OFFICE OF COUNTY ENGINEER
RAMSEY CO. MINN.

Construction Survey

HODGSON ROAD

From Rice St. To N. Co. Line

Road Acc't. No. 1

Date Filed 4-12-30 F...

FIELD BOOK

360 A

PROJ 29-01

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.
FOR SINGLE TRACK EXCAVATION.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

For Keith's Railroad Curve Tabels see end of book.

16

$$50\overline{)2000}$$
200

15
4)60
4
20

15
5

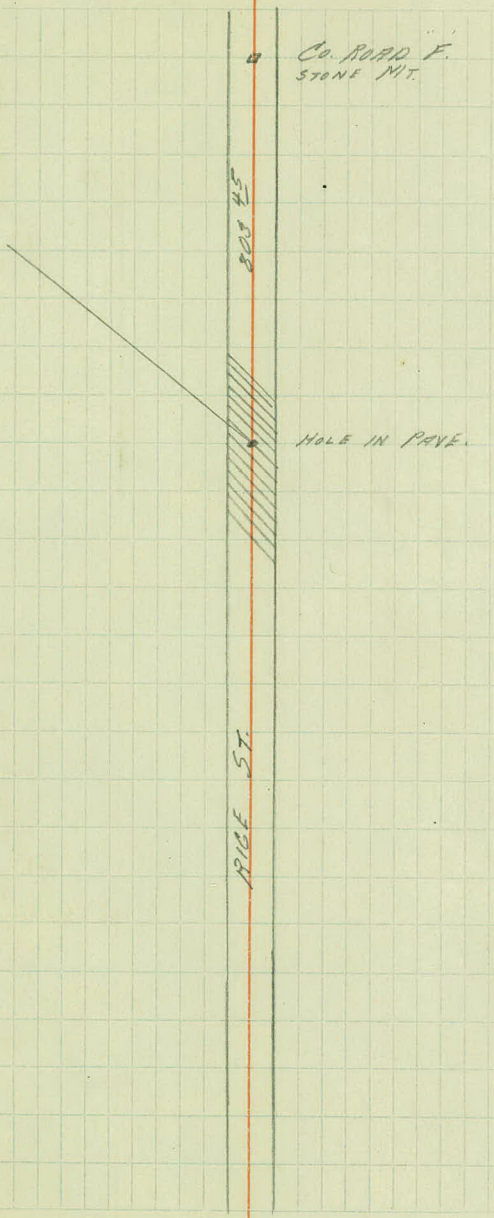
PROJ. # 29-01

STA.	To	STA.	DESCRIPTION	PAGE	TO	PAGE
0+00		244	ALIGNMENT	2		7
72	X	98	ORIGINAL X SECTIONS	15		19
51	X	72	ORIGINAL X SECTIONS	20		23
15	X	51	ORIGINAL X SECTIONS	25		31
122	X	202	ORIGINAL X SECTIONS	32		
202	X	209	ORIGINAL X SECTIONS	62		63
209	X	216	ORIGINAL X SECTIONS	60		61
216	X	222	ORIGINAL X SECTIONS	46		47
10	X	15	ORIGINAL X SECTIONS	55		
98	X	103	ORIGINAL X SECTIONS	57		58
117	X	122	ORIGINAL X SECTIONS	56		
	X		ORIGINAL X SEC. BORROW PIT # 1	66		
			BENCH MARKS	79		
10		244	CURVES - SUPER ELEV.	67		75

STA.	POINT	Δ LT.	Δ RT.		
✓ 6+16 ^{04}		24° 38' ^{30}			
6		20°			
+50		22°			
5		20°			
+50		18°			
4		16°			
+50		14°			
✓ 3+28 ^{8}	P.I			Δ-49°-17	✓
3		12°		D-8°-1.	✓
+50		10°		T-328 ^{8}	✓
2		8°		L-616 ^{04}	✓
+50		6°		R-716 ^{78}	✓
1		4°			
+50		02° 0'			
✓ 0+00	P.C.				
✓ 252+62 ^{65}	P.O.T.				

N 49°-17' W.

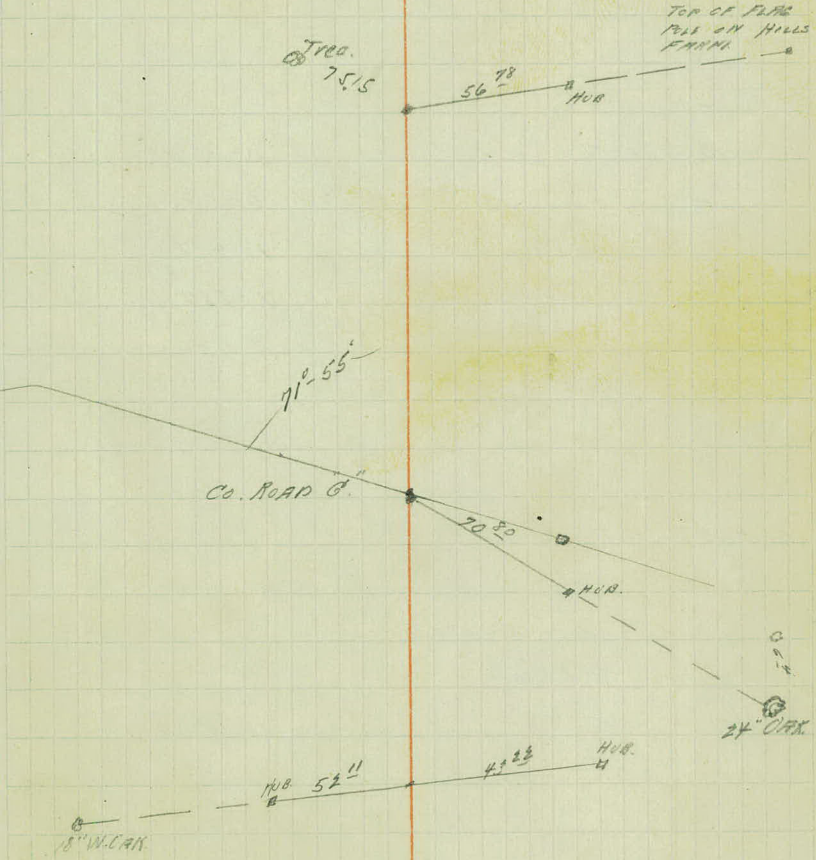
N 40°-00' E.


Co. ROAD F.
STONE MT.
BOB ST.
HOLE IN PAVE.
PINE ST.

STA.	POINT	Δ LT	Δ RT		
43+29.7	P.O.T.				
				N 12°-17' W	
19+95.33	P.T.		15°-30		
+50			14°-22		
19			13°-07		
+50			11°-52		
18			10°-37		
+50			9°-22		
17			8°-07		
16+93.2	P.I.			Δ-31°-00	✓
+50			6°-52	D-5°-R	✓
16			5°-37	T-317.87	✓
+50			4°-22	L-620°	✓
15			3°-07	R-1146.28	✓
+50			1°-52		
14			0°-37		
13+75.33	P.C.		0°-00		

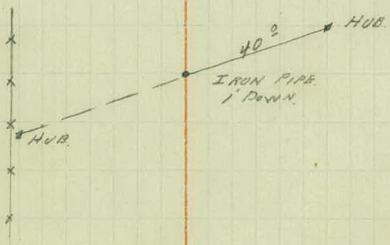
STA.	POINT	Δ LT.	Δ RT.	
				N 05° 22' W
185+84.05	P.T.	2° - 12'		
+50		1° - 51'		
85+00		1° - 21'		
84+74.12	P.I.			Δ - 4° - 24' ✓
+50		0° - 51'		D. - 2° - 0' ✓
84+00		0° - 21'		T. - 110.07 ✓
23+64.05	P.C.	0° - 00'		L. - 220.00 ✓
				R - 2864.93 ✓
				N 25° 47' W
71+35.4	P.O.T.			
43+55.8	P.I.		0° - 21'	✓

9-21-29


TOP OF FLAG
POLE ON HILLS
FARM
Tree.
75.15
56.78
HUB
71°-55'
Co. ROAD G.
70.80
HUB.
24" OAK
HUB.
43.22
HUB.
52.11
8" W.OAK

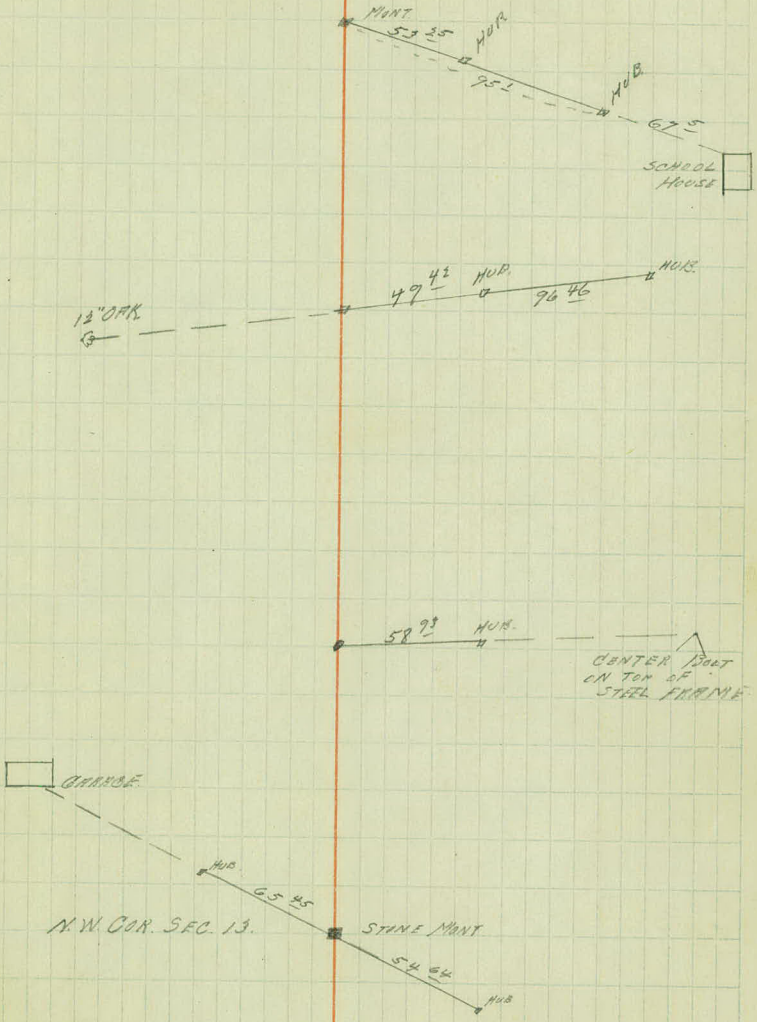
STA	POINT	Δ LT.	Δ RT.		
					N 60° - 32' W
127+03 43	P.T		20° - 37'		
127			20° - 32'		
+50			19° - 17'		
126			18° - 02'		
+50			16° - 47'		
125			15° - 32'		
+50			14° - 17'		
124			13° - 02'		
+50			11° - 47'		
123+10	P.I.			Δ - 41° - 14'	
123			10° - 32'		
+50			9° - 17'	P. - 5° - R	
122			8° - 02'		
+50			6° - 47'	T. - 431 23	
121			5° - 32'		
+50			4° - 17'	L. - 824 46	
120			3° - 02'		
+50			1° - 47'	R 1146 28	
119 77			0° - 32'		
118+78	P.C.		0° - 00'		
					N 34° - 41' W
100+92 98	P.T.	9° - 43'			
+50		8° - 28 5			
100		7° - 23 5			
+50		6° - 08 5			
99+00 6	P.I.			Δ - 19° - 26'	
99		4° - 53 5		P. - 5° - L.	
+50		3° - 38 5		T. - 196 28	
98		2° - 23 5		L. - 388 46	
+50		1° - 08 5		R. - 1146 28	
97+04 32	P.C.	0° - 00'			

9-21-29



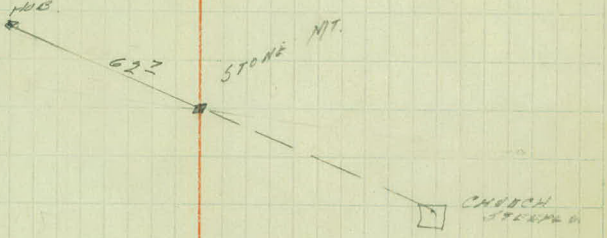
STA	POINT	ΔLT.	ΔRT.		
184+30.3	P. I.	0°-26'			N 00°-03' E.
158+10.9	P. I.		0°-14'		
152+55.85	P.O.T.			N 60°-11' W.	
131+65.7	P. I.		0°-21'		

10-2-27


MONT.
53 25
HUB.
95.1
HUB.
67.5
SCHOOL HOUSE
12" OAK
47 42
HUB.
96 46
HUB.
58 93
HUB.
CENTER BOLT ON TOP OF STEEL FRAME
GARAGE
HUB.
65 45
STONE MONT.
54 64
HUB.
N.W. COR. SEC. 13.

STA	POINT	Δ LT.	Δ RT.		
243+16.7	P.T.		3°-05.5'		
243			2°-46		
150.5			1°-46		
242+39.5	P.I.			Δ-6°-11'	
242			0°-46'	D°-4°-R.	
241+62.1	P.C.		0°-00'	T-77.38	
				L.-154.58	
				R.-1432.69	
					N 00°-08' W.
224+72.3	P.O.T.				
					N 00°-23' W.
210+69.55	P.I.		0°-15'		

10-3-27


HUB
627
STONE MT.
CHURCH STEEPLE


HUB
49 1/2
14" OAK


54 96
HUB
4" BIRCH

STA.	+	H.I	-	ELEV	CR. ROD
B.M.	5.86	932.94		927.08	
72				28.7	4.2
+50				28.75	4.2
73				28.8	4.1
+50				28.85	4.1
74				28.9	4.0
+50				28.95	4.0
75				29.0	3.9
+50				29.05	3.9
	5.26	934.11	4.09	928.85	
76				29.1	5.0
+50				29.15	5.0
77				29.2	4.9
+50				29.25	4.9

LEFT RIGHT 9-23-29
Crane

SPK IN 18" OAK 35' RT. STA 70+15.

5.2/33 3 0 7/5.2/-1.0 2 1 5/5.2/-1.0 5.3/18 5.6/12 4.8/-0.6 (4.2) 5.4/15 2 3/5.6/-1.4 2 0 3/5.5/-1.3 5.5/33

4.9/33 3 1 5/4.7/-0.5 2 0 5/4.7/-0.5 4.8/17 5.3/11 4.7/-0.5 (4.2) 5.4/13 2 1/5.6/-1.3 3 0 6/5.3/-1.1 5.2/33

4.8/33 3 1.2/4.8/-0.7 2 0 5/4.6/-0.5 4.9/12 5.2/11 4.7/-0.6 (4.1) 5.6/17 6.1/18 6.1/19 5.5/20 2 1/5.4/-1.3 3 0 3/5.4/-1.3 5.4/33

6.3/33 2 9.2/6.1/-2.0 2 2 5/5.6/-1.5 5.3/13 5.5/10 4.9/-0.8 (4.1) 6.0/16 6.2/19 2 3 3/6.0/-1.9 2 9 8/5.7/-1.6 5.6/33

7.3/33 2 5 5/7.0/-3.0 6.3/16 5.5/11 4.9/-0.9 (4.0) 5.6/12 6.0/17 6.2/18 6.0/21 2 3 3/5.9/-1.9 2 9 8/5.6/-1.6 5.5/33

7.4/33 2 5 3/6.9/-2.9 6.0/21 5.3/12 4.7/-0.7 (4.0) 5.4/12 5.1/13 5.4/17 5.7/19 2 1 5/5.5/-1.5 3 0 4/5.2/-1.2 5.2/33

6.6/33 6.3/27 2 3 7/6.0/-2.1 5.2/17 5.1/11 4.5/-0.6 (3.9) 5.0/13 4.8/16 2 2 1/5.2/-1.3 3 0 7/4.9/-1.0 4.9/33

6.0/33 2 9 4/5.8/-1.9 5.5/26 2 2 1/5.2/-1.3 5.1/19 4.4/12 4.8/11 4.2/-0.3 (3.9) 4.6/12 4.4/13 4.5/19 2 1 9/5.1/-1.2 4.6/28 3 3/4.5/-0.6 4.5/33

6.3/33 3 0 4/6.1/-1.2 2 0 1/5.5/-0.6 5.2/11 4.8/+0.2 (5.0) 5.4/11 5.0/14 2 1 3/5.8/-0.9 3 1 5/5.4/-0.5 5.4/33

5.9/33 3 1 0/5.7/-0.8 1 9 9/5.1/-0.2 5.0/11 4.7/+0.3 (5.0) 5.3/13 5.0/14 2 0 9/5.6/-0.7 3 2 4/4.8/+0.1 4.7/33

6.0/33 3 0 4/6.0/-1.2 2 0 1/5.1/-0.3 4.8/11 4.6/+0.3 (4.9) 4.7/12 1 9 5/4.8/0.0 3 2 1/4.4/+0.4 4.4/33

6.1/33 3 0 7/5.8/-1.0 5.9/26 2 0 1/5.1/-0.3 4.5/15 5.2/11 4.6/+0.3 (4.9) 4.8/15 1 9 5/4.8/0.0 4.1/26 3 3 0/4.1/+0.7 4.1/35

STA.	+	H.I.	−	ELEV	CR. ROD
		934.11			
78				293	4.8
+50				29.35	4.8
79				29.4	4.7
+50				29.3	4.8
80				29.2	4.9
T.P.	3.39	933.84	3.66	930.45	
+50				29.0	4.8
81				28.7	5.1
+50				28.3	5.5
82				27.9	5.9
+50				27.5	6.3
83				27.1	6.7
	4.05	931.84	6.05	927.79	
+50				26.7	5.4 5.1 4.8

9-23-29

60	60	51	45	52	46	48	50	43	42	46		
33	3/-13	2/-04	15	10	+02	12	20	3/+01	33			

59	56	52	48	52	47	51	48	47				
33	3/-09	2/-05	16	11	+01	11	1/-01	3/-02	33			

60	59	48	44	51	46	50	44	49	47	47		
33	3/-13	1/-02	15	10	+01	11	16	2/-03	3/-01	33		

57	56	45	45	53	48	50	47	45				
33	3/-09	20	18	11	00	11	1/00	3/-02				

61	60	48	47	52	48	52	48	46	48			
33	3/-12	1/00	17	12	+01	10	14	195	3/00			

60	59	54	51	54	52	47	51	46	45	47	47	
33	3/-11	25	20	14	10	+01	11	16	22	3/+01	33	

60	57	57	48	58	56	52	56	49	48	48		
33	3/-06	33	16	13	10	-01	11	17	3/+03	33		

60	59	55	50	62	62	55	61	51	51	51		
33	3/-04	22	18	13	10	-03	11	19	3/+04	33		

68	62	58	64	67	63	67	63	62	62			
33	3/-07	24	15	13	-04	11	12	3/-03	33			

64	63	63	69	69	70	62	69	67	71	72		
33	3/00	20	19	12	11	-03	11	12	3/-08	33		

54	54	64	67	73	69	73	70	73	73			
35	3/+13	28	19	12	-02	11	13	3/-06	33			

32	32	49	54	50	55	52	51	51	52	52		
35	3/+2.6	14	13	+01	11	13	2/-03	3/-04	33			

STA.	+	H.I.	−	ELEV	GR. ROD
		931.84			
84				26.3	6.0 5.5 5.
+50				26.0	6.4 5.8 5.
85				25.7	6.7 6.1 5.
+30				25.4	6.9 6.4 5.
B.M.	1.53	928.54	4.83	927.01	927.01
86				25.2	3.6 3.3 3.
B.M.			3.31	925.23	
+50				25.0	3.5"
87				24.8	3.7"
+50				24.7	3.8"
88				24.6	3.9"
+50				24.6	3.9"
89				24.6	3.9"
+50				24.6	3.9"
	5.37	929.47	4.44	924.10	

9-24-27

2.6	0/4.8	48	56	5.2	5.9	5.1	5/4.8	48	
35	3/+32	14	13	10.3	12	17	3/+02	33	

30	0/4.8	46	46	42	5.8	6.5	7/5.3	5.1	5/5.0	5.0
35	3/+36	23	14	11	0.0	14	1/-01	21	3/+02	33

47	0/4.7	46	20	6.5	7.1	9/5.7	42	0/4.7	47
35	3/+20	18	11	-0.4	15	1/-02	24	3/+02	35

68	5/6.7	63	75	7.1	7.3	1/6.7	3/5.8	5.8	
33	3/+02	15	12	-0.7	14	2/-08	3/+01	33	

62	9/5.8	9/5.3	5.1	40	4.8	4.2	4.6	1/4.3	9/4.8	4.6
33	2/2.2	2/-1.7	20	16	11	0.9	14	2/-13	2/-18	33

SPR. IN 12" CAP. 40 47 57H 85+70.

78	9/7.2	6.2	5.5	5.1	4.6	5.2	5.8	3/5.9	5.6
33	2/-37	20	18	11	-1.1	15	19	4/-24	33

85	5/8.2	7.2	5.9	5.8	5.0	5.3	6.1	3/6.0	6.5
33	2/-45	20	17	12	-1.3	14	16	2/-29	33

7.9	9/7.0	6.3	5.8	5.1	5.7	6.2	3/6.7	6.5
33	2/-32	19	12	-1.5	13	16	2/-29	33

64	6/6.2	5.8	5.2	5.7	5.0	5.7	6.1	8/6.1	6.0
33	2/-23	26	14	13	-1.1	15	25	2/-22	33

6.2	9/5.8	5.5	4.7	5.4	4.7	5.4	5.6	7/5.6	5.6
33	2/79	23	15	13	-0.8	15	26	2/-17	33

61	9/5.8	5.6	5.2	5.5	4.5	5.2	5.6	9/5.6	5.4
33	2/-19	20	14	13	-0.6	13	25	2/-17	33

5.4	4/5.1	4.6	5.1	4.5	5.1	5.6	1/6.0	5.4
33	3/-12	15	13	-0.6	16	24	9/-21	33

STA.	+	H.I.	−	ELEV	GR ROD.
		929.47			
90				24.7	4.8
+50				24.75	4.7
91				24.8	4.7
+50				24.85	4.6
			3.54		
92				24.9	4.6
+50				24.95	4.5
	2.31	929.76	2.02	927.45	
93				25.0	4.8
+50				25.05	4.7
94				25.1	4.7
+50				25.15	4.6
95				25.2	4.6
+50				25.25	4.4 4.5 4.4

9-24-27

5.3/33	3.1 5/-0.5 (5.3 x)	5.2/21	4.5/17	5.7/13	5.2/-0.4	(4.8)	6.0/15	6.5/26	2.9 5/-1.8 (6.6)	6.5/33	
5.0/33	3.1 8/-0.3 (5.0)	4.7/28	4.9/20	4.6/15	5.6/12	5.2/-0.5 (4.7)	6.1/16	2.9 4/-1.9 (6.6 x)	6.1/33		
4.5/33	3.2 5/+0.2 (4.5 x)	4.9/15	5.7/11	5.2/-0.5 (4.7)	6.0/15	3.0 0/-1.5 (6.2 x)	6.2/33				
4.9/33	3.1 9/-0.3 (4.9 x)	4.4/22	4.0/17	5.4/14	4.9/-0.3 (4.6)	5.7/15	3.0 4/-1.2 (5.8 x)	5.8/33			

NAIL IN T.P LT STA 91+65

3.7/35	3.3 0/+0.9 (3.7)	3.3/19	5.4/14	4.8/-0.2 (4.6)	5.4/15	4.9/16	3.1 3/-0.6 (5.2 x)	5.2/33		
4.0/35	3.3 0/+0.7 (3.8 x)	3.3/27	3.8/16	5.4/13	4.6/-0.1 (4.5)	5.2/14	5.0/16	3.1 9/-0.2 (4.7 x)	4.8/33	

NAIL IN T.P LT. STA 93+00

4.1/35	3.3 0/+0.7 (4.1)	3.4/19	4.1/14	5.5/13	4.9/-0.1 (4.8)	5.5/15	4.5/19	3.2 5/+0.2 (4.6 x)	4.6/33	
3.8/35	3.3 0/+0.9 (3.8 x)	3.6/22	3.1/18	5.4/13	5.0/-0.3 (4.7)	5.4/13	4.4/24	3.2 9/+0.5 (4.2 x)	4.3/35	
3.3/35	3.3 0/+1.4 (3.3 x)	3.4/21	5.4/10	5.0/-0.3 (4.7)	5.6/13	4.8/18	3.2 1/-0.1 (4.8 x)	4.8/35		
3.7/35	3.3 0/+0.9 (3.7 x)	3.3/35	4.0/18	5.5/13	5.0/-0.4 (4.6)	5.5/14	5.0/16	3.1 2/-0.7 (5.3 x)	5.5/33	
4.5/33	3.2 3/+0.1 (4.5 x)	4.0/18	5.7/13	5.0/-0.4 (4.6)	5.7/14	5.1/16	3.0 6/-1.1 (5.7 x)	5.7/33		
4.8/35	3.2 3/+0.1 (4.5)	4.6/21	3.9/18	5.5/13	4.9/-0.4 (4.5)	5.5/13	5.0/18	2.0 7/-0.6 (5.0)	3.0 6/-1.1 (5.5)	5.6/33

		929.74				
96				25.3	4.7	4.5 4.
50				25.35	54	44.3
97				25.4	54	44.3
50				25.45	57	43.2
98				25.5	57	43.2
	4.36	930.70	3.42	926.34		
B.M.			4.84	925.86	925.83	

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9-24-29
Crane

5.0/33	(1; 2/5) 5.0/-0.1	4.4/20	4.0/14	5.4/13	4.9/-0.4	(4.5)	5.4/13	(3; 1/2) 5.0/-0.9	5.6/28	(0; 0/3) 5.6/-1.5	5.6/33
5.0/35	(8; 2/3) 4.8/+0.4	4.9/20	4.5/16	5.6/13	4.9/-0.5	(4.4)	5.6/13	5.3/19	(7; 3/2) 5.7/-2.1	(8; 8/2) 5.9/-2.3	6.0/33
4.8/34	(4; 1/3) 6.0/-0.4	(7; 2/2) 7.2/-1.6	7.1/19	5.4/11	4.8/-0.4	(4.4)	5.2/13	(1; 4/2) 5.5/-2.3	5.7/28	6.0/33	
7.6/33	(2; 9/2) 7.7/-2.0	7.6/27	(5; 0/2) 6.2/-0.5	5.6/14	4.5/-0.2	(4.3)	4.4/14	4.4/20	(3; 4/2) 5.3/-2.4	6.5/30	5.6/33
7.5/33	(7; 9/2) 7.4/-1.7	7.3/28	(5; 9/1) 5.7/0.0	5.3/13	4.5/-0.2	(4.3)	4.0/13	4.0/20	(3; 4/2) 5.3/-2.4	6.3/30	5.0/33.5

SPK IN 24" OAK 100' LT. STA. 100+00

13.N1.	4.16	928.96		924.80	
13.N1.			4.12	924.84	
51				24.05	4.7
+50				24.12	4.2
	4.67	929.11	4.52	924.44	
52				24.3	4.8
+50				24.45	4.7
53				24.6	4.5
+50				24.75	4.4
54				24.7	4.2
+50				25.05	4.1
55				25.2	3.9
+50				25.04	4.1
56				25.47	3.6

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SPK IN 24" OAK 40 LT. STA 48+50

SPK IN 18" OAK 55' LT. STA 48+85

5.8/33	3 1.0/5.7/-0.8	2 .5/5.4/-0.5	5.1/11	4.8/+0.1	(4.9)	5.1/12	4.4/15	3 4.1/3.6/+1.3	3.9/43		
5.3/33	3 1.5/5.3/-0.5	4.7/20	4.5/11	5.0/10	4.6/+0.2	(4.8) 5.0/12	3.8/13	3 4.4/3.3/+1.5	3.3/43		
4.8/33	3 2.3/4.7/+0.1	3.8/13	5.1/11	4.7/+0.1	(4.8) 4.9/11	3.2/15	3 5.0/2.9/+1.9	3.5/43			
5.2/33	3 1.5/5.2/-0.5	1 9.7/4.8/-0.1	4.8/13	5.1/11	4.6/+0.1	(4.7) 4.9/11	3.9/14	3 3.2/3.7/+1.0	3.8/43		
5.8/33	3 0.4/5.7/-1.2	2 1.3/5.4/-0.9	5.3/14	5.2/11	4.5/0.0	(4.5)	5.0/11	4.6/13	1 9.9/4.7/-0.2	3 1.8/4.8/-0.3	4.6/33 4.6/43
5.6/33	3 1.3/5.0/-0.6	2 0.9/5.1/-0.7	5.2/17	5.2/11	4.7/-0.3	(4.4) 5.2/11	4.9/13	2 0.5/4.9/-0.5	3 1.3/5.0/-0.6	4.8/33	
5.4/33	5.1/-0.9	5.0/27	2 3.3/6.1/-1.9	5.0/13	5.1/12	4.7/-0.5	(4.2) 5.3/11	4.9/13	2 0.3/4.6/-0.4	3 1.6/4.6/+2.1	4.5/33
6.2/33	2 9.5/5.9/-1.8	2 1.7/5.2/-1.1	5.1/19	5.0/12	4.7/-0.6	(4.1) 5.1/11	4.5/12	4.0/20	3 2.3/4.0/+0.1	3.8/33	
6.6/33	2 4.3/6.3/-2.4	6.0/16	5.1/13	4.6/-0.7	(3.9) 5.2/9	5.1/14	2 0.9/4.6/-0.7	3 1.0/4.7/-0.8	4.4/33		
6.6/33	2 3.9/6.3/-2.2	5.8/17	5.4/14	4.5/-0.4	(4.1) 5.0/12	5.4/15	2 1.1/4.9/-0.8	3 1.0/4.9/-0.8	4.9/33		
6.2/33	2 4.3/6.0/-2.4	5.7/15	5.1/13	4.4/-0.8	(3.6) 4.9/11	4.7/12	2 2.1/4.9/-1.3	3 0.6/4.7/-1.1	5.1/33		

		929.11			
+50				25.61	3.5
57				25.7	3.4
+50				25.8	3.3
58				25.9	3.2
	5.09	929.95	4.25	924.86	
+50				26.0	4.0
59				26.1	3.9
+50				26.2	3.8
60				26.3	3.7
+50				26.4	3.6
61				26.5	3.5
+50				26.6	3.4
B.M.	4.75	929.96	4.75	925.20	925.21
62				26.7	3.3

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5.8/33	8.9 2/ 5.7x/-2.2	3.3 2/ 5.4x/-1.9	4.5/13	4.8/12	4.2/-0.7	(3.5)	4.1/10	4.0/12	0.9 2/ 4.2x/-0.7	0.7 3/ 4.5x/-1.0	4.5/33
5.9/33	8.6 2/ 5.8x/-2.4	8.5 2/ 5.6x/-2.2	5.9/17	4.6/12	4.0/-0.6	(3.4)	4.4/13	1.3 2/ 4.3x/-0.9	2.2 3/ 3.4x/0.0	3.4/33	
5.2/33	0.1 3/ 4.7x/-1.4	1.7 2/ 4.4x/-1.1	4.4/12	4.1/-0.8	(3.3)	4.4/12	3.6/13	9.9 1/ 3.5x/-0.2	2.3 3/ 3.2x/+0.1	3.2/33	
3.6/33	1.5 3/ 3.6x/-0.4	0.1 2/ 3.6x/-0.4	3.7/12	4.5/11	4.0/-0.8	(3.2)	4.4/12	3.5/13	9.9 1/ 3.4x/-0.2	2.5 3/ 3.0x/+0.2	3.0/33
3.2/35	3.0 3/ 3.2x/+0.8	3.6/12	5.4/11	4.9/-0.9	(4.0)	5.3/12	3.6/16	3.8/20	3.0 3/ 3.3x/+0.7	3.4/35	
2.4/35	3.0 3/ 2.4x/+1.5	2.6/14	5.1/11	4.7/-0.8	(3.9)	5.1/13	3.5/16	3.0 3/ 3.4x/+0.5	3.7/35		
2.0/35	3.0 3/ 2.0/+1.8	3.0/17	4.4/12	5.0/11	4.7/-0.9	(3.8)	5.1/13	4.5/14	0.7 2/ 4.4x/-0.6	1.9 3/ 4.4x/-0.6	4.4/33
3.2/35	3.0 3/ 3.2x/+0.5	0.1 2/ 4.0x/-0.3	4.5/12	4.9/11	4.5/-0.8	(3.7)	5.0/11	4.8/13	1.7 2/ 4.9x/-1.2	0.3 3/ 5.0x/-1.3	5.0/33
4.7/33	0.4 3/ 4.8x/-1.2	2.7 2/ 4.7x/-1.1	4.9/11	4.5/-0.9	(3.6)	4.7/11	5.1/16	2.3 2/ 5.0x/-1.4	0.0 3/ 5.1x/-1.5	5.1/33	
5.1/33	0.0 3/ 5.0x/-1.5	2.5 2/ 5.0x/-1.5	5.0/19	4.8/12	4.4/-0.9	(3.5)	4.8/12	5.2/18	2.7 2/ 5.1x/-1.6	8.9 2/ 5.7x/-2.2	5.8/33
5.3/33	9.5 2/ 5.2x/-1.8	2.9 2/ 5.1x/-1.7	5.0/13	4.5/-1.1	(3.4)	5.0/10	4.7/14	3.1 2/ 5.2x/-1.8	9.5 2/ 5.2x/-1.8	5.2/33	

SPK IN 18" OAK 50' LT STA. 61+80.

6.1/33	4.1 2/ 5.9x/-2.6	5.6/15	5.1/13	4.3/-1.0	4.8/12	4.1/14	1.1 2/ 4.1/-0.8	0.6 3/ 4.4x/-1.1	4.5/33	

(3.3)

		929.76			
+50				26.8	3.2
63				26.7	3.1
+50				27.0	3.0
64				27.1	2.7
	3.39	931.51	1.84	928.12	
+50				27.2	4.3
65				27.3	4.2
+50				27.4	4.1
66				27.5	4.0
+50				27.6	3.9
67				27.7	3.8
+50				27.8	3.7
	5.08	931.85	4.74	926.77	
B.M.			4.77	927.08	
B.M			4.08	927.77	

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(3.2)	6.0/33	5.9/29	1.3/2 4.1/-0.9	4.1/17	4.8/13	4.3/-1.1	4.6/12	4.3/13	0.7/2 3.8/-0.6	1.6/5 3.6/-0.4	3.5/33
(3.1)	5.0/33	9.5/2 4.9/-1.8	2.7/2 4.7/7.6	4.2/15	4.6/14	4.0/-0.9	4.3/12	3.5/13	9.9/1 3.3/-0.2	2.2/3 3.1/0.0	3.1/33
(3.0)	3.6/33	1.3/3 3.6/-0.6	0.1/2 3.3/-0.3	3.2/15	4.3/13	3.8/-0.8	4.1/11	3.1/14	9.3/1 3.0/0.0	2.2/3 3.0/0.0	2.9/33
(2.9)	2.7/33	2.5/3 2.7/+0.2	9.7/1 3.0/-0.1	3.0/15	4.0/12	3.7/-0.8	4.2/11	3.5/14	0.1/2 3.2/-0.3	1.2/3 3.6/-0.7	3.7/33
(4.3)	4.9/33	1.5/3 4.8/-0.5	0.5/2 5.0/-0.7	5.1/14	5.7/12	5.3/-1.0	5.8/11	5.1/14	0.7/2 4.9/-0.6	1.3/3 4.9/-0.6	4.8/33
(4.2)	4.9/33	1.2/3 4.9/-0.7	0.7/2 4.8/-0.6	4.9/13	5.7/12	5.3/-1.1	5.8/12	4.7/15	0.5/2 4.7/-0.5	1.5/3 4.7/-0.5	4.7/33
(4.1)	4.4/33	1.8/3 4.4/-0.3	0.1/2 4.4/-0.3	4.4/14	5.6/12	5.2/-1.1	5.4/13	4.4/16	0.7/2 4.7/-0.6	1.6/3 4.5/-0.4	4.4/33
(4.0)	3.7/33	2.6/3 3.7/+0.3	3.5/15	5.6/12	5.0/-1.0	5.5/12	3.8/14	3.5/20	3.0/3 3.3/+0.7	3.3/33	
(3.9)	2.9/35	3.0/3 2.9/+1.0	2.9/16	5.5/13	5.0/-1.1	5.5/11	2.8/14	3.0/3 2.6/+1.3	2.6/35		
(3.8)	2.8/35	3.0/3 2.8/+1.0	2.7/15	5.3/13	4.9/-1.1	5.4/11	2.7/14	3.0/3 2.6/+1.2	2.6/35		
(3.7)	3.3/35	2.6/3 3.3/+0.4	3.2/15	5.1/13	4.7/-1.0	5.3/12	2.9/14	3.0/3 3.0/+0.7	3.0/35		

SRK IN 18" OAK 75 RT STA. 70+55.

B.M.	4.53	932.30		927.77	
68				27.9	4.4
+50				28.0	4.3
67				28.1	4.2
+50				28.2	4.1
70				28.3	4.0
+50				28.4	3.9
71				28.5	3.8
+16				28.5	3.8
+35				28.6	3.7
+80				28.7	
B.M.			4.53	927.77	

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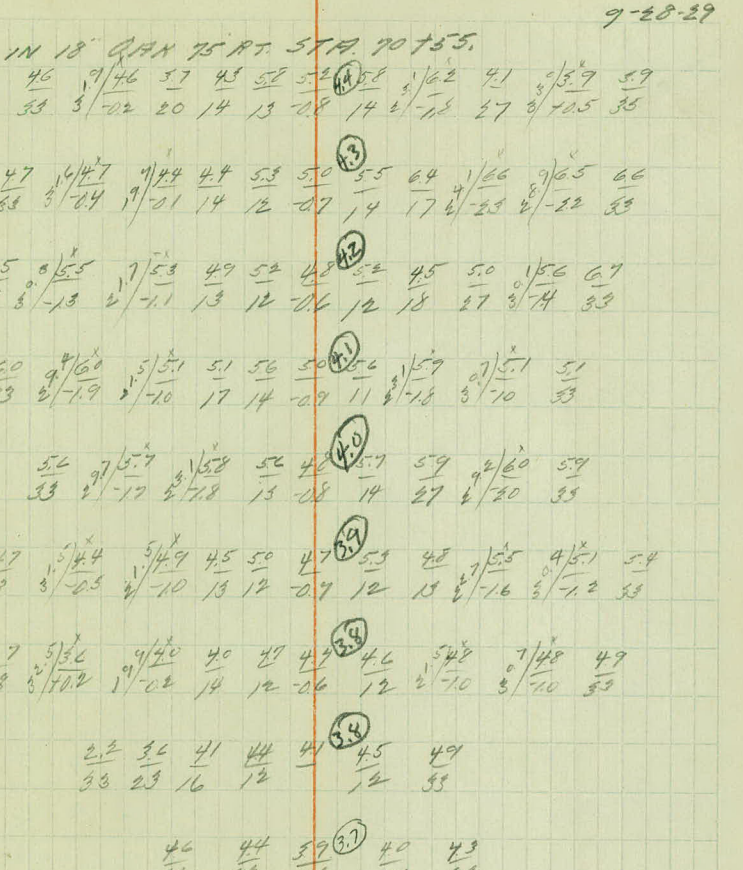
SPR IN 18" CMK 75' RT. STA. 70+55.



SEE CAISSON NOTES

SPR IN 18" CMK 75' RT STA. 70+55.

13 MI	1.54	921.41		919.87			
15				17.4	36	40	5
		VOID.					
750				17.0	30	44	5
16				16.7	33	47.6	
750				16.4	30	50	6
17		VOID.		16.4	36	50.6	
750				16.4	36	50	6
18				16.6	34	48	6

SPK IN 24" OAK 60 LT. STA. 15+25.

5.2/43 3.0/38 7.8/31 8 3/2 8.0/-4.4 4.3/20 3.7/15 4.4/-0.4 5.3/15 9 5/1 5.4/0.0 6.6/34 9.2/43

VOID

6.2/43 6.4/33 9 9/2 7.8/-4.8 7.2/26 4.5/20 4.7/-0.3 9 9/1 6.0/-0.2 6.5/23 7 8/2 8.3/-2.5 8.9/34 5.8/41 5.8/45

6.4/43 6.7/39 8.8/33 9 5/2 8.5/-5.0 6.4/25 4.8/20 4.9/-0.2 5.9/18 9 5/1 6.1/0.0 6.7/23 6 0/2 8.6/-2.5 9.7/31 5.2/40 5.4/43

5.8/43 6.0/41 8.1/36 8.7/32 8 1/2 8.2/-4.6 8.0/27 6.0/24 4.8/20 9.0/0.0 6.0/18 9 5/1 6.2/+0.2 6.5/23 8 0/2 8.9/-2.5 9.4/31 9.0/34 4.8/43

5.2/43 5.5/37 7.3/33 8 9/2 8.3/-4.7 7.7/25 5.2/20 5.1/-0.1 6.1/18 9 5/1 6.4/0.0 6.7/28 7 0/2 8.9/-2.5 9.5/30 8.7/35 4.8/43

VOID.

5.1/41 5.5/37 7.8/33 8.1/30 8 3/2 7.9/-3.4 7.1/27 6.4/25 5.0/20 5.2/-0.2 9 5/1 6.2/+0.2 8.4/20 8 6/2 8.8/-2.4 8.5/33 4.7/43

1.2/43 2.9/36 7.4/29 7 1/2 7.2/-3.8 6.9/25 4.7/20 5.1/-0.3 9 5/1 6.2/0.0 6.3/22 8.6/27 6 6/2 8.7/0.0 9.1/29 8.3/33 4.5/40 4.5/43

		NOTE SEE STA.	PAGE 55 FOR X SEC. 10+00 TO STA 14+50		FROM	
B.M.		1.55	921.42		919.87	
15					17.4	2.6 4.0
	+50				17.0	3.0 4.4
16					16.7	3.3 4.7
	+50				16.4	3.6 5.0
17					16.4	3.6 5.0
	+50				16.4	3.6 5.0
18					16.6	3.4 4.8
	+50				16.7	3.1 4.5
		4.94	922.79	3.57	917.85	
19					17.2	4.2 5.6
	+50				17.5	3.9 5.3
20					17.9	3.8 4.9
	+50				18.3	3.7 4.5

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SPK IN 24" OAK 60 LT. STA. 15 + 55

3.1/43 3.1/37 7.9/30 7.6/26 4.4/20 3.8/17 4.4/-0.4 (4.0) 5.4/17 7.3/43

6.2/43 6.4/32 7.4/30 5/2 7.5/-4.5 7.3/26 4.4/20 4.7/-0.3 (4.4) 5.9/19.5 8.1/2 8.3/-2.5 8.7/33 5.8/41 5.8/43

6.5/43 6.7/40 8.4/33 8.5/2 7.8/-4.5 4.8/20 4.9/-0.2 (4.7) 6.1/19.5 6.6/23 7.2/2 8.6/-2.5 9.3/30 5.2/40 5.2/43

5.8/43 6.1/41 8.3/33 7.7/2 7.7/-4.1 4.8/20 5.0/0.0 (5.0) 6.2/19.5 9.7/2 8.9/-2.5 8.8/33 4.9/43

5.2/43 5.5/27 7.6/32 7.5/2 7.6/-4.0 5.2/20 5.2/-0.2 (5.0) 6.4/19.5 8.6/27 8.9/2 8.9/-2.5 8.5/34 4.8/43

5.0/43 5.5/37 7.6/33 6.5/2 7.1/-3.5 5.1/20 5.2/-0.2 (5.0) 6.2/19.5 7.9/26 9.2/2 8.4/-2.0 8.2/33 4.7/41 4.7/43

2.9/36 7.1/30 7.3/2 7.3/-3.9 7.1/26 4.7/20 5.2/-0.4 (4.8) 9.5/1 6.2/0.0 8.4/27 8.5/2 8.7/-2.5 8.6/31 4.5/40 4.5/43

2.6/43 2.4/35 6.6/31 7.3/2 7.0/-3.9 7.0/26 4.8/20 5.0/-0.5 (4.5) 6.1/17 0.3/2 6.3/-0.4 6.4/22 7.9/28 8.9/2 8.1/-2.2 8.5/33 4.3/42

5.0/43 5.7/35 8.1/21 8.1/2 8.5/-4.3 8.3/26 7.2/21 6.6/20 6.2/-0.4 (5.6) 0.3/2 7.4/-0.4 9.1/26 9/2 9.5/-2.5 9.3/35 6.0/41 6.0/43

7.0/43 7.1/32 8.5/2 8.4/-4.5 8.3/26 5.1/19 5.9/-0.6 (5.3) 7.0/18 0.9/2 7.4/-2.7 7.7/24 8.6/27 1.9/3 9.2/-2.5 6.4/39 6.5/43

7.9/43 7.9/2 8.0/-4.2 8.0/25 5.9/17 5.6/-0.7 (4.9) 6.4/16 1.5/2 7.0/-1.0 8.0/23 8.4/28 8.6/2 8.4/-2.4 7.2/33 6.9/43

6.8/33 6.1/2 7.0/-3.3 6.7/16 5.7/11 5.7/-0.7 (4.5) 5.9/13 6.6/15 3.4/2 6.7/-1.4 6.6/3 6.4/-1.1 6.6/33

		922.79 ✓				
21					18.4	38. 42.
+50					18.9	39.
22					19.8	3.5.
+50					19.7	3.1.
23					20.0	2.8.
+50			✓		20.3 ✓	2.5.
	6.73	926.56	2.96		91983	
24					20.6	6.0.
+50					20.8	5.8.
25			✓		21.1	5.5.
13 M.	4.25	926.54	4.25		921.71 ✓	921.69
+50					21.2	5.3.
26					21.4	5.1.
+50					21.6	4.9.

9-30-29

(4.2)
4.2/33   8 4/5.0 -1.2   2 3/5.2 -1.4   5.3/14   4.2/-0.7   5.2/14   2 5/5.1 -0.5   3 5/5.1 -0.5   5.0/33

(3.9)
3.9/33   3 2/3.9 0.0   3.9/28   3.2/18   3.9/16   4.1/13   4.8/10   4.5/-0.6   4.9/12   4.4/13   2 0/4.2 -0.3   3 8/4.2 -0.3   4.4/33

(3.5)
3.5/33   3 2/3.5 0.0   3.9/13   4.4/12   4.2/-0.7   4.7/12   3.7/13   3.4/20   3 9/3.7 -0.2   3.7/33

(3.1)
3.5/33   3 8/3.4 -0.3   2 0/3.4 -0.3   3.6/13   4.0/12   3.8/-0.7   4.2/13   3.5/16   2 5/3.6 -0.5   3 6/3.5 -0.4   3.4/33

(2.8)
3.3/33   3 5/3.3 -0.5   2 0/3.4 -0.6   3.3/14   3.8/12   3.4/-0.6   3.8/12   3.1/17   2 3/4.2 -0.4   3 9/3.0 -0.2   3.0/33

(2.5)
3.2/33   3 2/3.2 -0.7   2 0/3.1 -0.6   2.8/18   3.5/12   3.1/-0.6   3.5/12   2.4/15   2.2/20   3 6/2.2 +0.3   2.3/33

(6.0)
6.4/33   3 6/6.4 -0.4   5.9/20   6.1/14   6.9/11   6.4/-0.7   7.0/12   5.1/16   3 0/4.5 +1.5   4.5/33

(5.8)
5.7/33   3 3/5.7 +0.1   5.2/20   5.3/14   6.8/12   6.5/-0.7   6.8/12   3.8/16   3 0/3.0 +2.8   3.0/35

(5.7)
5.3/33   3 6/5.2 +0.3   5.2/24   4.6/20   4.5/15   6.6/11   6.3/-0.8   6.6/12   3.0/18   3 0/2.8 +2.7   2.7/33

SPK IN 24" OAK 45 LT. STA 25+35.

(5.3)
5.5/33   3 1/5.4 -0.1   4.7/23   4.3/14   6.3/11   6.1/-0.8   6.3/12   4.0/15   3 0/4.2 +1.1   4.3/35

(5.1)
6.5/33   3 0/6.6 -1.5   6.6/25   2 5/6.1 -1.0   5.8/12   6.2/11   6.0/-0.9   6.2/11   5.8/12   2 1/5.9 -0.8   3 0/5.9 -0.8   5.9/33

(4.9)
7.4/33   2 9/7.0 -2.1   2 9/7.1 -2.2   6.2/20   6.2/18   6.1/-1.2   6.5/12   2 9/6.6 -1.7   2 9/6.6 -1.7   6.8/33

		926.54			
27				21.4	4.9
7:30				21.65	4.9
28				21.7	4.8
	8.70	927.19	6.05	920.79	
7:30				21.75	7.4
29				21.8	7.4
7:30				21.86	7.3
30				21.9	7.3
7:30				21.95	7.2
31				22.0	7.2
7:30				22.05	7.1
32				22.1	7.1
7:30				22.15	7.0

7-30-27

4.9	80	74/75	76	68	67	63	65	70	9/71	3/71	75
	38	4/-26	24	22	18	7.3	12	20	4/-22	2/-22	33
4.9	85	3/75	65	62	64	63	65	60	5/64	6/73	75
	38	4/-24	23	14	12	7.3	12	18	2/75	2/-24	33
4.8	84	78	5/63	58	62	63	63	55	3/57	1/62	66
	33	27	2/-75	14	13	7.2	12	19	1/-09	3/-14	33
7.4	100	7/100	83	87	82	85	1/82	7/84	85
	35	4/-26	13	12	7.0	12	1/-08	3/-10	33
7.4	85	4/86	9/81	79	83	81	83	76	71	74	3/72	72
	33	3/-11	2/-07	13	12	-0.7	12	13	19	24	2/102	33
7.3	62	0/65	60	56	85	61	61	50	0/60	61
	35	3/-08	28	16	11	-0.8	13	17	3/-13	35
7.3	49	0/49	41	46	22	81	82	46	43	0/51	51
	35	3/-24	27	17	11	-0.8	13	18	24	3/-12	35
7.2	45	0/45	38	29	20	21	23	49	53	0/59	60
	35	3/-27	28	21	11	-0.9	13	19	26	3/-15	35
7.2	57	0/57	53	55	80	80	79	63	67	71	9/78	79
	35	3/-10	27	14	11	-0.8	12	15	23	35	3/-06	33
7.1	62	0/62	53	62	80	80	80	69	5/71	74	6/82	85
	35	3/-09	20	14	11	-0.9	11	15	19/80	22	2/-11	33
7.1	57	0/57	44	40	82	81	81	71	3/71	76	9/80	82
	35	3/-14	24	17	11	-1.0	13	15	19/80	24	2/-09	33
7.0	61	2/61	53	46	58	81	81	81	76	5/75	77	7/80	82
	35	3/-09	24	16	13	10	-1.1	12	14	20/-05	23	3/-10	33

		929.19			
33				22.2	7.0
	4.73	927.58	6.54	922.65	
+50				22.25	5.3
34				22.3	5.3
+50				22.35	5.2
35				22.4	5.2
+50				22.45	5.1
36				22.5	5.1
+50				22.55	5.0
B.M.	2.15	925.98	3.74	923.84	923.83
37				22.6	3.4
+50				22.65	3.3
38				22.7	3.3
+50				22.75	3.2

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(circled) 7.0

7.5/33 · [4, 1, 3] 7.4/-0.4 · 6.6/35 · 6.0/16 · 7.2/11 · 8.1/7.1 · 8.2/13 · 7.8/15 · 7.8/22 · 8.2/24 · [1, 5] 8.4/7.4 · 8.4/33

(circled) 5.3

6.1/33 · [0, 3] 6.1/-0.8 · 5.7/27 · 4.6/25 · 4.3/19 · 6.8/11 · 6.4/7.1 · 6.6/14 · [5, 1, 2] 6.3/7.0 · 6.9/24 · [4, 0, 3] 6.5/-1.2 · 6.7/33

(circled) 5.3

6.3/33 · [7, 3] 6.2/-2.9 · 5.2/19 · 6.0/13 · 6.5/1.1 · 6.4/7.1 · 6.6/13 · 6.2/14 · [5, 0, 2] 6.0/-0.7 · 6.5/25 · [3, 0, 3] 6.6/-1.3 · 6.7/33

(circled) 5.2

5.3/33 · [2, 7, 3] 5.2/0.0 · 4.9/29 · 4.4/21 · 5.4/15 · 6.4/10 · 6.2/7.0 · 6.4/13 · 6.0/14 · [7, 0, 2] 5.8/-0.6 · 6.2/25 · [7, 0, 3] 6.2/-1.0 · 6.3/33

(circled) 5.2

4.2/33 · [0, 3] 4.1/+1.1 · 3.5/24 · 3.7/15 · 6.3/11 · 6.2/7.0 · 6.2/13 · 5.3/15 · 4.9/20 · 5.4/25 · [5, 1, 3] 5.7/-0.5 · 5.6/33

(circled) 5.1

2.9/35 · [0, 3, 3] 2.9/+2.2 · 1.7/19 · 3.3/13 · 6.2/9 · 6.1/7.0 · 6.0/13 · 4.3/15 · 4.7/27 · [2, 2, 3] 5.1/0.0 · 5.2/33

(circled) 5.1

3.4/35 · [0, 3] 3.4/+1.7 · 3.3/26 · 2.8/17 · 4.0/13 · 6.1/10 · 6.1/7.0 · 6.3/13 · 5.2/15 · [5, 9] 5.1/0.0 · [1, 8, 3] 6.1/-1.0 · 6.1/33

(circled) 5.0

4.8/33 · [5, 2, 3] 4.8/+0.2 · [9, 0, 2] 5.7/-0.7 · 5.6/15 · 6.2/10 · 6.1/7.1 · 6.4/14 · [3, 2] 6.4/-1.4 · [4, 9, 2] 6.9/-1.9 · 7.1/33

SPK IN 36" OAK 45 LT. STA 36+60

(circled) 3.4

4.6/33 · [4, 8] 4.6/-1.2 · [1, 2] 4.7/-1.3 · 5.6/13 · 5.1/11 · 4.6/7.2 · 5.2/14 · 5.6/22 · [7, 2] 5.5/-2.1 · 6.1/33

(circled) 3.3

6.6/33 · [1, 0, 2] 6.6/-3.3 · 6.5/14 · 5.1/10 · 4.7/-1.4 · 4.9/13 · 6.3/17 · 6.4/24 · [3, 6, 2] 6.7/-3.4 · 6.8/33

(circled) 3.3

8.8/33 · [1, 0, 3] 8.6/-5.3 · 8.2/16 · 5.3/11 · 4.9/7.6 · 5.4/13 · 8.2/18 · 8.3/23 · 7.6/26 · [1, 2] 7.6/-4.3 · 7.7/33

(circled) 3.2

10.6/35 · [0, 3] 10.6/-7.4 · 9.5/18 · 5.1/8 · 4.9/-1.7 · 5.6/14 · 8.1/18 · [1, 9, 2] 8.3/-5.1 · 8.0/33

		925.98			
39				22.8	32
+50				22.85	31
40				22.9	31
+50				22.95	30
41				23.0	30
+50				23.05	29
	5.41	726.86	4.53	921.45	
42				23.1	28
+50				23.15	27
43				23.2	27
+50				23.25	26
44				23.3	26
			1.72	925.14	
	10.85	732.30		921.45	

10-1-29

11.7	11.5	10.4	5.1	4.7	3.2	5.2	6.4	6.8					
.35	3/-.81	.20	.9	1.5		1.4	5/32	.33					
10.1	10.0	8.6	5.5	4.6	3.1	5.3	5.1	5.6					
.35	3/-.69	1.9	1.3	1.5		1.5	3/-.20	.33					
7.2	6.7	6.8	4.9	4.6	3.1	5.0	5.2	5.2	5.1				
.33	2/-.56	.25	.9	1.5		1.3	3/-.21	2/-2.1	.33				
7.1	6.2	6.0	4.8	4.5	3.0	5.0	4.8	4.7	4.7				
.33	2/-.32	.20	.10	1.5		1.4	3/-.18	2/-.17	.33				
7.3	6.7	5.0	4.4	4.9	3.0	5.0	4.0	4.2	4.1				
.33	2/-.37	.24	.14	1.2		1.4	3/-.10	3/-1.2	.33				
8.1	7.7	7.0	4.7	4.9	2.9	4.7	4.7	4.5	4.4				
.33	2/-.48	.26	.18	1.3		1.4	3/-.17	2/-1.6	.33				

ON ROCK.

10.1	9.1	5.4	5.7	5.4	3.8	6.0	6.4	5.8	6.3				
.33	3/-.55	.20	.14	1.6		1.3	1.5	4/.25	.33				
9.0	8.6	5.5	5.5	5.2	3.7	5.8	6.4	6.4	6.5	4.6	5.6	5.7	
.33	3/-.19	.23	.11	1.5		1.3	1.6	1.9	2/-.18	2/-.19	.33		
6.6	5.7	4.3	4.1	5.3	3.7	5.5	5.0	5.2	5.3				
.34	2/-.20	2/-.06	.17	.13		1.2	1.4	2/-.13	3/-.15	.33			
4.9	3.8	3.7	5.1	4.7	3.6	4.8	4.3	4.0	5.6	5.6			
.33	3/-.13	.20	.14	1.1		1.2	1.3	2/-.04	3/.60	.33			
5.2	4.9	4.2	3.0	4.9	3.6	4.7	1.9	1.5	1.6				
.43	3/-10.7	.22	.15	.12		1.0	.12	.17	3/-.21	.43			

NAIL IN STUMP LT STA. 44+10

ON ROCK.

		932.30			
+50				23.35	70
45				23.4	89
+50				23.45	89
46				23.5	88
	9.33	932.26	9.37	922.93	
+50				23.55	87
47				23.6	87
+50				23.65	86
48				23.7	86
+50				23.75	85
	7.08	930.63	8.71	923.55	
49				23.8	68
+50				23.85	68
+82				23.9	67

10-1-29

(9.0)

6.9/43   5/5/3 6.6/+2.4   6.7/22   9.9/13   9.9/-0.9   10.0/10   5.0/19   7/7/3 5.2/+3.8   5.2/43

22.6 (8.9)

5.6/43   7/7/3 5.2/+3.7   4.5/23   9.8/11   9.7/-0.8   9.9/11   4.2/20   9/8/3 4.4/+4.5   4.8/43

(8.9)

4.0/43   5/9/3 4.0/+4.9   3.7/22   2.9/14   9.7/11   9.4/-0.5   9.7/11   4.4/20   7/7/3 5.2/+3.7   5.4/43

22.9 (8.8)

4.0/43   4/9/3 4.0/+4.8   3.8/21   9.6/10   9.4/-0.6   9.4/13   4.7/20   4/7/3 5.3/+3.5   5.6/43

(8.7)

4.1/43   9/8/3 4.2/+4.5   4.1/19   9.1/11   9.2/-0.5   9.6/12   5.0/17   4/7/3 5.1/+3.6   5.3/43

23.1 (8.7)

4.7/43   0/8/3 4.8/+3.9   4.9/16   9.0/11   9.2/-0.5   9.4/12   5.2/18   0/7/3 5.5/+3.2   5.8/43

(8.6)

6.1/43   4/5.5/3 6.3/+2.3   6.6/14   8.9/11   9.0/-0.4   9.0/12   6.8/15   7/4/3 6.9/+1.7   6.8/43

(8.6)

7.7/43   1/3/3 8.0/+0.6   8.2/14   9.2/11   9.0/-0.4   9.3/14   8.2/15   6.6/20   7/3/3 7.8/+0.8   7.7/43

(8.5)

8.6/43   4/3/3 8.5/0.0   7.2/19   8.5/12   9.2/11   8.9/-0.4   9.3/14   8.3/15   1/3/3 7.9/+0.6   7.9/35   8.3/43

(6.8)

7.0/43   9/1/3 7.0/-0.2   6.8/14   7.2/12   6.8/-0.2   7.0/14   6.8/15   5.0/21   7/4/3 5.1/+1.7   5.7/43

(6.8)

5.7/43   8/5/3 5.7/+1.1   5.6/28   5.4/14   7.0/12   6.8/0.0   7.0/13   5.2/15   3.5/29   2/5/3 4.4/+2.4   4.8/43

(6.7)

5.5/43   5.3/15   6.5/12   7.0/11   6.6   7.0/12   4.0/16   1.2/25   1.5/27   3.4/30   4.2/43

		930.63 ✓			
50				23.9	6.7
+35				24.0 ✓	6.6
B.M.			5.77	924.86	924.84

SEE PAGE 20

10-1-27

53	54	53	67	65	68	61	40	43	43	40
43	54	114	11	702	19	27	33	54	24	43

(67)

61	62	62	68	56	54	44	43	
43	15	704	15	24	54	23	43	

(66)

SPK IN 18 OAK. 55 LT. STA. 48185.

NOTE: SEE PAGE 56 FOR X-SEC.
FROM 117+00 to 122+00

13.N1	1.13	924.98		923.85		
122				21.5	2.1	3.5 4
+50				21.5	2.1	3.5 4
123				21.4	2.2	3.4 5
+50				21.4	2.2	3.6 5
124				21.3	2.3	3.7 5
+50				21.3	2.3	3.7 5
125				21.3	2.3	3.7 5
+50				21.4	2.2	3.6 5
126				21.5	2.1	3.5 4
+50				21.65	1.9	3.3 4
	4.95	926.95	2.98	922.00		
127				21.8	4.0	5.2 6
+50				21.95	4.2	5.0 5

10-8-29

3.5

57	56	9	58	54	52	49	1	52	70	7	74	70	40	37	
45	30	4	27	18	03	14	2	03	28	3	25	35	40	45	

3.5

55	57	1	54	52	45	53	3	50	3	53	57	72	3	74	79	52	49
45	28	2	33	27	22	18	04	14	2	04	24	27	2	25	32	34	45

3.6

58	56	1	60	37	40	53	3	55	57	70	7	75	79	55	54
45	29	2	28	19	04	16	2	05	23	27	2	25	33	34	45

3.6

46	52	57	53	5	47	44	35	42	53	9	57	68	8	73	75	49	48
41	37	33	28	2	23	23	16	06	17	2	07	26	2	23	31	38	48

3.7

43	39	45	3	41	37	4	50	9	53	66	7	71	76	67	36	36
36	39	27	2	18	18	04	16	9	02	26	3	20	32	35	42	45

3.7

42	42	43	37	4	36	36	5	49	9	53	54	67	9	69	72	61	36	36
50	45	38	31	2	13	16	02	15	9	02	22	28	9	12	38	38	44	45

3.7

1	54	46	1	45	37	9	45	33	3	9	41	1	54	74	60	20	
8	36	31	2	22	26	4	12	18	02	12	2	03	33	37	45		

3.6

2	36	32	48	54	5	47	45	35	42	43	47	9	52	64	2	70	71	64	28	28
5	40	37	33	30	2	25	24	20	02	10	16	9	02	26	9	20	32	35	44	45

3.7

34	37	32	50	3	39	46	33	36	42	7	50	66	9	69	72	63	28	28
45	37	36	31	2	38	28	19	01	11	9	01	27	9	26	32	24	42	45

3.3

42	46	41	54	3	53	53	33	38	54	7	49	69	9	65	66	60	39	32
45	34	34	29	2	34	26	20	00	14	9	00	21	27	2	18	32	35	40	45

5.2

63	67	62	5	80	76	55	51	5	58	6	62	70	71	67	2	64	69	60	54
45	45	53	2	40	25	18	12	10	14	9	102	25	27	30	3	00	34	37	41

6.0

6	61	69	63	57	5	57	54	57	58	5	57	54	6	52	58	9	57	57
-19	26	24	23	4	15	18	16	14	-01	12	13	9	06	23	5	01	33	

		926.95				
128				22.1	4.5	4.9
+50				22.25		4.7
129				22.4		4.6
	4.78	927.28	4.45	922.50		
+50				22.55		4.7
130				22.7		4.6
+50				22.85		4.4
131				23.0		4.3
+50				23.15		4.1
132				23.3		4.0
+50				23.45		3.8
133				23.6		3.7
B.M.			1.39	925.89		925.86
B.M.	2.56	926.41		923.85		
	5.77	928.38	3.80	922.61		

10-8-29

4.9

57	3	58	58	57	3	54	55	49		55	52	5	45	49		48	44				
50	3	13	27	24	2	-07	13	00		12	13	1	08	24	3	10	35				

4.7

57	6	58	58	62	58	3	57	55	46		51	47	44		3	41	41				
33	3	11	21	26	25	2	-10	14	10		12	13	20		3	10	35				

4.6

60	4	58	57	62	57	4	58	58	53	46		50	48	45	3	46	51	2	47	48	
33	3	-12	22	25	23	2	-12	17	14	00		11	13	16	1	00	26	3	-01	35	

4.7

62	3	60	61	64	57	5	57	57	49		52	49	4	49	5	51	5	1			
33	3	-13	27	25	23	2	-10	13	-01		11	15	1	-02	22	3	-04	33			

4.6

55	4	55	56	7	52	54	56	46		53	49	48	45	41	3	39	39				
33	3	-07	23	2	-06	15	14	00		12	13	18	20	22	3	10	35				

4.4

54	7	54	58	51	1	52	55	47		62	50	7	45	57	5	54	33				
33	3	-10	23	22	2	-08	14	-03		12	13	19	01	24	3	10	33				

4.3

57	4	57	59	64	4	60	57	56	56	48		54	52	6	50	46	44	2	43	42	
33	2	-16	25	24	2	-17	21	20	13	-05		12	13	2	07	23	27	3	00	35	

4.1

66	4	67	66	62	55	48		55	56	58	2	48	3	56	55						
33	2	-26	21	15	12	-07		13	17	17	2	-17	3	-15	33						

4.0

62	4	59	60	2	57	58	62	57	48		55	57	65	4	3	60	64				
0	2	-19	28	2	-16	21	18	13	-08		13	17	21	2	-20	33					

3.8

55	8	54	53	7	49	60	57	55	54	46		51	54	63	5	66	67	62			
3	2	-16	28	2	-11	18	17	15	12	-08		12	14	19	2	-28	28	33			

3.7

56	9	55	50	4	50	55	51	54	51	43		51	54	55	62	4	64	2			
33	2	-18	19	2	-13	18	17	14	13	-06		12	13	17	20	2	-27	33			

		928.38			
133+50				23.75	4.6
134				23.9	4.5
+50				24.05	4.3
135				24.2	4.2
+50				24.35	4.0
136				24.5	3.9
+50				24.65	3.7
137				24.8	3.6
	5.19	930.43	3.14	925.24	
+50				24.95	5.5
138				25.1	5.3
+50				25.25	5.2
139				25.4	5.0

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4.6

68	67	68	64	57	52	58	69	74	70		
33	-2.1	-1.7	21	13	-0.6	12	18	-24	38		

4.5

60	58	57	52	54	61	56	49	57	64	65	62	60
33	-1.3	26	23	-0.9	19	13	-0.5	12	17½	-20	-17	30

4.3

45	44	37	44	50	52	46	52	57	51	49	
33	-2.1	23	-0.1	16	13	-0.5	12	-14	-08	33	

4.2

37	35	31	39	45	47	42	49	52	47	52	48	49
35	-0.7	33	20	17	14	0.0	12	15	17½	-10	-06	38

4.0

39	36	36	35	39	41	46	44	53	56	53	54	
35	-0.4	24	19	-0.1	16	10.1	11	12½	-18	-13	33	

3.9

38	38	37	37	41	45	51	42	45	47	45	46	
33	-0.1	26	-0.0	14	13	10.2	11	-0.6	26	-0.6	33	

3.7

39	38	37	40	51	59	52	54	53	53		
33	-0.1	15	12	10.2	11	15	20	-04	33		

3.6

35	34	36	39	51	57	54	38	26	26		
33	-0.2	14	12	10.2	11	12	17	-10	35		

3.5

44	44	45	52	57	54	51	46	48	48		
35	-0.1	22	15	14	10.4	11	12	16	-07	35	

3.3

32	35	38	48	55	49	54	49	41	44	43	
35	-0.1	28	16	13	10.4	11	14	19	-09	35	

3.2

31	32	32	44	51	55	47	52	49	42	45	46
35	-0.1	29	19	14	13	10.5	12	16	20	-07	33

3.0

36	38	39	46	52	54	47	54	56	53	54	55
35	-0.2	24	19	14	12	10.3	12	18	20	-03	-21	33

		930.43 ✓			
+50				25.55	4.9
140				25.7	4.7
+50				25.85	4.6
141				26.0	4.4
+50				26.15	4.3
142				26.3 ✓	4.1
	3.90	930.71 ✓	3.62	926.81	
+50				26.45	4.3
143.				26.6	4.1
+50				26.7	4.0
144				26.8	3.9
+50				27.0	3.7
145				27.0 ✓	3.7
B.M.	3.41	930.73 ✓	3.41	927.30	927.32

10-14-29

(4.9)

4.5/3.5 3.28/+0.4 1.9/-0.2 5.1/12 4.7/+0.2 5.2/12 5.7/18 2.1/-0.8 3.0/3 6.2/-1.3 6.1/33

(4.7)

5.4/33 3.3 5.3/-0.6 2.07 5.3/-0.6 5.0/12 5.3/11 4.6/+0.1 5.3/13 1.9 5.8/-1.1 3.0 5.8/-1.1 5.8/33

(4.6)

5.4/33 3.12 5.3/-0.7 2.11 5.4/-0.8 4.9/14 5.3/13 4.4/+0.2 5.4/14 5.2/19 2.01 5.2/-0.6 4.7/27 3.22 4.6/0.0 4.6/33

(4.4)

4.2/33 3.25 4.2/+0.2 5.0/30 2.01 4.7/-0.3 4.4/16 4.9/14 4.1/+0.3 4.8/12 5.2/19 2.01 5.0/-0.6 4.3/25 3.28 4.0/+0.4 4.2/35

(4.3)

3.5/35 3.30 3.4/+0.4 3.9/15 4.6/12 4.0/+0.3 4.7/12 5.2/19 2.5 4.8/+0.5 4.2/22 3.18 4.6/-0.3 4.9/33

(4.1)

3.5/35 3.30 3.5/+0.6 4.0/23 2.01 4.4/-0.3 4.2/16 4.8/12 4.1/0.0 4.8/13 5.2/19 2.16 5.1/-1.0 3.3 5.4/-1.3 5.4/33

(4.3)

4.6/33 3.18 4.6/-0.3 1.97 4.4/-0.1 4.7/18 5.0/12 4.4/-0.1 5.1/13 5.8/19 2.25 5.8/-1.5 3.01 5.7/-1.4 5.6/33

(4.1)

4.4/33 3.18 4.4/-0.3 2.07 4.7/-0.6 4.5/16 5.1/13 4.3/-0.2 5.0/13 4.9/14 5.3/19 2.15 5.1/-1.0 3.04 5.3/-1.2 5.3/33

(4.0)

3.12 4.7/-0.7 4.7/27 2.9 4.7/-0.7 4.8/20 4.6/17 5.2/16 4.3/-0.3 5.3/14 5.0/16 2.31 5.3/-1.3 3.07 5.0/-1.0 5.1/33

(3.9)

5.3/33 3.01 5.5/-1.4 2.3 5.3/-1.4 5.0/17 5.5/16 4.4/-0.5 5.4/14 5.8/16 2.25 5.6/-1.5 2.94 5.5/-1.6 5.6/33

(3.7)

5.7/33 2.91 5.8/-2.1 2.35 5.7/-2.0 5.2/14 5.6/15 4.6/-0.7 5.2/13 6.0/19 2.41 6.0/-2.3 2.46 6.1/-2.4 6.1/33

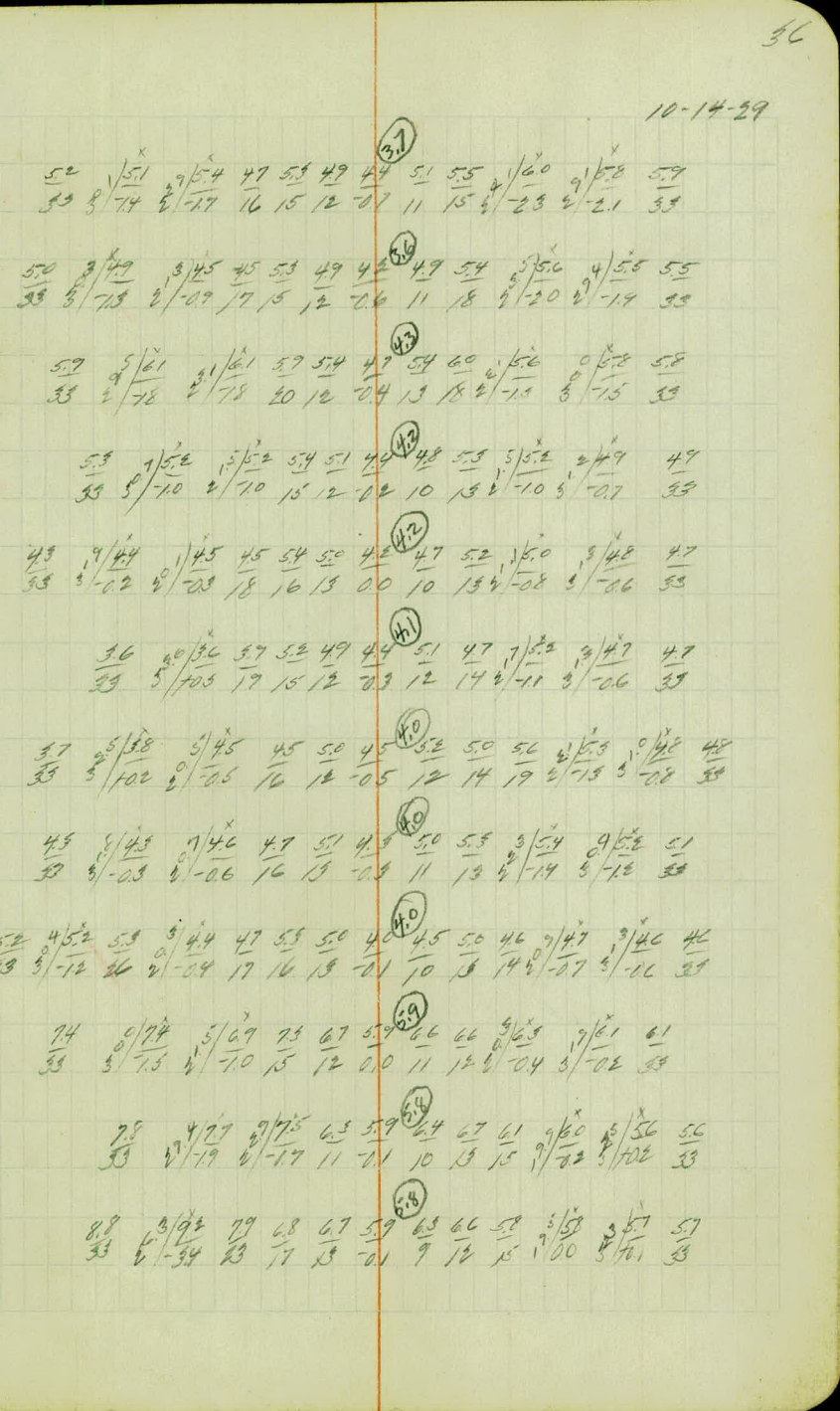
(3.7)

5.5/33 2.95 5.5/-1.8 2.33 5.6/-1.9 5.2/17 5.5/15 4.4/-0.7 5.4/13 5.9/18 2.47 6.3/-2.6 6.4/33

SPK IN 12" OAK 60 LT. STA 145+05.

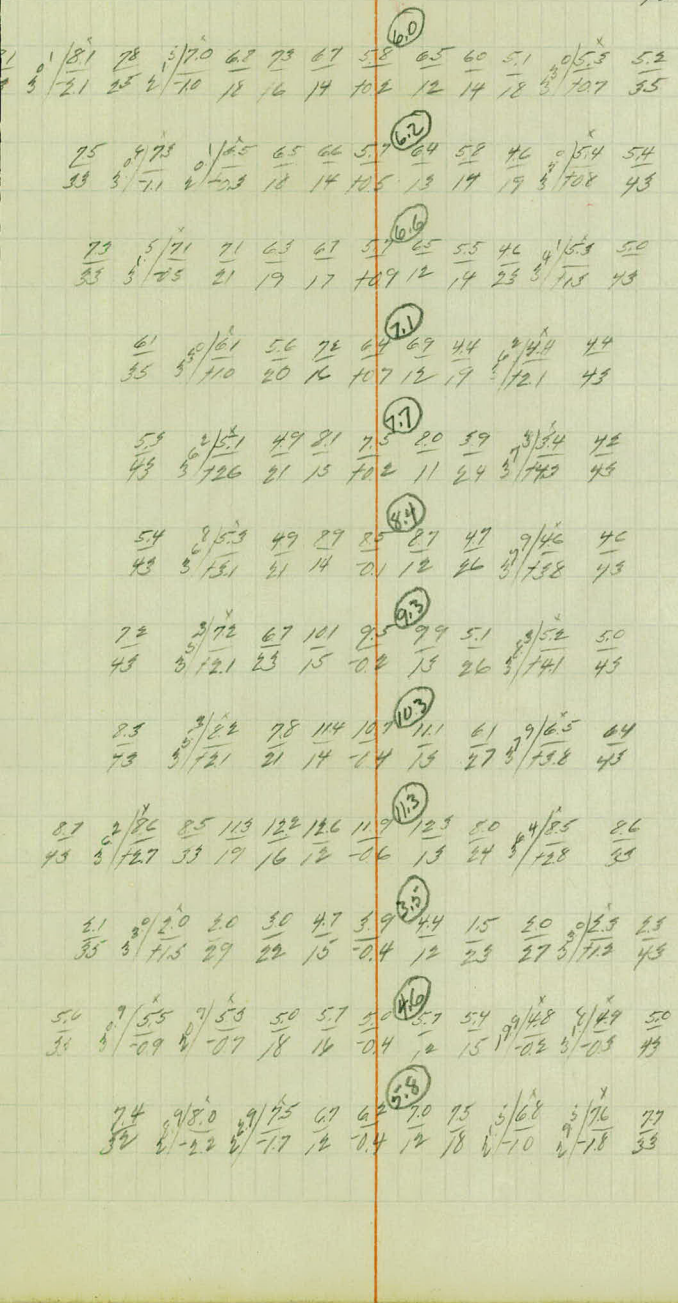
		930.78			
+50				27.05	3.7
146				27.1	3.6
T.P.	4.36	931.40	3.67	927.04	
+50				27.15	4.3
147				27.2	4.2
+50				27.25	4.2
148				27.3	4.1
+50				27.4	4.0
149				27.4	4.0
+50				27.45	4.0
	6.07	933.39	4.08	927.32	
150				27.5	5.9
+50				27.55	5.8
151				27.6	5.8

10-14-29



		933.39			
150				27.4	6.0
152				27.2	6.2
150				26.8	6.6
153				26.3	7.1
150				25.7	7.7
154				25.0	8.4
150				24.1	9.3
155				23.1	10.3
150				22.1	11.3
	3.64	924.40	12.63	920.76	
156				20.9	3.5
150				19.8	4.6
157				18.6	5.8

10-14-29



		924.40			
+50				17.5	6.9
	2.34	918.87	7.87	916.53	
158				16.3	2.6
B.M.	2.84	918.89	2.84	916.03	916.03
+50				15.2	3.7
159				14.1	4.8
+50				13.2	5.7
160				12.4	6.5
T.P.	7.19	915.64	10.44	908.45	
+50				11.8	3.8
161				11.3	4.3
+50				11.0	4.6
162				10.7	4.9
+50				10.45	5.2
163				10.2	5.4

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(6.9)
100 9/7.0 3/9.8 8.8 8.0 7.4 8.1 4/5/9.4 9.4
33 2/-2.1 5/-1.9 17 12 -0.5 12 2/-2.5 33

(2.6)
5.9 4/4.9 4.6 3.6 2.9 3.4 5/4.1 4.4
33 2/-2.3 16 12 -0.3 12 2/-1.5 33

PK IN 15" OAK 60' LT. STA. 157+30.

(3.7)
7.4 7/7.6 8.1 4.9 4.3 5.0 6.4 7/7.3 7.5
33 2/-3.9 20 11 -0.6 12 18 6/2/-3.6 33

(4.8)
8.9 5/9.3 9.4 9.9 9.4 6.2 5.7 6.2 9.4 10.1 9/7.9 10.0
33 2/-4.5 25 23 19 11 -0.9 12 20 24 2/5.1 33

(5.7)
9.0 6/7/9.3 10.0 9.8 7.3 6.7 7.2 10.5 11.1 7/11.3 11.4
33 2/-3.6 22 19 11 -1.0 12 20 26 3/0/-5.6 33

(6.5)
7.4 9/7.3 3/7/8.6 9.4 8.5 7.6 7.2 7.8 8.9 10.3 11.5 9.5/11.7 11.7
33 5/1/-0.8 2/-2.1 20 13 10 -0.6 13 17 20 25 2/-5.2 33

NAIL IN P.P. RT. STA. 160+40

(3.4)
2/9/3.3 3.4 1/4.9 5.2 5.5 5.3 4.7 4.3 5.0 6.3 7.3 9/7.4 8.0
3/+0.5 24 2/-7.1 21 16 15 11 -0.5 13 18 25 2/-3.6 33

(4.3)
3.0 3/0/2.5 3.8 4.0 5.0 5.0 4.4 5.6 6.6 6/6.4 6.9
35 3/+1.8 23 19 13 11 -0.1 13 17 2/-2.1 33

(4.6)
3.2 3/0/2.9 4.2 5.5 5.2 4.7 5.2 1/5.7 3/5.9 6.1
35 3/+1.7 19 13 10 -0.1 12 2/-1.1 3/0/-1.3 33

(4.9)
5.5 5/0/3.5 4.2 9/5/4.9 5.0 5.8 5.5 5.0 5.4 7/5.7 1/0/5.7 5.8
35 3/+1.4 24 1/0.0 17 13 11 -0.1 12 2/0/-0.8 3/-0.8 33

(5.2)
2 3/0/4.0 4.5 9/5/5.4 5.4 6.0 6.0 5.3 5.4 5/5.2 2/5.2 5.2
5 3/+1.2 25 1/0.0 17 14 12 -0.1 12 1/9/0.0 3/0.0 33

(5.4)
4.5 3/0/4.4 4.7 6.5 6.4 5.8 6.1 6.3 5.3 4.8 3/9/4.2 4.2
35 3/+1.0 18 14 10 -0.8 12 15 20 24 3/+1.2 35

		915.64			
+50				09.95	5.7
164				09.7	5.9
+50				09.45	6.2
165				09.2	6.4
	3.02	911.54	7.12	908.52	
+50				08.95	2.6
166				08.7	2.8
+50				08.45	3.1
167				08.2	3.3
+50				07.95	3.6
168				07.7	3.8
+50				07.6	3.9
169				07.5	4.0

(5.7)
42/35 · $^{3}_{3}{}^{0}$ 3.9ˣ/+18 · 4.3/22 · 4.8/20 · 5.5/16 · 6.3/13 · 6.5/11 · 6.0/-0.3 · 6.4/11 · 6.2/16 · 5.1/19 · 4.3/23 · $^{0}_{3}{}^{3}$ 3.4ˣ/+23 · 3.2/35

(5.9)
4.4/35 · $^{3}_{3}{}^{0}$ 4.3ˣ/+1.4 · 4.5/20 · 7.0/15 · 6.5/-0.4 · 6.9/13 · 4.6/22 · 3.5/32 · $^{3}_{3}{}^{0}$ 3.5ˣ/+2.4 · 3.5/35

(6.2)
5.6/33 · $^{6}_{3}{}^{2}$ 5.9ˣ/+0.3 · 5.9/18 · 7.3/14 · 6.8/-0.4 · 7.3/14 · 6.0/19 · 5.1/25 · $^{3}_{3}{}^{0}$ 4.9ˣ/+1.3 · 4.9/35

(6.4)
7.5/33 · $^{3}_{3}{}^{0}$ 7.7ˣ/-1.3 · $^{8}_{2}{}^{0}$ 7.3ˣ/-0.9 · 7.1/16 · 8.0/14 · 7.2/-0.8 · 7.2/12 · $^{4}_{2}{}^{0}$ 7.0/-0.2 · $^{8}_{3}$ 6.7ˣ/-0.3 · 6.6/33

(2.6)
5.0/33 · $^{5}_{2}{}^{9}$ 4.4ˣ/-1.8 · $^{3}_{2}{}^{2}$ 4.5ˣ/-1.9 · 5.1/19 · 4.2/12 · 3.4/-0.8 · 3.9/11 · 4.2/17 · $^{2}_{2}{}^{1}$ 3.7ˣ/-1.1 · $^{0}_{3}$ 4.0ˣ/-1.4 · 3.6/33

(2.8)
5.9/33 · $^{5}_{2}{}^{6}$ 6.3ˣ/-3.5 · 6.4/20 · 4.3/11 · 3.8/7.0 · 4.6/11 · 5.6/19 · $^{5}_{2}{}^{5}$ 5.8ˣ/-3.0 · 5.7/33

(3.1)
6.4/33 · $^{5}_{2}{}^{5}$ 7.1ˣ/-4.0 · 7.1/23 · 4.9/12 · 4.2/7.1 · 5.0/12 · 7.4/19 · $^{6}_{2}{}^{1}$ 7.5ˣ/-4.4 · 7.6/33

(3.3)
7.3/33 · $^{5}_{2}{}^{8}$ 7.8ˣ/-4.5 · 8.0/24 · 5.4/14 · 4.5/7.2 · 5.0/11 · 8.4/19 · 8.7/24 · 8.2/25 · $^{5}_{2}{}^{9}$ 8.3ˣ/-5.0 · 8.4/33

(3.6)
8.0/33 · $^{5}_{2}{}^{9}$ 8.6ˣ/-5.0 · 9.3/27 · 8.9/22 · 5.4/13 · 4.8/-1.2 · 5.7/12 · 8.5/18 · 7.5/24 · $^{5}_{3}{}^{8}$ 9.1ˣ/-5.5 · 9.0/33

(3.8)
8.1/33 · $^{1}_{2}{}^{9}$ 8.6ˣ/-4.8 · 9.0/28 · 9.2/22 · 5.3/12 · 4.9/-1.1 · 5.9/14 · 9.8/23 · $^{5}_{3}{}^{1}$ 9.8ˣ/-6.0 · 9.8/33

(3.9)
7.4/33 · 7.5/30 · $^{3}_{2}{}^{4}$ 8.3ˣ/-4.4 · 9.1/20 · 5.2/13 · 4.8/-0.9 · 5.4/12 · 8.0/18 · 8.4/22 · 9.4/26 · $^{3}_{3}{}^{0}$ 9.3ˣ/-5.4 · 9.3/33

(4.0)
7.1/33 · 7.6/30 · $^{3}_{2}{}^{8}$ 8.4ˣ/-4.4 · 9.1/26 · 8.5/20 · 5.6/13 · 4.6/-0.6 · 5.0/12 · 9.4/20 · $^{0}_{3}{}^{1}$ 10.0ˣ/-6.0 · 10.0/33

		911.54			
+50				07.6	3.7
170				07.7	3.8
B.M.	4.49	912.73	3.28	908.26	908.24
+50				07.8	4.7
171				08.0	4.7
+50				08.2	4.5
172				08.4	4.3
+50				08.6	4.1
173				08.8	3.9
	5.67	914.27	4.13	908.60	
+50				09.0	5.3
174				09.2	5.1
+50				09.4	4.9
175				09.6	4.7
			2.91	911.36	

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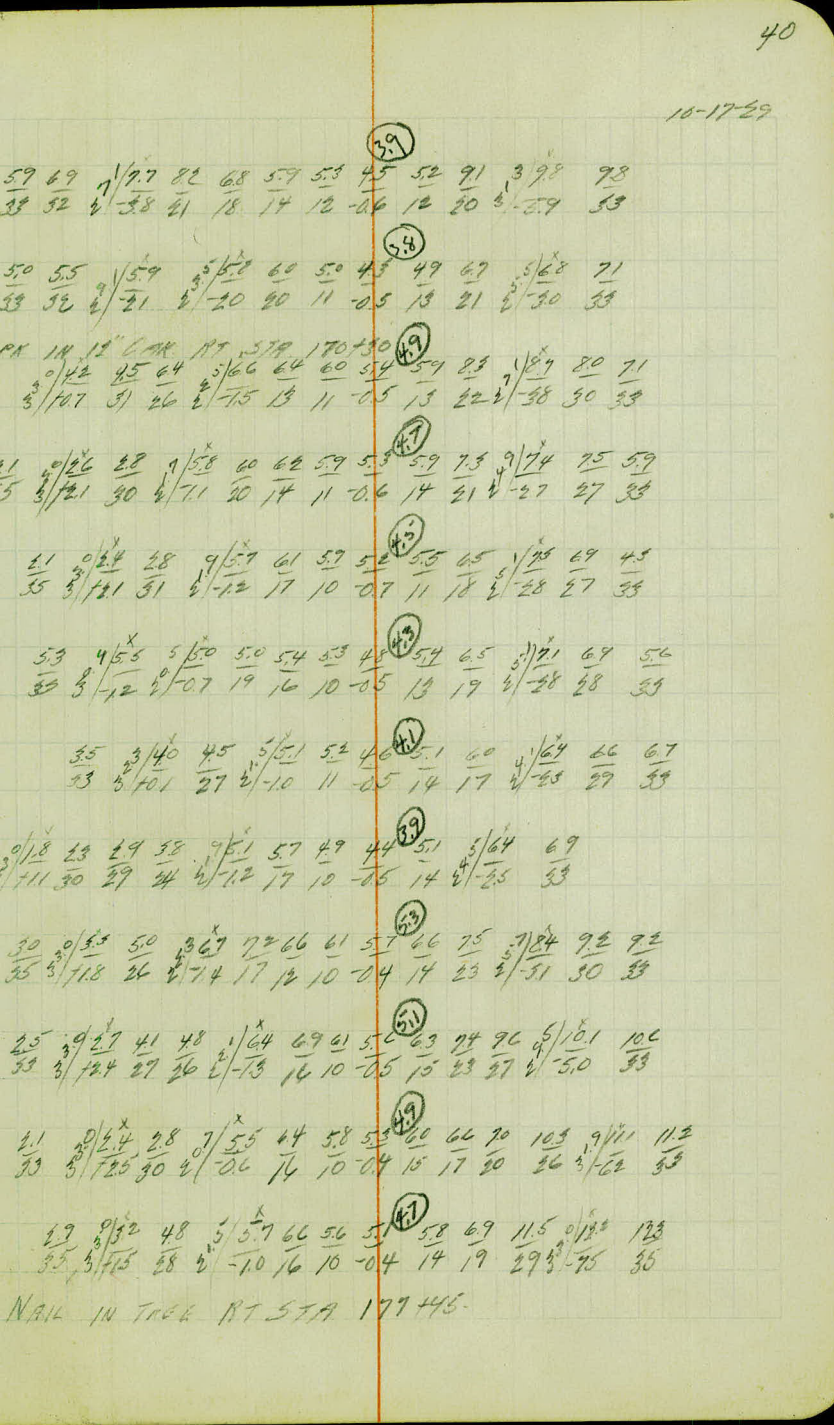

B.M.	5.26	913.50		908.24	
	4.71	915.39	2.82	910.68	
175+50				09.8	5.6
176				10.0	5.4
+50				10.2	5.2
177				10.4	5.0
+55				10.6	4.8
	11.19	923.49	3.09	912.30	
178				10.8	12.7
+50				11.0	12.5
179				11.2	12.3
+50				11.4	12.1
180				11.5	12.0
+50				11.6	11.9
	2.64	915.65	10.48	913.01	
B.M.	4.65	916.88	3.42	912.21	912.23

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SPK IN 12" OAK RT. STA. 170+30

(5.6)

6.0 3/6.2 7.0 9/7.3 8.0 6.4 5.7 6.5 11.0 12.4 0/12.6 12.7
33 3 -0.6 26 2 -1.7 16 11 -0.1 13 22 31 3 -7.0 35

(5.4)

6.4 6/6.5 5/7.4 7.9 6.3 5.8 5.3 6.0 7.0 10.4 9/11.6 12.0
33 3 -7.1 2 -2.0 17 12 10 +0.1 13 17 25 3 -6.2 35

(5.3)

5.2 3/5.8 9/6.4 6.7 6.0 5.3 4.8 5.3 6.4 8.4 7/8.8 9.6
33 3 -0.6 2 -1.2 18 13 9 +0.4 12 16 24 2 -3.7 33

(5.0)

4.0 0/4.0 3/5.0 5.3 5.0 4.3 5.0 5/6.0 6.6 5/6.8 6.8 7.2
43 3 +1.0 1 0.0 15 10 +0.7 13 2 -1.0 26 2 -1.8 33 43

(4.8)

2.5 4/2.0 1.9 2.1 3.0 4.7 4.4 3.7 4.5 5.5 4.3 3/4.1 4.5
43 3 +2.8 35 43 20 14 11 +1.1 12 19 25 3 +0.7 43

(12.7)

9.4 9.5 9/8.9 8.8 9.3 9.7 12.2 11.9 11.2 12.1 11.7 11.5 10.4 7/10.5 10.7
43 40 3 +3.8 36 30 22 14 10 +1.5 16 20 26 30 3 +2.2 43

(12.5)

7.4 1/7.3 6.9 6.6 7.0 7.6 10.9 11.6 11.2 10.6 11.3 11.1 7.8 7.1 2/7.8 7.4
43 4 +5.2 38 35 32 22 18 14 10 +1.9 13 24 33 37 3 +4.7 43

(12.3)

5.4 5/5.4 4.8 4.5 5.2 9.9 11.1 10.9 10.2 10.9 9.7 4.6 0/4.7 4.9
45 4 +6.9 38 33 27 20 15 11 +2.1 17 24 34 4 +7.6 45

(12.1)

6.0 5/5.9 5.9 5.5 5.5 9.7 10.4 10.3 9.7 10.2 10.2 9.0 5.2 4/5.5 5.4
43 4 +6.2 39 37 30 24 20 12 +2.4 12 21 26 35 4 +6.8 45

(12.0)

8.5 8.6 9/8.2 8.1 7.8 8.5 10.6 10.2 9.6 10.4 10.6 7.7 7.1 7/7.0 6.9
43 39 3 +3.8 37 31 19 14 11 +2.4 14 22 31 35 3 +5.0 45

(11.9)

9.9 9.9 9/9.7 9.2 10.6 11.2 10.4 10.0 10.5 11.1 10.5 9.0 8.4 7/8.6 8.6
43 39 3 +2.5 37 21 15 9 +1.9 12 16 25 30 35 3 +3.3 43

		916.88 ✓			
181				11.6	5.3
+30				11.6	5.3
182				11.5	5.4
+30				11.4	5.5
183				11.2	5.7
+30				11.0	5.9
184				10.7	6.2
+30				10.5	6.4
+60				10.4	6.5
185				10.2	6.7
+50				10.0 ✓	6.9
	4.35	914.63 ✓	6.0	910.28	
186				09.7	4.9

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5.3

45 41 6/37 36 50 51 47 39 45 50 47 3/52 34
43 37 3/116 35 22 16 12 11.4 13 16 27 5/121 43

5.3

45 7/43 44 59 50 45 52 1/56 58 9/47 45
35 3/110 27 20 10 10.2 12 2/-03 27 3/106 35

5.4

67 9/63 67 3/63 70 56 53 49 55 68 5/69 69 8/70 72
37 5/109 37 2/-14 19 12 9 10.5 13 19 2/-15 29 2/-16 33

5.3

78 80 7/81 83 60 58 54 59 74 5/75 4/74 74
33 30 2/-26 25 12 10 10.1 11 20 3/-20 2/-19 33

5.1

87 73 3/71 88 67 64 59 64 74 3/76 5/75 73
33 31 2/-34 20 12 8 10.2 10 18 2/-19 2/-18 33

5.9

85 5/87 87 67 64 64 76 7/75 0/74 73
33 2/-28 19 13 10.5 12 18 2/-16 2/-15 33

6.2

103 7/95 77 67 64 67 5/77 8/78 79
33 5/-31 19 10 10.2 13 2/-15 2/-16 33

6.4

67 67 63 63 65
33 19 19 33

6.5

65 2/65 65 68 68 2/70 70 71 65 69 63 64 9/68 69
33 2/10 31 28 24 2/-05 18 13 0.0 11 16 20 3/-03 33

6.7

75 2/74 5/72 69 73 68 68 67 70 7/67 63 41 2/40 44
33 6/-07 2/-05 13 10 10.1 12 14 16 9/-01 25 35 3/42.7 43

6.9

60 0/58 56 68 75 73 66 71 76 5/69 9/64 57
35 3/111 29 19 16 12 12.3 12 15 2/-00 2/-05 43

4.9

42 3/40 39 46 54 47 42 48 54 4/54 37 37
35 3/109 30 19 14 11 10.7 11 14 3/45 40 43

		914.63			
+50				07.5	5.1
187				07.2	5.4
+50				07.0	5.6
188				02.7	5.7
+50				08.5	6.1
189				08.2	6.4
+50				08.0	6.4
	6.07	911.35	9.35	905.28	
190				07.7	3.7
+50				07.5	3.7
191				07.2	4.2
+50				07.0	4.4
192				06.7	4.7

5.1

43	41	40	45	49	37	44	49	57	52	28	29
35	110	25	19	13	11.2	12	13	18	28	123	43

2.4

47	45	48	45	52	46	40	48	37	37	28	34	34
35	70.9	28	21	15	10	11.4	13	17	20	22	26	43

5.6

46	44	44	42	58	53	47	53	59	49	40	41	41
35	108	29	25	15	12	10.9	11	13	17	33	115	43

5.9

56	54	62	66	67	60	55	61	65	61	57	54	58
35	125	26	-0.7	14	11	10.4	11	14	-02	28	105	43

6.1

63	59	78	80	80	73	65	62	69	82	81	78	74	74	72
35	102	26	-19	20	15	11	10.1	12	20	-20	27	23	-13	33

6.4

78	91	89	91	75	77	77	89	89	91
33	28	-25	21	11	-0.7	13	22	-25	33

6.6

99	97	101	80	77	84	103	104	102
33	-3.1	20	11	-1.4	11	17	-38	33

3.7

58	64	67	70	55	50	47	54	73	79	50
33	81	-30	18	15	10	-1.0	12	17	-42	33

8.9

44	44	54	58	50	49	56	75	76	77
33	-0.0	26	-19	11	-1.0	12	18	-37	33

4.2

40	41	41	53	57	51	48	54	67	64	61	65
33	-0.1	31	27	-16	11	-0.6	13	19	-22	-19	33

4.4

45	43	50	45	52	49	46	49	63	64	62	61
33	-0.1	27	-01	18	11	-0.2	10	17	-20	-18	33

4.7

57	54	54	49	47	51	66	66	66	67
33	-0.7	-0.7	11	0.0	11	19	-19	-19	33

		911.35 ✓			
+50				064	5.0
193				060	5.4
+50				057	5.7
194				052	6.2
+50				047	6.7
195				042	7.2
+50				037 ✓	7.7
	2.84	907.87 ✓	4.32	907.03	
196				032	6.7
+50				027	7.2
197				022	7.7
+50				017 ✓	8.2
B.M.	1.52	908.37 ✓	3.04	906.83 ✓	906.85
198				012	7.2

10-21-29

(5.0)

6.5/33 3 0 1/6.4/-1.4 3 0 2/5.4/-0.4 5.0/12 5.3/10 4.7/+0.3 5.2/9 4.7/10 5.4/15 6.9/20 3 2 3/6.9/-1.9 4 9 2/6.9/-1.9 7.0/53

(5.4)

4.9/43 3 0 3/4.6/+0.8 5.1/19 4.5/+0.9 4.9/9 4.7/10 5.0/19 3 1 3/6.0/-0.6 6.1/33 6.3/43

(5.7)

3.4/43 6 2 3/3.0/+2.7 1.6/27 3.9/24 4.8/11 5.0/10 4.6/+1.1 5.0/9 4.8/10 4.5/17 4.0/25 7 3 3/4.7/+1.0 4.8/55

(6.2)

3.0/43 9 7 3/2.4/+3.8 1.2/32 1.1/29 4.9/14 5.0/10 4.6/+1.6 5.0/9 4.6/10 4.7/13 3.0/22 9 9 3/4.4/+1.8 4.6/43

(6.7)

3.6/43 5 8 3/1.5/+4.2 0.7/29 4.0/17 4.9/12 4.4/+2.3 4.9/9 4.7/12 2.5/20 3.8/32 4 6 3/3.9/+2.8 4.0/43

(7.2)

3.7/43 3 8 3/3.1/+4.1 1.3/30 4.9/14 4.4/+2.8 4.9/9 4.8/12 2.9/22 6 7 3/3.6/+3.6 4.0/43

(7.7)

4.9/43 2 8 3/3.7/+4.0 1.7/30 5.1/15 4.4/+3.3 4.9/9 4.8/10 4.5/19 4.3/24 2 6 3/5.0/+2.7 4.7/43

(6.7)

4.6/43 2 6 3/3.9/+2.8 2.8/31 3.8/25 4.1/20 4.2/11 3.7/+3.0 4.2/10 3.9/14 3.7/18 5.0/23 8 3 3/5.6/+1.1 5.4/43

(7.2)

6.6/43 6 4 3/5.6/+1.6 4.5/31 3.7/26 5.3/11 4.8/+2.4 5.1/10 5.7/12 4.9/13 4.8/24 6.5/28 3 3 3/6.5/+0.7 6.5/43

(7.7)

8.3/43 2 3 3/7.0/+0.7 6.3/20 6.4/12 6.7/10 6.1/+1.6 6.7/11 6.3/14 5.1/23 0 7 3/6.5/+1.2 6.9/43

(8.2)

8.8/33 2 2 3/8.2/+0.0 8.6/28 7.4/22 7.8/13 7.3/+0.9 7.8/11 5.6/20 6.1/22 8 6 3/5.1/+3.1 5.4/43

(7.2)

9.4/43 0 3/8.7/+1.5 1 2/7.8/-0.6 8.0/15 7.3/11 7.0/+0.2 7.6/11 6.5/18 6.7/22 3.7/29 8 3/3.3/+3.9 3.1/43

		908.37			
+50				00.7	7.7
199				00.2	8.2
	3.05	901.79	7.63	898.74	
+50				99.7	12.2 2.1
200				99.2	12.4 2.4
+50				98.7	12.6 3.1
201				98.2	12.8 3.4
+50				97.7	13.0 7.1
	9.85	908.57	3.05	898.74	
B.M.			1.74	906.83	906.83

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7.7

115	107	103	3	96	91	93	86	81	84	91	81	3	56	71	5	48	45
43	33	26	2	-19	20	16	12	-1.4	10	13	16	2	-0.8	30	3	7.9	43

8.2

	144		9	129	126	95	91	85	101	71	1	100	70	3	68	57	
	43		8	-4.7	25	11	-0.9	10	13	19	2	-1.8	30	3	7.7	43	

2.1

	98		9	97	92	3	92	80	44	41	45	42	53	3	2.4	1.5	
	45		4	12.5	34	3	-7.1	24	11	-2.0	10	18	23	3	-0.3	43	

2.6

	114		3	110	105	3	104	101	58	54	57	63	55	62	69	63	49	4	46	5.6
	45		4	11.4	40	3	-7.8	25	12	-2.8	10	13	16	18	23	-3.7	30	3	1.7	43

3.1

	122		3	122	3	1	117	114	72	66	70	70	83	3	75	68	0	60	61
	45		4	10.4	3		-5.8	23	11	-3.5	10	22	25	2	-4.4	30	3	1.0	43

3.6

	122		3	123	5	121	118	91	77	73	79	80	105	103	1	92	2	85	84
	45		4	10.5	3	18.5	22	13	11	-3.7	10	14	21	28	3	-5.6	4	12.5	43

4.1

	118		3	118	3	1	117	117	91	81	76	82	80	110	1	114	5	110	116
	43		4	11.2	3		-7.8	26	15	11	-3.5	8	9	18	3	-7.3	4	11.0	43

13.M.	4.53	908.80		904.27		
	1.82	903.45	7.17	901.63		
	5.66	898.49	8.62	894.83		
216+50				95.2	3.3	
217				95.4	3.1	
+50				95.6	2.9	
218				95.8	2.7	
+50			5.41 5.17	96.1	2.4	
	7.86	902.69	3.64	894.83		
219				96.4	4.3	
+50				96.8	3.9	
220				97.2	3.5	
+50				97.6	3.1	
221				98.0	2.7	
+50				98.4	2.3	
	8.47	908.84	2.32	900.37		

11-5-29

SPK IN 18" TREE 60' LT. STA. 22+20

(3.3)

NAIL IN T.P. LT. STA. 118+65.

4.9 4.8 6.8 5/6.8 6.6 5.6 5.6 4.9 4.7 4.9 5.0 5.2 9.7 9.4 9 1/8.1 6.5 7.0 7.0
43 32 28 2 6/-3.5 21 17 15 10 -1.4 10 13 17 25 27 2/-4.8 32 41 43

(3.1)

3.3 3.7 7 1/6.9 7.2 5.2 4.8 4.3 4.1 4.6 4.2 4.7 9.4 9.8 8 7/7.7 5.6 6.1
43 33 2/-3.8 23 23 14 10 -1.0 7 10 17 24 27 2/-4.6 31 43

(2.9)

3.5 3.7 7 9/7.1 6.6 4.8 3.7 3.4 3.7 4.4 4.4 9.6 9.4 8 5/7.4 5.3 5.7
43 25 2/-4.2 21 17 11 -0.5 11 12 15 24 27 2/-4.5 31 43

(2.7)

3.9 4.5 7 9/6.9 6.5 5.1 3.2 3.0 3.4 3.8 9.3 9.5 8 7/7.3 4.9 5.4
43 35 2/-4.2 22 17 9 -0.3 11 16 24 27 2/-4.6 31 43

(2.4)

4.3 3.8 6.0 6.0 4.4 3.2 2.4 2.8 3.4 9.0 9.1 8 3/6.8 4.3 4.1 4.6
43 34 28 20 16 11 0.0 12 16 23 27 2/-4.4 31 38 43

(6.3)

8.5 8.5 5 3/9.2 10.1 9.2 6.9 6.3 6.1 6.8 7.7 9.5 9.8 13.0 13.3 9 1/11.4 10.9 11.4
43 27 2/-2.9 23 20 14 10 +0.2 11 16 19 21 24 28 2/-5.1 32 43

(5.9)

9.3 7 1/10.0 10.5 10.0 6.5 5.8 5.6 5.9 6.5 6.8 5 9/9.1 11.2 12.0
43 2/-4.1 24 20 14 10 +0.3 10 13 17 2/-3.2 30 43

(5.5)

7.3 8.0 6 3/7.9 10.3 10.1 5.5 5.0 4.8 5.0 5.0 6 6/5.5 10.5 10.8
43 28 2/-3.4 23 21 13 9 +0.7 11 18 2/0.0 33 43

(5.1)

6.6 6.7 5 1/7.9 9.1 9.0 4.3 4.0 4.3 5 5/5.1 9.4 9.7
43 29 2/-2.8 23 19 10 +1.1 10 2/0.0 27 43

(4.7)

4 9/4.9 4.6 5 5/5.7 5.6 3.8 3.3 3.1 3.4 3.8 4.8 8 7/5.7 6.0
3/-0.2 27 2/-1.0 18 14 10 +1.6 11 20 27 3/-1.0 43

(4.3)

2.7 5 2/2.3 2.4 3.4 2.8 2.5 2.8 2.9 2.7 4 6/2.7 2.9
43 3/+2.0 23 16 10 +1.8 11 22 28 3/+1.6 43

		908.84			
222				98.8	10.0
+50				99.2	9.6
223				99.6	9.2
+50				00.0	8.8
224				00.4	8.4
	4.56	908.83	4.56	904.28	904.27
+50				00.8	8.0
225				01.2	7.6
+50				01.6	7.2
226				02.0	6.8
+50				02.4	6.4
227				02.8	6.0
+50				03.2	5.6

11-5-29

6.2 / 43	7 7 / 6.3 ; 3 / +3.7	8.0 / +2.0	8 2 / 5.9 ; 3 / +4.0	6.2 / 43
5.5 / 43	2 5 / 5.4 ; 3 / +4.2	7.2 / +2.4	9 5 / 4.4 ; 3 / +5.2	4.6 / 43
4.3 / 43	8 7 / 4.7 ; 3 / +4.5	6.6 / +2.6	1 5 / 3.0 ; 4 / +6.2	3.1 / 43
3.6 / 43	9 5 / 3.9 ; 3 / +4.9	6.0 / +2.8	0 9 / 3.0 ; 4 / +5.8	3.0 / 43
2.2 / 43	1 5 / 2.2 ; 4 / +6.2	5.3 / +3.1	1 5 / 2.2 ; 4 / +6.2	3.8 / 43
4.0 / 43	8 2 / 4.0 ; 3 / +4.0	5.0 / +3.0	9 7 / 3.0 ; 3 / +5.0	3.0 / 43
	8 0 / 5.1 ; 3 / +2.5	5.0 / +2.6	3 9 / 5.1 ; 3 / +2.5	5.1 / 35
	3 0 / 5.8 ; 3 / +1.4	5.0 / +2.2	3 0 / 5.4 ; 3 / +1.8	5.4 / 35
5.7 / 35	3 0 / 5.7 ; 3 / +1.1	4.9 / +1.9	2 6 / 6.5 ; 3 / +0.3	6.5 / 33
5.8 / 35	3 0 / 5.8 ; 3 / +0.6	4.9 / +1.5	2 8 / 6.0 ; 3 / +0.4	6.0 / 35
5.9 / 35	2 3 / 5.9 ; 3 / +0.1	5.0 / +1.0	2 6 / 5.7 ; 3 / +0.3	5.7 / 35
5.1 / 35	2 8 / 5.2 ; 3 / +0.4	5.0 / +0.6	1 / 5.9 ; 2 / +0.3	1 2 / 6.3 ; 3 / -0.7	6.4 / 33

		908.85			
228				03.5	5.3
+50				03.7	5.1
229				03.9	4.9
+50				04.0	4.8
230				04.1	4.7
	4.84	908.76	4.71	903.92	
+50				04.1	4.7
231				04.0	4.8
+50				03.9	4.9
232				03.8	5.0
+50				03.7	5.1
233				03.6	5.2
	6.37	908.50	6.23	902.13	
+50				03.5	5.0

5.0 / 35	3 2.6 / 5.0 / +0.3	4.9 / +0.4	1 9.5 / 5.3 / 0.0	3 3.1 / 5.4 / -0.1	5.4 / 33
4.6 / 35	3 3.0 / 4.6 / +0.5	4.7 / +0.4	3 3.0 / 4.4 / +0.7	4.3 / 35	
3.2 / 35	3 3.0 / 3.2 / +1.7	4.9 / 0.0	3 3.0 / 2.6 / +2.3	3.0 / 35	
3.2 / 3.5	3 3.0 / 3.2 / +1.6	4.8 / 0.0	3 3.0 / 2.4 / +2.4	2.4 / 33	
2.7 / 3.5	3 3.0 / 2.4 / +2.3	4.9 / -0.2	3 3.0 / 2.7 / +2.0	3.0 / 33	
3.1 / 3.5	3 3.0 / 3.1 / +1.6	4.7 / 0.0	3 2.6 / 4.3 / +0.4	4.6 / 33	
3.2 / 35	3 3.0 / 3.2 / +1.6	4.9 / -0.1	3 3.0 / 4.3 / +0.5	4.6 / 35	
	3 3.0 / 3.5 / +1.4	5.0 / -0.1	3 3.0 / 4.2 / +0.7	4.6 / 35	
	3 3.0 / 3.4 / +1.6	5.0 / 0.0	3 3.0 / 3.8 / +1.2		
	3 3.0 / 4.4 / +0.7	4.8 / +0.3	3 3.0 / 4.6 / +0.5		
5.0 / 33	3 2.6 / 4.9 / +0.3	4.9 / +0.3	2 1.5 / 6.2 / -1.0	3 0.0 / 6.7 / -1.5	6.7 / 33
5.6 / 33	3 1.5 / 5.5 / -0.3	4.8 / +0.2	2 2.7 / 6.6 / -1.6	2 9.5 / 6.8 / -1.8	7.0 / 33

		90850			
234				03.4	5.1
+50				03.3	5.2
235				03.2	5.3
+50				03.1	5.4
236				03.1	5.4
+35	✓			03.0	5.5
237	✓			03.1	5.4
+40	✓			03.1	5.4
238	✓			03.2	5.3
+50				03.3	5.2
239				03.4	5.1
+50				03.6	4.9

5.3 / 33	3 1.9 / 5.3 / -0.2	5.0 / +0.1	2 2.7 / 6.7 / -1.6	2 9.3 / 7.1 / -2.0	7.2 / 33
	3 3.0 / 4.7 / +0.5	4.9 / +0.3	2 2.7 / 6.8 / -1.6	2 9.3 / 7.2 / -2.0	7.1 / 33
	3 3.0 / 4.2 / +1.1	4.9 / +1.4	2 1.5 / 6.3 / -1.0	2 9.7 / 7.0 / -1.7	6.9 / 33
	3 3.0 / 4.2 / +1.2	4.9 / +0.5	1 9.5 / 5.4 / 0.0	3 1.0 / 6.2 / -0.8	6.3 / 33
	3 3.0 / 4.0 / +1.4	5.0 / +0.4	2 2.6 / 5.4 / 0.0		
	3 3.0 / 4.1 / +1.4	4.9 / +0.6	2 8.8 / 9.9 / -4.4		
3 3.0 / 4.7 / +0.7	2 1.5 / 6.4 / -1.0	5.1 / +0.3	2 0.1 / 5.7 / -0.3	2 1.5 / 5.9 / -0.5	6.0 / 33
	3 1.5 / 11.4 / -2.0	5.0 / +0.4	2 2.9 / 7.1 / -1.7	2 9.5 / 7.2 / -1.8	7.2 / 33
8.4 / 33	2 5.9 / 8.5 / -3.2	5.2 / +0.1	2 4.1 / 7.6 / -2.3		7.8 / 33
	2 8.3 / 9.6 / -4.4	5.4 / -0.2	2 6.1 / 8.5 / -3.3		8.5 / 33
10.7 / 33	3 0.5 / 10.6 / -5.5	5.4 / -0.3	2 8.1 / 9.4 / -4.3		9.5 / 33
	3 2.5 / 11.4 / -6.5	5.4 / -0.6	3 0.3 / 10.3 / -5.4		10.4 / 33

		908.50			
240				03.7	48
+30				03.9	46
B.M.	5.71	910.06	4.16	904.34	904.35
241				04.0	5.5 6.1 6
+50				04.2	5.0 5.7 6
242				04.3	4.7 5.8 6
+50				04.5	4.5 5.6
243				04.6	4.5 5.5 6
+50				04.8	4.4 5.3 6
244				04.9	4.9 5.2
B.M.			5.71	904.35	

	3.19 / 11.0 / -6.2	5.2 / -0.4	3.05 / 10.3 / -5.5	10.3 / 33
	3.83 / 10.0 / -5.4	4.8 / -0.2	2.99 / 9.8 / -5.2	9.8 / 33
10.3 / 33	2.95 / 10.5 / -5.0	5.8 / +0.3	/ 10.6 / -4.0	10.5 / 33
7.6 / 33	2.43 / 7.4 / -2.4	5.5 / +0.4	2.11 / 7.6 / -0.8	8.6 / 33
3.25 / 4.5 / +0.2	2.47 / 7.5 / -2.6	5.3 / +0.5	1.95 / 5.8 / +1.1	6.4 / 33
3.04 / 5.6 / -1.1	2.39 / 6.7 / -2.2	5.0 / +0.6	1.95 / 5.4 / +1.2	
3.30 / 3.9 / +0.6	2.47 / 7.2 / -2.7	5.3 / +0.2	2.25 / 8.0 / +1.5	3.30 / 4.9 / +1.6
3.32 / 4.6 / 0.0	2.51 / 7.4 / -2.8	5.3 / 0.0	2.25 / 7.5 / -1.5	3.30 / 5.0 / +1.0
3.13 / 5.5 / -0.6	2.51 / 7.7 / -2.8	4.9 / +0.3	2.31 / 7.3 / -1.8	5.23 / 5.4 / +0.1

B.M.	2.75	922.62		919.87
10				919.3
+50				19.1
11				19.0
+50				18.7
12				18.4
+50				18.0
13				17.9
+50				17.6
14				17.4
+50				17.3
B.M.			2.75	919.87

10-30-29

51	51	53	63	60	40	✓	40	75	85	
45	43	34	30	26	20	3.3	20	28	43	
49	47	52	62	62	41	✓	39	78	85	85
45	43	33	29	27	20	3.5	19	29	43	45
43	44	52	65	64	45	✓	43	81	88	
45	43	34	31	27	20	3.6	20	28	43	
43	44	46	67	65	45	✓	46	80	86	
45	43	36	31	27	20	3.7	20	27	43	
45	48	53	72	71	47	✓	49	80	90	
45	43	34	31	27	20	4.2	20	27	43	
47	47	53	75	72	49	✓	50	85	90	
45	43	35	30	27	20	4.6	20	27	43	
48	45	55	78	77	51	✓	54	89	97	
45	43	35	30	27	20	4.7	20	28	43	
54	54	57	86	86	50	✓	59	93	99	
45	43	34	30	27	20	5.0	20	28	43	
57	58	60	91	90	54	✓	64	91	100	
45	43	32	32	27	20	5.2	20	27	43	
55	54	59	91	91	53	✓	66	99	102	92	89
45	43	39	33	27	20	5.3	20	28	31	36	43

B.M.	1.75	725.60 ✓		923.85
117				22.1
+50				22.0
118				21.9
+50				21.7
119				21.7
+50				21.6
120				21.5
+50				21.5
121				21.2
+50				
B.M.			1.75	923.85 ✓

SEE PAGE 32

54	71	64	39	✓	45	68	72	55	54
73	39	32	21	3.5	21	30	37	43	45

55	69	62	39	✓	42	61	72	51	50
44	89	29	20	3.6	20	27	37	45	45

60	72	64	40	✓	44	67	74	49	48
43	59	30	20	3.7	20	29	37	43	45

59	59	67	62	37	✓	48	72	75	51	51
43	36	33	28	20	3.9	20	28	37	44	45

62	60	56	✓	52	71	79	57	56
43	28	20	3.9	21	27	36	43	43

62	62	58	✓	55	73	80	57	56
43	28	20	4.0	21	27	35	41	45

62	58	39	✓	56	76	80	52	53
43	26	20	4.1	21	27	32	38	43

61	57	41	✓	56	76	80	54	54
43	25	20	4.1	22	28	32	38	43

62	57	39	✓	54	75	80	51	47
43	27	20	4.4	20	28	33	38	43

SEE ORIGBEL X SEC.

B.M.	5.11	930.94 ✓		925.83
97				
+50				
98				
+50				25.2
99				25.6
+25				25.7
+50				25.7
+75				25.8
100				25.9
+50				25.8
101				25.8
+50				25.8

54 54 60 66
70 50 36 33

46 52 52 82 70 (5.4)
76 50 42 56 33

38 36 47 82 87 (5.4)
102 68 43 36 33

45 46 47 45 87 72 90 66 ✓ 52 71 74 59 58 61
125 100 70 43 35 34 29 20 5.7 20 26 32 34 50 60

54 55 53 52 79 86 82 65 ✓ 49 58 71 75
144 100 76 43 35 34 28 21 5.3 26 37 45 50

58 58 57 59 53 72 72 62 ✓ 48 68 72 50 68 60
153 150 100 83 47 43 38 31 5.2 21 26 30 35 47 50

59 62 63 59 60 66 66 58 65 ✓ 47 68 71 51 62
163 150 140 100 72 72 74 50 24 5.2 21 26 31 34 50

58 60 58 49 61 53 46 78 82 64 ✓ 49 66 70 57 61
172 150 110 84 50 47 40 35 28 20 5.1 20 25 31 35 50

58 62 57 49 50 64 50 49 46 85 84 67 ✓ 47 64 69 56 62
78 150 84 111 100 72 56 50 71 32 29 21 5.0 20 26 31 35 50

47 52 63 50 42 43 53 87 83 68 ✓ 49 63 66
163 124 123 116 106 90 42 33 28 22 5.1 20 37 50

43 53 44 49 50 53 80 84 81 65 47 67 71 63 63 70
212 188 163 150 100 37 33 32 27 21 5.1 20 26 30 32 43 50

38 42 44 47 49 74 77 60 47 67 72 54 61
134 112 100 50 37 32 26 21 5.1 20 26 31 34 50

93094 ✓

+83 26.0

102 25.9

+50 26.1 ✓

B.M. 5.11 925.89

SEE PAGE 56

47	46	72	75	51		50	68	74	58	56
50	37	32	26	20	49	19	25	30	34	50

47	47	72	74	55		49	69	75	55	56
50	37	31	25	20	50	20	24	31	35	50

46	48	74	74	55		49	68	73	52	53
50	37	32	24	20	48	20	24	31	25	50

13.M.	1.12	902.87		901.75	
209+50				95.55	119 73
210				95.5	123 74
+50				95.43	127 74
211				95.4	131 75
	4.35	897.96	9.26	893.61	
+50				95.35	86 26
212				95.3	90 27
+50				95.25	94 27
213				95.2	98 28
+50				95.15	102 28
214				95.1	106 29
+50				95.05	110 29
215				95.0	109 30
	5.13	898.39	4.70	893.26	

10-16-29

7.3

7.4

7.4

7.5

2.6

2.7

2.7

2.8

2.8

2.9

2.9

3.0

898.39

+30 95.1 107 33°

216 95.1 10.1 33°

B.M. 5.13 893.26 893.21

SEE PAGE 46.

(3.3)

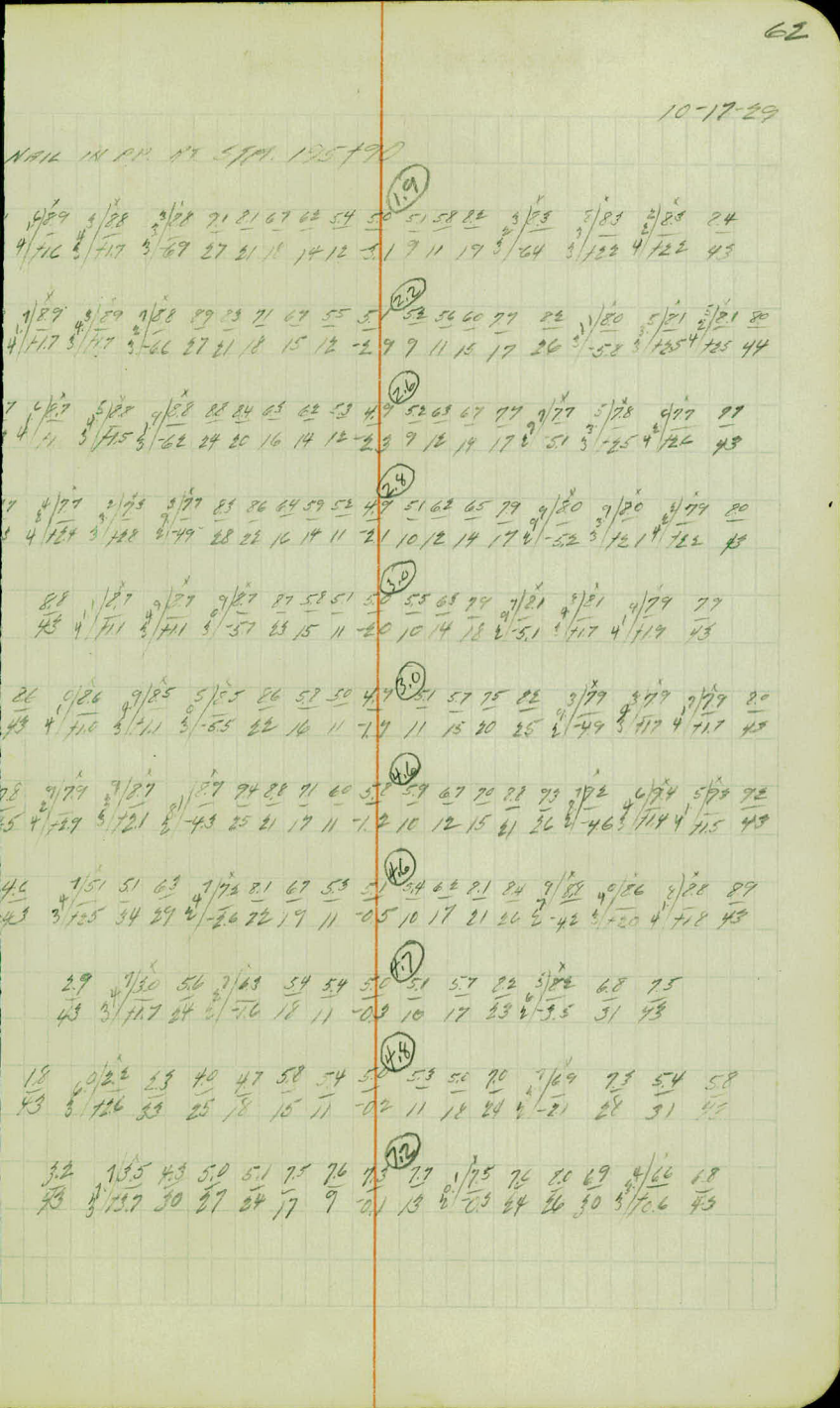
9.3	4/9.3	4/9.1	1/9.6	9.6	8.9	6.4	6.1	5.7	6.1	6.9	7.9	9.3	10.2	10.2	8.9	5/8.8	8/8.8	8/9.2	9.2
4.3	4/+1.4	5/+1.6	3/-6.3	27	21	16	10	-2.4	10	12	17	24	26	28	30	3/-5.5	3/+2.2	4/+1.8	4.3

(3.3)

9.2	1/9.1	5/9.2	9/9.0	9.0	8.8	6.2	6.1	5.4	5.2	5.6	7.0	8.9	9.8	9.7	1/8.6	6/8.3	9/8.8	8.8
4.3	4/+1.0	3/+0.9	3/-5.7	30	21	15	13	10	-1.9	10	13	24	25	27	3/-5.5	3/+2.4	4/+1.9	4.3

B.M1	2.19	909.04		906.85		
	2.06	897.12	11.98	897.06		
202				97.2	4.5	1.9
+50				96.9	10.6	2.2
203				96.5	10.3	2.6
+50				96.3	10.1	2.8
204				96.1	9.3	3.0
+50				96.1	9.6	3.0
	5.83	900.63	4.32	894.80		
205				96.0	10.8	4.4
+50				96.0		4.6
206				95.9		4.7
+50				95.85		4.8
	7.38	903.00	5.01	895.62		
207				95.8		7.2

10-17-29



		903.00 ✓			
+50				75.75	7.3
204				75.7	7.3
+50				75.65	7.4
207				75.6 ✓	7.4
B.M.			1.25	901.75	901.75

SEE PAGE 60.

7.3

2.6	4/2.5	2.6	61	70	76	76	7.4	7.8	9/7.5	5.5	6/5.8	6.0
43	3/44	37	27	17	14	11	0.1	12	1/2.2	30	3/1.4	43

7.3

3.0	3/2.9	3.0	5.3	7.2	7.5	7.2	7.6	7.1	5.1	4.7	6/4.3	5.2
43	3/4.4	35	29	19	11	10.1	14	19	25	33	1/2.6	43

7.4

4.5	6/4.4	4.4	6.5	7.0	7.5	7.2	7.5	7.1	4.4	6/4.6	5.3
43	3/3.0	36	27	20	10	10.2	11	22	29	3/2.8	43

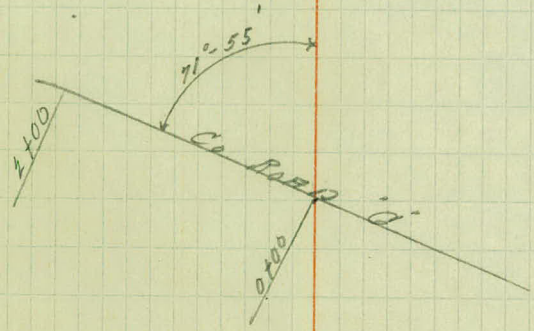
7.4

6.3	7/6.4	5/7.4	7.7	7.5	7.6	7.6	7.0	6.7	5.9	4/5.7	6.5
43	3/4.0	1/0.0	10	10.1	12	17	20	22	29	3/1.5	43

B.M.	4.48	932.25		927.77
0+33				27.8
0+50				27.7
1+75				27.6
1+00				27.6
1+50				27.3
2+00				26.5
B.M.			4.48	927.77
71+35	P.O.T.			

LEFT. RIGHT. 10-12-29

3.6	2.0	1.9	4.8			5.3	3.5	4.3				
40	33	20	13	4.5		19	24	35				
2.8	1.4	1.9	5.2			5.6	5.5	3.4	4.1	4.2		
40	33	19	13	4.6		18	20	25	33	40		
3.6	2.1	2.2	5.3	5.3		5.7	3.8	4.0	3.8			
40	33	20	15	12	4.7	17	24	33	40			
3.7	3.5	2.9	5.1			5.4	3.1	3.4	3.1			
40	33	19	13	4.7		17	23	33	40			
4.9	4.7	4.2	3.4	5.2	5.6		5.5	5.3	4.7	3.4	6.9	3.5	5.5
40	33	24	18	15	13	5.0	14	15	18	21	25	33	40
5.6	5.3	4.8	4.4	6.1	6.4		6.5	6.1	5.5	3.8	4.3	4.5	
40	33	24	18	15	12	5.8	12	13	17	21	33	40	



121		+1.40	-1.40	21.6	✓
+50		+1.40	-1.40	21.55	✓
122		"	"	21.5	✓
+50		"	"	21.5	
123		"	"	21.4	
+50		"	"	21.4	
124		"	"	21.3	
+50		"	"	21.3	
125		"	"	21.3	✓
+50		"	"	21.4	✓
126		+1.40	-1.40	21.5	✓
+50		+1.37	-1.37	21.65	✓
127		+1.17	-1.17	21.80	✓
+50		+0.80	-0.80	21.95	✓
128		+0.40	-0.40	22.1	✓
+50		+0.05	-0.05	22.25	✓
129				22.4	✓
+50				22.55	✓
130				22.7	✓
+50				22.85	✓
131				23.0	✓
+50				23.15	✓
132				23.3	✓
+50				23.45	✓
133				23.6	✓

	750	23.75 ←
134		23.9 ←
	750	24.05 ←
135		24.2 ←
	750	24.35 ←
136		24.5 ←
	750	24.65 ←
137		24.8 ←
	750	24.95 ←
138		25.1 ←
	750	25.25 ←
139		25.4 ←
	750	25.55 ←
140		25.7 ←
	750	25.85 ←
141		26.0 ←
	750	26.15 ←
142		26.3 ←
	750	26.45 ←
143		26.6 ←
	750	26.7 ←
144		26.8 ←
	750	27.0 ←
145		27.0 ←
	750	27.05 ←

146				27.1	✓
+50				27.15	✓
147				27.2	✓
+50				27.25	✓
148				27.3	✓
+50				27.4	✓
149				27.4	✓
+50				27.45	✓
150				27.5	✓
+50				27.55	✓
151				27.6	✓
+50				27.4	✓
152				27.2	✓
+50	927.38	T.P.LT. STA	158+60.	26.8	✓
153				26.3	✓
+50				25.7	✓
154				25.0	✓
+50				24.1	✓
155				23.1	✓
+50				22.1	✓
156				20.9	✓
+50				19.8	✓
157				18.6	✓
+50				17.5	✓
158				16.3	✓

+50	15.2
159	14.1
+50	13.2
160	12.4
+50	11.8
161	11.3
+50	11.0
162	10.7
+50	10.45
163	10.2
+50	09.95
164	09.7
+50	09.45
165	09.2
+50	08.95
166	08.7
+50	08.45
167	08.2
+50	07.95
168	07.7
+50	07.6
169	07.5
+50	07.4
170	07.7
+50	07.8

171	08.0	✓
+50	08.2	✓
172	08.4	✓
+50	08.6	✓
173	08.8	✓
+50	09.0	✓
174	09.2	✓
+50	09.4	✓
175	09.6	✓
+50	09.8	✓
176	10.0	✓
+50	10.2	
177.	10.4	✓
+50	10.6	✓
178	10.8	✓
+50	11.0	✓
179	11.2	✓
+50	11.4	✓
180	11.5	✓
+50	11.6	✓
181	11.6	✓
+50	11.6	✓
182	11.5	✓
+50	11.4	✓
183	11.2	✓

+50	11.0	
184	10.7	
+50	10.4	
185	10.2	L
+50	10.0	L
186	09.7	L
+50	09.5	L
187	09.2	L
+50	09.0	L
188	08.7	L
+50	08.5	L
189	08.2	L
+50	08.0	L
190	07.7	L
+50	07.5	L
191	07.2	L
+50	06.99	L X
192	06.61	L
+50	06.26	L
193	05.86	L
+50	05.42	L
194	04.95	L
+50	04.45	L
195	03.95	L
+50	03.45	L

196				02.95	✓
+50				02.45	✓
197				01.95	✓
+50				01.45	✓
198				00.95	✓
+50				00.40	✓
199				99.85	✓
+50				99.30	✓
200				98.75	✓
+50				98.20	✓
201				97.65	✓
+50				97.10	✓
202				96.75	✓
+50				96.40	✓
203				96.15	✓
+50				95.95	✓
204				95.85	✓
+50				95.80	✓
205				95.75	✓
+50				95.70	✓
206				95.65	✓
+50				95.60	✓
207				95.55	✓
+50				95.50	✓
208				95.45	✓

+50	95.40
209	95.35
+50	95.3
210	95.25
+50	95.2
211	95.15
+50	95.10
212	95.05
+50	95.00
213	94.95
+50	94.9
214	94.85
+50	94.80
215	94.75
+50	94.70
216	94.68
+50	94.74
217	94.85
+50	95.05
218	95.30
+50	95.62
219	96.03
+50	96.5
220	97.00
+50	97.50

221				98.0	✓
	+50			98.35	✓
222				98.90	✓
	+50			99.30	✓
223				9970	✓
	+50			00.10	✓
224				00.50	✓
	+50			00.90	✓
225				01.30	✓
	+50			01.7	✓
226				02.1	✓
	+50			02.4	✓
227				02.7	✓
	+50			03.0	✓
228				03.25	✓
	+50			03.50	✓
229				03.7	✓
	+50			038	✓
230				03.9	✓
	+50			039	✓
231				03.85	✓
	+50			03.8	✓
232				03.75	✓
	+50			03.7	✓
233				03.65	✓
	+50			0360	✓

234			03.55
+50			03.50
235			03.45
+50			03.4
236			03.35
+50			03.35
237			03.35
+50			03.38
238			03.45
+50			03.55
239			03.65
+50			03.75
240			03.85
+50			03.95
241			04.05
+50			04.15
242			04.25
+50			04.30
243			04.45
+50			04.55
244			04.65
12	0.00	0.00	18.4
+50	+0.20	-0.20	18.2
13	+0.51	-0.51	18.0
+50	+1.00	-1.00	17.8

14		+1.30	-1.30	17.6	✓
	-50	+1.40	-1.40	17.4	✓
15		+1.40	-1.40	17.2	✓
	+50	"	"	17.0	✓
16		"	"	16.7	✓
	+50	"	"	16.4	✓
17		"	"	16.4	✓
	+50	"	"	16.4	✓
18		"	"	16.6	✓
	+50	"	"	16.9	✓
19		+1.40	-1.40	17.2	✓
	+50	+1.37	-1.37	17.5	✓
20		+1.07	-1.07	17.9	✓
	+50	+0.80	-0.80	18.3	✓
21		+0.40	-0.40	18.6	
	+50	+0.05	-0.05	18.9	
22				19.3	✓
	+50			19.7	
23				20.0	✓
	+50			20.3	✓
24				20.4	✓
	+50			20.8	✓
25				21.1	✓
	+50			21.2	✓
26				21.4	✓

26	21.6
26.50	21.65
27	21.7
27.50	21.75
28	21.8
28.50	21.85
29	21.9
29.50	21.95
30	22.0
30.50	22.05
31	22.1
31.50	22.15
32	22.2
32.50	22.25
33	22.3
33.50	22.35
34	22.4
34.50	22.45
35	22.5
35.50	22.55
36	22.6
36.50	22.65
37	22.7
37.50	22.75

39				22.8	✓
	+50			22.85	✓
40				22.9	✓
	+50			22.95	✓
41				23.0	✓
	+50			23.05	✓
42				23.1	✓
	+50			23.15	✓
43				23.2	✓
	+50			23.25	✓
44				23.3	✗
	+50			23.35	
45				23.4	
	+50			23.45	
46				23.5	
	+50			23.55	✓
47				23.6	✓
	+50			23.65	✓
48				23.7	✓
	+50			23.75	✓
49				23.8	✓
	+50			23.85	✓
50				23.9	✓
	+50			24.0	✓
51				24.05	✓

	+50	24.12
52		24.3
	+50	24.45
53		24.6
	+50	24.75
54		24.9
	+50	25.05
55		25.2
	+50	25.35
56		25.5
	+50	25.61
57		25.7
	+50	25.8
58		25.9
	+50	26.0
59		26.1
	+50	26.2
60		26.3
	+50	26.4
61		26.5
	+50	26.6
62		26.7
	+50	26.8
63		26.9
	+50	27.0

64				27.1	✓
	+50			27.2	✓
65				27.3	✓
	+50			27.4	✓
66				27.5	✓
	+50			27.6	✓
67				27.7	✓
	+50			27.8	✓
68				27.9	✓
	+50			28.0	✓
69				28.1	✓
	+50			28.2	✓
70				28.3	✓
	+50			28.4	✓
71				28.5	✓
	+50			28.6	✓
72				28.7	✓
	+50			28.75	✓
73				28.8	✓
	+50			28.85	✓
74				28.9	✓
	+50			28.95	✓
75				29.0	✓
	+50			29.05	✓
76				29.10	✓

	+5.0			29.15
77				29.2
	+5.0			29.25
78				29.3
	+5.0			29.35
79				29.40
	+5.0			29.30
80				29.2
	+5.0			29.0
81				28.7
	+5.0			28.3
82				27.9
	+5.0			27.5
83				27.1
	+5.0	-0.30	+0.30	26.7
84		-0.52	+0.52	26.3
	+5.0	-0.57	+0.57	26.0
85		-0.57	+0.57	25.7
	+5.0	-0.50	+0.50	25.4
86		-0.30	+0.30	25.2
	+5.0			25.0
87				24.8
	+5.0			24.7
88				24.6
	+5.0			24.6

89				24.6	✓
	+50			24.6	✓
90				24.7	✓
	+50			24.75	✓
91				24.8	✓
	+50			24.85	✓
92				24.9	✓
	+50			24.95	✓
93				25.0	✓
	+50			25.05	✓
94				25.1	✓
	+50			25.15	✓
95		-0.00	+0.00	25.2	✓
	+50	-0.05	+0.05	25.25	✓
96		-0.40	+0.40	25.3	✓
	+50	-0.80	+0.80	25.35	✓
97		-1.17	+1.17	25.4	✓
	+50	-1.37	+1.37	25.45	✓
98		-1.40	+1.40	25.5	✓
	+50	-1.40	+1.40	25.55	✓
99		-1.40	+1.40	25.6	
	+50	-1.40	+1.40	25.65	✓
100		-1.40	+1.40	25.7	✓
	+50	-1.35	+1.35	25.75	✓
101		-1.11	+1.11	25.8	✓

117				22.0	
	+50	+0.20	-0.20	21.95	⌐
118		+0.60	-0.60	21.9	⌐
	+50	+0.96	-0.96	21.85	⌐
119		+1.27	-1.27	21.8	⌐
	+50	+1.35	-1.35	21.75	⌐
120		+1.40	-1.40	21.7	⌐
	+50	+1.40	-1.40	21.65	⌐
121					
101+50		-0.80	+0.80	25.85	⌐
102		-0.40	+0.40	25.9	⌐
	+50	-0.05	-0.05	25.95	⌐
103		0.00	0.00	26.0	

B.M.	5.00	931.04		926.04
B.M.			3.74	927.32
B.M.	6.15	922.49		916.34
B.M.			6.44	916.05
B.M.	3.53	910.38		906.85
B.M.			4.27	906.11
B.M.	6.75	899.96		893.21
B.M.			3.23	896.73
B.M.	4.62	908.75		904.13
B.M.			4.48	904.27
B.M.	3.65	909.49		905.84
B.M.			5.14	904.35

SPK IN 12" OAK 60' LT STA 145+05.

SPK IN 12" OAK 60' LT STA 157+30

SPK IN 10" OAK 50' RT STA 195+80

SPK IN PP 100' LT STA. 218+20.

SPK IN 18" TREE 60' LT STA. 227+20.

SPK IN T.P. 70' RT STA. 242+15.

STA	LT ELEV	RT ELEV	
87+00	921.8 / 28.3	919.8 / 25.5	24" X 54" P^3
58+50	914.5 / 33	917.4 / 33	24" X 66" P^3
168+00	902.6 / 29	901.5 / 31	24" X 60" P^3
202+28	88.0 / 36	884 / 34	24" X 72" P^3
214+60	863 / 36	866 / 30	24" X 72" P^3
239+60	95.1 / 30	95.5 / 30	24" X 60" P^3

KEITH'S RAILROAD CURVE TABLES.

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HOW TO USE KEITH'S TABLES.

EXAMPLE.

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

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

Tan. in Tab. IV opp. 23° 20′=1183.1
1183.1÷10=118.31.

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

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

2° 19½′=def. for sta.	542	I. P.=sta.	542+72
4° 49½′= " " "	+50	Tan.=	1.18.47
7° 19½′= " " "	543	B. C.=sta.	541+53.53
9° 49½′= " " "	+50	L. C.=	2.33.33
11° 40′= " " "	543+	E. C.=sta.	543+86.86
	86.86		

100—53.53=46.47×3′(def. for 1 ft. of 10° Cur.)=139.41′=
2° 19½″=def. for sta. 542.

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

Def. for 36.86 ft.=1° 50½′ for a 10° Curve

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

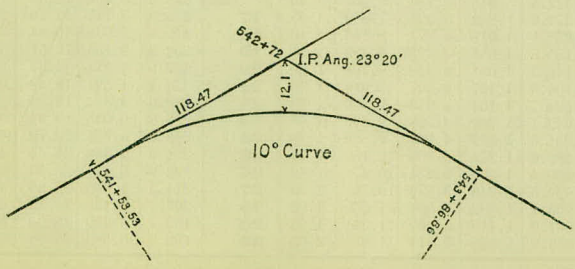

TABLE I. — Minutes in Decimals of a Degree.

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	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0269	.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. Def.	Chd. Def.	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot
0° 10′	34377.	.036	.145	.291	0.05′	7°	819.0	1.528	6.105	12.21	2.10′
20	17189.	.073	.291	.582	0.10	20′	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	8	716.8	1.746	6.976	13.95	2.40
1	5729.6	.218	.873	1.745	0.30	20	688.2	1.819	7.266	14.53	2.50
10	4911.2	.255	1.018	2.036	0.35	30	674.7	1.855	7.411	14.82	2.55
20	4297.3	.291	1.164	2.327	0.40	40	661.7	1.892	7.556	15.11	2.60
30	3819.8	.327	1.309	2.618	0.45	9	637.3	1.965	7.846	15.69	2.70
40	3437.9	.364	1.454	2.909	0.50	20	614.6	2.037	8.136	16.27	2.80
50	3125.4	.400	1.600	3.200	0.55	30	603.8	2.074	8.281	16.56	2.85
2	2864.9	.436	1.745	3.490	0.60	40	593.4	2.110	8.426	16.85	2.90
10	2644.6	.473	1.891	3.781	0.65	10	573.7	2.183	8.716	17.43	3.00
20	2455.7	.509	2.036	4.072	0.70	30	546.4	2.292	9.150	18.30	3.15
30	2292.0	.545	2.181	4.363	0.75	11	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	30	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	12	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	30	459.3	2.730	10.89	21.77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410.3	3.058	12.18	24.37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396.2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4.50
4	1432.7	.873	3.490	6.980	1.20	30	370.8	3.387	13.49	26.97	4.65
10	1375.4	.909	3.635	7.271	1.25	16	359.3	3.496	13.92	27.84	4.80
20	1322.5	.945	3.781	7.561	1.30	30	348.5	3.606	14.35	28.70	4.95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3.716	14.78	29.56	5.10
40	1228.1	1.018	4.071	8.143	1.40	18	319.6	3.935	15.64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16.51	33.01	5.70
5	1146.3	1.091	4.362	8.724	1.50	20	287.9	4.374	17.37	34.73	6.00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	22	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	24	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21.64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8.10
20	905.1	1.382	5.524	11.05	1.90	28	206.7	6.139	24.19	48.38	8.40
30	881.9	1.418	5.669	11.34	1.95	29	199.7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

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

Angle	Tangent	External	Angle	Tangent	External	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.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
31°	1589.0	216.3	**41°**	2142.2	387.4	**51°**	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	**42**	2199.4	407.6	**52**	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	**43**	2257.0	428.5	**53**	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276 2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	**44**	2314.9	450.0	**54**	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	**45**	2373.3	472.1	**55**	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.4	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	**46**	2432.1	494.8	**56**	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	**47**	2491.3	518.2	**57**	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	**48**	2551.0	542.2	**58**	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	**49**	2611.2	566.9	**59**	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	**50**	2671.8	592.3	**60**	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
61°	3375.0	920.2	**71°**	4086.9	1308.2	**81°**	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	**72**	4162.8	1352.6	**82**	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	**73**	4239.7	1398.0	**83**	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	**74**	4317.6	1444.6	**84**	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	**75**	4396.5	1492.4	**85**	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296 4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	**76**	4476.5	1541.4	**86**	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	**77**	4557.6	1591.6	**87**	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	**78**	4639.8	1643.0	**88**	5533.1	2225.5
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.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
91°	5830.5	2444.9	**101°**	6950.6	3278.1	**111°**	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	**102**	7075.5	3374.9	**112**	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	**103**	7203.2	3474.4	**113**	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	**104**	7333.6	3576.8	**114**	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	**105**	7467.0	3682.3	**115**	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	**106**	7603.5	3791.0	**116**	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	**107**	7743.2	3902.9	**117**	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	**108**	7886.2	4018.2	**118**	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	**109**	8032.7	4137.1	**119**	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	**110**	8182.8	4259.7	**120**	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V. Corrections for use with table IV,

For Tangents Add

△ ANGLE / 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	4.49	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6 34

For Externals Add

ANGLE / CURVE	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.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 62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.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

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

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

CURVE FORMULAS.

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

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

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

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

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

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

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

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

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

$$\text{No. chords} = \frac{\tfrac{1}{2} I}{D}$$

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

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

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

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

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

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

To find angle for a given distance and deflection.

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

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

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

Right Angle Triangles.— Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

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

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

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

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

Natural Sines

DEG.	0′	10′	20′	30′	40′	50′	DEG.
0	0000	0029	0058	0087	0116	0145	89
1	0175	0204	0233	0262	0291	0320	88
2	0349	0378	0407	0436	0465	0494	87
3	0523	0552	0581	0610	0640	0669	86
4	0698	0727	0756	0785	0814	0843	85
5	0872	0901	0929	0958	0987	1016	84
6	1045	1074	1103	1132	1161	1190	83
7	1219	1248	1276	1305	1334	1363	82
8	1392	1421	1449	1478	1507	1536	81
9	1564	1593	1622	1650	1679	1708	80
10	1736	1765	1794	1822	1851	1880	79
11	1908	1937	1965	1994	2022	2051	78
12	2079	2108	2136	2164	2193	2221	77
13	2250	2278	2306	2334	2363	2391	76
14	2419	2447	2476	2504	2532	2560	75
15	2588	2616	2644	2672	2700	2728	74
16	2756	2784	2812	2840	2868	2896	73
17	2924	2952	2979	3007	3035	3062	72
18	3090	3118	3145	3173	3201	3228	71
19	3256	3283	3311	3338	3365	3393	70
20	3420	3448	3475	3502	3529	3557	69
21	3584	3611	3638	3665	3692	3719	68
22	3746	3773	3800	3827	3854	3881	67
23	3907	3934	3961	3987	4014	4041	66
24	4067	4094	4120	4147	4173	4200	65
25	4226	4253	4279	4305	4331	4358	64
26	4384	4410	4436	4462	4488	4514	63
27	4540	4566	4592	4617	4643	4669	62
28	4695	4720	4746	4772	4797	4823	61
29	4848	4874	4899	4924	4950	4975	60
30	5000	5025	5050	5075	5100	5125	59
31	5150	5175	5200	5225	5250	5275	58
32	5299	5324	5348	5373	5398	5422	57
33	5446	5471	5495	5519	5544	5568	56
34	5592	5616	5640	5664	5688	5712	55
35	5736	5760	5783	5807	5831	5854	54
36	5878	5901	5925	5948	5972	5995	53
37	6018	6041	6065	6088	6111	6134	52
38	6157	6180	6202	6225	6248	6271	51
39	6293	6316	6338	6361	6383	6406	50

DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
40	6428	6450	6472	6494	6517	6539	49
41	6561	6583	6604	6626	6648	6670	48
42	6691	6713	6734	6756	6777	6799	47
43	6820	6841	6862	6884	6905	6926	46
44	6947	6967	6988	7009	7030	7050	45
45	7071	7092	7112	7133	7153	7173	44
46	7193	7214	7234	7254	7274	7294	43
47	7314	7333	7353	7373	7392	7412	42
48	7431	7451	7470	7490	7509	7528	41
49	7547	7566	7585	7604	7623	7642	40
50	7660	7679	7698	7716	7735	7753	39
51	7771	7790	7808	7826	7844	7862	38
52	7880	7898	7916	7934	7951	7969	37
53	7986	8004	8021	8039	8056	8073	36
54	8090	8107	8124	8141	8158	8175	35
55	8192	8208	8225	8241	8258	8274	34
56	8290	8307	8323	8339	8355	8371	33
57	8387	8403	8418	8434	8450	8465	32
58	8480	8496	8511	8526	8542	8557	31
59	8572	8587	8601	8616	8631	8646	30
60	8660	8675	8689	8704	8718	8732	29
61	8746	8760	8774	8788	8802	8816	28
62	8829	8843	8857	8870	8884	8897	27
63	8910	8923	8936	8949	8962	8975	26
64	8988	9001	9013	9026	9038	9051	25
65	9063	9075	9088	9100	9112	9124	24
66	9135	9147	9159	9171	9182	9194	23
67	9205	9216	9228	9239	9250	9261	22
68	9272	9283	9293	9304	9315	9325	21
69	9336	9346	9356	9367	9377	9387	20
70	9397	9407	9417	9426	9436	9446	19
71	9455	9465	9474	9483	9492	9502	18
72	9511	9520	9528	9537	9546	9555	17
73	9563	9572	9580	9588	9596	9605	16
74	9613	9621	9628	9636	9644	9652	15
75	9659	9667	9674	9681	9689	9696	14
76	9703	9710	9717	9724	9730	9737	13
77	9744	9750	9757	9763	9769	9775	12
78	9781	9787	9793	9799	9805	9811	11
79	9816	9822	9827	9833	9838	9843	10

DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
80	9848	9853	9858	9863	9868	9872	9
81	9877	9881	9886	9890	9894	9899	8
82	9903	9907	9911	9914	9918	9922	7
83	9925	9929	9932	9936	9939	9942	6
84	9945	9948	9951	9954	9957	9959	5
85	9962	9964	9967	9969	9971	9974	4
86	9976	9978	9980	9981	9983	9985	3
87	9986	9988	9989	9990	9992	9993	2
88	9994	9995	9996	9997	9997	9998	1
89	9998	9999	9999	9999	1.0000	1.0000	0

DEG.	60′	50′	40′	30′	20′	10′	DEG.

Natural Cosines

Natural Tangents

DEG.	0′	10′	20′	30′	40′	50′	DEG.
0	0000	0029	0058	0087	0116	0145	89
1	0175	0204	0233	0262	0291	0320	88
2	0349	0378	0407	0437	0466	0495	87
3	0524	0553	0582	0612	0641	0670	86
4	0699	0729	0758	0787	0816	0846	85
5	0875	0904	0934	0963	0992	1022	84
6	1051	1080	1110	1139	1169	1198	83
7	1228	1257	1287	1317	1346	1376	82
8	1405	1435	1465	1495	1524	1554	81
9	1584	1614	1644	1673	1703	1733	80
10	1763	1793	1823	1853	1883	1914	79
11	1944	1974	2004	2035	2065	2095	78
12	2126	2156	2186	2217	2247	2278	77
13	2309	2339	2370	2401	2432	2462	76
14	2493	2524	2555	2586	2617	2648	75
15	2679	2711	2742	2773	2805	2836	74
16	2867	2899	2931	2962	2994	3026	73
17	3057	3089	3121	3153	3185	3217	72
18	3249	3281	3314	3346	3378	3411	71
19	3443	3476	3508	3541	3574	3607	70
20	3640	3673	3706	3739	3772	3805	69
21	3839	3872	3906	3939	3973	4006	68
22	4040	4074	4108	4142	4176	4210	67
23	4245	4279	4314	4348	4383	4417	66
24	4452	4487	4522	4557	4592	4628	65
25	4663	4699	4734	4770	4806	4841	64
26	4877	4913	4950	4986	5022	5059	63
27	5095	5132	5169	5206	5243	5280	62
28	5317	5354	5392	5430	5467	5505	61
29	5543	5581	5619	5658	5696	5735	60
30	5774	5812	5851	5890	5930	5969	59
31	6009	6048	6088	6128	6168	6208	58
32	6249	6289	6330	6371	6412	6453	57
33	6494	6536	6577	6619	6661	6703	56
34	6745	6787	6830	6873	6916	6959	55
35	7002	7046	7089	7133	7177	7221	54
36	7265	7310	7355	7400	7445	7490	53
37	7536	7581	7627	7673	7720	7766	52
38	7813	7860	7907	7954	8002	8050	51
39	8098	8146	8195	8243	8292	8342	50

DEG.	60′	50′	40′	30′	20′	10′	DEG.

DEG.	0′	10′	20′	30′	40′	50′	DEG.
40	8391	8441	8491	8541	8591	8642	49
41	8693	8744	8796	8847	8899	8952	48
42	9004	9057	9110	9163	9217	9271	47
43	9325	9380	9435	9490	9545	9601	46
44	9657	9713	9770	9827	9884	9942	45
45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	42
48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
50	1.1918	1 1988	1.2059	1.2131	1.2203	1.2276	39
51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	36
54	1.3764	1.3848	1,3934	1.4019	1.4106	1.4193	35
55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	32
58	1,6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
59	1.6643	1 6753	1.6864	1.6977	1.7090	1.7205	30
60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
65	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
69	2.6051	2 6279	2.6511	2.6746	2.6985	2.7228	20
70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
72	3,0777	3.1084	3.1397	3.1716	3.2041	3.2371	17
73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
75	3.7321	3.7760	3.8208	3.8667	3.9136	3.9617	14
76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	11
79	5.1446	5.2257	5,3093	5.3955	5.4845	5.5764	10
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.727	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.542	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0

DEG.	60′	50′	40′	30′	20′	10′	DEG.

Natural Cotangents

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES $1^1/_2$ TO 1.

FOR SINGLE TRACK EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.