

← A4 →

← LETTER →

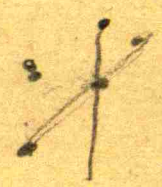
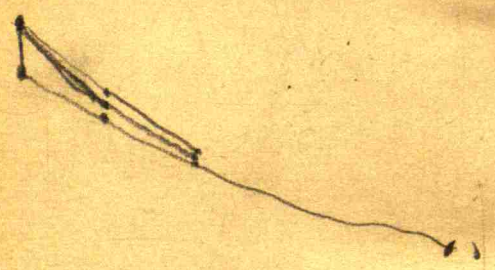
1916

TRAVEL BOOK

385



Danville Sewer System
Transit Notes



7.43
3.85
11.28

15.09
4.73
10.36
15.11
4.24
10.87

pipe

M.H. FL.

11.10
11.58
71
10.87

Clinton St M.H.

11:10
7.25
3.85

Flat M.H.

2

Wire Fence

Wire Fence

Wire Fence

Inlet Manhole Det R. 3879

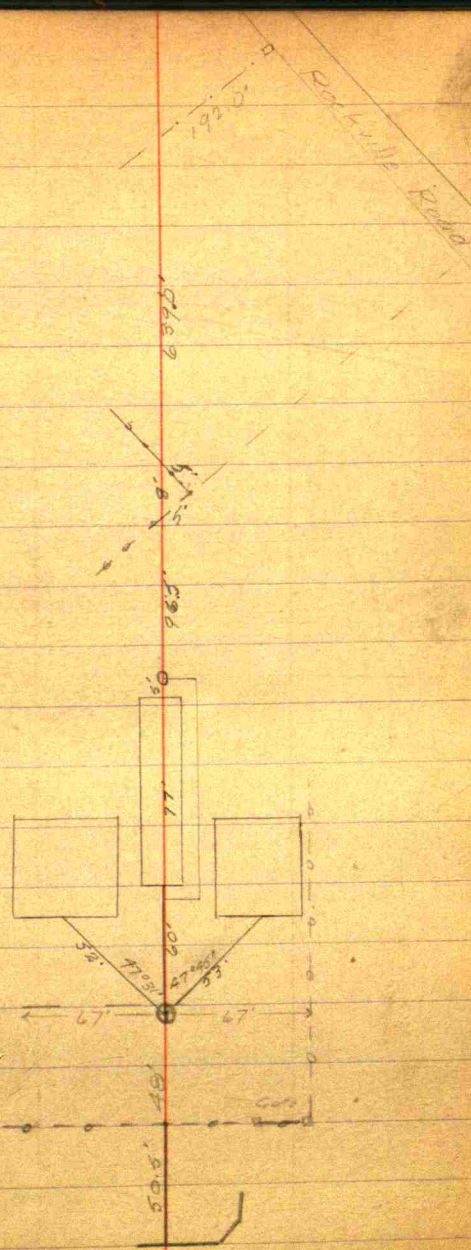
E. End Tank

Tank Outlet Manhole Det R 6'

Woven Wire Fence

Retaining Wall at Outlet

3



4

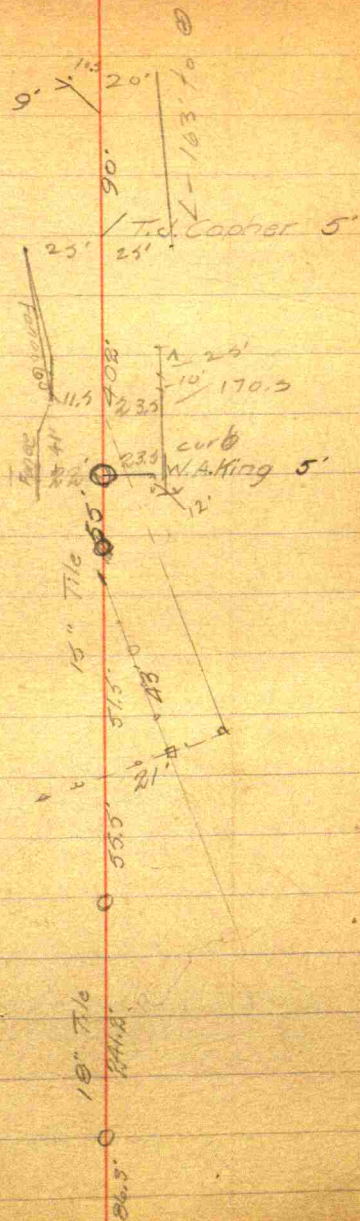
Manhole Def L $25^{\circ}57'$

Paling fence

Wire Ficket fence

Junction Manhole 0° Manhole Def L $5^{\circ}54'$

5

John (Harry) Kelly
Russell Chas Duncan

Manhole (Def R $88^{\circ}39'$
 (Def L $90^{\circ}44'$)

Lamp hole.

Manhole Def L $7^{\circ}81'$

Lead
 Cen. Sys.

Lead H. $94^{\circ}17'$ Cen
 Sys.

Agee Wilson
 (Bert Sears) 5'

780'
 516'

516'

7.5'

16'

527'

275'

37'

76'

141'

281'

142'

141'

121'

47'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

22'

Mrs. Jephtha Sears 4'

Wm Goff 11'

John Russel 6'

442'

141'

141'

121'

47'

22'

22'

22'

22'

22'

22'

22'

WAYNE ST

3' C.M. College

8

TRANSIT - Cen. System

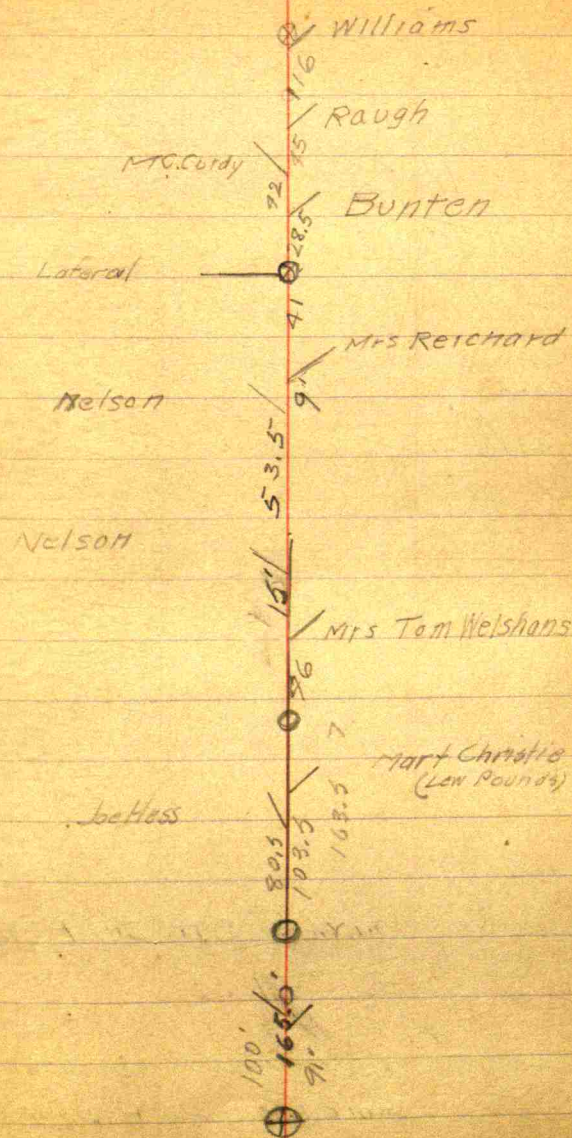
Alley Wash-Ind ManHole

Alley Ind-Tenn Manholes Def. R $2^{\circ} 11'$

Tenn St

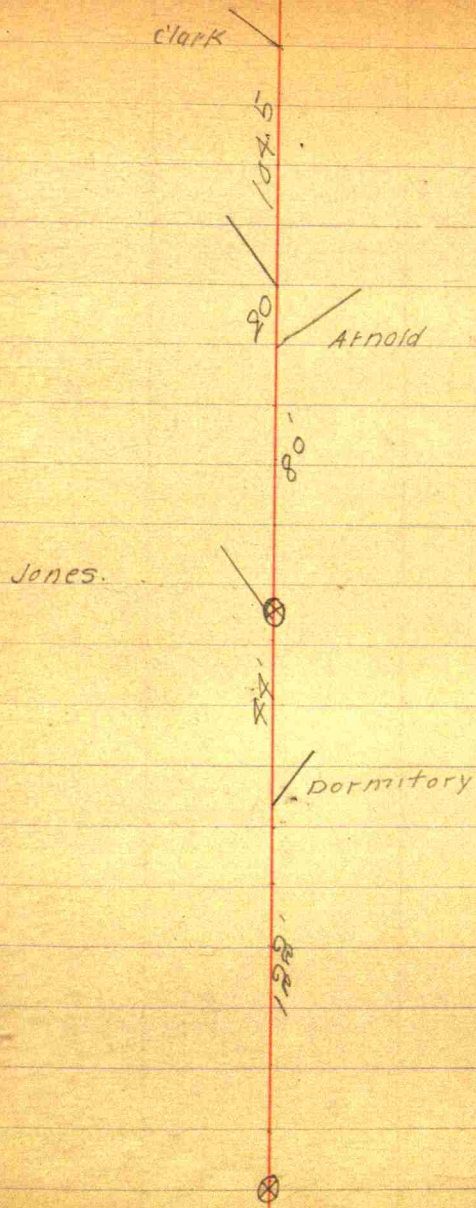
Manhole Def. $1^{\circ} 14' L$ Manhole Def. R. $91^{\circ} 22'$ Miss Bowers
Mrs. W. SearceJunction Def L $90^{\circ} 44'$

9



M. H. TURNER

N. SYSTEM
M. H. M. ST.



Lamp Hole
Ind + Wash

Man Hole
Tenn + Ind

Cy Thompson

Towles

Towles

Underwood

Buntin

Bunten

Christie.

MILLIKIN

Hodley

Thompson Figg.

From Last Y. Preceding
Page

16
Lamp Hole
Rear of Wilson
Jewelry Store

Main hole
Wash St

Lamp Hole
Lad + Wash

Jewelry Shop

Presbyterian Parsonage

Norton Drugs

Drawleys Pool

Drawleys Barber Shop

Thompson Drugs

Lingensolter

Drawleys. Clothing

Drawleys. Restaurant

J. Thompson Jewelry

Pierson Grocery

Republican Office

Gazette Office

K. of P.

Blacksmith Shop



Lamp Hole 18
End of line

Man Hole
Left Cross

Lamp Hole Reaps
Wilson Jewellery Store.

Armstrong

Harney

Christian Church

Wilson

Tomb Stone Shop

J. Thompson

Gaurage

Horman

Harness shop

County Fair Bldg.

McCours Dry Goods

Danville HdW Co.

Newman HdW.

Ten Cent Store

19



Manhole Hargrave

Manhole - Al Bell

Manhole Clinton St

Manhole - Figg

✓ Prentice
51.5

Hargrave

0

x8

✓

51.5 Fred Warner

✓ Hargrave

28

✓ Hargrave

50

0

83.5

0

50

13

92.5

0

57

16

0

85

John Ramsay

John Ramsay

Martin Christie

22

23

○ Sandpiper

244

✓ Prontica

28

Main South Line

Manhole - J.W. Thompson

Manhole

Welshans

Beck

Barker

Manhole

Estop

Johnson

Whyte

Bawen

Underwood

⊕

Hadley

Hadley

41.7

101.3

22

9.25

156.1

9.25

⊕

38.5

24.7

67.4

Campbell

33.1

67.4

33.1

61

Barker

132.5

81

44

Hall

89.5

McCurdy

⊕

36.5

29

Barnett

Manhole

Chas Cook.

Mrs Wills

Totaled @ to @
to here

265 0 59
32
221.10 in
97 1/2 g T
94 1/2 g T
89 1/2 g T

Mary Conn

J. d. Clark

man hole 111.10 1/2

alg Walters

Manhole

Manhole Wash

Griggs

Manhole Ind-Wash

Tim Tinder

Hogate

130.75

39

735

84

84

14

29

48

80.75

205

171.5

13'8"

2'

130.75

Gron Bros

Wilson

McCurdy

McCurdy

Mrs. Hendricks

Barnett

Manhole
Nug

Osborne

Heiger

Downard

119' / 9.5' / 26.2' / 66 / 27.5' / 82' / 66.6' / 18' / 61' / 16' / 2' / 19.5' / 2.5' / 29.5' / 3.11

Hull

Downard

white

Allred

Brady

white

White

Brady

Maulhoe

Armstrong
Main St

Maulhoe

Flots

0 427 / 520 / 62 / 82 / 525 / 54 / 818 / 55 / 520

Shirley

Brady

Brink

Mankole Thompson

✓ M. Daniel
○

○

42 Newman Lateral

Manhole - Adams

Manhole - Newman's

43

Newman

0 168.5 0 31 134.5 \ 250 20

In. Account with
McGrath Const. Co.

Date.	Hours.	Amount.
Oct 9.	10.	\$3.50
" 10.	10.	3.50
" 11.	10.	3.50
" 12.	10.	3.50
" 13.	5.	1.75
" 14.	5.	1.75
" 14.	Cash. to Co.	.50
" 16.	10	3.50
" 17.	10	3.50
" 18.	10	3.50
" 19	0	x xx
" 20	7.	2.25
" 21	5.	1.75
" 23	10	3.50
" 24	10	3.50
" 25	10	3.50
" 26	10	3.50
" 27.	10	3.50
" 28.	10	3.50

Paid out.

Oct. 5., 10¢ Tele. Arno-Hamule
 " 10., 10¢ " Ficksburg - "
 " 14., 50¢ to McGrath

Owe 6 meals. \$2.00
 Oct 28 Mary McGrath,
 " " Jim ... \$2.50

Oct 31 - 10 - \$3.50
 Black Rock.

134

Sewer Alley 1nd Tenn

Wed May 24 - 1916

	Rate	HRS
A. W.	20	10
^{Cross} J. A. Powers	20	5
Heward Buchanan	20	4 1/2
VEO. Sanders	20	5
Wallace Ford	20	5

Incidentals - 35

Twine .15¢

cup .10

oil .10

\$ 3.00

\$ 1.00

\$.90

\$ 1.00

Paid \$ 1.00 ✓

Thurs May 25 1916

H W 10

^{Cross}
J. A. Powers 10

H. Buchanan 10

Veo Sanders 10

Bob Phelps 10

Davic Maiden 10

Fri May 24 1916

R W.	10	4 ¹⁰
Joe Powers	10	"
Wes Sanders	10	"
Hamie Madden	10	
Deward Buchanan	10	"
Bob Phelps	10	

Sat May 27. 1916.

Incidentals

John Whyte - gravel	1.00
W Pearson Oil	.05
Grant Rummells - cement	45
Billy Shelton - tools	—
Trayage	25

Time Cashed.

Joe Powers	5.00
Wes Sanders	5.00
Deward Buchanan	4.90
Bob Phelps	4.00
Hamie Madden	4.00
Rackie Ford	1.00
	<hr/>
	\$23.90

138

New Bearings

S 81 $\frac{1}{2}$ E

S. 76 E

~~2 1/4~~

West Stone

Sycamore 14'

55 ch N. 44.45 W

Cottonwood 15'

44 ch. ~~N.~~ S. 86 $\frac{1}{2}$ W.

2nd Stone

139

Stone

Buckeye 14' 58 ch

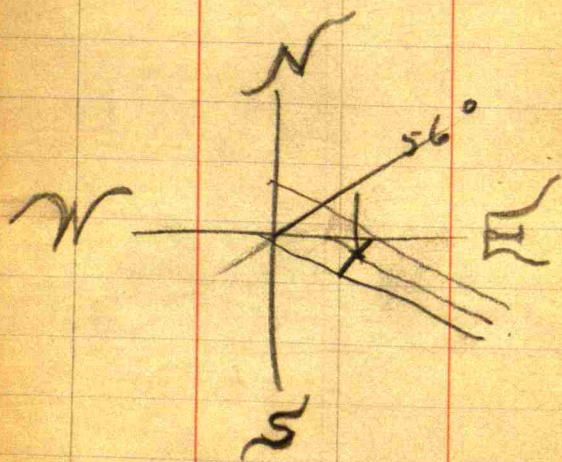
~~S. 5 $\frac{1}{2}$ E~~ S. 39 E

Sycamore 20' - 61 ch.

N. 8. W

Sta	+	+	-	Elev	Grade	Cut	Rise
B.M.	.89	100.89		100			
0			.89	100.00	89.13	10.87	1.13
1			1.94	98.95	89.23	9.72	2.28
2			4.61	96.20	89.33	6.95	4.05
3			6.96	93.93	89.43	4.50	4.50
4			8.70	92.19	89.53	2.66	4.34
5			7.43	93.46	89.58	3.88	3.12

N.E. Cor. of R117
of Clinton St. M.H.



142 Survey for Wm. Franklin
S.E. Cor. 23-10-100

Cotton wood 15' N 89. E. 39 1/2
15 N. 7. E. 70

S.W. Cor.

9.28 ch N. of Cen S. of S.W. 1/4

Sec. 23.

Thence S. 88 E 3.22 ch.

Thence S. 82 1/4 E 3.41 ch.

Thence S. 56 E 6.75 ch.

3.47-3.51 1/2

Witness 30' Cotton Wood. 62 chains N 32.5° E

11 24' Sycamore 50 chains S 32° W

By Whyte & Harway.

KEITH'S RAILROAD CURVE TABLES.

Published by KEUFFEL & ESSER CO., New York.

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HOW TO USE KEITH'S TABLES.

EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle
of Intersection or I. P. = 23° 20' to the R. at Station
542+72.

Ext. in Tab. IV opposite 23° 20' = 120.87
120.87 + 12 = 10.07. Say a 10° Curve.

Tan. in Tab. IV opp. 23° 20' = 1183.1
1183.1 + 10 = 118.31.

Tab. V correction for A. 23° 20' for a 10° Cur. = 0.16
118.31 + 0.16 = 118.47 = corrected Tangent.

(If corrected Ext. is required find in same way)
Ang. 23° 20' = 23.33° + 10 = 2.3333 = L. C.

2° 19 1/2' = def. for sta.	542	I. P. = sta.	542 + 72
4° 49 1/2' = " " "	+ 50	Tan. =	1.18.47
7° 19 1/2' = " " "	543	B. C. = sta.	541 + 53.53
9° 49 1/2' = " " "	+ 50	L. C. =	2.33.33
11° 40' = " " "	543 +	E. C. = sta.	543 + 86.86
	86.86		

100 - 53.53 = 46.47 x 3' (def. for 1 ft. of 10° Cur.) = 139.41' =
2° 19 1/2' = def. for sta. 542.

Def. for 50 ft. = 2° 30' for a 10° Curve.

Def. for 36.86 ft. = 1° 50 1/2' for a 10° Curve

(These tables are published in Field Books of
KEUFFEL & ESSER CO., New York, N. Y.)

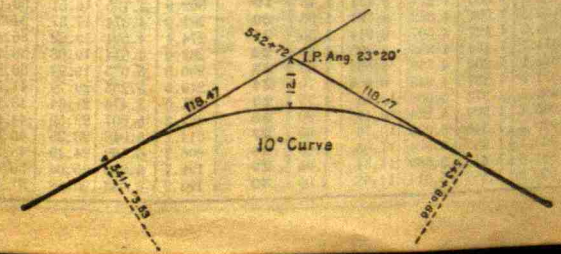


TABLE IV. — Tangents and Externals to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	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	483.3	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.

Angle	Tangent	External	Angle	Tangent	External	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	5763.0	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.

Angle	Tangent	External	Angle	Tangent	External	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 use with table IV,

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ANGLE	For Tangents Add													
	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	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.51	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

For Externals Add

ANGLE	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	.035	.039	.043	.047	.051	
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.100	.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	.040	.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	.470	.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	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	1.06								

Table VI. Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 sin. def. ang.	½ sub chord R = sin of def. angle				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51'	2° 17'	2° 58'	3° 43'	101.15
32°	181.39	1° 59'	2° 25'	3° 10'	3° 58'	101.33
34°	171.01	2° 06'	2° 33'	3° 21'	4° 12'	101.48
36°	161.80	2° 13'	2° 41'	3° 33'	4° 26'	101.66
38°	153.58	2° 20'	2° 49'	3° 44'	4° 40'	101.85
40°	146.19	2° 27'	2° 57'	3° 55'	4° 54'	102.06
42°	139.52	2° 34'	3° 05'	4° 07'	5° 08'	102.29
44°	133.47	2° 41'	3° 13'	4° 18'	5° 22'	102.53
46°	127.97	2° 48'	3° 21'	4° 29'	5° 36'	102.76
48°	122.92	2° 55'	3° 29'	4° 40'	5° 50'	103.00
50°	118.31	3° 02'	3° 38'	4° 51'	6° 04'	103.24
52°	114.06	3° 09'	3° 46'	5° 02'	6° 17'	103.54
54°	110.11	3° 16'	3° 54'	5° 13'	6° 31'	103.84
56°	106.50	3° 22'	4° 02'	5° 23'	6° 44'	104.14
58°	103.14	3° 29'	4° 10'	5° 34'	6° 57'	104.43
60°	100.00	3° 35'	4° 18'	5° 44'	7° 11'	104.72

CURVE FORMULAS.

$T = R \tan \frac{1}{2} I$	$R = T \cot. \frac{1}{2} I$	Chord def. = $\frac{\text{chord}^2}{R}$
$T = \frac{50 \tan. \frac{1}{2} I}{\text{Sin. } D}$	$R = \frac{50}{\text{Sin. } D}$	
$\text{Sin. } D = \frac{50}{R}$	$E = R \text{ ex. sec. } \frac{1}{2} I$	No. chords = $\frac{1}{2} \frac{I}{D}$
$\text{Sin. } D = \frac{50 \tan. \frac{1}{2} I}{T}$	$E = T \tan \frac{1}{2} I$	
		Tan. def. = $\frac{1}{2}$ chord def.

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

Table IV. contains Tangents and Externals to a 1° curve. Tan. and Ext. to any other radius may be found, nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Ext. opposite the given Central Angle by the given External.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table IV.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

RIGHT ANGLE TRIANGLES. — Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10. $10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. 25. $25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 =$ Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Natural Sines

deg.	0'	10'	20'	30'	40'	50'	60'	70'	80'	90'
0	0000	0029	0058	0087	0116	0145	0174	0203	0232	0261
1	0175	0204	0233	0262	0291	0320	0349	0378	0407	0436
2	0349	0378	0407	0436	0465	0494	0523	0552	0581	0610
3	0523	0552	0581	0610	0640	0669	0698	0727	0756	0785
4	0698	0727	0756	0785	0814	0843	0872	0901	0929	0958
5	0872	0901	0929	0958	0987	1016	1045	1074	1103	1132
6	1045	1074	1103	1132	1161	1190	1219	1248	1277	1305
7	1219	1248	1277	1305	1334	1363	1392	1421	1449	1478
8	1392	1421	1449	1478	1507	1536	1565	1594	1622	1651
9	1564	1593	1622	1651	1679	1708	1737	1766	1794	1823
10	1736	1765	1794	1822	1851	1880	1908	1937	1965	1994
11	1908	1937	1965	1994	2022	2051	2079	2108	2136	2164
12	2079	2108	2136	2164	2193	2221	2250	2278	2306	2334
13	2250	2278	2306	2334	2363	2391	2419	2447	2476	2504
14	2419	2447	2476	2504	2532	2560	2588	2616	2644	2672
15	2588	2616	2644	2672	2700	2728	2756	2784	2812	2840
16	2756	2784	2812	2840	2868	2896	2924	2952	2979	3007
17	2924	2952	2979	3007	3035	3062	3090	3118	3145	3173
18	3090	3118	3145	3173	3201	3228	3256	3283	3311	3338
19	3256	3283	3311	3338	3365	3393	3420	3448	3475	3502
20	3420	3448	3475	3502	3529	3557	3584	3611	3638	3665
21	3584	3611	3638	3665	3692	3719	3746	3773	3800	3827
22	3746	3773	3800	3827	3854	3881	3908	3935	3962	3989
23	3908	3935	3962	3989	4016	4043	4070	4097	4124	4151
24	4070	4097	4124	4151	4178	4205	4232	4259	4286	4313
25	4232	4259	4286	4313	4340	4367	4394	4421	4448	4475
26	4421	4448	4475	4502	4529	4556	4583	4610	4637	4664
27	4583	4610	4637	4664	4691	4718	4745	4772	4799	4826
28	4745	4772	4799	4826	4853	4880	4907	4934	4961	4988
29	4880	4907	4934	4961	4988	5015	5042	5069	5096	5123
30	5042	5069	5096	5123	5150	5177	5204	5231	5258	5285
31	5231	5258	5285	5312	5339	5366	5393	5420	5447	5474
32	5393	5420	5447	5474	5501	5528	5555	5582	5609	5636
33	5555	5582	5609	5636	5663	5690	5717	5744	5771	5798
34	5744	5771	5798	5825	5852	5879	5906	5933	5960	5987
35	5906	5933	5960	5987	6014	6041	6068	6095	6122	6149
36	6068	6095	6122	6149	6176	6203	6230	6257	6284	6311
37	6230	6257	6284	6311	6338	6365	6392	6419	6446	6473
38	6419	6446	6473	6500	6527	6554	6581	6608	6635	6662
39	6608	6635	6662	6689	6716	6743	6770	6797	6824	6851
40	6824	6851	6878	6905	6932	6959	6986	7013	7040	7067
41	7013	7040	7067	7094	7121	7148	7175	7202	7229	7256
42	7202	7229	7256	7283	7310	7337	7364	7391	7418	7445
43	7418	7445	7472	7499	7526	7553	7580	7607	7634	7661
44	7607	7634	7661	7688	7715	7742	7769	7796	7823	7850
45	7823	7850	7877	7904	7931	7958	7985	8012	8039	8066
46	8012	8039	8066	8093	8120	8147	8174	8201	8228	8255
47	8201	8228	8255	8282	8309	8336	8363	8390	8417	8444
48	8417	8444	8471	8498	8525	8552	8579	8606	8633	8660
49	8606	8633	8660	8687	8714	8741	8768	8795	8822	8849
50	8822	8849	8876	8903	8930	8957	8984	9011	9038	9065
51	9011	9038	9065	9092	9119	9146	9173	9200	9227	9254
52	9200	9227	9254	9281	9308	9335	9362	9389	9416	9443
53	9416	9443	9470	9497	9524	9551	9578	9605	9632	9659
54	9605	9632	9659	9686	9713	9740	9767	9794	9821	9848
55	9794	9821	9848	9875	9902	9929	9956	9983	10000	10000
56	9956	9983	10000	10000	10000	10000	10000	10000	10000	10000
57	9983	10000	10000	10000	10000	10000	10000	10000	10000	10000
58	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
59	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
60	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000

Natural Cosines

deg.	0'	10'	20'	30'	40'	50'	60'	70'	80'	90'
0	1000	9998	9996	9994	9992	9990	9988	9986	9984	9982
1	9982	9980	9978	9976	9974	9972	9970	9968	9966	9964
2	9964	9962	9960	9958	9956	9954	9952	9950	9948	9946
3	9946	9944	9942	9940	9938	9936	9934	9932	9930	9928
4	9928	9926	9924	9922	9920	9918	9916	9914	9912	9910
5	9910	9908	9906	9904	9902	9900	9898	9896	9894	9892
6	9892	9890	9888	9886	9884	9882	9880	9878	9876	9874
7	9874	9872	9870	9868	9866	9864	9862	9860	9858	9856
8	9856	9854	9852	9850	9848	9846	9844	9842	9840	9838
9	9838	9836	9834	9832	9830	9828	9826	9824	9822	9820
10	9820	9818	9816	9814	9812	9810	9808	9806	9804	9802

Natural Tangents

deg.	0'	10'	20'	30'	40'	50'	sec.	deg.	0'	10'	20'	30'	40'	50'	sec.
0	0000	0029	0058	0087	0116	0145	89	40	8391	8441	8491	8541	8591	8642	49
1	0175	0204	0233	0262	0291	0320	88	41	8693	8744	8796	8847	8899	8952	48
2	0349	0378	0407	0437	0466	0495	87	42	9004	9057	9110	9163	9217	9271	47
3	0524	0553	0582	0612	0641	0670	86	43	9325	9380	9435	9490	9545	9601	46
4	0699	0729	0758	0787	0816	0846	85	44	9657	9713	9770	9827	9884	9942	45
5	0875	0904	0934	0963	0992	1022	84	45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
6	1051	1080	1110	1139	1169	1198	83	46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
7	1228	1257	1287	1317	1346	1376	82	47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	42
8	1405	1435	1465	1495	1524	1554	81	48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
9	1584	1614	1644	1673	1703	1733	80	49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
10	1763	1793	1823	1853	1883	1914	79	50	1.1918	1.1988	1.2059	1.2131	1.2203	1.2276	39
11	1944	1974	2004	2035	2065	2095	78	51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
12	2126	2156	2186	2217	2247	2278	77	52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
13	2309	2339	2370	2401	2432	2462	76	53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	36
14	2493	2524	2555	2586	2617	2648	75	54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	35
15	2679	2711	2742	2773	2805	2836	74	55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4735	34
16	2867	2899	2931	2962	2994	3026	73	56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
17	3057	3089	3121	3153	3185	3217	72	57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	32
18	3249	3281	3314	3346	3378	3411	71	58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
19	3443	3476	3508	3541	3574	3607	70	59	1.6643	1.6753	1.6864	1.6977	1.7090	1.7205	30
20	3640	3673	3706	3739	3772	3805	69	60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
21	3839	3872	3906	3939	3973	4006	68	61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
22	4040	4074	4108	4142	4176	4210	67	62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
23	4245	4279	4314	4348	4383	4417	66	63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
24	4452	4487	4522	4557	4592	4628	65	64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
25	4663	4699	4734	4770	4806	4841	64	65	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
26	4877	4913	4950	4986	5022	5059	63	66	2.2400	2.2637	2.2817	2.2998	2.3183	2.3369	23
27	5095	5132	5169	5206	5243	5280	62	67	2.3550	2.3750	2.3945	2.4142	2.4342	2.4545	22
28	5317	5354	5392	5430	5467	5505	61	68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
29	5543	5581	5619	5658	5696	5735	60	69	2.6051	2.6279	2.6511	2.6746	2.6985	2.7228	20
30	5774	5812	5851	5890	5930	5969	59	70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
31	6009	6048	6088	6128	6168	6208	58	71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
32	6249	6289	6330	6371	6412	6453	57	72	3.0777	3.1084	3.1397	3.1716	3.2041	3.2371	17
33	6494	6536	6577	6619	6661	6703	56	73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
34	6745	6787	6830	6873	6916	6959	55	74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
35	7002	7046	7089	7133	7177	7221	54	75	3.7321	3.7760	3.8208	3.8657	3.9136	3.9617	14
36	7265	7310	7355	7400	7445	7490	53	76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
37	7536	7581	7627	7673	7720	7766	52	77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
38	7813	7860	7907	7954	8002	8050	51	78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	11
39	8098	8146	8195	8243	8292	8342	50	79	5.1446	5.2257	5.3093	5.3955	5.4845	5.5764	10

deg.	60'	50'	40'	30'	20'	10'	sec.	deg.	60'	50'	40'	30'	20'	10'	sec.
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9	80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8	81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7	82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6	83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5	84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.724	4	85	11.430	11.826	12.250	12.706	13.197	13.724	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3	86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.512	26.432	2	87	19.081	20.206	21.470	22.903	24.512	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1	88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0	89	57.290	68.750	85.940	114.588	171.885	343.77	0

Natural Cotangents

Wallace

13.38
6.75
6.63

120 | 180

