CR 343(4)
X-tions
Alignment

82 0020 1974

Weatherproof Field Book

"Rite in the Rain" paper
32 pages

4⅝" x 7¼"

Keuffel & Esser Co., Morristown, N. J. 07960 Made in U.S.A.

CROSS SECTIONS & ALIGN. CROSSINGS

CURVE FORMULAS

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

$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin. } \frac{1}{2} D}$

$\text{Sin. } \frac{1}{2} D = \frac{50}{R}$

$\text{Sin. } \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$

$R = T \cot. \frac{1}{2} I$

$R = \frac{50}{\text{Sin. } \frac{1}{2} D}$

$E = R \text{ ex. sec } \frac{1}{2} I$

$E = T \tan \frac{1}{4} I$

$\text{Chord def.} = \frac{\text{chord}^2}{R}$

$\text{No. chords} = \frac{I}{D}$

$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$

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

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.

GENERAL DATA

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. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 = \text{Base}$.

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.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574\,d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3}d^2$. The combined correction is negative.

PROBABLE ERROR. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean = $\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

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

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

Index 1

	BS	HI	F.S.	Elev
205-				
+50				
+12	Top bank			
+08	ditch			
	Edge of road			
204+00				
203+88				
℄ 10th North				
	6.51	4460.82		4454.31

Rebar near power pole
N.W. corner of Intersection

T.P	3.22	4460.70	3.34	4457.48
208+				
207+				
+10	℄ 15" CMP			
206+				
205+95	25° CMP Riser			
	1460.82			

Top of cement pipe

+66	sewer M.H.	2 34' Lt	4^{5}	4456.2
+39	End of road			
209+				
+93			4^{5}	
+89	9		3^{4}	
+84	4^{3}		4^{3}	
+83	5^{2} Ditch		5^{2}	
+76	ditch		5.3	
+15			4.2	
208+57			4.3	
		4460.70		

4-17-74
Payne
ward
warm & sunny

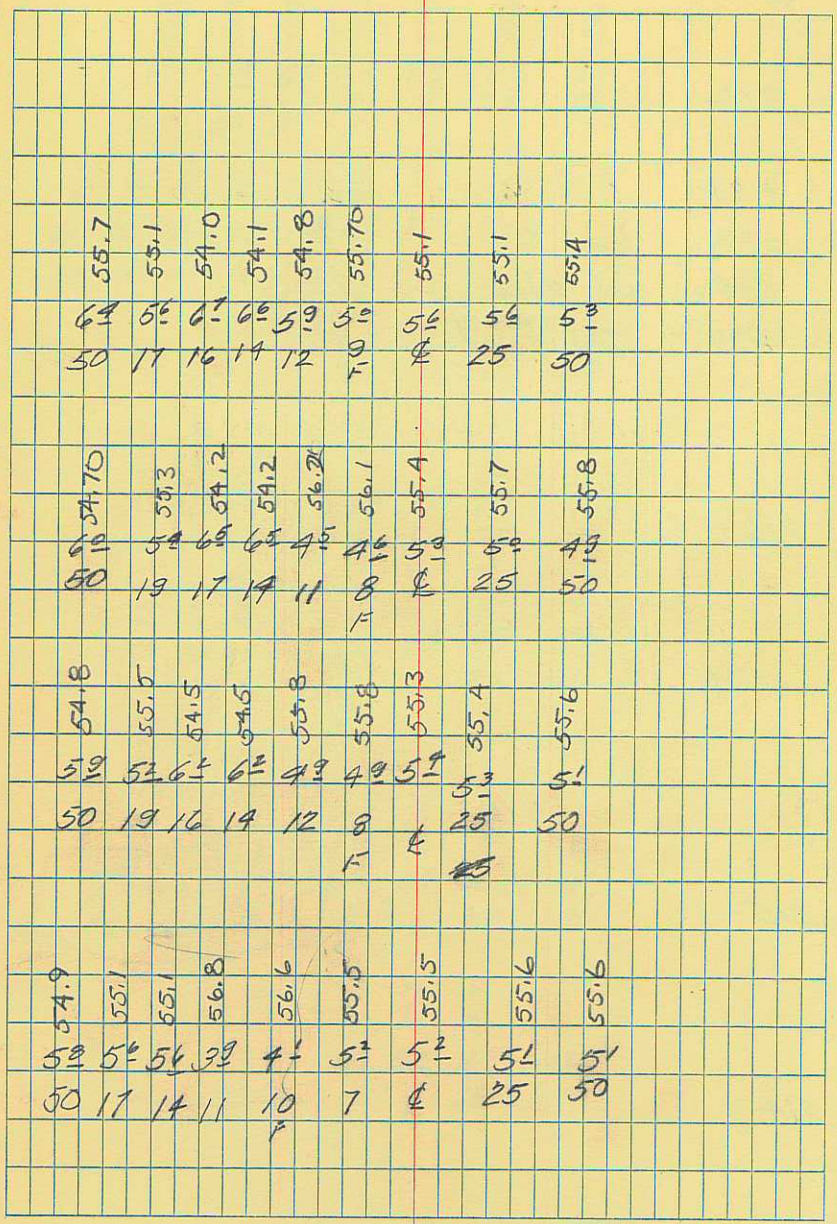
Elev.	56.7	56.5	56.5								
Rod	4^{2}	4^{2}	4^{2}								
Dist.	33	41	50								
Elev.	56.4	56.6	55.4	55.5	56.3	56.4	56.3	56.2	56.4		
Rod	4^{1}	4^{1}	5^{3}	5^{2}	4^{4}	4^{3}	4^{4}	4^{5}	4^{3}		
Dist.	22	18	16	14	13	11 F	℄	25	50		

Elev.	56.6	56.4								
Rod	4^{1}	4^{3}								
Dist.	44	50								
Elev.	58.8	56.6	57.0	55.1	55.4		56.3	56.4	56.2	56.5
Rod	3^{2}	4^{1}	3^{8}	5^{6}	5^{3}	F	4^{4}	4^{3}	4^{5}	4^{2}
Dist.	35	25	18	17	14	13	12	℄	25	50
Elev.							55.5	55.5	55.4	55.5
Rod							5^{2}	5^{2}	5^{3}	5^{2}
Dist.							12	℄	25	50

Elev.	58.1	55.3	55.4	55.4	55.4	55.4	55.4	55.4	55.5
Rod	2^{6}	5^{4}	5^{3}	5^{3}	5^{3}	5^{3}	5^{3}	5^{3}	5^{2}
Dist.	19	18	15	14 F	℄	25	50	75	100

Elev.	56.7	58.1	56.4	56.2	56.8	56.9
Rod	4^{2}	2^{6}	4^{3}	4^{5}	3^{9}	3^{8}
Dist.	14 F	8	3	℄	25	50

	BS	HI	FS	ELEV.
I13+79±		Fence		
TP	3.81	4458.89	5.62	4455.08
213				
+20	Manhole	2 3/4' Lt.	5.48	55.22
212				
211				
+73	Fence		5±	
210—				
		4460 ±		



2:55

217-

+33 7^{9}

+32 9^{3}

+30 bot. ditch 9^{6}

+29 Top bank 8^{0}

216-

+36

215-

214-

A458.89

47.3 52.5 52.9 53.2 53.3 53.0 52.7

11^{6} 6^{4} 6^{2} 5^{7} 5^{6} 5^{7} 6^{2}

±100 50 25 6 F ℄ 25 50

47.1 48.3 50.9 51.0 48.6 49.2 49.2 49.7 50.1 50.4

11^{8} 10^{6} 8^{9} 7^{9} 10^{3} 9^{1} 9^{1} 9^{2} 8^{10} 8^{5}

56 32^{5} 30 16 12^{5} 6 ℄ 36 77 93

FL F +32

18" cmp FL stream FL 12

51.0 51.5 50.3 50.1 51.4 51.5 52.0 51.5

7^{9} 7^{4} 8^{5} 7^{8} 7^{5} 7^{4} 6^{9} 7^{4}

50 16 12 10 6 F ℄ 25 50

53.7 54.1 52.9 53.4 53.6 53.5 54.2 54.3

5^{5} 4^{8} 6^{8} 5^{5} 5^{13} 5^{4} 4^{7} 4^{6}

50 12 9 7 6 F ℄ 25 50

53.6 54.3 53.4 54.6

5^{13} 4^{6} 5^{4} 4^{3}

50 13 11 8

53.5 54.7 53.5 53.5 55.0 54.4 54.4 54.5 54.6

5^{7} 4^{2} 5^{5} 5^{4} 3^{9} 4^{5} 4^{5} 4^{7} 4^{3}

50 16 14 13 10 6 F ℄ 25 50

54.8 54.3 54.7 54.8

4^{1} 4^{6} 4^{2} 4^{1}

7 F ℄ 25 50

221

220+52 ℄ Cross canal

TP	2.98	4457.86	4.01	4454.88

220 –

219 –

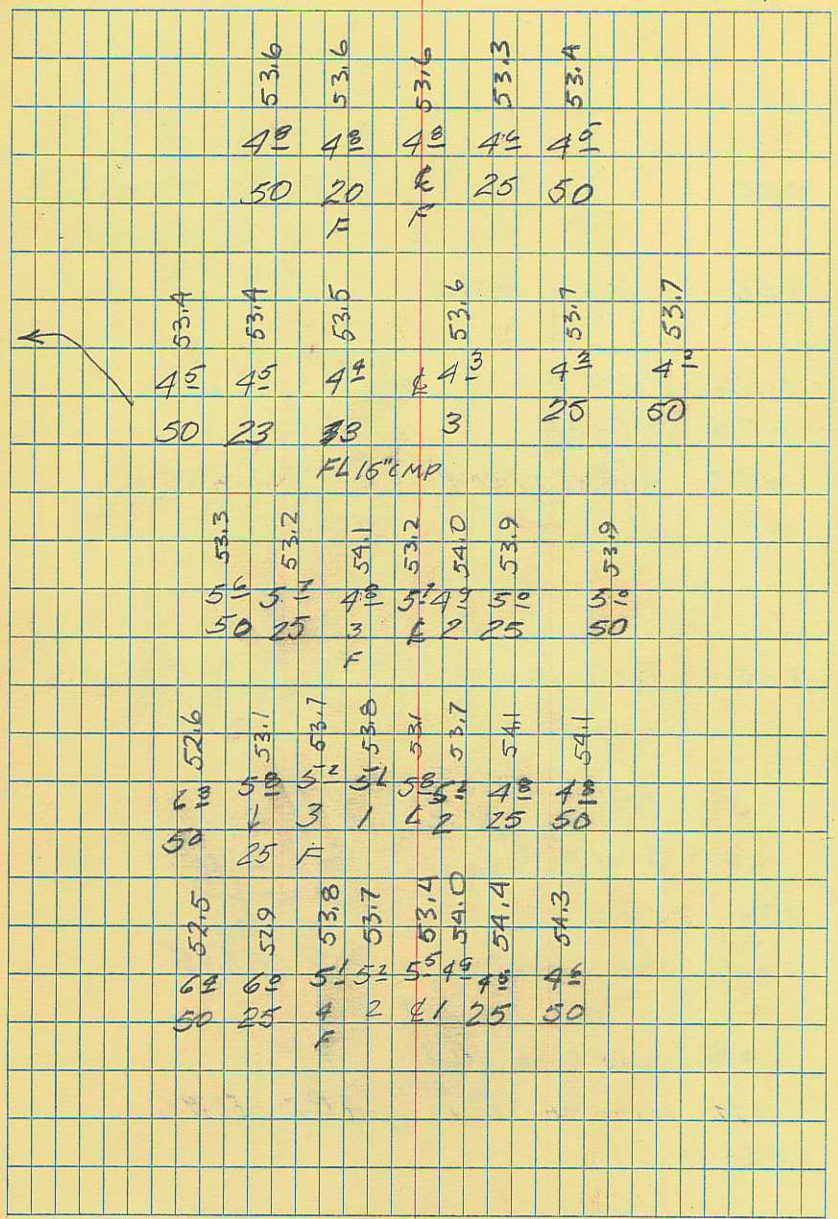
218 –

+42 Fence

+22 Sewer MH 23' Lt 6.00 52.89

+20 Fence

4458.89



225

+60 begin mud

+12 Fence

+08 Top bank 5.8

+05 ditch + 18" CMP 8.0

+03 ditch 8.0

224 – Top bank

+30 EL. of Ditch

+02 Sewer MH or Cleanout 24' Lt 5.98 51.88
5.74 Top Rim

223

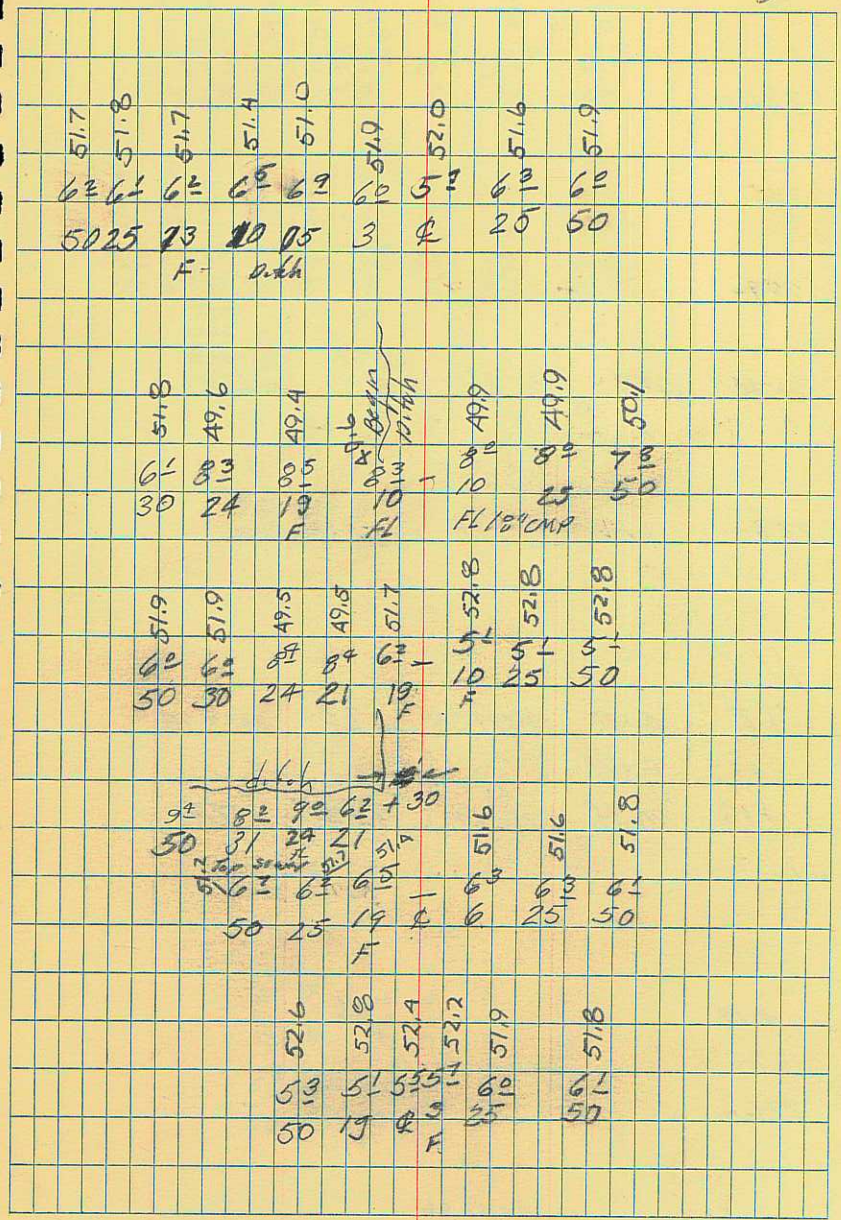
+97 Sewer Cleanout 26' Lt 5.41 52.45

+75 Low Swale (needs Drain) 6.1

+27 Sewer MH 24' Lt 4.90 52.96

222 –

4457.86



230–				
229–				
+44	well	17½' Lt	2.37 5.5	Top Pipe ground
228–	well	17' Lt	3.36 Top Pipe 5.20 Conc Base	
TP	4.40	4457.58	4.68	4453.18
+23	Fence			
+18	M.H.	16' Lt	4.92	5294
227–				
+18			6!	
226–				
		4457.86		

51.4 51.4 52.0 52.0 51.5 51.5 51.1 51.9
6½ 6½ 5½ 5½ 6½ 6½ 5½ 5½
50 28 25 15 8 ℄ 25 50
F

52.8 52.7 54.4 52.5 52.5 51.8 51.9 52.2 52.3
4⅝ 4⅝ 5½ 5½ 5½ 5⅛ 5½ 5¼ 5 1⅛
50 30 30 30 17 10 ℄ 25 50
Top Conc Found
F

51.8 51.8 52.6 52.6 52.3 52.4
5⅛ 5⅛ 5½ 5⅛ 5⅛ 5½
50 25 12 ℄ 25 50
F

51.8 52.2 52.9 52.6 52.7 52.8
6¼ 5½ 5⅛ 5⅛ 5½ 5½
50 13 ℄ 25 50
F

51.6 51.9 51.6 51.6 51.7 51.7
6⅜ 6⅛ 6⅜ 6⅜ 6½ 6½
50 25 14 ℄ 25 50
F

6.26 445132

BM – Power Pole on Fence Line
100' ± South 229+70

231 5+2

89
+~~88~~ Edge Rd 5+5

75
+~~69~~ 6+3

73
+~~66~~ 7+0

71
+~~68~~ FL ditch 7+0

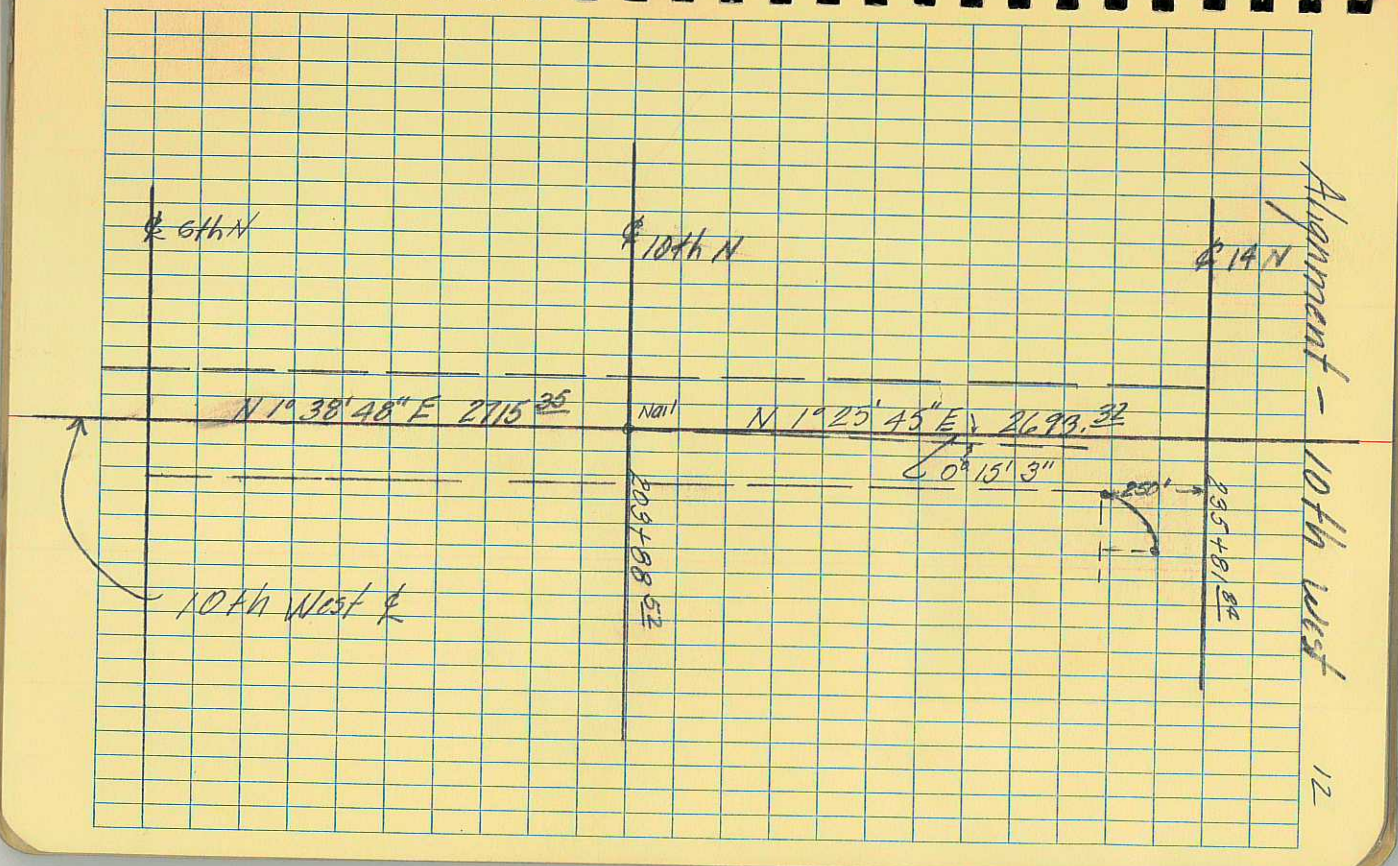
70
+~~64~~ ditch bank 6+4

230+62 Fence

445758

51.7 52.1 52.3 52.4 52.5
59 55 53 52 51
65 35 ¢ 23 50

48.6 49.6 51.6 50.0 51.9 50.4 50.2 50.5
9+0 8+0 6+0 7+6 5+1 7+2 7+2 7+1
60 33 33 7+0 7+0 +71 25 50
FL FL Top FL Top Box



Alignment - 10th West

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