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ENGINEERS
FIELD BOOK
No. 404

805

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EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and
SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from Center of Roadway for Cross-Sectioning
Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be $30.6 + (20 - 16) \times 2$ or 2 ft. added to 30.6 = 32.6. For slopes of 1 on 1½ see inside of back cover.

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Smithfield notes all
index none in
this book

INDEX-

- 1) Hillyard Water Work
- 2) Survey for Gno. Cannon in Richmond, UT.
11-22-15
- 3) Measurement of city supply line from
diWatts Spr.
- 4) River below State Dam
- 5) Logan HoHow at Crockett Ave.
- 6) Jacob Zollinger Survey
- 7) Studebaker Building
- 8) Survey of Elevator Ground

Hillgard Water work

\bar{A} - Pt 5 Slope Dist to Vert L u c L
 r 270°30 36.8 -3°

1- 3 89°20' 17.97h -5°38'

3- 4 184°10' 8.225 -2°30' 5. 223

4- 5 79°50' 5.06 -2°10' 5 3.3

6 189°10' 5.70 -1°

7- set 89°20' FS

8 66°15' 12.52 -1° 7-2.9

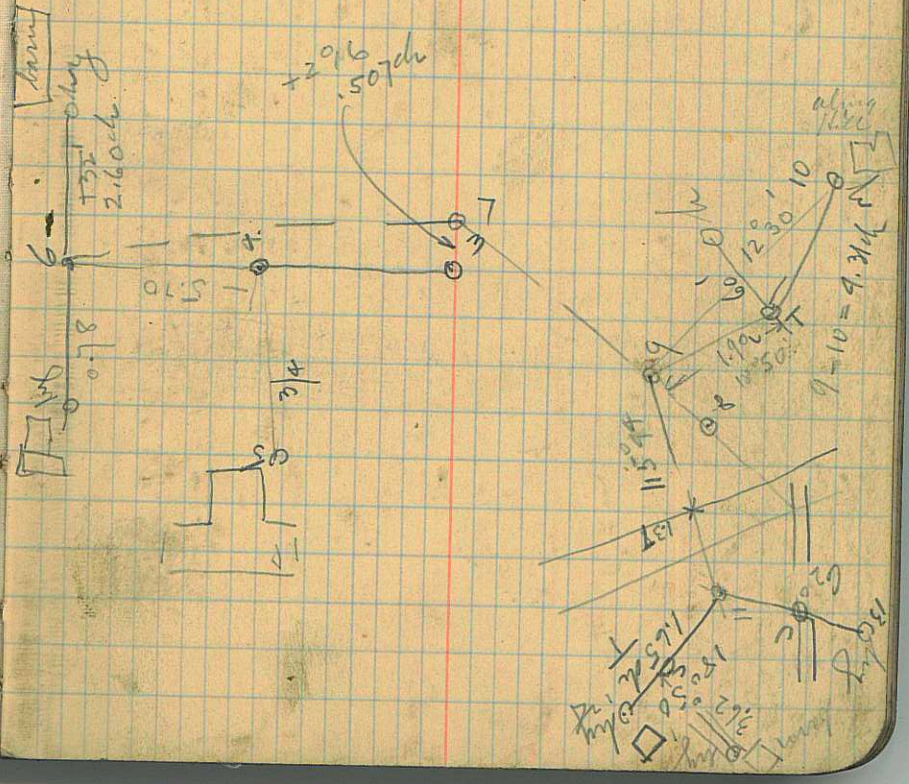
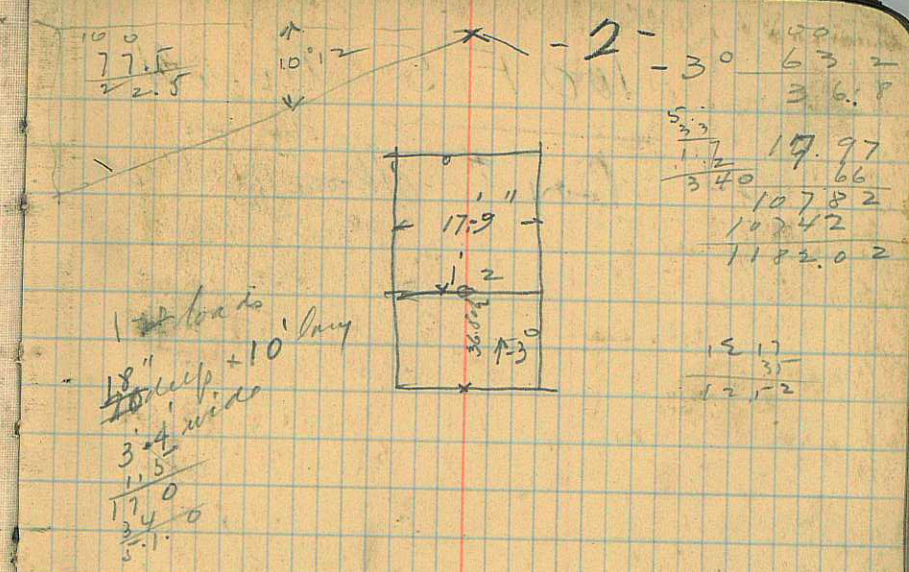
8- 9 246°15' 0.35 +1°

9- 11 115°44' 3.07 -5°36' 5 4

11- 12 180°50' 1.65

13 62° 2.15 -35'

14 -35'



100 F 5 Alma Helz

24 Boy # Alma Helz

42

Levels Boulder Co
 Sum 11-20-15

Sta	BS	FS	in	Ele	HT
	5.16			107.04	✓
	6.44	6.24		105.96	✓
f	3.940	7.21		104.99	112.20

b		4.43		104.50	✓
b		5.1		103.83	✓
c		4.18		104.75	✓
d		0.72		108.21	✓
	4.59	4.60		104.33	108.93

	6.54			102.38	✓
	6.38			102.54	✓

	8.92		100	108.92
--	------	--	-----	--------

Check

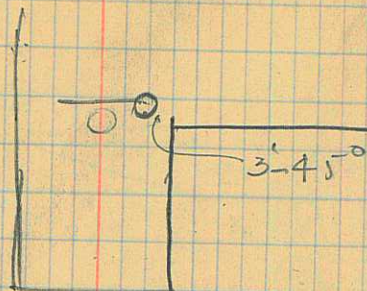
f	3.95			
b		8.95		3.98

5.16
 3.94
 4.59
 13.69

7.21
 4.60
 8.92
 20.73
 13.69
 7.04

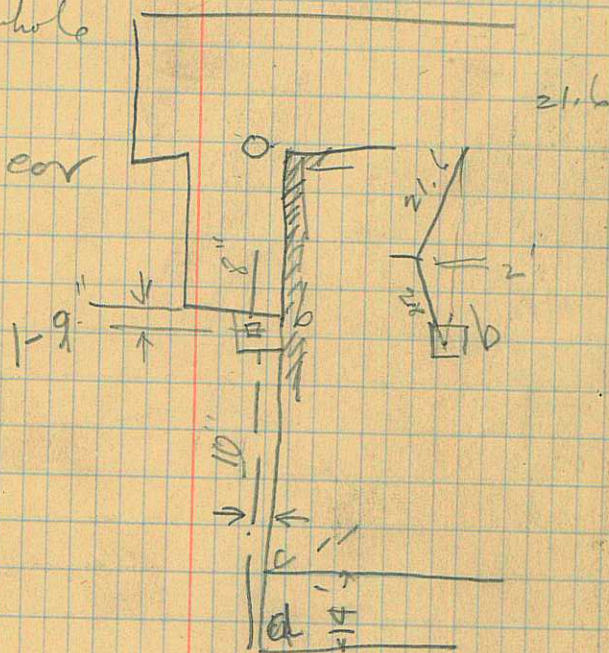
7.21
 5.16
 2.05 - 6-

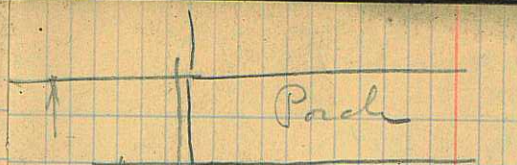
outcrop
 bottom trap



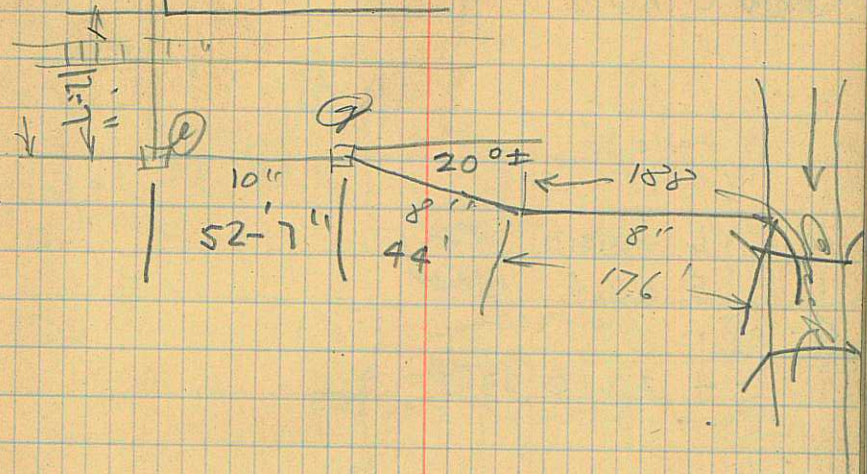
bottom manhole
 ground
 " in concrete cov

g





$$\begin{array}{r} 176 \\ 12 \\ \hline 188 \end{array} \quad - 8 -$$

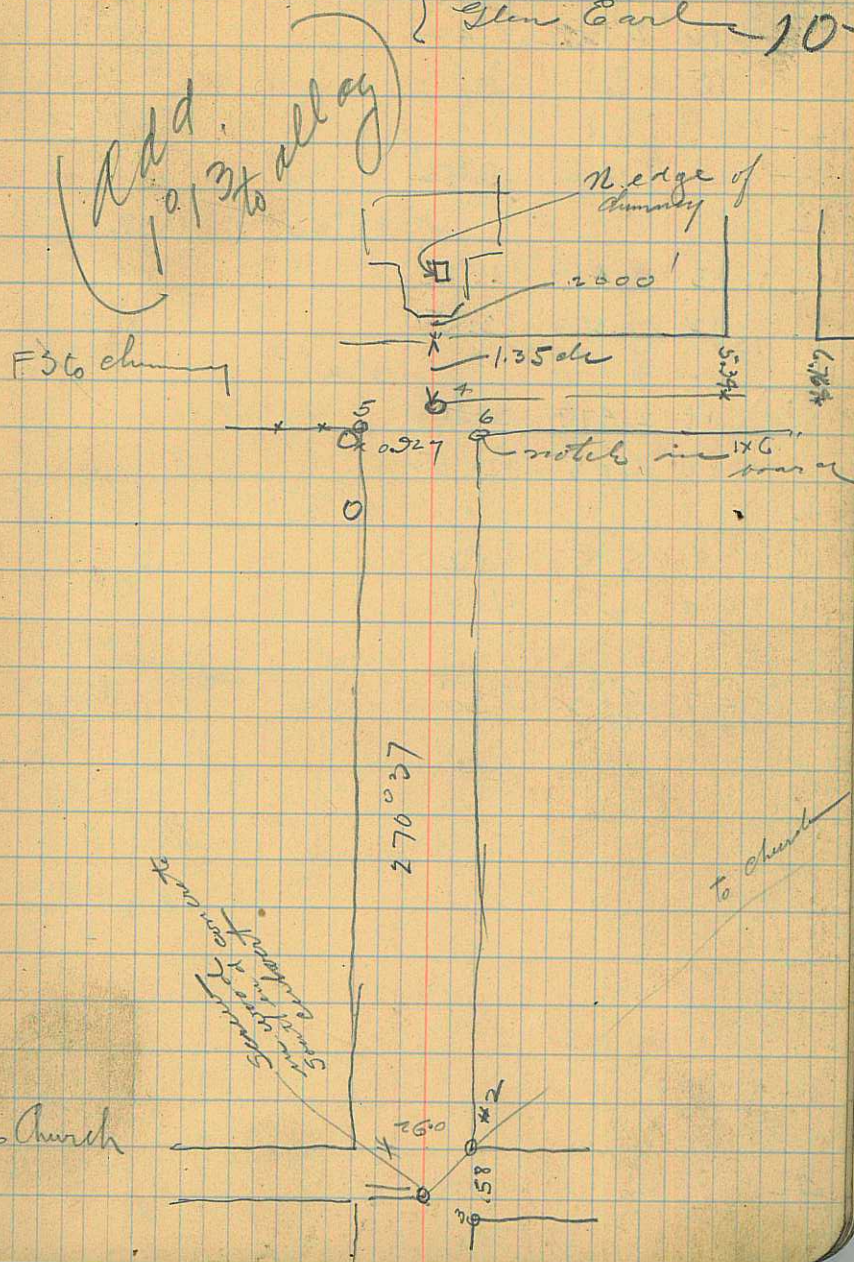


from
 5
 N-PC hlst ag Sett

6 0.312 18°43'
 5 0.64 170°38'
 4- 20.13 270°37'

3 0.285 19°45'
 2 0.566 301°6'
 1- 305°06'

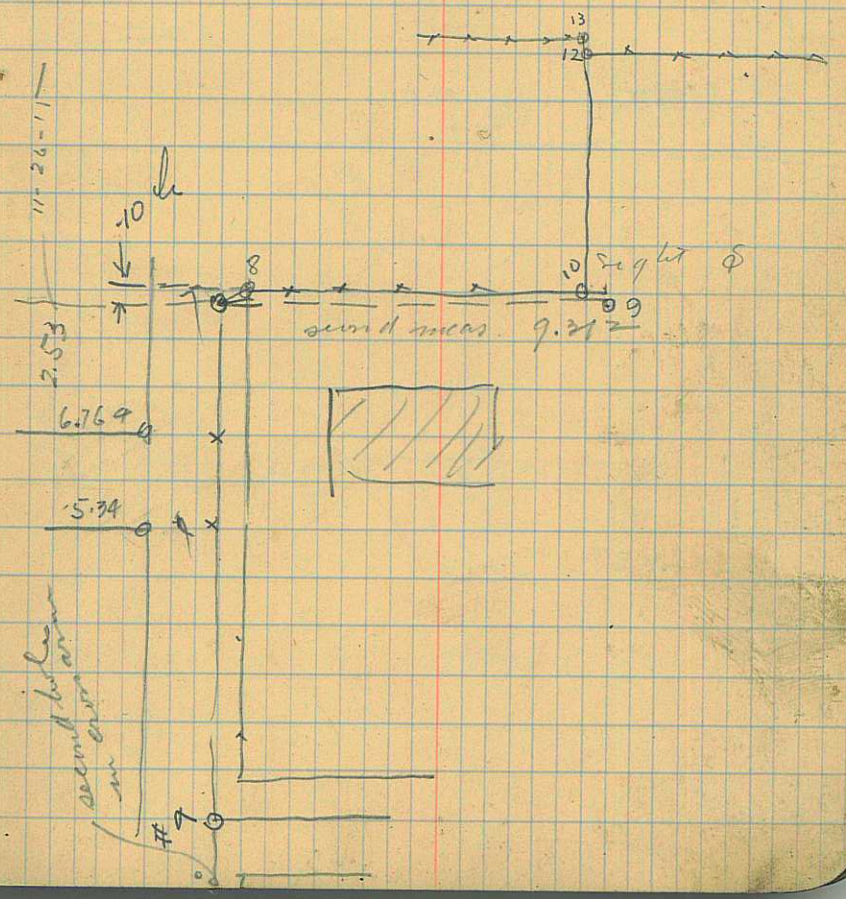
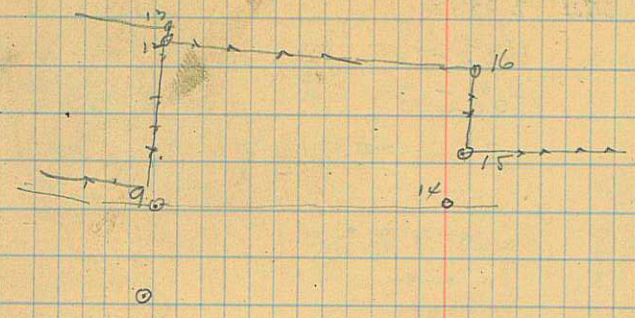
Survey for Ino Cannon
 in Jackson Utah
 Cannon } Davis + Christensen
 Glen Carl 10-11-22-15



Station	Dist	Angle	Notes
16	2.322	2°42'	
15	0.98	7°36'	
14	6.299	86°43'	
13	0.413	326°20'	
12	0.363	322°51'	
11	2.479	2°36'	F9
10	0.25	322°05'	
9	5.157	92°20'	F5
8	0.122	41°46'	
7	9.32	30'	

9.32
 6.76
 2.56
 2.529
 2.53

12-



4-

$\bar{\Delta}$ - Pt klist as
 1- 1 14.344 272°12' ²⁹¹⁰⁸ to 7 and 305°38' to divide
 21 162°02'
 22 150°45'

23-
-23 38.89

20- 16°24'

1 10.177 178°53'
 19 0.63 50°36'
 18 .657 307°18'

17-
17 8.433 86°43'

14-

963 166
 66 14.6
 303
 264
 390
 296

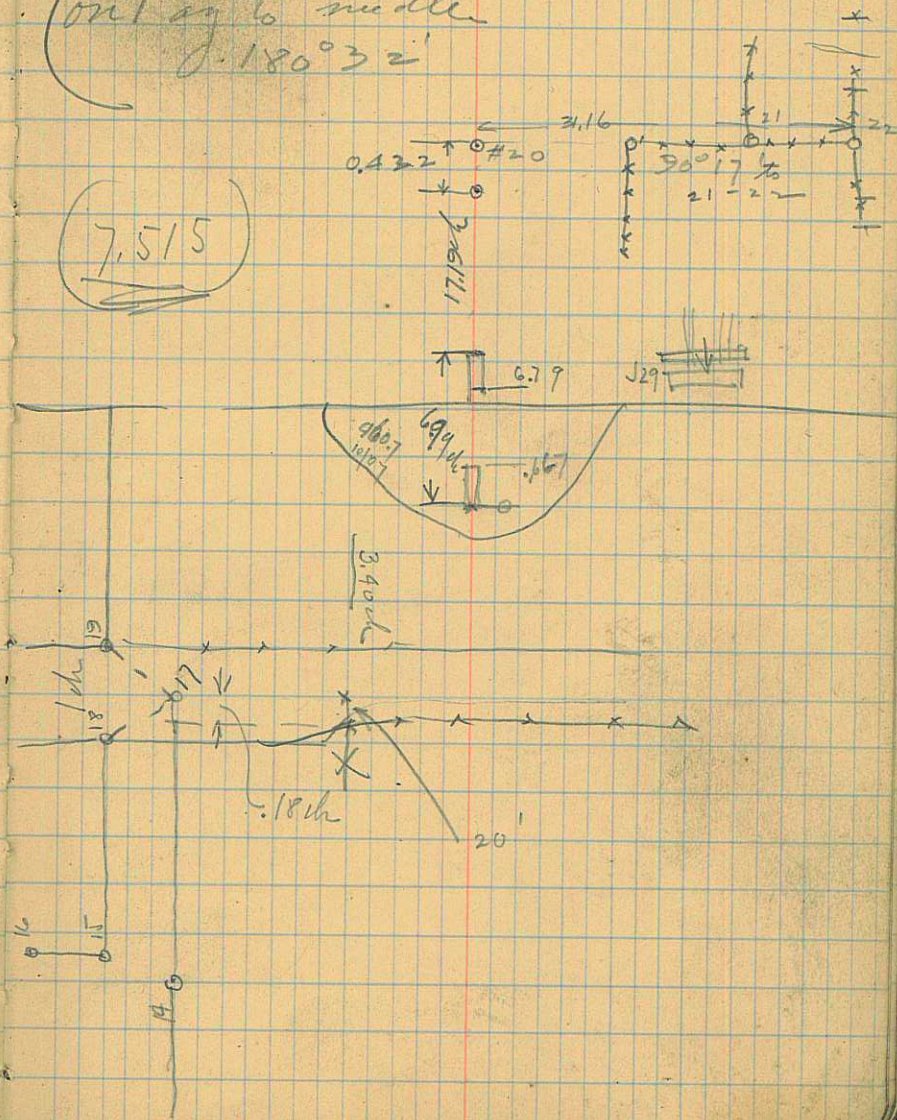
1134.6 66 -14-
 66 17.19 29J
 274
 274

26
 66
 600
 -94
 60

31.16
 146.0
 43.76

(cont) as to middle
 180°32'

7.515



- 16 -

Measurement of
City Supply line from Bellville
Spr.

Sta

15+50

6+53.3

6+33.6

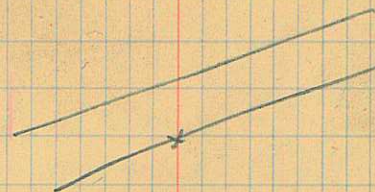
200
533
1467

11-23-15 1677
-26-19.7

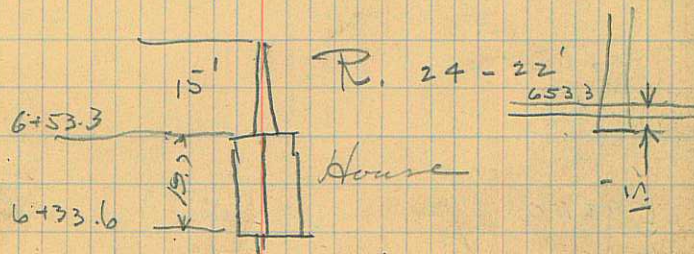
700
166
336

6336
197
6533

14



8+00



29"



104+ue
100+70
100+00
91+87

86+02

80+13
80+00

60+00

59+26

56

40+00
38+60

20+00

clean

- 28 -

a mark on pipe
Clean-out ^{pipe beam} opposite moon edge

to valve (4 strut bolts)

to clean-out

{ near 8" stem pipe of let Pover line
for low fines gang up the hull



to ^{large} ~~small~~ end of taper 22-18-12 to end

Head of let intake

{ Crother's cabins

138+95

136+00

134+77

132+54

131+74

128+84

126+55

123+22

121+90

120⁰⁰

119+91

~~120+00~~

119+11

117+87

110+93

108+94

108+88

106+93

61

52

- 30 -

valve U. 10. 10 am

Buller's 136+05 C.G.O.

clean - out

valve

clean - out

valve

clean out

valve fitting

clean out

to Buller's 120

valve

clean - out

valve

clean - out

" Buller's Sta. 108

to 2 out up hill opposite moon-eye

220+50
220+00
211+34
203+20
200+14
200+00

198+09
180⁰⁰

164+325

162+55
162+38

160⁰⁰

153+61

152+97 ✓
3+33 ✓
149+54 ✓

140⁰⁰

21286.67
21134.01
66
121
-32-

1529.4
1495.4
343

Johnson line Kales below Cavito gate
Bullens 209+87.5
about this sta. as went up here
is Bullens 198+68.4

Jakie Hollow

clean out 200 above Jakie Hollow

to 16" gate valve

to 16"
beg of R. 18'

to Bullens 153+11.4

air vent Steam mill Hollow
c
clean out

lower end V.P. Dam

265+12

263+27

263+25

262+82

263+24.8

260+40

260+00

249+38

247+97

240+00

239+57

< 34²

263 25

262 82

261

182

+ about 6" 5Y



beg of 18"

mark on L 263+24.4 end of 16" pipe
to Buller's 261+00
elli

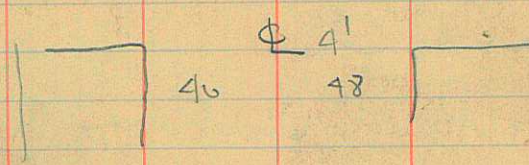
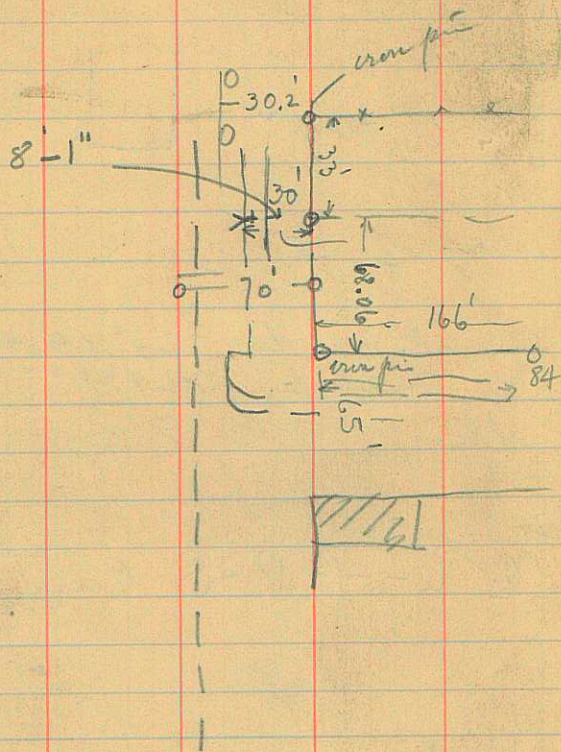
E L-H-P-S Canal

L abutment steel bridge is

Clear - out

Course opposite Utah Power Grounds

Imports p ipso



$$\frac{166}{8} = 20.75$$

$$\begin{array}{r} 166.8 \\ 65 \\ \hline 101.8 \\ 95 \end{array}$$

$$\begin{array}{r} 88 \\ 80 \\ \hline 128 \end{array} \quad 36$$

$$44$$

$$\begin{array}{r} 134.08 \\ 66 \\ \hline 68.06 \\ 33 \end{array}$$

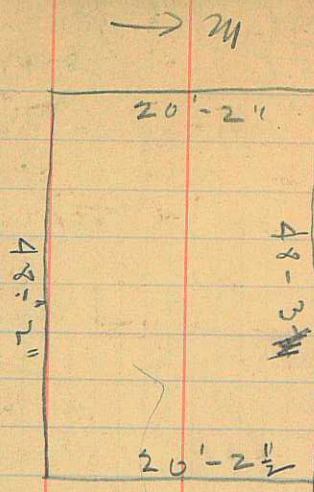


$$84 - 5 - 10 = 69$$

arr 4.92

SE cur 5.55

$$\begin{array}{r} 5.87 \\ 4.92 \\ \hline 0.95 \end{array}$$



48: 4 1/2

38

U
U
8
8
132

66
4

70

Rear Below State
Woods

4.265

OK

4.34

#2 grade

4.11

3.83

Reading from lower edge of
single nail under trap door

4.14

first hook reading

4.455 - 8-4-15

nail 4.10

4.50

8-2-15

steps

.775

9-30-15

nail

To get stages for

3.70

3.95

4.20

per haps

and as low as possible

height depth depth time Rev
Loyan Hollow 12-1-15
just first spill of L+N Canal

.4
1.2 .3 53 30

1.5 .36 46 30

2 .35 48 15

2 1/2 .4 54 30

3 .35 39 20

3.4 .41

- 42 -

Lagoon 4 N - $\frac{4}{12.5}$

Whit	klept	klept	time	Rev
2	.45	.27	43	2
4	.58	0.36	39	10
6	.65	0.40	47½	15
8	.65	.40	41	15
10	.62	.37	41	20
12	.46	.28	56	15
14	.32		59	10
15.5	.25			

12-1-15 Gage start
stop

0.645

time 3:30 P

0.645

" 3:45 P

44

Note turned up
on gate for about
4 minutes at
9:05 PM

293' from End 6" to Re 100

Length

21	7
21	7
20	9
20	9
21	10
19*	10
21	10
21	5
21	10
17*	11
14	
37*	

$82 \frac{12}{6}$

79/9 32 = 6'-10"

58 10

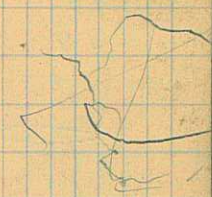
 8

788-6

19.8
20
19
588

46-

293



Car

48-

15	11
18	00
18	00
18	
18	00
19	11
18	

58
14
18
5
4
<hr/>
129

88
7
18
5
3
<hr/>
121
8
9

~~17 11~~

19	11
18	
18	
18	
18	
18	
18	

55
<hr/>
7

17	11
20	
<hr/>	
30	9 8

327	8'
-----	----

326	19
17	
<hr/>	
309	08

+ ~~about 18 - 12 60/18~~

+ about 52 - 18

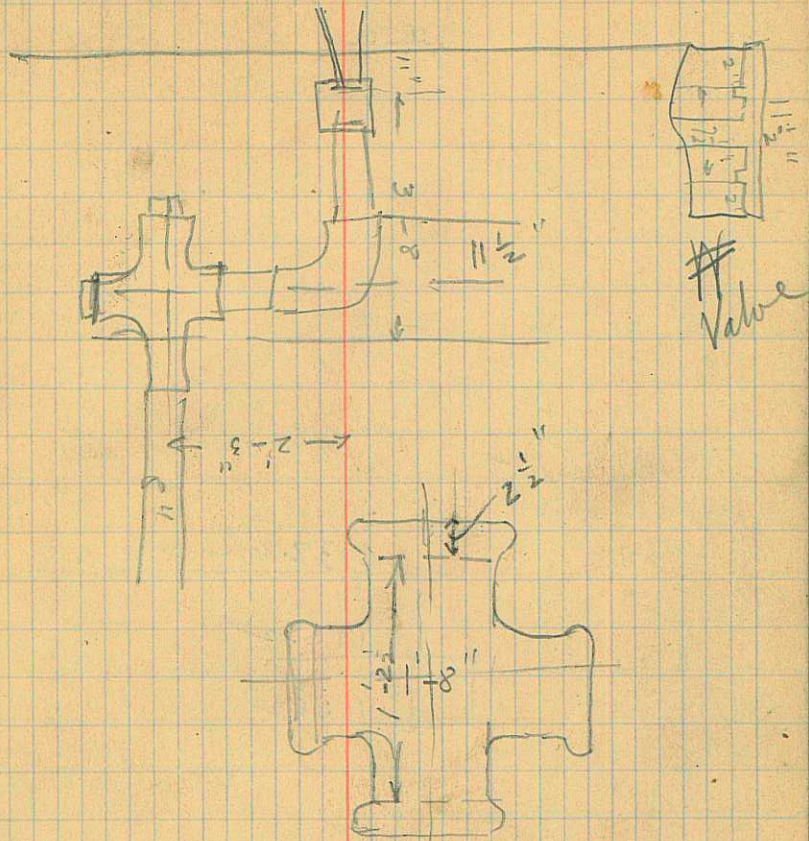
4" weights 5.85 per 1'
5" " 7.50 "

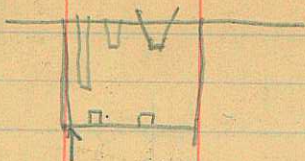
~~24~~
26
26
52

52

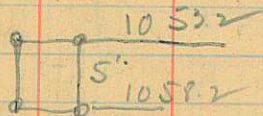
Fittings necessary
Remain
2 4" iron couph. to rec. M.J.p.

54





1032 School



C 6x6x9x6
1330.5

Extra 6" length 21'
18.6
Total 39.6

40
18
29 - 56
46 1058
15 102
79
21
0
200
695
1305
1200

man + C

700.5

Deck even
to man laws
1050'

Shelving
3' or 2'

Check on 6" pipe left

2' 2" nipples

10 7" Amount

19 6" required yet

19 11

17 11 272 hrs

21 10 4 slip

21 5 6 nipples

21 10

19 10 282

21 10 use 16' down

20 9 at Evans

21 if necessary add

18 6 the 3 foot pipe

20 9 made up by the

21 1 N. G. Co

21 7

298 11 2 = 4"

298 4"

Deduct 8" of all
of order comes

13 3 0 5
10 5 3 2
19 7 7 3

58

Extra order from 12-4-15
Geo a Lowell Co

freder one - 4" nipple 12" long with
one coupling to gal

one 8" M J nipple 11" long

" " 8" " " 20 5/8"

two 4" gal. couplings

Unions Chicago or equal

One 1"

one 2 1/2" M J B M 13 gal valve

3 - 1 1/2"

one 2" attends to

5 12/7/15

5 - short 2" gal iron nipples

Call Coppis attention

to one 1-6" valve str box

{ 2 4" " " }

order an extra 4" box

3 - 3" str boxes.

3 - 2 1/2" " "

send up a 3" plug from Legum

Condition of 4" plug order

On hand 4 all that are
4 needed

4" plug	NT	Low	Required	used
	8	4	6	1 1/2

3" with 2 1/2"		10		2
			2	
			2	
			2	
			2	

3" with 1 1/2 SP		7		2
			1	
			2	

3 plugs	7	2		1
			2	1

Crosses left open
Cros on main 3 E
fig 3 x 3 x 4 leave 4" plug out

one at Center + Elm fore plug
Elm 1st E
~~center~~ + both on main Str F.P.

Elm 4 2 E
Main + 3rd E. fore plugs Elm 2W
Elm + 1 West
~~Main 3 West~~
Elm 3 West

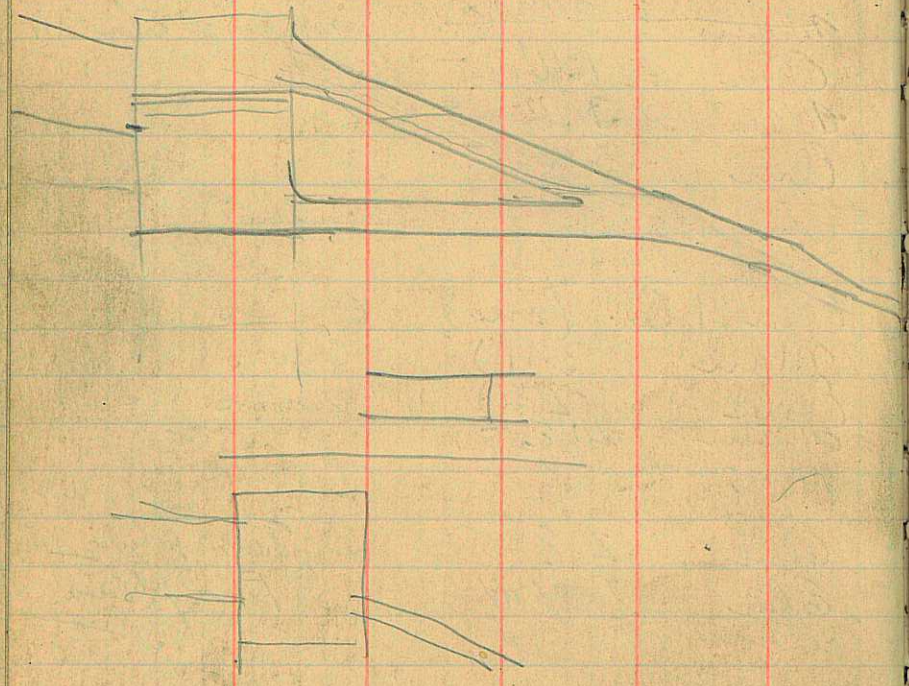
Elm 1 E. (in) cross
Main 3 W cross
Elm 2 W cross
Main 2 E fore plug

Elm 2 E
Elm first W
Fore plug
Fore plug

12-4-11

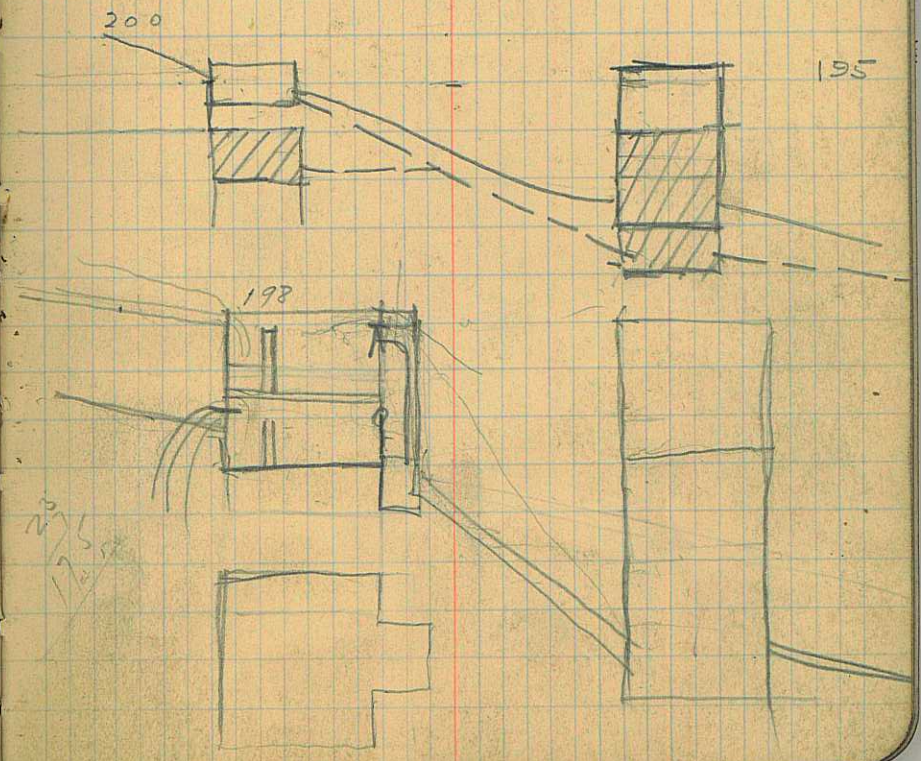
Plugs on hand

	Stacked	Used	Left
3	7	1	1
3-1 1/2 S	7	2	5
3-2 S	10	2	8
4"	4	2	2
4-2 S	2		2



main 1" G on 9" C

Mellville intake box study



L # One inch
 21 10 210
 20 5 100
 19 5 95
 405

L # 1 1/2" gal. ir. pipe
 19 1
 20 2
 21 3
 18 2
 19 1
 17-2 2
 18 1
 21 3
 21 3
 2 2
 18 1
 21 3
 21-4 3
 20-2 2
 19-x 1
 20-4 3

also 1 1/2 inch
 44 x 20 = 880
 64
 1540

\bar{A} - Pt ay. Flint Bear Vert. Needle

B.2 F.3

$$\begin{array}{r} 7.8 \\ 6.2 \\ \hline 14.0 \\ 6.4 \\ \hline 9.6 \end{array}$$

10 156 44
 9 74° 75
 8 59 39
 7 232°30 27

6

6 148°41 5 100
 237°22
 2 271°27

5-

5 125°31 2962.7

25 125°31
 3 196°
 2 196°00

2'

N 59° 29 W

1-

Wilson + Co
 Rivers - Heights 12-7-11
 - 66-8

$Q = 1.6 \times 0.8 = 1.28 \quad 0.13$

$$\begin{array}{r} 1440 \\ 7 \\ \hline 10.080 \end{array}$$

$$\begin{array}{r} 34. \\ 28 \\ \hline 37.8 \\ 2.6 \\ \hline 55.8 \end{array}$$

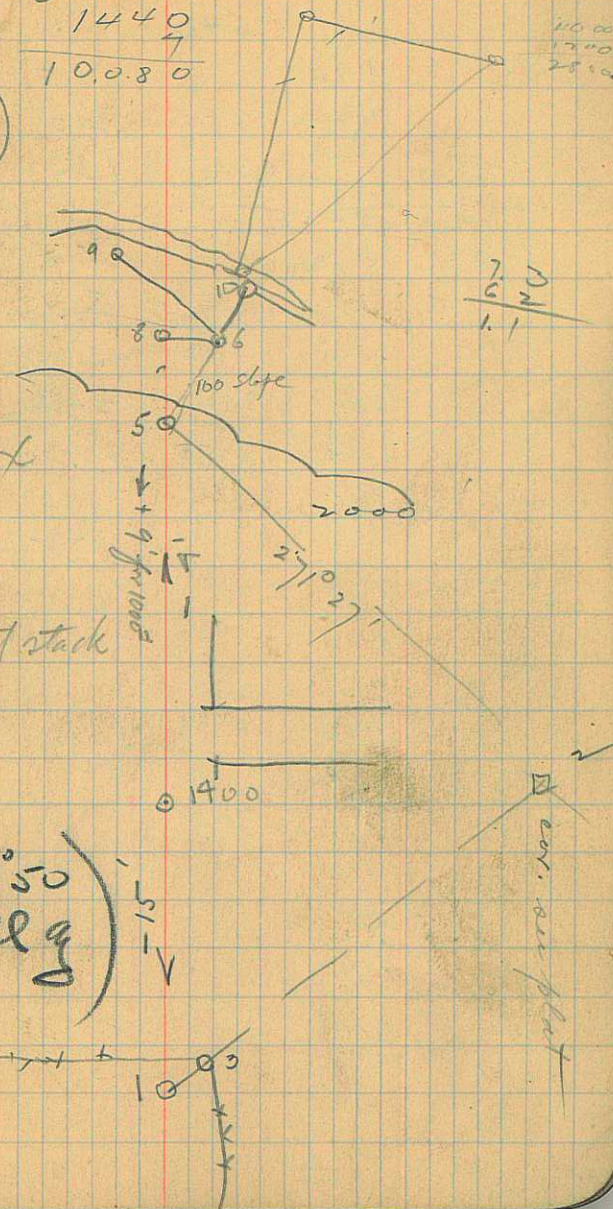
7'

to ram
 8.00. drum box
 7.6 on spr.
 HI 4.80

to C.A.C. heat stack

HI 5

(Sub 33°50
 from all g)



$$\begin{array}{r} 7.0 \\ 6.2 \\ \hline 1.1 \end{array}$$

gro yards Apr.

12-8-15

B5	F5	in	Ele	HT
3.00			200	203.0
	6.40		196.60	
1.90				198.50
		5.00	193.50	
		1.34	197.16	✓

Dec 8-15

4.06			197.16	201.22
		5.00	196.20	
		1.70	194.52	
		2.56	198.66	
	0.58	20.64		
9.60				208.24
		2.35	205.89	
		0		

68

3420

on junction of two streams

203.40
196.60
1.70
198.50
1.20
197.10

on Catch Basin spr.
on nail on a 1/8" root in tree

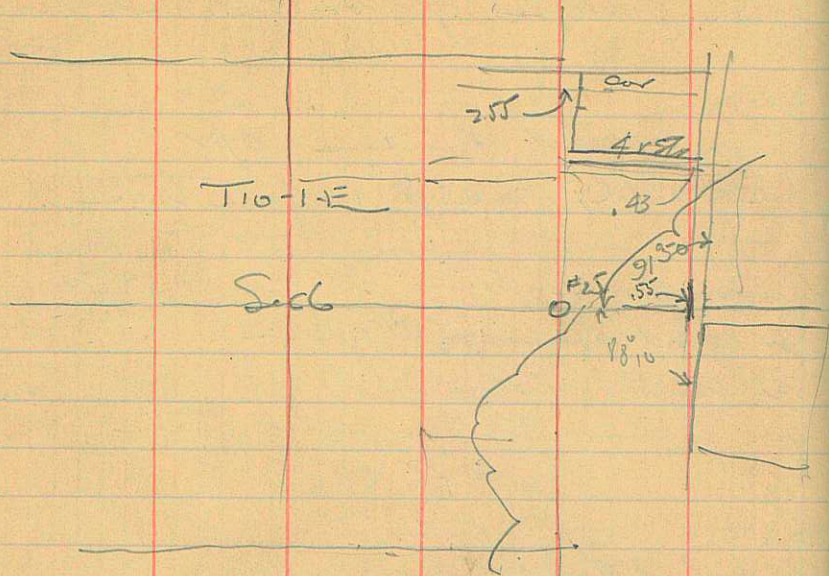
on root in tree
on hard pane spr. W of line
on jet two streams
on peg. one location catch basin

7.40
4.90
2.80
197.16
201.22
197.16

and East trench
about 20' below center source

206.
204. jet.

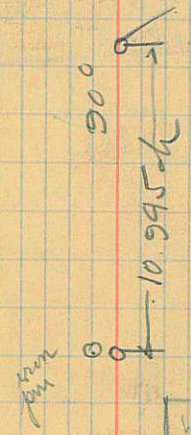
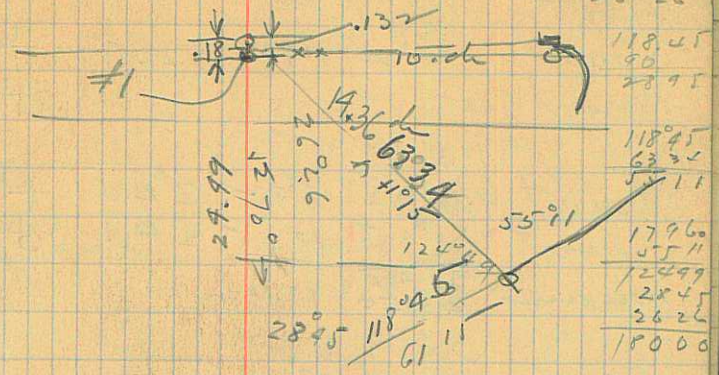
1440.00
1.60
1441.60
1.40
1443.00



$$\begin{array}{r}
 120.66 \\
 66 \\
 \hline
 120.8 \\
 120
 \end{array}$$

$$\begin{array}{r}
 290 \quad 70- \\
 495 \\
 12 \quad 66 \\
 \hline
 37.5 \\
 330 \quad .568 \\
 \hline
 910 \\
 396 \\
 \hline
 540 \\
 528 \\
 \hline
 120
 \end{array}$$

269 60
243 32
26 26

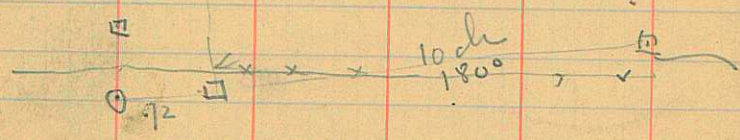


Second Trust west

Main

.03ch
0.
0.538

Callin
Stair



Dec 11-15

74-

Direct	az	Dist	Time	
Direct	29°20'	119°10'	255PM	P
Invert				σ

Direct	30°25'	189°2'	2°40'	⊕
Invert	31°15'	180°5'	2°41'	⊖
mean	$\frac{61\ 40}{20\ 50}$	1823°30'		

	30°57'	18°27'	
	31°59'	17°43'	2°40'

Mean 31°28' 18°05'

Z_{mean} 31°09' 18°45'

$\sin 55^\circ 11'$
7

$\sin 28^\circ 05'$
10.36

$\sin 55^\circ 11'$

1.156852
1.914334
1.071186

$\sin 28^\circ 05'$

1.682135
1.389051

25.49

10.94

35.43

25

18

.75

10.50

10

15.0

115.0

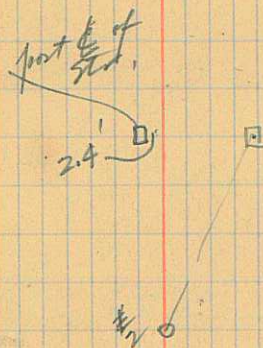
35.25

11 - Pt by West Bear n

5-	270	12.60	
	5	208.56	4.46
4-	4	202.56	4.11
			N 22° 56' 3.785
3-	3	212.17	3.58
		212.17	0.85
		93° 30'	2.74
			N 32° 12' 2.34
2-	2	90°	18.27
1-			

85
273
358

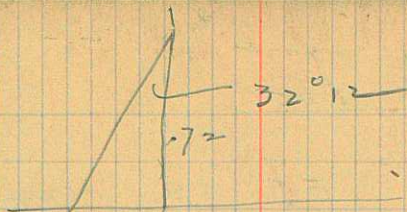
76- 150 60
132 229
150
132
480
462



3.785
2.31
6.095
10
6.095
3.905

SW contract
to 6 sec 6.

0 1/2



$\log .72 = \bar{1}.857332$
 $\log 32.12 = 1.507470$
 $\hline 1.929862$
 85.08

$\log 32.12 = \bar{1}.857332$ $\hline 25362$ 59178 16908 $\hline 2307842$	$22.5^\circ 92.1$ $\hline 411$ 92.1 3684 $\hline 3.78531$
---	---

$3.905 \overline{10921}$
 2856

3.905018752
 $\hline 35008 \quad 4462$
 40420
 $\hline 35008$
 54120
 $\hline 52512$
 $\hline 16080$

Levels for
Joe Morkas

12-22-11

1:50 PM to

IM BS FS IM Ele

1108

1150

40 10.94

10.29

40 10.62

9. ~~82~~

90 9.92

10.62

90

11.55
1106
0.99

25

80

117

10.82

in basement
bottom

on 2" water pipe grade

$$\frac{60}{1} = \frac{117}{x}$$

$$\frac{117}{60} = \frac{60}{1.9}$$

$$\frac{11.50}{550} = \frac{10.94}{10.94}$$

$$\frac{1.50}{117} = \frac{x}{40}$$

$$\frac{600}{185} = \frac{117}{.51}$$

~~60.22~~

$$\frac{60}{1} = \frac{107}{x}$$

$$\frac{1500}{430} = \frac{107}{.014}$$

$$\frac{.014}{90} = \frac{1.260}{1.260}$$

$$\frac{11.55}{1269} = \frac{10.29}{10.29}$$

~~1309~~

99.21
19.6

$$\frac{1106}{1022} = \frac{992}{992}$$

$$\frac{1106}{967} = \frac{1.339}{1.339}$$

$$\begin{array}{r} 10.62 \\ \underline{3} \\ 10.82 \end{array} \quad \begin{array}{l} 33 \\ 36 \\ 0.37 \end{array}$$

$$\begin{array}{r} 45 \\ \underline{36} \\ 90 \end{array} \quad \begin{array}{l} 12 \\ 38 \end{array}$$

$$\begin{array}{r} 10.82 \\ \underline{38} \\ 11.20 \end{array} \quad 0.66$$

$$\begin{array}{r} 10.50 \\ \underline{11.20} \\ 50 \end{array} \quad \begin{array}{l} 11.06 \\ \underline{1.69} \end{array}$$

$$\begin{array}{r} 9.92 \\ \underline{9.25} \\ 9.67 \\ \underline{38} \\ 9.29 \end{array} \quad \begin{array}{l} 11.06 \\ \underline{9.34} \\ 1.72 \end{array} \quad 1 - 9\frac{1}{2}$$

$$\begin{array}{r} 11.06 \\ \underline{9.29} \\ 1.77 \end{array} \quad 1 - 9\frac{1}{2}$$

$$\begin{array}{r} 7-10 \\ \underline{6} \\ 110 \end{array}$$

$$\begin{array}{r} 10.62 \\ \underline{1.1} \\ 9.52 \end{array} \quad \begin{array}{l} 50 \\ \underline{17} \\ 67 \\ 1 \end{array} = \frac{50}{67}$$

$$\begin{array}{r} 67 \\ \underline{70} \\ 1.1 \end{array}$$

$$\begin{array}{r} 10.96 \\ \underline{10.62} \\ .32 \end{array} \quad \begin{array}{l} 60 \\ 1 \end{array} = \frac{50}{4}$$

$$\begin{array}{r} 500 \\ \underline{480} \\ .8 \end{array}$$

$$\begin{array}{r} 10.62 \\ \underline{8} \\ 9.82 \end{array}$$

Morse
computation

Water measurement
of Spr. Creek June 5-16

Sta.	depth	D+0	time	Rev	Velot	mVert	Mean area	Mean D	W	Q	
1.4	.9	1.54	55	5	.23	.23	.40	1.21	1.1	1.1	.48
2.5	1.3	0.8	42	10	.55	.55	.76	1.40	1.4	1	1.10
3.5	1.50	0.9	46	20	.97	.97	.91	1.320	1.65	.8	1.20
4.7	1.8	1.08	40	15	.85	.85	.85	2.16	1.80	1.2	1.85
5.5	1.8	1.08	40	15	.85	.85					

- 84 -

4.73

6 e.p.s

Notes on
Dam site Garrison

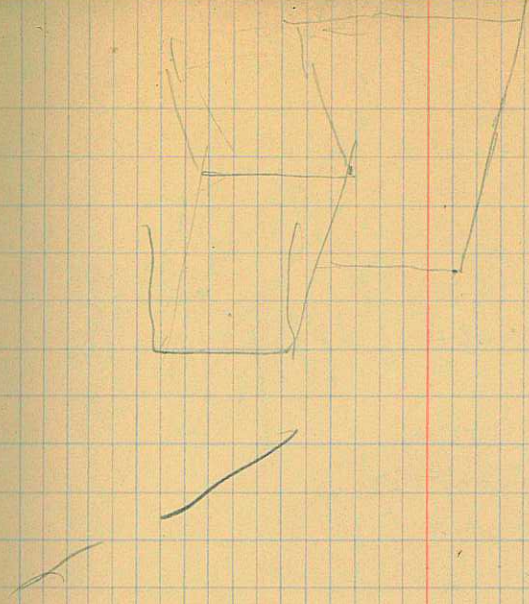
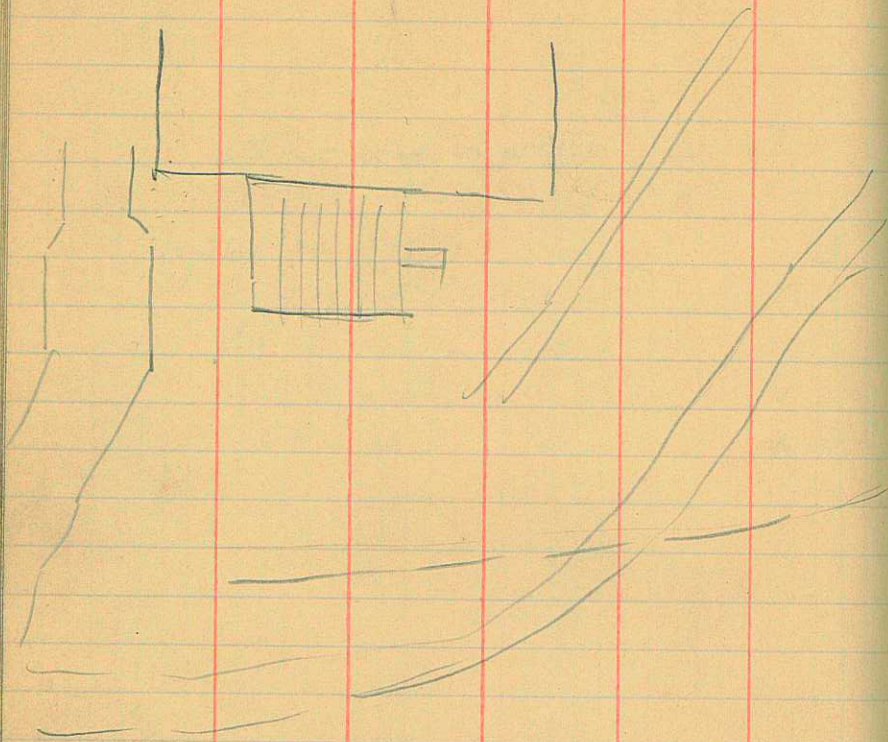
down on Spr. Creek

- 86 -

A - P	q.	Vert L	U	Stadia	
				C	L
	201°20'	+38'	4.71	4	
	209°45'	-9°48'	4.51	4	
	202°20'	-13°	6		5
	198°50'	-14°50'	6		5.13
	194°34'	-13°16'	6		5.17
	167°38'	-14°50'	6		5.34
	148	+11°35'	5		4.46

5 acres

-88-



R-P4 Day Unit

3- ~~SW~~ 25°30' 15.13

27- 27°30' 4.83

14.79
9.60
9.12
4.70

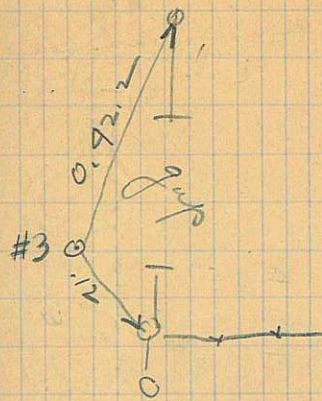
3- 21 1/21/76 check

3- ~~SW~~ 25°30' 15.12

1/19/16 Pic for Jake Zollinger

94

472
486
9589



23 to 2'

370
3
1110

15.15
66
9090
9090
999.90

to bluter

to # 27
E side
to W side lane 7/45

1979
960
10.19

318°29'

1/21/16

Stadelbaker
Bunker

Ele
99.88 4.17

West
C L U

100.00
99.93
98.95

4.05 3.94
4.12 3.56
5.10 4.18

Reported to Karl

104.17
4.05
100.12

SE cor

NE cor.

72' west of old building
72' west of NW cor of building

104.17
5
99.07

104.17
4.12
100.05

5.10
4.17
0.93

4.12
3.12
1.00
11.22
9.0

4.11 96
4.05
3.94

11
22
5.10
4.18
0.92
1.82
16.2

Survey of Elevator grounds
1/26/16

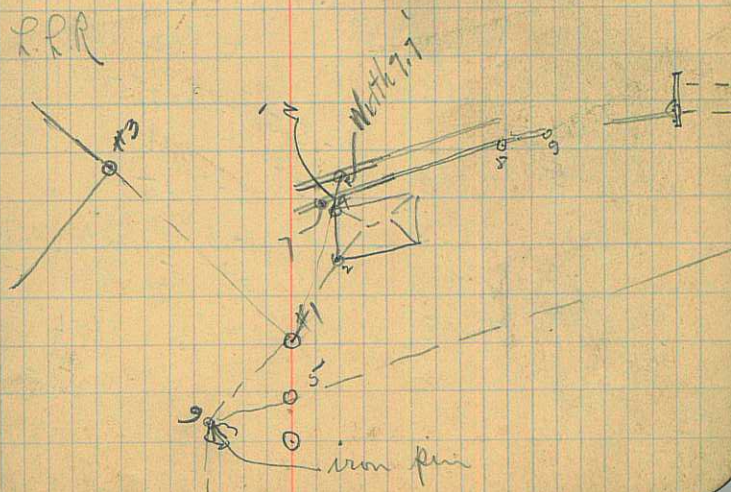
T - Pt	S az.	Dist	West	East	L	Stadia	
						C	J - H
19	92°47'		+1°25'		4	4.28	
18	104°53'		+4°41'		6	6.26	
17	98°55'				4	4.4	
16	121°57'				4	4.42	
15	137°10'				5	5.42	
14	157°36'				5	5.45	
13	176°7'				5	5.26	
12	242°53'		1°10'		3.50	3.50	5.00
11	237°43'		+26'		5	6.30	
10	235°29'		+25'		5	6.22	
9	231°11'		+0°24'		5	6.02	
8	229°27'		+0°45'		6	6.9	
7	183°20'				4	4.23	
6	53°53'	33.15					
5	360°	12.4					
4	186°00'	46.2					
3	130°14'		+7°45'				
2	191°20'	26.2					

5.00

78

R.W.
end of rock retaining wall
concrete wall n. side L.L.
wall of L.L.

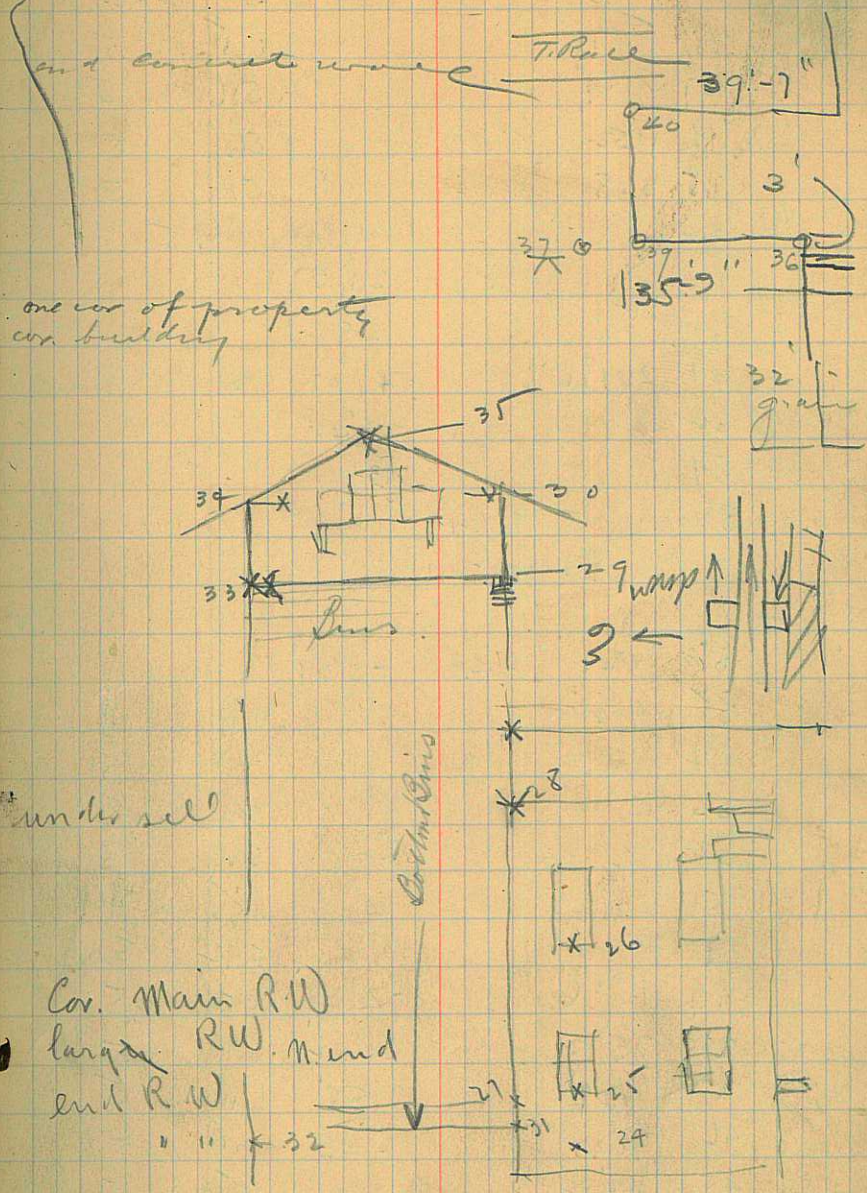
S Wall L.L.
" " " "
" " " "
end S. wall L.R.R.



α -Pt	α	Dist	Vert L	U	C	L	H
44	56°25'		-22'	5.56		5	
43	66°42'		-4	5.47		5	
42	81°13'		0.00	5.41		5.00	
41	102°13'		0.00	5.40		5.00	
40	106°52'	21.2					
39	180°39'	7.6					
38	183°17'						
37	73°41'	117.3 ⁰	+12 ^L				
36	22°0'						
35	95°18'						
35	105°13'		37°54'				
34	96°02'		36°53'				
33			+33°37'				
32	96°26'	73.5	+25'				
31	113°58'		+5°59'				
30	113°58'		+35°20'				
29	113°58'		+32°13'				
28	113°58'		+25°18'				
27		98.8 ⁰	+2°31'				
26	120°01'		+17°02'				
25	120°01'		+8°15'	to bottom rail			
24		82.5 ⁰	+2°01'				
3	130°14'	93.3 ⁰	+7°45'				
23	139°55'		+5°01'	314		3	
22	163°21'		+7°05'	296		2.0	
21	73°35'		+33'	544		5	
20	80°30'		+1°26'	535		5	

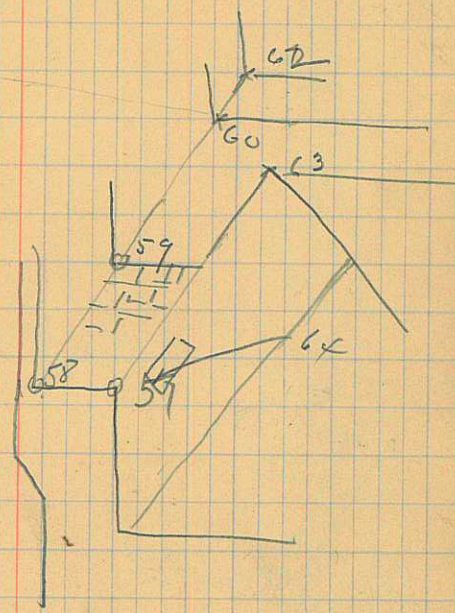
Stadia

100



Pt	Dist	Vert L	Stake		H.L.
			U	L	
68	19°18'		6.05	5	
67	9°49'		5.86	5	
66	1°52'		5.63	5	
65	328		5.26	5	
64		acc	1.5		
63	21°37'				
62	25°21'				
61	201°10'		4.31	3	
60			23°41'		
59			13°20'		
58	210°35'	95.6-11			
57	215°3'	100.5-11			
56					4.90
56	73°41'	84.0	+0°09'		
55	9°30'		4.93	4	
54	356°50'		5.64	5	
53	346°50'		5.46	5	
52	242°20'		5.39	5	
51	269°25'		4.55	4	
50	8°30'		5.42	5.0	
49	16°36'	-2°08'	5.56	5	
48	25°12'	-1°02'	5.96	5	
47	29°	-58'	6.11	5	
46	31°33'	-45'	6.20	5	
45	44°16'	-26'	5.75	5	

on floor
Main rd cut



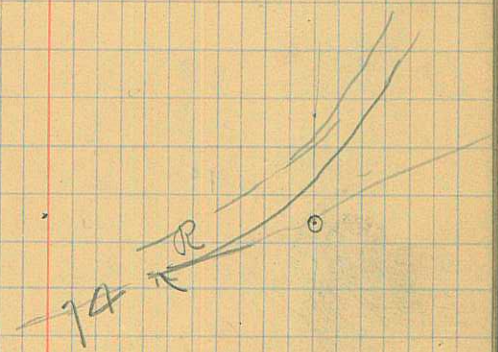
cur propert edge curb

37
37

K-Pt S
 my best Vent L C C
 Stadi's

	74	239 ⁰ 4.5'				
	73	2 ⁰ 22	88'		4.87	4
99-	72	2 ⁰ 22	-	-52'	5.56	2
	99	48 ⁰ 37'	201	-25'	6	4
	90	47 ⁰ 25'		-35'	6.99	5
56-	69	41 ⁰			6.62	5
					6.31	5
K-						

SW on Bell's



about - by C face

7.8
1.68

Sta	Depth	W of O	Time	Rev.
8.8	.3		54	30
7.6	.6	.36	41 $\frac{1}{2}$	30
6	.8	.28	48	30
		.48	57	30
5	.75	0.450	41	40
			42	40
4	.75	0.45	{ 46	20
3	0.68	.40		{ 40
			43	30
2	.45	0.270	59	10
1	.1		00	00

gauge a weller staff
read 0.72 - 1-27-15

-41' West - Slope 1.19 in 100'
-17' to N slope down N 0.49
SE cor Blk 14 N.F. = 5.16

$$\cos^2 R \tan \phi$$

50

$$\cos \phi \tan \phi$$

$$\frac{b}{c} = \frac{a}{b} = \sin \phi$$

$$100 \cos \phi \sin \phi R$$

$$\frac{b}{c} \times \frac{a}{c}$$

$$\frac{a^2 + b^2}{c^2} = 1$$

$$\frac{a^2}{c^2} + \frac{b^2}{c^2} = \sqrt{1 - \frac{a^2}{c^2}}$$

$$\frac{a^2}{c^2} = 1 - \frac{b^2}{c^2} = \sqrt{1 - \sin^2 \phi}$$

$$\sin = \sqrt{1 - \cos^2 \phi}$$

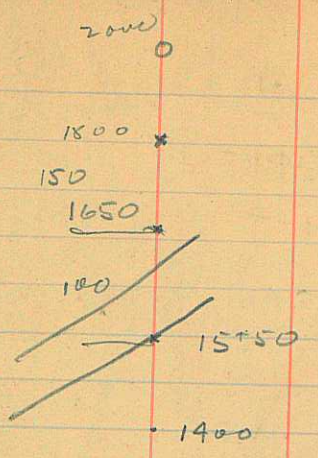
0	2	1	5
2	7	5	
1	1	0	5
1	3	7	
5	0		
6	3	7	

0.64

10	5	2	
10	6	7	
10	7	0	
13	6	2	7
6	7	6	
13	3	2	

$$100 \sqrt{1 - \sin^2 \phi} \sin \phi R = K$$

approximately) the distance from
 $\div (2 \times 688.26) = 2.16$ ft.
 $= \frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft.,
 $C \times D^\circ$ or = defl. for 1 ft. from Table
 e curve = $.3 \times 54.5 \times 8\frac{1}{2} = 136.2'$ or
 om Table III. For Sta. 159 deflec-
 $^\circ 26.2'$, etc.
 similar manner to tangents. Thus
 rom Table IV for 1° curve $E = 960.6$
 from Table V correction = .10 or
 nd E is measured and found to be
 $V E = 230.9$ and $\div 42 = 5.5$ or $D =$

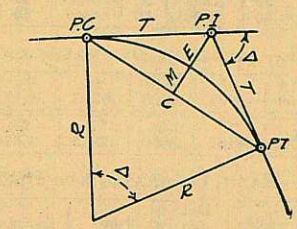


$$\frac{a^2}{c^2} = 1 - \frac{b^2}{c^2}$$

$$a = \sqrt{1 - e}$$

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



CURVE FORMULAS

- Radius= $R = \frac{50}{\sin \frac{\Delta}{2}}$ (1) Degree of Curve= D and $\sin \frac{D}{2} = \frac{50}{R}$ (2)
- Tangent= $T = R \tan \frac{\Delta}{2}$ (3) Length of Curve= $L = 100 \frac{\Delta}{D}$ (4)
- Middle ordinate= $M = R(1 - \cos \frac{\Delta}{2})$ (5) $= R \text{vers} \frac{\Delta}{2}$ (6)
- External= $E = T \tan \frac{\Delta}{4} = R \cos \frac{\Delta}{2} (1 - \cos \frac{\Delta}{2}) = R \text{exsec} \frac{\Delta}{2}$ (7) (8) (9)
- Long Chord= $C = 2 R \sin \frac{\Delta}{2}$ (10) $\Delta = \text{Central Angle}$

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.—Sta. 161+60.35 to find Sta. of P. C. and P. T. $\Delta = 62^\circ 10'$ $D = 8^\circ 20'$. From Table IV for 1° curve $T = 3454.1$ and $\div 8\frac{1}{3} = 414.49$ ft. From Table V correction = .36 or $T = 414.85$ ft. P. C. = Sta. P. I. — $T = 157 + 45.50$. Also from (4) $L = 746.00$ and P. T. = Sta. P. C. + $L = 164 + 91.50$.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft. = 7.27 ft. Distance = $158 - \text{Sta. P. C.} = 54.50$, hence offset = $7.27 (54.50 \div 100)^2 = 2.16$ ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2 \div (2 \times 688.26) = 2.16$ ft.

Deflections.—Deflection angle = $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For c ft. = (in minutes) $.3 \times c \times D^\circ$ or = defl. for 1 ft. from Table III $\times c$. For Sta. 158 of above curve = $.3 \times 54.5 \times 8\frac{1}{3} = 136.2'$ or $2^\circ 16.2'$, or = $2.50 \times 54.5 = 136.2'$ from Table III. For Sta. 159 deflection angle = $2^\circ 16.2' + 8^\circ 20' \div 2 = 6^\circ 26.2'$, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve $E = 960.6$ for $8^\circ 20' = 960.6 \div 8\frac{1}{3} = 91.27$ and from Table V correction = .10 or $E = 91.37$ ft. Or suppose $\Delta = 32^\circ$ and E is measured and found to be 42 ft. What is D ? From Table IV $E = 230.9$ and $\div 42 = 5.5$ or $D = 5^\circ 30'$.



F
D
P
E
T.

$$\begin{array}{r} 76 \\ 1 \\ \hline 77 \end{array}$$

$$\begin{array}{r} 09800 \\ 19600 \\ \hline 107600 \end{array}$$

$$\begin{array}{r} 1173650 \\ 8680 \\ \hline 1182330 \end{array}$$

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	25.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9 + (20 - 16) ÷ 2 or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.