	Azi.	FS	Elev
BM 2	4.1	103.3	4.1	
Δ 1		330° 31'		
Δ 2		103.3		
14-02	380	150° 31'	3.8	99.2 Top 2
13	271	168° 10'	6.8	
12	190	155° 25'	6.2	
11	269	153° 50'	5.2	
10	250	136° 50'	7.0	
9	160	154° 46'	4.6	
8	180	114° 10'	5.3	
7	222	133° 1'	5.4	
6	71	56° 72'	5.7	
5	166	10° 44'	7.6	
4	53	27° 0'	4.9	
3	403	25° 16'	10.3	
2	404	339° 0'	4.6	
1	246	353° 41'	4.9	
0	Azi. on	B.M. 1 0° 00'		
Δ 1		103.91		
B.M. 1	3101	103.01		100.00

Fisher
 McCoy
 Walker
 Kasht.

In pasture BM 2
 Swale
 Swale
 High ground
 Swale in pasture
 High ground in pasture
 S bank
 10' S of S fence
 S bank
 S bank N of road
 Fence S side road
 W bank N. of road
 E old road
 W of river
 S old road
 In pasture SE of B.M. 1
 Stk, N.W. cor pasture S of old road S of river

34 26 307°40' 3.4
 33 150 325°33' 4.4
 32 165 292°27' 7.6
 31 193 320°22' 7.0
 30 58 271°30' 6.6
 29 223 349°32' 4.3
 28 42 232°12' 4.5
 42 1.2 100.4
 99.2

Δ 3

100.4

27-Δ3 351 142°12' 7.0 96.3 Top 3

26 391 138°30' 8.5
 25 352 142°31' 8.1
 24 227 102°13' 6.2
 23 280 104°25' 6.2
 22 172 39°11' 5.7
 21 245 78°50' 6.2
 20 197 84°35' 6.0
 19 238 67°48' 8.8
 18 210 33°24' 7.0
 17 155 108°19' 5.7
 16 140 157°21' 6.9
 15 110 199°5' 7.3

A2

103.3

High ground

High ground

big swale off. outlet little swale

Swale

Foot of N bank in big swale

Swale W of cut off

W bank bridge site

BM 3 Near bridge site

E bank
 W bank
 W bank
 E bank

Main cut off

Top of bank S side cut off - Fence S side road

Fence S side road N side cut off

Top of bank S of cut off

E of road and cut off

Top river bank Top water 12.05

Top of bank

Top of bank Swale S 100' wide

Top of bank

91.3

$$\begin{array}{r} 6543 \\ 312 \\ \hline 742 \end{array}$$

AS
Top 6

~~887~~ 899

97.5

98.6 Top 5

96.3 Top 4

97.5

$$\begin{array}{r} 102.3 \\ 12 \overline{) 899} \\ \underline{899} \end{array}$$

E end bridge 2

W end bridge

the bank of swale

end br. site

Water

SW from br.

n Swale

 $12.7' = \text{length of br.}$

A9

244

340° 9

1.8

99.9

Top A9

3

4.7

97.0

2

5.0

96.7

1

4.3

97.4

0

5.3

96.4

55

95

341° 47

4.9

1.5

101.7 ✓

100.2 Top A7

A8

338

346° 34

6.7

~~97.7~~
96.5

Top A8

11.3

89.4

54

210

327° 5'

7.4

53

224

17° 56'

5.8

52

29

172° 6'

5.7

51

242

187° 18'

8.5

A7

6.9

104° 4 ✓

96.3

50-A7

576

330° 22'

1.28

100.2 ✓

49

158

274° 9

7.0

48

339

37° 25'

7.4

Δ6

101.5

BS on A8

On fence high ground.

Fs A7 to A8 (

Top of water proposed cutoff outlet from A8

N bank river S side draw from NE

Fence S side of draw from NE

E bank

E bank

BS on A6

$$\begin{array}{r} 104.4 \\ 11.3 \\ \hline 93.1 \end{array}$$

$$\begin{array}{r} 101.7 \\ 11.3 \\ \hline 90.4 \end{array}$$

E bank

W bank

314
150
134

553
212
212

156 38

705 424
643 210
162 214
286

708 74
4.0 573
1.67

321
152
151

514 340
486 040
108 303

574 5
256
318

57	167	339°20		
	3.5	102.3	✓	98.8
A 13	318	264°50	4.1	98.7
			10.5	92.3
So 12+54	108	321°05	4.8	98.0
12			4.7	98.1
	4.0	102.8	✓	98.8
A 12	286	336°38	3.6	97.6
				Top A12
A 11			5.9	96.5
10			5.0	97.4
9			4.9	97.5
	1.9	102.4		103.7
		101.2		97.2
A 11	308	331°02	5.5	98.8
				Top A11
			12.0	92.3
8			9.4	94.9
7	7+41	S bank of ravine 7.1		97.2
			6.3	98.0
6			6.3	99.0
	4.4	104.3	✓	99.9
A 10	210	314°0'	3.2	100.5
				97.7
				Top A10
5			5.0	98.7
4			5.9	97.8

1037

S bank at divide
BS 12

Top of H₂O inlet
S bank river inlet to proposed ditch.

BS on A11

BS on A10

Bottom of ravine

BS on A9

820
7.77
43

754
6.74
80

821
6.0

5.88

4.17
1800.81
378
234
326
18

7.51
468
7.08
4.0
3.08

5.44
0.30
5.14

3.47
1.96
1.51

BM 1 302 236° 25' 1.9

64 370 221° 43' 4.17 98.0

63 326 1050° 8'

62 91 32° 34' ~~5.5~~

A 16 6.0 102.2 ✓ 96.2
514 188° 15' 2.8 97.6

A 15 1.3 100.4 ✓ 99.1
221 201° 3' 7.0 96.2 Top 15
11.6 91.6

61 308 134° 47' 11.6 91.6
60 160 268° 2'

A 14 4.5 103.2 ✓ 98.7
468 239° 32' 3.15 99.1
59 43 209° 50' 2.15
58 162 286° 45'

102.3

A1

Left bank

Left bank

BS on 15

BS on 14

Top H₂O opp Gr. Cr.

Left bank

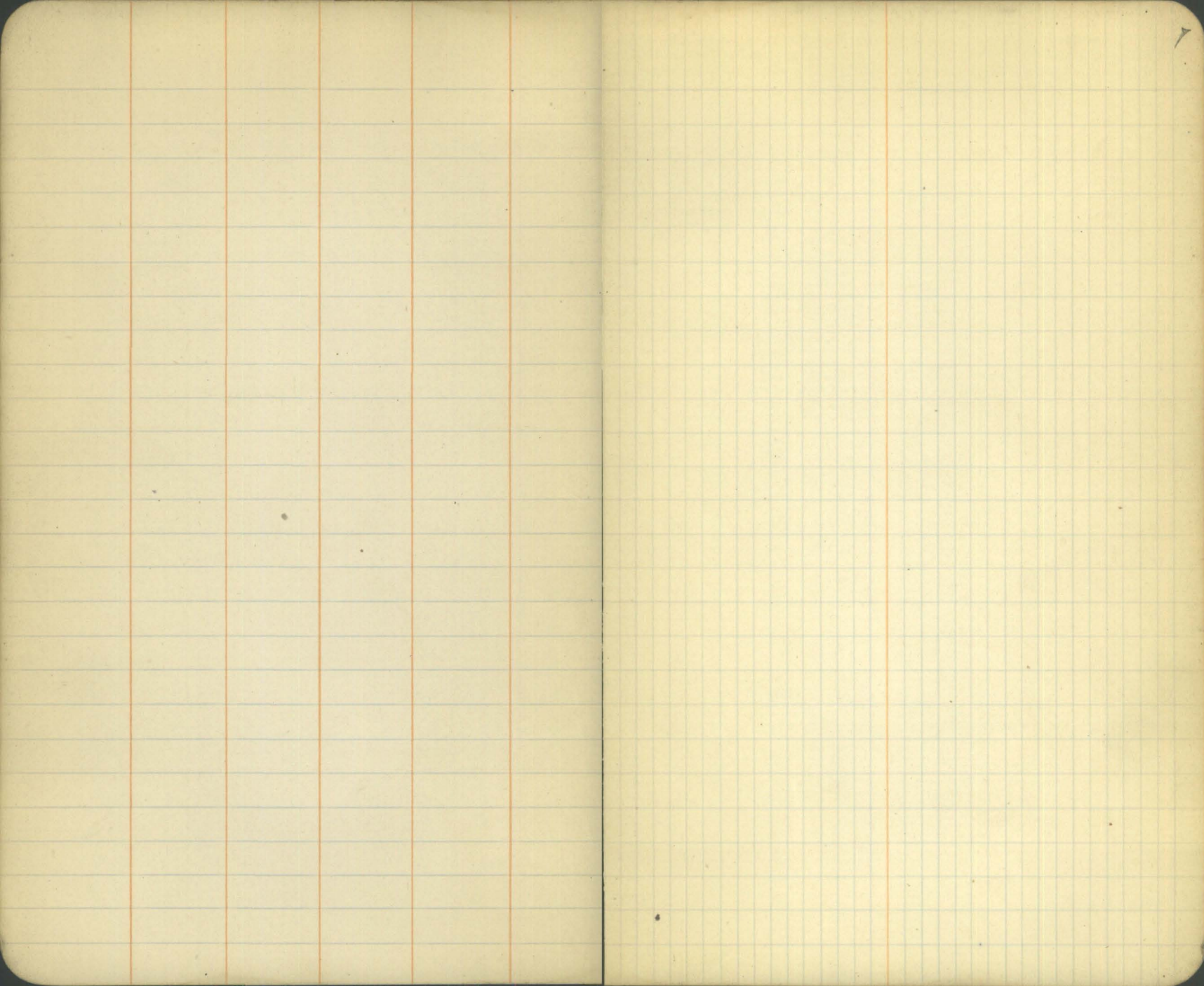
~~Top H₂O Crane Cr.~~

Left bank opp Crane Cr.

BS 13

Left bank

N bank below cut off



Tile Grades Logan Ave Road Between Sec 11 & 12

8

	6.50	103.44		
9	5.09	104.85	99.44	5.41
	7.91	102.03		
	6.60	103.34		
8	5.17	104.77	98.89	5.88
	6.12	103.82		
7	5.75	104.19	98.33	5.86
	6.82	103.12		
6	6.15	103.79	97.78	6.01
	7.16	109.94		
5	2.31	102.78		
	3.07	102.02		
5	2.31	102.78	97.22	5.56
	4.48	100.61		
4	3.77	101.32	96.67	4.65
	6.04	99.05		
3	5.48	99.61	96.11	3.50
	6.94	98.15		
2	6.32	98.77	95.56	3.21
	7.16	97.93		
+50	6.60	98.49	95.28	3.21
	8.93	96.16		
1	8.27	96.82	95.00	1.82
	10.13	94.96		
B.M.	5.09	105.09	100.00	

Bottom of Ditch at Culv

Break

Ditch E. side

End E. Headwall

4.85 109.94

0	11.23	105.09		
	1233	103.99		
10	11.23	105.09	100.50	4.59
	10.67	105.65		
11	9.87	106.45	102.00	4.45
	8.78	107.54		
12	7.65	108.67	103.50	5.17
	5.37	110.95		
13	4.71	111.61	106.06	5.56
	2.70	113.62		
14	2.14	114.18	108.62	5.56

East side

	3.62	112.70		
14	2.78	113.60	106.70	6.90
	5.97	114.35		
13	5.12	111.20	105.03	6.17
	8.75	1107.57		
12	7.54	1108.78	103.36	5.42
	11.17	105.15		
11	10.17	106.15	101.68	4.41
	11.08	116.32		
0	4.70	105.24		
	5.85	104.09		
10	4.70	105.24	100.00	5.20

Break

109.94

B.M.	5.06	100.00	S. End E. Headwall	
	8.05	97.01		
+ 50	7.20	97.86	95.50	236
	8.10	96.96		
2	7.35	97.71	95.73	198✓
	7.06	98.00		
3	6.45	98.61	96.20	241✓
	6.00	99.06		
4	5.30	99.76	96.67	309✓
	3.12	105.06		
0	8.00	101.94		
	8.94	101.00		
5	8.00	101.94	97.14	480✓
	7.63	102.31		
6	6.59	103.35	97.61	574✓
	7.16	102.78		
7	5.87	104.07	98.08	599✓
	4.63	105.31		
8	4.18	105.76	98.54	722✓
	7.54	102.40		
	6.94	103.00		
9	5.96	103.98	99.00	498✓
	109.94			

Ditch at Culv

Break.

	7.40	108.10	
0	3.37	100.70	
	4.93	99.14	
10	3.37	100.70	
	6.19	97.88	
9	5.17	98.90	
	6.75	97.32	
8	5.47	98.60	
	6.72	97.35	
7	5.46	98.61	
	5.45	104.07	
0	5.45	98.62	
	6.79	97.28	
6	5.45	98.62	
	6.75	97.32	
5	5.52	98.55	
	6.63	97.44	
4	5.40	98.67	
	5.68	98.39	
3	4.65	99.42	
	6.44	97.63	
2	4.90	99.17	
	7.77	96.30	
1	6.18	97.89	
	9.90	94.17	
BM.	4.07	104.07	100.00

Bottoms

Bottom Ditch West side

West side #7	9.53	98.57
	10.60	97.50
7	9.30	98.80
	10.54	97.56
8	9.47	98.63
	10.57	97.53
9	9.63	98.47
	9.05	99.05
10	8.00	100.10
	4.96	103.14
11	3.80	104.30
	2.77	105.33
+59	1.68	106.42

West side

	2.06	106.04
+59	1.33	106.77
	4.20	103.90
11	2.76	105.34

108.10

	3.44	100.31		
10	3.01	100.74	96.25	4.49
	5.44	98.31		
9	4.82	98.93	96.00	2.93
	5.44	98.31		
8	5.13	98.62	95.75	2.87
	5.48	98.27		
7	5.12	98.63	95.50	3.13
	5.12	103.75		
0	5.05	98.63		
	5.12	98.56		
6	5.05	98.63	95.25	3.38
	5.07	98.61		
5	5.13	98.55	95.00	3.55
	5.29	98.39		
4	5.03	98.65	94.68	3.97
	4.84	98.84		
3	4.27	99.41	94.36	5.05
	4.97	98.71		
2	4.50	99.18	94.04	5.14
	5.38	98.30		
1	5.78	97.90	93.72	4.18
	10.35	93.33		
	9.96	93.72		
B.M.	3.68	103.68	100.00	

Ditch E side
Ditch W. side

# Westside	9.30	98.61		
	9.60	98.31		
7	9.05	98.86	95.65	3.21
	9.63	98.28		
8	9.23	98.68	95.93	2.75
	9.45	98.46		
9	9.41	98.50	96.21	2.29
	7.66	100.25		
10	7.78	100.13	96.50	3.63
	3.26	104.15		
11	3.57	104.34	99.95	4.39
	1.98	105.93		
+59	1.45	106.46	102.00	4.46

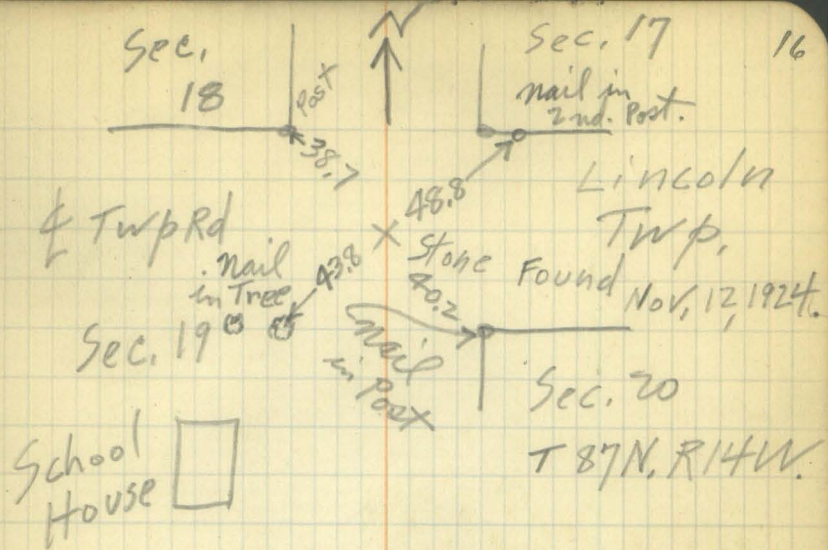
West side

	165	106.26		
+59	1.08	106.83	100.26	4.57
	3.32	104.59		
11	254	105.37	100.03	5.34
	7.17	107.91		
0	3.01	100.74		
	103.75			

	703	103.45		
9	567	104.81	99.93	4.88
	7.10	103.38		
8	573	104.75	99.32	5.43
	6.67	103.81		
7	592	104.56	98.71	5.85
	6.56	110.48		
0	273	103.92		
	3.58	103.07		
6	273	103.92	98.10	5.82
	4.66	101.99		
5	383	102.82	97.48	5.34
	6.03	100.62		
4	528	101.37	96.86	4.51
	7.63	99.02		
3	685	99.80	96.24	3.66
	8.50	98.15		
2	794	98.71	95.62	3.09
	8.70	97.95		
+50	8.13	98.52	95.31	3.21
	10.57	96.08		
1	9.77	96.88	95.00	1.88
	11.55	95.10		
	11.07	95.58		
BM.	6.65	106.65	100.00	

Ditch 10 E of Culv.

Ditch



Surveyed Elec. Line on
West side of Highway 30' from
E. from center of Sec. 19-20
T-87-14 to center of Sec. 17-18
T 87, R 14 a distance of one
mile.

	3.71	112.65		
14	2.80	113.56	108.70	4.86
	6.09	110.27		
13	5.22	111.14	106.18	4.96
	8.72	107.64		
12	7.62	108.74	103.66	5.08
	10.23	116.36		
0	4.35	106.13		
	5.32	105.16		
11	4.35	106.13	101.15	4.98
	6.38	104.10		
10	5.25	105.23	100.54	4.69

110.48

July 19 P.M. Check-on Piling 30' x 20' I-B. Lines 13-20

Piling - 4 @ 18'
1 @ 16'

21 Piling 1 @ 17
1 @ 15
1 @ 19
8 @ 18
10 @ 18½

Check Levels BMs

Eagle Center - Hudson Road

BM #5	6.32	210.37		204.05	203.73
T.P.	6.80	214.95	2.22	208.15	
T.P.	1.00	210.26	5.69	209.26	
BM #6			1.42	208.84	208.51
BM #7	3.85	207.28	6.83	203.43	203.08
T.P.	13.04	216.94	3.38	203.90	
BM #8	3.90	220.23	0.61	216.33	
T.P.	4.63	223.84	1.02	219.21	
BM #9	0.53	214.64	9.73	214.11	213.78
T.P.	1.17	204.39	11.42	203.22	
T.P.	1.24	193.23	12.40	191.99	
BM #10	0.25	184.80	8.68	184.55	184.23
BM #11			4.24	180.56	180.24
BM #11	4.24	184.80		180.56	180.24
BM #10	10.12	194.67	0.25	184.55	184.23
T.P.	11.52	205.79	0.40	194.27	
T.P.	9.41	214.32	0.88	204.91	
BM #9	9.52	223.62	0.22	214.10	213.78
T.P.	4.40	220.50	7.52	216.10	
BM #8	0.50	216.81	4.19	216.31	
T.P.	3.57	207.43	12.92	203.89	
BM #7	7.62	211.03	4.02	203.41	203.08
BM #6			2.20	208.83	208.51
T.P.	5.02	214.92	1.13	209.90	
T.P.	0.92	209.11	6.73	208.19	
BM #5			5.05	204.06	203.73

Spike in Transmission Pole Rt Sta 53+76 (Transforming)

Spike Trans pole Rt Sta 66+30 (Danger Sign)
Center N Headwall Conc Culv Sta 69+51.5

Spike Trans pole Rt Sta 80+72 (Danger Sign)

Spike " " " " 93+43 (" ")

" " " " " 105+95 (" ")

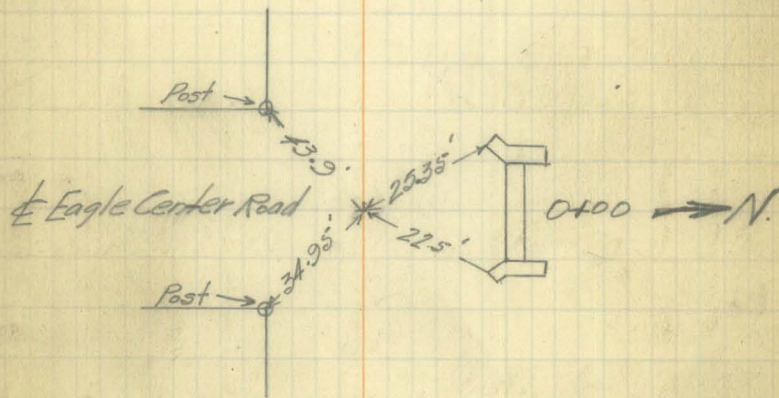
Top E railing N side wood Bridge Sta 111+90

				Corrected		Eagle Center Datum
BM#0	7.23	169.33		162.10	162.10	ail center W Head wall Rt Sta 0 - Same as BM 29
T.P.	12.80	180.25	1.88	167.45		
T.P.	6.24	182.60	3.89	176.36		
BM#1	3.27	185.52	0.35	182.25	182.25	Spike N side Transmission pole Rt Sta 12+60 (Danger sign)
T.P.	11.66	194.89	2.29	183.23	1	
T.P.	5.41	196.92	3.38	191.51		
BM#2	6.85	198.35	5.42	191.50	191.50	Spike S side Transmission pole Rt Sta 27+04 (Danger sign)
T.P.	5.36	203.08	0.63	197.92		
T.P.	3.26	196.74	9.60	193.48		
BM#3	10.93	201.55	6.12	190.62	190.63	Enter N. Head wall Conc Culvert Sta 39+30
T.P.	4.08	201.80	3.83	197.72		
BM#4			2.73	199.07	199.08	Enter N. Head wall Conc. Culv Sta 47+90
T.P.	5.12	204.34	2.58	199.22		
BM#5			0.63	203.71	203.73	Spike S side Transmission pole Rt Sta 53+76 (Transformer Pole)
BM#11	4.16	184.72		180.56	180.24	Top E piling N side wood bridge Sta 111+90
BM#12	12.37	192.97	4.12	180.60	180.27	Spike in corner post E side James Leonard's Driveway.
T.P.	9.39	201.96	0.40	192.57		
T.P.	2.37	201.63	2.70	199.26		
BM#13	7.77	205.85	3.55	198.08	197.74	Center N. Head wall skew Conc. Culv Sta 131+07
T.P.	10.04	214.91	0.98	204.87		
T.P.	11.45	223.82	2.54	212.37		
BM#14	3.58	226.40	1.00	222.82	222.50	Sikens E gate post Rt Sta 145+58
T.P.	6.41	227.54	5.27	221.13		145+58
T.P.	7.48	234.55	0.47	227.07		
R.P.			4.98	229.57		Spike S side Trans. Pole Rt Sta 156+25

Corrected

Transit Notes - Hudson Eagle Center Road

BM#0	7.02	169.12		162.10	162.10
T.P.	12.72	181.08	0.76	168.36	
T.P.	4.55	183.31	2.32	178.76	
BM#1			1.06	182.25	192.25
T.P.	11.60	193.00	1.91	181.40	
T.P.	5.17	195.94	2.26	190.74	
BM#2	7.52	199.03	4.42	191.89	191.50
T.P.	2.01	200.44	0.60	198.43	
T.P.	1.05	193.98	7.51	192.93	
BM#3			3.32	190.64	190.63
T.P.	8.98	202.61	0.35	193.63	
BM#4	5.09	204.20	3.50	199.09	199.08
BM#5			0.43	203.77	203.73
BM#11	3.32	183.88		180.56	180.24
BM#12			3.30	180.58	180.27
T.P.	12.91	196.20	0.59	183.29	
T.P.	6.11	201.83	0.48	195.72	
T.P.	2.72	200.55	4.00	197.83	
BM#13	8.58	206.61	2.52	198.03	197.74
T.P.	7.42	215.86	0.17	206.44	
T.P.	9.76	223.99	1.63	214.23	
BM#14	2.86	225.67	1.18	222.81	222.50
T.P.	6.76	227.90	4.53	221.14	
T.P.	5.78	232.87	0.81	227.09	
R.P.			3.26	229.61	
T.P.	8.93	231.19	3.83	222.21	221.05
BM#15			4.73	221.36	221.05



Red wall concave left to 161+15 at X Roads

Re-Cross Section 5 - Eagle Center - Hudson Road

24

BM #3

7.58 190.64

Culv

38

37

36

T.P

35

1.59 198.22 8.49 196.63

34

33

32

T.P

31

6.89 205.12 0.18 198.23

30

29

28

27

BM #2 6.91 198.41

191.50

$\frac{12.5}{17}$ 8.3 $\frac{11.9}{18}$
 $\frac{8.5}{33}$ $\frac{8.2}{25}$ $\frac{8.2}{22}$ $\frac{10.6}{17}$ $\frac{8.3}{11}$ 7.7 $\frac{7.9}{13}$ $\frac{9.9}{18}$ $\frac{7.5}{23}$ $\frac{6.9}{25}$
 5.5

$\frac{3.6}{33}$ $\frac{3.9}{25}$ $\frac{4.3}{23}$ $\frac{6.3}{17}$ $\frac{4.1}{12}$ $\frac{4.6}{36}$ $\frac{3.7}{12}$ $\frac{6.1}{18}$ $\frac{3.2}{23}$ $\frac{3.0}{25}$
 196.5
 8.6

$\frac{7.6}{33}$ $\frac{7.5}{25}$ $\frac{7.5}{22}$ $\frac{10.2}{16}$ $\frac{7.6}{12}$ 198.0 $\frac{7.3}{12}$ $\frac{9.7}{18}$ $\frac{7.0}{23}$ $\frac{6.6}{25}$ $\frac{6.8}{33}$
 200.4
 4.7

$\frac{4.3}{25}$ $\frac{4.6}{22}$ $\frac{7.1}{16}$ $\frac{4.9}{12}$ 200.8 $\frac{4.5}{12}$ $\frac{6.6}{17}$ $\frac{4.2}{22}$ $\frac{3.9}{25}$
 197.4
 1.20

$\frac{4.7}{33}$ $\frac{4.6}{26}$ $\frac{6.7}{18}$ $\frac{4.6}{13}$ 194.1 $\frac{4.4}{11}$ $\frac{6.6}{16}$ $\frac{3.7}{22}$ $\frac{3.3}{25}$ $\frac{3.3}{33}$
 191.9
 6.5

$\frac{9.7}{33}$ $\frac{9.4}{26}$ $\frac{9.5}{22}$ $\frac{10.6}{18}$ $\frac{8.3}{13}$ 190.8 $\frac{7.7}{11}$ $\frac{9.9}{16}$ $\frac{7.8}{22}$ $\frac{7.4}{25}$ $\frac{7.0}{33}$

$\frac{9.9}{33}$ $\frac{9.5}{26}$ $\frac{9.5}{23}$ $\frac{10.9}{19}$ $\frac{8.6}{14}$ 190.2 $\frac{8.1}{11}$ $\frac{10.2}{17}$ $\frac{7.8}{26}$ $\frac{7.5}{30}$

24

23

22

21

20

19

18

17

16

15

14

13

+14 Gate & Drive No Culv.

+02 Drive to Gravel Pit No Culv.

cultivated.

cultivated

+14 Gate
+94

+14 Gate
+95

36

35

34

33

A + 473

32

31

30

29

28

27

26 + 52

26 + 50

26

25

1/4 E Fence North
1/4 E Fence South

φ + 06

Corn

Oats

Ref. Hub → 30.0 → 24.6 → H. Line pole

Cultivated

Cultivated

D.A. = 7 AC.

Flat

400'

X + 50 X

Cultivated

X + 52 X

Cultivated

48
+90.9 $\pm$ Culv. 2 x 2 x 24 C.B.

47
+75 Gate Left

46

45

44

43

42

41

40
+76 $\frac{1}{4}$ - $\frac{1}{4}$ Sec. Line
+30.5 $\pm$ Conc. Culv. 3 x 3 x 24

39

38

37
+93 $\pm$ Gate to Field No Culv.

12.6 11.4

D.A. = 44 Ac.

Flat

+75 $\pm$ Gate

+76

12.3 11.9

+76 $\frac{1}{4}$ - $\frac{1}{4}$ Sec. Line

D.A. = 36 Ac.
Flat

60

59

58

+98 Fence North

57

56

55

54

53+37 12" x 24' Cor. culv
 53+09.8 Δ (= 53+107.8)
 53

52

51

50

49

+90 Gate to Field 1

Cultivated

53+37.5

52+81.8

Meyers Drug sign
 on large Cottonwood.

Willows
 +78 +102

Hog
 Pasture

Willows +8
 +94

←38' ←45' Evergreens

←29' Walnuts
 Cultivated

W/O aff. on

←36.5'

52+81.8

Cement corner post.

72

71

70

+51

Cult. 3 x 2 x 24

69

68

67

+55

Drive Left

66

65

64

63

62

61

Cultivated

+51 Cult.

D.A. = 80 Acres

Rolling

+52 p 26

12.4 11.6

Cultivated

+23

+97

+40 p

Wire Tel. Line

+99 p 26

Cultivated

Cultivated

84

83

82

81

80

79

78

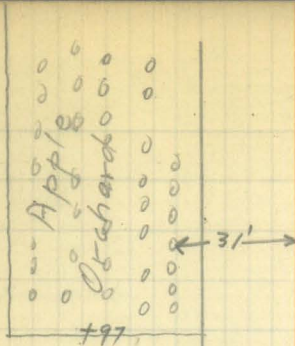
77

76

75

74

73

+33 ϕ 23

Corn

Corn

+32 ϕ 25

+57

 $\leftarrow 28 \rightarrow$

x + 57

25 $\rightarrow$

96

95

+42 Gate Left No Culv.

94

93

+65 Drive & Culv. Rt. 12" x 20 Corr. pipe

92

91

+53 East Line Barn & Corn Crib

90

+65 Drive Left

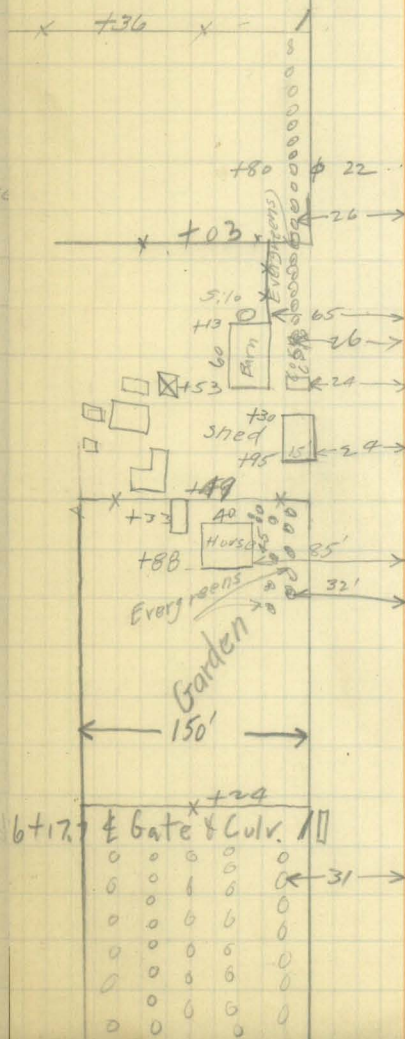
89

88

87

86 +17.7 Culv. 15" x 10' Drive Left

85



34

108

107

$\triangle$ 49.9

106

485

105.

99

98

97

+28 26

$$\begin{array}{ccccccc} & & \text{Post} & & & \text{Post} & \\ \times & +04 & \times & 24.3 & \Delta & 29.7 & \times \\ & & & & & & +04 \times \end{array}$$

read stamps

120

119

118

117

116
+ 90 $\pm$ Colv. and Drive Rt. 12" X 3/6 corr.

115

114

113

+ 21.5 $\pm$ 16' X 33' Wood Br.

112

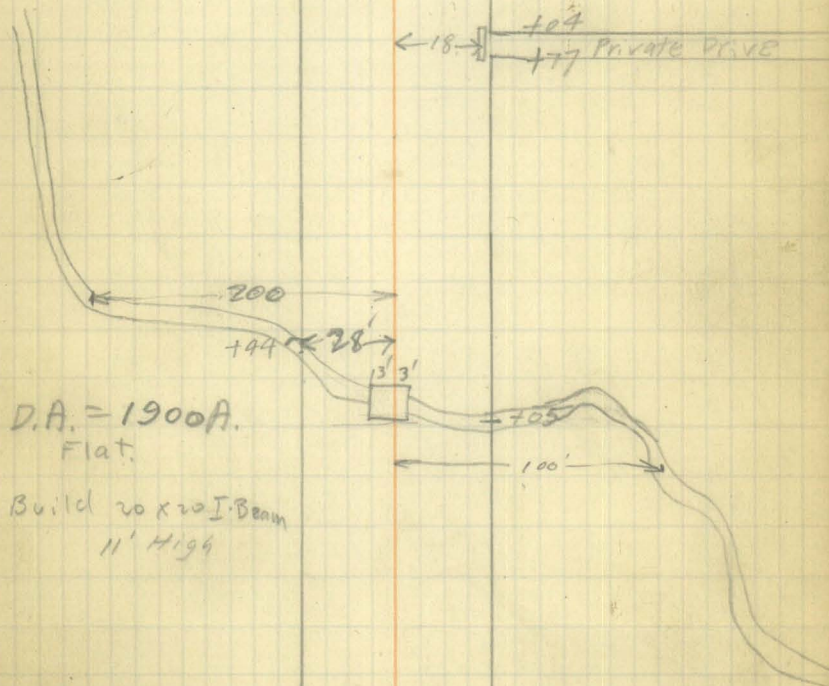
111

110

109

Item No 2
May 15th 1922
1922.

x +29
+22 Gate



132

13/ +07 3X3X27½ SKew box Culv.

129

128

127

126

124

123

POT. + 16.8

122

12/

36

33' out
to R.P.

Hand-drawn map of a road layout on graph paper. The map shows a road starting from the bottom left, curving upwards, and then branching into two paths that lead to two gates. The left gate is labeled "Gate 1" and the right gate is labeled "Gate 2". Various elevation points are marked with numbers: +59, +53, +33, +55, +61, +13, +11, +07. Distances are marked with "33'" and "11'". A note "D.A. = 55A." is written near the right gate. A note "3x2x37" is written near the bottom right. A note "Big Willow" is written near the left gate. A note "A 131" is written near the bottom left. A note "A 131" is written near the bottom left. A note "A 131" is written near the bottom left.

Reference Hub → 33' — 29.8' →

144

143

142

141

140

139

138

137

136

135

134

133

22

30 ϕ +1430 ϕ +3330 ϕ +52+58 ϕ 22+59 ϕ 22

$\Delta 156+00 \angle 0^\circ 1' \text{ Left } (+450 \frac{5/19/22})$

155

154

153

152

151

150

149

148

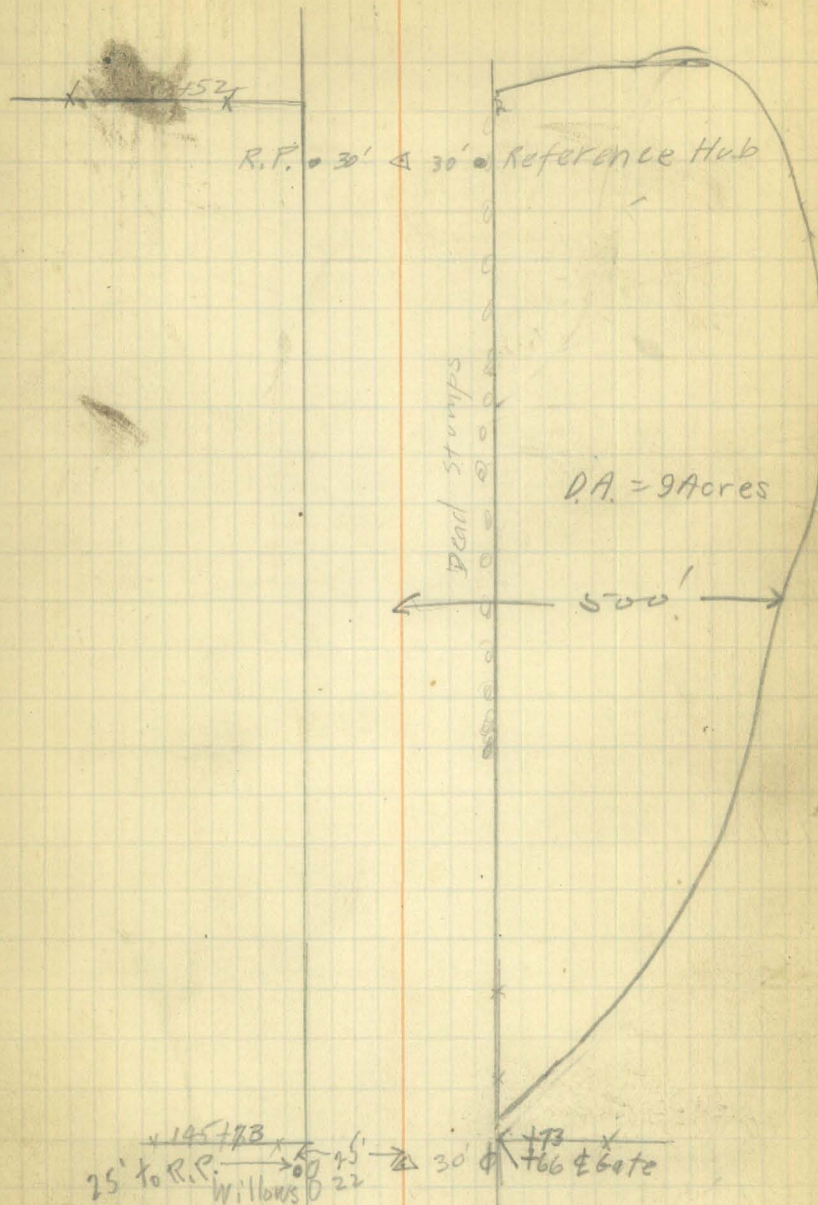
147

146

$\Delta +58 \text{ P.O.T.}$

$(+47.65 \frac{5/19/22})$

145



△ +15

161

160

159

158

157

(+20.3 ^{5/19/22})

161 +37

29
← 30
3225 △ +15
R.P. Cor. of
Coping

+39.5
+43.6 Hieline

+83

Dead Stumps

Bench Mark - Adjustment Sheet

BM No.	1 st Diff in Elev	2 ^d Diff in Elev	Adjusted Diff in Elev	Corrected Elev
0				162.10
1	+20.15	+20.15	+20.15	182.25
2	+9.25	+9.24	+9.25	191.50
3	-0.88	-0.85	-0.87	190.63
4	+8.45	+8.45	+8.45	199.08
5	+4.64	+4.66	+4.65	203.73
6	+4.79	+4.77	+4.78	208.51
7	+5.41	-5.42	-5.42	203.09
8	+12.90	+12.90	+12.90	215.99
9	-2.22	-2.21	-2.21	213.78
10	-29.56	-29.55	-29.55	184.23
11	-3.99	-3.99	-3.99	180.24
12	+0.04	+0.02	+0.03	180.27

Nail in Center W. Headwall Culv. Rt. Sta 0+00 = BM#29 Eagle Center ^{Datum.}

Take inside Transmission pole Rt. of Sta 12+60 (Danger Sign on pole)

" 5 " " " " " 27+04 (" " " ")

Center N Headwall Conc Culv Sta 39+30

" " " " " " 47+90

(Transformer on pole)
Take S. side Transmission pole Rt Sta 53+76

" " " " " " 66+30 (Danger Sign)

Center N Headwall Conc culv Sta 69+51.5

Take in Trans pole Rt Sta. 80+72 (Danger Sign)
9

" " " " " " 93+43 (" ")

" " " " " " 105+95 (" ")

Spot E. Along N. end wood Bridge Sta 111+90

Take in Corner post E side Jas. Loonans Driveway
Sta 115+77

12 180.27

+17.48 +17.45 +17.47

13 197.74

+24.74 +24.78 +24.76

14 222.50

-1.45 -1.46 -1.45

15 221.05

Enter N Headwall Conc Skew Culv Sta 131+07

Spike in E gate past Rt Sta 145+58

Enter E Headwall Conc Culv Lett Sta 161+15 at X Roads.

B. M. 07	4.27	166.37	162.10	✓
----------	------	--------	--------	---

27

26+2

26+0

26

25+18

25

24

T.P.

23

22

21

20

19

18+50

18

4± fence N

4± fence S

Hi. Loc Pole Rt.

3.69

198.16

2.30

194.47

✓

19677

188.5	188.9	189.0	189.5	189.9	190.3	190.3	188.1	190.3	190.7	191.0	74
7.7	9.3	9.2	19.7	8.3	7.9	7.9	10.1	7.9	7.5	7.2	6.5
33	27	22	19	14	11	16	22	24	26	33	

190.0	190.5	190.4	188.3	190.7	191.2	191.2	189.2	192.5	192.5	192.9
8.2	7.7	7.8	7.9	7.5	7.0	7.0	9.0	5.7	5.7	5.3
33	28	22	18	13	10	11	16	21	25	33

192.0	191.1	191.6	190.0	192.5	192.9	192.9	190.7	194.2	194.6	195.2
6.2	7.1	6.6	8.2	5.4	5.3	7.3	4.0	3.6	3.0	
33	28	24	19	14	12	16	22	24	33	

191.8	192.7	193.0	191.4	194.1	195.0	195.1	192.8	192.8	192.1	192.7
5.0	4.1	3.8	5.4	2.7	1.8	1.7	4.0	3.0	0.3	0.9
33	28	24	19	13	11	17	22	24	33	

188.3	190.2	190.7	189.2	191.9	192.6	192.4	190.4	194.1	194.6	194.3
8.2	6.1	6.4	7.6	2.9	7.2	6.4	2.7	2.2	2.2	2.5
33	33	28	20	13	12	17	22	33	33	

189.2	189.4	189.8	189.9	190.7	191.6	191.5	189.4	192.9	193.6	194.1
7.6	7.2	7.0	8.7	6.1	5.2	5.3	7.1	3.7	2.7	2.7
33	28	25	19	13	12	16	23	23	26	28

189.3	189.3	189.4	189.8	190.7	191.6	191.5	189.4	192.9	193.6	194.1
7.6	7.2	7.0	8.7	6.1	5.2	5.3	7.1	3.7	2.7	2.7
33	28	25	19	13	12	16	23	23	26	28

189.3	189.4	189.8	189.9	190.7	191.6	191.5	189.4	192.9	193.6	194.1
7.6	7.2	7.0	8.7	6.1	5.2	5.3	7.1	3.7	2.7	2.7
33	28	25	19	13	12	16	23	23	26	28

189.3	189.4	189.8	189.9	190.7	191.6	191.5	189.4	192.9	193.6	194.1
7.6	7.2	7.0	8.7	6.1	5.2	5.3	7.1	3.7	2.7	2.7
33	28	25	19	13	12	16	23	23	26	28

189.3	189.4	189.8	189.9	190.7	191.6	191.5	189.4	192.9	193.6	194.1
7.6	7.2	7.0	8.7	6.1	5.2	5.3	7.1	3.7	2.7	2.7
33	28	25	19	13	12	16	23	23	26	28

38

37

T.P.

36

1.28

195.19

10.08

193.91

✓

35 12.117

34✓

33

32+40

32

T.P.

31

30

29

28

3.81

203.99

0.05

200.18

✓

BM#2

8.73 200.23

6.60

191.56

191.50

198.16

Spike 5 side Transmission pole 5/4 274 04 (P4)
1st pole W of 42145

189.8	190.1	187.6	184.9	190.6	190.4	188.5	191.4	191.4
5.4	5.1	7.6	5.3	4.6	4.8	6.7	3.8	3.8
33	24	17	11	11	12	17	25	33
192.2	192.0	190.4	192.3	192.5	192.0	190.0	192.7	193.1
3.0	3.2	4.8	2.2	2.7	3.2	5.2	2.5	2.1
33	24	16	11	11	12	17	22	26
194.7	194.8	192.9	194.3	194.7	194.2	192.1	193.3	195.3
9.3	9.7	12.1	9.7	9.3	9.8	11.9	8.7	8.7
33	25	17	12	12	13	18	25	33
191.0	191.3	193.8	196.0	196.2	196.3	193.9	196.9	196.9
8.0	7.7	10.2	8.0	7.4	7.7	10.1	7.1	7.1
33	25	17	12	12	13	19	25	33
197.7	197.9	195.2	197.7	198.3	198.1	195.7	198.8	199.2
6.3	6.1	8.8	6.3	5.7	5.9	8.3	5.2	4.8
33	24	16	11	11	12	18	25	33
200.5	200.8	201.1	201.6	200.2	200.5	200.3	201.2	201.2
3.5	3.2	2.9	4.4	4.0	3.7	6.2	2.8	3.8
33	24	22	16	11	12	18	25	33
201.3	201.3	198.5	201.0	201.5	201.2	199.1	202.0	201.9
2.7	2.7	5.5	3.6	2.5	2.5	2.9	2.0	2.2
33	24	17	11	11	11	17	25	28
200.5	200.5	198.0	200.5	200.5	200.6	198.5	201.4	201.4
3.2	3.2	6.0	3.5	3.2	3.2	5.6	2.6	2.2
33	25	17	11	11	12	17	25	26
197.1	197.5	195.4	197.1	197.5	197.3	195.1	198.0	198.0
2.3	2.4	4.8	3.1	2.7	2.9	5.1	2.2	1.6
33	25	17	13	12	12	18	22	25
191.0	191.1	191.1	191.1	191.1	191.1	191.1	191.1	191.1
5.2	6.1	8.3	6.1	5.6	5.1	8.1	5.2	4.8
33	25	18	13	11	11	16	22	24
190.8	190.9	189.1	191.3	191.5	191.6	189.4	192.0	192.0
9.4	9.3	11.1	8.4	8.4	8.6	10.8	8.2	8.0
33	26	19	13	11	11	16	24	33
188.7	188.9	187.6	188.9	190.7	190.6	188.4	190.6	191.3
11.3	11.3	12.6	10.3	9.5	9.6	10.8	9.6	8.7
33	26	22	13	11	11	16	20	33

B.M.#4	4.78	20386	5.04	199.11	199.08	Center North Head wall Conc. Culv. Sta. 47+90
--------	------	-------	------	--------	--------	---

48 + 90.4 $\pm$ Conc. Colv. 2x2x24

47

46

45

T. P. 4.09 204.15 - 2.04 200.06 ✓

49

43

42

41

40

B. M. #3 11.47 202.10 4.42 190 77
+30.5 ± 6 vlv.

37

19519

(Faint handwritten notes at the bottom of the page, possibly bleed-through from the reverse side.)

+ 30 5 ~~£~~ 6 v/v.

[illegible]

BM # 3			558	190.79
T.P.	2.27	196.37	9.15	197.10
T.P.	4.64	203.25	0.77	198.61
BM # 2	7.78	199.88	6.48	191.58
T.P.	5.09	198.06	1.06	192.97
T.P.	10.70	194.03	3.44	188.83
BM # 1	4.46	186.77		182.31
B.M. # 2			4.00	192.00
T.P.	3.04	196.00	12.09	192.96
T.P.	6.08	205.05	0.54	198.97
B.M. # 3	8.47	199.51	8.24	191.04
T.P.	1.83	199.28	8.57	197.45
B.M. # 4	6.56	206.02	5.38	199.40
B.M. # 5	0.46	204.84	0.07	203.79 203.73

56

55

B.M. #5

6.80

210.53

204.05

203.73

57

53+37

53+26

53+09.8

53+90

B.M. #5

2.75

206.48

204.05

203.73

~~B.M. #5~~

0.48

204.03

~~204.05~~

B.M. #4

5.27

204.51

5.88

199.22

~~199.24~~

T.P.

6.62

205.10

2.92

198.48

B.M. #3

10.58

201.40

190.82

B.M. #2

7.73

191.54

T.P.

0.71

199.27

4.71

198.56

T.P.

9.18

203.27

2.28

194.09

B.M. #3

5.58

196.37

190.79

~~190.82~~

205.0 5.5 33	205.1 5.4 28	204.3 6.2 25	202.4 8.1 18	201.7 5.8 13	203.4 5.1 51	205.0 5.5 13	203.1 7.4 17	204.5 4.0 23	206.9 3.6 25	206.9 3.8 33
203.3 7.2 33	202.4 7.1 27	202.6 7.9 25	200.8 9.7 19	203.3 7.2 13	203.7 6.8 68	203.3 7.2 13	201.2 9.3 18	204.1 6.4 24	204.3 6.2 33	203.3 7.2 45
201.4 5.1 33	201.5 5.0 28	199.6 6.9 17	201.8 7.7 13	201.2 4.3 43	202.1 7.4 14	200.1 6.5 19	201.5 5.0 24	203.3 3.2 27	203.3 3.2 33	203.3 3.2 33
199.2 7.3 33	199.3 7.2 26	199.8 6.7 18	201.4 5.1 10	201.9 4.7 47	201.9 5.1 13	200.8 5.7 32	200.6 5.9 36	202.2 4.3 100	202.2 3.6 100	202.2 3.6 100
199.7 6.8 33	199.8 6.7 25	199.8 6.7 16	200.4 6.1 11	201.2 5.3 53	201.2 5.3 53	201.0 5.3 14	200.1 6.4 18	200.3 6.2 25	200.2 6.3 33	200.2 6.3 33

48

✓

✓

✓

✓

✓

✓

✓

68

2.65 207.13 8.56 204.48

67

+55 Drive Left No Calc.

65

T.P.	2.43	2/3	.04	4.50	210.61	✓
------	------	-----	-----	------	--------	---

64

63

62

61

60

59

6.62	215.11	2.04	208.49
------	--------	------	--------

58

57

21053

4

[illegible]

207.13

Handwritten calculations on lined paper, showing various arithmetic problems involving fractions and decimals. The calculations are organized into columns, with some results marked with checkmarks. The problems involve operations like addition, subtraction, multiplication, and division of fractions and decimals.

214.11

97

96

T.P.

95

0.91 206.19 8.85 205.28 ✓

+36

Drive Left No Culv.

94

93

B.M.#9

93

0.35 214.13 9.15 213.74 213.78 ✓

92+65

Drive & Culv. Rt.

92

91

90+35

T.P.

90

Drive Left

3.58 212.89 3.28 219.31 ✓

222.59

202.2	202.1	200.2	202.0	202.7	202.1	200.5	202.7	203.0	202.9
7.0 f	7.1	6.0	4.2	3.5	7.1	5.7	3.5	3.2 f	3.5
33	23	16	12	12	12	16	22	28	30
204.6	204.3	202.0	204.0	204.8	204.0	202.3	204.3	204.5	204.4
1.6 f	1.9	4.2	2.2	1.4	2.2	3.9	1.9	1.7 f	1.8
28	23	16	12	12	12	17	20	28	33
204.1	204.4	204.1	205.9	206.4	205.9	204.3	206.4	206.8	207.0
7.4 f	7.7	10.0	8.2	7.7	8.2	2.8	2.9	1.3 f	2.1
28	23	16	12	12	13	16	23	28	30
207.1	207.1	207.4	207.5	208.2	208.6	208.4	209.3	209.4	209.4
1.0	6.9	6.7	8.1	6.6	5.9	7.8	4.8	7.7 f	7.7
100	24	20	16	12	13	17	23	28	33
211.0	209.0	206.5	208.5	209.3	208.6	208.4	209.3	209.4	209.4
3.1 f	5.1	7.3	5.6	4.8	5.5	7.8	4.8	7.7 f	7.7
28	23	16	12	12	13	17	23	28	33
211.7	211.7	211.1	209.6	209.3	208.6	208.4	209.3	209.4	209.4
2.9	2.4	2.4	4.5	4.8	5.5	7.8	4.8	7.7 f	7.7
30	28	24	16	12	13	17	23	28	33

211.5	212.1	211.6	210.0	212.4	212.8	213.0
11.4	10.8	11.3	12.9	10.5	10.1 f	9.9
12	12	12	16	22	28	30
213.7	213.7	213.5	213.6	213.0	214.0	215.6
9.2	9.2	9.4	9.3	8.9	7.3	6.1 f
13	13	13	18	18	100	175
215.1	215.1	214.9	213.2	216.1	216.3	216.4
8.0	8.0	9.7	9.7	6.8	6.6 f	6.5
13	13	18	18	29	28	33
217.5	217.5	217.5	216.0	218.7	218.9	218.9
5.1	5.1	6.9	4.2	4.0 f	4.0 f	4.0 f
12	12	17	23	28	28	33
219.2	219.2	219.2	219.2	219.2	219.2	219.2
3.7	3.7	3.7	3.7	3.7	3.7	3.7
219.9	219.9	219.9	219.9	219.9	219.9	219.9
3.3	3.3	3.3	3.3	3.3	3.3	3.3
219.3	219.3	219.3	219.3	219.3	219.3	219.3
5.3	5.3	5.3	5.3	5.3	5.3	5.3
18	18	18	18	18	18	18
219.0	219.0	219.0	219.0	219.0	219.0	219.0
3.6	3.6	3.6	3.6	3.6	3.6	3.6
219.5	219.5	219.5	219.5	219.5	219.5	219.5
3.1 f	3.1 f	3.1 f	3.1 f	3.1 f	3.1 f	3.1 f
27	27	27	27	27	27	27
219.4	219.4	219.4	219.4	219.4	219.4	219.4
3.2	3.2	3.2	3.2	3.2	3.2	3.2
30	30	30	30	30	30	30

Handwritten calculations on a grid background, showing various arithmetic operations (addition, subtraction, multiplication, division) and results. The calculations are organized into several columns and rows, with some numbers written in a larger, bolder font. The results are often written in a smaller font, sometimes with a checkmark indicating a correct result. The calculations involve numbers ranging from 10 to 100, with some results reaching up to 1000. The calculations are as follows:

Calculation	Result
179.1	179.1
3.8×30	114
176.6	176.6
179.1	179.1
3.9×30	117
176.7	176.7
179.0	179.0
4.0×30	120
176.9	176.9
4.1×30	123
177.0	177.0
4.2×30	126
177.1	177.1
4.3×30	129
177.2	177.2
4.4×30	132
177.3	177.3
4.5×30	135
177.4	177.4
4.6×30	138
177.5	177.5
4.7×30	141
177.6	177.6
4.8×30	144
177.7	177.7
4.9×30	147
177.8	177.8
5.0×30	150
177.9	177.9
5.1×30	153
178.0	178.0
5.2×30	156
178.1	178.1
5.3×30	159
178.2	178.2
5.4×30	162
178.3	178.3
5.5×30	165
178.4	178.4
5.6×30	168
178.5	178.5
5.7×30	171
178.6	178.6
5.8×30	174
178.7	178.7
5.9×30	177
178.8	178.8
6.0×30	180
178.9	178.9
6.1×30	183
179.0	179.0
6.2×30	186
179.1	179.1
6.3×30	189
179.2	179.2
6.4×30	192
179.3	179.3
6.5×30	195
179.4	179.4
6.6×30	198
179.5	179.5
6.7×30	201
179.6	179.6
6.8×30	204
179.7	179.7
6.9×30	207
179.8	179.8
7.0×30	210
179.9	179.9
7.1×30	213
180.0	180.0
7.2×30	216
180.1	180.1
7.3×30	219
180.2	180.2
7.4×30	222
180.3	180.3
7.5×30	225
180.4	180.4
7.6×30	228
180.5	180.5
7.7×30	231
180.6	180.6
7.8×30	234
180.7	180.7
7.9×30	237
180.8	180.8
8.0×30	240
180.9	180.9
8.1×30	243
181.0	181.0
8.2×30	246
181.1	181.1
8.3×30	249
181.2	181.2
8.4×30	252
181.3	181.3
8.5×30	255
181.4	181.4
8.6×30	258
181.5	181.5
8.7×30	261
181.6	181.6
8.8×30	264
181.7	181.7
8.9×30	267
181.8	181.8
9.0×30	270
181.9	181.9
9.1×30	273
182.0	182.0
9.2×30	276
182.1	182.1
9.3×30	279
182.2	182.2
9.4×30	282
182.3	182.3
9.5×30	285
182.4	182.4
9.6×30	288
182.5	182.5
9.7×30	291
182.6	182.6
9.8×30	294
182.7	182.7
9.9×30	297
182.8	182.8
10.0×30	300

126

125

124

T.P.

2.24

201.49

1.99

199.25 Root 4

Trans. Pole 123 + 95

123

122

121

120

119

T.P.

10.20

201.24

0.62

191.04 ✓

118

117

116 + 12

116

191.66

195.1 6.4 33	195.3 6.2 27	195.3 6.2 25	193.6 7.9 19	195.7 5.8 15	196.7 4.8 13	195.9 5.6 13	194.4 7.1 17	196.2 5.3 23	197.3 4.2 30	197.5 4.0 32	55
195.7 5.8 33	195.7 5.8 31	195.8 5.7 27	195.9 5.6 26	194.1 7.4 20	196.3 5.2 15	197.1 4.4 13	196.6 4.9 17	195.0 6.5 25	196.8 4.7 27	198.1 3.4 31	196.2 3.3 33
195.9 5.6 33	195.9 5.6 31	196.2 5.3 28	196.4 5.3 26	194.7 6.8 19	196.7 4.8 13	197.7 4.4 13	197.1 4.4 17	196.7 4.1 23	195.9 2.7 31	196.8 2.7 33	

196.2 5.0 30	196.3 4.9 27	194.1 6.5 19	196.7 4.5 15	197.8 5.4 13	196.8 4.4 13	195.5 5.7 17	197.4 3.8 23	196.4 2.8 30	196.4 2.8 33	
195.7 5.3 30	196.0 5.2 26	194.2 7.0 19	196.3 4.9 14	197.1 4.1 13	196.5 4.1 13	195.2 6.0 17	196.9 3.3 23	197.9 3.3 30	196.4 2.8 33	
195.1 6.1 30	193.1 5.8 27	193.6 7.0 28	195.6 5.6 14	196.3 4.9 13	195.7 5.2 13	194.2 7.0 17	195.5 5.7 23	196.8 4.4 30	196.8 4.4 33	
194.4 6.8 30	194.4 6.8 27	193.4 7.8 22	194.1 7.1 13	194.6 6.6 13	193.8 7.4 13	191.9 9.3 17	193.7 7.3 23	193.6 7.6 30	194.6 6.6 33	
193.1 8.1 30	193.1 8.1 27	190.3 16.3 19	191.4 9.8 13	192.0 9.2 13	191.1 10.1 13	189.4 11.8 17	191.0 10.2 25	191.6 9.6 30	191.6 9.6 33	
186.0 5.7 30	186.1 5.6 27	185.2 6.5 25	187.7 7.6 13	188.6 7.9 13	187.8 7.9 13	186.2 5.5 18	187.4 4.3 24	188.3 3.4 30	188.3 3.4 33	
181.9 9.8 30	182.4 9.3 27	181.6 10.1 24	179.1 12.6 17	180.7 11.0 13	181.4 10.3 13	181.4 10.3 18	180.9 10.8 30	181.3 10.4 33	181.3 10.4 33	

154.9

132

131407 5 new culr

B17/13 6.47 204.21

B. 1713

3.18

197.74

197.72 197.742

131

130

129

T. P.

3.61 200.90

4.20. 197.29v

128

129

201. 49-

[illegible]

143

T.P.

11.81

227.18

3.98

215.37

✓

142

141

140

T.P.

10.44

219.35

3.02

208.91

✓

139

138

137

136

135

T.P.

9.23

211.93

1.61

202.70

✓

134

133

204.21

✓

$$\begin{array}{r} 218.3 \\ 8.9 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 218.3 \\ 8.9 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 218.2 \\ 12.0 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 216.7 \\ 10.5 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 217.3 \\ 9.9 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 216.6 \\ 10.6 \\ \hline 19 \end{array}$$

$$\begin{array}{r} 214.7 \\ 12.0 \\ \hline 19 \end{array}$$

$$\begin{array}{r} 216.4 \\ 10.8 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 216.5 \\ 10.7 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 214.3 \\ 5.1 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 216.2 \\ 3.2 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 216.3 \\ 3.1 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 213.2 \\ 6.2 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 214.5 \\ 4.9 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 213.6 \\ 4.9 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 212.8 \\ 6.6 \\ \hline 19 \end{array}$$

$$\begin{array}{r} 214.4 \\ 4.0 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 214.5 \\ 4.9 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 212.2 \\ 7.2 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 212.1 \\ 7.3 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 218 \\ 2.6 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 209.3 \\ 18.1 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 210.9 \\ 8.0 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 213.6 \\ 5.8 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 212.5 \\ 5.3 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 211.2 \\ 6.6 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 214.5 \\ 4.9 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 210.7 \\ 1.2 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 210.5 \\ 1.4 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 209.9 \\ 2.9 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 207.6 \\ 4.3 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 209.1 \\ 2.8 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 209.9 \\ 2.9 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 207.3 \\ 4.6 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 208.8 \\ 3.1 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 208.9 \\ 3.0 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 209.3 \\ 2.4 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 209.6 \\ 2.3 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 208.9 \\ 3.0 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 206.6 \\ 5.3 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 208.0 \\ 3.9 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 207.6 \\ 4.3 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 206.0 \\ 5.9 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 207.5 \\ 4.4 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 208.9 \\ 4.3 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 207.7 \\ 4.2 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 208.4 \\ 5.6 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 207.7 \\ 4.2 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 205.2 \\ 6.7 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 206.7 \\ 5.2 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 207.4 \\ 4.5 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 206.4 \\ 5.4 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 204.9 \\ 7.1 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 206.6 \\ 5.3 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 206.4 \\ 5.5 \\ \hline 28 \end{array}$$

$$\begin{array}{r} 206.6 \\ 5.3 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 206.2 \\ 5.7 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 203.4 \\ 8.5 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 201.5 \\ 10.5 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 203.6 \\ 5.9 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 201.8 \\ 10.1 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 203.8 \\ 8.1 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 206.6 \\ 5.3 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 204.4 \\ 7.8 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 204.4 \\ 7.8 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 204.1 \\ 7.8 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 201.5 \\ 10.5 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 203.1 \\ 8.8 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 203.6 \\ 8.7 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 201.8 \\ 10.1 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 203.8 \\ 8.1 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 206.6 \\ 5.3 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 202.6 \\ 1.6 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 202.6 \\ 1.6 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 202.0 \\ 2.2 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 199.4 \\ 4.8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 200.7 \\ 3.1 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 201.3 \\ 3.3 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 199.3 \\ 4.9 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 201.4 \\ 2.8 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 201.5 \\ 2.7 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 201.3 \\ 2.9 \\ \hline 33 \end{array}$$

$$\begin{array}{r} 201.2 \\ 3.0 \\ \hline 26 \end{array}$$

$$\begin{array}{r} 200.3 \\ 3.9 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 199.5 \\ 5.7 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 200.7 \\ 5.3 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 199.9 \\ 5.1 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 197.1 \\ 7.1 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 199.0 \\ 2.2 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 199.9 \\ 2.1 \\ \hline 33 \end{array}$$

146

+66

145

144

Gate Rt

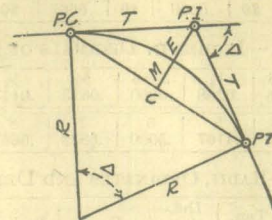
229.18

✓

$\frac{5.6}{33}$	$\frac{221.6}{21}$	$\frac{222.4}{21}$	$\frac{219.9}{15}$	$\frac{221.6}{11}$	$\frac{222.4}{8}$	$\frac{221.9}{17}$	$\frac{220.3}{21}$	$\frac{222.5}{28}$	$\frac{222.6}{33}$	$\frac{222.7}{33}$
$\frac{4.2}{33}$	$\frac{223.0}{21}$	$\frac{222.4}{21}$	$\frac{219.6}{16}$	$\frac{221.4}{11}$	$\frac{222.2}{17}$	$\frac{221.5}{17}$	$\frac{220.3}{20}$	$\frac{222.5}{28}$	$\frac{222.6}{33}$	$\frac{222.7}{33}$
$\frac{6.3}{33}$	$\frac{220.9}{22}$	$\frac{220.4}{22}$	$\frac{217.7}{16}$	$\frac{219.2}{13}$	$\frac{221.1}{17}$	$\frac{221.1}{17}$	$\frac{219.6}{20}$	$\frac{221.3}{27}$	$\frac{221.8}{33}$	$\frac{221.9}{33}$
					$\frac{221.7}{15}$	$\frac{218.9}{17}$	$\frac{217.4}{20}$	$\frac{218.7}{27}$	$\frac{219.3}{33}$	$\frac{219.3}{33}$

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



CURVE FORMULAS

Radius= $R = \frac{50}{\sin. \frac{D}{2}}$ (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) $= R \text{vers} \frac{\Delta}{2}$ (6)

External= $E = T \tan \frac{\Delta}{4}$ (7) $= R \div \cos \frac{\Delta}{2} - R$ (8) $= R \text{exsec} \frac{\Delta}{2}$ (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. $\Delta=62^\circ 10'$ $D=8^\circ 20'$. From Table IV for 1° curve $T=3454.1$ and $\div 8\frac{1}{2}=414.49$ 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 $(54.50 \div 100)^2=2.16$ ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2 \div (2 \times 688.26)=2.16$ ft.

Deflections.—Deflection angle= $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For c ft.=(in minutes) $.3 \times C \times D^\circ$ or=defl. for 1 ft. from Table III $\times C$. For Sta. 158 of above curve=.3 $\times 54.5 \times 8\frac{1}{2}=136.2'$ or $2^\circ 16.2'$, or $=2.50 \times 54.5=136.2'$ from Table III. For Sta. 159 deflection angle= $2^\circ 16.2' + 8^\circ 20' \div 2=6^\circ 26.2'$, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 115.37 For from Table IV for 1° curve $E=960.6$ for $8^\circ 20'=960.6 \div 8\frac{1}{2}=115.27$ and from Table V correction=.10 or $E=115.37$. Or suppose $\Delta=32^\circ$ and E is measured and found to be 42 ft. What is D ? From Table IV $E=230.9$ and $\div 42=5.5$ or $D=5^\circ 30'$.

B.M. #15

3.81 220.97 221.05

11.66
4.745
6.915
94
6.41
53

6.605
1.190
6.415

53

163

162

161+28

160+15

160+97

160

159

T.P.
223
10.5
33

158

224.3
10.5
8.2263
8.5
224.1
7.7
9.7
9.6
6.4
6.2
6.0
5.9
5.8
5.7
5.6
5.5
5.4
5.3
5.2
5.1
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
4.1
4.0
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1

1.15 224.78 10.13 223.63
224.5 223.3
10.2 12.3 10.5
19 14 10 16 19 26
223.6
10.2
31

233.76

L ← C → R

TABLE I.—MINUTES IN DECIMALS OF A DEGREE.

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

TABLE II.—INCHES IN DECIMALS OF A FOOT.

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE III.—RADI, ORDINATES AND DEFLECTIONS.

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

Note. Chord Deflection=2 times tangent deflection.

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

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

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10'	1598.0	218.7	10'	2151.7	390.7	10'	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10'	3386.3	925.9	10'	4099.5	1315.6	10'	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V.—CORRECTIONS FOR 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	.79	.89	.99	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	.032	.037	.043	.049	.056	.063	.071
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.077	.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	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.440	.528	.617	.707	.797	.877	.977	1.07	1.18	1.29
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	.885	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	.067	.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	.223	.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

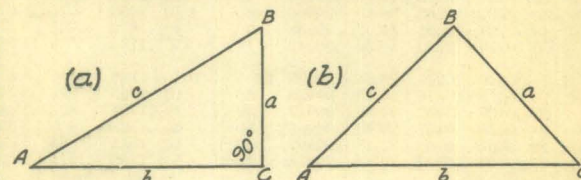
SLOPE REDUCTIONS.

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 $4^\circ 20'$ from Table VIII Cos=.99714 and correction= $1 - .99714 = .00286$ per foot or total of $.286 \times 2\frac{1}{2}$ (near enough)=.57 and horizontal distance= $248.7 - .57 = 248.13$ ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

$$\begin{aligned}\sin. & A = \frac{a}{c} \\ \cos. & A = \frac{b}{c} \\ \tan. & A = \frac{a}{b} \\ \cot. & A = \frac{b}{a} \\ \sec. & A = \frac{c}{b} \\ \operatorname{cosec.} & A = \frac{c}{a}\end{aligned}$$



FORMULA FOR SOLVING TRIANGLES.

Given		Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A = \frac{a}{c}, \cos. B = \frac{b}{c}, b = \sqrt{(c+a)(c-a)}$	
a, b	A, B, c	$\tan. A = \frac{a}{b}, \cot. B = \frac{b}{a}, c = \sqrt{a^2 + b^2}$	
A, a	B, b, c	$B = 90^\circ - A, b = a \cot. A, c = \frac{a}{\sin. A}$	
A, b	B, a, c	$B = 90^\circ - A, a = b \tan. A, c = \frac{b}{\cos. A}$	
A, c	B, a, b	$B = 90^\circ - A, a = c \sin. A, c = c \cos. A$	
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	$\left\{ \begin{aligned} \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A &= \sqrt{\frac{(s-b)(s-c)}{bc}} \\ \cos. \frac{1}{2} A &= \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}, \\ \sin. A &= 2 \sqrt{\frac{(s-a)(s-b)(s-c)}{bc}} \end{aligned} \right.$	
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	0	.1392	.1405	7.115	.99027	82
10	.0029	.0029	343.8	I	50	10	.1421	.1435	6.968	.98986	50
20	.0058	.0058	171.9	.99998	40	20	.1449	.1465	6.827	.98944	40
30	.0087	.0087	114.6	.99996	30	30	.1478	.1495	6.691	.98902	30
40	.0116	.0116	85.94	.99993	20	40	.1507	.1524	6.561	.98858	20
50	.0145	.0145	68.75	.99989	10	50	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.99985	89	9	.1564	.1584	6.314	.98769	81
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.99939	88	10	.1736	.1763	5.671	.98481	80
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.99863	87	11	.1908	.1944	5.145	.98163	79
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.99756	86	12	.2079	.2126	4.705	.97815	78
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.571	.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
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

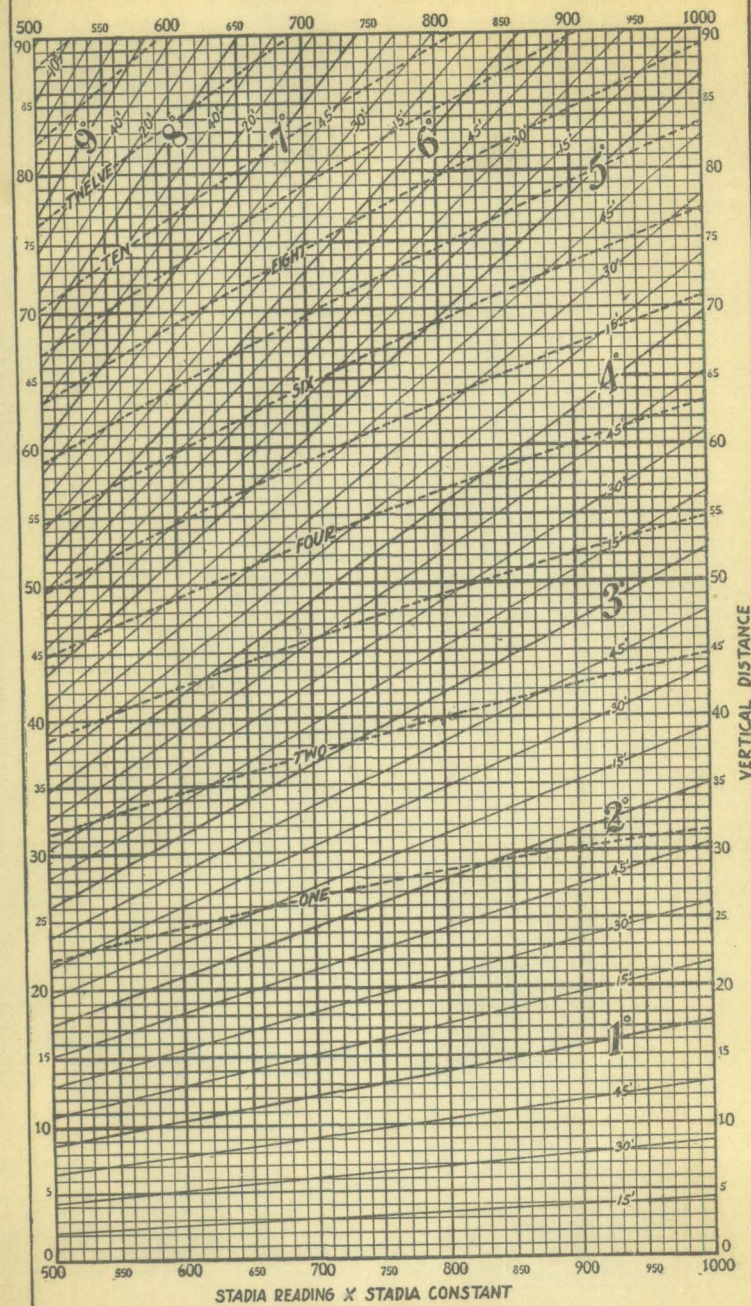
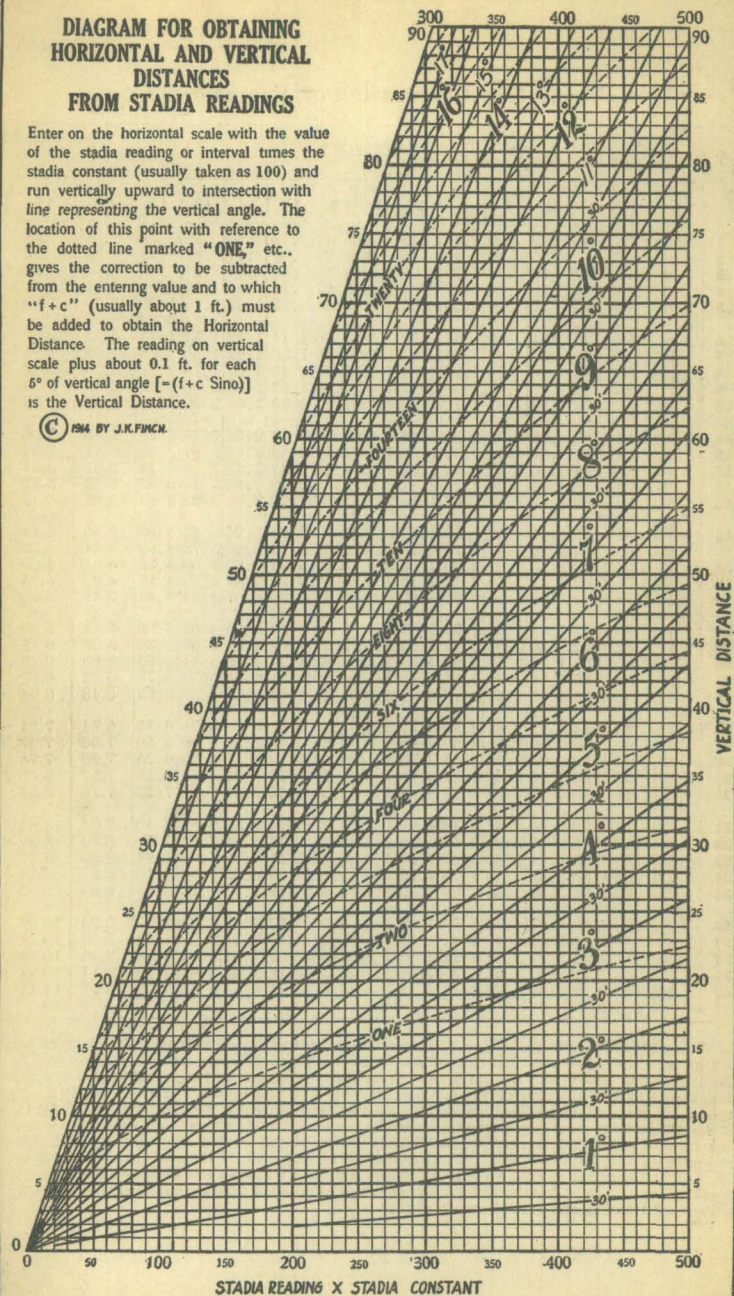
TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
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	2.699	.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
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

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 $[-(f+c \sin \alpha)]$ is the Vertical Distance.

© 1914 BY J.K.FINCH.



180.24

3.68

183.92

183.92

181

2.92

100

1.08

121.68

1.08

103.36

1.67

105.13

1.67

106.70

95.00 - 1

56

95.56 - 2

55

96.11 - 3

56

96.67 - 4

56

97.23 - 5

56

97.79 - 6

55

98.34 - 7

56

98.90 - 8

56

99.46 - 9

56

100.02 - 10

56

99

192

100.92

192

102.84

192

104.76

193

106.69

193

108.62

400) 6,700.00 (1675 : 81.25

2700

2400

3000

2500

2000

100.00

95.00

46.00

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

1500

5000

205555

112

55

28

01924

38

56

1924

102

1924

108.62

99.00

9.62

5.00

4.62

4.02

12.00

12.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

20.00

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.