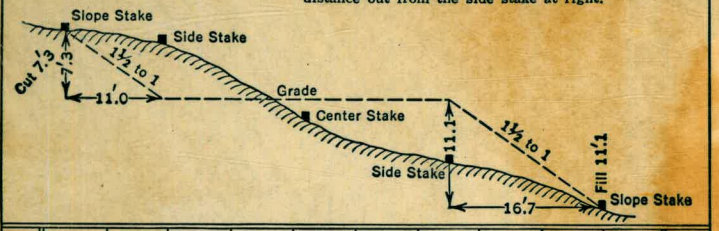
DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

KEUFFEL & ESSER CO., N. Y.

For Curve Tables see end of book.

ARCH RING X-SECTS
8-52
HRS

ORGINAL X-SECTIONS
8-52

The paper in this book **No. F364A** is made of **50%** high grade rag stock with a **WATER RESISTING** surface sizing.

11,377-1. c, x, yk. chss.

INDEX

PAGE			
1	ARCH	14-15	GRID
2	"	15-16	~~4~~ REF.
6		13-14	~~4~~ REF
10		13-12	~~4~~ REF
13		11-12	~~4~~ REF
16	CONE	CUT OFF	TRAVERSE 11-12
17	"	" "	" 11-10
18	ARCH	10-11	GRID
19		11-12	GRID
20		12-13	GRID
21		13-14	GRID
22		16-17	GRID
23		1-2	GRID
24		2-3	GRID
25		3-4	GRID
26		4-5	GRID
27		5-6	GRID
28		14-15	GRID
29		6-7	GRID
30		9-10	GRID
31		8-9	GRID
32		7-8	GRID
SEE CITY BOOK 798		15-16	(CITY'S NOTES FOR GRID LAYOUT)

PAGE

33-38 — CHECK OF ARCH CUT OFFS

(1) X- SECTION ARCH 14-15

D 1840

D 1850

D 1860

D 1870

D 1880

D 1890

D 1900

BASE LINE L 1075 (N & SOUTH)

SOUTH NORTH

H.I. 2013.60

TBM 2018.49
0.37
H.I. 2018.86
-11.83
TBM 2007.03
+6.57
H.I 2013.60
-0.73
2012.97
6.05
H.I 2019.02

9.1/26 13.1/8.7 12.6/4.5 19.9/1.0

9.1/25.8 10.2/15.1 17.6/13.0 17.8/6.1 15.2/5 10.4/0 9.9/3.0 10.5/10

6.0/25.4 6.0/21.8 15.0/19 16.3/13.8 12.8/13.0 4.4/3.0 4.3/0 3.4/10 0

2.0/23 12.4/18 12.9/13.0 15.4/12.5 7.4/5 6.8/0 0.5/10

HI 2018.86

6.7/19.8 15.9/12.5 16.0/8.0 12.0/6.5 6.3/0 5.5/10

4.7/13.5 4.8/9.0 12.9/5.3 4.7/13.5 4.8/9.0 12.9/5.3 13.1/4.0 9.8/6.0 4.4/15 4.1/20

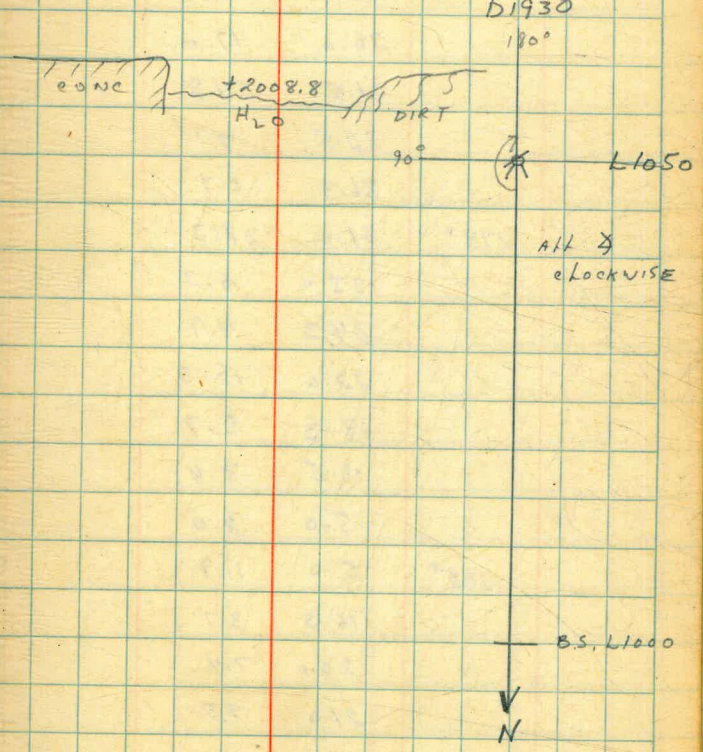
H.I. 2019.02

0.5/10

(2) X-SECTION ✓ ARCH 15-16

TRANSIT @ D1930 L1050	HORZ ∠	HORZ DIST	ROD	ELEV
	115°	15'	5.4	
		21'	7.4	
		30.5'	16.9	
		26.0	16.6	
		30.0	17.6	
		31.0	16.2	
		35.0	17.0	
		38.0	19.2	
		41.0	20.6	
		42.0	19.8	
		47.0	17.0	
		54.0	14.0	
		58.0	14.8	
	127°	8.0	3.9	
		13.0	4.7	
		20.0	6.7	
		25.0	13.5	
		26.0	22.5	
		28.0	41.0	
		28.0	17.0	
		32.0	11.2	
		38.0	11.6	
		42.5	12.1	
		39.0	11.4	2016.3

TBM 2026.20
+S 1.54
7-30-52 H.I. + 2027.74
1.50
TBM 2026.24



(3)

ARCH 15-16

H.I 2027.74

HORZ ∠	HORZ DIST	ROD	ELEV
155°	5.0	2.3	
	18.0	5.0	
	22.0	9.0	
	25.0	12.3	
	26.0	47.0	
	31.5	54.8	
	32.5	7.1	
	36.3	6.7	
178°	31.0	38.3	
	33.0	5.3	
	34.3	4.9	
	22.0	10.3	
	18.3	5.7	
	16.5	3.4	
	5.0	2.0	
188°	5.0	1.9	
	16.3	3.1	
	20.0	7.4	
	21.0	9.5	
		18.9	2008.8
	23.0	22.9	
	26.5	22.9	
	27.0	14.4	
	23.0	11.9	

(4)

	ARCH	15-16	
	H.I.	2027.74	
HORZ ∠	HORZ DIST	R.O.D	ELEV
214°	36.0	0.6	
	31.7	0.2	
	29.7	1.1	
	24.5	9.0	
	22.5	9.7	
	20	8.0	
	14.5	2.0	
	4.0	1.5	
	H.I.	2034.52	
244°	10.0	7.4	
	5.0	7.9	
	15.0	6.5	
	19.0	11.4	
	21.0	12.4	
	24	10.8	
	27.5	3.9	
	34.9	3.2	
	49.0	2.2	2032.3
257°	41.7	1.8	
	34.5	2.1	
	28.8	3.2	
	27.0	7.9	
	25	9.9	
	22	11.4	

(5)

ARCH 15-16

H.I. 2034.52

Horz ∠	H. Dist	Rod	Elev
257°	20	10.6	
	16	5.7	
	10	6.8	
	5	7.7	
270°	5	7.5	
	10	6.4	
	18	5.0	
	22	10.4	
	25	10.6	
	27.5	9.7	
	30	3.5	
	33.2	3.0	
	31	7.6	
	39	8.0	
	42	7.3	
	48	+1.5	

(6)

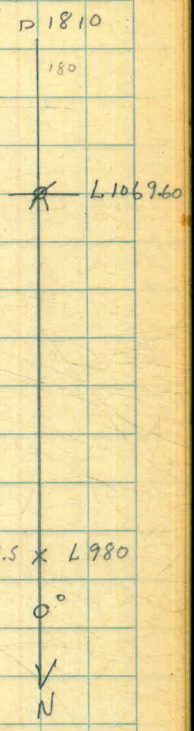
ARCH 13-14.

H.I. 1991.36

HORZ ∠	HORZ DIST	ROD	ELEV
110°	13	+2.0	
	17	0.9	
	19	3.1	
	24.5	6.5	
	25.2	1.12	
	28.0	0.83	
	36.3	3.18	
133°	62.0	16.9	
	52.0	15.6	
	50.0	14.1	
	44.0	14.9	
	33.0	13.9	
	31.5	8.3	
	29.0	6.5	
	19.0	+1.0	
146°	25.0	+1.5	
	30.0	2.6	
	36.0	10.1	
	39.5	10.5	
	43.0	7.2	
	47.0	6.1	
	55.0	6.3	
180°	50.0	+2.1	
	43.0	+2.5	

H.I. 1991.36
-5.01
TBM 1991.35

TBM 1997.14
8.93
H.I 2006.07



(7)

ARCH 13-14
H.I. 1991.36

HORZ ∠	H. DIST	MOD	ELEV
180°	41.0	2.5	
	39.0	3.8	
	38.5	5.4	
	35.0	5.1	
	31.0	2.1	
	29.0	+4.7	
205°	27.5	1.0	
	31.5	1.7	
	H.I. 2006.07		
	34.0	14.0	
	36.0	14.3	
	40.8	6.5	
	43.6	5.5	
	22.0	7.5	
244°	19.0	5.3	
	25.0	11.7	
	26.0	13.0	
	29.0	13.5	
	31.9	5.5	
	39.0	4.1	
258°	22.0	4.9	
	26.5	12.0	
	31.5	12.0	
	38.0	10.6	
	40.0	7.1	

(8)

ARCH 13-14
H.I. 2006.07

HORZ ∠	H. DIST	R.O	ELEV
270°	45.0	+2.2	
	55.0	+5.4	
	39.0	3.6	
	36.0	6.5	
	30.0	5.29	
	23.0	6.0	
	9.0	2.4	
258°	16.0	4.3	
	18.0	4.2	
	14.0	2.0	
	9.0	2.7	
	3.0	0.5	
	0.0	1.2	
244°	4.0	2.0	
	9.0	2.5	
	13.0	1.5	
205°	17.0	4.3	
	4.0	1.4	
	9.0	2.8	
	17.0	6.1	
180°	4.0	1.6	
	9.0	3.7	
	15.0	4.4	
	20.0	8.5	

(9)

ARCH 13-14
H.I. 2006.07

HORZ ∠	H. DIST	ROD	ELEV
146°	8.0	5.7	
	16.0	10.6	
133°	12.0	9.3	
110°	10.0	9.4	

(10)

X-SECTION ✓ ARCH 13-12

H.I. 1986.65

1	HORZ ∠	HI DIST	ROD	ELEV ✓
	256°	15	2.9	
		23	3.1	
		24.2	4.5	
		26.8	3.36	
		34.5	3.96	
		36.0	5.4	
		38.8	2.9	
		42.0	1.7	
	237°	17.0	2.6	
		23.0	2.7	
		28.0	10.2	
		34.0	10.2	
		39.0	7.3	
		41.0	5.3	
		43.0	2.6	
		44.0	2.1	
		47.0	+0.4	
	220°	46.8	1.5	
		40.0	2.3	
		37.0	8.1	
		33.0	9.7	
		32.0	11.1	
		24.0	3.1	
		19.0	2.6	

SOYSTER
LOCKER
HADLEY
ASH

7-31-52

BM 1988.29
-S 1.64
H.I. 1986.65
-S 11.46
1975.19
+S 0.66
H.I. - 1975.85

180
D 1750

L 1081.00 90 — 270

B.S.
L 980

N

(11)

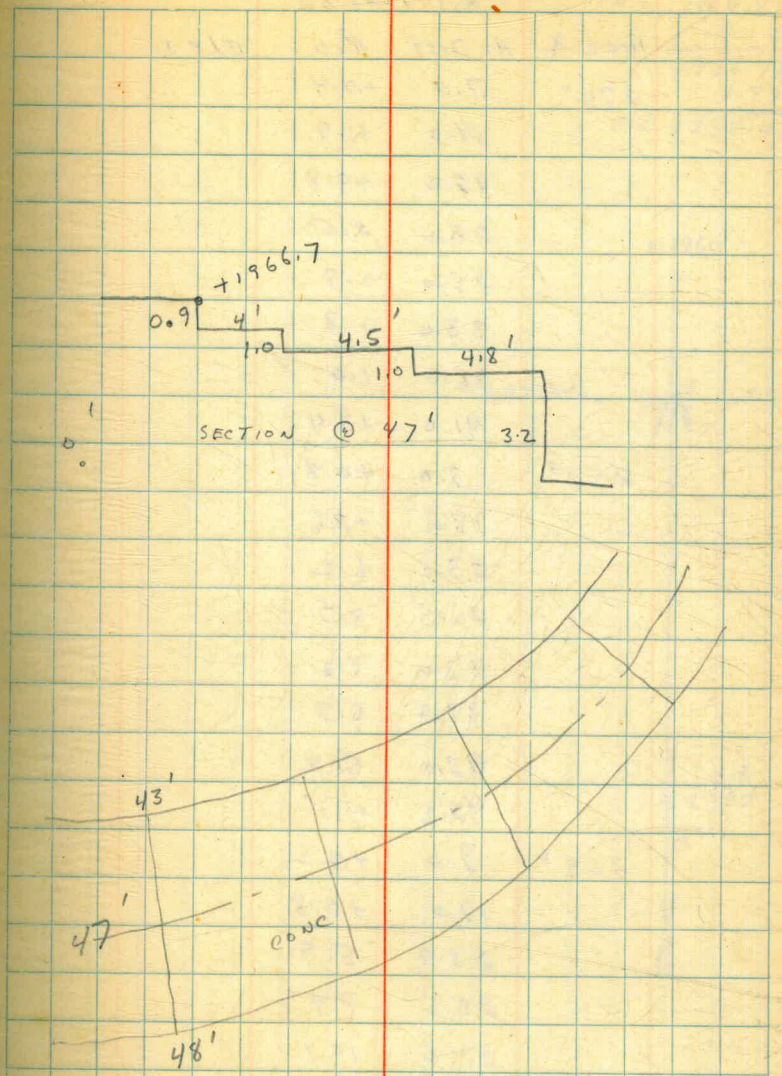
ARCH 13-12

HORZ ∠	H DIST	H.I. 1986.65 R.D	ELEV
220°	14.0	3.1	
	0.0	5.0	
200°	16.0	3.6	
	26.5	4.7	
	34.0	13.4	
	38.0	12.8	
	39.0	9.8	
	47.0	3.8	
	52.0	2.3	
180°	55.8	8.8	
	49.7	9.2	
	41.0	16.6	
	30.0	7.0	
	20.0	5.3	
162°	20.0	7.5	
	25.0	7.8	
	31.0	10.3	
146°	29.0	10.7	
	16.0	8.6	
133°	27.0	10.8	
	17.0	9.2	
	H.I. 1975.85		
162°	43.0	9.1	
	48.0	9.1	
	60.0	1.9	

(12)

ARCH 13-12
H.I. 1975.85

HORZ ∠	H. DIST	R.O	ELEV
162°	67.0	1.6	
146°	37.0	7.6	
	38.0	10.9	
	41.0	12.3	
	48.0	12.5	
	53.0	12.0	
	61.6	4.3	
	68.0	4.8	
	76.0	5.1	
133°	32.0	9.4	
	38.0	11.7	
	44.0	15.0	
	49.5	15.6	
	49.6	16.3	
	53.0	16.3	

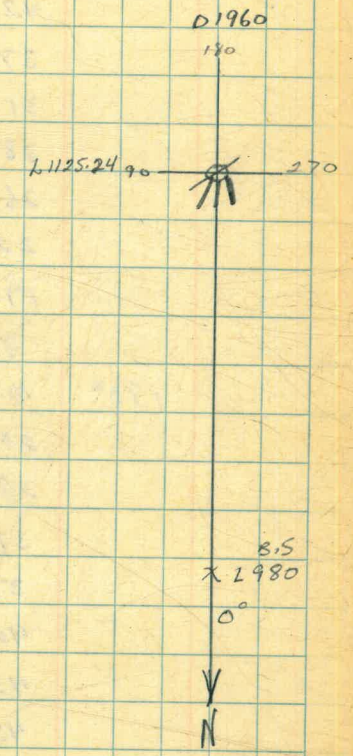


(13)

ARCH 11-12
H.I. 1968.83

Horz ∠	H. Dist	Rod	Elev
270°	7.0	+0.4	
	18.0	+1.9	
	22.0	+0.8	
	23.0	2.5	
	25.0	0.8	
	33.0	0.3	
	36.0	1.0	
	41.0	+3.4	
247°	7.0	+0.4	
	18.0	+1.6	
	23.0	6.2	
	26.5	8.7	
	37.0	8.2	
	37.2	5.3	
	42.0	5.2	
	42.2	4.1	
225°	9.0	+0.2	
	17.0	+0.8	
	23.0	5.9	
	25.5	7.9	
	27.0	10.1	
	30.0	8.8	
	32.0	7.4	
	32.5	5.1	

TBM 1968.30
0.53
7-31-52 H.I. 1968.83
12.12
1956.71
1.77
H.I. 1958.48



(14)

AXCH 11-12
H.I. 1968.83

HORZ ∠	H. DIST	ROD	ELEV
225°	39.6	+2.0	
	44.7	+4.5	
202°	43.8	+1.8	
	49.0	+2.2	
	42.2	+1.2	
	37.0	5.2	
	31.0	10.0	
	38.0	11.3	
	26.0	8.7	
	22.0	4.1	
	19.0	0.5	
	8.0	1.2	
180°	10.0	1.3	
	20.0	2.2	
	28.0	9.6	
	31.0	14.9	
	37.0	14.5	
	40.0	4.1	
	42.8	1.1	
	45.6	+0.7	
	51.0	+0.3	
158°	55.0	2.0	
	45.4	3.4	
	H.I. 1958.48		
	40.0	8.1	

(15)

ARCH 11-12

H.I. 1958.48

HORZ ∠	HI DIST	ROD	ELEV
158°	32.0	7.6	
	30.0	0.9	
	28.0	+0.1	
	22.0	+5.6	
	17.0	+6.0	
135°	20.0	+4.2	
	15.0	+5.0	
	0.0		1967.30
	22.5	+3.7	
113°	16.0	+3.9	
	21.0	+2.1	
	11.0	+5.0	
135°	30.0	2.6	
	30.5	10.0	
	36.0	10.1	
	36.5	9.1	
135°	39.0	7.4	
	43.0	2.7	
	53.0	0.7	
113°	26.0	3.1	
	30.6	2.5	
	37.0	4.6	
	40.0	6.3	
	43.0	3.1	
	48.0	3.6	

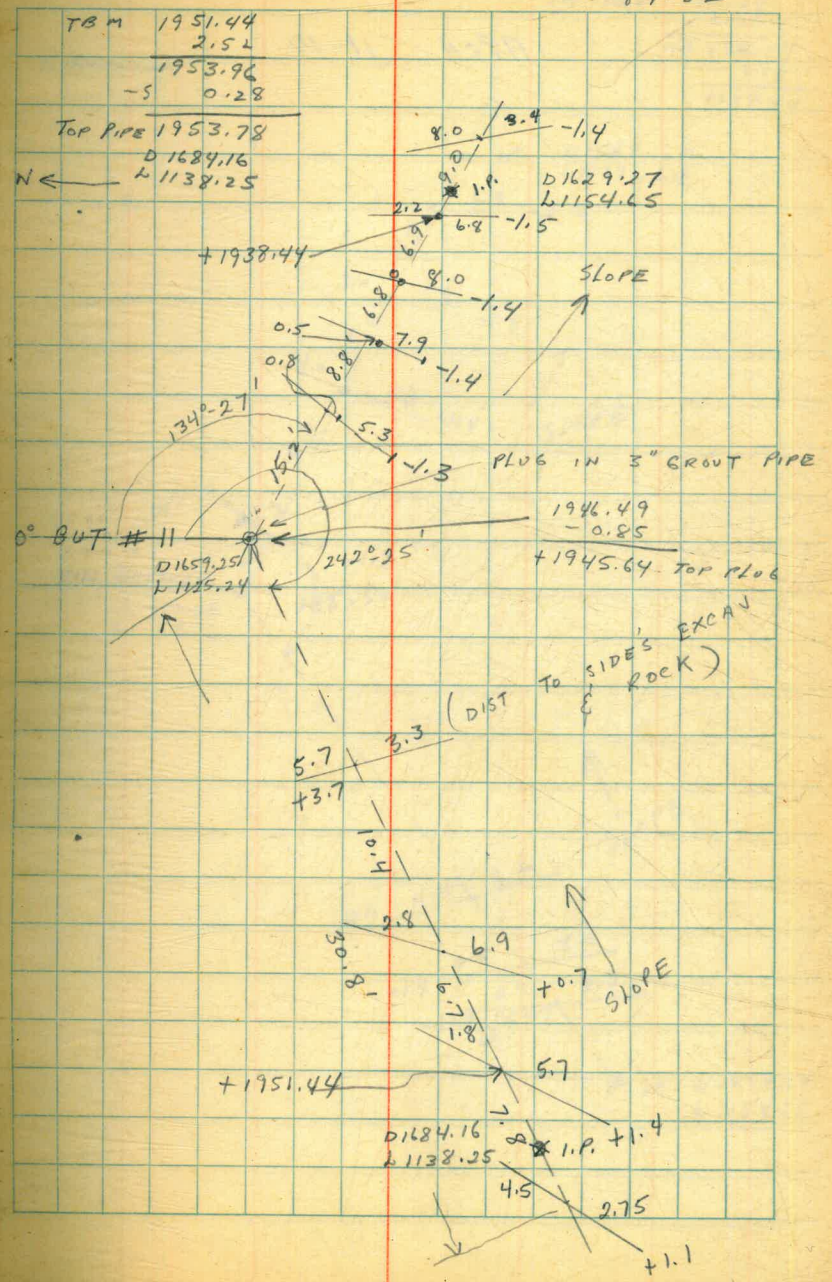
(16)

CONC CUT OFF LOCATIONS BY TRAVERSE

ARCH 11-12

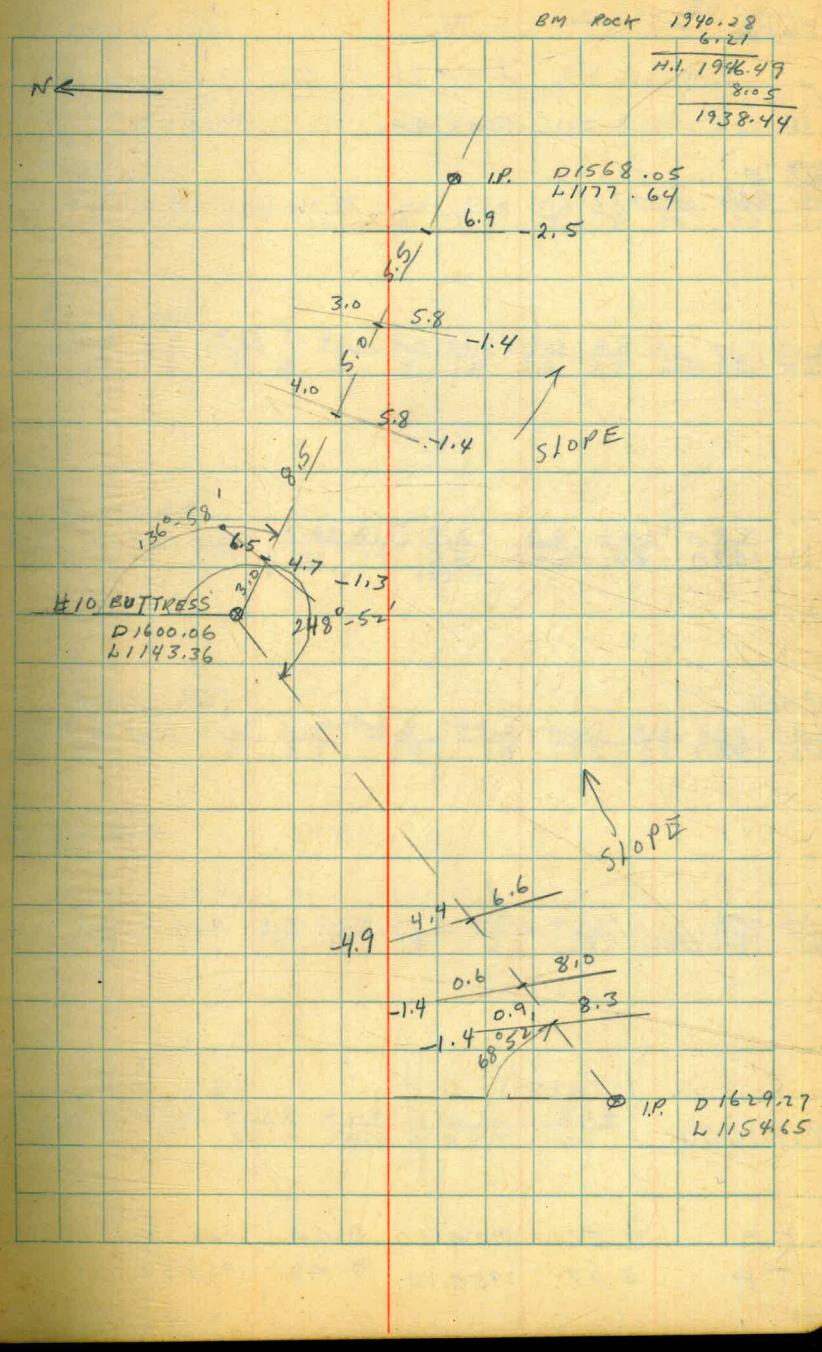
JOYSTER
LOCHER
HADLEY
ASH

8-1-52



(17)

ARCH 11-10


BM ROCK 1940.28
6.21
H.I. 1946.49
8.05
1938.44
N
I.P. D1568.05
L1177.64
6.9
-2.5
5.1
3.0
5.8
-1.4
5.0
4.0
5.8
-1.4
SLOPE
8.5
136°-58'
6.5
4.7
-1.3
#10 BUTTRESS
D1600.06
L1143.36
3.10
248°-52'
SLOPE
4.9
4.4
6.6
0.6
8.0
-1.4
0.9
8.3
-1.4
68°52'
I.P. D1629.27
L1154.65

(18) Arch Ring # 10 - # 11 - D-1600 - 1660

Sta.	+	⊼	−	Elev.
⊡	3.20	1943.48		1940.28
D-1610				
D-1620				
D-1630				
D-1640				
D-1650				
D-1660				
T.P.	11.56	1954.90	0.14	1943.34
T.P	3.60	1958.10	0.40	1954.50

8-Aug. '52 X-Section of Arch Rings (18)

Dallas - ⊡
Stanley - ⊼
Dave - ⊽

South — Clyde-Tape — North

Base line = L-1154.65 @ 1 Pipe

L-1165
Bench on top of rock S/S Arch Ring 10-11 @ D-1620

(1943.48)

5.3/15 4.7/10 4.5/0 10.73/0.7 10.75/10 15.64/10 15.64/11.5 7.3/12 2.2/18 +1.4/30 +2.8/33 5.8/36

(1943.48)

9.6/30 6.5/18 4.9/8 9.22/5 | ϕ 9.21/3 4.0/7 +2.5/15 +3.0/24 8.8/27 8.2/44 +1.7/46 +1.5/50

(1943.48)

5.8/30 7.7/18 7.0/5 6.43/5 | ϕ 6.43/5 5.5/19 9.6/28 1933.9 6.8/44.5 +4.5/48 +4.7/52

North

(1943.48)

5.09/-1 5.09/3 3.42/3 2.35/7 2.5/10 +4.0/14 +9.3/20 +10.1/26 0.1/37 +8.0/49 +8.0/52

⊼ 3.2 South 0.0/21

(1943.48)

+6.9/10 +2.0/0 2.00/11 2.0/17 0.57/17 0.57/19 +5.2/22 +11.5/33 +11.6/44 +9.0/47 +11.6/51

(1943.48)

+17.0/3 +16.5/0 +18.9/9 +7.3/23.5 +1.7/24.5 ‖ 13.20/29.5 (1958.10) 8.28/35

(19) Arch Ring # 11-12 · D-1660-1720

Sta.	+	⊼	—	Elev.
		1958.10		
D-1670				
T.P.	10.41	1968.44	0.07 ~~0.03~~	1958.~~07~~ .03
D-1680				
D-1690				
D-1700				
D-1710				
D-1720				

8-Aug. '52 same party as page 18 ~~+4.6~~ (19)

X-Sections

~~South~~ (1958.10) North

Base line ± L 1154.65

(1968.44) (1958.10) (1968.44)

2.1/5 4.9/13 | 8.5/17 9.2/19 9.2/28 4.0/28 | 8.7/39

(1958.10)

1.3/7 2.0/10 | 5.7/12 6.8/16 6.4/20 2.3/22 | 4.1/32 4.5/38

(1958.10)

+0.6/6 0.9/9 | 3.7/12 4.5/20 0.0/22 | 1.9/31 1.9/35

(1968.44)

+1.5/8 +1.2/10 8.9/17 10.6/23 8.8/27 1.8/34 +0.6/36

(1968.44)

+2.4/11 +2.0/15 5.8/25 9.7/32 6.8/39 +0.6/50

(1968.44)

+4.8/12 +4.4/21 4.91/31.5 8.18/31.5 8.26/44 2.66/50

Note all shots were taken North of Base line

9.2
1.4
+7.8

(20)

Arch. Ring # 12-13 = D-1720-1780

Sta.	+	⊼	−	Elev.
		1968.44		
D-1730				
T.B.M. T.P.	11.09	1978.87	0.66	1967.78
D-1740				
D-1750				
D-1760				
D-1770				
D-1780				
T.P.	11.26	1988.27	1.86	1977.01
T.B.M.			5.38	1982.89 (1982.87)

8-Aug'52 Same Party as page 18

X-Sections

(20)

Base line = L-115465 North

(1868.44)

℄ +5.9/14 +5.5/18 0.1/24 3.2/30 4.1/37 0.6/43 +6.5/54 +7.1/60

Concrete on rock Near ℄ arch @ D-1741 ± ⊟ L-1121 ± @ Iron pipe

(1868.44)

℄ +7.3/24/16 +7.0/20 +2.4/24 1.0/29 1.2/33 +7.6/44 +9.2/49

(1978.87)

℄ 0.8/20 1.5/24 5.7/28 8.7/33 +05/43 +1.2/46

(1978.87)

℄ +1.5/23 +1.0/28 2.9/32 6.2/38 5.3/39 0.0/45 +3.1/49 +3.6/51

(1978.87)

℄ +5.5/30 +4.9/36 0.2/40 1.7/46 3.3/46 3.4/49 +0.5/55 +4.0/60 +5.0/62

(1978.87)

℄ + +6.9/40 +6.6/46 +0.8/50 1.9/55 2.5/60 +4.80/67

Note All shots were taken North of Base line

Top core pipe @ bottom buttress # 13

Top of pipe 10' ± S.W. of ℄ bottom # 13.

+6.8 +9.0 +7.0 +9.9 1.9

(21)

Arch Ring #13-14 = D-1780-1840

Sta.	+	⊼	−	Elev.
⊡	11.33	1994.22		1982.89
1790				
1800				
1810				
1820				
1830				
⊡			11.33	1982.89

(21)

9-Aug.'52 same party as page 18

X-Sections — Base Line = L-1112.05

See bottom of of page 20.

South (1994.22) North

6.5 / ~~6~~	6.8 / 6	12.2 / 6.5	12.5 / 12.5	7.2 / 19	7.0 / 29	
2.9 / 3	3.0 / 0	6.5 / 1	10.5 / 5	9.7 / ~~+1.0~~ 1.0 / 17	+1.9 / 27	
0.2 / 2	0.1 / 0	5.4 / 2	6.0 / 4	7.8 / 4.5	7.6 / 8	3.2 / 13	+2.1 / 19	+5.2 / 26
+2.7 / 0	+2.6 / 2.5	1.3 / 6	4.8 / 10	4.5 / 13	1.1 / 18	+5.1 / 24	+5.9 / 30	
+6.5 / 5	+6.1 / 12	0.4 / 17	2.1 / 22.5	2.8 / 25.5	1.0 / 28	+2.1 / 32	+7.0 / 37	+7.1 / 40

North

See top of page

~~+9.0~~

~~+7.0~~ ~~−7.0~~

(22)

Arch Ring X-Section of # 16-17

Sta.	+	⏊	−	D-1960 = 2020 Elev.
T.B.M. 1	1.50	2044.01		2042.51
D-1960				
D-1970				
D-1980				
D-1990				
D-2000				
D-2010				
D-2020				
			1.50	2042.51 2042.51

9-Aug. 1952 Same party as page 18

(22)

Base line = L-1073.13

Top of 2x2 hub on Axis line @ D-1980

(2044.01)

North

13.5 / 0	12.3 / 17	13.2 / 23.5	Top Bank			
11.7 / 0	11.3 / 14	15.5 / 15	17.2 / 20	16.7 / 24	11.0 / 29	8.5 / 39
9.9 / 0	8.8 / 11	14.7 / 12	15.6 / 17	10.0 / 19	7.1 / 23	6.8 / 29
8.0 / 0	6.8 / 10	12.3 / 12	13.1 / 15	9.0 / 18	5.5 / 21.5	4.4 / 31
6.2 / 0	4.4 / 14	8.7 / 15.5	8.4 / 20	X	2.5 / 27	0.4 / 37
0	2.5 / 10	0.8 / 23	6.2 / 25	5.6 / 32	+3.5 / 52	+1.5 / 42	+3.5 / 53
0	0.3 / 21	+2.5 / 42	1.2 / 50	1.4 / 59	← North		

+4.10

−5.10

(23) Arch Ring # 1-2 X-Section D-1060 - D-1120

Sta.	+	⊼	—	Elev.
⊡	3.38	2053.98		2050.60
D-1060				
D-1070				
D-1080				
D-1090				
D-1100				
T.P.	0.14	2042.87	11.25	2042.73
D-1110				
D-1120				

ASSUMED AS 1952 GRD. LINE FWK.

Base line Going East & West = L-1090 = 0 (23)

13-Aug. 1952

Dallas - ⊞
Stanley - ⊼
Clyde - Tape ⊡ Axe
Curley - Tape ⊡ ⊕

Top of 2x2 Hub @ D-1000 & L-1000

(2053.98) North

7.3 / 0	6.6 / 6.5	5.7 / 10	4.5 / 19	3.5 / 30	1.2 / 41.5	0.1 / 43
46.6	47.3	48.2	49.4	50.4	52.7	53.8

8.7 / 0	7.8 / 4	5.8 / 12	4.5 / 21	3.6 / 30	2.2 / 41	1.0 / 42.5	0.10 / 45
45.7	46.1	48.1	49.4	50.3	51.7	52.9	53.9

9.1 / 0	4.8 / 10	5.1 / 20	3.6 / 30	2.1 / 42	0.0 / 40	
44.8	47.1	48.8	50.3	51.8	53.9	

9.4 / 0	6.9 / 12	5.3 / 23	4.0 / 30	2.2 / 36	~~4.4~~ / ~~2.5~~	2.5 / 44	0.10 / 50
44.5	47.0	48.6	49.9	50.7		51.4	53.9

(2053.98)

11.1 / 0	9.7 / 5	7.8 / 10	6.6 / 15	4.5 / 25	3.8 / 30	2.8 / 42	1.8 / 49
42.8	44.2	46.1	47.3	49.4	50.1	51.1	52.1

(2042.87)

on Rock @ D-1105 ⊡ L-1085

2.5 / 0	0.4 / 7	+1.9 / 17	+3.5 / 24.5	+4.6 / 30	+6.0 / 35	+2.7 / 39
40.3	42.4	44.7	46.3	47.4	48.8	50.5

(2042.87)

5.2 / 0	3.3 / 7	1.8 / 16	+0.1 / 22	+1.1 / 30	+3.0 / 44
37.6	39.5	41.0	42.9	43.9	45.8

North

(24) Arch Ring # 2-3 D-1120 - 1180

Sta.	+	⊼	—	Elev.
		2042.87		
T.P.	6.15	2047.85	1.17	2041.70
			2.60	2045.25
T.P.	0.68	2036.69	11.84	2036.01
D-1130				
D-1140				
D-1150				
D-1160				
D 1170				
T.P.	0.06	2024.66	12.~~08~~ 09	2024.~~61~~ 60
D 1180				

Base line L-1090 = 0 (24)

13-Aug. 1952 Page 23 for party

Rock @ D-1127 & L-1062

Check elev. on Hub @ ⊼ Buttress #2 on Axis line

Rock @ D-1142 & L-1064

South (2036.69) North

1.8 / 0	+0.2 / 9.5	+1.5 / 18	+3.0 / 25	+3.5 / 30	+4.4 / 37	+5.0 / 46	+5.4 / 58
34.9	36.5	35.2	33.4	33.2	32.3	31.7	31.3
	36.9	38.2	39.7	40.2	41.1	41.7	42.1

4.6 / 0	3.1 / 8	1.7 / 17	0.6 / 23	+0.7 / 30	+1.6 / 38	+1.5 / 50
32.1	33.6	35.0	36.1	36.0	35.1	35.2

7.8 / 0	6.0 / 11	4.4 / 24	3.4 / 30	2.6 / 40	2.0 / 48
28.9	30.7	2.3	3.3	4.1	4.7

13.2 / 14.	11.9 / 7	10.5 / 0	9.1 / 11	7.9 / ~~37~~ 17	6.7 / 30	6.1 / 39	5.5 / 50
23.5	24.8	26.2	27.6	28.8	30.0	30.6	31.2

13.8 / 12	12.9 / 8.5	12.3 / 0	12.4 / 7	10.6 / 18	10.1 / 25	9.8 / 33.5	11.7 / 29
22.9	23.8	24.4	24.3	26.1	26.6	26.9	25.0

1 x 2 hub @ D-1170 & L-1085

South (2024.66) North

13.2 / 40	11.5 / 29.	9.7 / 20	5.8 / 7.5	5.0 / 0	2.6 / 10	1.8 / 27	3.7 / 36
		15.0	18.9	19.7	22.1	22.9	21.0

+7.0

(25)

Arch Ring # 3-4 D-1180 - 1240

Sta.	+	⊼	—	Elev.
D-1190		2024.66		
T.P.	0.12	2012.59	12.19	2012.47
D-1200				
D-1210				
D-1220				
T.P.			1.86	2010.73 (2010.74)
~~D-1230~~				
⊡	11.79	2004.05		1992.26
~~D-1240~~				
D-1230				
D-1240				
⊡	4.09	1996.35	11.79	1992.26

Assumed as 1992 Grd. Line Elev.

Base line L-1090 = 0

13-Aug. 1952 Page 23 for party

(25)

South (2024.66) North

16.3/40 08.3 | 13.9/37 10.7 | 13.3/28 11.3 | 12.6/20 12.0 | 10.6/8 14.0 | 0 | 7.6/5 17.0 | 5.8/15 18.8 | 4.0/31 20.6

1x2 hub @ D-1201 & L-1090 = 5

(2012.59)

7.2/46 05.3 | 6.1/36 06.4 | 3.3/20 09.2 | 1.9/9 10.6 | 0.0/0 | +2.8/18 15.3 | +4.0/34 16.5

10.9/53 01.6 | 8.4/34 04.1 | 5.6/20 6.9 | 3.0/0 9.5 | 1.5/15 11.0 | -0.0/32 12.5

(2012.59)

13.7/54 1998.8 | 10.9/33 1.6 | 9.4/20 3.1 | 8.5/15 4.0 | 6.4/4 6.1 | 5.7/0 6.8 | 3.9/15 8.6 | 3.5/28 9.0 | 3.3/38 9.2

Nail in Stump @ D-1215 ± & L-995.

2x2 hub on Axis @ D-1273.48

(2004.05)

South North

8.2/53 1995.8 | 6.1/38 1997.9 | 5.0/27 1999.0 | 3.9/20 0.1 | 2.8/13 1.2 | 1.0/4 3.0 | ~~0.2~~ 0.0/0 3.8 | ±0.7/5.5 4.7 | +1.5/15 5.5 | -2.0/17.5 2002.1

(2004.05)

11.5/56 | 8.4/48 | 8.1/30 | 6.7/22 | 6.1/18 | 7.0/17 | 8.1/0 | 7.6/6 | 6.1/8.5 | 5.9/15 | 7.3/17

96.0 97.4 98.0 97.1 96.0 96.5 98.0 98.2

2x2 hub on Axis @ D-1273.48

14-Aug. '52 D-1230 & D-1240 were taken same party as 13-Aug. See page 23

(26) Arch Ring #4-5 D-1240 – 1300

Sta.	+	℄	–	Elev.
		1996.35		
D-1250				
D-1260				
D-1270				
D-1280				
T.P.	2.27	1986.86	11.76	1984.59
D-1290				
D-1300				
T.P.	0.57	1975.69	11.74	1975.12
			6.00	1969.69	1969.69

Assumed 0+ 1975.69
Grid line E-W

Base line = L-1125 = 0
14-Aug. '52 See page 23 for party.

(26)

South (1996.35) North

6.3 / 23	5.4 / 19	3.0 / 12	2.0 / 8.5	1.6 / 0	2.1 / 15	2.1 / 35	2.0 / 45
90.0	90.9	93.3	94.3	94.7	94.2	94.2	94.3

9.2 / 25	6.0 / 18	4.5 / 12.5	4.3 / 0	3.7 / 15	2.4 / 35	2.0 / 47
87.1	90.3	91.8	92.0	92.6	93.9	94.3

10.7 / 19	5.1 / 9	3.0 / 0	3.6 / 9	4.4 / 15	3.3 / 21	2.8 / 35
85.6	91.2	93.3	92.7	91.9	93.0	93.5

(1996.35)

8.6 / 7	5.3 / 0	6.9 / 8	10.4 / 11.5	10.4 / 13.5	8.8 / 16	4.5 / 21.5	1.9 / 25	1.5 / 35
87.7	91.0	89.4	85.9	85.9	87.5	91.8	94.4	94.8

Top rock D-1296 @ L-1112

(1986.86)

5.9 / 12.5	1.8 / 5.5	+0.2 / 0	+1.0 / 3	1.7 / 8.5	2.5 / 13.5	2.2 / 20.5	+0.5 / 28.5	+1.6 / 35
80.9	85.0	87.0	87.8	85.1	84.3	84.6	87.3	88.4

11.7 / 17	10.0 / 12	4.7 / 2	0	4.2 / 6.5	5.5 / 7	4.4 / 18.5	9.6 / 22
75.2	76.9	82.2	82.7	81.4	82.5	77.3	

Top of rock @ D-1312 @ L-1130
Check shot on Axis hub @ D-1332 3/4

(27)

Arch Ring # 5-6 = D-1300 — 1360

Sta.	+	⏊	—	Elev.
		1975.69		
D-1310				
D-1320				
D-1330				
D-1340				
T.P.	2.00	1965.51	12.18	1963.51
D-1350				
D-1360				
T.P.	0.75	1955.01	11.25	1954.26
⊟			7.32	1947.69	1947.68

Base line = L-1166.80 = 0

14-Aug, 52 See page 23 for party.

(27)

South (1975.69) North

0	6.5 / 16	3.9 / 25	0.2 / 31	0.8 / 36	0.0 / 42	3.5 / 49	1.5 / 56	4.8 / 73
	69.2	71.8	75.5	74.9	75.7	72.2	74.2	70.9

0	10.4 / 11	8.9 / 20	4.4 / 27	2.8 / 30	3.7 / 37	1.8 / 42	2.8 / 50	2.6 / 60
	65.3	66.8	71.3	72.9	72.0	73.9	72.9	73.1

⊙	13.1 / 12	7.3 / 23	8.2 / 30	9.8 / 33	9.5 / 40	3.5 / 42	5.2 / 67
	62.6	68.4	67.5	65.9	66.2	72.2	70.5

(1975.69)

19.1 / 0	16.5 / 10	11.2 / 20	10.2 / 24.5	8.6 / 30.5	11.8 / 32	12.7 / 37	11.3 / 42	5.1 / 50	6.0 / 60
56.6	59.2	64.5	65.5	67.1	63.9	63.0	64.4	70.6	69.7

Rock @ D-1345 ⊟ L-1139

(1965.51)

⊙ 7.4 / 13	6.8 / 25.5	3.1 / 26.5	3.0 / 29	7.3 / 32.5	9.6 / 36.5	12.6 / 44	13.3 / 47	8.5 / 51
56.1	58.7	62.4	62.5	58.2	55.9	52.9	52.2	57.0

0 13.5 / 13.	14.2 / 27	14.3 / 37.5	16.2 / 40.5	21.0 / 43.5	
52.0	51.3	51.2	49.3	44.5	

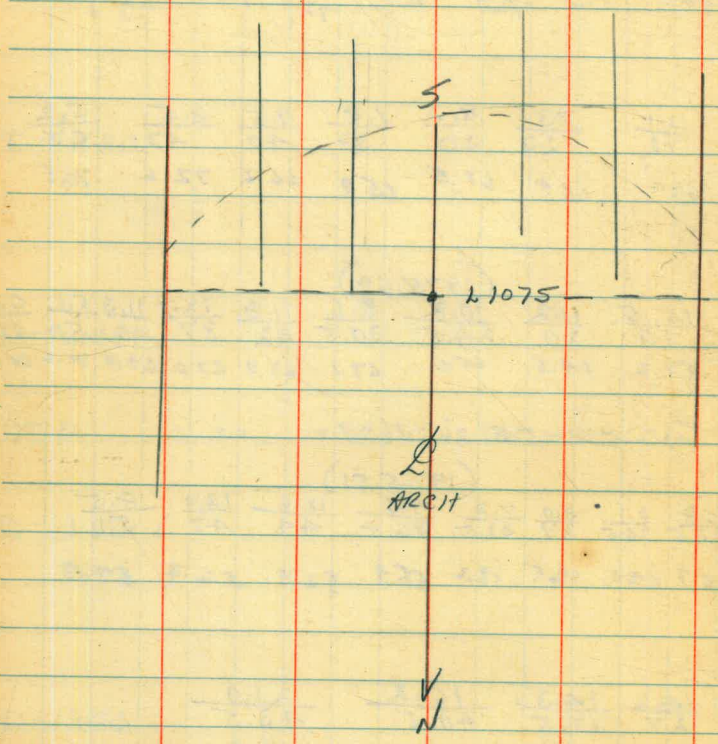
Rock @ D-1361 ⊟ L-1158

2X2 hub on Axis @ D-1380 16

(28)

ARCH 14-15
July 30, 1952

STA	+	H.I.	−	ELEV
	0.37	2018.86		2018.49
	6.57	2013.60	11.83	2007.03
	6.05	2019.02	0.73	2012.97
			0.43	2018.59



BASE LINE = L 1075.0 FOR DISTANCES

SOUTH ℄ NORTH

D 1840 H.I. 2013.60

9.1/26 13.1/8.7 12.6/4.5 19.9/1.0

D 1850 H.I. 2013.60

9.1/25.8 10.2/15.1 17.6/13 17.8/6.1 15.2/5.0 10.4/0 9.9/2.0 10.5/10

D 1860 H.I. 2013.60

6.0/25.4 6.0/21.8 15.0/19 16.3/13.8 12.8/13 4.4/3 4.3/0 3.4/10

H.I. 2013.60

D 1870 H.I. 2018.86

2.0/23 12.4/18 12.9/13 15.4/12.5 7.4/5.0 6.8/0.0 0.5/10 } H.I. 2013.60

H.I. 2018.86 D 1880

6.7/19.8 15.9/12.5 16.0/8. 12.0/6.5 6.3/0.0 5.5/10 } H.I. 2019.02

D 1890 H.I. 2019.02

4.7/13.5 4.8/9.0 12.9/5.3 13.1/4.0 9.8/6.0 4.4/15 4.1/20

D 1900

0.5/10

(29)

ARCH 6-7 = D 1360 - 1420

STA	+	⊼	−	ELEV
T.P.	0.40	1954.66	/	1954.26
D-1370				
D-1380				
T.P.	0.55	1943.40	11.81	1942.85
D-1390				
D-1400				
T.P.	4.36	1935.64	12.12	1931.28
D-1410				
D-1420				
⊡			10.21	1925.43 (1925.43)

BASE LINE FOR 0' = L 1166.80

15 AUG 1952

DALLAS ⊡
STAN ↑
DAVE ⌀ - TAPE
CURLEY "
CLYDE "

SOUTH NORTH

Rock @ D-1361 E L-1158

(1954.66)

4.1/0 3.7/13 5.4/17 4.2/27 7.8/30.5 7.3/37.5 5.1/42 4.4/50

50.6 51.0 49.3 50.5 46.9 47.4 49.6 50.3

(1954.66)

10.4/0 8.0/10 17.2/14.5 14.5/20.5 4.3/27 3.2/33

44.3 46.7 37.4 40.2 50.3 51.4

Rock @ D 1386 E L 1164

(1943.40)

4.4/7 3.5/0 3.5/4 5.0/6.5 12.8/8 8.3/18 2.8/19.5 +1.3/21.5 +4.0/24.5 +6.8/32

39.9 39.9 39.9 38.4 30.6 35.1 40.6 44.7 47.4 50.2

(1943.40)

8.8/0 8.5/2.5 18.3/8.1 18.4/12 11.5/17.9 8.8/19 3.4/26 +0.5/27 +1.4/33 1.0/36 1.9/41

34.6 34.9 25.1 25.9 31.9 34.6 40.2 43.1 44.8 47.4 41.5

Rock @ D 1415 E L 1180

(1935.64)

4.3/9 4.5/0 7.3/6 14.6/8 14.6/17.5 8.6/17.5 2.8/28

31.2 31.1 28.3 21.0 21.0 27.0 32.8

(1935.64)

6.3/10 6.6/1 0 11.3/6

CHECK ON I.P. IN RING 9-10 16' SE OF BUT #10

(30)

ARCH RING 9-10

D 1600 – D 1540

STA	+	⊼	–	ELEV	
TBM	10.36	1935.79	/	1925.43	IRON PIPE SE # 10
D-1600					
D-1590					
D-1580					
TBM	1.63	1927.06	10.36	1925.43	I.P.
D 1570					
D 1560					
		1927.06			
I.P.	6.15	1921.71	11.50	1915.56	
D 1540					

AUG 1-52

BASE LINE FOR 0' = L 1143.36

(1935.79)

SOUTH OR LS NORTH OR RS

39/3.1 31/2.4 23/0.5 17/+1.5 11.4/+1.0 11.4/4.3 10/8.1 0/7.0 6.7/1.20 8.2/1.22

(1935.8)

45/8.5 31/10.1 30/7.6 20/7.7 20/12.9 13.3/12.5 13.0/10.95 8/10.7 7/9.3 4/7.8 0/7.5 1/5.2

50/12.2 43/13.1 33/14.0 25/14.8 23/1.8 12/0.3

(1935.8)

27/+1.5 20/2.4 3/4.1 0 20/14.4

(1927.1)

55/4.4 46/5.6 38/6.8 28/8.7 21/5.7 17/0.2 6/+1.5 4/+3.0 0 2.5/+3.5 7/1.8 13/1.3 24/+3.7

(1927.1)

55/1.0 50/7.4 37/9.8 28/9.6 16/9.4 0/8.4 12/7.8 25/6.2

(1927.1)

55/11.7 46/11.9 33/10.0 18/10.5 4/10.0 0 4/8.8 14/9.2 26/9.6

BASE LINE FOR 0' L 1156.58

1921.71

50/7.8 4.5/8.1 37/8.1 25/7.6 10/7.4 1/7.20 0 5.4/1.74

(31)

ARCH RING 9-8 D1540-1480

STA	+	℄	−	ELEV	
I.P.		1921.71			
D-1530					
D-1520					
D-1510					
D 1500					
D 1490					
		1921.71	—		
I.P.	12.17	1927.73	6.15	1915.56	(1915.56)
D 1480					

Aug 1, 195~

BASE LINE FOR 0' = L1156.58

SOUTH									NORTH
(1921.7)									
50/6.4	42/6.3	37/8.6	27/8.5	17/8.6	9/9.5	4/12.5	0/12.8	20/13.2	39/12.5
(1921.7)									
50/6.6	45/7.6	33/7.8	20/8.5	10/8.3	0/7.3	2/7.9	5/11.7	16/11.7	34/12.7
(1921.7)									
50/4.2	44/4.4	36/6.5	27/6.4	20/7.4	8/8.1	0/7.9	7/10.6	12/10.1	13/11.3 30/11.5
(1921.7)									
52/2.5	46/3.4	38/3.4	27/4.5	19/5.9	11/4.9	9/2.8	0/2.6	8/4.2	12/9.3 18/10.5 31/10.3
(1921.7)									
52/1.2	45/2.7	30/2.0	23/2.7	19/3.9	11/4.6	0/5.2	7/8.0	22/8.2	36/8.6

(1927.73) BASE LINE L1150

0/7.0	5/10.5	10.5/11.0	13.5/9.8	29/7.7	42/7.9

(32)

ARCH RING

8-7 D1480 – D1420

STA	+	℄	—	ELEV
I.P.		1927.73		
D-1470				
D-1460				
D-1450				
D-1440				
D-1430				
D-1420				

AUG 1, 195–

BASE LINE FOR 0' = L 1150

NORTH — SOUTH

(1927.73)

13.2 / 3.3 — 14.5 | 8.2 / 0.5 — 19.5 | 0 | 7.8 / 2.5 — 19.9 | 11.7 / 4.5 — 16.0 | 11.7 / 6.5 — 16.0 | 9.4 / 15.5 — 18.3 | 7.7 / 26 — 20.0 | 7.1 / 35 — 20.6

NORTH — (1927.73) — SOUTH

11.6 / 8.0 — 16.1 | 0 | 11.1 / 1.5 — 16.6 | 9.1 / 1.0 — 18.6 | 10.0 / 3.0 — 17.7 | 9.6 / 4.5 — 18.1 | 8.1 / 6.5 — 19.6 | 9.7 / 12 — 18.0 | 10.5 / 14 — 17.2 | 8.8 / 23 — 18.9 | 8.2 / 34 — 19.5

SOUTH — (1927.73) — NORTH

7.5 / 11.7 — 20.2 | 6.9 / 7.0 — 20.8 | 6.9 / 0 — 20.8 | 8.4 / 3 — 19.3 | 7.0 / 10 — 20.1 | 8.0 / 13 — 19.7 | 9.2 / 18 — 18.5 | 10.5 / 21 — 17.2 | 10.0 / 31 — 17.2 | 9.2 / 33 — 18.5 | 8.6 / 36 — 19.1

(1927.73)

5.6 / 11 — 28.1 | 5.0 / 4 — 22.7 | 4.7 / 0 — 23.0 | 4.5 / 3.6 — 23.2 | 6.3 / 12 — 21.4 | 7.2 / 18 — 20.5 | 6.9 / 26.6 — 20.8 | 6.1 / 34 — 21.6 | 6.1 / 38.8 — 21.6

(1927.73)

1.2 / 15 — 26.9 | 2.0 / 5.3 — 25.7 | 4.3 / 2 — 23.4 | 0 | 6.6 / 4.4 — 21.1 | 7.0 / 14 — 20.7 | 5.5 / 21.7 — 22.2 | 4.1 / 29.5 — 23.6 | 3.8 / 36 — 23.9

(1927.73)

6.7 / 14.4 — 21.2 | 7.3 / 5 — 20.4 | 0 | 7.2 / 1 — 20.5 | 3.6 / 7.7 — 24.1 | 3.2 / 13.5 — 24.5 | +0.1 / 18 — 27.8 | +1.8 / 19 — 29.5 | +2.2 / 31 — 29.9 | +3.6 / 39 — 31.3

NOTE: IF X-SECTION WAS NOT RUN SOUTH FAR ENOUGH ADDITIONAL POINTS WERE TAKEN FROM CITY'S BOOK (798) FOR SAME SECTION WHEN NOTES WERE PLOTTED

(33)

CHECK ARCH RING CUTOFF
14-15 Arch Ring

BASE LINE HUB D- 1870 L- 1072.15

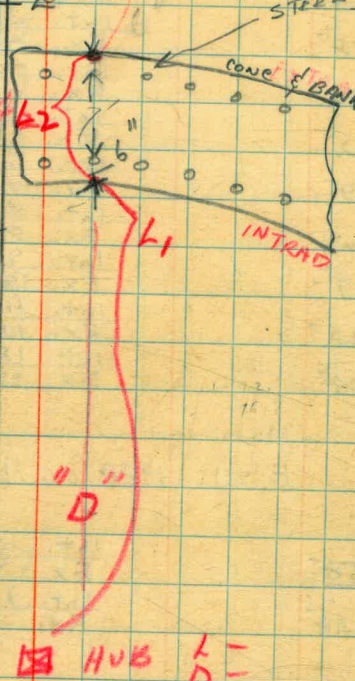
"D" STATION	+	H.I.	−	ELEV	INTRA DIST ACTUAL
1. Pipe @ # 14-15 Ring	8.15	2007.20		1999.15	
		Int.	8.06	1999.24	1088.05
Q = ℄ Ring		Ex.	8.12	1999.18	
W- 6.29'		Int.	6.08	2001.22	1085.95
		Ex.	7.09	2000.21	
W- 10.32'		Int.	5.09	2002.21	1082.75
		Ex.	6.13	2001.17	
W- 15.86'		Int.	4.03	2003.27	1076.95
		Ex.	5.14	2002.16	
W- 19.58'		Int.	1.99	2005.21	1070.85
		Ex.	4.09	2003.21	
W- 22.48'		Int.	0.20	2007.10	1064.35
		Ex.	3.10	2004.20	
E- 6.29'		Int.	9.78	1997.52	~~1087.89~~
		Ex	9.13	1998.17	1088.85
E- 10.32'		Int.	10.08	1997.22	1088.15
		Ex.	10.13	1997.17	
E- 15.86'		Int.	11.94	1995.36	1085.65
		Ex.	11.10	1996.20	
E- 19.58'		Int.	9.24	1994.31	
		Ex.	8.30	1995.25	1081.55
E- 22.48'		Int.	10.72	1992.83	
		Ex.	9.04	1994.51	1077.35
T.P.	4.40	2003.55	8.15	1999.15	
1. P. pe			4.40	1999.15	

SEPT 25-52 Elevations

DALLAS STAN OURLEY

See Bent Book Page

DIST THEO	L_1	L_2	WIDTH to EXTRAD	ARCH ℄	FILL	DIST
1090.93						
	15 9' S	6 1'	3.28		2.88	21.67
1087.89						
	13 8' S	6 8'	3.27		1.94	20.61
1085.05						
	10 6' S	7 0'	3.32		2.30	18.76
1079.60						
	4 8' S	9 2'	3.58		2.65	14.37
1072.79						
	13' N	10 3'	4.13		1.94	9.60
1064.78						
	7 8' N	13 3'	5.80		0.63	3.58
1091.59						
	16 7' S	5 9'	3.44		2.74 / 3.78	20.61
1090.04						
	16 0' S	6 0'	3.56		1.89	18.76
1087.51						
	13 5' S	6 3'	4.01		1.86	14.37
1083.79						
	9 4' S	8 0'	4.72		2.24	9.60
1079.25						
	5 2' S	9 5'	6.45		1.90	3.58



SOUTH SPRING LINE

Continued on page 34

Check Arch Ring Cutoff # 13-14

(34) Continued from page 33

"D" Station	+	⏊	−	Elev.	INTRA ACTUAL
L. Pipe	11.30	1994.15		1982.85	
		Int.	3.20	1990.95	1080.83 ✓
W-22.48'		Ex.	4.04	1990.11	
		Int.	3.55	1990.60	1087.13 ✓
W-19.58'		Ex.	4.86	1989.29	
		Int.	4.70	1989.45	1093.13 ✓
W-15.86'		Ex.	5.73	1988.42	
		Int.	5.72	1988.43	1098.93 ✓
W-10.32'		Ex.	6.82	1987.33	
		Int.	6.76	1987.39	1102.78 ✓
W-6.29'		Ex.	7.64	1986.51	
		Int.	8.70	1985.45	1103.93 ✓
0 = ℄ Ring		Ex.	8.56	1985.59	
		Int.	9.97	1984.18	1107.63 ✓
E-6.29'		Ex.	10.36	1983.79	
		Int.	11.60	1982.55	1104.03 ✓
E-10.32'		Ex.	10.47	1983.68	
		Int.	12.29	1981.86	1101.43 ✓
E-15.86'		Ex.	12.45	1981.70	
L. Pipe	5.21	1988.06	11.30	1982.85	
		Int.	7.06	1981.00	1098.03 ✓
E-19.58'		Ex.	7.10	1980.96	
		Int.	11.52	1976.54	1093.53 ✓
E-22.48'		Ex.	7.18	1980.88	
L. Pipe			5.21	1982.85	

26-Sept.'52 Page 33 for party

Base line Hub = D-1816 24 Bent Book page 30
L-1084 03
D-1810 = ℄ Arch Ring

L. Pipe in ring 15' ± S.W. ℄ 13 Butt.

THEO DIST	L1	L2	EXTRADO WIDTH	FILL
1081.13 ✓	3 2/4 N	9 0'	7.50	0.30 ✓
1087.50 ✓	3 1/4 S	9 5'	4.95	0.37 ✓
1093.42 ✓	9 1/4 S	7 8'	4.33	0.29 ✓
1098.83 ✓	14 2/4 S	6 7'	3.99	C0.1 ✓
1101.72 ✓	18 0' S	6 3'	3.91	1.06 0.3+ ?
1104.72 ✓	19 2/4 S	5 5'	3.91	0.79 ✓
1104.93 ✓	20 2/4 S	5 3'	4.07	0.30 ✓
1104.71 ✓	20 0' S	5 5'	4.29	0.68 ✓
1101.01 ✓	17 2/4 S	5 8'	4.77	C0.42 ✓
1097.10 ✓	14 0' S	6 5'	5.57	C 0.93 ✓
1095.54 ✓	9 5' S	8 6'	7.62	F 2.01 ✓

Continued on page 35

(35)

Check Arch Ring Cutoff #12-13
continued from page 34

"D" Station	+	⊼	−	Elev.	
l. Pipe	3.06	1977.19		1974.13	INTRA ACTUAL
			Int. 1.67	1975.52	1097.06
W-22.48'			Ex. 2.73	1974.46	
			Int. 2.31	1974.88	1102.96
W-19.58'			Ex. 3.77	1973.42	
			Int. 3.74	1973.45	1108.56
W-15.86'			Ex. 4.86	1972.33	
			Int. 4.89	1972.30	1114.46
W-10.32'			Ex. 6.23	1970.96	
			Int. 6.10	1971.09	1117.96
W-6.29'			Ex. 6.50	1970.69	
			Int. 7.60	1969.59	1120.16
0 = ⊼ Ring			Ex. 7.80	1969.39	
			Int. 9.27	1967.92	1120.86
E-6.29'			Ex. 9.31	1967.88	
			Int. 10.30	1966.89	1120.16
E-10.32'			Ex. 10.27	1966.92	
l. Pipe	3.28	1969.00	11.47	1965.72	1965.72
			Int. 3.21	1965.79	1117.54
E-15.86'			Ex. 3.19	1965.81	
			Int. 5.22	1963.78	1114.26
E-19.58'			Ex. 4.19	1964.81	
			Int. 8.89	1960.11	1110.46
E-22.48'			Ex. 4.28	1964.72	
l. Pipe			3.28	1965.72	

26-Sept.'52 page 33 for party

(35)

Base line Hub = D — 1750.31 Page 31 Bent Book
L — 1104.06

D-1750 = ⊼ Arch Ring

Iron pipe in Ring #12-13

THEO DIST	L1	L2	WIDTH ARCH @ CUTOFF	FILL
1096.56	7° N	9.2'	7.72	C 0.50
1103.22	1° N	8.2'	5.98	0.26
1109.42	4.5° S	7.5'	5.27	0.86
1114.96	10.4° S	6.6'	4.85	0.50
1118.02	13.9° S	5.5'	4.75	0.05
1120.58	16.1° S	5.0'	4.73	0.42
1121.19	16.8° S	4.6'	4.92	0.33
1120.37	16.1° S	5.1'	5.16	0.24
			l. pipe 10'± S.W. #12 Butt	
1117.08	13.5° S	7.4'	5.73	C 0.48
1114.32	10.2° S	8.9'	6.71	0.06
1111.97	6.4° S	12.8'	8.90	1.51

Continued on page 36

(36)

Check Arch Ring Cutoff # 11-12
Continued from page 35

"D" station	+	±	−	Elev.	INTRA ACTUAL
L. Pipe	8.52	1962.19		1953.67	
		Int.	1.90	1960.29	1109.28
W-22.48'		Ex.	4.52	1957.67	
		Int.	4.62	1957.57	1118.38
W-19.58'		Ex.	4.48	1957.71	
		Int.	4.44	1957.75	1125.28
W-15.86'		Ex.	5.97	1956.22	
		Int.	5.81	1956.38	1130.68
W-10.32'		Ex.	6.07	1956.12	
		Int.	7.39	1954.80	1132.98
W-6.29'		Ex.	7.81	1954.38	
		Int.	9.31	1952.88	1136.48
0 = ℄ Ring		Ex.	9.27	1952.92	
		Int.	10.68	1951.51	1136.48
E-6.29'		Ex.	10.31	1951.88	
		Int.	10.71	1951.48	1135.88
E-10.32'		Ex.	10.24	1951.95	
L. Pipe	3.40	1957.07	8.52	1953.67	
		Int.	8.79	1948.28	1131.18
E-15.86'		Ex.	7.02	1950.05	
		Int.	8.74	1948.33	1129.18
E-19.58'		Ex.	8.69	1948.38	
		Int.	11.93	1945.14	1124.48
E-22.48'		Ex.	8.69	1948.38	
L. Pipe			3.40	1953.67	

19-Sept. 1952 Page 33 for party.
Base line Hub D-1090 02
1-1112 28
D-1690 = ℄ Arch Ring

(56)

THEO DIST	L-1	L-2	L. Pipe in Arch Ring #11-12 WIDTH ARCH @ CUTOFF	FILL
1111.79	3° N	15 6	8.70	2.51
1120.53	6 1 S	9 3	7.15	2.15 ~~3.15~~
1125.12	13 9 S	7 4	6.25	(C.16)
1130.88	18 1 S	7 2	5.76	0.20
1134.31	20.7 S	6 9	5.65	1.33
1137.29	24 2 S	6 3	5.64	0.81
1137.60	24 2 S	5 7	5.83	1.12
1135.78	23 6 S	5 8	6.04	(C0.10)
1134.59	18 9 S	7 8	6.86	3.41
1129.77	15 9 S	9 1	7.81	1.59
1126.94	12 2 S	10 0	8.04	2.46

fh
10-16-5

Continued on page 37

(37) Check Arch Ring Cutoff # 10-11
Continued from page 36

"D" Station	+	±	−	Elev.	INTRA ACTUAL
L. Pipe	10.01	1945.17		1935.16	
		Int.	2.00	1943.17	
W-22.48'		Ex.	3.75	1941.42	1130.56 ✓
		Int.	2.22	1942.95	
W-19.58'		Ex.	3.17	1942.00	1135.76 ✓
		Int.	3.59	1941.58	
W-15.86'		Ex.	4.89	1940.28	1140.76 ✓
		Int.	4.85	1940.32	
W-10.32'		Ex.	6.80	1938.37	1146.56 ✓
		Int.	6.54	1938.63	
W-6.29'		Ex.	6.79	1938.38	1149.06 ✓
		Int.	8.14	1937.03	
0=± Ring		Ex.	8.15	1937.02	1151.66 ✓
		Int.	9.49	1935.68	
E-6.29'		Ex.	9.64	1935.53	1151.26 ✓
		Int.	10.98	1934.19	
E-10.32'		Ex.	11.06	1934.11	1151.96 ✓
L. Pipe	5.08	1940.24	10.01	1935.16	
		Int.	7.56	1932.68	
E-15.86'		Ex.	5.96	1934.28	1148.56 ✓
		Int.	7.52	1932.72	
E-19.58'		Ex.	7.49	1932.75	1144.56 ✓
		Int.	12.30	1927.94	
E-22.48'		Ex.	7.54	1932.70	1140.56 ✓
L. Pipe			5.08	1935.16	

29-Sept. 1952 Page 33 for party (37)
Baseline Hub D-1625.78
L-1128.56
D-1630 = ± Arch Ring

THEO DIST	L-1	L-2	WIDTH ARCH @ CUTOFF	FILL
			From pipe in Arch Ring # 10-11	
✓1128.91 ✓	2° S	10°	10.30	✓ C 1.65 ✓
✓1135.15	7½° S	9°	8.21	✓ C 0.61
✓1141.29	12½° S	9½°	7.29	✓ 0.53
✓1146.94	18° S	7½°	6.70	✓ 0.38
✓1150.48	20 5° S	7 6°	6.56	✓ 1.42
✓1153.14	23 1° S	7 2°	6.51	✓ 1.48
✓1153.43	22 7° S	7 9°	6.75	✓ 2.17
✓1153.07	23 4° S	6 8°	7.06	✓ 1.11
✓1150.19	20° S	7 7°	8.13	✓ 1.63
✓1145.38	16° S	9½°	9.68	✓ 0.82
✓1144.14	12° S	11°	12.38	✓ 3.58

ok
10-16-52 ✓

Continued on page 38

Check Arch Ring Cutoff #9-10
Continued from page 37

"D" Station	+	⏃	—	Elev.	INTRA ACTUAL
L. Pipe	1.57	1927.00		1925.43	
W-22.48		INT	0.22	1926.78	1143.39 ✓
		EXT	3.86	1923.14	~~1139.39~~
W-19.58		INT	2.02	1924.98	
		EXT	5.50	1921.50	1151.39 ✓
W-15.86		INT	4.09	1922.91	
		EXT	7.04	1919.96	1159.69 ✓
W-10.32		INT	6.90	1920.10	
		EXT	8.64	1918.36	1166.19 ✓
W-6.29		INT	8.52	1918.48	
		EXT	10.22	1916.78	1169.79 ✓
O-E RING		INT	10.17	1916.83	
		EXT	10.15	1916.85	1172.89 ✓
E-6.29		INT	11.57	1915.43	
		EXT	11.65	1915.35	1173.19 ✓
E-10.32		INT	12.95	1914.05	
		EXT	12.95	1914.05	1172.29 ✓
L. Pipe	0.84	1918.28	9.56	1917.44	
E-15.86'		INT	5.84	1912.44	
		EXT	4.47	1913.81	1169.29 ✓
E-19.58		INT	5.69	1912.59	
		EXT	5.91	1912.37	1164.19 ✓
E-22.48		INT	6.26	1912.02	
		EXT	5.89	1912.39	1157.39 ✓
L. Pipe			0.84	1917.44	

30-Sept. 1952 Page 38 for party.
Baseline Hub = D-1575.94
L-1151.39
D-1570 = ℄ Ring Fill

INTRA THEO	L_1	L_2	WIDTH ARCH @ CUTOFF	
			Iron pipe in ring #9-10	
1146.30				2.91
1145.30	8° N	16 ½°	11.62 ✓	~~1.91~~
✓1153.12	0.0	13°	9.57	✓1.73
✓1159.96	8 ¾° S	10 ¾°	8.54	✓0.27
✓1167.16	14 ¾° S	9 ½°	7.94	✓0.97 ~~0.03~~
✓1170.63	18 ¼° S	8 ½°	7.77	✓0.84
✓1173.34	21 ½° S	7 ½°	7.71	✓0.45
~~1176.68~~ 1173.	21 ¾° S	6 ¾°	7.96	✓0.49 ~~3.49~~
✓1173.21	20 ¾° S	7 ½°	8.34	✓0.92
			Iron pipe in #9-10 ring	1917.45
✓1170.43	17 ¾° S	9 ½°	9.25	✓1.14
✓1165.51	12 ¾° S	11 ¾°	10.45	✓1.32
✓1160.06	6° ~~S~~ A	15°	12.85	✓2.67 ~~2.77~~
				1917.45

ok
10-16-5 ✓

Continued on page 39

(39) Check Arch Ring Cutoff #8-9
Continued from page 38

"D" Station	+	⊼	−	Elev.	INTRA ACTUAL
L. Pipe	1.04	1918.49		1917.45	
		Int.	7.01	1911.48	1162.77
W-22.48'		Ex.	7.02	1911.47	
		Int.	7.16	1911.33	1165.77
W-19.58'		Ex.	6.66	1911.83	
		Int.	6.66	1911.83	1170.07
W-15.86'		Ex.	6.65	1911.84	
		Int.	6.44	1912.05	1174.57
W-10.32'		Ex.	6.48	1912.01	
		Int.	6.43	1912.06	1176.17
W-6.29'		Ex.	6.61	1911.88	
		Int.	6.66	1911.83	1177.47
0=℄ Ring		Ex.	6.51	1911.98	
		Int.	6.59	1911.90	1175.37
E-6.29'		Ex.	6.53	1911.96	
		Int.	6.62	1911.87	1176.37
E-10.32'		Ex.	6.54	1911.95	
		Int.	6.59	1911.90	1170.27
E-15.86'		Ex.	6.62	1911.87	
		Int.	6.70	1911.79	1164.37
E-19.58'		Ex.	6.59	1911.90	
		Int.	6.65	1911.84	1157.87
E-22.48'		Ex.	6.62	1911.87	
L. Pipe			4.51	1913.98	

30-Sept. 1952 page 33 for party
Base Line Hub = D - 1509.22
L - 1180.87
D - 1510 = ℄ Arch Ring

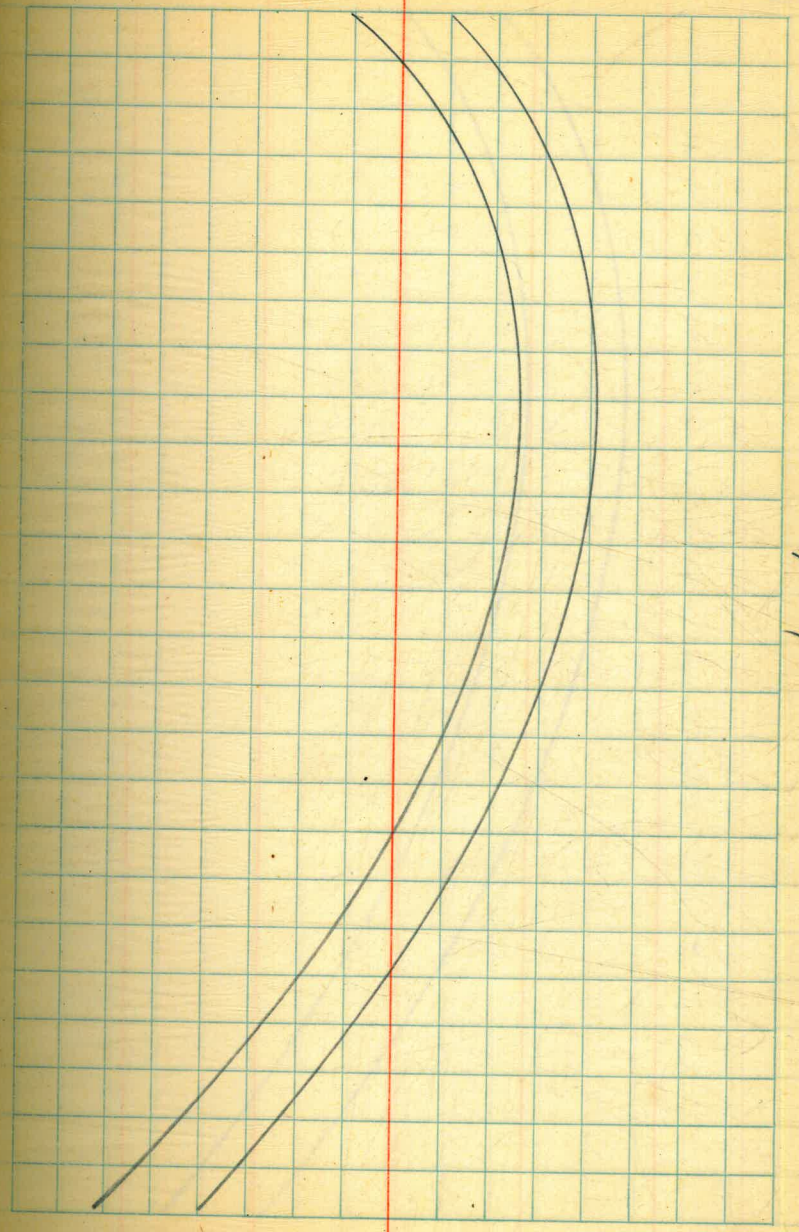
(39)

	L-1	L-2			
INTRA THEO			WIDTH ARCH @ CUTOFF		FILL
1160.60	18.1' N	9.0'	12.90	?	(C 2.12)
1166.77	15.1' N	9.6 ~~9.8~~	10.56		2.05
1171.04	10.8 N	11.1'	9.31		1.02
1175.21	6.3 N	8.9 ~~8.9~~	8.45		0.69
1177.05	4.7 N	9.2 ~~9.1~~	8.11		0.92
1178.34	3.4 N	8.1 ~~8.6~~	8.01		0.92
1177.21	3.5 N	6.5 ~~6.8~~	8.19	?	1.89
1175.39	4.5 N	7.0 ~~7.8~~	8.49	?	(C 0.93)
1170.97	10.6 N	9.6	9.31		0.75
1166.31	16.5 N	12.5 ~~15.6~~	10.52		1.99
1153.08	28.0 N	14.4 ~~22.7~~	12.87		(C 4.74)

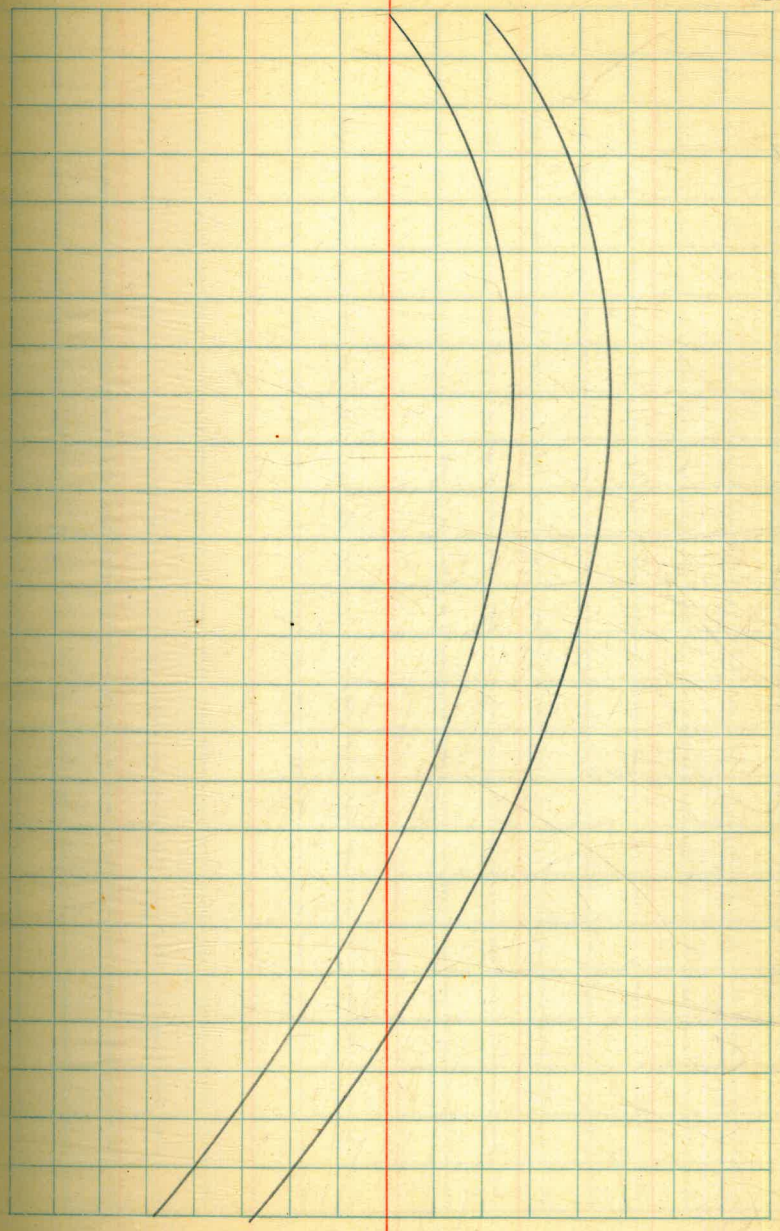
Iron pipe in ring #9-10

S/S # 9 Buttress elev. 1913.98

10-16-52



13-14



12-13

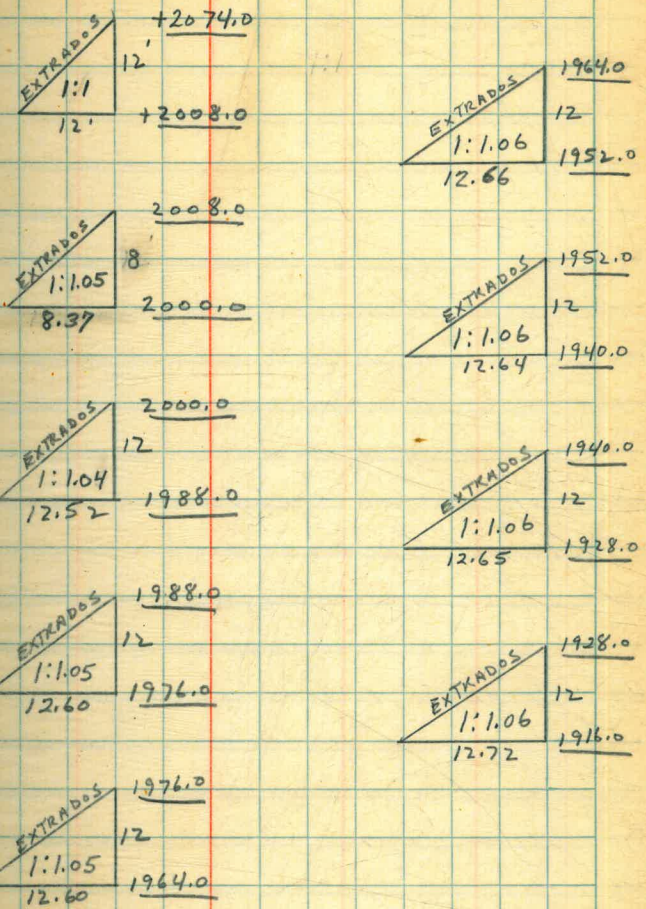
11-14

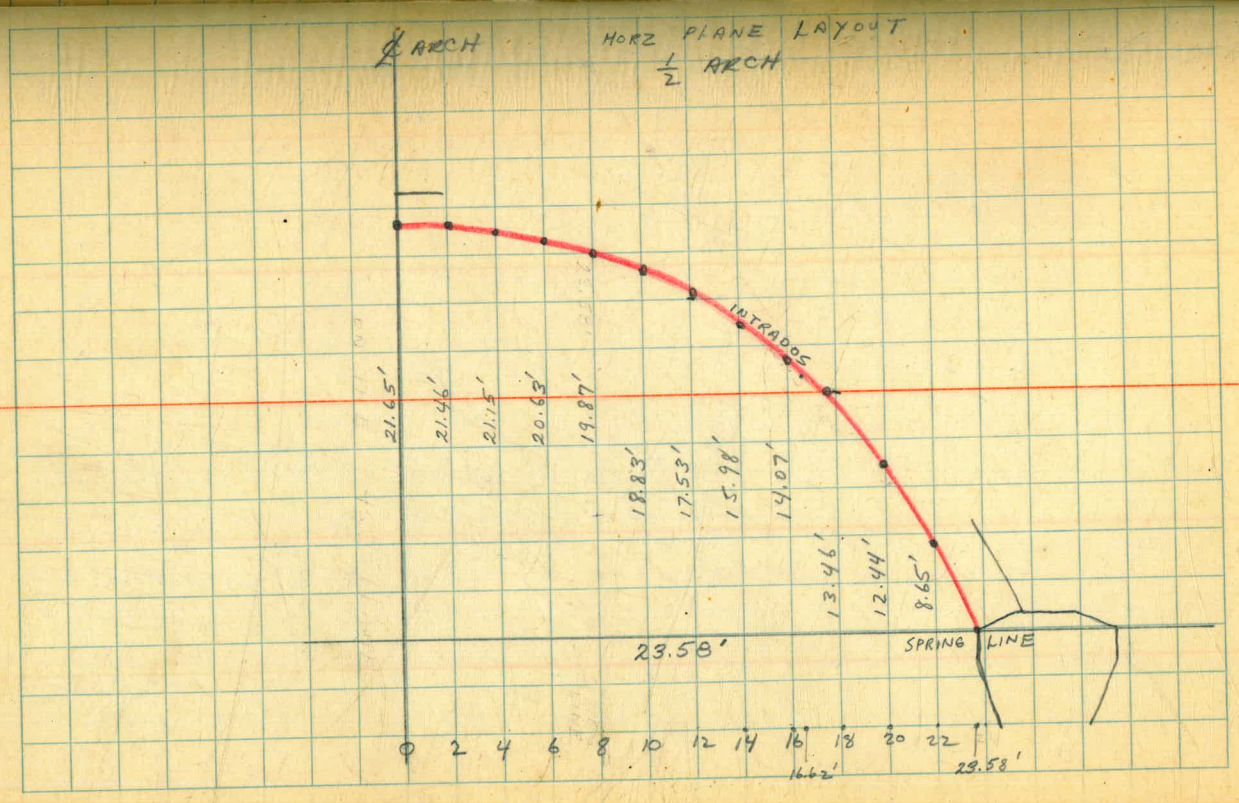
9-10

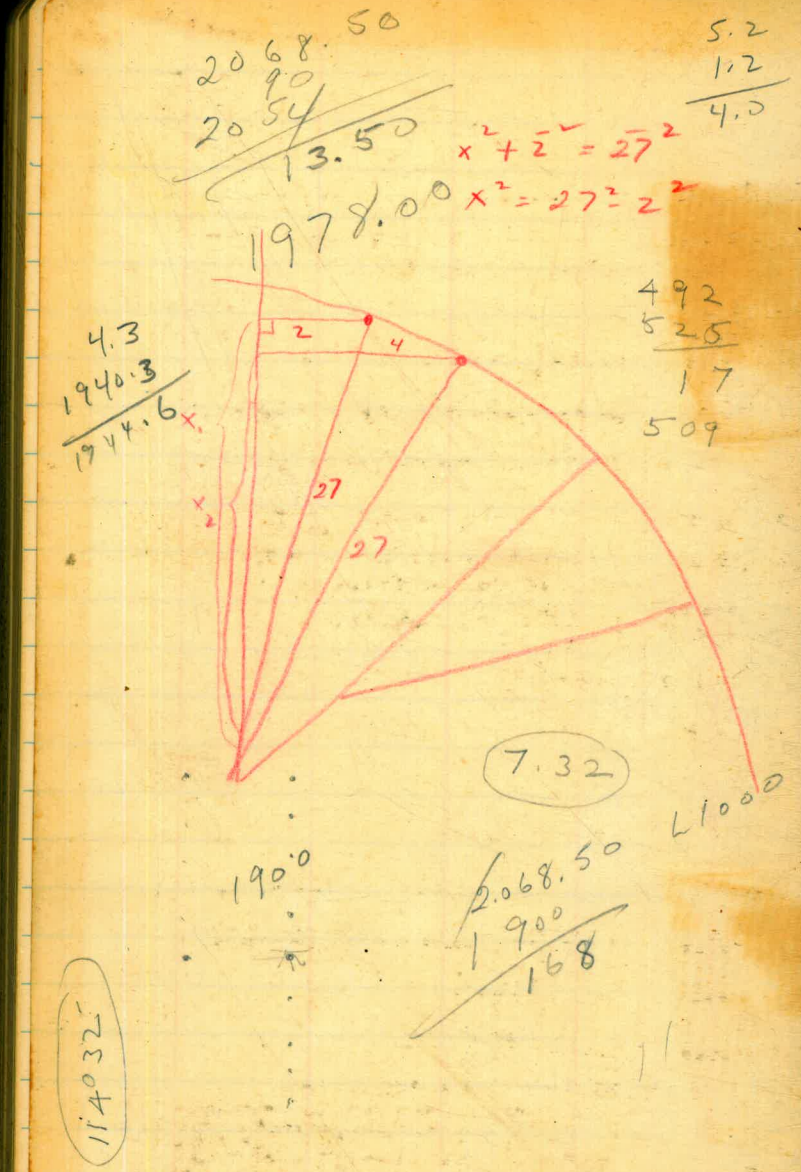
SLOPES FOR EXTRADOS

FROM	TO	SLOPE

SLOPE Δ

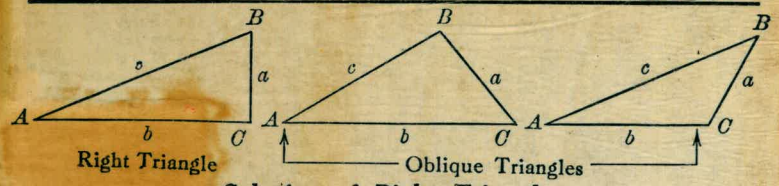



℄ ARCH
HORZ PLANE LAYOUT
½ ARCH
INTRADOS
21.65'
21.46'
21.15'
20.63'
19.87'
18.83'
17.53'
15.98'
14.07'
13.46'
12.44'
8.65'
23.58'
SPRING LINE
0 2 4 6 8 10 12 14 16 18 20 22
16.62'
29.58'



TRIGONOMETRIC FORMULÆ

Amon Rod



Solution of Right Triangles

For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A,$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C, \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}, c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}, \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}, \sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}, C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL

Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft. Horizontal distance also = Slope distance minus slope distance times (1 — cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 — .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 — 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.