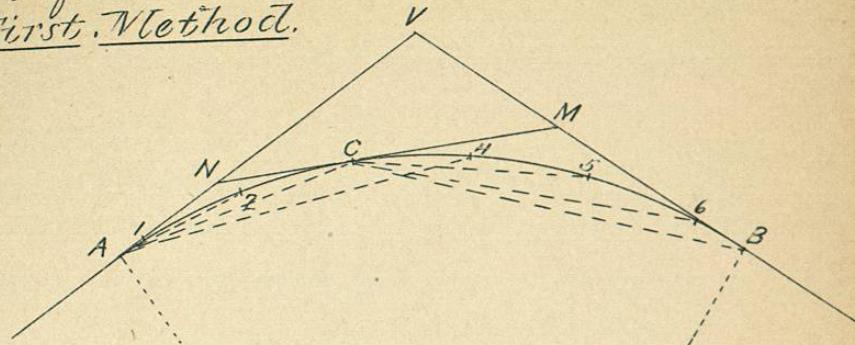


Fieldwork when the ^{entire} curve cannot be laid out from the P.C.

First Method.



- (a.) Lay out curve as far as C as before.
- (b.) Set transit point at some convenient point as C (even station preferably).
- (c.) Move transit to C.
- (d.) Turn vernier back to 0 and beyond 0 to measure the angle VAC.
- (e.) Sight on A.
- (f.) Turn vernier to 0. See that transit line is on auxiliary tangent NCM ($VAC = NCA$ being measured by $\frac{1}{2}$ arc AC)
- (g.) Set off new deflection angle ($\frac{1}{2} \alpha$ or $\frac{1}{2} D$).
- (h.) Set point 4 and proceed as in ordinary cases.

Second Method.

- (a.) Set point C as before and move transit to C.
- (b.) Set vernier at 0
- (c.) Sight on A.
- (d.) Set off the proper "total deflection" for the point 4, $= VA4$.
- (e.) Reverse transit and set point 4, $NCA + MC4$ $VA4$, each measured by $\frac{1}{2}$ arc $AC4$.

(f.) Set off and use the proper "total deflections" for the remaining points.

The second method is in some respects more simple, as the notes and calculations, and also setting off angles are the same as if no additional setting were made. By the first method the deflection angles to be laid off will in general be even minutes, often degrees or half degrees, and are thus easier to lay off. It is a matter of personal choice which of the two methods shall be used.

Fieldwork of Finding P.C. and P.T.

In running in the line, it is common and considered advisable to establish "V," determine the statim of "V," and measure the angle I. Having given I only, an infinite number of curves could be used. It is, therefore, necessary to assume additional data to determine what curve to use. It is common to proceed as follows:—

- (a.) Assume either (1.) D at once (directly)
- (2.) E and calculate D.
- (3.) I and calculate D.

It is often difficult to determine off-hand what degree of curve will well fit the ground. Frequently the value of E_x can be readily determined on the ground.

The determination of D_x from I_x is readily made, using the approx formula $D_x = \frac{I_x}{I_x'}$.

Similarly we may be limited to a given (or ascertainable) value of I_x , and from this readily find $D_x = \frac{I_x}{I_x'}$.

The value of D_x adopted will in general, be taken to the nearest $\frac{1}{2}^{\circ}$ (perhaps only to nearest degree) rather than at the exact value found as above. (Some engineers use $1^{\circ}40' = 100'$ and $3^{\circ}20' = 200'$ etc. rather than $1^{\circ}30'$ or $3^{\circ}30'$ etc.)

(b.) From the data finally adopted I is calculated anew.

(c.) The instrument still being at V , the P.T. is set by laying off T .

(d.) The station of P.C. is calculated and P.C. set.

(e.) The length of curve I is calculated and station of P.T. thus determined.
(not by adding I to station of V .)

Total deflections should be all calculated, and entered in note book.

Whether D , E , or I shall be assumed, depends upon the special requirements in each case.

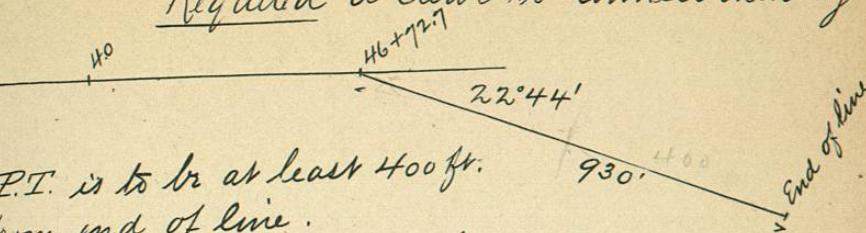
Curves are often run out from P.C. without finding or using V , but the best engineering usage seems to be in favor of setting V , whenever this is at all practicable, and from this finding the P.C. and P.T.

$$T = 22^\circ 40' \quad I = 1148.4$$

=

$$\begin{array}{r} 930 \\ 400 \\ \hline 530 \end{array}$$

Example Given a line as shown in sketch
Required a curve to connect the tangents



P.T. is to be at least 400 ft. from end of line.

Use smallest degree or half degree consistent with this.

Find degree of curve and stations of P.C. and P.T.

Table VI Scales $22^\circ 40' I = 1148.4$

$\frac{4}{4}$	$\frac{3.4}{3.4}$	$\frac{930}{400}$
$22^\circ 44'$	$\frac{1151.8}{1060}$	$(\frac{530}{2.2})$
	$\frac{1060}{918}$	use $2^\circ 30'$ curve.

$$I = \frac{1151.8}{100} \left(\frac{2.5}{460.7} \right)$$

$$\text{Table V correction } \frac{0}{460.7} = I$$

$$\begin{array}{r} V = 46 + 72.7 \\ I = 4 + 60.7 \\ P.C. \quad 42 + 12.0 \\ I \quad 9 + 09.3 \\ P.T. \quad 51 + 21.3 \end{array}$$

$$2.5 \left| \begin{array}{r} 22^\circ 44' \\ 22^\circ 7333 \\ \hline 909.3 = I \end{array} \right. \quad \frac{DD}{1100}$$

~~$L = \frac{I}{100}$~~

$$I = \frac{LD}{100}$$

$$LD = 100I$$

$$L = \frac{100I}{D}$$

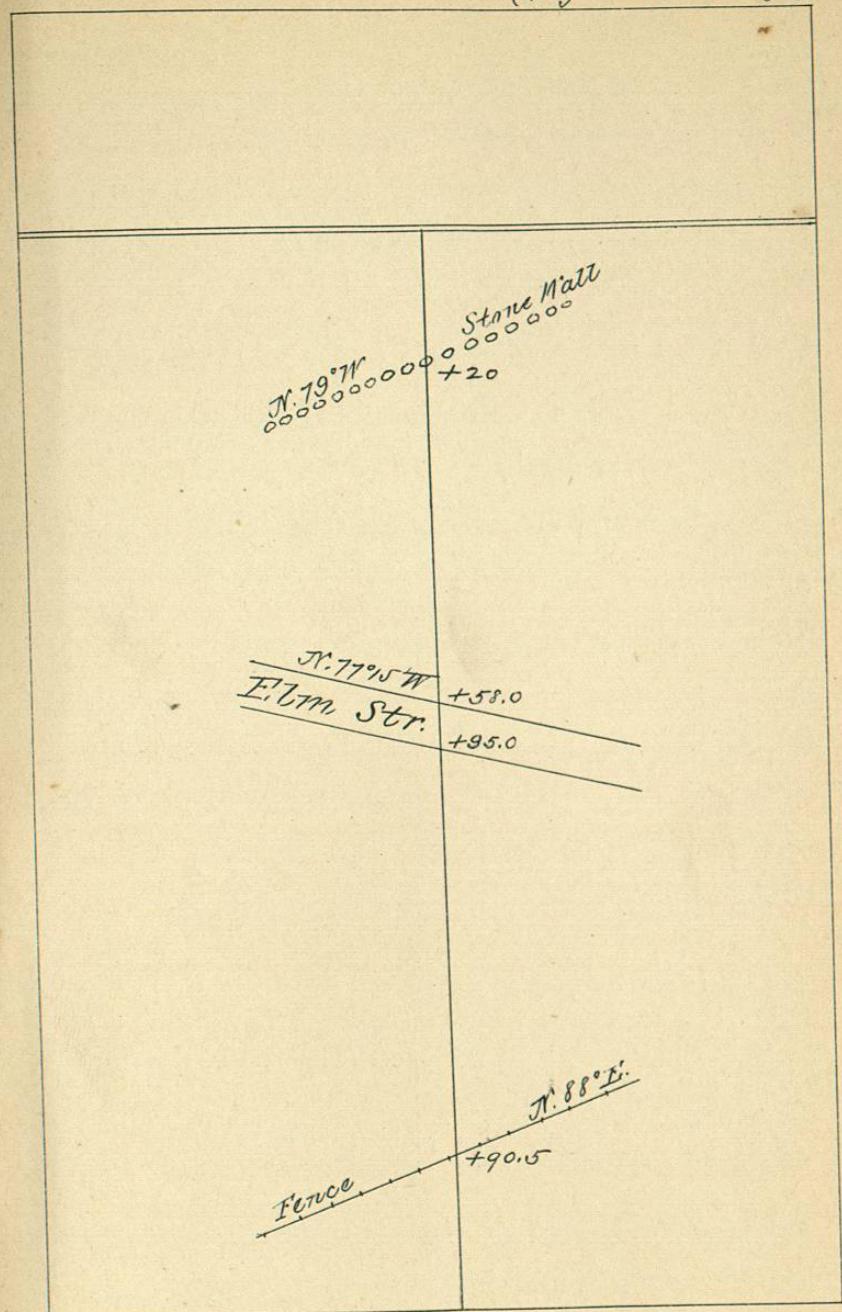
Form of Transit Book (left hand page)

(Date)
(Names of Party)

Station	Points	Descrip. of Curve	Total Deflect.	Observed Course
114				
113				
112				
111				
110				N. 46° 00' E.
109	0+90.0 P.I.		11° 15' 9° 00'	
108		R=1146.3		
107	0+68.0 T	I=450.0	6° 30'	
106		I=228.0	4° 00'	
		I=22° 30'		
105	0+40.0 P.C.	5° Right	1° 30'	
104				
103				
102				
101				
100				
99				N. 23° 15' E.
98				

T is not a point on the curve. Nevertheless it is customary to record the stations found by chaining along the tangent.

(right hand page)



The station to which the + refers will be clear
from the left hand page.

Metric Curves.

In Railroad Location under the "Metric System" a chain of 100 meters is too long, and a chain of 10 meters is too short. Some engineers have used the 30 meter chain, some the 25 meter chain, but lately the 20 meter chain has been generally adopted as the most satisfactory. A "station" is 10 meters. Ordinarily every second station only is set, and marked Sta 0, Sta 2, Sta 4 etc. On curves, chords of 20 meters are used. Usage among engineers varies as to what is meant by the degree of curve under the metric system. There are two distinct systems used as shown below.

I. The degree of curve is the angle at the center subtended by a chord of 1 chain of 20 meters.

II. The degree of curve is the deflection angle for a chord of 1 chain of 20 meters (or one half the angle at the center).

II. Or very closely, the degree of curve is the angle at the center subtended by a chord of 10 meters (equal to 1 station length)

For several reasons, the latter system is here favored. Tables upon this basis have been calculated, giving certain data for metric curves. Such tables are to be found in Henck's Field Book, but not in Searles'.