

T140 R27

26+40

25

24

23+10

22

21

20

19

18

17

16+50

15

14

13 189

12

11

10

9+10

8+26

Road swings to north

7

6

5

4

3+30

2

1+22

0+00

marked C.R.C.
Road swings No. - I.P. at int. with state
started from road int. $\frac{32}{14}$ T140-M1-R27

N 84° 0' E

$\frac{32}{14}$

Jan. 2, 1938

59

BURCH + ASPEN
TIMBER

WATER

BURCH + ASPEN
TIMBER

O.I.P. S.C. $\frac{32}{14}$ 141-27

T140 R27

33
4/3

52+86

SET 3' INCH OAK FOR MINE POST SEC. 32/33

52+13

KEELED APP SEC. COY. 52+86 E OF SEC. 32/33

50

Leave SW SWAMP N.S.

49+50

Enter SW SWAMP N.S.

48

47

46+67

~~LEFT SWAMP~~

45

44

43

42+90

41

40+00

~~CENTERED SWAMP~~

39

38

37

36+30

35

34

33

32

31

30

29+70

28

27

32/33
5/4

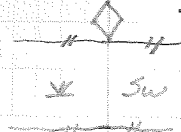
Jan 3. 1938

33/3

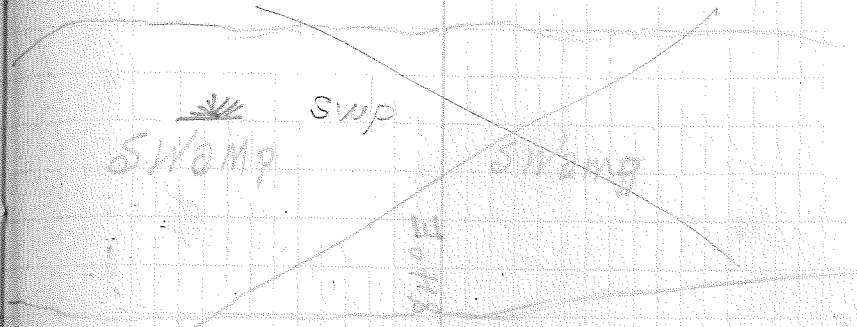
60

N 84° E

BURCH
ASPEN
TIMBER



BURCH
ASPEN
TIMBER



BURCH ASPEN
TIMBER

BURCH ASPEN
TIMBER

T 140 R 27

26+40

25

24

23+10

22

21

20

19

18

17

16+50

15

14

13

12

11

10

9+90

8

7

6

5

4

3+30

2

1

0+01 Start east from appr. 30. $\frac{33}{4 \frac{1}{2}}$ 140-141-27

$\frac{3334}{4 \frac{1}{2}}$

Jan. 4 1939

G/

partly Woods. TOD

Grapes ch

Finney ch

Bain Oxe

BUSHY Oxe

N 84° E

BUTCH-ASPEN
TIMBER

N 84° E

BUTCH-ASPEN
TIMBER

◇ Appr. stake

52+80 FOUND ORIGINAL SECTION CORNER 3 INCH PINE
 51 2 Feet long BLED ON TWO SIDES SCRIBED
 50 140N R27W S-34 - 140N R27W S-35
 49 BT. 2 INCH NOTWAY PINE SCRIBED 140N R27W S-35
 48 N 34° E DISTANCE 51 FEET.

47+55 FOUND 2 INCH ASPEN STAKE KEPT
 46 SEC 34 SEC. 3 SEC. 35 SEC. 2
 45 @ 250 12 INCH NOTWAY PINE SCRIBED 140N
 44 R27W S-51 26.3 ft.
 43 2 INCH ASPEN SCRIBED 140N R27W S-2
 42+90 S-55° E DISTANCE 34.1 FEET
 41 CROSSED ROAD N-S

40
 39
 38
 37+61 ENTERED PINE TIMBER.

36+30
 35
 34
 33
 32+00 LEFT SWAMP.

31
 30+38 ENTERED M.E. SWAMP.
 29+70
 28
 27

COR. $\frac{35}{31}$

33 34 41
 4 3 2
 N 84° E ☐ $\frac{34}{32}$ Jan 4 1938 C 2

PINE TIMBER

N 84° E

PINE TIMBER

ROAD

BUTCH ASPEN
 TIMBER.

BUTCH ASPEN
 TIMBER

M.E. SWAMP

BUTCH ASPEN
 TIMBER

BUTCH ASPEN
 TIMBER.

T140 R 27

26+40

25

24

23+10

22

21

20

19

19

17

16+50

15

14

13

12

11

10

9+90

8

7

6

5

4

3+30

2

T140 N R27 W 535

10+64 1/2
0+00

Found stake scriber T140 N R27 W, 534
STARTED FROM SEC. COR. 34 1/2

34 1/35
3 1/2

Jan. 4 1938

63

Same party

N 84° E

pine timber

N 84° E

pine timber

sec. 34 1/35
3 1/2

140-141-27

W.

B.T.

Wooden Stake - Keel.
B.T.

53+43 $\frac{1}{2}$ 4" wooden stake led corner to $\frac{25}{11}$ 141-27

53+10 $\frac{1}{2}$ FOUND 2" square pine post 1 $\frac{1}{2}$ foot long

52+80 FOUND 14 inch pine stump SETTED

N-E-W-D

51

50

49+50

Set app. S.C. $\frac{35}{211}$

48

47

46

45

44

43

42+90

41

40

39

38

37

36+30

35

34

33

32

31

30

29+70

29

28

~~3837~~

Jan H 1938

~~3837~~

N 84° E $\frac{31}{2}$ app. S.C.

S Y

PINE TIMBER

N 84° E

PINE TIMBER

T140 R27

26+40

25

24

23+10

22

21

20

19

18

17

16+50

15

14

13

12

11

10

9+90

8+88 LEFT BITCH TIMBER ENTERED TAM. SWAMP.

7

6

5

4

3+30

2+00 LEFT PINE TIMBER ENTERED BITCH TIMBER.

1

0+00 STARTED WEST FROM SEC. COR.

1813
75134

T140 R27

Jan. 6 1938 65

PATTY WOODSTOD

GRAPESCH

BAIN CH

FINNEY AXE

EVANS AXE

S 83° W

mag. Bearing S 83° W

6 INCH WHITE PINE BOARDS

SSDPW DISTANCE 15 FEET

SCRIBED B.T.

4 FOOT ASPEN STAKE.

T14D R27

52+80 Set 13 inch Tamrack For section $\frac{14}{13}$
 51 Keel'd App. sec. core. $\frac{23}{27}$
 50 $\frac{14}{13}$
 $\frac{23}{27}$

49+50

48

47+59 Crossed fence North-South

46+77 Entered M.B.R. Swamp

45

44

43

42+90 Left pine timber entered Spruce Swamp

41

40

39

38+16 Crossed fence North-South entered pine timber

37

36+30 quit For Day Jan. 6, 1938

35

34

33

32

31

30

29+70

28

27

S 83° W

Jan. 6 1938
 Jan 7 1938
 CC

Mag 5830 W

T 140 R 27

26+40

25

24

23+40

22

21

20

19

18

17

16+50

15

14

13

12+00

STRUCK EDGE OF LAKE

11+00

CROSSED ROAD

10+95

LEFT OPEN FIELD

10

HOUSE WENT TO NORTH OF LINE

9+00

TELEPHONE LINE OPEN FIELD

8+00

LEFT SPRUCE SWAMP

7

6

5

4

3+30

2

1+00

LEFT M.B.R. SWAMP. ENTERED SPRUCE SWAMP

0+00

STARTED WEST FROM SEC. COR. 23 1/2 T 140 R 27

Q. R. L.

Jan 7, 1938

S 93° W

~~Woods~~
partly Woods road
Grapes on
Bain's on
Finney's on
Evans's on

MEX. BOUNDARY
2429
2429

N

T 140 R 27

Jan 7 1938

S 83° W

~~all~~

Mag Bearing S 83° W
Random line

36 + 30 LEFT LAKE ENTERED SPRUCE SWAMP. QUIT FOR DAY JAN 7 1938

35

34

33

32

31

30

29 + 70

28

27

26+74
 26+40
 25
 24
 23+10
 22
 21
 20
 19
 18
 17
 16+50
 15
 14
 13+67
 13+53
 13+05
 12+30
 11+20
 10
 9+20
 8
 7
 6
 5
 4
 3+30
 2
 1
 0+00

CROSSED FENCE N-S 2750 OPEN FIELD
 FENCE RUNS NORTH
 ROAD CLIVES SOUTH
 FENCE AND TELEPHONE LINE NORTH.
 ENTERED SWAMP
 LEFT SWAMP
 STARTED WEST FROM APP. SOL. COT 2750

1140 R27

S 83° W

OPEN FIELD
 Jan. 11 1938

67

PARTY MILE COT

CHAPPA CH

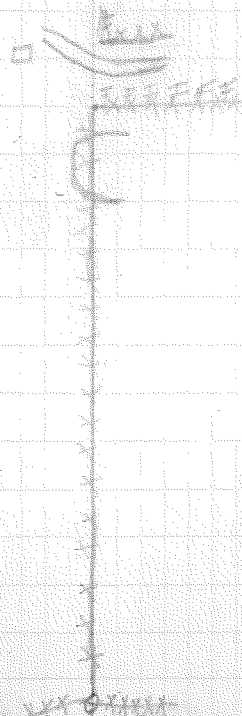
WOODS CH

CUM STOCK AXE

BAIN AXE

PEASE AXE

MAP. BEARING S 83° W
 1000 P.M. LINE



53+44

53+11

Telephone line N-S

52

51

50

49+50

48

47+30 LEFT Hay meadow

46

45

44+69 Hay meadow

43

42+90 Crossed Road LEFT Swamp.

41

40

39

38

37+24

36+30

35

34

33+90

32

31+52 ENTERED Spruce Swamp.

30

29+00

LEFT OPEN FIELD

28

27+94 east side OF house 25 ft. North OF Line.

CENTER OF ROAD OFFSET 4 1/4"
 SOUTH TO FENCE RUNNING E-W
 APP. SEC. COR. 15114
 20023

SET 4" BIRCH NAIL LONG 10' W FROM

CENTER OF ROAD IN FENCE KEPT

APP. SEC. COR. E.C.W. SEC. 15114
20023

Jan 11, 1938

68

OFFSET 12' North to 2" i.p. 21

above ground. at 50 1/2' i.p. stick in

in 2" i.p. started new line
FROM i.p.

FOUND 2" iron pipe with cap

9.4 feet south of line 2 feet

above ground.

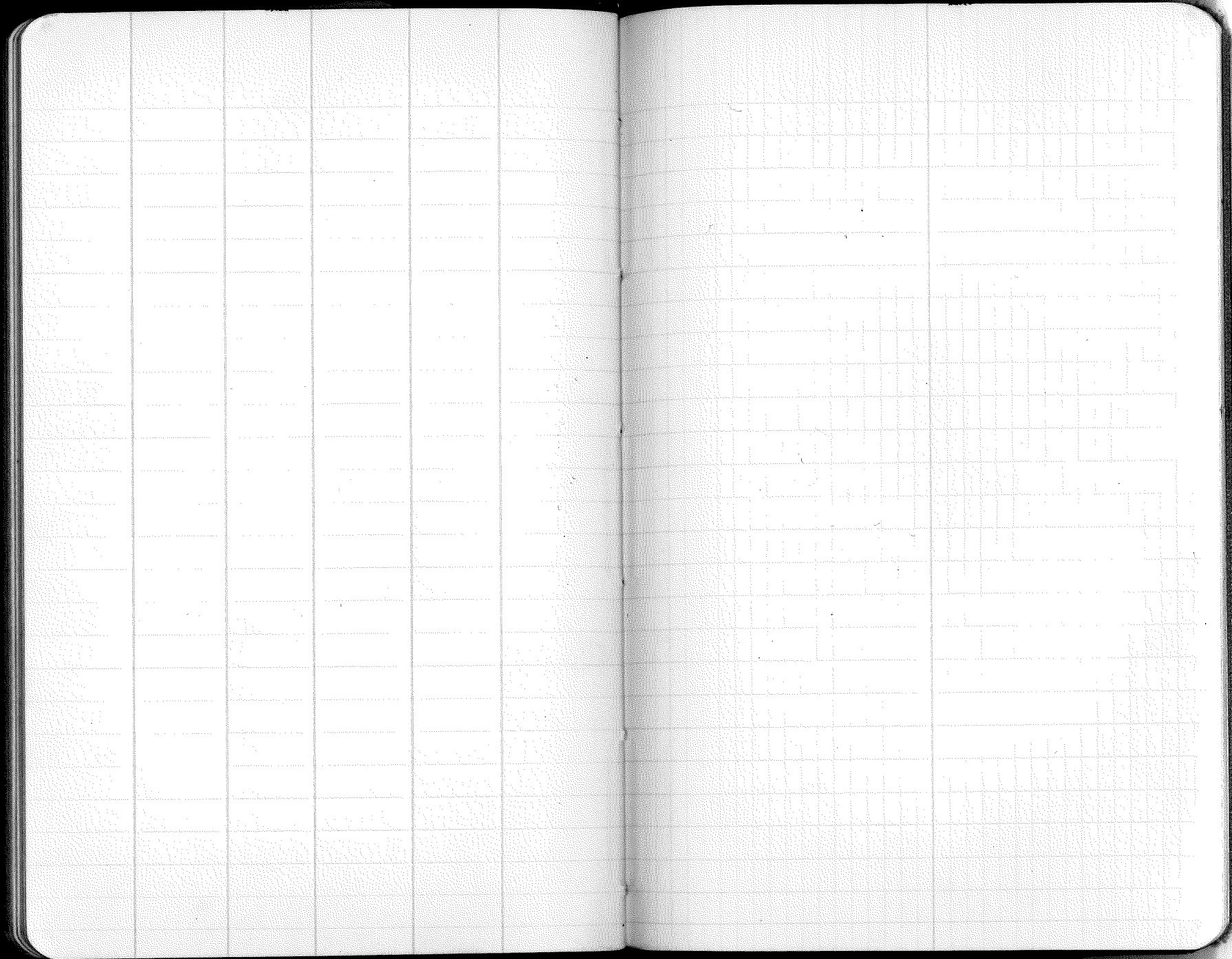
2 inch spruce stake 2 feet long

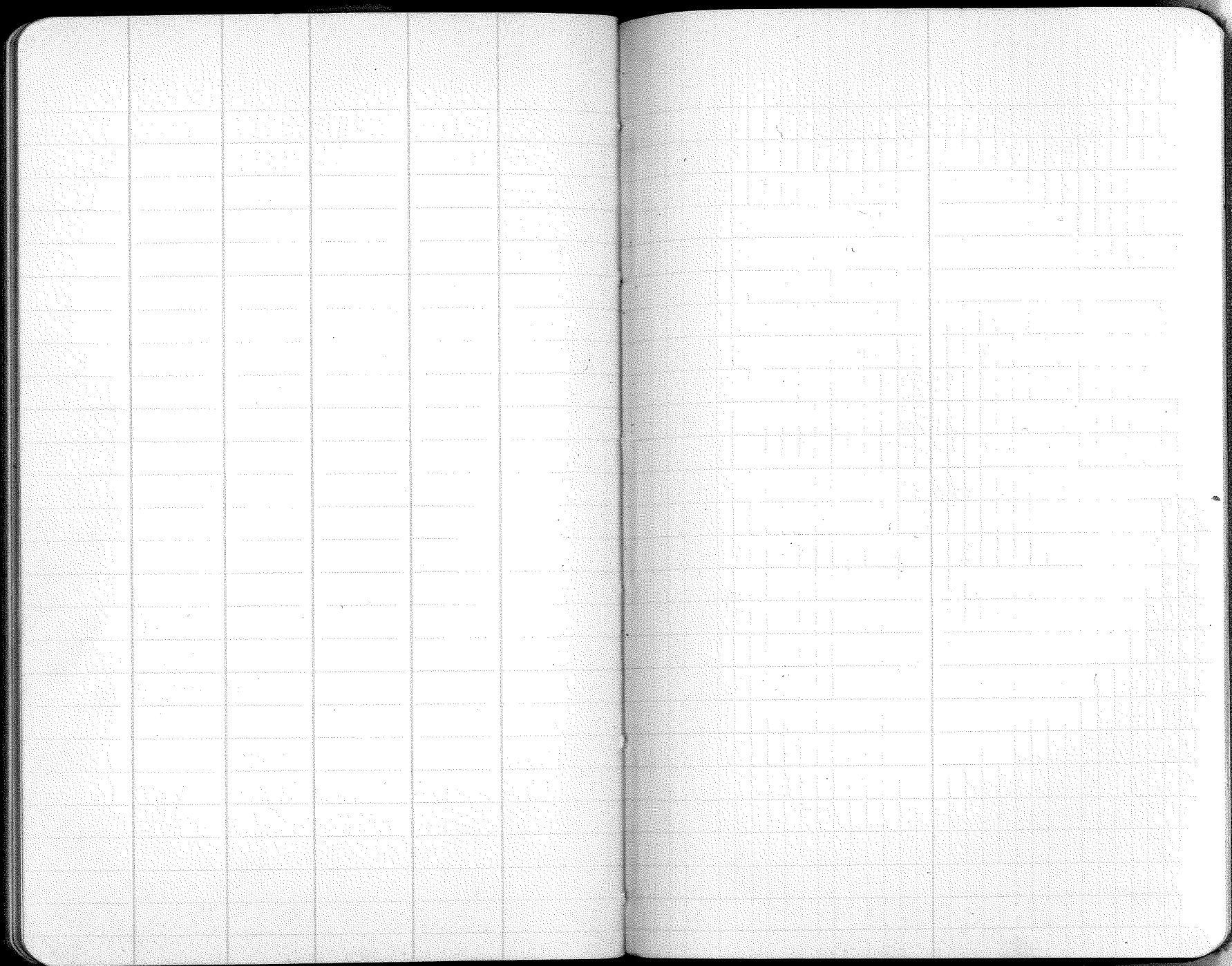
SQUARED ON TWO SIDES 5.8 feet

North of line.

583 W
 Mag bearing
 Random line

open field





IMPROVED TABLES AND INFORMATION

DIRECTIONS FOR USE OF TABLES

TABLE No. 1.

Distance of slope stake from side or shoulder stake for any width roadway, slope $1\frac{1}{2}$ to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

TABLE No. 9.

To find Tangent and External for curve of any other degree, divide by degree of curve and add correction found in column of corrections.

Degree of curve with a given I may be found by dividing tangent, (or external), opposite I by given tangent, (or external).

The distance from a point on the tangent to the curve is very nearly the square of the tangent length divided by twice the radius.

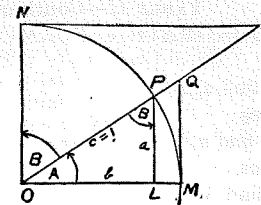


TABLE II
TRIGONOMETRIC FORMULÆ.

$$\angle A = \angle MOP \quad \angle B = \angle PON = \angle OPL \\ R = OB = c = 1$$

$$\sin A = \frac{a}{c} = \frac{a}{1} = a = \cos B = LP$$

$$\cos A = \frac{b}{c} = \frac{b}{1} = b = \sin B = OL$$

$$\tan A = \frac{a}{b} = \frac{MQ}{OM} = \frac{MQ}{1} = MQ = \cot B = MQ$$

$$\cot A = \frac{NT}{ON} = \frac{NT}{1} = NT = \tan B = NT$$

$$\sec A = \frac{OQ}{OM} = \frac{OQ}{1} = OQ = \csc B = OQ$$

$$\csc A = \frac{OT}{ON} = \frac{OT}{1} = OT = \sec B = OT$$

$$\text{vers } A = \frac{LM}{OP} = LM = \text{covers } B \#$$

$$\text{covers } A = \frac{OP - LP}{OP} = OP - LP = \text{vers } B$$

$$\text{exsec } A = PQ = \text{coexsec } B$$

$$\text{coexsec } A = PT = \text{exsec } B$$

$$\sin \frac{1}{2} A = \sqrt{\frac{1 - \cos A}{2}} \quad \cos \frac{1}{2} A = \sqrt{\frac{1 + \cos A}{2}}$$

$$\sin 2A = 2 \sin A \cos A \quad \cos 2A = \cos^2 A - \sin^2 A$$

$$\text{Law of Lines} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\text{Law of Cosines} \quad c^2 = a^2 + b^2 - 2ab \cos C$$

$$\text{Law of Tangents} \quad \frac{a+b}{a-b} = \frac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$$

TABLE II—Continued
TRIGONOMETRIC FORMULAE (continued)

In any triangle:

Given a, b, C; to find c, B, A.

Use Law of Lines.

Given A, B, c; to find a, b, C.

Use Law of Lines.

Given a, b, c; to find A, B, C.

$$\text{Let } \frac{a+b+c}{2} = s, \sqrt{\frac{(s-a)(s-b)(s-c)}{s}} = r$$

$$\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \frac{1}{2} A = \frac{r}{s-a}$$

$$\tan \frac{1}{2} B = \frac{r}{s-b}$$

$$\tan \frac{1}{2} C = \frac{r}{s-c}$$

Area of a triangle:

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

PRISMOIDAL FORMULA.

$$\text{Vol.} = \frac{h}{6} (B+b+4M)$$

h = altitude; b, B = bases; M = midsection

TABLE III
INCHES AND FRACTIONS OF AN INCH IN DECIMALS OF A FOOT

	0	1	2	3	4	5	6	7	8	9	10	11
$\frac{1}{16}$	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
$\frac{1}{8}$	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271
$\frac{3}{16}$	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
$\frac{1}{4}$	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
$\frac{5}{16}$	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
$\frac{3}{8}$	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479
$\frac{7}{16}$	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
$\frac{1}{2}$	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583
$\frac{9}{16}$	.0469	.1302	.2135	.2969	.3803	.4635	.5469	.6302	.7135	.7969	.8802	.9635
$\frac{5}{8}$	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
$\frac{11}{16}$	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740
$\frac{3}{4}$	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
$\frac{7}{8}$	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
$\frac{15}{16}$	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896
1	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948
	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.000
	0	1	2	3	4	5	6	7	8	9	10	11

TABLE IV
USEFUL RELATIONS.

Lineal feet	×.00019	= miles
Lineal yards	×.0006	= miles
Square inches	×.007	= square feet
Square feet	×.111	= square yards
Square yards	×.0002067	= acres
Acres	×4840	= square yards
Cubic inches	×.00058	= cubic feet
Cubic feet	×.03704	= cubic yards
Links	×.22	= yards
Links	×.66	= feet
Feet	×1.5	= links

$$360^\circ = 21600' = 1296000''$$

$$\text{Radius} = \text{arc of } 57.2957790^\circ$$

$$\text{Arc of } 1^\circ (\text{radius} = 1) = .017453292$$

$$\text{Arc of } 1' (\text{radius} = 1) = .000290888$$

$$\text{Arc of } 1'' (\text{radius} = 1) = .000004848$$

$$\pi = 3.141592654$$

$$\sqrt{\frac{1}{\pi}} = 0.564190$$

$$\frac{\pi}{4} = 0.785398163$$

$$\sqrt[3]{\frac{6}{\pi}} = 1.240700982$$

$$\frac{\pi}{6} = 0.523598776$$

$$\pi^2 = 9.869604401$$

$$\sqrt{\frac{4}{\pi}} = 1.128379167$$

$$\frac{1}{\pi^2} = 0.101321184$$

$$\frac{\pi}{6} = 0.523598776$$

$$\sqrt{\pi} = 1.772453851$$

$$\frac{4\pi}{3} = 4.188790205$$

$$\frac{1}{\pi} = 0.3183099$$

Curvature of Earth's surface = about 0.7 feet in 1 mile

Curvature in feet = $0.667 (\text{Dist. in miles})^2$

Difference between arc and chord length, 0.05 feet in $11\frac{1}{2}$ miles

$$\text{Probable error of a single observation} = 0.6754 \sqrt{\frac{Mv^2}{n-1}}$$

Error in chaining of 0.01 feet in 100 feet:

Due to—

1. Length of tape error of 0.01 feet
2. Alignment. One end 1.4 feet out of line
3. Sag of tape at centre of 0.61 feet.
4. Temperature difference of 15°
5. Difference of pull of 15 lbs.

STADIA REDUCTION FORMULAE.

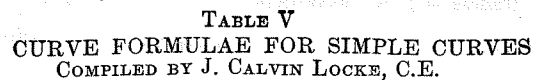
$$\text{Horizontal Distance} = R - R \sin^2 a + C \cos a$$

$$\text{Vertical Distance} = R \frac{1}{2} \sin 2a + C \sin a$$

$$R = \text{Reading} \times \frac{\text{distance from Object glass to cross hairs}}{\text{distance between cross hairs}}$$

C = distance from Object glass to cross hairs + distance from Object glass to center of instrument.

a = angle of elevation for mid Reading



COMPILED BY J. CALVIN LOCKE, C.E.

$$(2) \quad c = \sqrt{a^2 + b^2}$$

$$(36) \text{ Area Seg.} = \frac{LR - R^2 \sin I}{2} = \frac{LR - Rb}{2}$$

deg.	sin 0'	tan 0'	sin 10'	tan 10'	sin 20'	tan 20'	sin 30'	tan 30'	sin 40'	tan 40'	sin 50'	tan 50'	sin 60'	tan 60'	sin 70'	tan 70'
0	0000	0000	0029	0009	0058	0058	0087	0087	0116	0116	0145	0145	0173	0173	0202	0202
1	175	0175	0204	0204	0233	0233	0262	262	291	291	320	320	349	349	378	378
2	349	349	378	378	407	407	436	437	465	466	494	495	523	523	552	552
3	523	524	552	553	581	581	610	612	640	641	669	670	698	699	727	727
4	698	699	727	729	756	756	785	787	814	816	843	844	872	873	901	902
5	872	875	901	904	929	934	958	963	987	992	1016	1016	1045	1045	1074	1074
6	1045	1051	1074	1080	1103	1110	1132	1139	1161	1169	1190	1198	1227	1227	1256	1256
7	1227	1228	1256	1257	1285	1287	1313	1317	1344	1346	1373	1375	1402	1404	1431	1432
8	1402	1405	1431	1435	1461	1465	1491	1495	1521	1524	1550	1554	1580	1584	1610	1614
9	1580	1584	1610	1614	1641	1644	1670	1673	1699	1703	1729	1733	1759	1763	1789	1792
10	1733	1736	1763	1765	1792	1794	1823	1822	1853	1851	1883	1880	1914	1917	1948	1951
11	1908	1944	1937	1974	1965	2004	1994	2035	2022	2065	2051	2095	2085	2129	2119	2164
12	2079	2126	2108	2156	2136	2186	2164	2217	2193	2247	2221	2278	2250	2309	2283	2341
13	2341	2400	2378	2439	2406	2470	2434	2497	2463	2529	2493	2560	2524	2591	2555	2622
14	2591	2660	2616	2687	2646	2718	2674	2749	2706	2783	2739	2816	2772	2850	2806	2884
15	2884	2964	2919	2997	2954	3033	2990	3071	3028	3111	3067	3150	3106	3190	3145	3229
16	3229	3315	3269	3356	3313	3401	3358	3449	3406	3500	3456	3551	3507	3603	3558	3655
17	3655	3747	3699	3794	3749	3845	3799	3894	3849	3947	3899	3997	3951	4050	4003	4103
18	4103	4203	4154	4256	4208	4311	4263	4367	4319	4424	4375	4481	4432	4539	4489	4597
19	4597	4704	4655	4763	4714	4822	4773	4882	4833	4942	4892	5002	4952	5063	5013	5125
20	5125	5239	5176	5291	5244	5359	5311	5427	5379	5496	5447	5565	5516	5634	5585	5704
21	5704	5825	5755	5876	5827	5948	5898	6020	5970	6093	6043	6167	6117	6241	6191	6316
22	6316	6443	6386	6513	6464	6591	6542	6670	6620	6749	6699	6828	6778	6908	6858	6988
23	6988	7120	7069	7199	7149	7280	7230	7362	7311	7444	7393	7526	7475	7609	7558	7693
24	7693	7831	7779	7917	7865	7999	7947	8083	8030	8167	8114	8252	8199	8338	8285	8425
25	8425	8568	8514	8656	8602	8745	8691	8835	8780	8926	8871	9017	8962	9109	9054	9202
26	9202	9351	9296	9446	9391	9541	9486	9637	9581	9734	9678	9831	9774	9928	9871	10025
27	10025	10183	10126	10288	10230	10392	10334	10497	10439	10603	10545	10710	10651	10817	10758	10925
28	10925	11093	11034	11205	11145	11316	11256	11428	11368	11542	11481	11656	11595	11771	11710	11887
29	11887	12067	12005	12186	12124	12305	12243	12425	12363	12546	12484	12668	12605	12791	12728	12915
30	12915	13105	13042	13233	13170	13361	13298	13491	13428	13622	13559	13754	13691	13887	13824	14021
31	14021	14220	14156	14356	14292	14492	14428	14630	14565	14768	14703	14907	14842	15047	14982	15188
32	15188	15397	15332	15539	15474	15681	15616	15825	15760	15970	15905	16116	16051	16263	16198	16411
33	16411	16627	16561	16776	16710	16925	16859	17081	17015	17238	17172	17396	17330	17555	17489	17715
34	17715	17942	17875	18097	18030	18252	18185	18408	18341	18565	18498	18723	18656	18882	18815	19042
35	19042	19279	19211	19438	19370	19597	19529	19757	19689	19918	19850	20080	20012	20243	20175	20407
36	20407	20650	20581	20813	20744	20976	20907	21140	21071	21305	21236	21471	21402	21638	21569	21806
37	21806	22053	21983	22219	22149	22385	22315	22552	22482	22720	22650	22889	22819	23060	22990	23232
38	23232	23483	23412	23652	23581	23821	23750	23991	23920	24162	24091	24334	24263	24507	24436	24681
39	24681	24936	24864	25108	25036	25280	25208	25453	25381	25627	25555	25802	25730	25978	25906	26156
40	26156	26415	26342	26590	26517	26765	26692	26941	26868	27118	27045	27296	27223	27475	27402	27656
41	27656	27920	27846	28097	28023	28274	28200	28452	28378	28631	28557	28811	28737	28992	28918	29175
42	29175	29444	29369	29624	29549	29804	29729	29985	29910	30167	30092	30350	30275	30534	30459	30720
43	30720	31000	30924	31183	31107	31366	31290	31550	31474	31735	31659	31921	31845	32108	32032	32297
44	32297	32585	32508	32770	32693	32954	32877	33139	33062	33325	33248	33512	33435	33699	33622	33888
45	33888	34180	34102	34368	34290	34555	34477	34743	34665	34931	34853	35120	35042	35310	35232	35502
46	35502	35800	35721	36000	35921	36199	36120	36400	36321	36601	36522	36803	36724	37006	36927	37210
47	37210	37520	37440	37724	37644	37928	37848	38133	38053	38339	38259	38545	38465	38752	38672	38961
48	38961	39280	39200	39490	39410	39700	39620	39911	39831	40122	40042	40334	40254	40547	40467	40761
49	40761	41080	41000	41296	41216	41512	41432	41729	41649	41946	41866	42164	42084	42383	42303	42603
50	42603	42930	42850	43152	43072	43374	43294	43597	43517	43821	43741	44046	43966	44272	44192	44500
51	44500	44830	44750	45060	44980	45290	45210	45521	45441	45752	45672	45984	45904	46217	46137	46451
52	46451	46790	46710	47024	46944	47258	47178	47493	47413	47728	47648	47964	47884	48201	48121	48440
53	48440	48790	48710	49030	48950	49270	49190	49511	49431	49752	49672	50000	49920	50249	50169	50499
54	50499	50850	50770	51096	51016	51342	51262	51589	51509	51836	51756	52084	52004	52333	52253	52583
55	52583	52940	52860	53192	53112	53444	53364	53697	53617	53950	53870	54204	54124	54459	54379	54715
56	54715	55080	55000	55340	55260	55600	55520	55861	55781	56122	56042	56384	56304	56647	56567	56911
57	56911	57280	57200	57544	57464	57808	57728	58073	57993	58339	58259	58606	58526	58874	58794	59143
58	59143	59520	59440	59792	59712	60064	60000	60353	60273	60627	60547	60902	60822	61178	61098	61455
59	61455	61840	61760	62120	62040	62400	62320	62681	62601	62962	62882	63244	63164	63527	63447	63811
60	63811	64200	64120	64488	64408	64776	64696	65065	64985	65355	65275	65646	65566	65938	65858	66231
deg.	sin 60'	tan cot	sin cos	tan cot	sin cos	tan cot	sin cos	tan cot	sin cos	tan cot	sin cos	tan cot	sin cos	tan cot	sin cos	tan cot

TABLE VI (continued)
SINES, COSINES, TANGENTS, COTANGENTS (continued)

[illegible]

TABLE VII
RODS IN FEET AND INCHES

Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches
1	16—6	21	346—6	41	676—6	61	1006—6	81	1336—6
2	33—0	22	363—0	42	693—0	62	1023—0	82	1353—0
3	49—6	23	379—6	43	709—6	63	1039—6	83	1369—6
4	66—0	24	396—0	44	726—0	64	1056—0	84	1386—0
5	82—6	25	412—6	45	742—6	65	1072—6	85	1402—6
6	99—0	26	429—0	46	759—0	66	1089—0	86	1419—0
7	115—6	27	445—6	47	775—6	67	1105—6	87	1435—6
8	132—0	28	462—0	48	792—0	68	1122—0	88	1452—0
9	148—6	29	478—6	49	808—6	69	1138—6	89	1468—6
10	165—0	30	495—0	50	825—0	70	1155—0	90	1485—0
11	181—6	31	511—6	51	841—6	71	1171—6	91	1501—6
12	198—0	32	528—0	52	858—0	72	1188—0	92	1518—0
13	214—6	33	544—6	53	874—6	73	1204—6	93	1534—6
14	231—0	34	561—0	54	891—0	74	1221—0	94	1551—0
15	247—6	35	577—6	55	907—6	75	1237—6	95	1567—6
16	264—0	36	594—0	56	924—0	76	1254—0	96	1584—0
17	280—6	37	610—6	57	940—6	77	1270—6	97	1600—6
18	297—0	38	627—0	58	957—0	78	1287—0	98	1617—0
19	313—6	39	643—6	59	973—6	79	1303—6	99	1633—6
20	330—0	40	660—0	60	990—0	80	1320—0	100	1650—0

TABLE VIII
LINKS IN FEET AND INCHES

Line	Feet	Inches	Line	Feet	Inches	Line	Feet	Inches	Line	Feet	Inches	Line	Feet	Inches	Line	Feet	Inches
1	0	7.92	18	11	10.56	35	23	1.20	52	34	3.84	69	45	6.48	86	56	9.12
2	1	3.84	19	12	6.48	36	23	9.12	53	34	11.76	70	46	2.40	87	57	5.04
3	1	11.76	20	13	2.40	37	24	5.04	54	35	7.68	71	46	10.32	88	58	0.96
4	2	7.68	21	13	10.32	38	25	0.96	55	36	3.60	72	47	6.24	89	58	8.88
5	3	3.60	22	14	6.24	39	25	8.88	56	36	11.52	73	48	2.16	90	59	4.80
6	3	11.52	23	15	2.16	40	26	4.80	57	37	7.44	74	48	10.08	91	60	0.72
7	4	7.44	24	15	10.08	41	27	0.72	58	38	3.36	75	49	6.00	92	60	8.64
8	5	3.36	25	16	6.00	42	27	8.64	59	38	11.28	76	50	1.92	93	61	4.56
9	5	11.28	26	17	1.92	43	28	4.56	60	39	7.20	77	50	9.84	94	62	0.48
10	6	7.20	27	17	9.84	44	29	0.48	61	40	3.12	78	51	5.76	95	62	8.40
11	7	3.12	28	18	5.76	45	29	8.40	62	40	11.04	79	52	1.68	96	63	4.32
12	7	11.04	29	19	1.68	46	30	4.32	63	41	6.96	80	52	9.60	97	64	0.24
13	8	6.96	30	19	9.60	47	31	0.24	64	42	2.88	81	53	5.52	98	64	8.16
14	9	2.88	31	20	5.52	48	31	8.16	65	42	10.80	82	54	1.44	99	65	4.08
15	9	10.80	32	21	1.44	49	32	4.08	66	43	6.72	83	54	9.36	100	66	.000
16	10	6.72	33	21	9.36	50	33	0.00	67	44	2.64	84	55	5.28	101	66	7.92
17	11	2.64	34	22	5.28	51	33	7.92	68	44	10.56	85	56	1.20	102	67	3.84

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=10°	I	T	E	I=20°	I	T	E	I=30°
1°	50.00	.218	+	11°	551.70	26.500	+	21°	1061.9	97.577	+
10'	58.34	.297	5° C.	10'	560.11	27.313	5° C	10'	1070.6	99.155	5° C
20'	66.67	.388	T	20'	568.53	28.137	T	20'	1079.2	100.75	T
30'	75.01	.491	.03	30'	576.95	28.974	.06	30'	1087.8	102.35	.10
40'	83.34	.606	E	40'	585.36	29.824	E	40'	1096.4	103.97	.13
50'	91.68	.733	.001	50'	593.79	30.686	.006	50'	1105.1	105.60	.023
2°	100.01	.873		12°	602.21	31.561		22°	1113.7	107.24	
10'	108.35	1.024		10'	610.64	32.447		10'	1122.4	108.90	
20'	116.68	1.188		20'	619.07	33.347		20'	1131.0	110.57	

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=40°	I	T	E	I=50°	I	T	E	I=60°
31°	1589.0	216.3	+	41°	2142.2	387.4	+	51°	2732.9	618.4	+
10'	1598.0	218.7	5° C.	10'	2151.7	390.7	5° C.	10'	2743.1	622.8	5° C.
20'	1606.9	221.1	T	20'	2161.2	394.1	T	20'	2753.4	627.2	T
30'	1615.9	223.5	.13	30'	2170.8	397.4	.17	30'	2763.7	631.7	.21
40'	1624.9	226.0	E	40'	2180.3	400.8	E	40'	2773.9	636.2	E
50'	1633.9	228.4	.023	50'	2189.9	404.2	.037	50'	2784.2	640.7	.056
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	235.8		20'	2218.5	414.5		20'	2815.2	654.3	

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=70°	I	T	E	I=80°	I	T	E	I=90°
61°	3375.0	920.2	+	71°	4086.9	1308.2	+	81°	4893.6	1805.3	+
10'	3386.3	925.9	5° C.	10'	4099.5	1315.6	5° C.	10'	4908.0	1814.7	5° C.
20'	3397.5	931.6	T	20'	4112.1	1322.9	T	20'	4922.5	1824.1	T
30'	3408.8	937.3	.25	30'	4124.8	1330.3	.30	30'	4937.0	1833.6	.36
40'	3420.1	943.1	E	40'	4137.4	1337.7	E	40'	4951.5	1843.1	E
50'	3431.4	948.9	.080	50'	4150.1	1345.1	.110	50'	4966.1	1852.6	.149
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	10° C.	73°	4239.7	1398.0	10° C.	83°	5069.2	1920.5	10° C.
10'	3522.6	996.2	T	10'	4252.6	1405.7	T	10'	5084.0	1930.4	T
20'	3534.1	1002.3	.51	20'	4265.6	1413.5	.61	20'	5099.0	1940.3	.72
30'	3545.6	1008.3	E	30'	4278.5	1421.2	E	30'	5113.9	1950.3	E
40'	3557.2	1014.4	.159	40'	4291.5	1429.0	.220	40'	5128.9	1960.2	.299
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	15° C.	50'	4383.3	1484.4	15° C.	50'	5234.9	2031.4	15° C.
65°	3650.2	1063.9	T	75°	4396.5	1492.4	T	85°	5250.3	2041.7	T
10'	3661.9	1070.2	.76	10'	4409.8	1500.5	.91	10'	5265.6	2052.1	1.09
20'	3673.7	1076.6	E	20'	4423.1	1508.6	E	20'	5281.0	2062.5	E
30'	3685.4	1082.9	.240	30'	4436.4	1516.7	.332	30'	5296.4	2073.0	.450
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	20° C.	40'	4530.4	1574.7	20° C.	40'	5405.6	2147.5	20° C.
50'	3780.4	1134.8	T	50'	4544.0	1583.1	T	50'	5421.4	2158.4	T
67°	3792.4	1141.4	1.02	77°	4557.6	1591.6	1.22	87°	5437.2	2169.2	1.45
10'	3804.4	1148.0	E	10'	4571.2	1600.1	E	10'	5453.1	2180.2	E
20'	3816.4	1154.7	.321	20'	4584.8	1608.6	.445	20'	5469.0	2191.1	.603
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	25° C.	20'	4667.4	1660.5	25° C.	20'	5565.4	2258.0	25° C.
30'	3901.2	1202.0	T	30'	4681.3	1669.2	T	30'	5581.6	2269.3	T
40'	3913.4	1208.9	1.28	40'	4695.2	1678.1	1.53	40'	5597.8	2280.6	1.83
50'	3925.6	1215.8	E	50'	4709.2	1686.9	E	50'	5614.2	2292.0	E
69°	3937.9	1222.7	.403	79°	4723.2	1695.8	.558	89°	5630.5	2303.5	.756
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	30° C.	80°	4807.7	1749.9	30° C.	90°	5729.7	2373.3	30° C.
10'	4024.4	1272.1	T	10'	4822.0	1759.0	T	10'	5746.3	2385.1	T
20'	4036.8	1279.3	1.54	20'	4836.2	1768.2	1.84	20'	5763.1	2397.0	2.20
30'	4049.3	1286.5	E	30'	4850.5	1777.4	E	30'	5779.9	2408.9	E
40'	4061.8	1293.6	.485	40'	4864.8	1786.7	.671	40'	5796.7	2420.9	.910
50'	4074.4	1300.9		50'	4879.2	1796.0		50'	5813.6	2432.9	

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

$$E = R \operatorname{exsec} \frac{1}{2} I$$

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=100°	I	T	E	I=110°	I	T	E	I=120°
91°	5830.5	2444.9	+	101°	6950.6	3278.1	+	111°	8336.7	4386.1	+
10'	5847.5	2457.1	5° C.	10'	6971.3	3294.1	5° C.	10'	8362.7	4407.6	5° C.
20'	5864.6	2469.3	T	20'	6992.0	3310.1	T	20'	8388.9	4429.2	T
30'	5881.7	2481.5	.43	30'	7012.7	3326.1	.51	30'	8415.1	4450.9	.62
40'	5898.8	2493.8	E	40'	7033.6	3342.3	E	40'	8441.5	4472.7	E
50'	5916.0	2506.1	.200	50'	7054.5	3358.5	.268	50'	8468.0	4494.6	.360
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	10° C.	103°	7203.2	3474.4	10° C.	113°	8656.6	4651.3	10° C.
10'	6055.4	2606.8	T	10'	7224.7	3491.3	T	10'	8684.0	4674.2	T
20'	6073.1	2619.7	.86	20'	7246.3	3508.2	.103	20'	8711.5	4697.2	.125
30'	6090.8	2632.6	E	30'	7268.0	3525.2	E	30'	8739.2	4720.3	E
40'	6108.6	2645.5	.401	40'	7289.8	3542.4	.536	40'	8767.0	4743.6	.721
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'	6162.2	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	15° C.	50'	7444.6	3664.5	15° C.	50'	8965.0	4909.9	15° C.
95°	6252.8	2751.3	T	105°	7467.0	3682.3	T	115°	8993.8	4934.1	T
10'	6271.1	2764.8	1.30	10'	7489.6	3700.2	1.56	10'	9022.7	4958.6	1.93
20'	6289.4	2778.3	E	20'	7512.2	3718.2	E	20'	9051.7	4983.1	E
30'	6307.9	2792.0	.604	30'	7534.9	3736.2	.806	30'	9080.9	5007.8	1.09
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	20° C.	30'	7672.9	3846.5	20° C.	30'	9259.0	5158.8	20° C.
40'	6438.4	2889.0	T	40'	7696.3	3865.2	T	40'	9289.2	5184.5	T
50'	6457.3	2903.1	1.74	50'	7719.7	3884.0	1.08	50'	9319.5	5210.3	2.52
97°	6476.2	2917.3	E	107°	7743.2	3902.9	E	117°	9349.9	5236.2	E
10'	6495.2	2931.6	.809	10'	7766.8	3921.9	1.08	10'	9380.5	5262.3	1.46
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	25° C.	10'	7910.4	4037.8	25° C.	10'	9567.2	5422.1	25° C.
20'	6630.1	3033.1	T	20'	7934.6	4057.4	T	20'	9598.9	5449.2	T
30'	6649.6	3047.9	2.18	30'	7959.0	4077.2	2.61	30'	9630.7	5476.5	3.16
40'	6669.2	3062.8	E	40'	7983.5	4097.1	E	40'	9662.6	5504.0	E
50'	6688.8	3077.7	1.02	50'	8008.0	4117.0	1.36	50'	9694.7	5531.7	1.83
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	30° C.	110°	8182.8	4259.7	30° C.	120°	9924.0	5729.7	30° C.
10'	6848.5	3199.6	T	10'	8208.2	4280.5	T	10'	9957.5	5758.6	T
20'	6868.8	3215.1	2.62	20'	8233.7	4301.4	3.14	20'	9991.0	5787.7	3.81
30'	6889.2	3230.8	E	30'	8259.3	4322.4	E	30'	10025.0	5817.0	E
40'	6909.6	3246.5	1.22	40'	8285.0	4343.6	1.63	40'	10059.0	5846.5	1.20
50'	6930.1	3262.3		50'	8310.8	4364.8		50'	10093.0	5876.1	

TABLE X.
MIDDLE ORDINATES OF RAILS
Length of Rail (feet)

C o /	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch	C o	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch
0-20	17189	.08	.07	.06	.05	.04	.03	8	716.8	1.88	1.64	1.42	1.20	1.01	.84
0-40	8594	.16	.14	.12	.10	.08	.07	9	637.3	2.12	1.84	1.60	1.35	1.14	.94
1-0	5730	.24	.20	.18	.15	.13	.10	10	573.7	2.36	2.05	1.78	1.50	1.27	1.04
1-20	4297	.31	.27	.23	.20	.17	.13	11	521.7	2.59	2.26	1.95	1.65	1.39	1.15
1-40	3438	.39	.34	.29	.25	.21	.17	12	478.3	3.83	2.47	2.15	1.81	1.54	1.26
2-0	2865	.47	.41	.35	.30	.25	.20	13	441.7	3.05	2.66	2.30	1.96	1.66	1.36
2-20	2456	.55	.48	.41	.35	.29	.23	14	410.3	3.30	2.87	2.48	2.10	1.78	1.46
2-40	2149	.63	.55	.47	.40	.33	.27	15	383.1	3.54	3.08	2.68	2.26	1.91	1.57
3-0	1910	.71	.62	.53	.45	.38	.31	16	359.3	3.76	3.28	2.83	2.40	2.04	1.67
3-20	1719	.78	.68	.59	.50	.42	.35	17	338.3	4.00	3.48	3.02	2.57	2.16	1.78
3-40	1563	.86	.75	.65	.55	.46	.38	18	319.6	4.21	3.67	3.18	2.70	2.28	1.87
4-0	1433	.94	.82	.71	.60	.50	.42	19	302.9	4.45	3.89	3.36	2.86	2.41	1.98
4-20	1323	1.02	.89	.77	.65	.55	.45	20	287.9	4.70	4.09	3.55	3.00	2.54	2.09
4-40	1228	1.10	.96	.83	.70	.59	.48	22	262.0	5.16	4.44	3.84	3.30	2.80	2.29
5	1146	1.18	1.03	.89	.75	.63	.52	24	240.5	5.64	4.92	4.20	3.59	3.04	2.50
6	955.3	1.41	1.23	1.06	.90	.76	.62	26	222.3	6.07	5.29	4.58	3.88	3.29	2.70
7	819.0	1.65	1.44	1.24	1.05	.89	.73								

TABLE XI.
SHORT RADIUS CURVES

Radius Feet	Chord Feet	Central Angle	Deflection Angle	Deflection for 1 Foot
35	10	16-26	8-13	49.3
45	10	12-46	6-23	38.3
50	15	17-16	8-38	34.5
60	15	14-22	7-11	28.8
75	15	11-30	5-45	23.0
100	20	11-30	5-45	17.3
120	20	9-34	4-47	14.3
150	20	7-39	3-49	11.5
190	25	7-32	3-46	9.15
200	25	7-10	3-35	8.6
225	25	6-25	3-12	7.7
240	25	5-58	2-59	7.2
250	25	5-44	2-52	6.9
275	25	5-12	2-36	6.2
288	50	9-58	4-59	6.0
300	50	9-32	4-46	5.7
350	50	8-12	4-06	4.9
376	50	7-40	3-50	4.6
400	50	7-10	3-35	4.3
410	50	7-00	3-30	4.2

To find length of curve divide angle from P. C. to P. T. by central angle of chord, and multiply by length of chord.

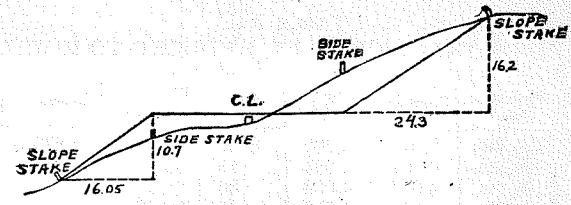
TABLE XII.
INCLINED DISTANCE OF 100 FT. REDUCED TO HORIZONTAL

Slope	Horizontal Distance	Correction	Rise Per Foot	Slope	Horizontal Distance	Correction	Rise Per Foot
0°00'	100.000	0.000	0.000	8°00'	99.027	0.973	0.139
15'	99.999	0.001	0.004	15'	98.965	1.035	0.143
30'	99.996	0.004	0.009	30'	98.902	1.098	0.148
45'	99.991	0.009	0.013	45'	98.836	1.164	0.152
1 00	99.985	0.015	0.017	9 00	98.769	1.231	0.156
15	99.976	0.024	0.022	15	98.700	1.300	0.161
30	99.966	0.034	0.026	30	98.629	1.371	0.165
45	99.953	0.047	0.031	45	98.556	1.444	0.169
2 00	99.939	0.061	0.035	10 00	98.481	1.519	0.174
15	99.923	0.077	0.039	15	98.404	1.596	0.178
30	99.905	0.095	0.044	30	98.325	1.675	0.182
45	99.885	0.115	0.048	45	98.245	1.755	0.187
3 00	99.863	0.137	0.052	11 00	98.163	1.837	0.191
15	99.839	0.161	0.057	15	98.079	1.921	0.195
30	99.813	0.187	0.061	30	97.992	2.008	0.199
45	99.786	0.214	0.065	45	97.905	2.095	0.204
4 00	99.756	0.244	0.070	12 00	97.815	2.185	0.208
15	99.725	0.275	0.074	15	97.723	2.277	0.212
30	99.692	0.308	0.078	30	97.630	2.370	0.216
45	99.657	0.343	0.083	45	97.534	2.466	0.221
5 00	99.619	0.381	0.087	13 00	97.437	2.563	0.225
15	99.580	0.420	0.092	15	97.338	2.662	0.229
30	99.540	0.460	0.096	30	97.237	2.763	0.233
45	99.497	0.503	0.100	45	97.134	2.866	0.238
6 00	99.452	0.548	0.105	14 00	97.030	2.970	0.242
15	99.406	0.594	0.109	15	96.923	3.077	0.246
30	99.357	0.643	0.113	30	96.815	3.185	0.250
45	99.307	0.693	0.118	45	96.705	3.295	0.255
7 00	99.255	0.745	0.122	15 00	96.593	3.407	0.259
15	99.200	0.800	0.126	15	96.479	3.521	0.263
30	99.144	0.856	0.131	30	96.363	3.637	0.267
45	99.087	0.913	0.135	45	96.246	3.754	0.271

TABLE XIII.
MINUTES IN DECIMALS OF A DEGREE.

0 30"	.00833	10' 30"	.17500	20' 30"	.34167	30' 10"	.50833	40' 30"	.67500	50' 10"	.84167
1 00	.01667	11 00	.18333	21 00	.35000	31 00	.51667	41 00	.68333	51 00	.85000
30	.02500	30	.19167	30	.35833	30	.52500	30	.69167	30	.85833
2 00	.03333	12 00	.20000	22 00	.36667	32 00	.53333	42 00	.70000	52 00	.86667
30	.04167	30	.20833	30	.37500	30	.54167	30	.70833	30	.87500
3 00	.05000	13 00	.21667	23 00	.38333	33 00	.55000	43 00	.71667	53 00	.88333
30	.05833	30	.22500	30	.39167	30	.55833	30	.72500	30	.89167
4 00	.06667	14 00	.23333	24 00	.40000	34 00	.56667	44 00	.73333	54 00	.90000
30	.07500	30	.24167	30	.40833	30	.57500	30	.74167	30	.90833
5 00	.08333	15 00	.25000	25 00	.41667	35 00	.58333	45 00	.75000	55 00	.91667
30	.09167	30	.25833	30	.42500	30	.59167	30	.75833	30	.92500
6 00	.10000	16 00	.26667	26 00	.43333	36 00	.60000	46 00	.76667	56 00	.93333
30	.10833	30	.27500	30	.44167	30	.60833	30	.77500	30	.94167
7 00	.11667	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000
30	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833
8 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667
30	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500
9 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333
30	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167
10 00	.16667	20 00	.33333	30 00	.50000	40 00	.66667	50 00	.83333	60 00	1.00000

C
0-1
0-20
0-40
1-0
1-20
1-40
2-0
2-20
2-40
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3-20
3-40
4-0
4-20
4-40
5
6
7



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING.

SLOPE 1 1/2 TO 1. ROADWAY OF ANY WIDTH.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

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2970
330

3060
530

4290
330

4620

4620
330

3465
2260

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330

2470
330

3060
530
4290
330
4620
330

3465
2260
5720

