DEWAR-READLYN ROAD
Gravel Project No. 2

Book I.
Center Line & Cross-Sections

DIETZGEN

ENGINEERS'

FIELD BOOK

No. 404

30

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.

H	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)÷2 or 2 ft. added to 30.6 =32.6. For slopes of 1 on 1½ see inside of back cover.

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BK. #30

PREL. SURVEY
DEWAR-READLYN ROAD.
GRAVEL PROJECT.
1919 #2

Sec. A, B, C, D, E
Book I
℄ + X-Secs.

If Lost Return to
County Engineers Office
Court House
Waterloo Iowa.

Entered 1922 CRH →

Ent 2-23 CRH

Dewar - Readlyn Road
Gravel Proj. No. 2.

Section + Half Section Stones on Dewar-Readlyn Road 1-2
Bench Levels 4-7
Center Line + Cross Section Notes 11-23
Rerun Bench Levels 7-10
1920 X-Sections 0+00 — 132+00 24-37
Center Line between Sec. 14-13 Benn. 31
Bridge Survey 1½ M.N of Denver Sec 2-11 Poyner 36

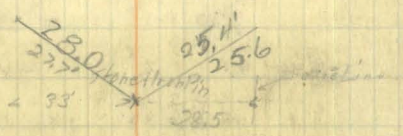
Bench Levels + Check Levels -38-39-40 + 46-50
℄ Profile 40 + 46-50
℄ Survey (Transit) 41-45
Bench Mark Adjustment Sheet 57-58

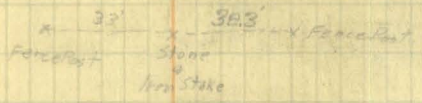
Section Stone Corners of Sections 13, 14
23 + 24 Bennington
25.4' NE. to S. end Headwall
27.7 NW " S. " "

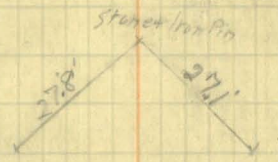
1/2 Sec. Stone. Between Sec. 23 + 24

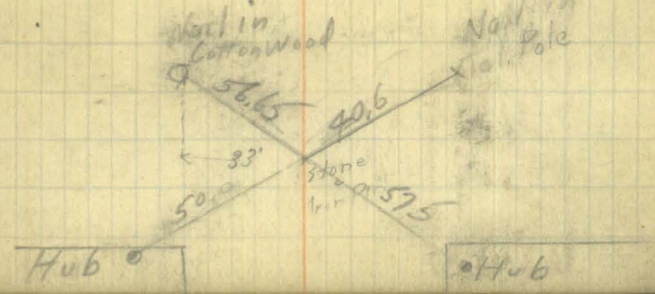
Section Stone. Corner of Sections 23
24, 25, & 26. Bennington
27.1' S.E. to N. end Headwall
27.8' S.W. " N. " "

Section Stone Corner of Sections 25
26, 35 & 36 Bennington Twp.
11.5' NW to Fence Post
40.5 NE to Tel. Pole

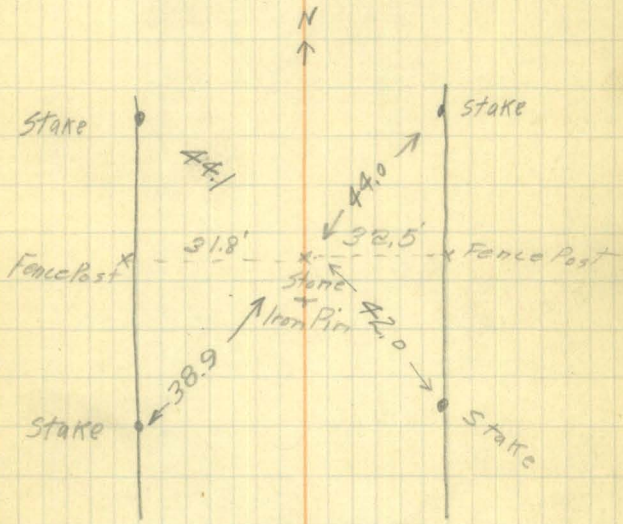








1/2 Section Stone Between Sec. 11 + 12
31.8' W to Fence Post
32.5' E " " "



Sta.	B.S.	H.I.	F.S.	Elev.		
	7.40	110.46	4.43	103.05		
	8.03	107.48	4.35	99.46		
B.M.#8	3.80	103.81	3.80	100.01	✓	Nail+Washer in 1st Tel. Pole N. of 2nd Bridge
	5.52	103.81	9.51	98.29		
B.M.#7	3.95	107.80	2.88	103.85	✓	On top 1st Pile at N end Bridge No. 16
	8.10	106.73	5.23	98.63		
	2.60	103.86	10.15	101.26		
	3.96	111.41	3.78	107.45		
B.M.#6	2.85	111.23	3.62	108.38	✓	N. end E. Headwall 1st Culv. N. of X Road Sta 69+30
	3.65	112.00	7.67	108.35		
	2.80	116.02	8.63	113.22		
B.M.#4	1.14	121.85	6.90	120.71	✓	N.E. Corner Headwall Conc. Culv. at 1st X Road N. of Dunkerton Corner Sta 52+99
	2.11	127.61	7.98	125.50		
	2.83	133.48	8.81	130.65		
B.M.#3	1.89	139.46	0.74	137.57	✓	Top of N. Gate Post of Wagon Gate at E.J. Rodgers Farm Sta. 39+41
	10.29	138.31	1.18	128.02		
	10.13	129.20	1.97	119.07		
	7.17	121.04	4.03	113.87		
	7.62	117.90	1.11	110.28		
	7.21	111.39	4.45	104.18		
B.M.#2	5.20	108.63	8.11	103.43	✓	Nail+Washer in 1st Tel. Pole So. of 1st Culv. N. of Dunkerton Corner Sta 12+77
	2.55	111.54	9.88	108.99		
B.M.#1	3.14	118.87	3.55	115.73	✓	Nail+Washer in 4th Pole N. of Dunkerton Corner Sta 6+02
	9.66	119.28	2.27	109.62	✓	
B.M.#0	11.89	111.89		100.00		X On High Point of S. Stone N.E. corner X Road Sta 0+20

B.M.#10			3.29	114.89	✓	
	2.42	118.16	9.39	115.74		
	0.74	125.13	10.63	124.39		
	2.87	135.02	6.66	132.15		
	6.26	138.81	5.25	132.55		
B.M.#11	4.13	137.80	4.65	133.67	✓	Nail+Washer in 1st Tel. Pole S. of H. Holdiman Farm.
	5.23	138.32	5.24	133.09		
	7.11	138.33	2.76	131.22		
	9.58	133.98	1.88	124.40		
	10.53	126.28	2.69	115.75		
B.M.#10	3.53	118.44	5.49	114.91	✓	Nail+Washer in 3rd Tel. Pole S. of McGee Farm.
	4.10	120.40	4.92	116.30		
	6.56	121.22	2.60	114.66		
BM#9	5.85	117.26	[illegible]	111.41		
BM#7			2.80	103.85	✓	
	4.57	106.65	1.56	102.08		
BM#8	3.65	103.64	3.63	99.99	✓	
	4.49	103.62	6.63	99.13		
	3.56	105.76	6.08	102.20		
	4.14	108.28	6.99	104.14		
	2.69	111.13	6.09	108.44		
BM#9	3.12	114.53	3.19	111.41	✓	N. end W. Headwall Conc. Culv. at 2nd X Road N. of Dunker-tap Corner
	6.61	114.60	2.46	107.99		
		110.45				

BM #17	4.58	163.52	5.52	158.94	162.50	Cross Chiseled in Conc Base of S. Gate Post Farm W. side Road
	7.23	164.46	1.14	157.23		
BM #16	3.70	158.37	4.38	154.67	158.19	S. end W. Head wall 1st Culv. N of School
	5.21	159.05	3.04	153.84		
	2.41	156.88	0.50	154.47		
	3.54	154.97	2.52	151.43		
BM #15	4.55	153.95	7.70	149.40	152.91	Nail & Red Cloth in Tel. Pole NE cor X Road N. of Church
	8.08	157.10	0.98	149.02		
	11.39	150.00	2.43	138.61		
BM #14	5.19	141.04	3.73	135.85	139.34	N. end W. Head wall 1st Culv. So. of Church
	2.92	139.58	2.28	136.66		
	3.22	143.94	6.78	140.72		
	3.51	147.50	3.78	143.99		
	5.05	147.77	5.29	142.72		
	4.15	148.01	7.56	143.86		
BM #13	4.38	151.42	4.18	147.04	150.54	Nail + Washer in Tel. Pole by House on Hilderbrand Farm
	6.60	151.22	3.88	144.62		
	7.64	148.50	3.55	140.86		
	6.06	144.41	3.47	138.35		
	5.75	141.82	4.20	136.07		
BM #12	6.45	140.27	3.28	133.82		
	9.11	137.10	2.77	127.99		
	3.75	130.76	5.98	127.01		
	3.55	132.99	6.72	129.44		
BM #11	2.49	136.16		133.67		

Spencer
R. Bailey
M. Francis

	2.23	126.46	9.48	124.23	
	4.57	133.71	10.21	129.14	
B.M. #3			1.76	137.59	Top of N. Gate Post of Wagon Gate at E. J. Rodgers Farm Sta. 39+41
	7.10	139.35	5.29	132.25	
	12.50	137.54	1.20	125.04	
	10.00	126.24	3.44	116.24	
	7.08	119.68	2.34	112.60	
	7.86	114.94	2.90	107.08	
	6.45	109.98	5.30	103.53	
13+80	Culvert				
B.M. #2	5.23	108.83	7.14	103.60	Nail & Washer in 1st. Tel. Pole So. of 1st. Culv. N. of Dunkerton Cor. Sta. 12+77 (8 / 100.5 / 8.3; 9 / 100.3 / 8.5)
	1.84	110.74	9.52	108.90	
B.M. #1	2.65	118.42	1.64	115.77	Nail & Washer in 4th. Pole N. of Dunkerton Cor. Sta. 6+02
	9.00	117.31	0.51	108.31	
B.M. #0	8.82	108.82		100.00	X on High Point of S. Stone N.E. Cor. X Roads Sta. 0+20

BM #16			3.00	154.97	✓
	4.79	157.97	7.13	153.18	
	2.91	160.31	6.92	157.40	
BM #17	5.21	164.32	4.54	159.11	✓
	5.82	163.65	5.10	157.83	
	5.92	162.93	5.24	157.01	
BM #18	4.12	162.25	4.73	158.13	✓ 161.59 So. End W. Headwall 1st Culv. So. of County Line
	5.92	162.86	6.58	156.94	
		163.52			

B.M. #D	4.33	144.22	0.79	139.89	E Edge of S. Headwall Culvert Rt. of intersect. 3 Mi. N. of Dunkerton Road
	7.93	140.68	1.90	132.75	
	6.65	134.65	4.44	128.00	
B.M. #C			5.51	126.93	N. Edge E. Headwall Stone Culvert. N. of Holdiman Farm
	3.18	132.44	6.43	129.26	
B.M. #11	2.10	135.69	4.12	133.59	Nail & Washer in 1st. Tel. Pole S. of A. Holdiman Farm
	4.08	137.71	2.83	133.63	
	8.26	136.46	0.33	128.20	
	10.25	128.53	0.15	118.28	
B.M. #B			4.18	114.25	N. End E Head Wall Culvert - 1st. S. of McGee Farm
B.M. #10			3.62	114.81	Nail & Washer in 3rd. Tel. Pole S. of Magee Farm
	4.71	118.43	6.92	113.72	
	5.63	120.64	2.14	115.01	
B.M. #9	5.83	117.15	0.19	111.32	N. end W. Head Wall Conc. Cul. at 2nd. X-Road N. of Dunkerton Cor.
	7.73	111.51	3.74	103.78	
	7.51	107.52	3.56	100.01	
	2.14	103.57	5.28	101.43	
B.M. #A	3.75	106.71	1.01	102.96	Top of West Side of South Abutment 100' Span About Sta 85+00
	3.49	103.97	10.14	100.48	
	2.97	110.62	3.55	107.65	
69+23	Culvert Flow Line				13 / 104.1 / 7.1 — 9 / 104.1 / 7.1
B.M. #G	2.82	111.20	4.63	108.38	N. end E. Head Wall 1st. Cul. N. of X-Road Sta. 69+30
	4.00	113.01	7.09	109.01	
	2.62	116.10	9.72	113.48	
B.M. #4	2.48	123.20	5.74	120.72	N.E. Cor. Headwall Conc. Cul. 1st. X Road N. of Dunkerton Cor. Sta. 52+99
		126.46			

6584

	2.94	148.24	7.85	145.30	
B.M. #13	2.61	153.15		150.54	
B.M. #18			4.54	161.59	So. End W. Headwall 1st. Culv. So. of County Line
	4.64	166.13	5.09	161.49	
	4.27	166.58	5.43	162.31	
B.M. #17			5.24	162.50	Cross - chisseled in Conc. Base of S. Gate Post - W. side of Road
	7.64	167.74	1.84	160.10	
	5.75	161.94	4.80	156.19	
B.M. #16			2.80	158.19	S. end W. Headwall 1st. Col. N. of School House
	3.80	160.99	6.57	157.19	
	7.43	163.76	2.73	156.33	
B.M. #F	5.04	159.06	4.35	154.02	Nail & Rag 3rd. Pole N. of B.M. #15
	6.00	158.37	6.15	152.37	
B.M. #E			4.18	154.34	N Edge W. Headwall Conc. Culvert N. of X-Road and N. of Church
B.M. #15			5.61	152.91	Nail & Rag in Tel. Pole N.E. Cor. X-Road N. of Church
	2.46	158.52	0.88	156.06	
	12.06	156.94	0.14	144.88	
B.M. #14	5.68	145.02	6.01	139.34	N. end W. Headwall 1st. Col. So. of Church
	2.21	145.35	8.08	143.14	
	4.74	151.22	5.17	146.48	
	4.91	151.65	7.76	146.74	
B.M. #13			3.96	150.54	Nail & Rag on Tel. pole in front New House
	4.85	154.50	2.48	149.65	
	7.87	152.13	3.16	144.26	
	6.20	147.42	3.00	141.22	
		144.22			

B.M. #11			1.96	133.42
	6.22	135.38	3.14	129.16
B.M. #C			5.49	126.81
	4.08	132.30	6.52	128.22
	1.76	134.74	8.92	132.98
B.M. #D.	2.04	141.90	5.04	139.86
	3.21	144.90	6.55	141.69
		148.24		

8					
7					
BM #1	3.14	118.87	4.21	115.73 / 115.72 ✓	
6					
+00	Stake ℄ Road				
5					
	8.47	119.93	3.68	111.46 ✓	
4					
3					
	12.31	115.14	1.95	102.83 ✓	
2					
1					
+27	Row of 6 Cotton Wood Trees 50' off ℄ Road.				
+22	Fence E & W. on N. side Road				
0+00	Iron Pin Stone ℄ X Road Dunkerton Corner.				
B.M.0	4.78	104.78		100.00	

Nail & washer in 4th Tel. pole N. Dunkerton Rd. Sta. 6+02 (118.8)

32 / 4.5 / 114.3	24 / 5.5 / 113.3	16 / 6.2 / 112.6	10 / 5.8 / 113.0	5.6 / 113.2	5 / 5.9 / 112.9	18 / 7.1 / 111.7	26 / 6.5 / 112.3	37 / 6.4 / 112.4	
33 / 3.5 / 115.3	23 / 4.7 / 114.1	15 / 4.5 / 114.1	11 / 4.3 / 114.5	4.2 / 114.6	4 / 4.4 / 114.4	14 / 5.7 / 113.1	22 / 5.9 / 112.9	30 / 4.8 / 114.0	
32 / 4.3 / 115.6	23 / 5.0 / 114.9	16 / 5.8 / 114.1	11 / 5.2 / 114.7	5.3 / 114.6	6 / 5.8 / 114.1	14 / 7.0 / 112.9	20 / 6.4 / 113.5	28 / 6.1 / 113.8	

32 / 4.8 / 115.1	25 / 5.5 / 114.4	19 / 6.6 / 113.3	11 / 5.9 / 114.0	6.1 / 113.8	4 / 6.0 / 113.9	12 / 7.3 / 112.6	17 / 6.2 / 113.7	28 / 6.5 / 113.4	
31 / 2.2 / 112.9	27 / 2.4 / 112.7	19 / 5.9 / 109.2	10 / 4.5 / 110.6	(119.9) / 4.4 / 110.7	8 / 4.5 / 110.6	18 / 5.9 / 109.2	22 / 5.2 / 109.9	24 / 4.5 / 110.4	29 / 4.6 / 110.5
32 / 6.0 / 109.1	17 / 9.3 / 104.8	10 / 8.4 / 106.7	8.5 / 106.6	8 / 8.6 / 106.5	16 / 8.9 / 106.2	21 / 8.2 / 106.9	26 / 6.9 / 108.2	29 / 7.2 / 107.9	

(115.1)

33 / 1.6 / 103.1	18 / 2.8 / 101.9	9 / 1.9 / 102.8	2.0 / 102.7	7 / 2.2 / 102.5	14 / 3.4 / 101.3	28 / 2.2 / 102.5

33 / 5.4 / 99.3	18 / 5.7 / 99.0	8 / 4.2 / 100.5	4.3 / 100.4	7 / 4.3 / 100.4	17 / 5.4 / 99.3	24 / 5.5 / 99.2	27 / 5.6 / 99.1		

300 / 1.2 / 103.5	200 / 2.7 / 102.0	100 / 3.8 / 100.9	33 / 4.2 / 100.5	20 / 4.6 / 100.1	5.0 / 99.7	16 / 5.1 / 99.6	25 / 5.0 / 99.7	100 / 5.2 / 99.5	200 / 5.5 / 99.2	300 / 4.8 / 99.9

X on high pt. of S. Stone NE cor. (104.7) Xroads Sta. 0+20

+82 Fence E

15" x 16" Conc. Arch Culv.

+60 Center Drive E House 600' from Road

19+41 Fence E.

13+80 16 ft 18" Vitrified Tile Culv.

13+31 Fence E.

12+74 Tel. pole E. side on Fence Line

11+57 Fence S.E.

5+29 Fence W.

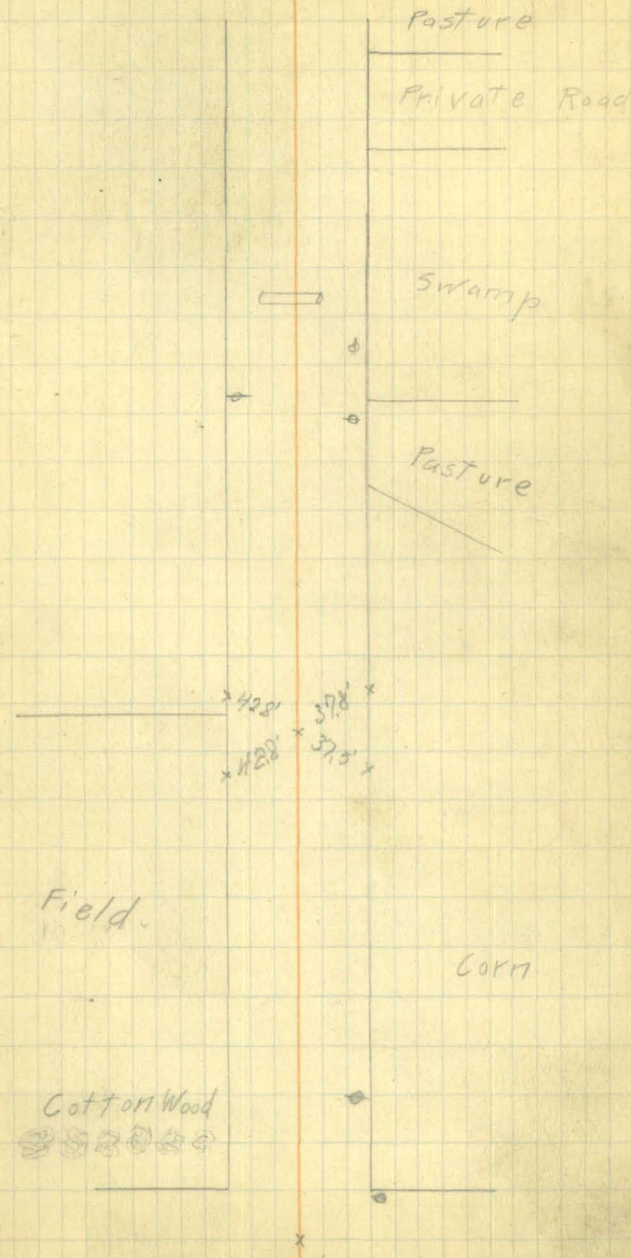
5+20 Stake

4+80 Drainage begins

+37 Row of Trees W.

+32 Fences E & W.

0+00



	7.87	113.58	3.85	105.71
+63	Drive E			
19				
18				
17				
	5.63	109.56	4.73	103.93
16				
15				
14				
+80	Culv.			
BM#2	5.83	108.66	8.79	103.43 / 103.44 ✓
13				
12				
11				
10				
	2.80	112.23	9.44	109.43
9				
		118.87		

					3.6 / 105.9	12 / 4.2 / 105.3	34 / 5.2 / 104.3	50 / 5.5 / 104.0	
30 / 3.8 / 105.7	23 / 5.1 / 104.4	16 / 6.0 / 103.5	8 / 4.5 / 105.0	4.2 / 105.3	8 / 4.5 / 105.0	15 / 6.7 / 102.8	24 / 6.7 / 102.8	33 / 6.5 / 103.0	
32 / 4.5 / 105.0	26 / 4.8 / 104.7	22 / 6.0 / 103.5	17 / 6.4 / 103.1	10 / 6.2 / 104.3	5.0 / 104.5	7 / 5.2 / 104.3	12 / 6.9 / 102.6	21 / 6.9 / 102.6	32 / 7.0 / 102.5
31 / 5.0 / 104.5	26 / 5.3 / 104.2	21 / 6.0 / 103.5	15 / 6.8 / 102.7	7 / 5.6 / 103.9	5.2 / 104.3	8 / 5.4 / 104.1	12 / 6.1 / 103.4	17 / 7.8 / 101.7	24 / 7.0 / 103.5 / 33 / 7.5 / 102.0
					109.5				
32 / 4.4 / 104.2	24 / 5.6 / 103.0	15 / 6.6 / 102.0	7 / 5.2 / 103.4	4.8 / 103.8		8 / 5.1 / 103.5	13 / 6.2 / 102.4	23 / 6.6 / 102.0	32 / 6.8 / 101.8
33 / 5.5 / 103.1	25 / 6.2 / 102.4	16 / 6.6 / 102.0	9 / 5.6 / 103.0	5.2 / 103.4		8 / 5.7 / 102.9	15 / 7.1 / 101.5	20 / 6.8 / 101.8	30 / 7.5 / 101.1
34 / 6.3 / 102.3	22 / 7.2 / 101.4	13 / 6.7 / 101.9	5 / 5.0 / 103.6	4.9 / 103.7		7 / 5.1 / 103.5	13 / 6.8 / 101.8	19 / 7.5 / 101.1	23 / 7.0 / 101.6 / 31 / 7.4 / 101.3
33 / 6.4 / 102.2	24 / 7.2 / 101.4	15 / 7.1 / 101.5	8 / 5.1 / 100.5	7 / 5.0 / 103.6	5.0 / 103.6	8 / 5.0 / 103.6	9 / 5.8 / 100.4	23 / 8.1 / 100.5	24 / 7.0 / 101.6 / 28 / 6.8 / 101.8
					108.6				
33 / 9.5 / 102.7	24 / 10.0 / 102.2	18 / 10.4 / 101.8	10 / 9.1 / 103.1	8.9 / 103.3		11 / 9.2 / 103.0	14 / 10.3 / 101.9	23 / 10.6 / 101.6	31 / 11.0 / 101.2
33 / 7.2 / 105.0	25 / 7.9 / 104.3	16 / 8.4 / 103.8	8 / 7.7 / 104.5	7.6 / 104.6		7 / 7.8 / 104.4	14 / 8.6 / 103.6	22 / 8.9 / 103.3	33 / 9.1 / 103.1
32 / 3.6 / 108.6	27 / 6.3 / 105.9	18 / 6.1 / 106.1	10 / 5.5 / 106.7	5.4 / 106.8		8 / 5.5 / 106.7	22 / 7.5 / 104.9	27 / 6.3 / 105.9	33 / 5.8 / 106.4
33 / 9.2 / 112.0		19 / 2.7 / 109.5	10 / 2.9 / 109.3	2.7 / 109.5		8 / 3.9 / 109.3	18 / 4.1 / 108.1	24 / 4.0 / 108.2	28 / 2.3 / 109.9 / 32 / 2.4 / 109.8
					112.2				
32 / 5.5 / 113.3	25 / 6.2 / 112.1	16 / 7.3 / 111.5	10 / 7.3 / 111.5	7.1 / 111.7		7 / 7.4 / 111.4	19 / 8.9 / 109.9	25 / 8.0 / 110.8	31 / 8.0 / 110.0

	8.16	123.33	4.24	115.17
32				
31				
30				
29				
	7.57	119.41	4.68	111.84
28				
27				
26				
25				
	6.57	116.52	3.63	109.95
24				
23				
22				
21				
20		113.58		

31	26	24	16	9		5	11	19	22	29
3.8	4.7	5.9	5.3	4.0	3.8	4.2	5.2	6.3	5.7	5.8
115.6	114.7	113.9	114.1	115.4	115.6	115.2	114.2	113.1	113.7	113.6
30	26	21	16	9		4	10	20	22	31
4.3	4.7	6.0	5.6	4.8	4.7	4.9	6.3	6.4	6.0	6.4
115.1	114.7	113.4	113.8	114.6	114.7	114.5	113.1	113.0	113.4	113.0
30	26	21	16	11		5	10	20	21	29
4.6	5.4	6.5	6.0	5.2	5.3	5.3	6.2	7.0	6.4	6.6
114.8	114.0	112.9	113.4	114.2	114.1	114.1	113.2	112.4	113.0	112.8
31	28	24	19	13	5		3	9	18	20	28
5.0	5.7	7.3	6.9	5.7	5.2	5.7	5.5	7.2	7.9	7.2	7.2
114.4	113.7	112.1	112.5	113.7	114.3	113.7	113.9	112.0	111.5	112.2	112.2
						(119.4)					
32	28	24	18	12			5	9	17	21	27
3.3	4.3	5.3	4.6	3.4	3.5		3.3	5.3	5.9	4.8	4.5
113.2	112.2	111.2	111.9	113.1	113.0		113.2	111.2	110.6	111.7	113.0
	32	26	18	11			5	9	17	21	26
	4.8	5.9	5.5	4.3	4.2		4.3	6.0	6.7	5.6	5.6
	111.7	110.6	111.0	112.2	112.3		112.2	110.5	109.8	110.9	110.9
	31	23	17	11			5	10	18	19	25
	5.7	7.2	6.6	5.4	5.3		5.5	7.1	7.5	6.0	6.2
	110.8	109.3	109.9	111.1	111.2		111.0	109.4	109.0	110.5	110.3
33	30	23	17	11			5	11	19	22	27
7.0	7.0	8.0	7.6	6.4	6.1		6.3	7.7	8.0	7.0	7.1
109.5	109.5	108.5	108.9	110.1	110.4		110.2	108.8	108.5	109.5	109.4
					(116.5)						
33		27	18	11			5	12	18		26
4.7		5.0	5.6	4.1	3.8		4.1	5.6	5.0		4.9
108.9		108.6	108.0	109.3	109.8		109.5	108.0	108.6		108.7
33	29	22	17	10			7	15	21	26	28
5.6	5.6	6.7	6.2	4.8	4.4		4.8	6.1	5.9	5.2	5.2
108.0	108.0	106.9	107.4	108.8	109.2		108.8	107.5	107.7	108.4	108.4
33	26	22	14	8			9	16	23		28
6.3	6.2	7.6	7.2	5.9	5.2		5.6	7.0	6.2		6.2
107.3	107.4	106.0	106.4	107.7	108.4		108.6	106.0	107.4		107.4
32		21	14	7			8	15	24		29
6.9		8.2	8.3	7.0	6.4		6.8	8.4	7.4		7.5
106.7		105.4	105.3	106.6	107.2		106.8	105.2	106.2		106.1
32		25	20	14	7		7	14	21		31
8.2		8.6	9.6	9.4	7.9	7.5	7.7	9.2	9.9		8.8
105.4		105.0	104.0	104.2	105.7	106.1	105.9	104.4	103.7		104.8
						(113.6)					

+56 Fence W

40+38 Center Drive W. Stake 25' from E Fence

40+22 S. side Pine Grove E., Fence W. Row Trees W.

39+98 Center Small Gate to House E.

39+92 S. side House E. 100' off Road.

39+64 S side Hedge E. S side Barn W. 300' off Road.

39+25 Center Gate E.

39+17 Fence E

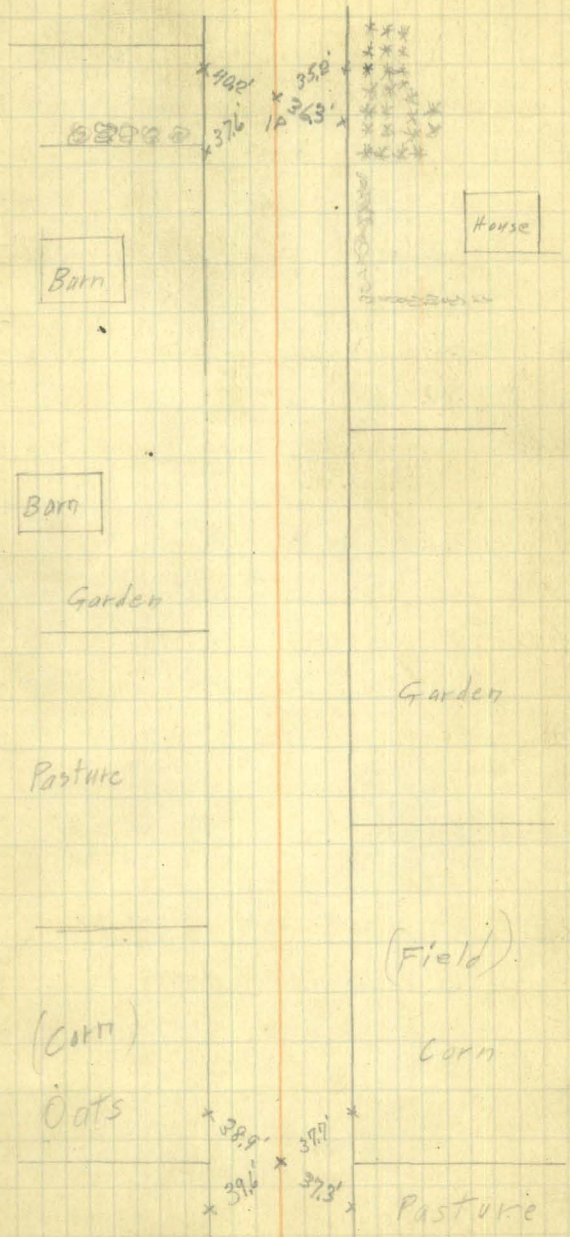
38+92 S. side Barn 200' off Road.

38+59 Fence W

33+82 Fence E.

32+14 Fence W.

26+58 Fence E + W ½ Sec. Stake



43					
	4.21	133.78	9.12	129.57	
42					
41					
+46	Drive W				
BM#3	1.12	138.69	1.12	137.57 137.58	✓
40					
+33	Drive E				
39					
	10.64	138.70	2.01	128.06	
38					
37					
36					
	8.95	130.07	2.21	121.12	
35					
34					
33					
		123.33			

29	23	17	12		4	9	17	22	28
3.4	4.5	4.9	4.0	4.0	4.1	5.0	5.0	4.4	4.6
130.4	129.3	128.9	129.8	129.8	129.7	128.8	128.8	129.4	129.2
				(133.8)					
32	27	20	13		4	9	15	21	25
5.8	7.3	7.7	7.4	7.4	7.2	8.0	7.4	7.3	7.4
132.9	131.4	131.6	131.3	131.3	131.5	130.7	131.3	131.4	131.3
33	24	17	12		5	10		22 Force	26
4.2	4.7	4.9	5.7	5.7	5.6	6.3		5.7	5.6
134.5	134.0	133.8	133.0	133.0	133.1	132.4		133.0	133.1
46	31	23	12						
4.5	4.5	4.5	4.7	5.0					
134.2	134.2	134.2	134.0	133.7					
				(138.7)					
31	28	21	12		5	13		22	
4.8	4.9	5.4	5.9	6.0	5.7	5.5		4.8	
132.9	133.8	133.3	132.8	132.7	133.0	133.2		133.9	
					6	13	24	39	
				7.9	8.0	7.4	6.2	6.1	
				130.8	130.7	131.3	132.5	132.6	
32	29	21	12		4	13	20	25	
7.9	7.7	9.1	8.8	8.9	8.8	8.4	7.8	7.1	
130.8	131.0	129.6	129.9	129.8	129.9	130.3	130.9	131.6	
33	26	21	11	(138.7)	4	12	19	25	
2.6	2.5	3.1	2.6	2.9	2.7	3.0	2.6	1.5	
127.5	127.6	127.0	127.5	127.2	127.4	127.1	127.5	128.6	
32	27	20	9		7	16	22	26	
5.6	5.7	5.8	5.4	5.0	5.3	5.5	5.0	3.9	
124.6	124.4	124.3	124.7	125.1	124.8	124.6	125.1	126.5	
33	27	20	9		6	14	21	27	
7.8	7.9	8.8	7.6	7.3	7.6	8.2	7.6	6.6	
122.3	122.2	121.3	122.5	122.8	122.5	121.9	122.5	123.5	
33	27	20	10	(130.1)	6	13	17	20	26
3.7	3.7	4.7	3.4	3.0	3.1	4.1	4.0	3.0	2.5
119.6	119.6	118.6	119.9	120.3	120.2	119.2	119.3	120.3	120.8
33	26	22	16	10		6	11	19	21	27
6.0	6.2	6.9	6.5	5.3	5.1	5.2	6.1	7.0	5.8	5.4
117.3	117.1	116.4	116.8	118.0	118.2	118.1	117.2	116.3	117.5	117.9
32	26	17	10			5	11	19	28
7.9	8.5	8.2	6.8	6.7		6.8	8.4	8.7	8.7
115.4	114.8	115.1	116.5	116.6		116.5	114.9	114.6	114.6
				(123.3)					

	2.12	119.91	6.88	117.79
54				
+24.5	℄ X Road			
53				
+97	Culv.			
BM #4	3.98	124.67	8.66	120.71 / 120.69 ✓
52				
51				
50				
49				
48				
47				
	1.48	129.35	5.91	127.87
46				
+45				
44				
		133.78		

33 / 5.1 / 119.6	19 / 5.6 / 119.1	14 / 6.7 / 118.0	9 / 6.0 / 118.7	5.7 / 119.0	11 / 5.9 / 118.8	13 / 7.6 / 117.1	19 / 6.5 / 118.2	24 / 6.3 / 118.4	26 / 6.4 / 118.3
200 / 0.1 / 124.6	100 / 3.7 / 121.0	32 / 4.8 / 119.9	10 / 4.7 / 120.0	4.9 / 119.8	16 / 5.5 / 119.2	27 / 5.8 / 118.8	100 / 7.2 / 117.5	200 / 8.9 / 115.8	300 / 10.3 / 114.4
33 / 4.7 / 120.0	28 / 5.5 / 119.2	20 / 5.7 / 119.0	16 / 5.0 / 119.7	11 / 4.5 / 120.2	4.4 / 120.3	7 / 5.0 / 119.7	14 / 6.1 / 118.6	19 / 7.2 / 117.5	23 / 6.8 / 117.9	29 / 6.3 / 118.4
30 / 5.2 / 119.5	24 / 5.3 / 119.4	14 / 6.0 / 118.7	11 / 6.1 / 118.6	10.5 / 3.6 / 121.1	10 / 4.0 / 120.7	4.1 / 120.6	7 / 4.3 / 120.4	7 / 4.0 / 120.7	2.5 / 6.4 / 118.3	16 / 6.5 / 118.2	21 / 6.0 / 118.7	26 / 5.6 / 119.1
30 / 7.2 / 122.2	23 / 8.1 / 121.3	16 / 9.4 / 120.0	10 / 8.5 / 120.9	(124.8) / 8.4 / 121.0	6 / 8.5 / 120.9	17 / 9.8 / 119.6	21 / 9.3 / 120.1	27 / 9.1 / 120.3	
29 / 6.1 / 123.3	26 / 6.5 / 122.9	17 / 8.1 / 121.3	11 / 7.4 / 122.0	7.2 / 122.2	6 / 7.4 / 122.0	17 / 8.5 / 120.9	22 / 7.6 / 121.8	26 / 7.9 / 121.5	
31 / 5.2 / 124.2	25 / 5.6 / 123.8	18 / 7.2 / 122.2	11 / 6.2 / 123.2	6.0 / 123.4	7 / 6.4 / 123.0	17 / 7.4 / 122.0	22 / 7.3 / 122.1	25 / 7.0 / 122.4	
28 / 4.9 / 124.5	25 / 5.9 / 124.1	18 / 6.7 / 122.7	10 / 5.3 / 124.1	5.0 / 124.4	7 / 5.2 / 124.2	14 / 6.8 / 122.6	21 / 6.2 / 123.2	26 / 6.3 / 123.1	
29 / 3.3 / 126.1	24 / 3.5 / 125.9	17 / 4.7 / 124.7	10 / 4.0 / 125.4	3.6 / 125.8	7 / 3.8 / 125.6	17 / 5.0 / 124.4	23 / 5.0 / 124.4	26 / 4.4 / 125.0	
29 / 1.0 / 128.4	26 / 1.4 / 128.0	18 / 2.5 / 126.9	10 / 2.1 / 127.3	1.9 / 127.5	7 / 2.1 / 127.3	16 / 3.4 / 126.0	23 / 2.6 / 126.8	27 / 2.5 / 126.9	
30 / 4.7 / 129.1	26 / 5.6 / 128.2	19 / 6.9 / 126.9	16 / 6.3 / 127.5	11 / 5.4 / 128.4	(129.4) / 5.4 / 128.4	5 / 5.5 / 128.3	10 / 6.7 / 127.1	16 / 7.2 / 126.6	19 / 6.7 / 127.1	26 / 6.6 / 127.2
29 / 4.8 / 129.0	25 / 5.5 / 128.3	22 / 6.6 / 127.2	17 / 6.0 / 127.8	12 / 5.3 / 128.5	5.3 / 128.5	5 / 5.3 / 128.5	9 / 6.3 / 127.5	15 / 6.8 / 127.0	19 / 6.4 / 127.4	26 / 6.0 / 127.8
29 / 5.2 / 128.6	25 / 5.8 / 128.0	19 / 5.9 / 127.9	13 / 5.0 / 128.8	5.2 / 128.6	(128.8)	5 / 5.3 / 128.5	9 / 6.5 / 127.3	15 / 6.9 / 126.9	21 / 6.4 / 127.4	27 / 6.9 / 126.9

55+00 Fence W.

54 +81 S. side Shed 90' off Road. W

+95 S. side Corn Crib 250' off Road W

+50 Big Cotton Wood Tree 29' off ℄ Road.

+43 Fence E

53+17.1 Section Stone Turn 0° 15' Left.
11.5' W. of ℄ of Road.

52+89 ℄ 18' X 18' X 17' Box Culv. Old Style.

52+87 Fence E & W.

51+55 Tel. pole W. side road along Fence.

51+15 Tel. pole S. side road along Fence

48+78 Fence E

+34 Gate W to Field 12" x 20' ϕ con. Culv.

44+27 Fence W.

43+34 Fence W. Drainage Line Ind

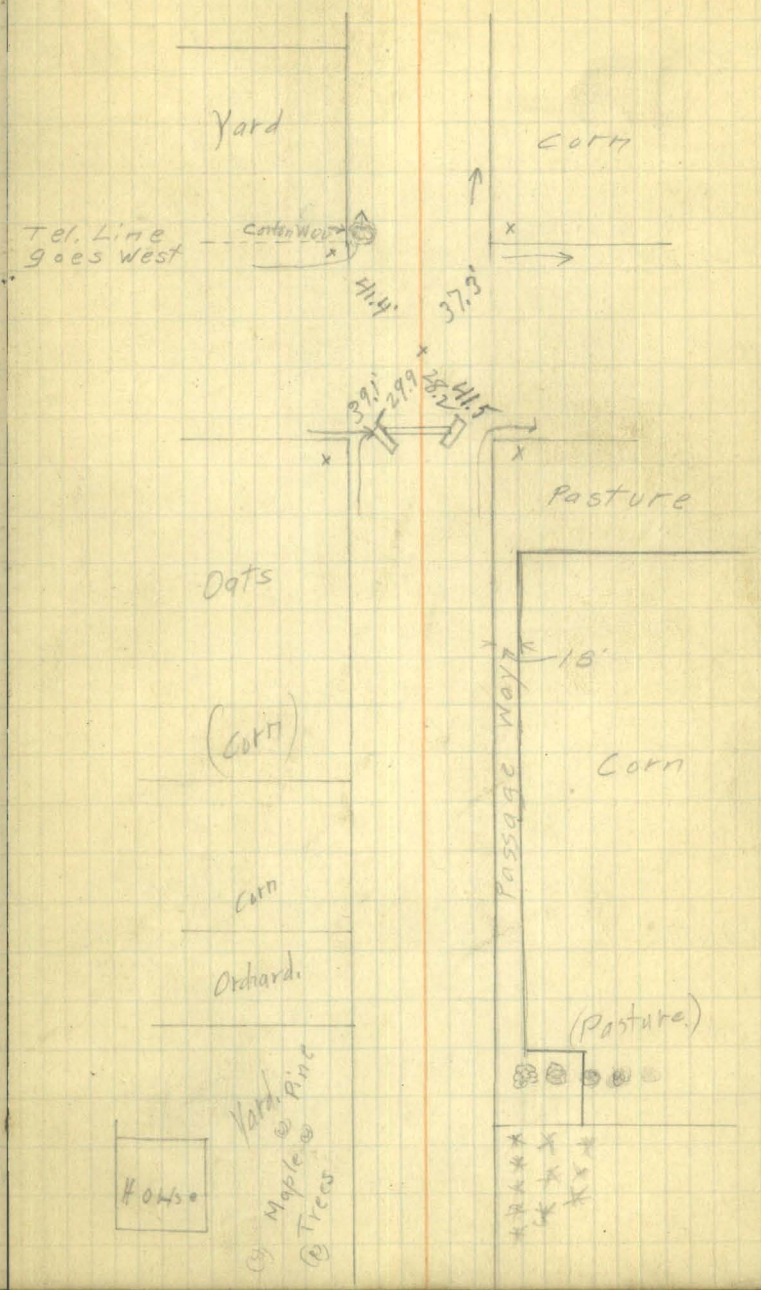
+95 Fence E 50' Long

+80 Fence W.

+66 Row Willow Trees E.

+53 Fence E. N side Pine Grove

41 S. side House W. 250' off Road



66

65

64 Fe

4.64	113.07	7.29	108.43

63

62

61

+25 Drive E

60

59

2.93	115.72	7.12	112.79

58

57

56

55

	119.91		

31	27	23	14	5		5	15	18	27	30
5.8	6.3	7.0	5.9	5.0	5.6	6.0	7.5	6.6	6.2	6.3
107.3	106.8	106.1	107.2	108.1	107.5	107.1	105.6	107.1	106.9	106.8
31	28	22	14	5		3	9	15	20	30
4.9	5.2	6.5	5.5	4.8	5.1	5.7	6.3	7.2	6.2	6.2
108.2	107.9	106.6	107.6	108.3	108.0	108.0	106.8	105.9	106.9	106.9
31	24	14	5		4	13	18	23	29	
4.5	5.5	5.0	4.7	4.5	4.4	6.3	4.9	4.8	4.8	
108.6	107.6	108.1	108.7	108.6	108.7	106.8	108.2	108.3	108.3	
	30	22	14	(113.1)	4	13	22	29		
	6.9	8.0	7.0	6.8	6.9	8.5	7.9	8.1		
	108.8	107.7	108.7	108.9	108.8	107.2	107.8	107.6		
30	26	22	12		5	14	23	29		
6.1	6.6	7.0	6.6	6.3	6.2	8.4	7.2	7.3		
109.6	109.1	108.7	109.1	109.1	109.5	107.3	108.5	108.4		
30	26	21	12		5	15	22	29		
4.9	5.7	6.3	5.7	5.3	5.5	7.3	6.3	6.4		
110.8	110.0	109.4	110.0	110.4	110.2	108.4	109.4	109.3		
				4.7	4	14	22	28		
				111.0	4.8	5.4	5.6	5.7		
					110.9	110.3	110.1	110.0		
30	24	18	13		5	14	19	25	29	
4.0	5.1	5.6	4.8	4.6	4.9	6.7	6.1	5.2	5.5	
111.7	110.6	110.1	110.9	111.1	110.8	109.0	109.6	110.5	110.2	
29	25	19	10		6	14	23	26	29	
3.4	3.9	4.4	4.1	3.9	4.1	5.9	4.7	4.3	4.5	
112.3	111.8	111.3	111.6	111.8	111.6	109.8	111.0	111.4	111.2	
	31	23	16	11	(112.7)	5	10	14	20	27
	6.6	7.2	7.8	7.2	7.0	7.2	8.4	8.9	7.8	7.5
	113.3	112.7	112.1	112.7	112.9	112.7	111.5	111.0	112.1	112.4
31	24	18	12	2		5	13	19	23	27
5.1	5.6	6.5	5.6	5.2	5.5	5.7	7.6	6.6	6.2	6.3
114.8	114.3	113.4	114.3	114.7	114.4	114.2	112.3	113.3	113.7	113.6
31	25	17	11		6	13	20	25		
3.9	4.3	5.3	4.4	4.3	4.5	6.4	5.2	4.9		
116.0	115.6	114.6	115.5	115.6	115.4	113.5	114.7	115.0		
33	25	15	9		4	12	20	24		
2.8	2.3	2.6	2.8	2.5	2.7	4.0	2.8	2.8		
117.7	117.6	117.3	117.2	117.4	117.2	115.9	117.1	117.1		
				(117.3)						

75+09 Stake

+65 Gate to Field

73+58 Fence E

70+96 S. end Row Willows & Cotton Wood Trees 30' to 33' off ℄

69+23 ~~2x3~~ 3x2 X 20 Stan. Conc Box Culv. 27' W of ℄

+93.5

68+97 Stake

66+46 Fence W.

+20 Center Gate E to Field 12"x20 ϕ conc Culv. 14' off ℄

60+03 Fence E

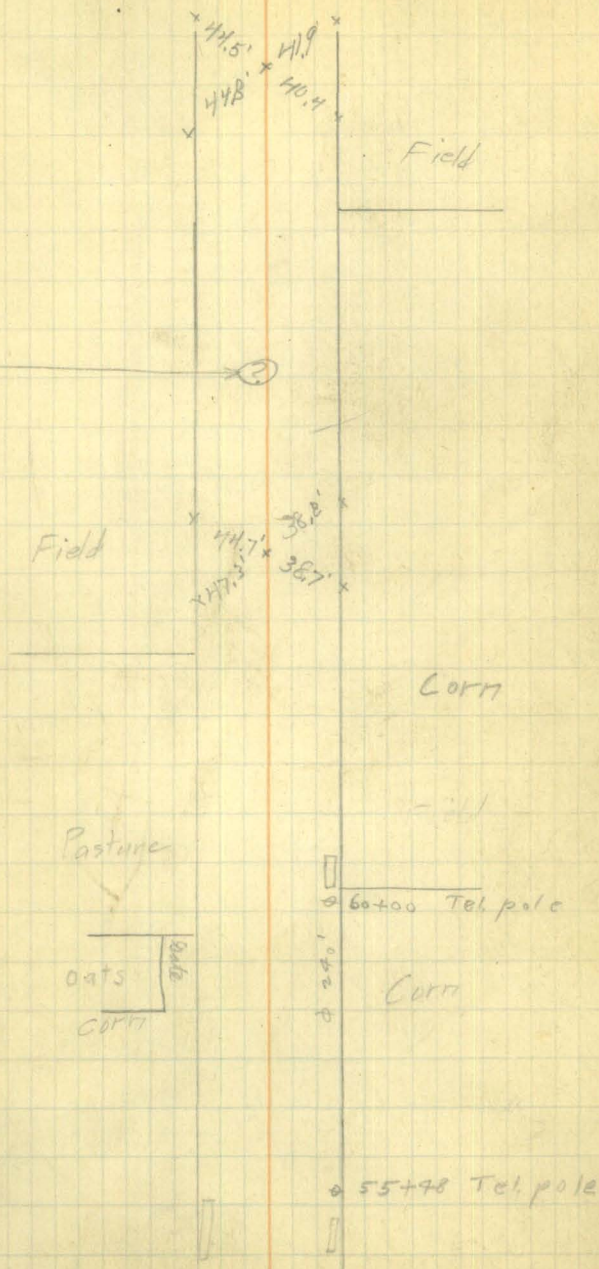
59+93 Fence W.

58+25 Fence W. 90' over

56+76 Fence W

+54 So. End Row Soft Maples 34' off ℄ R.R.

55+ 6 Center Gates E & W. 12"x24" Wood Culv. W
9"x16 " " E



78				
77	3.09	106.83	9.18	103.74
76				
75				
74	5.34	112.92	3.32	107.58
73				
72				
71				
70				
+23	Calc.			108.38
BM#6	2.52	110.90	4.72	108.35 ✓
69				
68				
67		113.07		

33	29	24	18	9		8	14	19	26	32
4.7	6.5	8.0	8.4	5.9	6.0	5.9	7.3	9.2	7.0	5.9
102.1	100.3	98.8	98.4	100.9	100.8	100.9	99.5	97.6	99.8	100.9
31	28	26	20	12	9		9	18	25	28	31
3.0	3.1	4.3	4.8	3.5	3.5	3.8	4.0	5.3	5.0	3.7	3.2
103.8	102.7	102.5	100.0	103.3	103.3	103.0	102.8	101.5	101.8	107.1	103.6
	32		23	16	7	(106.8)	7	17	21	27	31
	0.6		7.3	7.8	7.0	7.0	7.1	8.7	9.0	7.5	5.8
	107.3		105.6	105.1	105.9	105.9	105.8	104.2	103.9	105.4	107.1
34	25	22	15	9		8	18	19	25	31
4.0	4.1	5.9	5.8	4.8	4.7	5.0	7.0	7.8	6.7	4.9
108.9	108.8	107.0	107.1	108.1	108.2	107.9	105.9	105.1	106.2	108.0
32	25	17	10		8	17	24	26	30
4.8	5.1	7.0	5.7	5.9	6.2	7.9	7.3	6.3	6.2
108.3	107.8	105.9	107.2	107.0	106.7	105.0	105.6	106.6	106.7
33	25	19	12	(112.9)	6	17	23	30
3.8	4.8	5.4	4.1	4.4	4.5	5.9	4.9	4.7
107.1	106.1	105.5	106.8	106.5	106.3	105.0	106.0	106.2
33	27	21	14	5		6	18	21	27	29
5.1	5.1	6.0	4.9	4.4	4.7	5.1	6.6	5.8	5.1	5.4
106.8	105.8	104.9	106.0	106.5	106.2	105.8	104.3	105.1	105.8	105.5
33	28	20	13	3		6	17	21	22	30
5.2	5.3	6.5	5.2	4.7	5.1	5.4	7.0	6.5	5.3	5.2
105.7	105.6	104.4	105.7	106.2	105.8	105.5	103.9	104.4	105.6	105.7
33	28	21	14	4		7	15	23	30
5.2	6.4	6.3	5.3	4.8	5.2	5.6	6.7	5.6	5.2
105.7	104.5	104.6	105.6	106.1	105.7	105.3	104.2	105.3	105.2
33	25	13	13	12		8	9	9	19	28
5.8	6.5	6.7	2.5	3.6	3.9	3.7	2.5	6.9	6.4	6.1
105.1	104.4	104.2	108.4	107.3	107.0	107.2	108.4	104.0	104.0	104.8
34	28	22	13	6	(110.9)	5	9	17	25	30
7.8	8.4	8.4	6.6	6.5	6.6	6.7	8.7	7.8	8.5	8.4
105.3	104.7	104.7	106.5	106.6	106.5	106.4	104.4	104.9	104.6	104.7
	34	25	15	7		4	11	15	23	27
	7.2	8.3	7.2	6.8	7.1	7.3	8.9	8.3	7.8	7.9
	105.9	104.8	105.9	106.3	106.0	105.8	104.2	104.8	105.3	105.2
33	27	21	14	5		5	13	17	26	31
6.8	7.4	7.4	6.8	6.4	6.5	6.8	8.4	7.0	6.6	6.7
106.3	105.7	105.7	106.3	106.7	106.6	106.3	104.7	106.1	106.5	106.4

7.54 99.29

79

106.83

32	29	21	20	11	7	9	15	24	30	34
7.0	7.5	9.5	8.8	7.6	7.7	7.9	9.7	9.7	8.7	8.3
99.8	99.3	97.3	98.0	99.2	99.1	98.9	97.1	97.1	98.1	98.6

(106.8)

(see Page 31.)

106+53.7 E. & W. North Fence

+49.7 2 x 2 x 24' Conc. Colr.

106+20.7

105+88.7 E. & W. South Fence

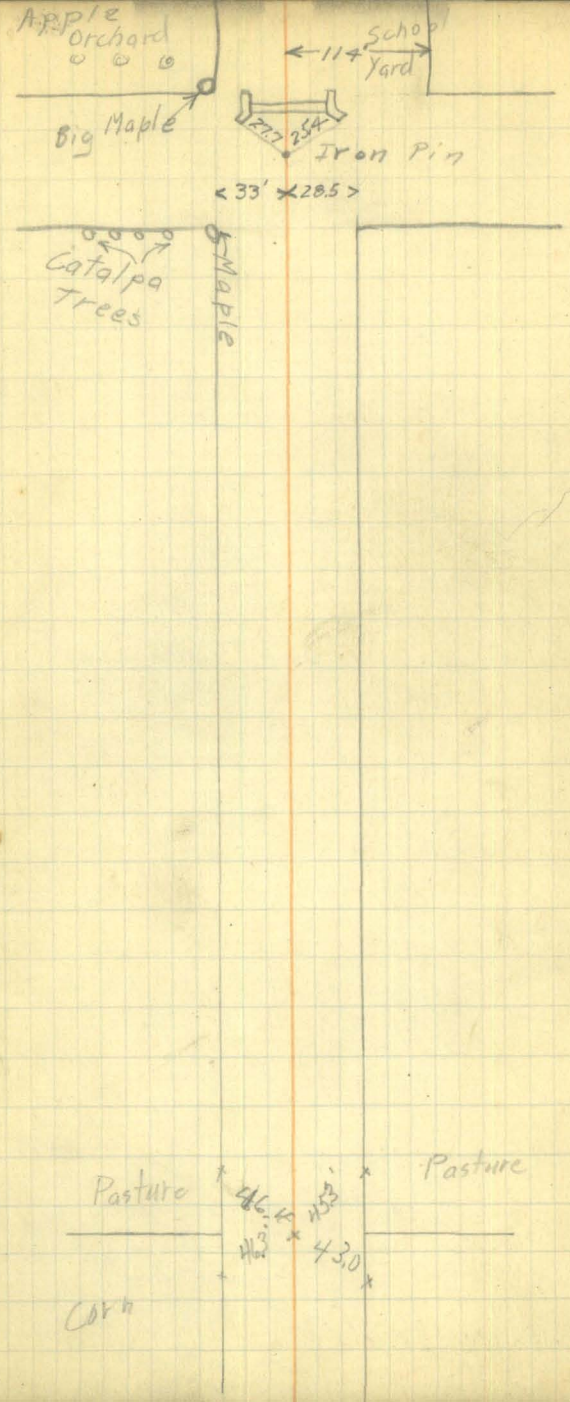
92+97 W. Fence

85+30 N. End 100' Span

84+26 S. End of 100' Span Bridge

79+74 Iron Pin ½ See Stone Fence E. & W. Thru 0°23' R.

75+47 Gate W. to Field



Rerun X-Sections

10+00				
9+00				
8+00				
7+00				
B.M. #1	3.30	119.00	2.62	115.70
6+00				
5+00				
4+00				
	11.70	118.32	0.95	106.62
3+00				
2+00				
1+00				
0+26				
0+00	℄ X Roads. Dunkerton Corner			
B.M. #0	7.57	107.57		100.00

31	25	20	17	11	9		11	16	23	30	32 f
7.2	9.1	10.2	9.4	9.5	9.9	9.4	10.2	9.9	11.2	9.2	9.2
111.8	109.9	108.8	109.6	108.5	109.1	109.6	108.8	109.1	107.8	109.8	109.8

31	28	23	21	10		11	23	29	32
5.6	5.9	6.9	7.5	7.7	7.0	8.0	9.2	7.9	8.0
113.4	113.1	112.1	111.5	111.3	112.0	111.0	99.8	111.1	111.0

30	26	20	13	11		10	21	31
4.6	5.0	6.4	6.6	6.7	5.6	6.5	7.3	6.3
114.4	114.0	112.6	112.4	112.7	113.4	112.5	111.7	112.7

29	20	14	12		9	13	19	27	30
3.8	4.8	4.5	4.9	4.1	5.2	5.1	5.8	6.0	5.1
115.2	114.2	114.5	114.1	114.9	113.8	113.9	113.2	113.0	113.9
				119.0					

29	15	12		9	18	28
3.2	4.2	4.0	3.5	4.4	5.4	4.4
115.1	114.1	114.3	114.8	113.9	112.9	113.9

32	28	24	15	12		8	15	20	27
3.1	3.5	3.8	4.8	4.4	4.1	4.9	5.6	4.6	4.8
115.2	114.8	114.5	113.5	113.9	114.2	113.4	112.7	113.7	113.5

31	29	22	14	8		9	11	20	24	26
4.9	4.9	8.6	7.3	7.6	7.0	7.6	7.5	8.6	7.1	6.8
113.4	113.4	109.7	111.0	110.7	111.3	110.7	110.8	109.7	111.2	111.5
					118.3					

18	11		13	19	23
2.0	1.1	1.0	1.4	1.3	0.5
105.6	106.5	106.6	106.2	106.3	107.1

32	29	19	10	9		9	11	16	20	26
4.4	4.4	5.5	5.1	5.2	4.5	5.3	5.0	6.0	6.3	4.9
103.2	103.2	102.1	102.5	102.4	103.1	102.3	102.6	101.6	101.3	102.7

32	20	14	9	8		7	10	16	25	
8.0	8.5	8.0	7.1	7.4	6.9	7.3	7.2	8.2	8.3	f
99.6	99.1	99.6	100.5	100.2	100.7	100.3	100.4	99.4	99.3	

f	33	23	19	16	12		11	25
	8.5	9.5	8.8	8.3	7.9	8.2	8.8	8.8
	99.1	98.1	98.8	99.3	99.7	99.4	98.8	98.8

500	386	300	200	100	50	14		19	93	185	300	353	400
0.4	7.6	4.0	5.4	6.6	6.7	7.4	8.3	7.8	7.7	8.3	7.4	7.0	8.5
107.2	105.0	103.6	102.2	101.0	100.9	100.2	99.3	99.8	99.9	99.3	100.2	100.6	99.1
						107.6							

	6.95	112.59	3.89	105.64
19				
18				
	5.43	109.53	7.48	104.10
	7.39	111.58	4.42	104.19
17				
16				
15				
14				
13+80	Culv.			
B.M. #2	5.05	108.61	8.48	103.56
13+00				
12+00				
11+00				
	1.62	112.04	8.50	110.42
B.M. #1	3.22	118.92	3.52	115.70
	9.20	119.22	0.88	110.02
B.M. #0	10.90	110.90		100.00

29 22 16 12 9 11 18 23 25 32
4.1 4.9 5.9 5.7 5.2 3.9 5.3 6.6 7.1 6.5 6.2
104 104.6 103.6 103.8 104.3 105.6 104.2 102.9 102.4 103.0 103.3

29 22 13 10 11 20 31
4.6 4.7 6.4 5.6 4.6 6.1 7.0 6.2
104.9 104.8 103.1 103.9 104.9 103.4 102.5 103.3

109.5

21 16 8 4 12 17 21 28 32
4.8 5.9 5.1 4.2 3.9 5.1 6.6 6.7 6.0 5.9
103.8 102.7 103.5 104.7 104.7 103.5 102.0 101.9 102.6 102.7

30 23 20 14 11 8 4 13 17 22 31
4.6 5.1 5.8 6.5 7.0 5.7 4.8 4.3 5.7 6.9 7.4 6.4
104.0 103.5 102.8 102.1 101.6 102.9 103.8 104.3 102.9 101.7 101.2 102.2

25 21 18 8 14 24 31
5.5 6.0 6.7 5.9 5.0 6.1 7.3 6.7
103.1 102.6 101.9 102.7 103.6 102.5 101.3 101.9

30 21 15 3 5 11 23 32
6.1 6.8 7.2 5.2 5.0 4.6 5.2 7.5 7.0
102.5 101.8 101.4 103.4 103.6 104.0 103.4 101.1 101.6

100 34 28 21 3 2 5 10 13 14 27 29 48 75
5.5 6.6 6.5 7.0 8.1 4.9 4.9 4.7 5.0 4.8 8.3 8.0 6.8 7.7 8.0
103.1 102.0 102.1 101.6 100.5 103.7 103.7 103.9 103.6 103.8 100.3 100.6 100.9 100.2
.81 .89 .92
7.2 8.5 9.4
99.4 100.1 99.2

108.6

30 23 16 5 3 10 16 23 31
9.3 9.6 10.1 9.0 8.7 8.4 9.3 10.0 10.3 10.6
102.7 102.4 101.9 103.0 103.3 103.6 102.7 102.0 101.7 101.4

30 26 17 8 5 11 19 29 33
7.0 7.4 8.5 7.8 7.8 7.5 7.9 8.9 8.5 8.7 f
103.0 102.6 101.5 102.2 102.2 104.5 104.1 103.1 103.5 103.3

30 33
3.0 3.7 6.7 5.9 5.6 5.1 5.8 5.5 6.4 7.2 5.1
109.0 108.3 105.3 106.6 106.4 106.9 106.2 106.5 105.6 104.8 106.9

112.0

30				
29				
28				
27				
	6.78	119.27	3.85	112.49
26				
25				
24				
	6.97	116.34	3.22	109.37
23				
22				
21				
20				
19+60	Road	E.		
		112.59		

28	24	19	16	11		8	13	18	24	28
4.3	5.0	6.2	6.0	5.2	4.5	5.5	6.3	6.7	6.2	6.1
115.0	114.3	113.1	113.3	114.1	114.8	113.8	113.0	112.6	113.1	113.2
28	25	21	17	11		8	13	18	23	28
4.5	5.2	7.0	6.8	5.7	4.9	5.9	7.1	7.7	6.7	6.7
114.8	114.1	112.3	112.5	113.6	114.4	113.4	112.2	111.6	112.6	112.6
28	25	22	16	10		9	18	24	28	
5.8	6.6	7.9	7.7	6.4	5.4	6.7	8.6	7.3	7.2	
113.5	112.7	111.4	111.6	112.9	113.9	112.6	110.7	112.0	112.1	
28	25	21	16	10		9	18	23	28	
7.0	7.8	8.8	8.7	7.2	6.4	7.5	9.4	8.4	7.9	
112.3	111.5	110.5	110.6	112.1	112.9 (119.3)	111.8	109.9	110.9	111.4	
28	25	24	17	6		10	15	22	23	27
5.3	5.4	6.4	6.8	5.5	4.4	5.7	7.1	6.9	5.7	5.7
111.0	110.9	109.9	109.5	110.8	111.9	110.6	109.2	109.4	110.6	110.6
27	24	21	14	7		2	11	19	25	26	29
6.6	6.7	7.7	7.6	6.3	5.8	5.5	6.6	7.9	7.8	6.7	6.6
109.7	109.6	108.6	108.7	110.0	110.5	110.8	109.7	108.4	108.5	109.6	109.7
28	19	14	8		12	19	25	28
7.4	7.7	8.3	7.1	6.4	7.3	8.3	7.4	7.3
108.9	108.6	108.0	109.2	109.9 (116.3)	109.0	108.0	108.9	109.0
28	26	17	6		12	22	27	29
4.5	4.6	5.6	4.2	3.5	4.2	5.1	4.1	4.0
108.1	108.0	107.0	108.4	109.1	108.4	107.5	108.5	108.6
31	26	16	12	7		4	13	22	26	29
5.2	5.1	6.4	6.2	5.2	4.5	4.0	5.0	6.2	5.1	5.0
107.4	107.5	106.2	106.4	107.4	108.1	108.6	107.6	106.4	107.5	107.6
27	21	15	7		3	13	22	27	30
6.0	6.0	7.7	6.3	5.5	5.1	6.2	7.5	6.5	6.2
106.6	106.6	104.9	106.3	107.1	107.5	106.4	105.1	106.1	106.4
25	18	13	6		11	20	30
7.6	8.5	8.4	7.3	6.3	7.2	8.8	7.8
105.0	104.1	104.2	105.3	106.3	105.4	105.8	104.8
					10	14	34	40	100
				6.4	7.3	6.8	7.7	8.4	9.1
				106.2 (112.6)	105.3	105.8	104.9	104.2	103.5

41				
B.M. #3	1.90	139.54	1.87	137.64
40+38 ℄ Drive W				
40				
39+25 ℄ Drive E				
39				
	9.53	139.51	1.20	129.98
38				
37				
36				
	10.51	131.18	1.49	120.67
35				
34				
33				
32				
	6.99	122.16	4.10	115.17
31				
		119.27		

33 / 5.1 / 134.4 — f 29 / 5.1 / 134.4 — 14 / 5.7 / 133.8 — 11 / 6.7 / 132.8 — 6.3 / 133.2 — 139.5 — 7 / 6.7 / 132.8 — 12 / 7.2 / 132.3 — 21 / 6.3 / 133.2 — 25 / 6.3 f / 133.2 — 33 / 6.3 / 133.2

100 / 5.4 / 134.1 — 51 / 5.0 / 134.5 — 24 / 5.0 / 134.5 — 10 / 5.2 / 134.3 — 9 / 5.5 / 134.0 — 5.6 / 133.9

27 / 5.5 / 134.0 — 24 / 5.5 / 134.0 — 20 / 6.4 / 133.1 — 17 / 6.2 / 133.3 — 11 / 6.4 / 133.1 — 9 / 6.8 / 132.7 — 6.3 / 133.2 — 9 / 6.2 / 133.3 — 25 / 5.2 / 134.3 — 8.3 / 131.2 — 8.8 / 131.7 — 3.6 / 7.2 / 132.3 — 47 / 6.8 / 132.7

27 / 8.3 / 131.2 — 23 / 9.2 / 130.3 — 19 / 9.9 / 129.6 — 10 / 9.7 / 129.8 — 9.1 / 130.4 — 139.5 — 13 / 9.2 / 130.3 — 17 / 8.9 / 130.6 — 24 / 8.2 / 131.3 — 28 / 7.7 / 131.8

27 / 3.5 / 127.7 — 19 / 3.6 / 127.6 — 11 / 3.9 / 127.3 — 8 / 4.3 / 126.9 — 3.4 / 127.8 — 4 / 3.2 / 128.0 — 16 / 4.1 / 127.1 — 22 / 3.9 / 127.3 — 28 / 2.8 / 128.4

27 / 6.8 / 124.4 — 17 / 6.7 / 124.5 — 9 / 6.8 / 124.4 — 5.8 / 125.4 — 3 / 5.5 / 125.7 — 16 / 6.7 / 124.5 — 24 / 6.3 / 124.9 — 28 / 5.0 / 126.2

27 / 8.7 / 122.5 — 24 / 8.8 / 122.4 — 22 / 9.6 / 121.6 — 15 / 9.6 / 121.6 — 8 / 9.0 / 122.2 — 8.3 / 122.9 — 131.2 — 3 / 7.8 / 123.4 — 15 / 9.2 / 122.0 — 22 / 9.2 / 122.0 — 26 / 8.3 / 122.9 — 27 / 8.1 / 123.1

27 / 2.3 / 119.9 — 22 / 2.3 / 119.9 — 13 / 3.4 / 118.8 — 8 / 2.5 / 119.7 — 1.4 / 120.8 — 13 / 2.2 / 120.0 — 21 / 2.7 / 119.5 — 25 / 1.4 / 120.8 — 29 / 1.0 / 121.2

27 / 4.5 / 117.7 — 22 / 4.6 / 117.6 — 19 / 5.3 / 116.9 — 13 / 5.1 / 117.1 — 7 / 4.4 / 117.8 — 3.5 / 118.7 — 3 / 3.1 / 119.1 — 11 / 4.0 / 118.2 — 20 / 5.3 / 116.9 — 25 / 4.6 / 117.6 — 29 / 3.6 / 118.6

28 / 6.3 / 115.9 — 25 / 6.8 / 115.4 — 19 / 7.1 / 115.1 — 14 / 7.1 / 115.1 — 8 / 5.9 / 116.3 — 5.0 / 117.2 — 2 / 4.7 / 117.5 — 10 / 5.8 / 116.4 — 18 / 7.2 / 115.0 — 26 / 6.9 / 115.3 — 29 / 6.4 / 115.8

28 / 7.1 / 115.1 — 23 / 7.3 / 114.9 — 19 / 8.1 / 114.1 — 14 / 7.9 / 114.3 — 9 / 6.8 / 115.4 — 6.0 / 116.2 — 122.2 — 9 / 7.0 / 115.2 — 16 / 8.6 / 113.6 — 25 / 8.3 / 113.9 — 28 / 8.1 / 114.1

28 / 4.2 / 115.1 — 24 / 4.3 / 115.0 — 20 / 5.7 / 113.6 — 17 / 5.4 / 113.9 — 12 / 4.7 / 114.6 — 4.1 / 115.2 — 8 / 5.1 / 114.2 — 13 / 6.1 / 113.2 — 18 / 6.6 / 112.7 — 22 / 5.8 / 113.5 — 28 / 5.7 / 113.6

119.3

+89 Culv. 18" x 18" x 17'

52

51

50

49

2.85 127.78 8.60 124.93

48

47

46

45

+44 End Culv.

+34 Entrance to Field W.

+24 End Culv.

44

5.01 133.53 11.02 128.52

43

42

139.54

35 28 21 11 10 7 8 21 22 28 34
6.8 7.7 9.3 9.0 6.7 6.5 7.2 10.1 9.8 9.0 8.5 8.7
121.0 120.1 118.5 118.8 121.1 121.3 120.6 117.7 118.0 118.8 118.3 119.1

33 28 21 16 11 11 16 24 27 31 33
5.5 5.5 8.2 8.1 6.9 6.2 7.3 8.1 7.0 f 7.5 7.4 7.8
122.3 122.3 119.6 119.7 120.9 121.6 120.5 119.7 120.8 120.3 120.4 120.0

33 28 24 17 16 14 10 11 16 25 31 32 33
4.4 4.4 4.8 5.8 6.4 5.7 6.3 5.3 6.4 7.0 6.8 6.3 6.2 6.5
123.4 123.4 123.0 122.0 121.4 122.1 121.5 122.5 121.4 120.8 121.8 121.5 121.6 121.3

33 28 21 17 16 13 10 12 17 26 34
3.5 3.5 3.7 4.9 5.5 4.8 5.1 4.3 5.2 5.9 5.2 5.7
124.3 124.3 124.1 122.9 122.3 123.0 122.7 123.5 122.6 121.9 122.6 122.1

33 25 18 17 10 3.3 11 17 25 33
3.3 f 3.5 4.1 5.1 4.3 4.5 5.2 4.6 f 4.8
124.5 123.3 123.7 122.7 123.5 124.5 123.3 122.6 123.2 123.0
127.8

33 27 17 15 9 12 17 26 33
7.6 7.4 8.2 9.1 8.6 7.5 8.7 9.7 9.2 8.9
125.9 126.1 125.3 124.4 124.9 126.0 124.8 123.8 124.3 124.6

33 28 17 15 10 11 16 26 33
5.4 f 5.4 6.5 7.5 6.8 5.7 6.8 7.7 6.5 6.8
128.1 128.1 127.0 126.0 126.7 127.8 126.7 125.8 127.0 126.7

33 28 29 17 11 8 16 24 33
4.5 f 4.5 5.4 6.5 5.6 4.6 5.8 7.0 5.9 f 6.4
129.0 129.0 128.1 127.0 127.9 128.9 127.7 126.5 127.6 127.1

33 27 23 21 15 2 9 11 20 27 29 33
4.0 4.3 5.3 6.3 5.7 4.4 4.7 5.8 6.6 5.4 5.5 5.6 6.0
129.5 129.2 128.2 127.2 127.8 129.1 128.8 127.7 126.9 128.1 128.0 127.9 127.5

Flow Line

6.8
127.5

c 21 16 13 2 4.7
5.0 4.7 5.0 4.4
128.5 128.8 128.5 129.1 128.8
128.2 128.5
127.6

Flow L.

33 28 20 14 3 7 14 25 29 33
4.9 f 4.9 5.4 5.3 4.3 4.8 5.4 6.3 6.2 f 6.7 6.7
128.6 128.6 128.1 128.2 129.2 128.7 128.1 127.2 127.3 126.8 126.8
133.5

33 29 19 13 8 16 25 33
9.1 9.5 11.0 10.3 9.7 10.6 10.8 10.0 10.8
130.4 130.0 128.5 129.2 128.8 128.9 128.7 129.5 128.7

33 29 19 15 13 7 17 25 33
6.7 f 6.9 8.8 8.5 9.8 8.1 8.7 8.3 7.8 f 8.3
132.8 132.6 130.7 131.0 130.7 131.4 130.8 131.2 131.7 131.2
139.5

61				
	3.59	114.40	8.21	110.81
60				
59				
58				
57				
56				
	2.45	119.02	8.34	116.57
	E.&W. Culverts Flow Line N. Ends			
55	Drive W			
	E.&W. Culvs. Flow Lines S. "			
54				
53+36	Ditch Line			
+17.1	℄ X-Road.			
53	Ditch Line			
B.M.#4	4.10	124.91	6.97	120.81
		127.78		

Left — Right

33	31	21	15		8	13	16	19	26	33
3.9	3.4	4.9	4.7	4.0	4.9	5.9	5.0	4.3	4.8	5.0
111.0	111.0	109.5	109.7	110.4	109.5	108.5	109.4	110.1	109.6	109.4
				114.4						

33	30	19	14		8	13	22	26	33	
7.4	7.3	8.8	8.5	7.8	8.8	10.0	8.7	8.5	8.8	
111.6	111.7	110.2	110.5	111.2	110.2	109.0	110.3	110.5	110.2	

33	30	24	17	12		6	12	16	19	25	33
6.6	6.6	7.7	8.0	7.6	7.2	7.9	9.1	8.5	7.9	7.6	7.9
112.4	112.4	111.3	111.0	111.4	111.8	111.1	109.9	110.5	111.1	111.4	111.1

33	29	20	15	11		8	13	16	25		33
5.6	5.5	6.2	6.9	6.4	6.0	7.1	7.9	7.4	6.4	f	6.9
113.4	113.5	112.8	112.1	112.6	113.0	111.9	111.1	111.6	112.6		112.1

33		29	17	10		7	13	15	21	25	31	33
4.3	f	4.2	5.5	4.9	4.4	5.3	6.7	6.2	5.6	5.4	5.4	5.8
114.7		114.8	113.5	114.1	114.6	113.7	112.3	112.8	113.4	113.6	113.6	113.2

33	29	15	9		8	15	16	25	33	
2.8	3.1	4.5	3.7	3.0	3.8	5.3	4.8	3.9	3.6	
116.2	115.9	114.5	115.3	116.0	115.2	114.7	114.2	115.1	115.4	
				119.0						

			8.2			9.1				
			116.7			115.8				
35	29	18	7		8		21	35		
6.5	6.8	7.4	8.0	7.3	7.9		8.2	8.3		
118.4	118.1	117.5	116.9	117.6	117.0		116.7	116.6		
			8.2			9.1				
			116.7			115.8				

34	18	16	7		8	13	16	22	25	33
5.4	5.9	7.0	6.3	5.7	6.3	7.7	7.2	6.5	6.5	6.5
119.5	119.0	117.9	118.6	119.2	118.6	117.2	117.7	118.4	118.4	118.4

34	20		4		17	37	
5.9	5.3	5.0	5.6		7.1	8.2	
119.0	119.6	119.9	119.3		117.8	116.7	

250	200	100	31		24	100	200	300	400	500
00	0.9	3.6	5.0	4.9	5.8	7.4	9.1	10.5	11.6	12.9
124.9	124.0	121.3	119.9	120.0	119.1	117.5	115.8	114.4	113.3	112.5

34	32	23	17		13	24	33	
5.8	5.7	5.8	4.5	4.6	5.5	6.9	7.3	
119.1	119.2	119.1	120.4	120.3	119.4	118.0	117.6	
				124.91				

108.38

B.M. #6			3.69	108.45
68				
67				
66				
	4.49	112.14	6.75	107.65
65				
69				
63				
62				
		114.40		

33	24	16	4		6	13	16	20	28	33
5.6	7.1	6.5	5.6	5.9	7.0	7.9	7.2	6.6	6.7	7.0
106.5	105.0	105.6	106.5	106.2	105.1	104.2	104.9	105.5	105.4	105.1

f 34	26	16	6		5	12	17	27	33
5.8	6.4	5.9	5.0	5.7	6.4	7.3	5.7	5.6	5.7
106.3	105.7	106.2	107.1	106.4	105.7	104.8	106.4	106.5	106.4

33	24	16	107.4		6	14	16	27	33
4.8	5.8	5.2	4.7		5.5	6.5	5.1	5.2	5.3
107.3	106.3	106.9	112.1		106.6	105.6	107.0	106.9	106.8

33	29	26	17	6		5	12	15	26		33
6.2	6.4	7.6	7.0	5.8	6.5	7.0	8.2	7.6	7.4 f		7.7
108.2	108.0	106.8	107.4	108.6	107.9	107.4	106.2	106.8	107.0		106.7

33	32	29	25	23	17	8		6	11	14	16	18	27	33
5.8	5.7	5.7	6.7	7.3	6.7	5.4	5.8	6.2	7.2	8.0	6.9	6.1	5.9	6.2
108.6	108.7	108.7	107.7	107.1	107.7	109.0	108.6	108.2	107.2	106.4	107.5	108.3	108.5	108.2

33	f 31	22	15	6		5	13	16	26	33
5.5	5.4	6.6	6.1	5.0	5.5	5.9	7.4	6.6	6.4	6.6
108.9	109.0	107.8	108.3	109.4	108.9	108.5	107.0	107.8	108.0	107.8

33	31	27	24	14		6	13	17	26	33
4.7	4.7	5.4	5.3	5.5	4.9	5.5	6.7	6.3	5.8	5.9
109.5	109.7	109.0	108.9	108.9	109.5	108.9	107.7	108.1	108.6	108.5
					114.4					

132+75.3 Wood Hub 30' from East Fence Line
30' " West Fence Line

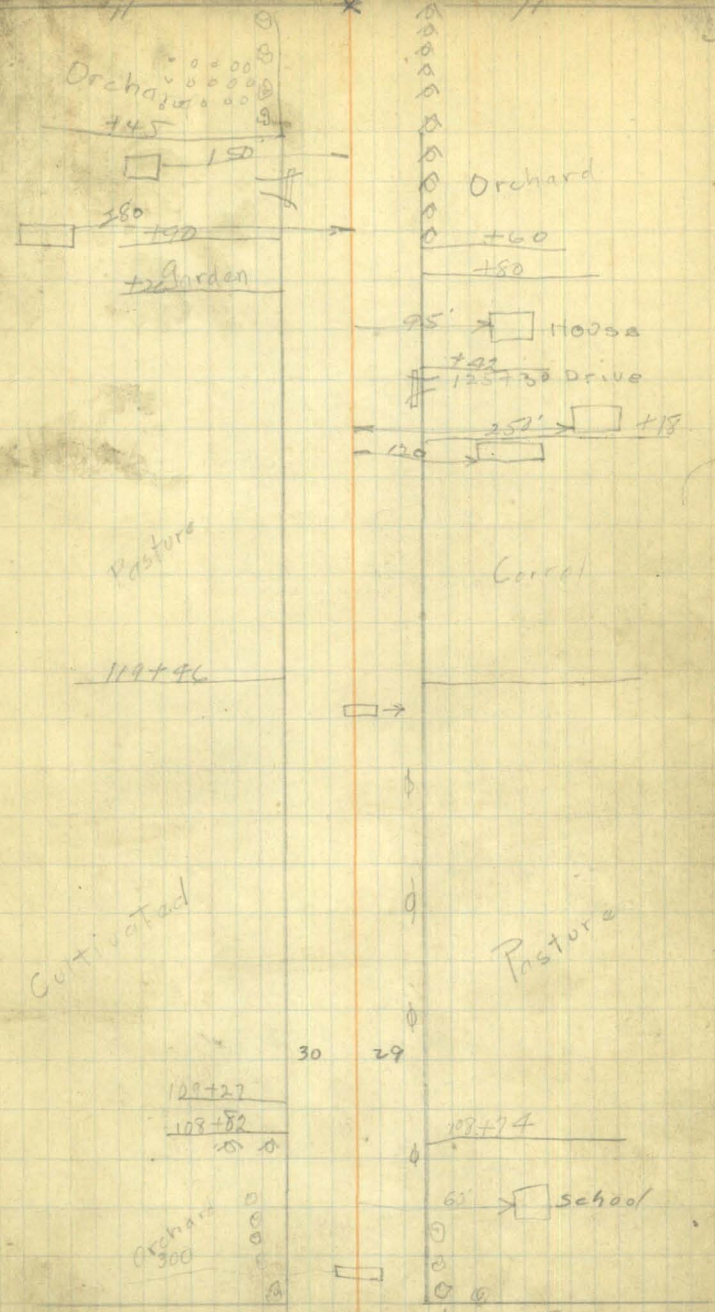
128+55 F West
128+70 House
128+10 ℄ Drive West
127+68 F. East Barn
126+80 F East
126+36 F. West
+70 ∠ Edge of house
+42 F. E
125+30 ℄ of Drive F.
124+15 F.W
123+59 S Edge of Shed

119+46 F. E & W.
119+40 3x3x26

108+25 F.E
+77
108+46 F.W

2x2x26

106+20.7 Iron Pin ∠ 0°30' Left



(See P. 23)

B.M.#A	3.72	106.68		102.96
	6.08	104.52	8.24	98.44
91				
92				
93		105.6		
T.P.	7.06	105.56	6.02	98.50
94				
95				
96				
97				
98		109.0		
T.P.	6.33	109.03	2.86	102.70
99				
100				
101				

Left Rt.

Top S.W. Cor. South Abutment of 100 ft. span High Truss

38 Fence 34 6.1 98.4 29 8.3 96.2 24 8.9 95.6 16 7.0 97.5 6.4 98.1 5 6.6 97.9 12 8.6 95.9 20 7.6 96.9 23 6.2 98.3 26 Tel. 98.3 28 Fen. 98.3

38 Fence 34 6.2 98.3 27 8.1 96.4 22 8.6 95.9 14 6.6 97.9 6.4 98.1 11 6.4 98.1 15 7.9 96.6 20 7.3 97.2 24 6.2 98.3 26 6.4 98.1 28 Fen. 98.1 33 6.5 98.0

36 Fence 94.3 33 7.2 94.3 23 7.8 96.7 12 6.2 98.3 5.8 98.7 11 6.2 98.3 17 7.3 97.2 23 6.5 98.0 27 6.3 98.2 28 Fen. 98.2 33 6.5 98.0

37 Fence 35 6.8 98.8 30 8.2 97.4 21 8.5 97.1 16 7.2 98.4 6.6 99.0 10 7.0 98.6 15 8.2 97.4 22 7.6 98.0 26 7.1 98.5 Tel. 28 7.0 98.6 Fen. 33 7.2 98.4

37 6.3 99.3 28 6.5 99.1 20 7.8 97.8 15 6.1 99.5 5.5 100.1 10 6.0 99.6 15 7.6 98.0 21 6.4 99.2 25 6.1 99.5 26 6.2 99.4 Tel. 27 Fen. 33 6.2 99.4

Fen. 35 4.2 101.4 26 4.7 100.9 19 6.6 99.0 13 4.9 100.7 4.3 101.3 10 5.0 100.6 15 6.8 98.8 26 4.6 101.0 Tel. 27 28 Fen. 33 4.6 101.0

Fen. 34 3.7 101.9 25 4.5 101.1 19 5.7 99.9 15 4.2 101.4 3.4 102.2 11 4.4 101.2 15 5.9 99.7 20 4.6 101.0 22 4.1 101.5 Tel. 27 29 Fen. 33 3.8 101.8

35 3.2 102.4 22 4.5 101.1 21 5.1 100.5 19 5.1 100.5 15 3.4 102.2 3.0 102.6 8 3.6 102.0 13 4.9 100.7 15 4.9 100.7 20 4.0 101.6 26 3.5 102.1 Tel. 27 28 Fen. 33 3.4 102.2

35 6.3 101.1 27 6.9 102.7 19 8.0 101.0 14 6.3 101.1 6.1 102.9 9 6.7 102.3 12 7.8 101.2 14 7.9 101.1 22 6.8 102.2 Tel. 27 29 Fen. 33 6.6 102.4

35 5.8 103.2 Fen. 18 7.3 101.7 14 5.7 103.3 5.4 103.6 10 6.2 102.8 12 7.2 101.8 15 7.2 101.8 20 6.3 102.7 Tel. 28 29 Fen. 33 6.1 102.9

35 4.5 104.5 25 5.0 104.0 21 6.1 102.9 18 6.3 102.7 14 4.7 104.3 4.6 104.4 10 5.4 103.6 13 6.5 102.5 15 6.2 102.8 21 5.4 103.6 28 29 33 5.4 103.6

		109.0		
		109.03		
102				
103		114.6		
T.P.	6.40	114.63	0.80	108.23
104				
105				
106				
B.M. #9			3.20	111.43 ✓ 111.41
106 + 20.7				
B.M. #9	4.48	115.91		111.43
106 + 47	Culv.	2'x2'x24'		
107				
108				
109				
110				
111				
	5.24	120.77	0.35	115.56

Lt. Rt.

Fen. 33 32 27 21 18 14 10 12 14 23 27 29 33
3.1 3.6 3.7 4.8 5.1 3.6 3.3 4.1 5.2 4.9 4.1 4.1
105.9 104.4 105.3 104.2 103.9 105.4 105.7 104.9 103.8 104.1 104.9 104.9

Tel. Fen. 33 30 20 18 13 9 13 15 23 27 29 33
1.1 1.6 3.5 3.6 2.1 1.8 2.5 4.0 3.9 2.9 2.6
107.9 107.4 105.5 105.4 106.9 107.2 106.5 105.0 105.1 104.1 106.4

Tel. Fen. 33 25 19 14 9 13 25 27 29 33
4.1 6.6 7.8 6.1 5.6 6.2 7.8 8.7 5.9 5.9
110.5 108.0 106.8 108.5 109.0 108.4 106.8 105.9 108.7 108.7

Fen. 33 24 19 11 10 14 24 27 29 33
4.1 5.6 7.2 5.7 5.1 5.8 7.2 6.6 5.6
110.5 109.0 107.4 109.2 109.5 108.8 107.4 108.0 109.0

36 24 14 23 28 30 33
5.2 5.3 5.4 6.2 7.3 7.0 7.2 7.3
109.4 109.3 109.2 108.4 107.3 107.6 107.4 107.3

250 200 100 100 200 300 400
0.0 0.6 3.1 5.4 9.1 10.7 11.6 11.5
114.6 114.0 111.5 109.2 105.5 103.9 103.0 103.1

60 30 20 Fl. 12 10 F.L. 17 28 130
5.7 6.7 8.5 8.8 5.8 5.7 6.3 8.8 8.7 8.9 11.2
110.2 109.2 107.4 107.1 110.1 110.2 109.6 107.1 107.2 107.0 104.7

37 20 15 11 20 28
5.2 7.5 6.1 5.9 6.8 8.3 7.2
110.7 108.4 109.8 110.0 109.1 107.6 108.7

33 21 14 13 17 29 33
4.9 6.6 5.4 4.9 5.8 7.4 5.8 5.8
111.0 109.3 110.5 111.0 110.1 108.5 110.1 110.1

31 19 14 12 17 21 28 33
2.9 6.0 4.4 3.5 4.4 6.0 5.1 4.0 4.0
113.0 109.9 111.5 112.4 111.5 109.9 110.8 111.9 111.9

30 19 14 12 17 29 33
1.5 5.1 3.1 2.3 3.2 4.9 3.1 3.1
114.4 110.8 112.8 113.6 112.7 111.0 112.8 112.8

33 30 19 14 12 17 21 28 33
0.6 0.6 3.9 2.1 1.2 2.2 4.0 3.0 2.2 2.2
115.3 115.3 112.0 113.8 114.7 113.7 111.9 112.9 113.7

120.8				
(120.77)				
112				
113				
114				
115				
116				
B.M. #10	4.30	(118.92)	6.15	114.62
117				
118				
119				
B.M. #B.			4.82	114.10
119+40	3x3x26 Culv.			
120				
121				
122				
T.P.	11.52	129.35	1.09	117.83

L.T. Fen.

30 / 5.4 / 115.4	19 / 8.2 / 112.6	14 / 6.5 / 114.3	5.7 / 115.1
33 / 5.0 / 115.8	30 / 5.0 / 115.8	25 / 6.8 / 114.0	20 / 7.5 / 113.3
33 / 4.6 / 116.3	30 / 4.5 / 116.3	19 / 7.2 / 113.6	14 / 5.2 / 115.6
33 / 4.8 / 116.0	32 / 4.8 / 116.0	19 / 7.3 / 113.5	14 / 5.5 / 115.3
	30 / 4.8 / 116.0	19 / 7.4 / 113.4	13 / 5.5 / 115.3
30 / 3.6 / 115.3	23 / 5.7 / 113.9	19 / 6.9 / 112.0	12 / 4.9 / 114.0
	Fen. 30 / 6.2 / 112.7	20 / 8.2 / 110.7	13 / 6.6 / 112.3
33 / 7.1 / 111.8	29 / 7.1 / 111.8	28 / 8.6 / 110.3	24 / 9.2 / 109.7
30 / 9.1 / 109.8	23 / 9.0 / 109.9	Fl. 9.2 / 109.7	12 / 5.5 / 113.4
33 / 7.6 / 111.1	30 / 7.8 / 111.1	22 / 8.1 / 110.8	14 / 6.3 / 112.6
33 / 5.9 / 113.0	25 / 5.9 / 113.0	19 / 7.1 / 111.8	13 / 5.1 / 113.8
33 / 3.4 / 115.5	18 / 3.4 / 115.5	14 / 5.3 / 113.6	12 / 3.4 / 115.5

R.T. Fen.

12 / 6.8 / 114.0	16 / 8.6 / 112.2	20 / 7.9 / 112.9	29 / 6.8 / 114.0	33 / 6.8 / 114.0
10 / 6.1 / 114.7	15 / 7.9 / 112.9	22 / 6.8 / 114.0	29 / 6.1 / 114.7	33 / 6.1 / 114.7
11 / 5.3 / 115.5	16 / 7.1 / 113.7	19 / 6.4 / 114.4	28 / 5.4 / 115.4	33 / 5.4 / 115.4
11 / 5.8 / 115.0	17 / 7.7 / 113.1	20 / 6.9 / 113.9	28 / 6.3 / 114.5	33 / 6.3 / 114.5
12 / 5.7 / 115.1	18 / 7.6 / 113.2	25 / 7.0 / 113.8	29 / 5.6 / 115.2	33 / 5.6 / 115.2
12 / 5.2 / 113.7	18 / 7.3 / 111.6	25 / 6.3 / 112.6	28 / 4.5 / 114.4	33 / 4.5 / 114.4
13 / 6.1 / 112.8	18 / 6.9 / 112.0	29 / 8.4 / 110.5	6.9 / 112.0	33 / 6.9 / 112.9
10 / 6.5 / 112.4	21 / 9.3 / 109.6	27 / 8.3 / 110.6	28 / 8.0 / 110.9	33 / 8.0 / 110.9
12 / 5.2 / 113.7	12 / 5.5 / 113.4	Fl. 9.4 / 109.5	23 / 9.5 / 109.4	50 / 9.5 / 109.4
12 / 6.4 / 112.5	22 / 8.4 / 110.5	29 / 7.9 / 111.0	33 / 7.9 / 111.0	
12 / 5.7 / 113.2	18 / 7.5 / 111.4	30 / 5.7 / 113.2	33	
12 / 3.6 / 115.3	14 / 5.3 / 113.6	32 / 2.5 / 116.4		

129.4

(129.35)

123				
1				
124				
125				
126				
127				
T.P.	8.75	(136.32)	1.78	127.54
128				
129				
130				
131				
132				
B.M.			1.46	134.86

RT.

Fen.

29 / 10.8	18 / 13.9	13 / 11.6	10.5	13 / 12.1	19 / 13.7	29 / 9.9
118.6	116.0	117.8	118.9	118.3	115.7	119.5

33

28 / 7.5	18 / 10.6	12 / 8.5	7.5	13 / 8.2	18 / 10.0	30 / 7.0
119.9	118.8	120.9	121.9	121.2	119.4	122.4
28 / 4.8	17 / 7.5	11 / 5.3	4.8	13 / 5.6	18 / 6.9	30 / 4.3
124.6	121.9	124.1	124.6	123.8	122.5	125.1
33 26 / 2.9	16 / 5.3	11 / 3.6	2.9	14 / 3.3	18 / 4.6	32 / 2.6
126.5	124.1	125.8	126.5	126.1	124.8	126.8
28 / 0.7	17 / 3.6	12 / 1.9	1.3	14 / 1.9	20 / 3.5	30 / 1.1
128.7	125.8	127.5	128.1	127.5	125.9	128.3
27 / 6.5	16 / 8.0	12 / 7.3	6.7	13 / 7.4	19 / 9.0	30 / 6.9
129.8	128.3	129.0	129.6	128.9	127.3	129.4
27 / 4.9	15 / 7.3	11 / 5.9	5.6	14 / 6.5	19 / 8.1	30 / 6.1
131.4	129.0	130.4	130.7	129.8	128.2	130.2
26 / 4.6	15 / 6.6	11 / 5.2	4.6	14 / 5.5	19 / 7.2	30 / 5.4
131.7	129.7	131.1	131.7	130.8	129.1	130.9
33 24 / 3.1	16 / 6.0	12 / 4.4	3.7	12 / 4.6	17 / 6.6	29 / 4.8
133.2	133.2	130.3	131.9	132.6	131.7	129.7	131.5
33 24 / 3.0	17 / 5.4	11 / 3.8	3.1	12 / 3.9	17 / 5.5	28 / 3.9
133.3	133.3	130.9	132.5	133.2	132.4	130.8	132.4

Nail in Tree opp. 132+75 West side

BENCH LEVELS

DEWAR - READLYN ROAD

No.	Correction	to transfer	to Sea Level	Datum = 856.24)	Mch 8 1923 {Lyons, Forrest, Hoff Notes	
BM - 0	9.93	109.93		100.00	Highest pt - S - Boulder NE Cor X Road - Sta 0+20 - BM Dewar Duck	
BM - 1			9.96	99.97	Spikes in root CW tree E of Row Left " 0+30	
T.P.	9.05	118.30	0.68	109.25		
BM - 2	1.97	117.69	2.58	115.12	old #1 Rt. side Hwy 4th Tel Pole N. sta 0	Sta 6+02 Top of hill
T.P.	1.11	112.24	6.56	111.13		
BM - 3	5.39	109.08	8.55	103.69	old #2 - Spk + Wash. 1st tel pole S of Culv Rt. Sta - 12+77	
T.P.	5.27	112.20	2.15	106.93		
BM - 4	8.06	118.59	1.67	110.53	Spike + Washer 1st Tel. Pole Rt S. of 1/4 Sec Cor. Approx Sta 25+18	
T.P.	9.39	125.57	2.41	116.18		
T.P.	10.11	134.90	0.78	124.79		
BM - 5	3.93	137.22	1.61	133.29	Spike + Washer in N. Gate post of Drive Rt Sta 39+41	
T.P.	2.67	130.42	9.47	127.75		
—	—	—	9.50	120.92 (9.31 / 120.71)	old # 4	
BM - 6	1.20	122.55	9.07	121.35	Spike in Root of live CW tree NW Cor of X Road Sta 53+50	
T.P.	1.55	114.94	9.16	113.39		
BM - 7	3.57	112.15	6.36	108.58	old #6 - N.E Cor E Hwall RCB (1st S of 1st HT) Sta 69+30 (102.96)	
T.P.	1.06	106.11	1.10	105.05		
BM - 8	3.67	106.76	3.02	103.09	old A - X Top of W end S. Abut. 100' span P.T. Sta 84+98	
T.P.	5.29	105.62	6.43	100.33		
T.P.	8.67	112.03	2.26	108.36		
BM - 9	8.08	119.62	0.49	111.54	old #9 - N. End W Hwall Culv N of X Roads Sta 106+50	
T.P.	4.47	119.63	4.46	115.16		
BM - 10	9.99	124.15	5.21	114.42	old #B N End E Hwall Conc Culv Sta 119+40	
T.P.	11.15	134.68	0.62	123.53		
BM # 11			0.30	134.38 (86 / 20)	Spike + Washer in Maple Tree - Left of Sta 132+75.3 0.86' below old R.P.	

Check BM. Levels

BM#11	0.30	134.68		134.38
T.P.	1.01	124.54	11.15	123.53
BM-10	5.13	119.56	10.11	114.43
T.P.	5.31	120.47	4.40	115.16
BM-9	0.43	111.95	8.95	111.52
T.P	3.71	107.05	8.61	103.34
T.P.	6.97	107.24	6.78	100.27
BM-8	—	—	4.22	103.02
BM-0	11.62	111.62	—	100.00
" -1	—	—	11.64	99.98
T.P	8.30	119.63	0.29	111.33
BM-2	2.58	118.31	3.90	115.73
T.P	0.16	111.30	7.17	111.14
BM-3	5.49	109.19	7.60	103.70
T.P	5.77	112.69	2.27	106.92
BM-4	4.76	119.29	2.16	110.53
T.P	11.71	127.87	3.13	116.16
T.P.	10.23	134.99	3.11	124.76
BM-5	3.42	136.69	1.72	133.27
T.P	3.69	131.42	8.96	127.73
BM-6	0.65	121.99	10.08	121.34
T.P.	1.08	114.48	8.59	113.40
BM-7	3.58	112.18	5.88	108.60
T.P	0.24	105.31	7.11	105.07
BM-8			2.13	103.18

℄ Profile - Sta 68 to Sta 91

BM #7	3.58	112.17		108.59
68			5.3	106.9
69			5.1	107.1
+23	℄ 3x2 Culv		4.8	107.4
70			5.0	107.2
71			5.6	106.6
72			5.3	106.9
73			4.7	107.5
74			4.3	107.9
75			3.5	108.7
+50			4.3	107.9
76			5.7	106.5
77			8.4	103.4
T.P.	0.90	106.19	6.88	105.29
78			5.0	101.2
79			6.7	99.5
80			7.2	99.0
81			7.7	98.5
82			7.2	99.0
83			6.5	99.7
84			4.0	101.8
BM ℄ 8	3.39	106.51	3.07	103.12
+26	5 End H.T.		3.3	103.2
85			3.5	103.0
85 5b. Crane Cr. Lt			13.2	93.3
+26			3.4	103.1

106.51

86		4.1	102.4
87		5.0	101.5
88		5.3	101.2
89		4.3	102.2
+30 5b old Channel Lt	1.0 H₂O	12.9	93.6
90		5.7	100.8
91		6.5	100.0
92		6.1	100.4
93		6.5	100.0
94		6.6	99.9

P.I. Sta. 159 + 22.85 Δ = 0° - 10' Left

Ditch Left 157+80

146+27.7 3x2 x 18 Conc Culv Bad Condition

141+55 Board F Lt.

+79 S Line Com Cr 250' Lt

139+71 ℄ Gate 12" x 20' Corr 15' Lt

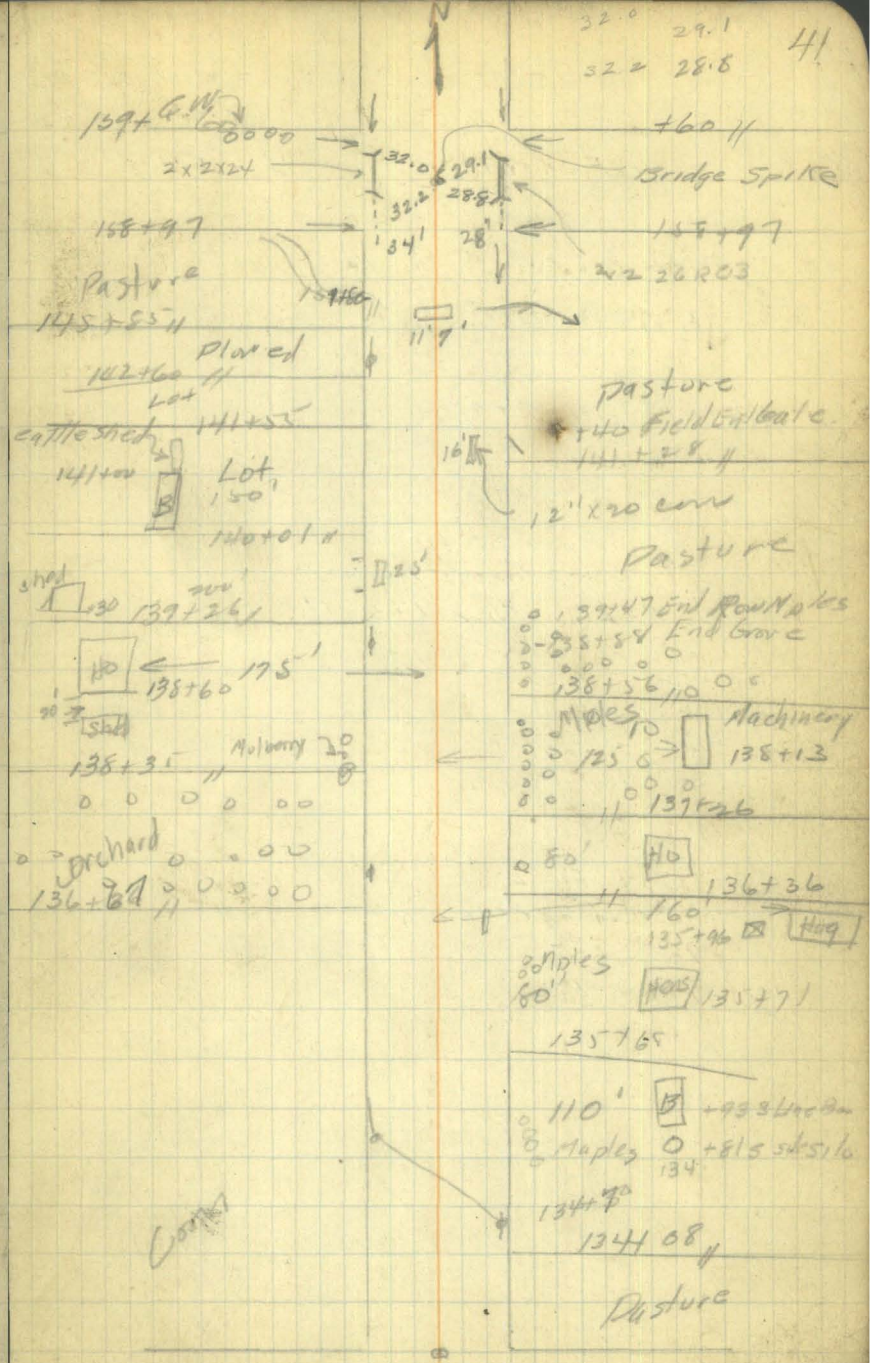
+67 F Lt

+53 S Line Rt 80'

+36 F Rt

136+25 Drive Rt 12" x 20' Corr 15' Rt of ℄

℄ 132+15.3 1/4 Sec Cor F Rt L Δ = 0°.5' Left



P.I. Sta 185+98.5 D=0°04' Left

Fence Rt + Lt - End F Rt

P.O.T. Sta 175+98

~~P 175+98~~

+80 S Line to Rt 90'

+130 S of 2 Rows Evergreen trees Rt

+44 S Line Shed 175' Rt

+87 ℄ Drive Rt No Culv

+22 Fence SE

174+14 ℄ W Mill

173+76 S Line Concrete

172+95 S Line Barn

171+80 B. end Row Apples Rt

+38 Fence Lt

164+16 ½ Row Evergreens Lt + Tel Pole

+98 S Line Machine Shed

163+27 S Line to Lt

+90 ℄ Gate Drive + 12'x16' Concrete

+83 ℄ Wind Mill

+70 Bd. Fence W

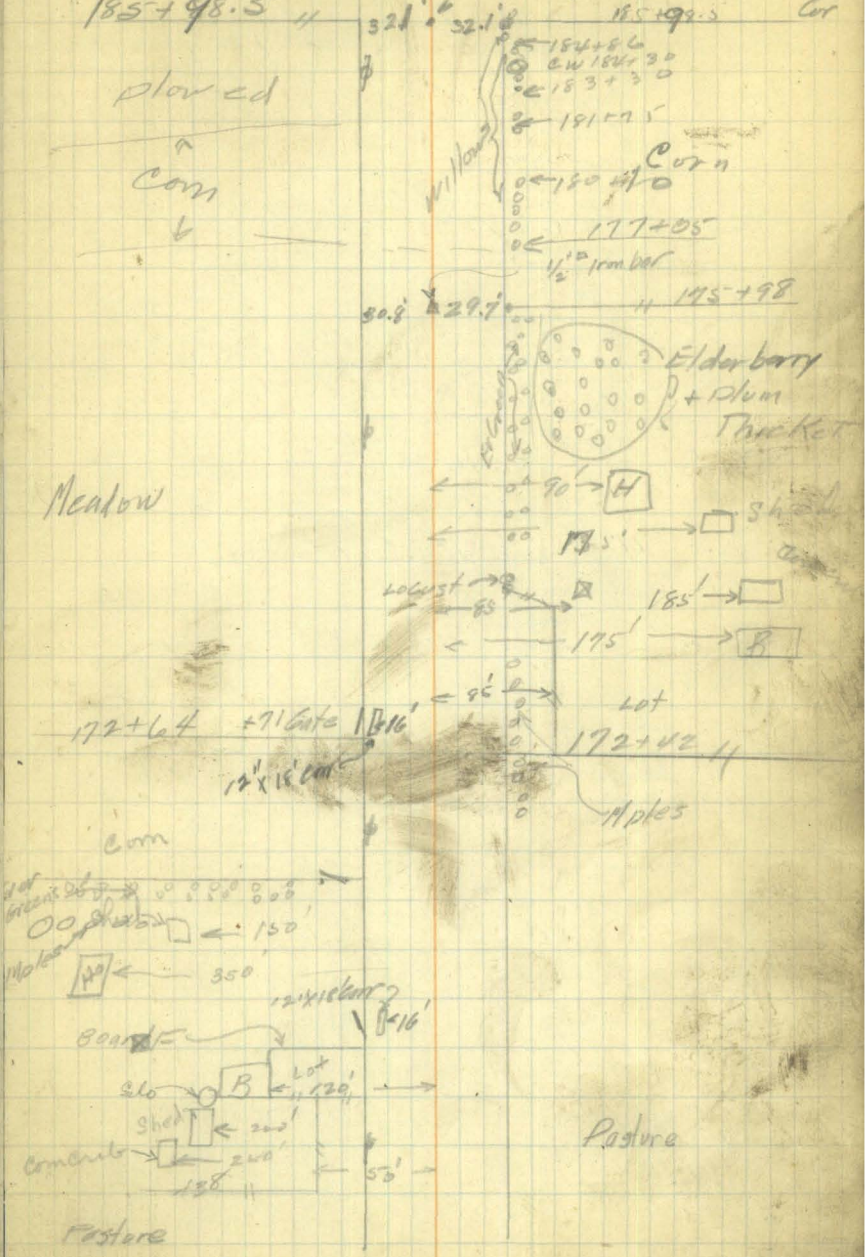
162+02 F Lt. S Line Barn + ℄ of Silo

+39 Bd Fence Feed Rack + S Line Hogs

161+09 S Line Corn Crib Tel Poles

160+38 Fence Lt.

185+98.5



211+96 N End Hitch Shed Lt
+51 F Lt + S Line Hitch shed
210+3 ℄ Gate + Board walk to Ch Lt
+90 S Line Ch Lt
+64 S Line shed Lt
+67 S Line Mchine shed Rt
+56 S Line Chicken Ho Rt
+27 N. Line Barn Rt

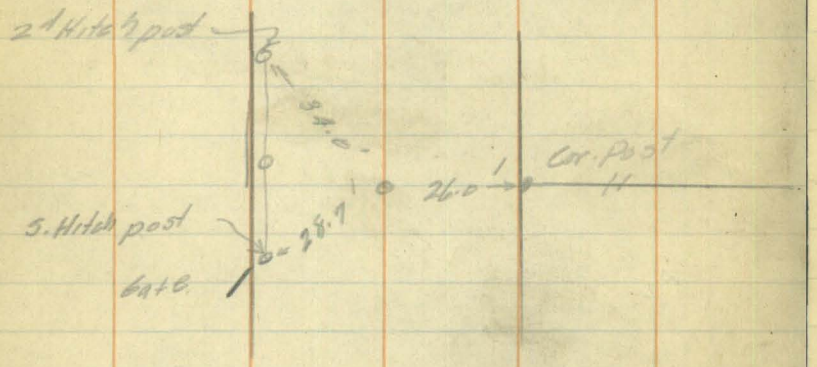
P.I. 212+62.4
Δ = 0°27' R

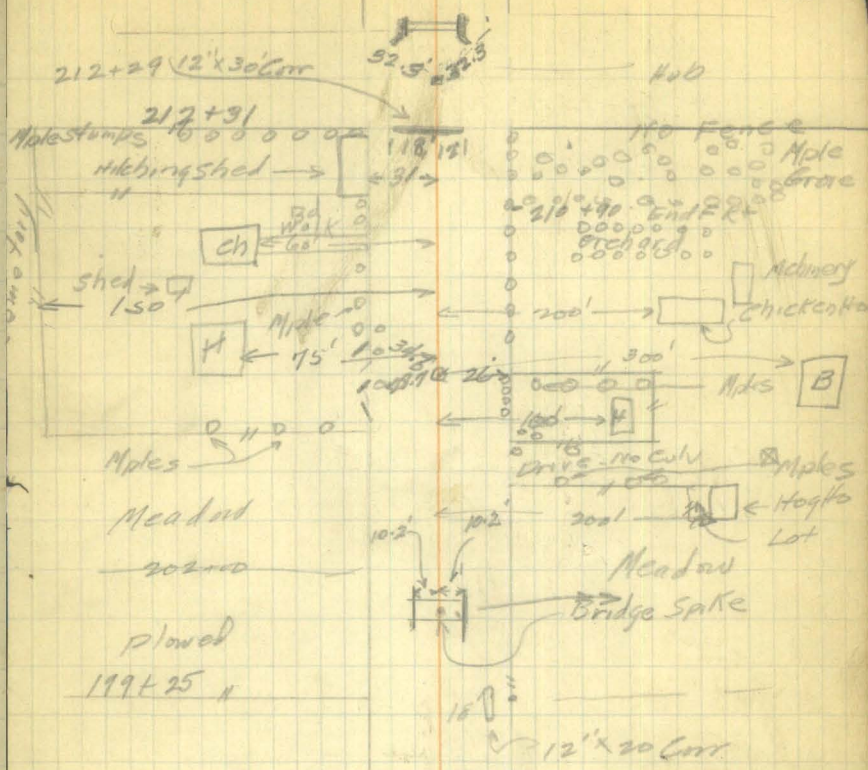
POT 209+14.8 - Spike
+4 S End Hitch rack Lt
209+9 E Small Gate to Ho Lt
+69 S Line Ho Lt
+71 Double Gate Lt
+56 S Line Ho Rt
+43 F Lt
+32 F Rt
+17 ℄ Drive Rt No culv - W Wall
208+05 F Rt
207+71 S Line Hog Ho Rt

P.I. 200+41.3 Δ = 0°10' Rt 4'x3'x20.4' RCB

199+25 F Lt. Begin Fence Rt + ℄ 12'x20' Corr 18' Rt

Rd to POT Sta 209+14.8





+27 F Rt
+22 F Lt.
239+18 ℄ Gate Rt No Culv. F & W Ew

237 +53.8 P.I. Δ = 0°-15' Left.

+26 F Rt
233+14 ~~22~~ x 16' Plank Br 20' Rt
232+26 F Left
231+09 Gate + Field Line Rt No Culv

219+40 End Row Maples Lt

+96 F Lt
+515 Line Coalshed Lt
213 +195 Line of School Lt
213+01 F. Rt
210+95 2x2x30 RCB

261+92 D1 Co Line End of Rec S

261+62 F Rt + Lt

261+40 Mple 35' Rt

+50 F Rt

258 +395 2x2x26 RCB

257+69 F Rt

249+85 F Lt

248+14 F Lt + S Line Barn 100' Lt

+43 ℄ Gate Lt + S Line Shed 175' Lt

+34 F Lt

+19 ℄ Drive Lt No Culv S Line Wn 100' Lt

247+00 Tel Line Lt starts

+85 S Line Corner Rib 30' Lt + Barn 250' Lt

+71 N End Rod Moles Lt

246+33 F Lt

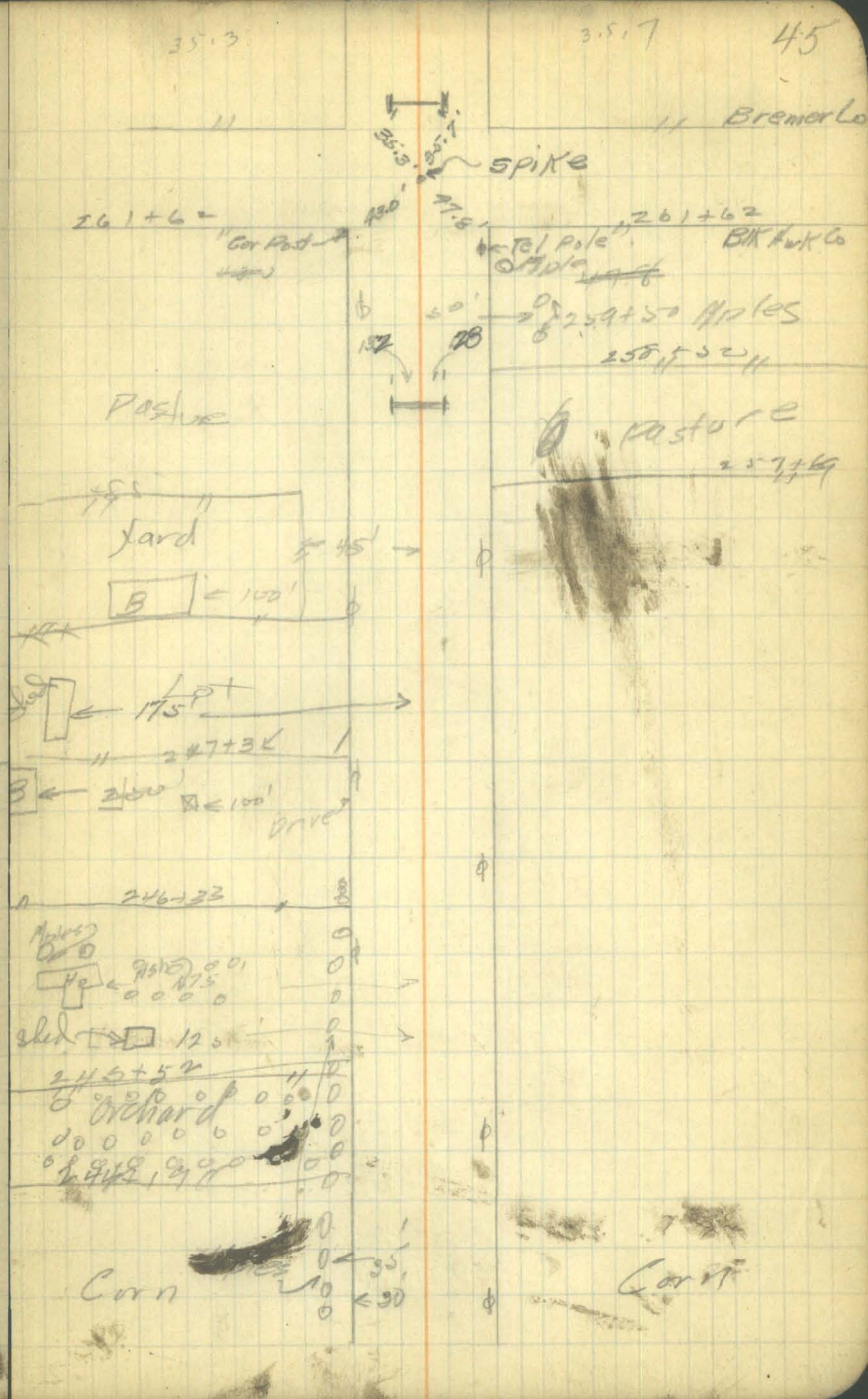
+70 S Line Ho 175' Lt

+57 SW Shed 125' Lt

245+52 F Lt

244+19 F Lt

240+75 - S End Rod Mples Lt



CENTER-LINE PROFILE NOTES

Sta.	+	H.I.	℄ Profile	Elev.
BM #11	3.33	137.77		134.44
133			4.2	133.6
134			4.8	133.0
135			4.9	132.9
136			4.7	133.1
137			4.7	133.1
138			5.4	132.4
139			6.2	131.6
140			6.6	131.2
T.P.	2.64	133.96	6.45	131.32
141			3.5	130.5
142			4.2	129.8
143			4.4	129.6
144			5.0	129.0
145			5.9	128.1
146			6.2	127.8
+27.7	℄ Cult.		6.2	127.8
147			6.3	127.7
BM #12	High-point on big rock left in pasture Sta. 146+58 5.88	135.17	4.67	129.29
148			7.1	128.1
149			6.3	128.9
150			5.4	129.8
151			4.8	130.4
152			3.5	131.7
153			2.5	132.7

Sta.	+	H.I.	℄ Profile −	Elev.
T.P.	9.60	141.96	2.81	132.36
154			8.0	134.0
155			6.8	135.2
156			5.5	136.5
157			4.5	137.5
158			3.6	138.4
159			2.7	139.3
+28.85	P.I. X-Rds. X on E end N Hdwy. R.C.B. Rt. at cross roads Sta.		2.5	139.5
BM #13	1.24	141.96	1.24	140.72
	3.03	135.39	9.60	132.36
BM #12	4.87	134.18	6.08	129.31
	6.50	137.86	2.82	131.36 134.74
BM #11.			3.36	134.50

BM 13	4.89	145.58		140.69
160			6.2	139.4
161			5.8	139.8
162			5.1	140.5
163			4.7	140.9
164			3.8	141.8
165			3.1	142.5
166			2.6	143.0
167			2.3	143.3
T.P.	9.77	152.01	3.34	142.24
168			8.0	144.0
169			7.3	144.7
170			6.4	145.6
171			5.4	146.6
172			4.0	148.0
173			3.1	148.9
174			2.3	149.7
175			1.9	150.1
	Spike in Tel. Pole Rt 34 175+10			
BM 14	2.47	153.40	1.08	150.93
176			3.0	150.4
177			3.6	149.8
178			4.6	148.8
179			5.6	147.8
180			6.3	147.1
181			6.8	146.6

153.40

182			6.5	146.9
183			6.5	146.9
T.P.	5.73	151.87	7.26	146.14
184			5.3	146.6
185			5.4	146.5
186			5.4	146.5
187			5.0	146.9
188			4.5	147.4
189			4.1	147.8
190			4.9	147.0
191			5.6	146.3
T.P.	1.24	147.46	5.65	146.22
192			2.0	145.5
193			2.8	144.7
194			3.8	143.7
195			5.0	142.5
196			5.8	141.7
197			7.2	140.3
198			8.7	138.8
199			9.7	137.8
200			9.9	137.6
+ 41.3			9.9	137.6
	N. End W. Hwall 4x3 R Co Sh 200+41			
BM + 15	9.47	149.24	7.69	139.77
201			11.8	137.4
202			11.1	138.1

		149.24			
203			10.0	139.2	BM #16 154.75
204			7.8	141.4	
205			4.9	144.3	
206			2.2	147.0	
T.P.	12.07	160.05	1.26	147.98	
207			10.1	150.1	
208			6.7	153.4	
209			2.9	157.2	
210			3.8	156.3	
211			6.0	154.1	
212			6.7	153.4	
+29			6.2	153.9	
P.I. +624			6.2	153.9	
BM # 16			5.30	154.75	

Chk. BM.s.

BM # 16	5.30	160.05		154.75
T.P.	0.86	148.84	12.07	147.98
BM # 15	7.68	147.46	9.06	139.78
T.P	5.00	151.25	1.21	146.25
T.P	7.15	153.34	5.06	146.19
BM # 14	2.15	153.11	2.38	150.96
T.P	3.78	146.00	10.89	142.22
BM # 13			5.34	140.66

BM #16	3.54	158.30		154.76
213			4.2	154.1
214			5.2	153.1
215			5.3	153.0
216			5.3	153.0
217			5.2	153.1
218			4.9	153.4
219			4.4	153.9
220			4.2	154.1
221			4.1	154.2
222			4.0	154.3
223			3.9	154.4
T.P.	10.23	163.93	4.60	153.70
224			8.9	155.0
225			8.5	155.4
226			7.9	156.0
227			7.2	156.7
228			6.4	157.5
229			5.4	158.4
230			4.3	159.6
231			4.4	159.5
232			5.3	158.6
233			5.7	158.2
234			6.2	157.7
235			6.5	157.4

		163.93			
236			6.8	157.1	
237			7.0	156.9	
+53.8			6.9	157.0	
BM #17	5.68	164.30	5.31	158.62	× N. End. W. Hd. wall R.C.B 237+53.8
238			7.1	157.2	
239			7.1	157.2	
240			7.1	157.2	
241			6.6	157.7	
242			5.5	158.8	
243			4.3	160.0	
244			3.0	161.3	
245			1.6	162.7	
246			0.9	163.4	
247			0.7	163.6	
T.P. BM #18	3.71	167.26	0.75	163.55	Nail. Tel. Pole Sta 247+00 Left.
248			4.0	163.3	
249			4.3	163.0	
250			4.7	162.6	
251			4.9	162.4	
252			5.2	162.1	
253			5.2	162.1	
254			5.5	161.8	
255			5.7	161.5	

		167.26			
256			6.0	161.3	
257			6.0	161.3	
258			5.7	161.6	
+39.5			5.7	161.6	
BM #19			5.23	162.03	× S Cor. W. Hd. wall R.C.B Sta 258+39.5
259			6.0	161.3	
260			6.0	161.3	
261			5.5	161.8	
P.I. +92			5.2	162.1	
262+30			4.8	162.5	
263+30			5.3	162.0	
264+30			4.3	163.0	

South end of Dewar-Readlyn Road

Dunkerton Corner.

$\Delta = 89°24'$

$R = 150.8$

$D = 38°$

$Tan = 149.22$

$Ext. = 61.35$

$L = 235.26$

P.T.	2+35.26	44° 42'
	2+00	38°- 0'
	1+50	28°-30'
	1+00	19°-00'
	0+50	9°-30'
P.C. = 0+00		

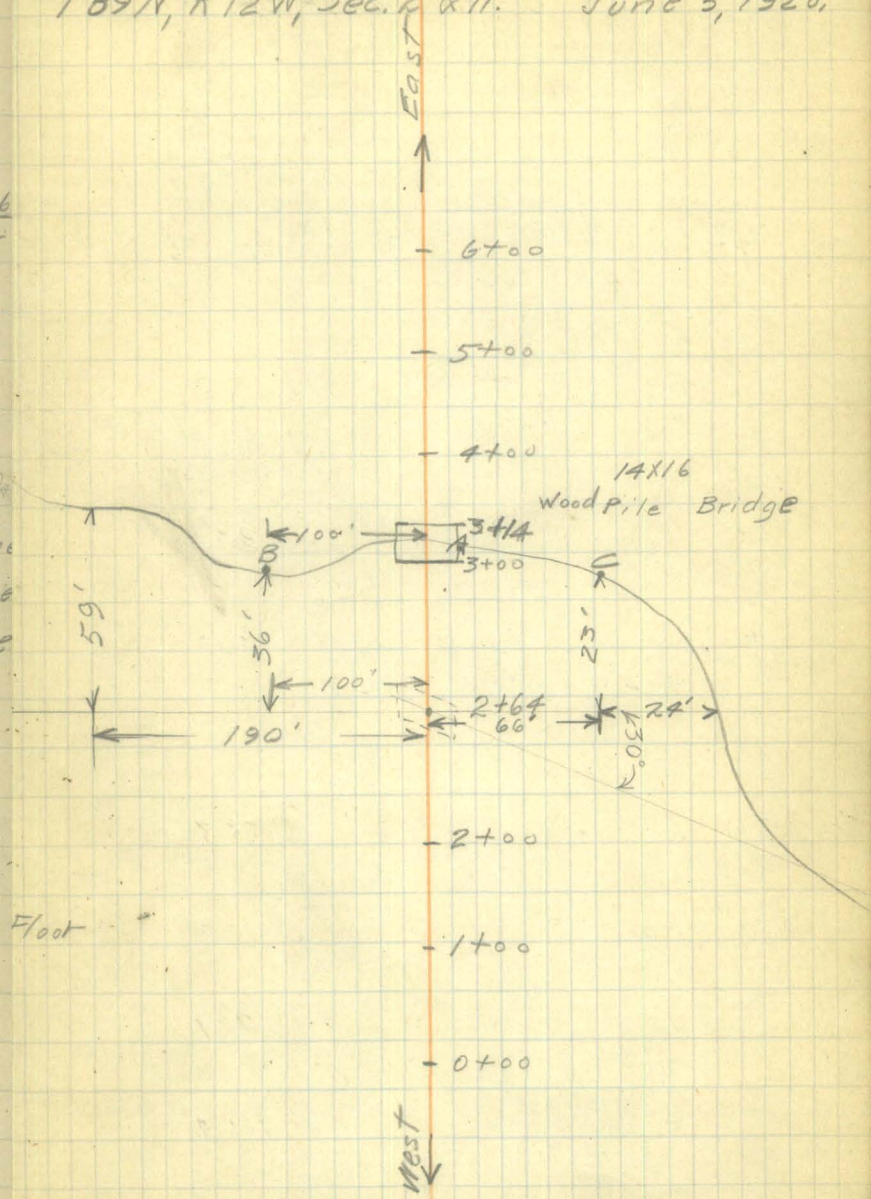
Staked
Apr. 9, 1925
Spencer
Tarbell
Bunn.

Bridge 1¼ miles N. of Dewar (Poyner Twp.)

Dewar - Dunkerton Road T89N, R12W, Sec. 2 & 11. June 5, 1920.

	℄							
2+64	97.4 / 7.4 / 24	95.3 / 9.5 / 20	98.8 / 6.0 / 13	98.8 / 6.0	98.8 / 6.0 / 5	97.9 / 6.9 / 8	95.0 / 9.8 / 18	98.1 / 6.7 / 29	96.6 / 8.2 / 36

C	11.6	93.2	Flow Line
B	11.5	93.3	Flow Line
A	13.4	91.4	Flow Line
High Water	8.3	96.5	
6	5.1	99.7	
5	6.0	98.8	
4	6.1	98.7	
3	4.6	100.2	Bridge Floor
+64	6.0	98.8	
2	5.7	99.1	
1	5.0	99.8	
0	3.4	101.4	
B.M.	4.78	104.78	100.00



S-W. Cor. West Railing of Conc. Culvert about 150' west of Wooden Bridge.

BENCH MARK ADJUSTMENT SHEET

B.M. No.	1st Diff	2d Diff	Corr. Diff.	Corr. Elev.
0				100.00
	-0.03	-0.02	-0.02	
1				99.98
	+15.75	+15.75	+15.75	
2				115.73
	-12.03	-12.03	-12.03	
3				103.70
	+6.84	+6.83	+6.84	
4				110.54
	+22.76	+22.74	+22.75	
5				133.29
	-11.94	-11.93	-11.94	
6				121.35
	-12.77	-12.74	-12.75	
7				108.60
	-5.49	-5.47	-5.48	
8				103.12
	+8.45	+8.50	+8.47	
9				111.59
	+2.88	+2.91	+2.90	
10				114.49
	+19.96	+19.95	+19.95	
11				134.44
	-5.15	-5.19	-5.17	
12				129.27

DEWAR - READLYN ROAD DIST NO 4

Description		Sta
Highest pt S. Boulder N.E Cor of X Road	Rt	0+20
Spikes 10 E of Row C.W. trees	Lt	0+30
Spike + Washer in 4th Tel Pole N. of 0+00 on	Rt	6+02
Spike + Washer in 1st " " S of Culv.	Rt	12+77
Spike + Washer in 1st " " S of ¼ Sec Cor	Rt	25+18
Bent Spike + Washer in N. Gate post of Drive	Rt	39+44
Spike in Root of lone C.W. tree N.W. Cor of X-Road		53+56
X in N.E. cor E Headwall 3x2 RCB		69+30
X in Top of W. end S. Abut. 100' span H.T.		84+26
X in N end of W Headwall Conc Culv		106+50
X in N end of E Headwall Conc Culv		119+40
Spike in Maple tree - 2d from N end of Row		132+75
High pt Large rock in pasture 100' Left		146+50

BM ADJUSTMENT SHEET

BM No.	1st Diff	2d Diff	Corrected Diff	Corrected Elev
12				129.27
	+11.43	+11.41	+11.42	
13				140.69
	+10.24	+10.30	+10.27	
14				150.96
	-11.16	-11.18	-11.17	
15				139.79
	+14.98	+14.97	+14.97	
16				154.76
	+3.86		+3.86	
17				158.62
	+4.93		+4.93	
18				163.55
	-1.52		-1.52	
19				162.03

Description	Sta
High point Largerock in pasture 100' Left	146+50
X on E. end N. Hdwall 2x2x26 RCB at X-Road Rt	159+21
Spike in Tel. Pole Rt. Sta. 175+10	
x on N end W Hd. Wall 4x3x21 R.C.B.	200+41
x on N end W. Hd. Wall Culv N of x Rd.	213+00
x on N end W Hd Wall R.C.B Sta.	237+53.8
Nail Tel. Pole at Left Sta.	247+00
x Scor. W. Hd Wall R.C.R. Sta.	258+395.

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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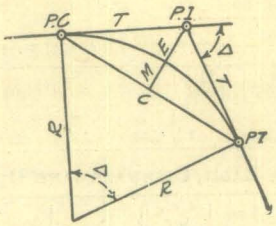


CURVE FORMULAS

Radius$=R=\frac{50}{\sin. D/2}$ (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)$=R\text{xsec}\frac{\Delta}{2}$ (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. $\Delta=62°\ 10'$ $D=8°\ 20'$. From Table IV for 1° curve T=3454.1 and ÷8⅓=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 $(54.50\div100)^2$=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2\div(2\times688.26)$=2.16 ft.

Deflections.—Deflection angle=½ D for 100 ft., ¼ D for 50 ft., etc. For c ft.=(in minutes) .3 x C x D° or=defl. for 1 ft. from Table III x C. For Sta. 158 of above curve=.3 x 54.5 x 8⅓=136.2′ or 2° 16.2′, or=2.50 x 54.5=136.2′ from Table III. For Sta. 159 deflection angle=2° 16.2′ +8° 20′ ÷2=6° 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° 20′=960.6÷8⅓=115.27 and from Table V correction=.10 or E=115.37 Or suppose Δ=32° and E is measured and found to be 42 ft. What is D? From Table IV E=230.9 and ÷42=5.5 or D=5° 30′.

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	⅛	3–16	¼	5–16	⅜	½	⅝	¾	⅞
.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.—Radii, 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	20	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	5808.2	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	.70	.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	4.55	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	.029	.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	.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	.711	.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	1.32	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	.985	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.

D	FOR SUB-CHORDS ADD 10	20	30	40	50	60	70	80	90	Excess of arc per 100 ft.	D	LONG CHORDS 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 32	30	28	26	24	22	20	Deg. of Curve	LENGTH OF RAILS. 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	.037	.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	.222	.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° 20′ from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286× 2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$

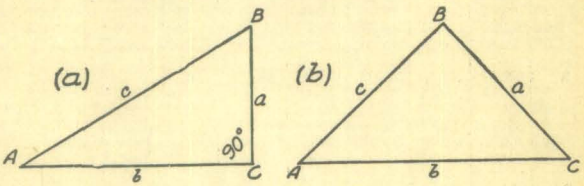
cos. $A=\frac{b}{c}$

tan. $A=\frac{a}{b}$

cot. $A=\frac{b}{a}$

sec. $A=\frac{c}{b}$

cosec. $A=\frac{c}{a}$



Formula for Solving Triangles.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $c=c \cos. A$
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	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{bc}}$; $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{bc}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$; $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)}}{bc}$
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	8	.1392	.1405	7.115	.99027	82
10	.0029	.0029	343.8	1	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	4.574	.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
					82						74
	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	2.669	.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
					66						58
	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.	
°						°					
32	.5299	.6249	1.600	.84805	**58**	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	**39**	.6293	.8098	1.235	.77715	**51**
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	**57**	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
40	.5544	.6661	1.501	.83228	20	**40**	.6428	.8391	1.192	.76604	**50**
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	**56**	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
40	.5688	.6916	1.446	.82248	20	**41**	.6561	.8693	1.150	.75471	**49**
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	**55**	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
40	.5831	.7177	1.393	.81242	20	**42**	.6691	.9004	1.111	.74314	**48**
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	**54**	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
40	.5972	.7445	1.343	.80212	20	**43**	.6820	.9325	1.072	.73135	**47**
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	**53**	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
40	.6111	.7720	1.295	.79158	20	**44**	.6947	.9657	1.036	.71934	**46**
50	.6134	.7766	1.288	.78980	10	10	.6967	.6713	1.030	.71732	50
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	**52**	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	**45**
											°
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

Table IX.—Calculation of Earthwork.

Width	HEIGHT														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.33
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if w =16.2 and h =5.3, cu. yds. =1.48+.028+.089 =1.597 cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one half and multiply result by 2, if both w and h are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills) =h, and ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

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 Sino)] is the Vertical Distance.

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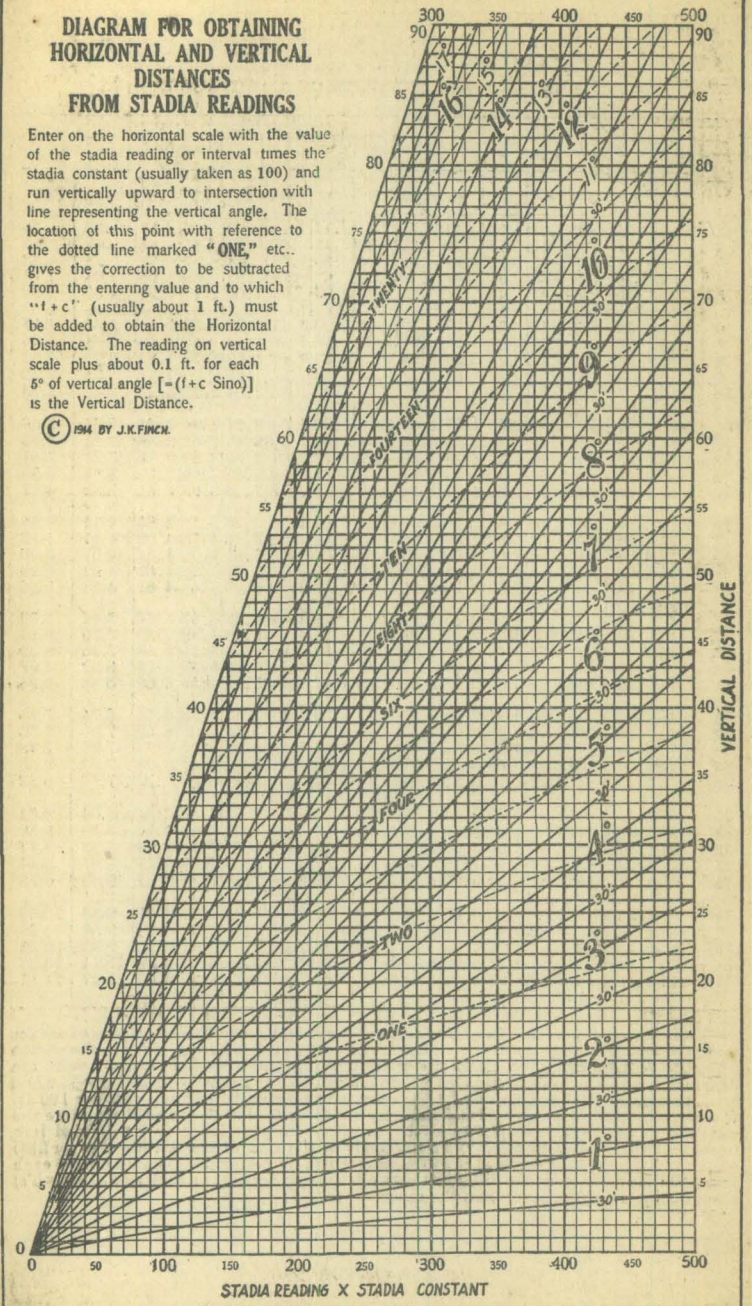
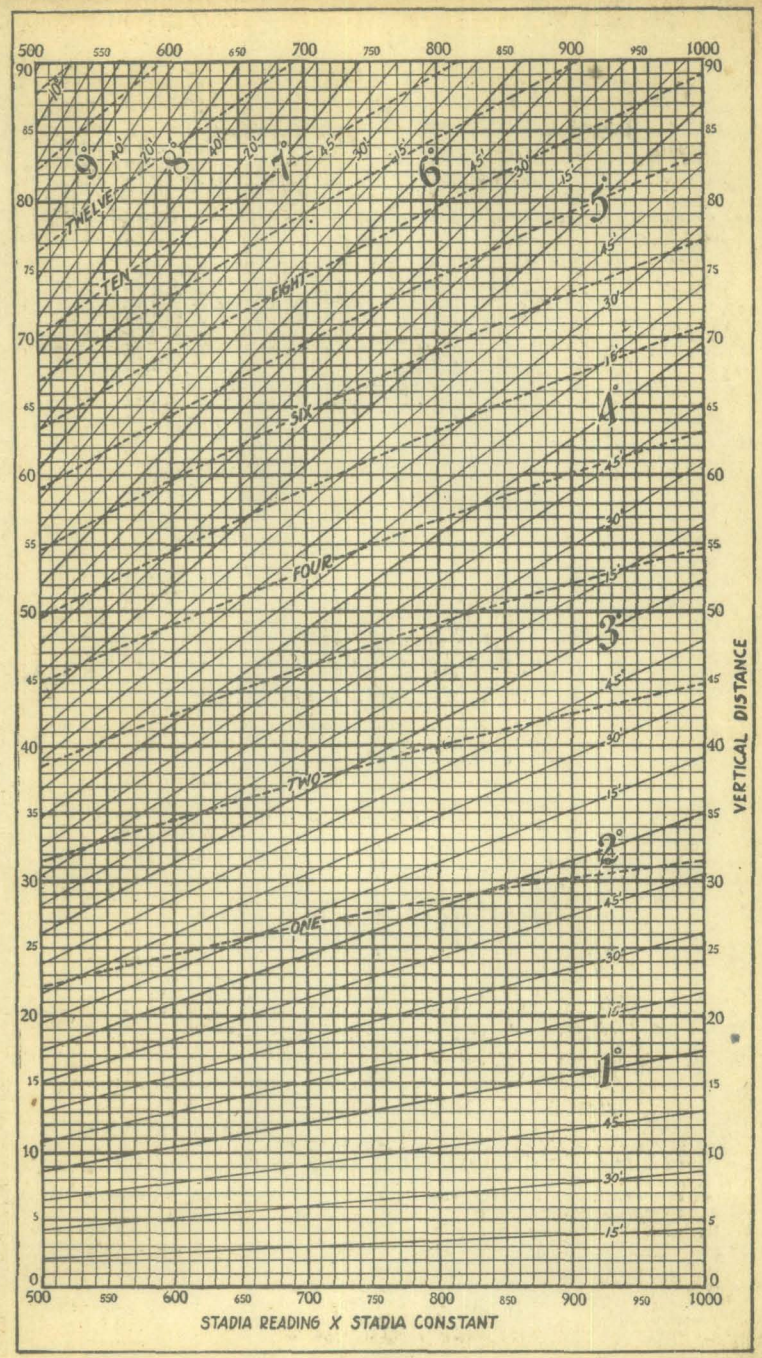
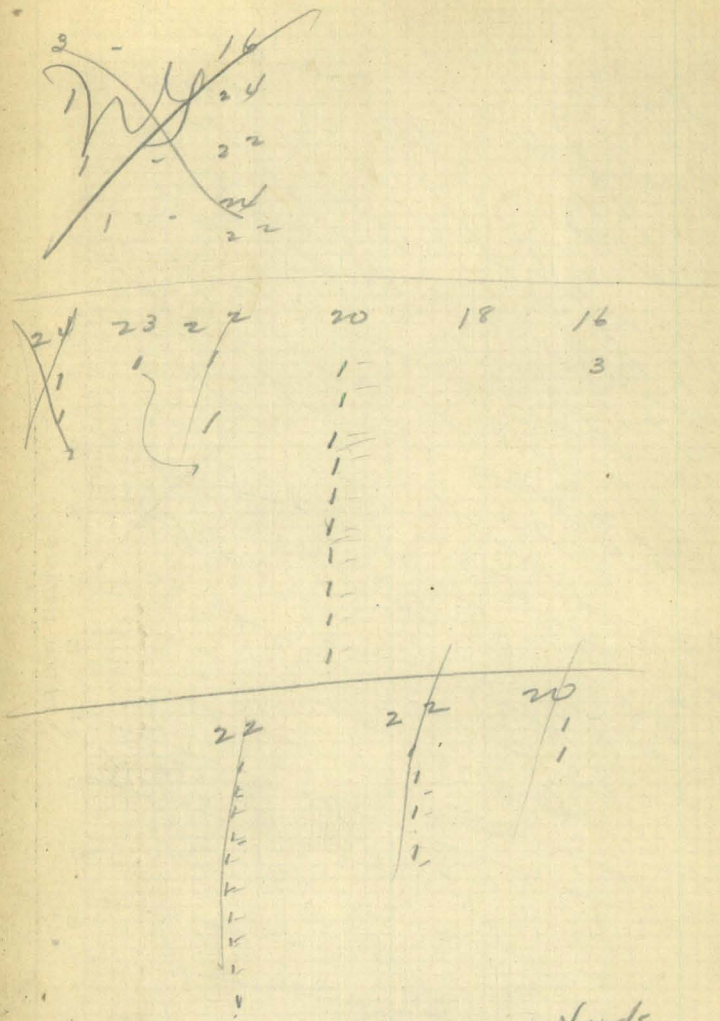




List



List of Br Piling - Don Kerton Yards 3/10/23

No		Length
3	—	24'
17	—	22
17	—	20
3	—	16

11-13
6-9

40

3 9 3 1.5

6 + 20.7
32
105 + 887

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	25.2	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.

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