CITY OF SAN DIEGO, CALIFORNIA

BUREAU OF WATER DEVELOPMENT

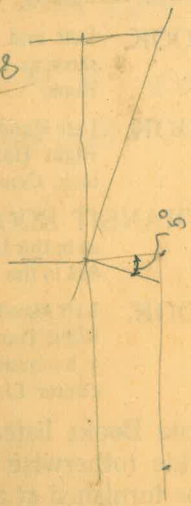
SURVEY

DULZURA CONDUIT

JANUARY 1928

#243

48" C.P. will take only 10 of bend per joint upon 8' lengths.



— INDEX —

DULZURA CONDUIT

January 16-17-18-1918
R. M. Sandersen
Brittain

2+00

40 Tunnel

H.W. 5'-0" high

TUNNEL # 1/8

+60

2

0+58

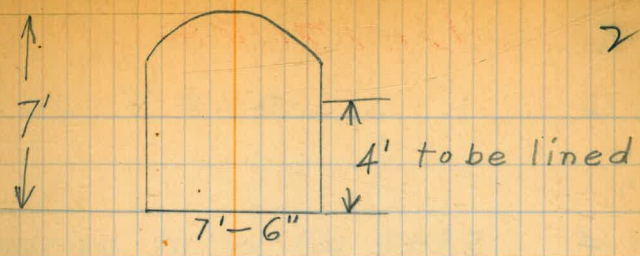
33

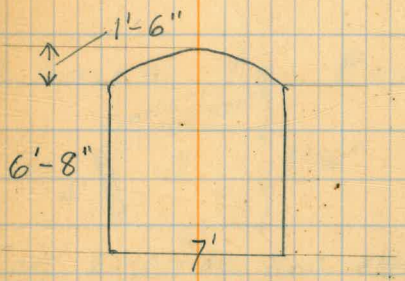
0+25

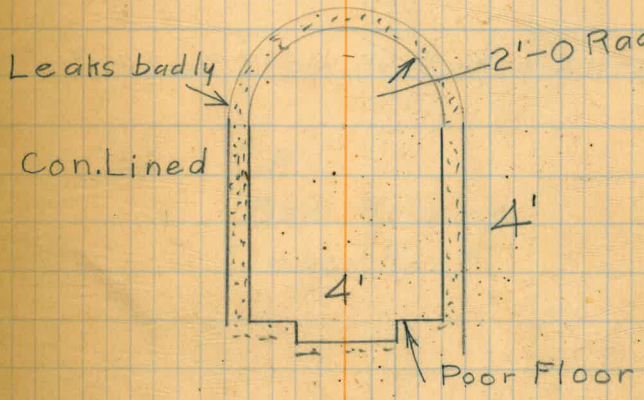
30" C.I. PIPE

25

0+00 OUTLET







8+16

52

7+64

34

7+30

16

7+14

14

7+00

28

6+72

32

6+40

10

6+30

7

6+23

13

6+10

88

5+22

322

2+00

Sec 7+14

Change to Sec @ 5+22

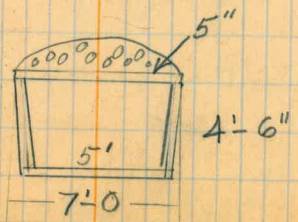
Repairs to Roof

Break out 5'-0 wide Roof and repair

Breakout 2'-0 wide Roof and repair

T.R.
Bad Remore
Timber Roof

Manhole 1'-3" X 5'-0



0+50

50

12+50 = (16+00) = 0+00

5

12+45

35

12+10

103

11+07

107

10+00

119

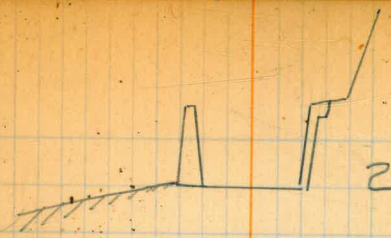
8+81

41

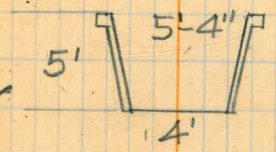
8+40

24

8+16



25' bad



25' Cover

cover

2-3'-6" H. Gate - Tunnel Portal

#3/16 · Addit 5'X6'

A.H.W. 3'-0

here forward should be lined from Tunnel no lining

Broken Roof

11+75

75

11+00

90

10+10

69

9+41

61

8+80

530

3+50

115

2+35

185

0+50

Ditch

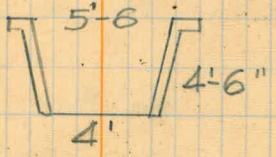
Manhole

Cover Good

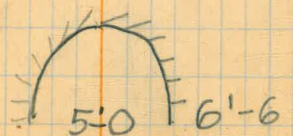
Cover Good

Ditch

Cover Good



#1/4



24+95

545

19+30

18

19+12

87

18+25

139

16+86

31

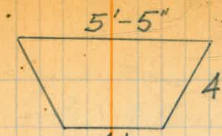
16+55

273

13+82

207

11+75

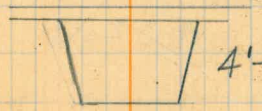


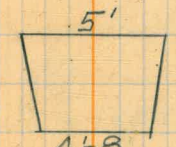
Ditch

Tunnel ½ Must be lined
Fissured 6'X6' to 12'

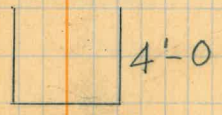
Ditch

M. H.





Cover



Av 12'-0

Flume 6

24+95
545
19+30
18
19+12
87
18+25
139
16+86
31
16+55
273
13+82
207
11+75

30+00
100
29+00
61
28+39
39
28+00
56
27+44
49
26+95
45
26+50
54
25+96
60
25+36
41
24+95

Cover

O. Ditch

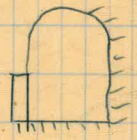
Cover

Ditch

Cover

Ditch

Put in
Arch Cover



Tunnel $\frac{5}{8}$

Cover

50+50

111

49+39

30

49+09

31

48+78

363

45+15

619

38+96

262

36+34

488

31+46

30

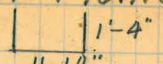
31+16

116

30+00

48' long 9

Appro. No:1 Inlet Flume



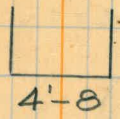
#9 Flume

O. D.

Cover

O. D.

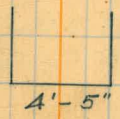
15' high



Flume #8

O. D.

12' Av



Flume #7

O. D.

64+82

70

64+12

112

63+06

54

62+46

75

61+71

26

61+45

83

52+62

43

52+19

19

52+06

50

51+56

35

51+15

15

51+00

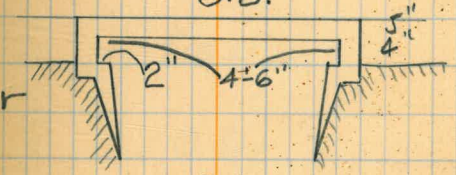
50

50+50

O.D.

Cov.

O.D.



Cover

O D

Cover

OD Lined
Poor D.G. Sides

OD No lining

Tunnel $\frac{3}{4}$

O.D.

+61

20

83+41

11

+30

16

82+14

+23

81+91

+41

81+50

+61

-43-61-

75+00

70+66

-66-

70+00

-35-

69+65

25

69+40

217

67+23

38

66+85

203

64+82

O.D.

Cov.

O.D.

Cov.

O.D.

Cov.

O.D.

Cor

O.D.

Cover

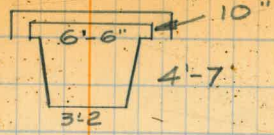
Weak Ext Wall

O.D.

Cov.

100+40
100+17 317 23
97+00 79
96+21 4
96+17
114
95+03 4
+99
44
94+45
345
91+06
41
91+59
159
89+00
78
88+22
29
32
311
85+11
82
84+29
68
83+61

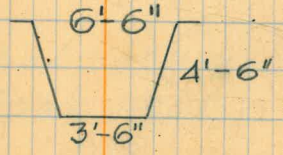
O.D.



Cov.
O.D.
Cov
O.D.

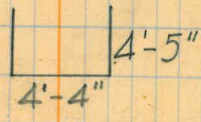
Cov
O.D.

Cov



O.D

Flume #10



O.D.

Cov.

O.D.

Cov.

128+46

116+52

115+85

115+31

+85

110+20

108+00

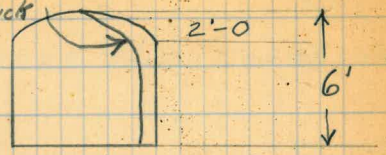
102+31

101+67

100+40

O D

49' half lined 6" thick



20'+57'~~44'~~ (Wrong side)
77' Total

15'+44'+37' lined in middle

~~19'~~ (32'+20') W. Portal
(167' Total Fully lined)

Track still in ½
Badly Cared
Tunnel No 1

Cov

100' Ditch bad both sides
Tear out

O.D.

Cov

Ext wall 13" high

Ext Wall 8" high
O.D.

Cov

+81

141+54

141+39

135+00

134+48

134+00?

133+76?

+76

+33

+22

132+16

131+88

131+56

131+46

131+06

128+46

O.D.

Cover Remove this cover

O D

Cut 4' off of Cover

17' O D

Cut 3' off of Cover

Wheelborrow in ditch

Cov.

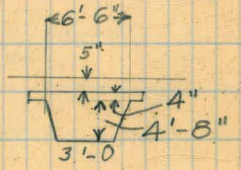
O.D.

M H 5' X 7'

10' out

M.H. 3'-6' X 4'-0

6' out



Cov.

O.D.

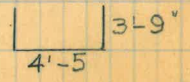
Cov

O.D.

Gate

Appro. No 2.

Flume #11



O.D.

Cov.

153+68

153+48

150+70

150+00

149+22

+73

148+58

147+16

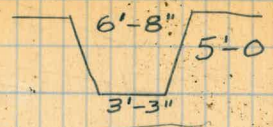
145+39

143+63

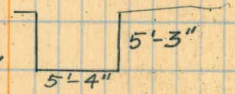
142+79

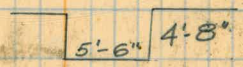
141+81

O.D.

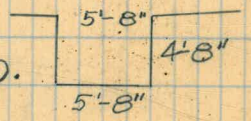


Cov



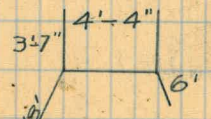


O.D.



Tunnel #1 & 4

O.D.



#12 Flume

Cov

O.D.

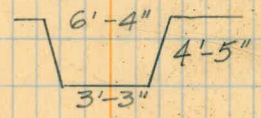
Cov

179+35 O.D.

+72 Cov.

+55 O.D.

177+26 Cov.



175+00

174+26 O.D.

173+71 Cov.

169+50 Cut off Cor

167+70 SW . Same ↘

167+10 S.Wall 5'x2'-6x8'-0

153+68

218+40
+95
217+72

213

208+80

+40
189 +30
+22

188+00

187+80

187

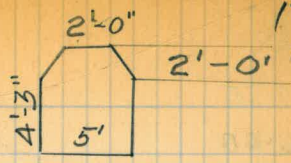
180+94

179+93

179+88

179+53

179+35



Fully lined
6"X4'-0 Wall one side
#2 Tunnel - Seams plastered

Cut 2" slabs 75□' From sides

6' Cov

O. D
4' lining one side
NO lining
Lined on one side

#1 3/4 Tunnel 6'x6' sides lined 4'

Remove 50' of forms for Cover

O.D.
Cut off boulder in top
Cov Sides bad

O.D.

#1 1/2 Tunnel 6'X7'

+75
306+68
+64
305+18
299+90
293+45
87+92
267+27
266+00

255+80

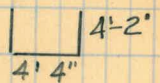
255+42

247+11

228+13

+50
222+18

220+83
+97
+50
+21
219+01
218+40

O.D.
Cover
O.D.
#13 Flume 

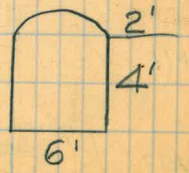
OD
#5 Tunnel 6'X6'-6"
OD
#4 Tunnel 7'X7' to 7'X9'-6"
Cover

OD

Cov

OD
2058' Many Creases
#3 Tunnel

End of lining
Bottom Lined

OD
No Lining 

Lined one side
Lined two sides
Lined one side

339+17

338+18

+97

328+61

326+18

325+44

+62

316+18

+97

314+71

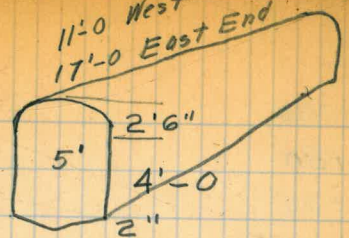
313+47

310+62

308+11

306+87

306+75



O.D. bottom lined 30'
Walls 4'x 6"
T #6 ½" ϕ@ 12" ctrs.

O.D.
Cor

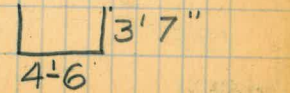
O.D.
Cor.

O.D.
Cor.
O.D.
Cor.

OD
12' out

Cover

O.D.
15' high
Flume 14



397+20
+80
+30
396+20

+96
393+57

+92
388+31

382+05

373+51

358+06

+86

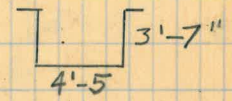
351+06

+95
345+41

339+17

O.D.
Cov.
O.D.
Cor.

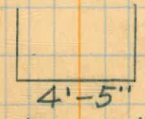
O.D.
#16 F.lume



O.D.
Cov

End of F/#15+20' Bott Lined

№ 15



App. No 4 15"X24"
Engrs Trail

End Lining

Bottom Lining

O. D.
Cor.

449+97

448+06

446+71.5

+98

432+58

428+38

427+51

406+20

405+43

403+29

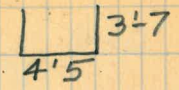
402+96

397+20

O. D.

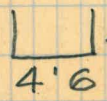
2-3' W. G.

Flume #19



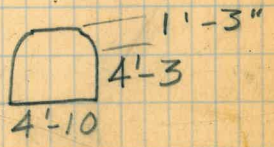
O D 30' each end bottom lined

F #18



O D 12' of T lined on W

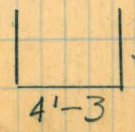
Tunnel #7 #5½ 13' lined



Concrete Road X

Standard Sect

O D



F #17

546+90

546+65

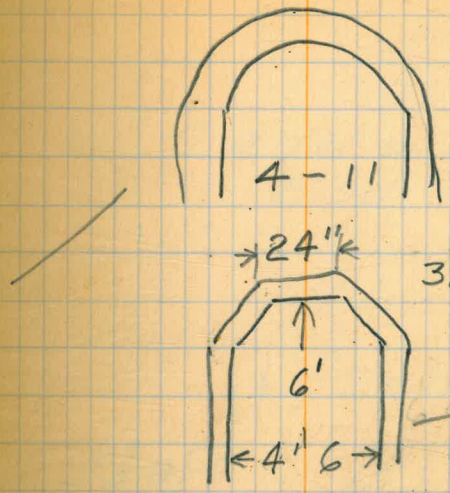
546 00 about

25+74
524+54
6+19
475+92
467+17
466+65

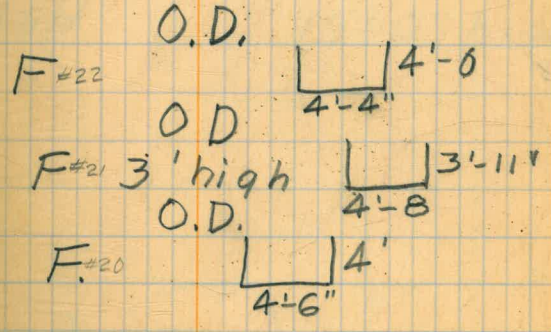
454+70

451

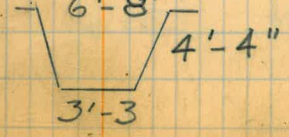
449+97



#8 Very Poor



Rd X



569 End of LINE

555+75

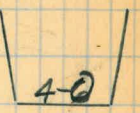
552+15

551+38

546+90

Weir House

deep Cut
¼-1 slope h

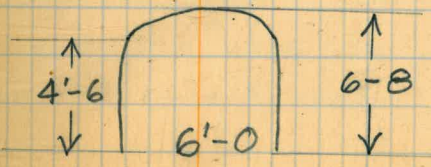


Canal in Rock
End

Solid Rock

Shaft 15' Up

Shaft Hole 15±0" high



Hill
Walker

March 1938

Dulzura Conduit Inspection

Flume "6 Length 276'

Trestle good condition, flume portion poor.

Needed:

2 stringers - 10'
6 - 4"x6"x10' sills.
20 - 4"x4"x5' posts
40 - 3"x4"x7' top ties.
New lining.

Note deliver 4x4" post material in 20' lengths to provide for 4' posts if needed. (all cases)

Flume "7 Length 539'

Condition same as "6

Needed:

4 - 8"x8" trestle posts
6 - stringers - 10'
8 - 4"x6"x10' sills
30 - 4"x4"x5' posts
60 - 3"x4"x7' top ties
New lining

Flume "8 - 622'

Trestle good. Some posts slightly rotted at base due to earth accumulation. Lining very poor. Flume portion poor

Needed:

2 stringers 10'
6 - 4"x6"x10' sills
40 - 4"x4"x(4'4") posts
50 - 3"x4"x7' ties, New lining.

Flume "9 - 164'

Trestle in good condition. Flume portion fair. Clean off earth from stringers & posts. Lining poor.

Needed:

4 - 4x6"x10' sills
20 - 4x4" posts
12 - 3x4"x7' ties.
New lining.

Flume "10

Poor condition - Probably good for several years with minor repairs from time to time. Tar paper lining torn and should be replaced.

Flume #11 Length 63'
Fair - no immediate repairs indicated. Lining rather poor. A few posts, sills & ties probably needed if relined.

Flume #12 Length 142'.
General condition fair. Lining poor. Portion rebuilt in March 1937 good although lining is beginning to leak quite badly.

Flume #13 (12½) Length 125'.
Foundation poor, trestle fair, flume rather poor. Lining in bad condition. Foundation pedestals undermined by over-flow at flume. Flume should have another tier of planking. W. abutment and adjacent boulder partially undermined. Needed:
2"x12" redwood planking
12"x12" trestle posts
4x4" flume posts
4"x6" & 3"x4" sills & ties
About 5000 F.B.M. altogether

Flume #15 Length 841' (Metal)
Good condition. Retar and remove earth from posts at foundation.

Flume #16 Length 40'
General condition rather poor. Lining very bad. Many new posts, sills & ties if relined. New bent under 18' span.
About 600 F.B.M.

Flume #17 Length 34' (Metal lined)
General condition good. Needed: tarring and renailing metal in places.

Flume #18 Length 40'
General condition rather poor. New bent should be placed under 16' span. A number of flume posts, sills & ties should be replaced.

Flume #19 Length 324'
General condition very poor. Should be replaced by concrete pipe syphon.

Flume "20 Length 52'
General condition poor. A number of sills, posts & ties should be replaced. New lining.

Flume "21" Length 28'
Rather poor. Replace some sills, posts & ties. New lining.

Flume "22, Length 120'
General condition fair. A number of sills, posts & ties should be replaced.

Tunnel Investigation

Tunnel 3/16 Unable to reach. Slide between tunnels 1/4 & 3/16 has backed up water.

Tunnel 1/4: Tunnel sides fairly even, not much trimming to concrete. Length 122'.

Tunnel 5/8: E. wall concreted 3' high. W. side fairly smooth. Length 91'.

Tunnel 3/4: Concrete lined & in good condition. About 40' of lining out at W. end. Length 85'.

Tunnel 1: Hardrock, much over-breakage. Slide 4' deep in about 200' from W. end. Rip rap rock. 2 sections 30' concreted.

Tunnel 2: About 15 c.y. slukk. 1 foot sand on floor. 30% concreted length 302'

Tunnel 3: Little over-breakage. Alignment irregular. About 1 foot of sand on floor. Length 1896'.

Tunnel 4: About same as "3". 3/4 foot of sand on floor. Length 2061'.

Tunnel 5: Concreted and in good condition. Length 552'.

Tunnel 6: Debris caused 2' sand deposit at entrance end. Water overflowed sides of deep cut approach. Tunnel length 976'.

Miscellaneous Repairs:
Slide between tunnels 3/16 & 1/4. About 20 c.y.

Miscellaneous Repairs (cont.)

Tree roots growing thru side of conduit decked section near Home #6.

Conduit wall badly broken by roots from cottonwood tree at sta. 170+75

Shoulder washed out in two places near tunnel 2 erk.

About 20' of shoulder washed out between tunnels 2 & 3.

Tree roots are breaking side of conduit between tunnels 2 & 3.

Sand in conduit 1' deep for 250' by creek between tunnels 2 & 3.

Tree roots breaking side of conduit at upstr. portal of tunnel 4.

Shoulder washed out for 12' at sta. 331+50. Also for about 25' at sta. 336+25.

Large boulders have fallen into conduit near exit portal of tunnel 5 1/4.

Scattered boulders in conduit from tunnel 5 to W. end of conduit.

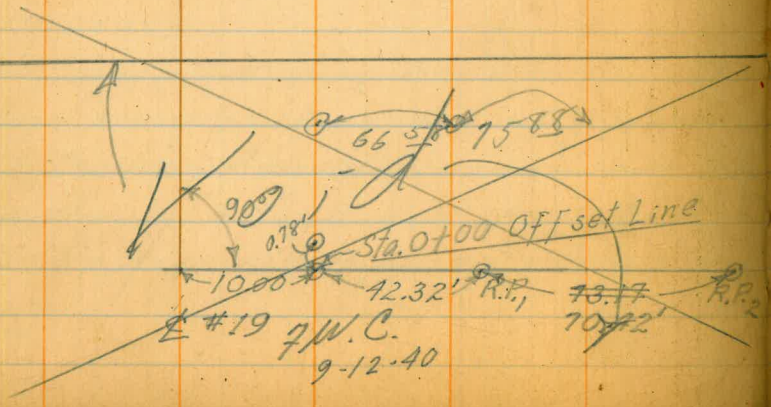
Repair riprapping placed last spring.

Dulzura Conduit - Survey of Flume #19

Automobile Report

Thurs. Sept. 12, 1940
Car No. 237 - Ford Touring
Out - 43,692 Miles.
In - 43,756 Miles
Miles driven = 64

Friday Sept. 13, 1940
Car No. 651 - Buick Sedan
Out - 28,124
In - 28,188
Miles driven = 64



Sept. 12 & 13, 1940
Party -
Clayton, F.W.
Remmen, A.

Work Order #822

General Notes

Referenced out both ends of existing structure by setting two (2) stakes on a line at right angles to ℄ of the flume at each end. Established offset line ten feet (10.00') northerly from ℄ of existing structure. Set 2"x2" hubs at intersection of offset lines and reference line.

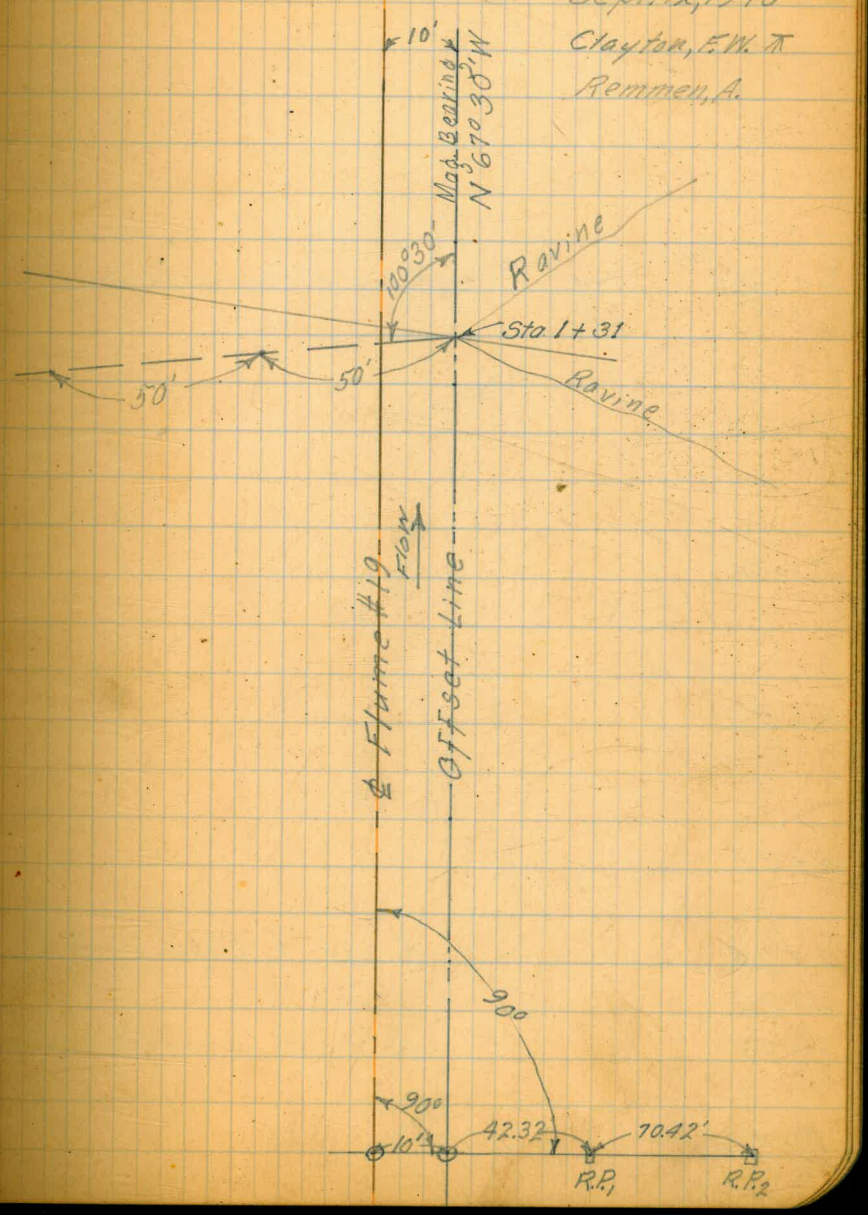
Ran out transition at ends of existing structure by measuring deflection angles to Five Foot (5.00') chords on northerly edge of line section.

Took profile on ℄ of conduit from beginning of easterly transition section to end of westerly transition section. Also from offset line to a point 100 ft. down the channel, elevations were secured.

FLUME #19 Offset Line - 10' North of ℄ of Existing Wooden Flume

Sept. 12, 1940
Clayton, E.W. T
Remmen, A.

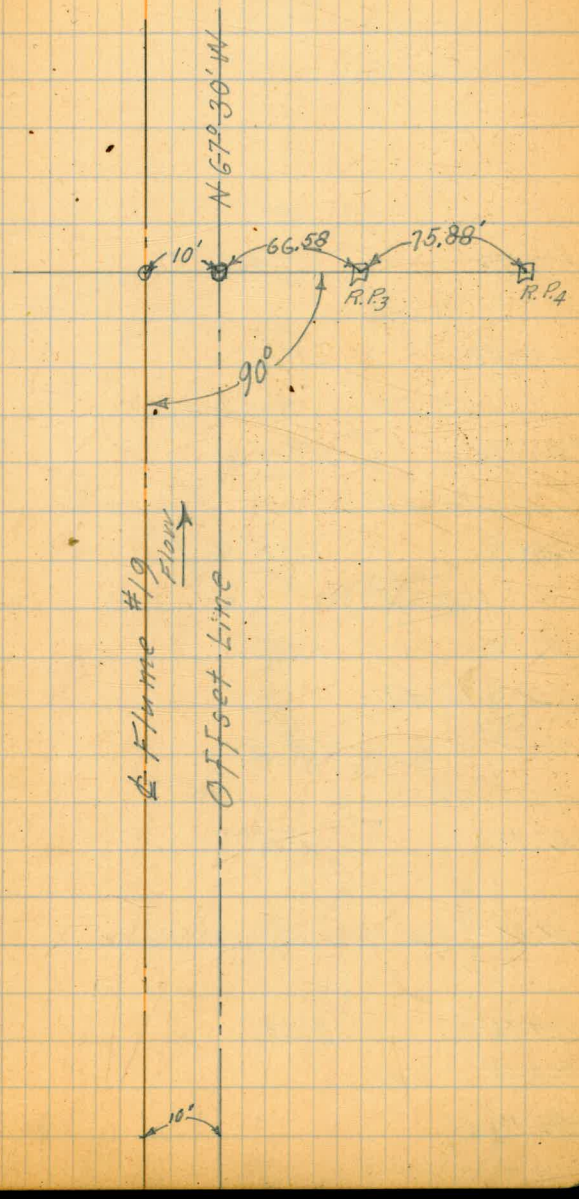
Station	Remarks
1+75	
1+73	Br. in Slope on ℄
1+59	Break in Slope on ℄
1+50	
1+31	Bottom of Draw or Ravine
1+25	
1+00	
0+95	Break on ℄
0+90	" " "
0+75	
0+57	Br. in slope on ℄
0+50	
0+45	Br. in slope on ℄
0+25	
0+16	Break in slope on ℄
0+00.78	W. face of E. Abutment
0+00	East end of offset line



Flume #19 Offset Line - 10' North of ℄ of Existing Wooden Flume

Sept. 12, 1990

Station	Remarks
3+22.78	E. face of W. Abutment - W. End of Offset.
3+00	
2+75	
2+50	
2+25	
2+08	Break in Slope on ℄
2+00	
1+91	Br. in Slope on ℄
1+75	

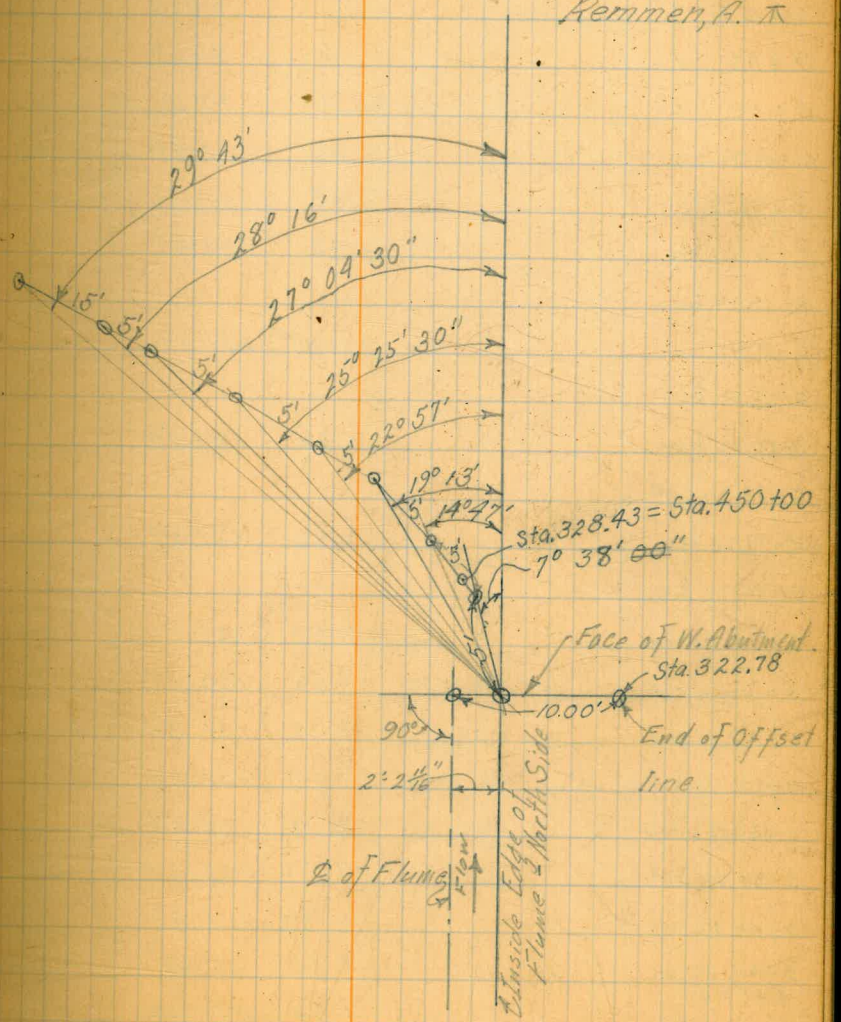


FLUME #19 - WEST END TRANSITION

Station	Chord Distance	Deflection from forward tangent Defl. Rt.	Change in deflect.	Remarks
3+72.78		29° 43"		
	15.00			
3+57.78		28° 16'		
	5.00			
3+52.78		27° 04' 30"		
	5.00			
3+47.78		25° 25' 30"		
	5.00			
3+42.78		22° 57'		
	5.00			
3+37.78		19° 13'		
	5.00			
3+32.78		14° 47'		
3+28.43 = Sta. 450+00 on Conduit.				
3+27.78	5.65	7° 38'		
~~3+22.78~~	5.00			
3+22.78				

See sketch

Sept. 12, 1940
Clayton, F.W. Notes
Remmen, A. T.



FLUME #19 - Profile Levels

Station	+	H.I.	−	Elev.	Remarks
T.P.	0.78	96.69	11.95	95.91	
0+25			13.7	94.2	
0+16			11.4	96.5	
0+02			10.3	97.6	In 1.5 cut Beginning of Flume.
0+00.78 top			3.46	104.40	Beginning of Flume.
0+00.78 bot			7.55	100.31	
0-4.22 top.			3.38	104.48	
0-4.22 bot.					
0-9.22 top			3.37	104.49	
0-9.22 bot					
0-14.22 top			3.36	104.50	
0-14.22 bot					
0-19.22 top			3.32	104.54	
0-19.22 bot.					
0-24.22 top			3.32	104.54	
0-24.22 bot.			7.56	100.30	
0-29.22 top			3.32	104.54	
0-29.22 bot.			7.60	100.26	
0-34.22 top			3.29	104.57	
0-34.22 bot.			7.52	100.34	
0-49.22 top			3.39	104.47	
0-49.22 bot.			7.50	100.36	
=446+00 bot.			~~7.50~~	~~100.36~~	
B.M.#1	7.86	107.86		100.00	Bench Mark - see Note.
	Σ(+) 8.64		Σ(−) 11.95		

107.86
11.95
95.91

Sept. 13, 1940
Clayton, F.W. &
Remmen, A. π-notes

The transit was used on this level circuit.

Note:
B.M. #1 - Cast iron window weight driven in ground 4.62 Ft. north easterly from R.P. #2.

FLUME #19 PROFILE LEVELS

Station	+	H.I.	−	Elev.	Remarks.
T.P.	10.03	107.46	0.80	97.43	
3+00			1.7	96.5	
2+75			4.6	93.6	
2+50			6.4	91.8	
2+25			8.4	89.8	
2+08			9.8	88.4	
2+00			11.5	86.7	
T.P.	12.03	98.23	0.47	86.20	
1+91			0.6	86.1	
1+75			4.3	82.4	
1+73			5.9	80.8	
1+59			7.9	78.8	
1+50			8.6	78.1	
1+31 (90' South)			14.8	71.9	
1+31 (40' South)			10.9	75.8	
1+31			8.9	77.8	
1+25			8.9	77.8	
1+00			6.8	79.9	
0+95			6.7	80.0	
0+90			5.3	81.4	
T.P.	2.09	86.67	12.11	84.58	
0+75			12.5	84.2	
0+54			9.0	87.7	
0+50			8.4	88.3	
0+45			6.8	89.9	
	Σ(+) 24.15	96.69	Σ(−) 13.38		

96.69
12.11
84.58
2.09
86.67

86.67
47
86.20
12.03
98.23

98.23
.80
97.43
10.03
107.46

Sept. 13, 1940
Clayton, F.W.P
Remmen, A.T.-notes

FLUME #19 - PROFILE LEVELS

Station	+	H.I.	−	Elev.	Remarks
B.M. #1			3.58	100.02	100.02 or .02 ft. error.
T.P.	6.90	103.60	10.61	96.70	
Set B.M.	4.64	107.31	4.79	102.67	B.M. #2 See note.
3+72.78 (bot.)			7.59	99.87	
3+72.78 (top)			3.25	104.21	
3+47.78 (bot.)			7.57	99.89	
3+47.78 (top)			3.26	104.20	
3+22.78 (bot.)			7.51	99.95	
3+22.78 (top)			3.41	104.05	
3+21			9.6	97.9	In 15 cut
		107.46			
	Σ(+) 11.54		Σ(−) 18.98		

107.46	107.31
4.79	10.61
102.67	96.70
4.64	6.90
107.31	103.60

Sept. 13, 1940
Clayton, F.W. ϕ
Remmen, A. T. - notes

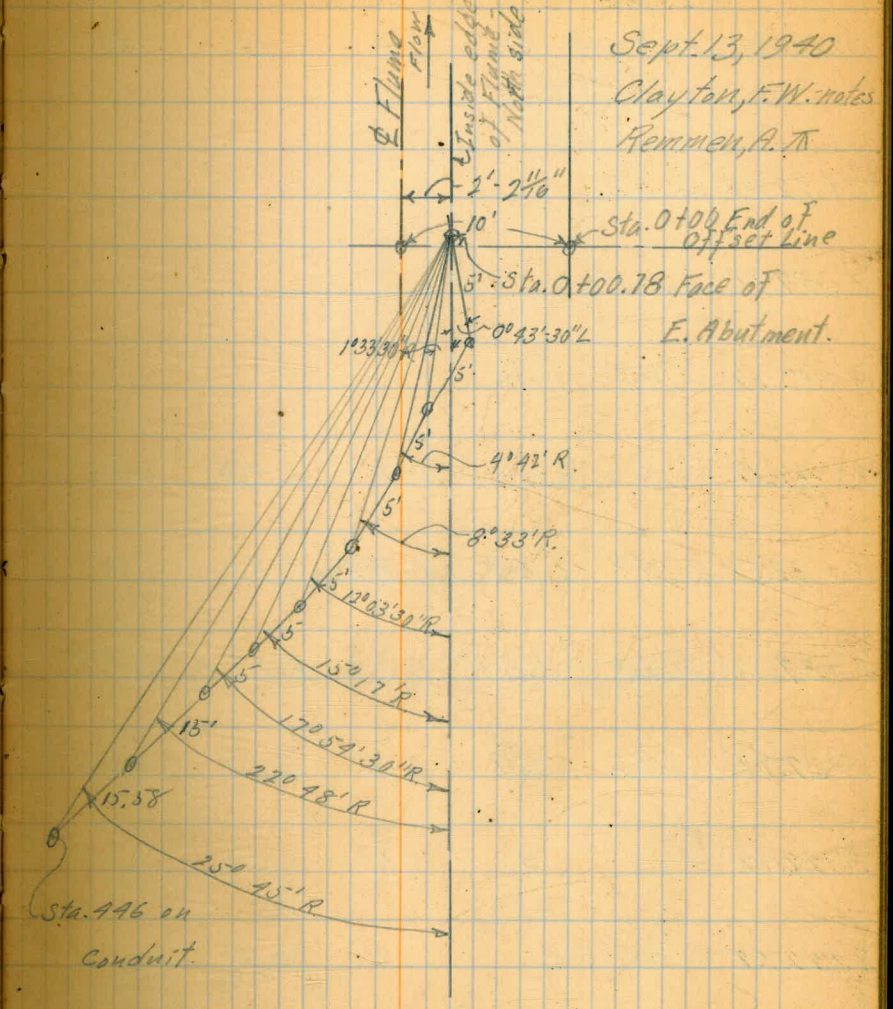
Note:
B.M. #2 - 18" bolt driven in ground about 2' easterly from R.P. #3

Check:

Σ(+) =	44.33
Σ(−) =	44.31
Diff. =	+0.02 error of closure.

FLUME #19 EAST END TRANSITION

Station	Chord Distance	Deflection from back tangent	Change in deflect	Remarks
0+00.78				
	5.00		0°43'30" L	
0-04.22		0°43'30" L.		
	5.00		1°77'30" R	
0-09.22		1°33'30" R		
	5.00		3°08'30"	
0-14.22		4°42' R.		
	5.00		3°51'00"	
0-19.22		8°33' R.		
	5.00		3°30'30"	
0-24.22		12°03'30" R.		
	5.00		3°13'30"	
0-29.22		15°17' R.		
	5.00		7'30"	
0-34.22		17°54'30" R.		
	15.00			
0-49.22		22°48' R.		
0-64.90	=446	25°45' R.		

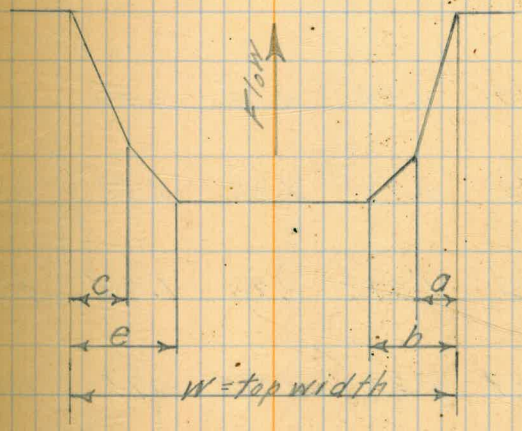


Sept. 13, 1940
Clayton, F.W. notes
Remmen, A. T.

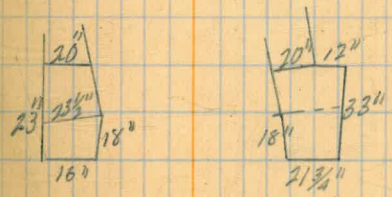
FLUME #19 - WEST END TRANSITION

Station	W	c	e	b	a
3+72.78	6.52				
3+57.78	6.65				
3+52.78	6.63				
3+47.78	6.66	1.60	1.88	1.75	1.58
3+42.78	6.57	1.60	1.88	1.71	1.41
3+37.78	6.34	1.38	1.71	1.63	1.29
3+32.78	5.52	0.67	0.92	0.94	0.69
3+27.78	4.80	0	0.13	0.50	0.25
3+22.78	4.36				

Sept. 13, 1940
Clayton, F. W.
Remmen, A.



SECTION LOOKING DOWNSTREAM (West)

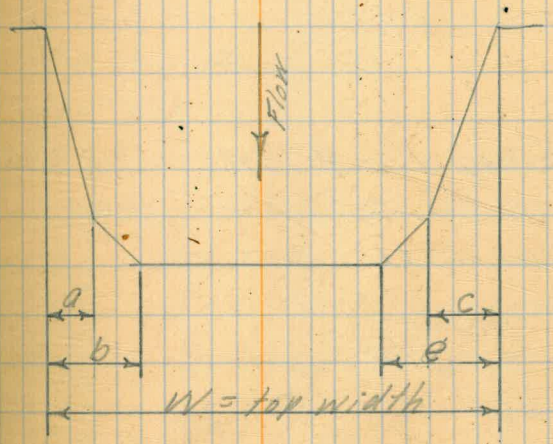


Abutment Plan

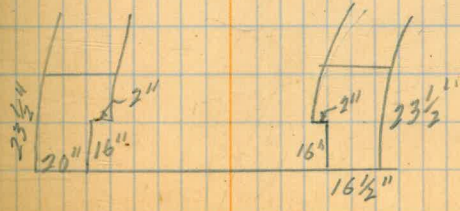
FLUME #19 EAST END TRANSITION

Station	W	a	b	e	c
0+00.28					
0-04.22	5.00	0.44	0.75	0.56	0.38
0-09.22	5.70	0.77	1.02	1.21	0.88
0-14.22	6.36	1.21	1.46	1.68	1.42
0-19.22	6.59	1.29	1.58	1.79	1.54
0-24.22	6.71	1.29	1.58	1.83	1.58
0-29.22	6.71				
0-34.22	6.70				
0-49.22	6.70				

Sept. 13, 1940
Clayton, E.W.
Remmen, A.



SECTION LOOKING UPSTREAM (East)



Abutment Plan

Owlzura Conduit - Replacement of Flume 19

Automobile Report

Thursday Nov. 7, 1940
Car No. 451 - Nash Touring
Out - 53,410
In - 53,496
86 miles

Friday Nov. 8, 1940
Car No. 249 - Ford Touring
Out 11,111
In 11,179
68

Saturday Nov. 9, 1940
Out 11,179
In 11,254
75 miles

Nov. 7, 1940
Clayton, F.W.
Remmen, A.

Note:
Stakes were placed 6'-0" to the north of the center line as requested by the Contractor when he visited the site today.
The Contractor objected to the clearance allowed between the trench as designed, and the pipe. He planned to take this matter up with the Hydraulic Engineer.
I suggested that the plans showed the "pay width" of trench and that he could excavated a wider trench if he so desired.

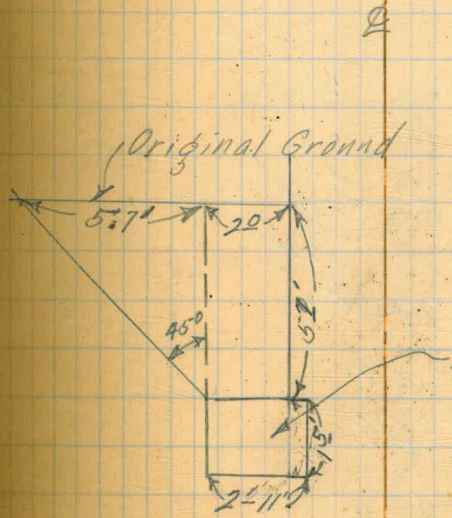
11-7-40
Fred W. Clayton

Dulzura Conduit - Replacement of Flume 19

Dec. 4, 1940
Overcast and moderate
Clayton, F.W.

Excavation for Blow off Pipe
at Sta 1+31

Footing Under Valve
Cement used - 2 sacks.



Elevation

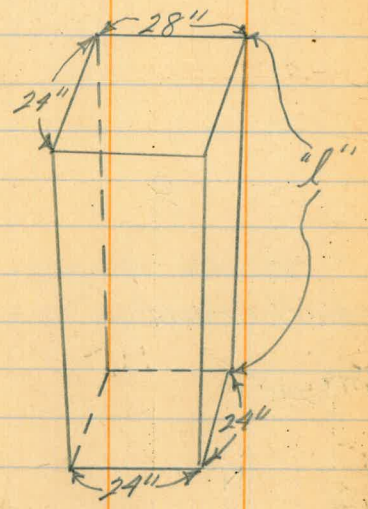
Width =

Dulzura Conduit - Replacement of Flume 19

Dec. 4, 1940
Overcast and moderate
Clayton, F. W.

Excavation of Old Abutments

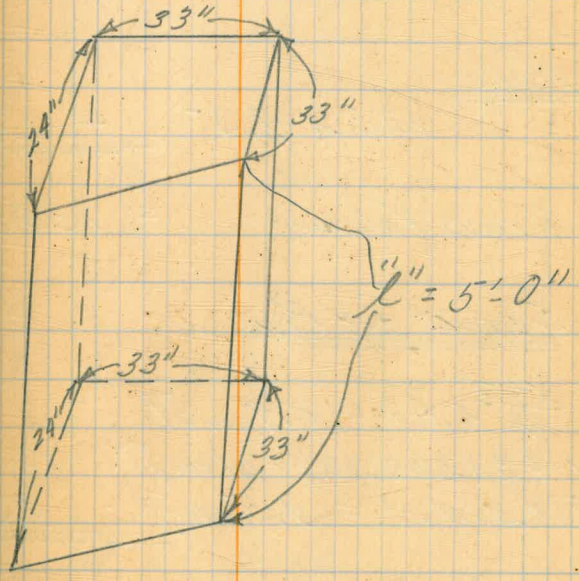
#1 & #2,



#1 $l = 4'-6"$
#2 $l = 5'-0"$

#3
2'-0" X 3'-0"
x 4'-0"

#4



Dulzura Conduit - Replacement of Flume #19

West Transition Section

Dec. 11, 1940
Cloudy and cold
Clayton, F.W.

Total - 25 sacks of cement used.

Mix: 1 : 2.6 : 3.1
Results proved more satisfactory than 1 : 2 : 4 with less voids.

* Floor
7.17 x 1.25 x 4.0 = 35.9 cu.ft.

* Footing
3.17 x 2.0 x 5.5 = 34.9 cu.ft.

Walls
13.3 x 4.5 = 59.8 cu.ft.

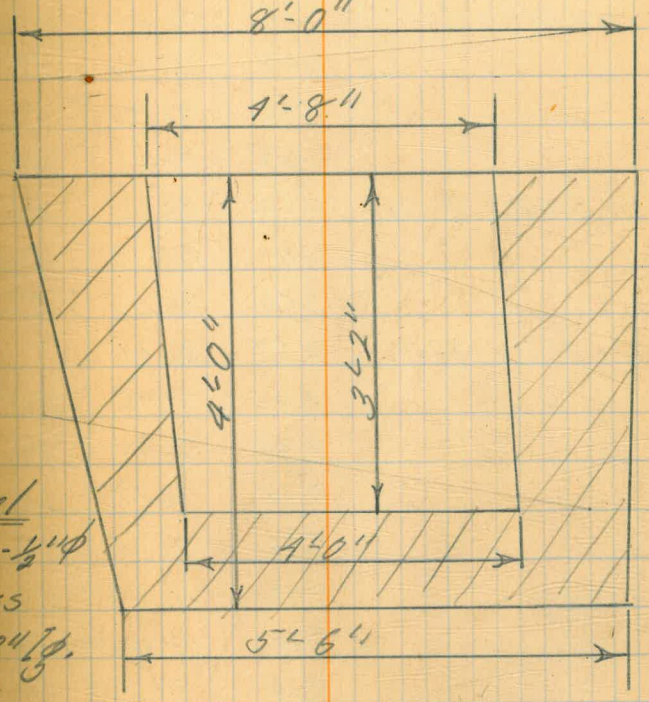
Gross Volume = 130.6 cu.ft.

Deduct for Pipe

$\frac{16\pi}{4} \times .67 = 8.4$ cu.ft.
$1.33 \times 2.0 \times 1.25 \times \frac{1}{3} = 1.1$ cu.ft.
Tot. deduct. = 9.5 cu.ft. - 9.5 cu.ft.

Net Volume = 121.1 cu.ft.
= 4.50 cu.yds.

*Note: Add these volumes to excavation quantities.



4'-6" Deep.

Outer Area = $\frac{8'+5.5'}{2} \times 4.0 = 6.75 \times 4.0 =$ 27 sq.ft.

Inner Area = $\frac{4'8" + 4'0"}{2} \times 3.17$
$= 4.33 \times 3.17 =$ 13.7 sq.ft.

Net Area = 13.3 sq.ft.

Dulzura Conduit - Replacement of Flume 19

Nov. 8, 1940
Clayton, E.W.
Remmen, A.
Cloudy and cold

Station	+	H.I.	−	Elev.	Grade Elevation	Cut
B.M. #1	4.78	104.78		100.00		
℄ 0-04 21			4.47	100.31		
6' out 0-04 21			1.39	103.39	100.31	3.08
6' out 0-00 21			1.42	103.36	98.83	4.53
0+09 51			6.46	98.32	93.22	5.10
0+17 03			8.67	96.11	90.48	5.63
T.P. 0+24 76	1.46	95.58	10.66	94.12	88.41	5.71
0+48 14			6.61	88.97	83.01	5.96
0+75			11.06	84.52	77.79	6.73
T.P.	4.95	87.96	12.57	83.01		
0+95 26			8.01	79.95	73.85	6.10
1+11 07			9.40	78.56	71.35	7.21
1+19 01			9.48	78.48	70.38	8.10
1+27			9.96	78.00	70.10	7.90
1+31			9.73	78.23	70.10	8.13
1+43			9.90	78.06	70.10	7.96
1+58 94			9.08	78.88	71.49	7.39
1+66 82			8.03	79.93	72.88	7.05
1+74 64			6.31	81.65	74.54	7.11
1+97 93	10.93	97.31	1.58	86.38	80.35	6.03
2+05 75			9.00	88.31	82.01	6.30
2+13 69			8.19	89.12	82.98	6.14

7.94

2+13.69
1+97.93
15.76

23
13.69
11.31

Dulzura Conduit - Replacement of Flume 19

2+25		97.31	7.30	90.01	83.97	6.04
2+50			5.18	92.13	86.16	5.97
2+75			3.19	94.12	88.35	5.77
T.P.	10.25	106.36	1.20	96.11		
3+01 36			8.78	97.58	90.65	6.93
3+09 09			7.87	98.49	92.72	5.77
3+16 60			7.46	98.90	95.46	3.44
3+21 81			6.35	100.01	98.47	1.54
6' out 3+25 81			4.63	101.73	100.00	1.73
℄ 3+25 81			6.36	100.00		
B.M. #2			3.68	102.68	Rec. 102.67	
Set B.M. #3	4.57	107.25	3.21	104.04	opposite 450+50 Conduit Stationing 6.5 ft. South of ℄ Canal	

301 36
270
26.36

Nov. 8, 1940
Clayton, F.W.
Remmen, A.

Cloudy and cold

97.31
1.70
96.11
10.25
106.36
3.68
102.68
2.68
4.57
107.25
3.21
104.04

Dulzura Conduit - Replacement of Flume 19

Automobile Report

Monday Nov. 18, 1940
Car No. 482 - Ford Pick-up
Out 96824
In 96895 8 hrs.
71 miles

Wed. Nov. 19, 1940
Car No. 237 - Ford Touring
Out 45223
In 45289 4 hrs.
66

Tuesday Nov. 26, 1940
Car No. 451 - Nash Touring
Out 53,695
In 53,781
86

Wednesday Nov. 27, 1940
Car No. 451 - Nash Touring
Out 53,781
In 53,859
78

Thursday Nov. 28, 1940
Car No. 2 - Reo Sedan
Out 42,652
In 42,719
67

Friday Nov. 29, 1940
Car No. 2 - Reo Sedan
Out 42,719
In 42,784
65

Saturday Nov. 30, 1940
Car No. 2 - Reo Sedan
Out 42,784
In 42,851
67

Sunday Dec. 1, 1940
Car No. 2 - Reo Sedan
Out 42,851
In 42,921
70

Bulzura Conduit - Replacement of Flume 19

Sta.	+	H.I.	−	Elev.	Grade Elev.	Cut or Fill +	Grade Rod
B.M.#3	1.00			104.04			
T.P.1	0.32	105.04	11.66	93.38			
27+13.69	0.30	93.70	10.80	82.90	82.98	+0.08	
1+74.64		83.20	8.82	74.38	74.54	+0.16	
0+75.00			5.93	77.27	77.79	+0.52	
0+83			6.81	9			
0+91			8.25	74.95			
0+99			9.76				

1495
7340
1.70

Nov. 26, 1940
Clear and cool
Clayton, F.W.

Car Report
Monday Dec. 2, 1940
Car No. 2
Out 42,921
In 43,012
91

Tuesday Dec. 3, 1940
Car No. 2
Out 43012
In 43085
73

Dulzura Conduit - Replacement of Flume 19

Nov. 27, 1940
Clear and Cool
Clayton, F.W.

Station	+	H.I.	−	Elevation	Grade Elevation
B.M.#3	0.50			104.04	
3+16 60		104.54	9.20	95.14	95.46
3+09 09	0.79	93.35	11.98	92.56	92.72
3+01 36			1.82	91.53	90.65
2+75			4.91	88.44	88.35
2+50			7.19	86.16	86.16
2+29			8.78	84.57	83.97
2+13 62			10.44	82.91	82.98
1+97 93	0.79	81.15	12.99	80.36	80.35
Extra Stake			3.89	77.26	
1+74 69			6.67	74.48	74.54
1+66 82			8.28	72.87	72.88
T.P.1	12.80	93.16	0.79	80.36	
T.P.2	12.17	104.74	0.59	92.57	
B.M.#3			0.73	104.01	

Car Report Wednesday
Car No.2 - Dec. 4, 1940
Out 43085
In 43158
73 miles

Car No.2 - Thurs. Dec. 5, 1940
Out 43,158
In 43,234
76 miles

Dulzura Conduit - Replacement of Flume 19

Station	+	H.I.	−	Elev.	Grade
1+74.	1.29	75.77		74.48	
1+66			2.90	72.87	72.88
1+58			4.15	71.62	71.49
1+43			4.21	71.56	70.10
1+27			5.40		
1+19			5.56	70.21	70.38
1+11			3.95	71.82	71.35
1+58	7.37	78.86		71.49	71.49
			8.43	70.43	
1+27	7.37		8.40	70.46	70.10
			8.10	70.71	70.38
1+19			8.33	70.53	70.38
1+58				71.49	

Grade Rod 4.78 / 5.67

Nov. 29, 1940
Clear and cool
Clayton, F. W.

7.28
5.67
5.67
5.39
4.42

Car No. 2 Dec. 6, 1940 - Friday
Out 43,234
In 43,304
70 miles

Car No. 2 - Dec. 7, 1940 - Saturday
Out 43,304
In 43,382
78 miles.

Dulzura Conduit - Replacement of Flume 19

Nov. 30, 1940
Clear and cool
Clayton, F.W.

	+	H.I.	−		
B.M. #1	5.11	105.11		100.00	
T.P. #2	1.33	95.27	11.17	93.94	
Sta. 0+48	1.34	85.33	11.28	83.99	83.01
0+64			6.90	78.43	78.44
B.M. A	11.10	93.32	3.11	82.22	
0+48			9.35	83.97	83.01
			4.05	89.27	88.41
			2.07	91.25	90.48
			0.47	92.85	93.22

S. side of Excavation

	90.77
	11.99
	83.24

Car No. 2 - Wed. Dec. 11, 1940
Out 43,525
In

Car No. 2 - Monday Dec. 9, 1940
Out 43,382
In 43,449
67

Car No. 2 - Tuesday Dec. 10, 1940
Out 43,449
In 43,525
76

Car Report - Dulzura Conduit - Replacement of F Flume 19

Car No. 2

Wednesday Dec. 11, 1940
Out 43,525
In 43,592
67 miles

Thurs. Dec. 12, 1940
Out 43,592
In 43,680
88 miles

Friday Dec. 13, 1940
Out 43,680
In 43,765
85 miles

Saturday Dec. 14, 1940
Out 43,765
In 43,835
70 miles

Dulzura Conduit - Replacement of Flume 19

Dec. 7, 1940
Fair and warm
Clayton, F.W.

East Transition Section

4'-3" Deep

* Footing - 6.5 x 2.5 x 2.5 = 34.4 cu. ft.
* Floor - 6.0 x 0.75 x 4.0 = 18.0 cu. ft.

Walls -

15.4 x 4.25 = 65.5 cu. ft.

Gross Volume = 117.9 cu. ft.

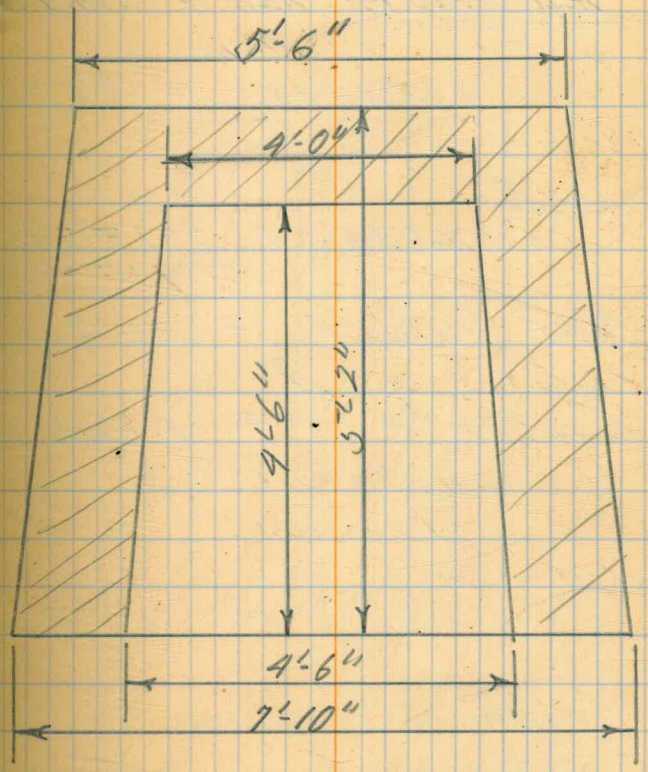
Deductions for Pipe

$2.0 \times \frac{17.5}{2} \times 3.0 = 7.5$ cu. ft.
$.67 \times 1.0 \times \frac{1}{2} \times 4.0 = 1.3$ cu. ft.
Total = 8.8 cu. ft.

Net Volume = 109.1 cu. ft.

= 4.04 cu. yds.

* Note: Add. volumes to excavation.



Outer Area = $\frac{6.97 + 7.83}{2} \times 5.17 = \frac{13.3}{2} \times 5.17 = 34.5$ sq. ft.
Inner " = $\frac{4.04 + 4.5}{2} \times 4.5 = 4.25 \times 4.5 = 19.1$ sq. ft.

Net Area = 15.4 sq. ft.

Dulzura Conduit - Replacement of Flume 19

Dec. 7, 1940
Fair and Warm
Clayton, F.W.

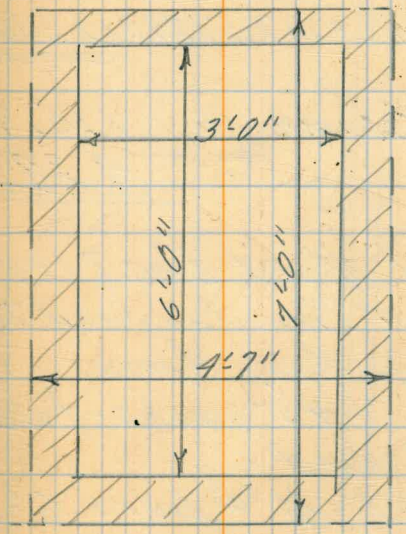
Sand Trap

Excavation - add to excavation item
4.58 x 7.0 x 1.5 = 48.2 cu. ft.

Trap
6.0 x 3.0 x 1.0 = 18.2 cu. ft.

Net Volume = 30.2 cu. ft.

Concrete = 1.12 cu. yds.



Excavation = 18" deep
Trap = 12" deep.

Dec. 7, 1940
Fair and warm
Clayton, F.W.

Owlzura Conduit - Replacement of Flume 19

Spillway Apron

Concrete

Floor - 20.0 x 8.0 x 0.5 = 80.0 cu. ft.
Upper Wall = 11.0 x .83 x 1.25 = 11.5 cu. ft.
Lower Wall = 9.5 x 1.0 x 1.5 = 14.3 " "
Side Walls = .5 x .5 x 20.0 x 2 = 10.0 " "

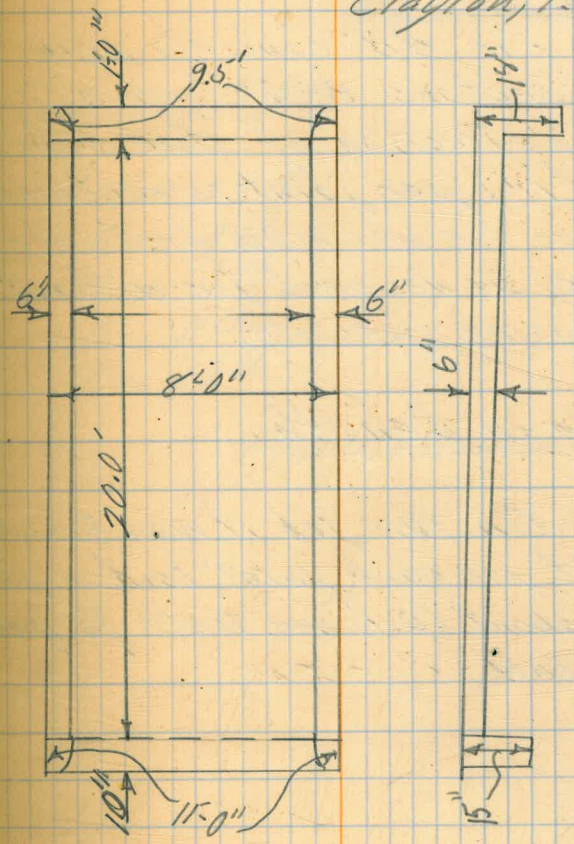
* Total Volume = 115.8 cu. ft.
= 4.29 cu. yds.

Cement Used Dec. 7, 1940 in East Transition, Sand Trap and Spillway Apron
- 45 sacks - total

Steel used -
87 - ½" ⌀ bars 6'-3" lg.

Mix - 1 sack cement
2 cu. ft. sand.
4 cu. ft. gravel
Sufficient water to produce a workable mix.

* Note: Add volume to excavation.



Dulzura Conduit - Replacement of Flume 19

Dec. 14, 1940
Clayton, E.W.

Maximum Deflection per Joint of Pipe -

For 48" concrete pipe sections 8'-0" long a deflection of One degree (1°) per joint is recommended as the maximum grade change to be designed for without using specials.

Gain in Length.

On this job it was found that for each joint laid a gain of about (0.1) one tenth Ft. proved the rule.

Pictures taken

Nov. 27th.
Dec. 4th
Dec. 6th
Dec. 11th
Dec. 17th

Tunnel #4 very little timbering slight overbreak on sides.
slide between tunnels 3/6 & 4 to about 2' of top - about 25 or 30 C.Y. of slide (sand) in conduit
Tree roots in decked section of conduit near flume 6 growing thru side of conduit.
Tunnel #2 decomposed granite fairly even sides some bracing at breaks indicated.
Tunnel #8 conc. wall 3' on E. side W. side fairly smooth W about 6'
Tunnel #7 good condition all timbered but about 10 lin. ft. conduit timbered out for 10 ft. end tunnel #8

Tunnel #4½ large boulders in roof from sides
Overflow washed out earth from flume for about 25' at sta 336+25
Sta 334+50 back washed out for 12'

Races wrapped last year have settled away from and slightly let

Numerous tramps
Tunnel #5 erected OK
" #4 about 3/4 ct. a foot of sand on bot. side of flume broken out by roots near portal (upst)

Tunnel #3 about 1 foot of sand on floor.
about 250 lin ft conduit with sand slide bet tunnels 2 & 3
Roots have broken out W. wall conduit along side of each between tunnels 2 & 3.
about 20 washed out back of conc. between tunnels 2 & 3
Tunnel #2 about ½ conc. lined about 15 yds of slide. about 1' of sand on bottom
10' washed out back of wall at Tunnel #2 creek - 2 flume 20 200 up str. of ck.
Wall broken by cottonwood tree bet. at 2 & rattlesnake - 20' sec. new wall. sta 170+25 ↓

Dulzura Flume Lengths

Flume	Length
6	275.5
7	538.8
8	521.8
9	163.6
10	10.4
11	63.1
12	141.8
12¼	15.9
12½	121.8
15	840.6
16	10.4
17	33.9
18	10.0
19	324.6
20	52.0
21	27.3
22	119.7
	3394.4

87 5
28 19
3 24

Flume #6 trestle good remainder rather poor but good for a few years needs 2 stringers and 6 4x6x10' sills. about 25 or 30 (40) 3"x4"x7' top ties. W. Flume 4'9"
Propably some 4"x4"x4' posts needed

Flume 7 trestle good about 4 new 8x8 posts, 5 stringers 8 - 4"x6"x10' sills, 30 4"x4"x5' posts 60 - 3'x4'x7'
30

Flume 8 trestle good footings of posts need repairing in several cases. about 6 sills 2 stringers, 50-3x4x7' ties, 40 - 4"x4"x20' posts.

Flume #9 clean out earth from stringers & posts. good condition about 12 - 3x4x7' ties, 4 sills, 20 posts 4x4x5'
Flume 10' 2-4x6 sills 6, 4x4 posts
4 - 3x4 ties

Tunnel #1 very irregular with much over breakage, about 30 or 40 C.Y. rock in bottom at slide. 2 sections 300'± long concreted also arch on E.R. sides & W. S.

Trestle #17 clean & repaint metal sides repair paint trestle in good condition.

Trestle #18 poor - paper fair upright 3' put in new bent between 16' span.
Bridge at 455+60 too light for loaded wagon passed upon it
about ½ doz posts & sills also top ties

#19 condemn

#20 poor but no lined, repairs unlined - paper poor

21 same as #20

22 fair - paper poor not much needed

16 new bent under 18' span ht. 4'
paper poor - gen. end, fairly poor
new posts and cap at time of shoring.
If metal lined new posts & caps
posts 4"x4"x4' caps 4"x6"x 9'6"
spaced 4 ft.

Flume lengths

Flume #6 - 276'			
7 - 339'			
8 - 522'			
9 - 164'			
10 - 40'			
11 - 63'			
12 - 142'	12¼	46	
	12½	128	
13			
14 - abandoned			
15 - 829' (steel)			
16 - 40'			
17 - 34'			
18 - 40'			
19 - 324.5'			
20 - 52'			
21 - 27.5'			
22 - 119.5'			

repairs 1931

Benton Roof Co Contract $3,187.
tar & paper all flumes except
15 & 17 These metal flumes
were tarred.

Origs. living complete 1928 - $1.95 per lin. ft.
Flume 17 labor $1.852 per lin. ft.
20 gage gal iron 1.128 " " "
Heat 086 tar 6.05 per lin ft

ERNEST BRITTAIN
4051 BRANT ST
HILC 1572 J-

IMPROVED TABLES
AND
INFORMATION

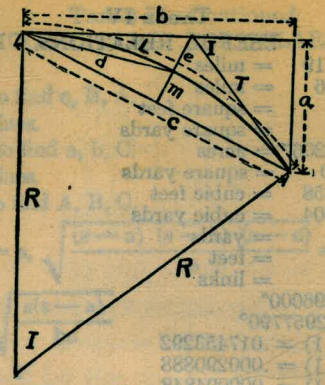


Table V

CURVE FORMULAE FOR SIMPLE CURVES

Compiled by J. Calvin Locke, C.E.

(1) $c = \sqrt{2Ra}$ (2) $c = \sqrt{a^2+b^2}$

(3) $c = \sqrt{2R\,(R-\sqrt{(R+b)\,(R-b)}} = \sqrt{2R(R-\sqrt{R^2-b^2})}$

(4) $c = 2\sqrt{m\,(2R-m)}$

(5) $c = 2R \sin \frac{1}{2} I$ (6) $c = 2T \cos \frac{1}{2} I$

(7) $e = R \operatorname{exsec} \frac{1}{2} I$

(8) $e = R \tan \frac{1}{2} I \tan \frac{1}{4} I$ (9) $e = T \tan \frac{1}{4} I$

(10) $b = \sqrt{a\,(2R-a)}$

(11) $b = \sqrt{\left(c+\frac{c^2}{2R}\right)\left(c-\frac{c^2}{2R}\right)} = \sqrt{c^2-\frac{c^4}{4R^2}}$

(12) $b = R \sin I$ (13) $b = a \cot \frac{1}{2} I$

(14) $R = \frac{a^2+b^2}{2a} = \frac{c^2}{2a}$ (15) $R = \frac{d^2}{2m} = \frac{c^2+4m^2}{8m}$

(16) $d = \sqrt{R\,(2R-\sqrt{(2R+c)\,(2R-c)}} = \sqrt{R(2R-\sqrt{4R^2-c^2})}$

(17) $d = \sqrt{2Rm}$ (18) $d = 2R \sin \frac{1}{4} I$ (19) $m = \frac{d^2}{2R}$

(20) $m = R \mp \sqrt{\left(R+\frac{c}{2}\right)\left(R-\frac{c}{2}\right)} = R \mp \sqrt{R^2-\frac{c^2}{4}}$

(21) $m = R \operatorname{vers} \frac{1}{2} I$ (22) $m = R \sin \frac{1}{2} I \tan \frac{1}{4} I$ (23) $m = \frac{1}{2} c \tan \frac{1}{4} I$

(24) $a = \frac{c^2}{2R}$ (25) $a = R - \sqrt{(R+b)\,(R-b)} = R - \sqrt{R^2-b^2}$

(26) $a = 2R\,(\sin^2 \frac{1}{2} I)^2$ (27) $a = R \operatorname{vers} I$ (28) $a = R \sin I \tan \frac{1}{2}$

(29) $a = b \tan \frac{1}{2} I$ (30) $a = T \sin I$ (31) $T = R \tan \frac{1}{2} I$

(32) $I = \frac{L}{R} \times 57.295780$ (33) $R = \frac{L}{I} \times 57.295780$

(34) $L = IR \times 0.01745329$ (35) $L = \frac{8d-c}{3}$

(36) Area Seg. $= \frac{LR - R^2 \operatorname{Sin} I}{2} = \frac{LR - Rb}{2}$

Table VI

SINES, COSINES, TANGENTS, COTANGENTS

deg.	sin 0′	tan 0′	sin 10′	tan 10′	sin 20′	tan 20′	sin 30′	tan 30′	sin 40′	tan 40′	sin 50′	tan 50′	deg.
0	0000	0000	0029	0029	0058	0058	0087	0087	0116	0116	0145	0145	89
1	175	0375	0204	0204	0233	0262	262	291	291	320	320	320	88
2	349	349	378	378	407	407	436	437	465	466	494	495	87
3	523	524	552	553	581	582	610	612	640	641	669	706	86
4	698	699	727	729	756	758	785	787	814	816	843	864	85
5	872	875	901	904	929	934	958	963	987	992	1016	1022	84
6	1045	1051	1074	1080	1103	1110	1132	1139	1161	1169	190	198	83
7	219	228	248	257	279	287	305	317	334	346	363	376	82
8	392	405	421	435	449	465	478	495	507	524	536	554	81
9	564	584	593	614	622	644	650	673	679	703	708	733	80
10	736	763	765	793	794	823	822	853	851	883	880	914	79
11	908	944	937	974	965	2004	994	2035	2022	2065	2051	2095	78
12	2079	2126	2108	2156	2136	186	2164	217	193	247	221	278	77
13	250	309	278	339	306	370	334	401	363	432	391	462	76
14	419	493	447	524	476	555	504	586	532	617	560	648	75
15	588	679	616	711	644	742	672	773	700	805	728	836	74
16	756	867	784	899	812	931	840	962	868	994	896	3026	73
17	924	3057	952	3089	939	3121	3007	3153	3035	3185	3062	217	72
18	3090	249	3118	281	3145	314	173	346	201	378	228	411	71
19	256	443	283	476	311	508	338	541	365	574	393	607	70
20	420	640	448	673	475	706	502	739	529	772	557	805	69
21	584	839	611	872	638	906	665	939	692	973	719	4006	68
22	746	4040	773	4074	800	4108	827	4142	854	4176	881	210	67
23	907	245	934	279	961	314	987	348	4014	383	4041	417	66
24	4067	452	4094	487	4120	522	4147	557	173	592	200	628	65
25	226	663	253	699	279	734	305	770	331	806	358	841	64
26	384	877	410	913	436	950	4462	986	488	5022	514	5059	63
27	540	5095	566	5132	592	5169	617	5206	643	243	669	280	62
28	695	317	720	354	746	392	772	430	797	467	823	505	61
29	848	543	874	581	899	619	924	658	950	696	975	735	60
30	5000	774	5025	5812	5050	851	5075	890	5100	930	5125	969	59
31	150	6009	175	6048	200	6088	225	6128	250	6168	275	6208	58
32	299	249	324	289	348	330	5373	371	398	412	422	453	57
33	446	494	471	536	495	577	519	619	544	661	568	703	56
34	592	745	616	787	640	830	664	873	688	916	712	959	55
35	736	7002	760	7046	783	7089	807	7133	831	7177	854	7221	54
36	878	265	901	310	925	355	948	400	972	445	995	490	53
37	6018	536	6041	581	6065	627	6088	673	6111	720	6134	766	52
38	157	813	180	860	202	907	225	954	248	8002	271	8050	51
39	293	8098	316	8146	338	8195	361	8243	383	292	406	342	50
40	428	391	450	441	472	491	494	541	517	591	539	642	49
41	561	693	583	744	604	796	626	847	648	899	670	952	48
42	691	9004	713	9057	734	9110	756	9163	777	9217	799	9271	47
43	820	325	841	380	862	435	884	490	905	545	926	601	46
44	947	657	967	713	988	770	7009	827	7030	884	7050	942	45
45	7071	1.0000	7092	1.0058	7112	1.0117	133	1.0176	153	1.0235	173	1.0295	44
deg.	60′ cos	60′ cot	50′ cos	50′ cot	40′ cos	40′ cot	30′ cos	30′ cot	20′ cos	20′ cot	10′ cos	10′ cot	deg.

TABLE X.

MIDDLE ORDINATES OF RAILS

Length of Rail (feet)

C ° ′	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch	C °	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch
0-20	17189	.08	.07	.06	.05	.04	.03	8	716.8	1.88	1.64	1.42	1.20	1.01	.84
0-40	8594	.16	.14	.12	.10	.08	.07	9	637.3	2.12	1.84	1.60	1.35	1.14	.94
1-0	5730	.24	.20	.18	.15	.13	.10	10	573.7	2.36	2.05	1.78	1.50	1.27	1.04
1-20	4297	.31	.27	.23	.20	.17	.13	11	521.7	2.59	2.26	1.95	1.65	1.39	1.15
1-40	3438	.39	.34	.29	.25	.21	.17	12	478.3	3.83	2.47	2.15	1.81	1.54	1.26
2-0	2865	.47	.41	.35	.30	.25	.20	13	441.7	3.05	2.66	2.30	1.96	1.66	1.36
2-20	2456	.55	.48	.41	.35	.29	.23	14	410.3	3.30	2.87	2.48	2.10	1.78	1.46
2-40	2149	.63	.55	.47	.40	.33	.27	15	383.1	3.54	3.08	2.68	2.26	1.91	1.57
3-0	1910	.71	.62	.53	.45	.38	.31	16	359.3	3.76	3.28	2.83	2.40	2.04	1.67
3-20	1719	.78	.68	.59	.50	.42	.35	17	338.3	4.00	3.48	3.02	2.57	2.16	1.78
3-40	1563	.86	.75	.65	.55	.46	.38	18	319.6	4.21	3.67	3.18	2.70	2.28	1.87
4-0	1433	.94	.82	.71	.60	.50	.42	19	302.9	4.45	3.89	3.36	2.86	2.41	1.98
4-20	1323	1.02	.89	.77	.65	.55	.45	20	287.9	4.70	4.09	3.55	3.00	2.54	2.09
4-40	1228	1.10	.96	.83	.70	.59	.48	22	262.0	5.16	4.44	3.84	3.30	2.80	2.29
5	1146	1.18	1.03	.89	.75	.63	.52	24	240.5	5.64	4.92	4.20	3.59	3.04	2.50
6	955.3	1.41	1.23	1.06	.90	.76	.62	26	222.3	6.07	5.29	4.58	3.88	3.29	2.70
7	819.0	1.65	1.44	1.24	1.05	.89	.73								

TABLE XI.

SHORT RADIUS CURVES

Radius Feet	Chord Feet	Central Angle	Deflection Angle	Deflection for 1 Foot
35	10	16-26	8-13	49.3
45	10	12-46	6-23	38.3
50	15	17-16	8-38	34.5
60	15	14-22	7-11	28.8
75	15	11-30	5-45	23.0
100	20	11-30	5-45	17.3
120	20	9-34	4-47	14.3
150	20	7-39	3-49	11.5
190	25	7-32	3-46	9.15
200	25	7-10	3-35	8.6
225	25	6-25	3-12	7.7
240	25	5-58	2-59	7.2
250	25	5-44	2-52	6.9
275	25	5-12	2-36	6.2
288	50	9-58	4-59	6.0
300	50	9-32	4-46	5.7
350	50	8-12	4-06	4.9
376	50	7-40	3-50	4.6
400	50	7-10	3-35	4.3
410	50	7-00	3-30	4.2

To find length of curve divide angle from P. C. to P. T. by central angle of chord and multiply by length of chord.

INCLI … L

Slop
0°0(
15
30
45
1 00
15
30
45
2 00
15
30
45
3 00
15
30
45
4 00
15
30
45
5 00
15
30
45
6 00
15
30
45
7 00
15
30
45

0 30″	.008														
1 00	.016														
30	.025														
2 00	.033														
30	.041														
3 00	.050														
30	.058														
4 00	.066														
30	.075														
5 00	.083														
30	.091														
6 00	.100														
30	.108														
7 00	.1166	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000				
30	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833				
8 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667				
30	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500				
9 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333				
30	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167				
10 00	.16667	20 00	.33333	30 00	.50000	40 00	.66667	50 00	.83333	60 00	1.00000				

Apr. 17 1935 – Farmer

1 8 ″
1 ″
2 ″
2 3 6 ″
2 4 6 ″
2 5 9 ″
2 6 8 ″
2 7 8 ″

9 days @ $32.00 per day plus truck + material used. labor Total $288.00

flumes repaired 11 to 22 incl. with Huffsgang.

Hayward's gang worked from dam downstream to 11 flume

Water Dist
Carl Thomas
for 8"

12.77
2.78
9.99

10.35
.33
10.02

2.74

2.07

Wed
Dec

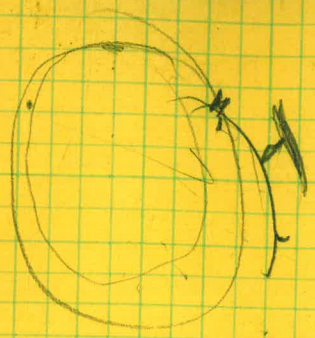
43158
42652
706

12/2/40

Fred Clayton 12/2/40

Plse send in sketch of bar screen to be put infront of siphon on # Syphon 15

AB



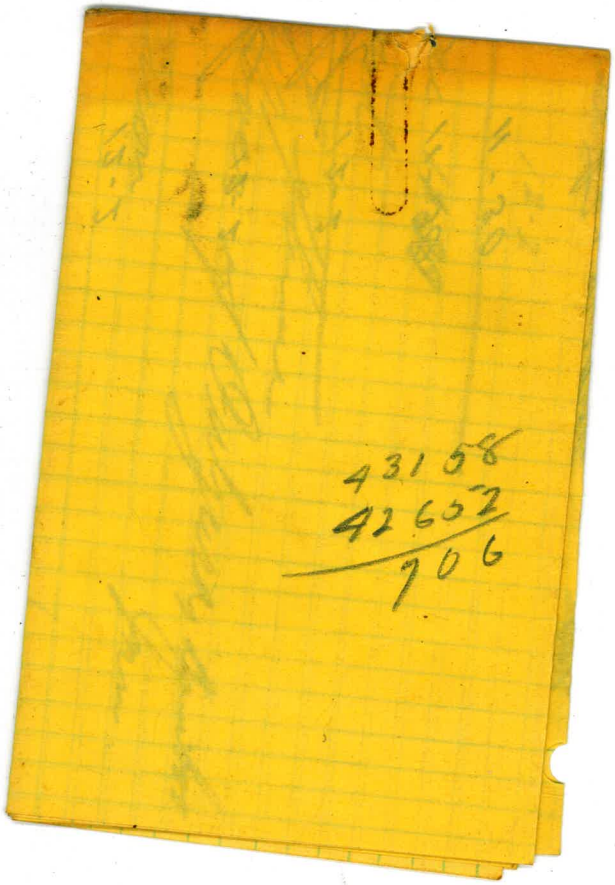
Special Memos

Fan belt - 11-28
Flat Tire - 11-29
Tires - 12-2
X Transit 12-2

Yes - Track rack 12-2
- Flash light 12-2
Yes - Hand Trap 11-30
Yes X Spillway 11-30
No - Month End Payment & Estimate 12-2

- Angle of pipe 12-30
Rain per joint
Disposal of Stone
Mr. W. A. Glover of Dulgura, Manitoba Inn.
X Time extension
8" Pipe & Cap.
Cap from Dirt.

Estimate from Barker.


43158
42652
706

Wed
Dec. 4, 1940
43,158

Water Dist
Carl Thomas
for 8"

1.79

12.77
2.78
9.99

10.35
.33
10.02

10.2

Wed - 53 859
Nov. 27 781
78

83.20
13.20
70.00

52

73.80
71.32
2.00