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FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

HORIZONTAL AND VERTICAL CONTROL TABULATION

FOR THE

HOUSING AND URBAN DEVELOPMENT

FLOOD INSURANCE STUDY, 90-09

FIELD BOOKS 1 THRU 6

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
11890
RICHARD D.
COOK
Date Signed 4/30/91
ARIZONA, U.S.A.

Richard D. Cook, R.L.S.
Aerial Mapping Company, Inc.
3141 West Clarendon Ave.
Phoenix, Arizona 85017

CURVE FORMULAS

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

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

$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$

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

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

$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$

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

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

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

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

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

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

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

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 =$ Base.

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

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

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574 d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3} d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean = $\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Elan Publishing Co., Inc., Meredith, N.H. 03253

Bill Barbee
Don May
Job No. 90088

Book 1 Levels
CAP OVER Shoots
FCD 90-09

Book #1

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Page	Index
	Levels
1-10	BM L-365 To BM R-366 (514) Thru 829, TBM 1, TBM 2, TBM 3, 512, 520 (83), 513
10	R-366 (514) To A00+ ∡ STA Jup (82x)
10-12	R 366 (514) To J 266
12-22	BM J-266 To STA 479+50 Cap Canal BM 125' rt ℄
22-30	West to Foot Bridge Then East To Caterpillar Tank Rd Bridge Thru a number of ROW Marks south side of CAP to BC Market Bldg Rt side of Road on South part of Cap. at Bridge.

BM	5.50			1247	248
L 365	5.50				
			4.25		
			3.91		
	5.65				
	5.31				
			3.50		
			3.25		
	5.82				
	5.57				
			3.99		
			3.77		
	6.37				
	6.15				
			3.83		
			3.37		
	5.38				
	4.92				
			4.37		
			4.19		
	6.47				
	629				
			4.80		
			4.46		

1)

L - 365 US Coast & Geodite

6.50				
6.15				
		4.01		
		3.90		
6.46				
6.34				
		3.89		
		3.66		
5.94				
5.72				
		5.62		
		5.26		
2.41				
2.05				
		7.98		
		7.81		
10.79				
10.62				
		3.38		
		3.48		
4.61				
4.71				
		3.75		
		3.44		

	6.70				
	639				
829			3.39		
			3.39	1269.080 ADJ	
	6.13				
	6.13				
			3.22		
			2.94		
	6.70				
	6.42				
			6.92		
			6.79		
	3.51				
	3 38				
TBM			4.69		
# 1			4.69	1270.590 ADJ	
	1,33				
	1,33				
			10.62		
			10.78		
	2.96				
	3 12				
			9.88		
			8.87		

+21.84
-21.83

1/2" RB. Alum Cap 90-829

+1.51
-1.51

1/2" RB 5' East 3rd Pole North NE
Cor Blue Circle Plant Prop
Pole # WR 369

	2.38				
	1.38				
			10.73		
			10.04		
	1.38				
	0.68				
			7.49		
			6.70		
	4.57				
	3.78				
TBM			3.32		
#2			3.32	1241.169 ADJ	
	4.31				
	4.31				
			8.62		
			7.84		
	4.36				
	3.58				
			5.80		
			5.78		
	7.18				
	7.16				
			4.30		
			3.90		

-29.42
+29.42

SET R.B 6' SSE Sign Hatfield Rd
& 107th Ave on SW Cor OF intersection

	4.87				
	4.46				
			9.05		
			8.39		
	8.63				
	7.97				
			8.07		
			7.56		
	1.74				
	1.24				
			3.14		
			2.87		
	844				
	817				
TBM			3.67		
# 3			3.67	1238.048	
	3.93				
	3.93				
			7.23		
			6.90		
	6.88				
	6.55				
			3.57		
			3.18		

-3.12
+3.12

2' Dia Rock 15' N Hatfield Rd 300
East west Brick Aqua Friz River

	4.69				
	4.30				
			2.69		
			2.05		
	10.52				
	9.88				
			2.58		
			2.33		
	9.52				
	9.27				
			1.44		
			1.04		
	10.03				
	9.64				
PMK			3.29		
ERM			1.50		
512			1.56	1264.611 ADJ	
	5.16				
	5.16				
			2.40		
			1.50		
	10.78				
	9.88				
			3.74		
			3.51		

+ 26.56
− 26.57

3/4" I.P. BC A.P.S. 16/2 COR Sec 7
(512)

	5.11				
	4.89				
			7.88		
			7.51		
	9.10				
	8.73				
			5.98		
			5.91		
	6.72				
	6.65				
520			5.98		
(83)			5.98	1275.	505 ADS.
	6.09				
	6.09				
			2.77		
			2.47		
	5.32				
	5.02				
			7.73		
			7.46		
	1.77				
	1.50				
			4.61		
			4.28		

+10.89
-10.90

1/2" RB Alum Cap. (520 1983 Job)
South Hobo Line & East 115th Ave

5.59				
5.26				
		0.82		
		0.73		
5.35				
5.20				
		4.61		
		4.42		
11.23				
11.04				
		8.71		
		8.64		
7.55				
7.48				
		2.33		
		1.95		
6.81				
6.43				
		7.07		
		6.74		
6.40				
6.07				
		5.60		
		5.25		

	1.37				
	1.02				
			3.02		
			2.89		
	10.23				
	10.10				
513			2.05		
			2.05	1293.893 ADJ	
	3.00				
	3.00				
			2.92		
			2.95		
	11.18				
	11.21				
			0.63		
			0.53		
	11.12				
	11.02				
			0.97		
			0.59		
	10.63				
	10.24				
			1.09		
			0.97		

+18.39
- 18.39

Set 1/2" RB Alum Cap 1000' ± East of NUCOR 6 T4N R12E, North of Power Line approx 100' where Road Turns East along Power Line

	11.11				
	10.99				
			0.88		
			0.45		
	11.09				
	10.66				
			0.70		
			0.46		
	10.71				
	10.47				
PMK			2.68		
BM			2.16	1353.377	R.
#514			2.16		
	9.19				
	9.19				
			1.715		
			1.335		
	6.18				
	5.80				
PMK			0.84		
824			0.595		
△			0.595	1366.444	
	0.52				
	0.52				

+59.49
−59.48

PC US Coast & Geodetic R-366
* (1353.377)

+13.06
−13.06

824-ADOT TRI Joe Alum Cap set in concrete on South bank of Beardsey Canal 400'± East of 115th Ave

		9.25		
		8.11		
2.22				
1.08				
		10.77		
		10.52		
4.86				
4.60				
		3.26		
		2.62		
11.21				
10.57				
		8.76		
		8.15		
7.61				
7.00				
		8.69		
		7.66		
3.27				
2.24				
		6.52		
		6.10		
3.94				
3.52				

X Sect			5.92		
East side Flume			5.92	1346	902 ADI
	5.45				
	5.45				
BM			6.17		
J266			6.17	1346	185 R
	5.57				
	5.57				
X Sect			6.17		
West Side			6.17	1345	584 ADI
	8.36				
	8.36				
			4.41		
			4.12		
	4.57				
	4.28				
			7.46		
			6.72		
	5.33				
	4.59				
			5.71		
			5.59		
	4.30				
	4.17				

-19.57
+19.55

(12)

1/2" RB East side Flume +
U

-0.72
+0.72

US Coast. & Geodetic BC (J 266)
SW Headwall Syphon (1346.185)

-0.60
+0.60

1/2" RB West side Flume +
Near J-266

			5.70		
			5.60		
	5.58				
	5.48				
			4.05		
			3.91		
	6.41				
	6.27				
			3.23		
			2.80		
	6.96				
	6.53				
			2.74		
			2.30		
	5.82				
	5.39				
Ground			4.07		
ERM			3.04		
533			3.04	1356.584 ADJ.	
	10.04				
	10.04				
			2.51		
			2.28		
	7.58				
	7.35				

+11.02
-10.99

G.L.O. 13C 1/4 COR 35|36 T5N R1W

		x 1.80		
		x 1.35		
	6.00			
	5.55			
		2.67		
		2.40		
	7.59			
	7.32			
		4.49		
		4.21		
	6.08			
	5.80			
PMK		5.15		
730		3.99		
		3.99	1378.411 ADJ	
	4.78			
	4.78			
		6.02		
		5.94		
	8.35			
	8.27			
		2.39		
		2.34		
	6.52			
	6.47			

+ 21.83
- 21.83

South Leg 2' South Center
GLO BC Sec Cor NE Corr Sec 35 T5N R1W

		7.63		
		7.36		
10.56				
10.29				
		2.04		
		1.70		
8.13				
7.79				
		3.38		
		3.23		
826				
8.11				
		2.80		
		2.65		
7.24				
7.10				
		3.02		
		290		
4.48				
4.36				
		9.45		
		9.03		
5.26				
4.83				

		1.48		
		1.30		
9.20				
9.03				
		2.09		
		1.89		
5.77				
5.57				
		1.28		
		1.18		
6.20				
6.10				
		1.69		
		0.51		
9.69				
8.51				
		2.39		
		2.24		
7.00				
6.86				
505		3.24		
(90)		3.24	1430.952 ADJ	
6.70				
6.70				

+ 52.54
- 52.56

		2.16		
		1.58		
4.75				
4.16				
		4.35		
		3.79		
6.62				
6.05				
		1.05		
		1.00		
9.36				
9.31				
		1.31		
		1.18		
11.17				
11.03				
		1.80		
		1.49		
11.40				
11.10				
		1.81		
		1.52		
11.69				
11.39				

		1.38		
		1.14		
	11.10			
	10.86			
		2.91		
		2.71		
	6.49			
	6.29			
x. Sect		2.89		
890		2.89	1490. SSI ADJ.	
	1.42			
	1.42			
		11.59		
		11.24		
	1.05			
	0.70			
		9.84		
		9.51		
	0.80			
	0.47			
		10.76		
		10.67		
	0.96			
	0.87			

+59.62
-59.59

60' NAIL on Black Rock Hill
500' Sec Center Sec 23

		9.69		
		9.50		
1.84				
1.65				
		9.15		
		896		
8.91				
8.71				
		3.09		
		3.05		
6.92				
6.88				
		1.71		
		1.55		
10.92				
10.76				
		2.42		
		2.18		
6.32				
6.08				
		5.10		
		5.07		
9.85				
9.83				

			3.28		
			3.86		
	6.27				
	6.06				
			2.96		
			2.88		
	4.85				
	4.77				
504			4.46		
			4.46	1476.598 ADJ.	
	8.02				
	8.02				
			0.60		
			0.40		
	8.18				
	7.98				
			2.13		
			2.03		
	7.04				
	6.94				
			2.59		
			2.51		
	8.44				
	8.37				

-13.96

-13.93

1/2" RB Alum Cap set 300 ± 55W from N 1/4 Sec 23 T 5N R1W

			2.52		
			2.49		
	8.10				
	8.07				
			2.32		
			2.27		
	11.22				
	11.17				
			5.64		
			5.50		
	7.48				
	7.33				
			1.42		
			1.25		
	7.48				
	7.31				
			2.14		
			1.81		
	5.72				
	5.39				
ERM			6.12		
537			6.12	1522.793 ADJ	
	10.39				
	10.39				

+46.20
-46.20

ROW MARK South Side Cap 150'±
South South R/W Alum Cap Concrete
By Fence COR (ADJ EL 1522.793)

ERM			7.75		
536			7.75	1525.432 R.	
	1.19				
			9.96		
	6.57				
Hd wL			6.54	1516 692	
FL Pipe			11.14	1512 092	
			6.57		
	10.29				
ERM			1.52	1525.432 R	
536					
	3.36				
	3.36				
			4.26		
			4.01		
	2.77				
	2.52				
			3.16		
			2.98		
	10.02				
	9 85				
ERM			5.29	1	
535			5.29	1528.883 R	
	8.44				
	8.44				

+2.64
-2.64

(22)

Dept of Interior BC in concrete
STA 478+50 125' Rt (Row)
(1525.432) B.R.

Top Head wall South side Cap
Flow line Culvert Pipe 30"
West of 4-72" Pipes
+0.00
-0.00
STA 479+50 125' Rt (1525.432)

+3.44
-3.45

Dept of Interior BC (1528.883)
STA 470+59.78 125' Rt (BM)

		2.87		
		2.68		
5.23				
5.04				
		2.80		
		2.39		
5.24				
4.83				
		10.82		
		10.72		
0.23				
0.14				
		10.24		
		9.72		
5.44				
4.93				
		8.36	1518.373	
		9.12	1517.613	
		13.80	1512.933	
		2.57	24 1637	
		2.57	24 1637 1524	173 405
11.43				
11.43				
		1.43		
		1.12		

-4.72

-4.70

Panel +10.51 (South Cap West Foot Bridge)

HA WL -11.27

Flow Line -15.95 30" Pipe

37

.23

	8.79			
	8.48			
		3.43		
		3.28		
	8.47			
	8.32			
		9.73		
		9.20		
	0.96			
	0.43			
		10.70		
		10.38		
	1.62			
	1.30			
		5.24	1524	903 913
		11.02	1519	123 133
		6.13		013
		6.13	1524.	033 023 ADJ.
ERM	0.74		1522	793 ADJ
537	0.74			
		9.90		
		9.60		
	1.47			
	1.17			

-0.15
+0.15

Panel	+0.74	
Flow line	-5.04	30" Pipe
Top Flow line	-0.15	West Foot Bridge North Cap

Alum Cap Pg 21 (ADJ EL 1522.793)

		10.08		
		981		
0.72				
0.45				
		3.60	1502	143
		11.66	1494	083
		0.49	05	23
		0.36	05	383
10.87				
10.74				
		2.45		
		2.22		
10.03				
9.80				
		0.60		
		0.36		
8.46				
8.22				
		11.02		
		10.84		
4.80				
4.62				
		1.22		
		0.91		

(Panel Top Head Wall -20.65
Flow Line 4-72" Pipes -28.71)

	4.77				
	4.45				
ERM			4.46	24 1524	433 428
538			4.46	1524	433 R
	1.86				
	1.86				
ERM			7.06		
539			7.06	1519.244 R	
	3.76				
	3.76				
ERM			5.14		
549			5.14	1517	863
	5.95				
	5.95				
			3.05		
			293		
	4.42				
	4.30				
ERM			3.19	1521.994 Ave.	
548			3.19	1521	991 R
	5.62				
	5.62				
			7.74		
			726		

+1.64
-1.63

Dept of Interior BC (1524.443) R
STA 504+95.47 125 Rt

-5.20
+5.20

Dept of Interior BC (1519.244 R)
STA 510+00.07 125 Rt

-1.38
+1.38

Dept of Interior BC
C Sec 14 T5N R1W

+4.13
-4.13

D. of I. BC. 125' Rt
STA 517+11.90 (1521.991) R

	3.29				
	280				
ERM			3.68	1519	476 Ave
547			3.68	1519	487 R
	1.33				
	1.33				
			11.29		
			11.05		
	8.67				
	8.43				
			0.92		
			0.95		
	7.88				
	7.91				
ERM			3.81	1521	342 Ave
546			3.81	1521	334 R
	11.23				
	11.23				
			7.26		
			7.15		
	4.73				
	4.61				
			9.77		
			9.62		

+2.51
-2.52

D. of I BC (1519.487 R)
521 + 99.28 125 Rt

+1.86
-1.85

D of I BC 125' Rt
STA 527 + 19.57 Pt

	3.40				
	3.25				
			7.47	1516	194
			8.36	1515	304
			12.92	1510	744
			x 1.81		
			x 1.54		
	x 10.96				
	x 10.69				
ERM			0.91	1531	904 Ave
545			0.91	1531	902 R
	9.76				
	9.76				
ERM			2.13	1539.529	ADS
543			2.13		
	5.85				
	5.85				
ERM			4.96	40	422 Ave
542			4.96	1540.415	R
	1.26				
	1.26				
			10.95		
			10.40		
	2.55				
	2.00				

Panel 1 -5.14
Top Hd WL
FL Pipe 30" Pipe 2nd W C.P. Rd South

+10.57
-10.57

D. of I B.C (1531.902 R)
STA 538+00.00 125 Rt

+7.63
-7.63

Alum Cap 5/8" Alum Pipe
IE 1/4 Sec 14 T 5N R1W

+0.89
-0.89

D of I B.C 125 Rt
STA 541+06.63 (1540.415) R

			5.83		
			5.43		
	8.36				
	7.96				
ERM			2.95	32	855 Rve
541			2.95	1532	845
	0.06				
	0.06				
			10.91		
			10.55		
	0.42				
	0.06				
Panel			8.50	1513	915
			9.78	1512	635
			14.33	1508	085
			2.71		
			2.47		
	11.44				
	11.20				
			1.05		
			0.78		
	11.03				
	10.76				
			0.97		
			0.81		

-7.56
+7.56

O of I 13 C (1532.845 R)
STA 546 + 37.38 125 Rt

Panel
H J Wall
FL Pipe 30" Pipe 1.5' W CP Rd
south side

	10.75				
	10.59				
			4.53		
			4.24		
	4.23				
	3.94				
ERM			8.59		
540			8.59	1542	007 ADJ
		CH			

+9.17
-9.17
(1)

BC in concrete
Stamped 19° LT 62' South Bridge

CURVE FORMULAS

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

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

$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$

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

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

$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$

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

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

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

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

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

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

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

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 =$ Base.

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

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

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574 d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3} d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2=the sum of the squares of these differences and n=the number of observations, then the probable error of the mean $= \pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Elan Publishing Co., Inc., Meredith, N.H. 03253

Bill Barbee
Don May

Book 2 Levels

Job No. 90138

CAP OVERSHOOTS FCD 90-09

Book # 2

ERM	7.46			1542	007 ADJ
(540)	7.46				
			1.49		
			1.36		
	8.23				
	8.10				
			8.68		
			8.58		
	1.50				
	1.40				
			10.47		
			10.30		
	1.05				
	0.88				
			9.98		
			9.78		
	3.51				
	3.31				
			9.68		
	2.98		9.63		
	2.93				
			7.50	1518	937
			7.90	1518	537
			12.50	1513	937

①

BC in concrete 62' South (19°LT)
Cap Canal Caterpillar Track Rd

Upper Panel -23.07 ✓
Top Hand wheel -23.47 ✓
Flow line Pipe -28.07 ✓ NORTH END
30" Pipe, 1st West Caterpillar Rd

		x 4.23		
		x 375		
11.27				
10.79				
		7.46		
		7.31		
10.27				
10.12				
		0.68		
		0.46		
11.07				
10.85				
		0.60		
		0.40		
11.19				
10.99				
		10.86		
		10.68		
1.41				
1.23				
		11.50		
		11.08		
0.77				
0.35				

		x 11.49		
		x 11.29		
8.66	- 7.75			
8.46				
		10.20	1524	057
		10.46	1523	797
		15.26	1518	997
		x 1.10		
		x 0.81		
9.65				
9.36				
		1.14		
		043		
10.18				
9.47				
		1.97		
		1.96		
5.45				
5.44				
		4.80		
		4.81		
7.67				
7.68				
		1.99		
		1.93		

Panel North Culvert Pipe -17.95 ✓
Hand wall -18.21 ✓
Pipe Northeast -23.01 ✓
30" Pipe 2nd West
Caterpillar Rd

9.46				
9.40				
		11.10		
		10.88		
0.94				
0.72				
		8.85		
		8.80		
1.33				
1.28				
		9.32		
		9.24		
2.12				
2.04				
		7.69		
		7.39		
3.08				
2.78				
		10.39		
		10.27		
1.95				
1.83				
		4.33		
		4.26		

10.38				
10.31				
		9.56		
		9.55		
2.28				
2.26				
		8.86		
		8.74		
1.57				
1.45				
		10.14		
		10.01		
1.46				
1.33				
		7.16		
		7.01		
5.51	-33.12 ✓			
5.36				
		0.80	1508	087
		8.76	1500	127
	×	2.97		
	×	2.76		
11.70				
11.49				

-33.92 Panel at Headwall 4 Pipes 72"
-41.88 ft - Pipes

East White Peak Mine
North side Cap

			0.59		
			0.36		
	11.79				
	11.56				
			0.29		
			0.21		
	11.09				
	11.01				
TBM			2.62		
#4			2.62	1536	992
	3.93				
	3.93				
			1.98		
			1.61		
	3.88				
	3.51				
			9.90		
			9.73		
	0.67				
	0.50				
			11.79		
			11.59		
	8.84				
	8.64				

-5.01
+5.02

Sol 1/2 RB East of old Runway
West of Mine Rd.

			7.6	1523	042
			14.72	1515	922
			X 10.06	1520	582
			X 10.06	1520	582
		CH			
1/2" RB	2.87			1623	632
	2.87				
R/R			4.85		
Spike			4.85	1621	652
	0.96				
	0.96				
			11.52		
			11.33		
	0.27				
	0.08				
			2.67		
			2.35		
	0.99				
	0.67				
			9.13		
			8.60		
	1.09				
	0.56				

(7)

-16.41
+16.41

Panel	-13.95	
FL Pipe	-21.07	30" Pipe
Headwall		1st East Foot Bridge
"		

CH

Pt for FL transfer	-1.98
to 822	+1.98
" " "	

		9,29		
		9,18		
0,59				
0 48				
		10,77		
		10,58		
0,41				
0 22				
		10,76		
		10,36		
0,62				
0,22				
		10,08		
		9.82		
0,65				
0 39				
		9,61		
		9,56		
0,29				
0,24				
		11,82		
		11,30		
2,18				
1,66				

	+		−		
TBM			7.06		
#4			7.06		
(ERM	× 2.65			1542.007 ADJ	
540)	2.65				
			8.81		
			8.68		
	5.84				
	5.72				
			10.60		
			10.23		
	0.61				
	0.24				
			10.04		
			9.90		
	0.55				
	0.41				
			7.48		
			7.29		
	1.18				
	0.98				
			1.96	1513.945	
			× 9.96		
TBM Rock			× 9.96	1505.945 ADJ	

(9)

-84.66
-84.66

19 ft. BC

-36.06
+36.06 (3)

-27.61 Panel & Hd WL South 72" Pipe 9.56
-35.66 ft 9.56

Flow line 72" Pipe

	5.21				
	5.21				
			-3.16	1507	995
			+4.86	1516	02
			+4.86	1516	02
			1.50		
			0.98		
	9.58				
	9.05				
			1.37		
			1.22		
	10.50				
	10.35				
			1.59		
			1.50		
	6.46				
	6.37				
(ERM 850)			1.06	3218	Ave
			1.06	1532	16 R
840	7.46			1542	007
	7.46				
			1.49		
			1.36		

FL Pipe North side
Panel
Head wall

+26.23
-26.22

D of I BC (1532.160) R
Sta 571+54.79 850
OSRP

EZM BC 19° & LT

	11.03				
	10.90				
			1.03		
			0.84		
	9.06				
	8.88				
			1.62		
			0.55		
	8.88				
	7.81				
			7.16		
			7.12		
	8.30				
	8.25				
828			3.55	1571	887
			3.55		
	4.07				
1/2 RB			5.69	1570	267
	6.10				
828			4.48	1571	887
ERM	8.39			1542	.007
19° Ht.	8.39				
			10.28		
			9.95		

+29.88
-29.88

1/2" RB & Alum Cap 828

-1.62

828 Elev TRANSferred to 820

+1.62

Dot & BC at Bridge
START Level Loop South

	1.01				
	0.68				
			10.29		
			9.90		
	5.45				
	5.06				
(ERM 552)			5.11		
			5.11	1531	179
	1.91				
	1.91				
			8.43		
			7.86		
	1.11				
	0.54				
			6.51		
			6.38		
	3.28				
	3.15				
			9.13		
			8.78		
	1.62				
	1.27				
			11.75		
			11.25		

-10.83
+10.83 (3)

Def I BC Sol in Concrete
South of Ap East side Rd.
Stamped RP 2203400 BM OF Al. EQ

	0.64			
	0.14			
		9.44		
		9.04		
	1.61			
	1.21			
		11.79		
		11.76		
	0.14			
	0.11			
		10.70		
		10.67		
	6.78			
	6.75			
PMK		2.89		
503		2.71	1477816	
		2.71		
	3.52			
	3.52			
		8.35 ✓		
		8.31		
	3.91			
	3.87			
		7.30 ✓		
		7.11		

-53.37 (8)
+53.37

Fd 1/2 RB PLASTIC CAP LS # 18814 (-53.55)
East side Rd, May be 1/4 Cor

North End TRIP Around mud hole

2.02				
1.83				
		5.73		
		5.66 ✓		
4.71				
4.65				
		8.91		
		815		
2.58				
1.82				
		6.66		
		6.27		
0.55				
0.16				
		10.04		
		9.91		
8.17				
8.04				
		7.53		
		7.64		
3.99				
4.11				
		10.19		
		10.05		

Road South

	2.35				
	2.23				
			9.54		
			9.46		
	6.55				
	6.47				
			9.51		
			9.23		
	2.54				
	2.25				
			8.10		
			7.97		
	4.39				
	4.26				
			6.87		
			6.78		
	4.18				
	4.09				
827			7.26		
			7.26	1421	311
		CH			

- 56.51
- 56.50

13

1/2" RB Set Alum Cap

503	3.52			1477	816
	3.52				
			8.35		
			8.31		
	3.91				
	3.87				
			7.30		
			7.11		
	2.02				
	1.83				
*			5.73		
			5.66		
	3.43				
	3.36				
			11.23		
			11.20		
	1.18				
	1.15				
			5.00		
			4.41		
	2.62				
	2.03				
			8.02		
			7.85		

* South Rd

	2.84				
	2.68				
			7.79		
			7.65		
	1.77				
	1.63				
502			5.35		
			5.35	1440	348
	1.85				
	1.85				
			8.87		
			8.52		
	1.60				
	1.25				
			4.40		
			3.86		
	3.51				
	2.97				
			6.62		
			6.15		
	2.99				
	2.52				
			7.48		
			7.19		

- 37.48
+ 37.47

1/2" RB Alum Cap (90 - 502)
East side Rd

1.93				
1.64				
		8.33		
		8.28		
2.21				
2.16				
		7.69		
		7.52		
2.50				
2.33				
		9.57		
		9.23		
1.59				
1.26				
		10.64		
		10.57		
4.12				
4.05				
		4.90		
		4.82		
8.88				
8.80				
		9.83		
		9.44		

	4.92				
	4.52				
			1.79		
			1.68		
	5.19				
	5.08				
TBM			4.68		
# 5			4.68	1396	847
	6.02				
	6.02				
			4.69		
			4.54		
	10.08				
	9.93				
			7.56		
			7.38		
	6.12				
	5.94				
			3.87		
			3.78		
	6.96				
	6.87				
Side Shot			5.2		
			x 6.69		
			x 6.64		

-43.51
+43.51

Set 5/8" R.B 5' west of Greenswood Bush west side Rd. SW Powerline Rd to East, west of TRISTA AQUA

N. Road intersection

	3.07				
	3.03				
501			6.35		
			6.35	1399	946
	✓ 3.61				
	✓ 3.61				
			5.94		
			5.81		
	3.54				
	3.41				
			7.10		
			6.99		
	1.68				
	1.57				
			6.44		
			6.17		
	2.05				
	1.78				
			7.24		
			7.06		
	2.14				
	1.96				
			9.98		
			9.80		

5

+3.09
−3.10

Set 1/2" RB Alum Cap (90-501)

	0.80				
	0.62				
			11.58		
			11.48		
	0.49				
	0.39				
			11.50		
			11.11		
	041				
	0.02				
			10.69		
			10.50		
	3.54				
	3.35				
Panel			7.80		
			7.80	1339	944
	2.15				
	2.15				
			7.89		
			7.63		
	3.47				
	3.21				
			11.28		
			11.07		

9

-60.01
+60.01

1/2" RB East x Section East upon (Panel)

	0.96				
	0.75				
			5.49		
			5.21		
	3.49				
	3.21				
ERM S-366 534			8.335		
			8.335		
	10.465				
	10.465				
			3.34		
			3.23		
	8.53				
	8.42				
			2.23		
			2.05		
	5.93				
	5.75				
PNK			3.75		
807			3.53		
(83)			3.53		
	3.16				
	3.16				
			4.07		
			3.85		

(4)

+22.925
+22.925

USCGS BC. (1317.016R) S364
Line 101 Quad 331121, in cone
Base 2nd Support Bradley Cont. Abandoned.

+15.825
-15.825

"2" RB Alum Cap 1983 PJ +14.99

	1.60				
	1.38				
			10.06		
			10.02		
	0.88				
	0.83				
			10.52		
			10.35		
	1.26				
	1.10				
			7.30		
			7.24		
	4.91				
	4.85				
			689		
			681		
	5.13				
	5.05				
TBM			4.16		
#6			4.16		
	2.26				
	2.26				
			11.65		
			11.44		

-26.06
+26.06

Set 1/2" RB By Fence at Road Fork
East side fence

	2.80				
	2.59				
			8.02		
			7.90		
	1.08				
	0.96				
			7.31		
			7.16		
	1.36				
	1.22				
			7.38		
			7.14		
	3.72				
	3.48				
PMK			6.23		
BM			x6.01		
(518)			x6.01		

-29.15
+29.14

PMK - 29.37
BC USC&GS 1277.676
L-246

CURVE FORMULAS

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

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

$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$

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

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

$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$

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

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

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

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

Tan. def. = ½ chord def.

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

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

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875$ = Base.

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

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

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574\,d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3}d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean = $\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

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BILL BARBEE
DON MOY

BOOK 3 LEVELS
Job No. 90138
CAP OVER SHOOTS FCD 90-09

BOOK # 3

TBM #1	6.46				
	6.46				
			3.00		
			2.65		
	6.15				
	5.80				
			6.08		
			5.90		
	8.95				
	8.77				
			3.10		
			3.06		
	7.56				
	7.52				
			0.97		
	11.26		0.62		
	10.91				
			0.91		
			0.76		
	10.94				
	10.79				
			0.86		
			0.75		
	10.86				
	10.75				

			5.84		
			5.80		
	6.75				
	6.71				
			4.99		
			5.00		
	5.85				
	5.86				
			6.12		
			5.55		
	4.51				
	3.94				
PMK			3.57		
818			3.34	1314	655
			3.34		
	10.27				
	10.27				
			0.91		
			0.30		
	10.48				
	9.87				
			6.09		
			5.60		
	5.52				
	5.03				

②

+44.08
-44.05

+43.85
1/2" R Bar 0.23 ABOVE GR
75' South of Steel Twin Power line

			3.35		
			2.79		
	7.01				
	6.45				
			3.81		
			3.60		
	6.15				
	5.94				
			2.57		
			2.23		
	5.74				
	5.40				
PMK			3.04		
731			3.68	1339	415
			3.68		
TBM #	4.46			1241	.169
2	4.46				
			1.61		
			1.10		
	11.23				
	10.72				
PMK			4.40		
522 (83)			4.25		
84 Job			4.25		

CH7

③

+24.76
+24.76

+25.40

BC AH Happy Valley Rd
& Lake Pleasant Rd.

+9.83
+9.83

Fd 1/2" RB & Alum Cap 83 Job 83022

TBM# 3	0.71				
	0.71				
			3.00		
			2.82		
	10.48				
	10.30				
			1.43		
			1.20		
	10.56				
	10.33				
			0.92		
			0.80		
	9.79				
	9.67				
			0.77		
			0.30		
	7.46				
	69.8				
			4.40		
	3.76		4.16		
	3.52				
			7.62		
			7.01		
	4.09				
	3.48				

Ground			6.42	1260	333
ERM			5.63		
551			5.63	1261	123
	2.84				
	2.84				
			8.18		
			7.97		
	4.19				
	3.97				
			9.03		
			8.86		
	4.44				
	4.26				
			8.15		
			7.84		
	3.93				
	3.62				
			6.53		
			6.47		
	4.72				
	4.66				
			5.88		
			5.43		
	1.69				
	1.24				

+23.08
-23.07

5

+23.29
BC on Top 3/4" Iron Pipe
E 1/4 Cor Sec 12 T4N R1W APS

Gr			5.65		
Bushnine			8.28		
Bus1			8.22		
Bus1			8.20		
Gr			822		
Top			7.83		
732			7.83	1237	323
TBM #6	4.92			1306	810
	4.92				
			4.90		
			4.83		
	4.63				
	4.56				
			4.80		
			4.61		
	8.11				
	7.92				
			2.17		
			2.09		

-21.1 2' East Sycamore cecti'

-24.24

-24.18

-24.16

-24.18

- 23.79
+ 23.81

Stone Sec Cor

1/2" RB Fork of Road NW Caldwood

3,55				
3.47				
		1,49		
		1,32		
10,37				
10,20				
		0,94		
		0,68		
8,42				
8 16				
		6,03		
		5,84		
2,41				
2.22				
		11,04		
		10,90		
0,95				
0,81				
		10,91		
		10,88		
0,90				
0,87				
		10,14		
		10,06		

	1.70			
	1.62			
			9.21	
			897	
	2.40			
	2.16			
			6.52	
			6.40	
	4.90			
	4.78			
			4.31	
			3.81	
	5.24			
	4.75			
			2.98	
			2.65	
	5.99			
	5.66			
PMY			—	
506			416	
			4.16	1291.695

MC

-15.11
+15.10

"R" RB Alm Op

TBM	5.53				
Flume	x4885				
			x6.145		
			x5.50		
		CH			
544 (83)	5.27			1263.935	
PK Bottle cap	5.27				
			2.82		
			2.70		
	2.78				
	2.66				
			9.04		
			8.98		
	1.93				
	1.87				
			3.09		
			2.54		
	7.54				
	6.99				
			3.22		
			3.08		
	6.97				
	6.83				

- 0.615
+ 0.615

BC BM S-366
U.S.C&G.S in 2nd Stanchion
Pipe Rack

PK & Coke Bottle cap in Black top

			3.82		
			3.30		
	11.74				
	11.22				
BM			0.47		
			0.47	1277676	
		(H)			
519(83	2.16			1253286	
			5.04		
	3.68				
			5.62		
	4.06				
			5.47		
	4.11				
			4.96		
	12.28				
			6.45		
	3.40				
522(83)			4.45	1250986	
		(H)			
544	3.42			1263935	
			7.92		
	4.02				
			5.90		

+13.77
-13.77

L-266 USC&G BM
West side Agua Fria River

BM M 266 0.35 ABOVE GR.

-2.30

1/2" RB Alum Cap (83-522) R 1250.988

	3.57				
			5.89		
	3.87				
			5.42		
	4.62				
Rm			5.03	1253	286

-10.96

US CGS B4 BC M 266

CURVE FORMULAS

$T = R \tan \frac{1}{2} I$	$R = T \cot. \frac{1}{2} I$	Chord def. $= \frac{\text{chord}^2}{R}$
$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin.} \frac{1}{2} D}$	$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$	No. chords $= \frac{I}{D}$
$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$	$E = R \text{ ex. sec } \frac{1}{2} I$	Tan. def. $= \frac{1}{2}$ chord def.
$\text{Sin.} \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$	$E = T \tan \frac{1}{4} I$	

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

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

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875$ = Base.

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

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

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574 d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3} d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean $= \pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
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9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

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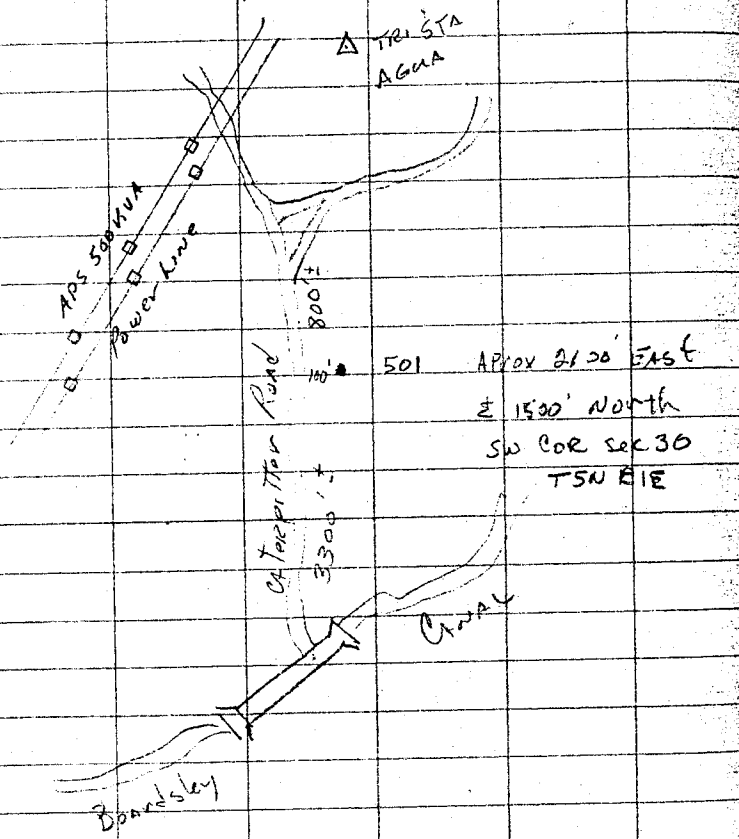
Book 4 Descriptions
FCD 90-09
Bill BARBEE
DON Moy

Pg INDEX Job No. 90138

1-17 Descriptions of Points
18
19
20
21
22
23 Dist 828 to 850
24 Horz ∡ BS 820 ⊼ 828 FS 850
25 Picture Point 732
26 Horz ∡ BS 903 ⊼ 824 FS 818
27 Dist 820 To 828 offset.
Reciprical ∡ 828 offset to 820
Dist 824 to 818
Reciprical ∡ 818 to 824
28 Horz ∡ BS 820 ⊼ 822 FS 821
29 Reciprical ∡ EL Transfer to 822 & 821
Reciprical ∡ 824 to 828
30 Dist's to EL Transfer 821 & 822
31 Dist's " " " " " "
Reciprals 821 To 822
" 824 To 825
30 Reciprial ∡ 824 to 826

Book 4

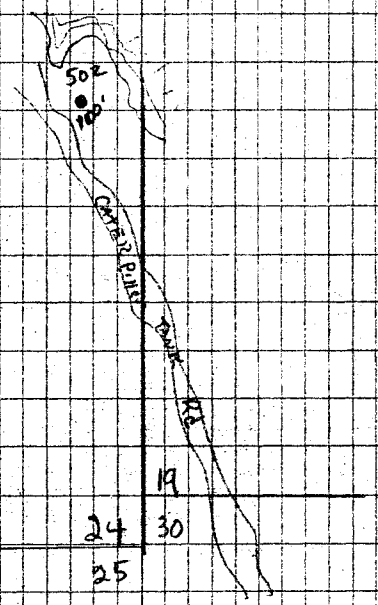
501' Set 1/2" R.B & Alum Cap
STAMPED 90-501
3300± NORTH OF SYPON ON
Boardsley CANAL ON
CATERPILLAR TANK Road



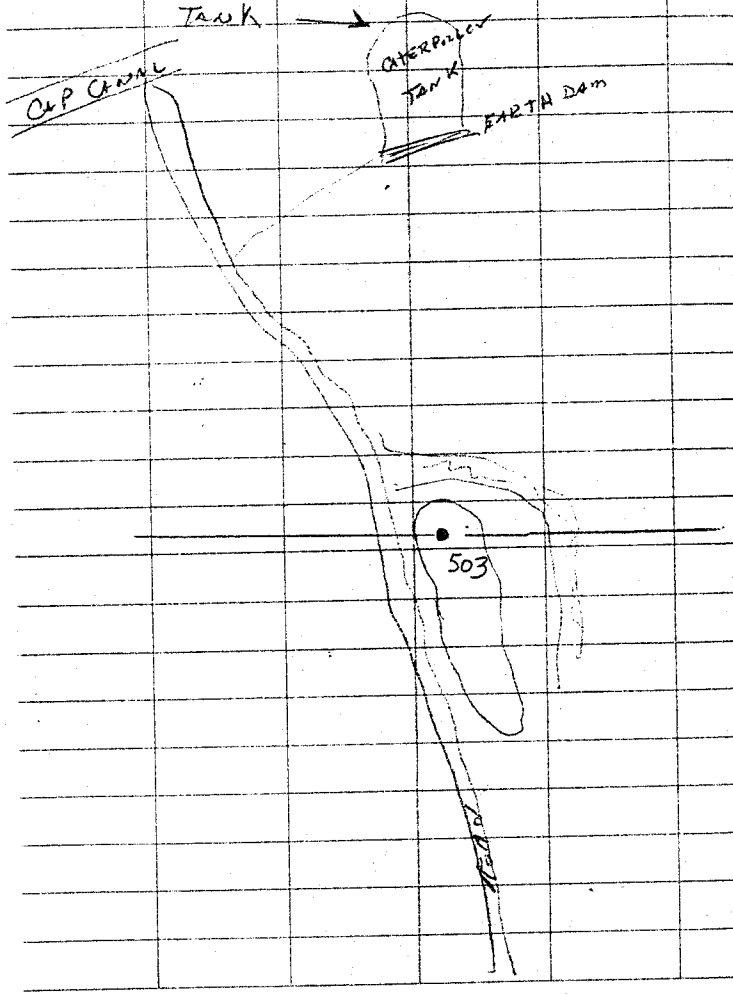
Approx 2130' East
± 1500' North
SW COR Sec 30
T5N R1E

①

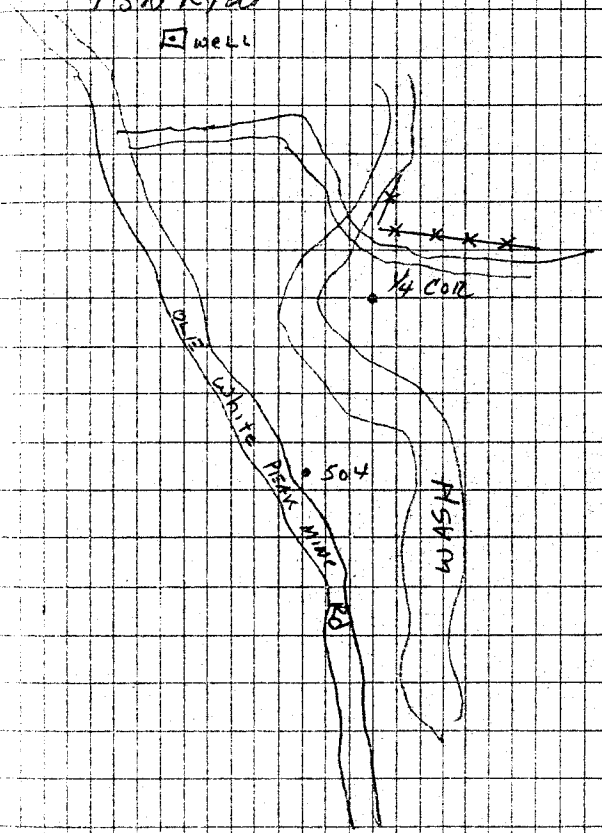
502' Set 1/2" R.B & Alum cap. STAMPED
90-502. Approx 9000' North of
Sypon on Boardsley CANAL on Caterpillar
Rd. Pt Approx 100' East of Road
Pt is 2000 North & 100' West of SE Cor
Sec 24 T5N R1W



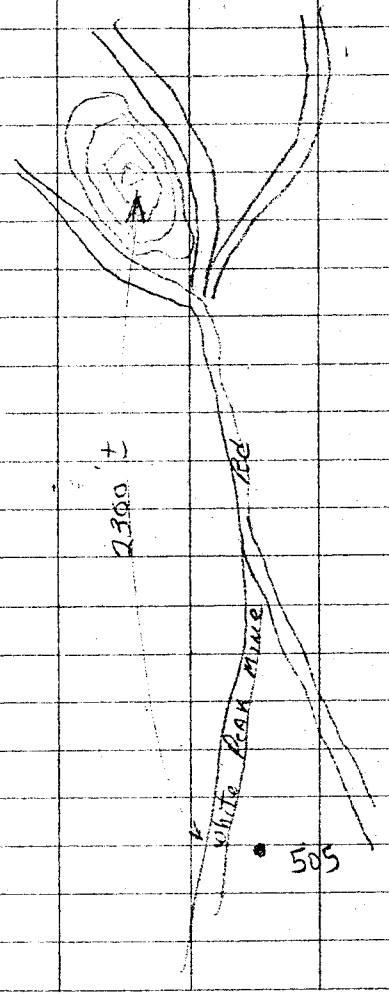
503' Fd 1/2" R.BAR with Plastic CAP
LS # 18214, Assumed N 1/4 of
Sec 24 T5N R1W
APROX 4000' South of Caterpillar
TANK →



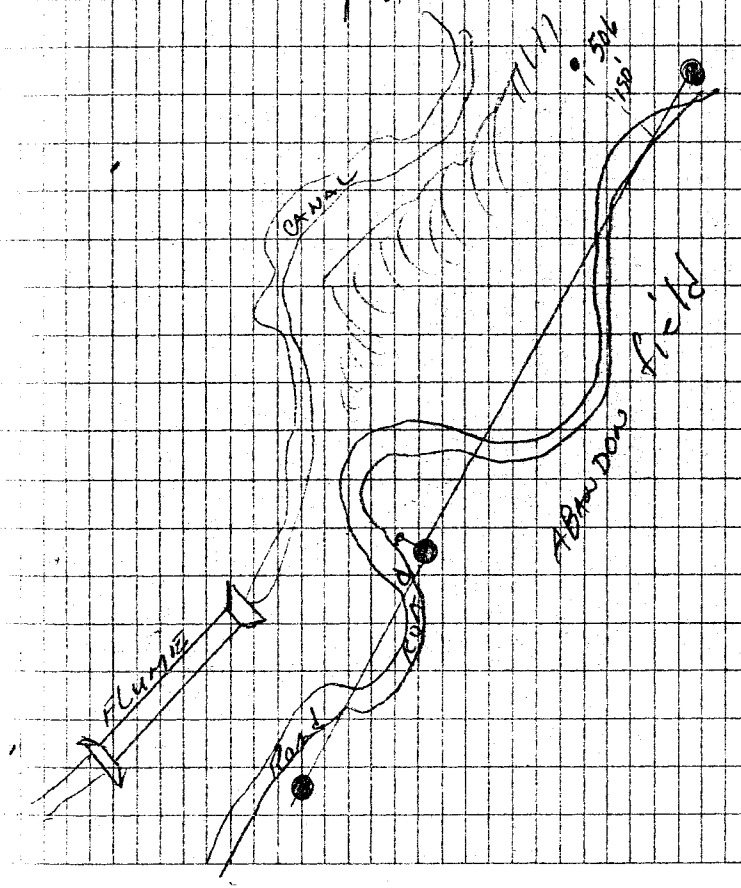
504' Set 1/2" R.B & ALUM CAP STAMPED
90-504
A set East side of Road to White Peak
MINE 55 West 300' from N 1/4 Sec 23
T5N R1W



505' Set ½" RB & Alum Cap stamped
90-505
Pt 3000 East & 400' South of
NW Cor Sec 26 T5N R1W

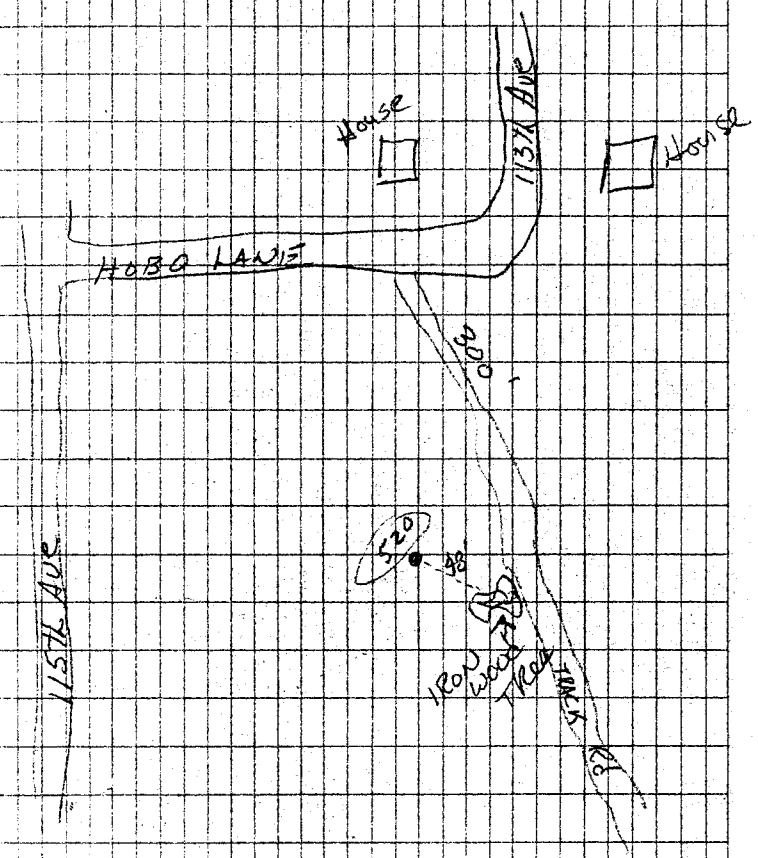


506' Set ½" RB Alum Cap stamped
90-506
Pt Approx 6000' North of
Agua Fria River xing of Tomax Rd
in SE¼ of Sec 30 T5N R1E
Approx 500' North of Sypon
Beardsley Canal.



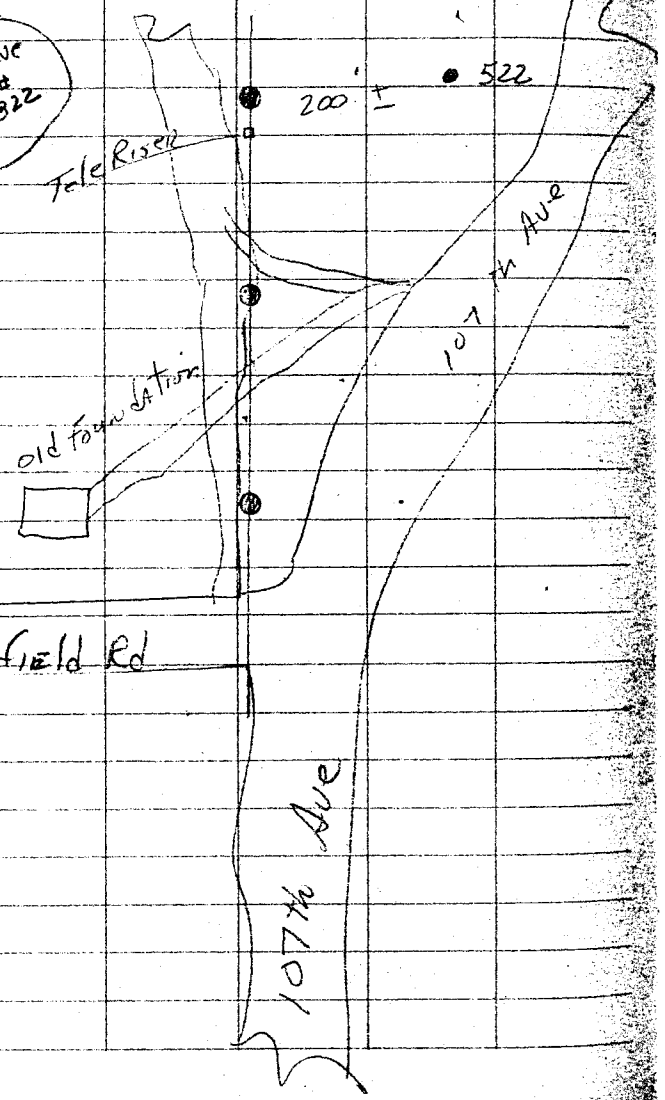
807' Fd 1/2 RB Alum cap stamped 807
(83) This Point from 1983 (Job 83022)
83 Description
Fd 1/2" RB with AMC Alum cap
100' NE of C/4 31 T5N R1E
0.25 ABOVE Ground
500± S of Dirt Road to west
AQUA DUCT of Beardsley Canal
C 1/4 31 has 3' BASE CAIN
on west side
C 1/4 is Brass Cap on 3" IP.

520' Fd 1/2" RB Alum cap stamped
520 (AMC 1983 Job 83022)



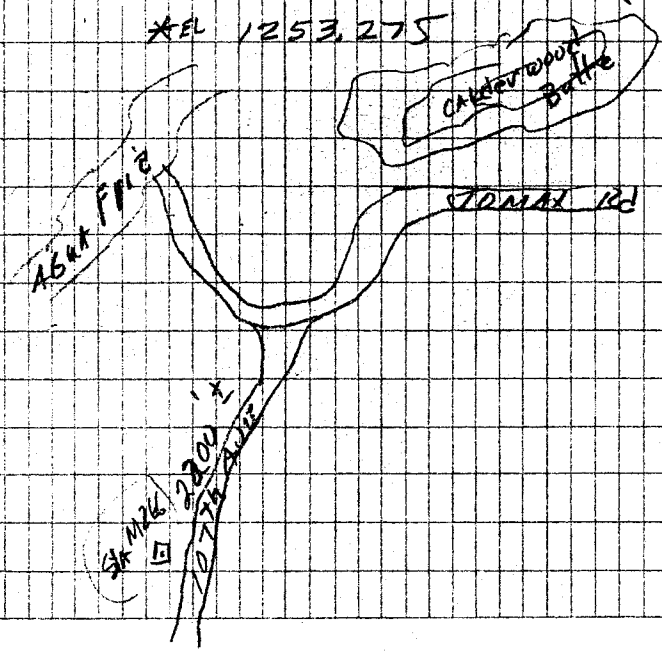
522' Fd 1/2" R.B & Alum Cap
Stamped 522 From 1983
AMC Job 83022

Note Also have
CONTROL # 822

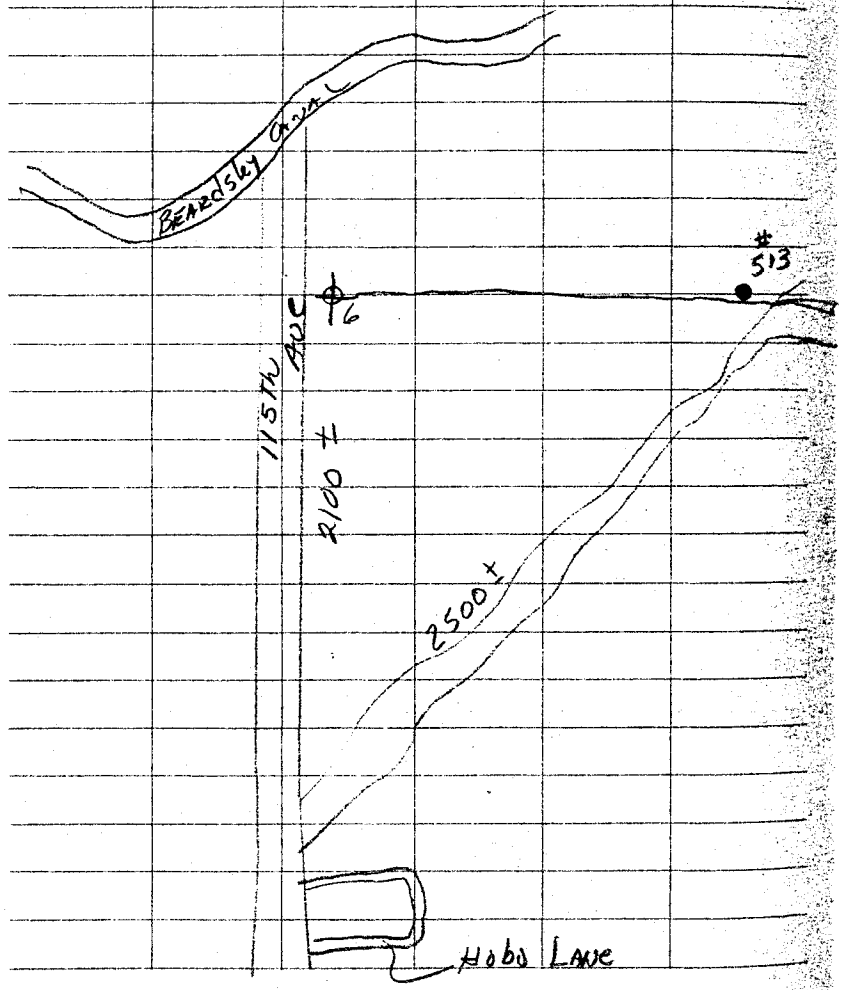


512' Fd BC STAMPED 16/2 Cor
Sec 7 T 4 R 1E
1.79' out of Ground

519' = USCGS BC in Concrete Post
(1983 Job) No M 266 1948
Quad 331121 Line 101
0.35 About Pnk
*EL 1253.275

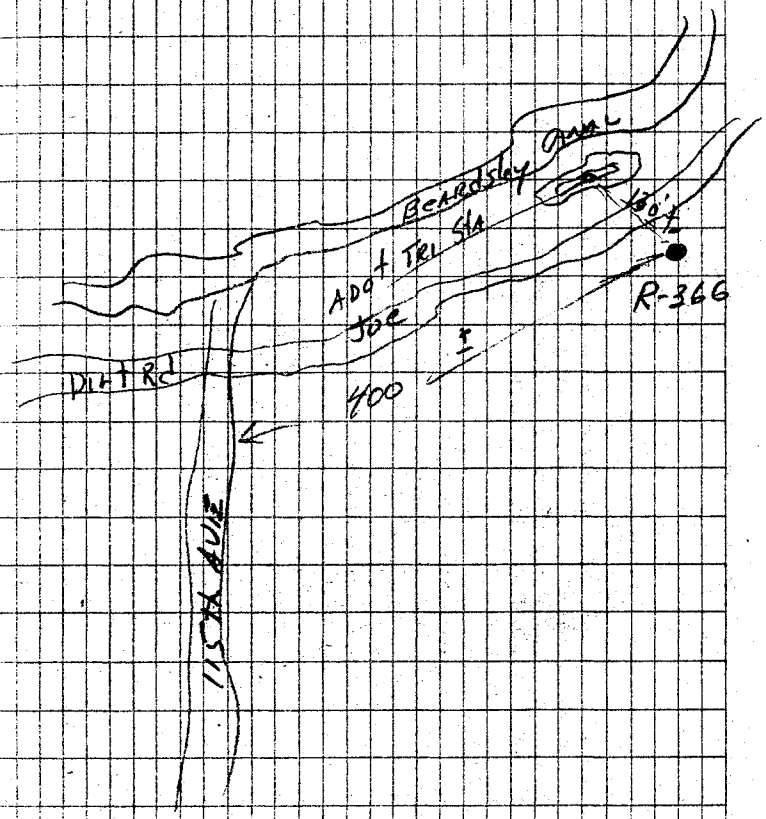


513 SET 1/2" Rebar & Alum Cap
APROX 1900' EAST OF the
NW COR of Sec 6 T4N R1E
STAMPED 90-513



(6)

514 USC&GS BM R-366
BC set in side 6" steel
Pipe.



890 ✓ Fd 60P NAIL ON BLACK
X Section H.11 1000'± SW Center Sec 23
control T5N R1W
Control Pt for X Section
NOTE ALSO Sketch Pg 11

ERM BM ↑ 266 USC&G BC
(508) ✓ IN SW Head wall of
Flume Beardsley Canal
Located in South Portion
of Sec 34 T5N R1W

537 ✓ ERM ROW MARK South side of
Cap Canal Alum Cap set in
Concrete APPROX 1000 NNW of
WELL in SW 1/4 Sec 14 T5N R1W
AT FENCE COR 250± SOUTH OF RW
MARK 479+50 125 Rt (ROW)

536 ✓ ERM Dept of Interior BC in
Concrete Sta 479+50 125' RT (ROW)
CAP CANAL

USBR

535 ERM Dept of Interior BC
STA 470+59.78 125' Rt
CAP Canal

538 ERM Dept of Interior BC
CAP STA 504+95.47
125' Rt (ROW)

539 ERM Dept of Interior BC
CAP STA 510+00.07
125' Rt (ROW)

549 ERM Dept. of Interior BC
Cor Sec 14 T5N R1W

551 Fd BC on 3/4" I.P. E1/4 Sec 12 T4N R1W
Set By AZ Pub. Sec Co.

552 USBR Set in Concrete
900'± South of CAP Canal
East side of Caterpillier
Tank Road.

548 ERM Dept of Interior BC
CAP. STA 517+11.90
125' RT (ROW)

545 ERM Dept of Interior BC
CAP. STA 521+99.28
125 RT (ROW)

546 ERM Dept of Interior BC
CAP STA 527+19.57
125' RT (ROW)

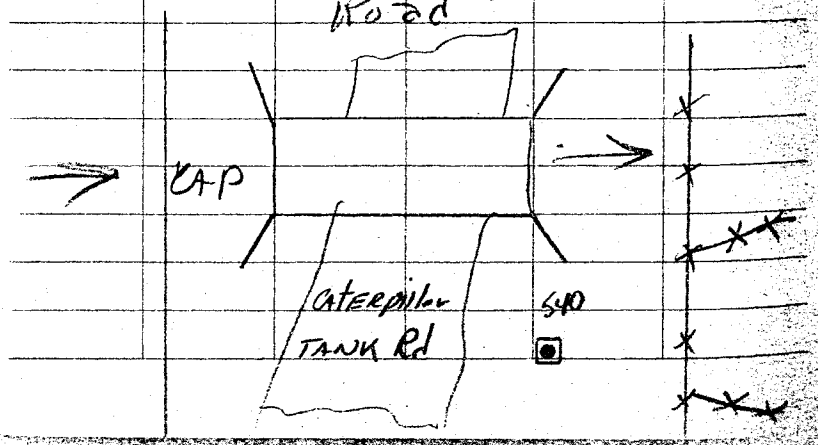
545 ERM Dept of Interior BC
CAP STA 538+00
125' RT (ROW)

543 ERM Alum Cap 5/8" RB
NE 1/4 Sec 14 T3N R1W

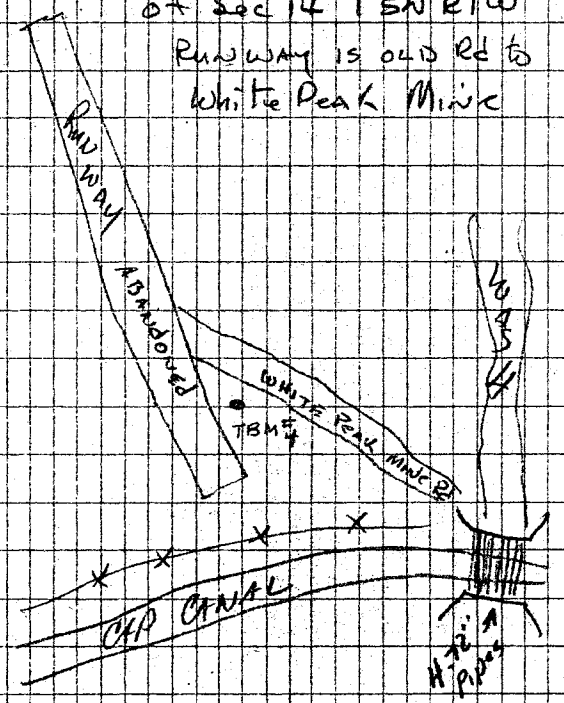
542 ✓ ERM Dept of Interior BC
CAP Sta 541+00.04
125' Rt (ROW)

541 ✓ ERM Dept of Interior BC
CAP Sta 546+37.38
125' Rt (ROW)

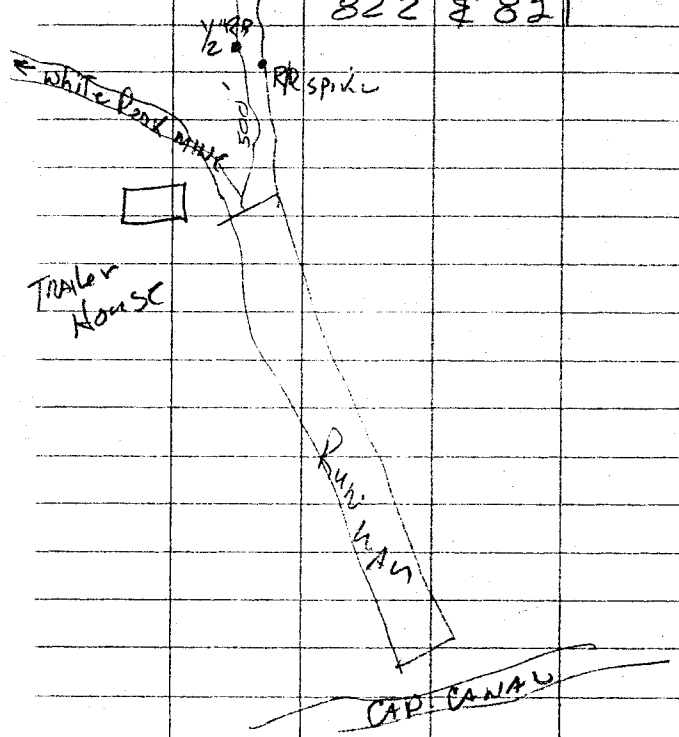
540 ✓ ERM Dept of Interior BC.
Cap stamped 19° Lt
62' South of Bridge
over CAP Canal
on Caterpiller Tank
Road -



TBM #4 Set 1/2" RB West Portion
of Sec 14 T5N R1W
Runway is old Rd to
White Peak Mine



TBM's 1/2" RB West Side Rd
EL. TRAN for to
822 & 821

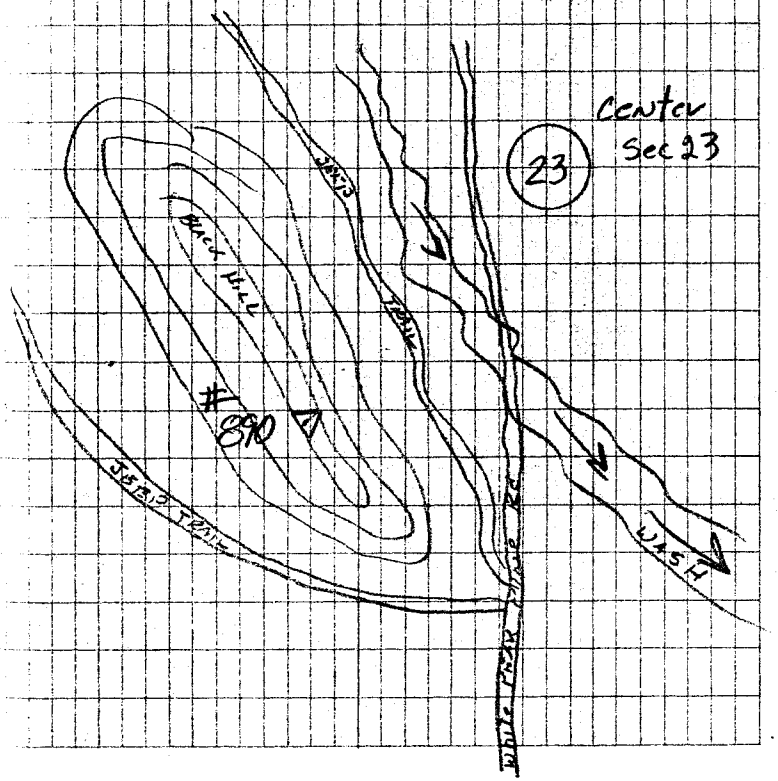


TBM's R/R Spike in East side Road
EL Transfer to 822 & 821

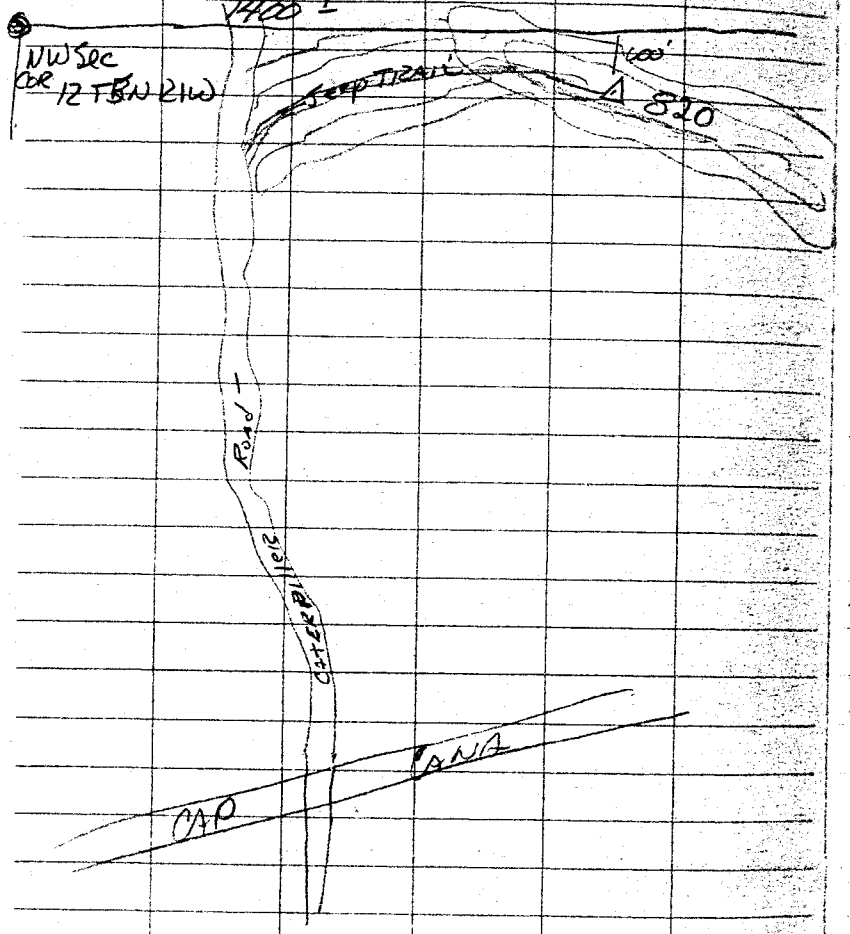
(11)

850 ERM Dept of Interior BC
CAP STA 571+54.9
125' Rt (Row)

890 60 Penney Nail in Root Low
Hill in Sec 23 SW1/4

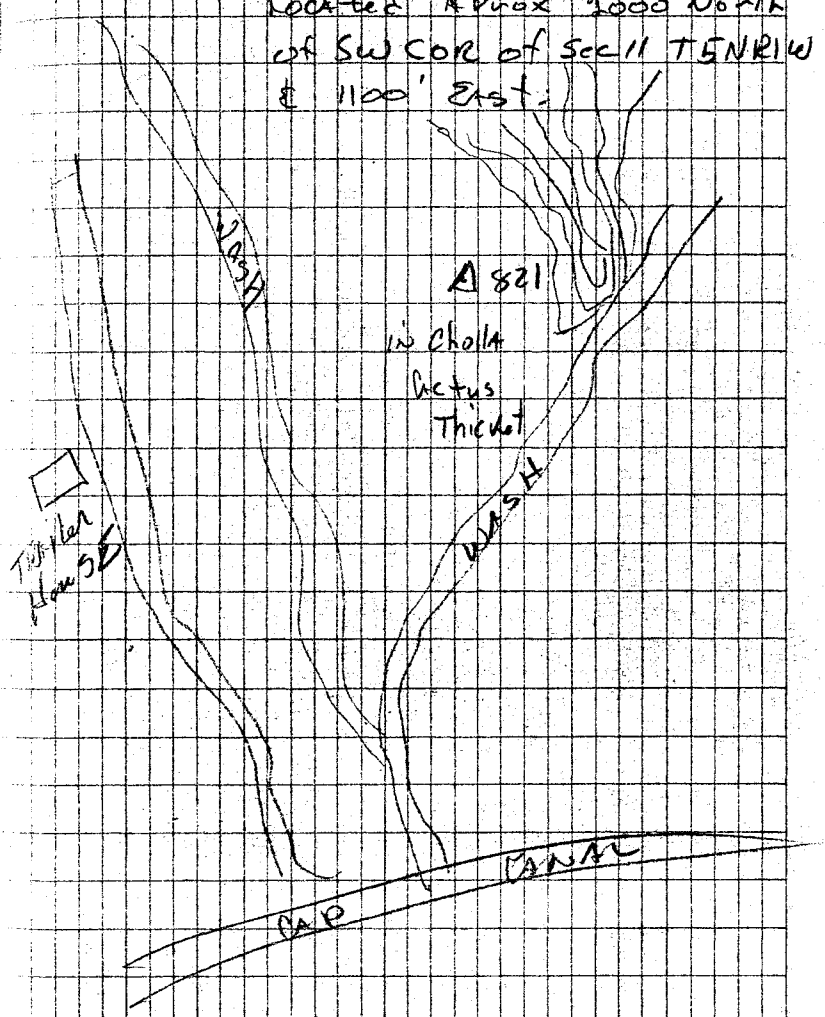


820 ✓ Set 1/2" RB Alum Cap stamped
(Note 520 (83 job)) 90 - 820

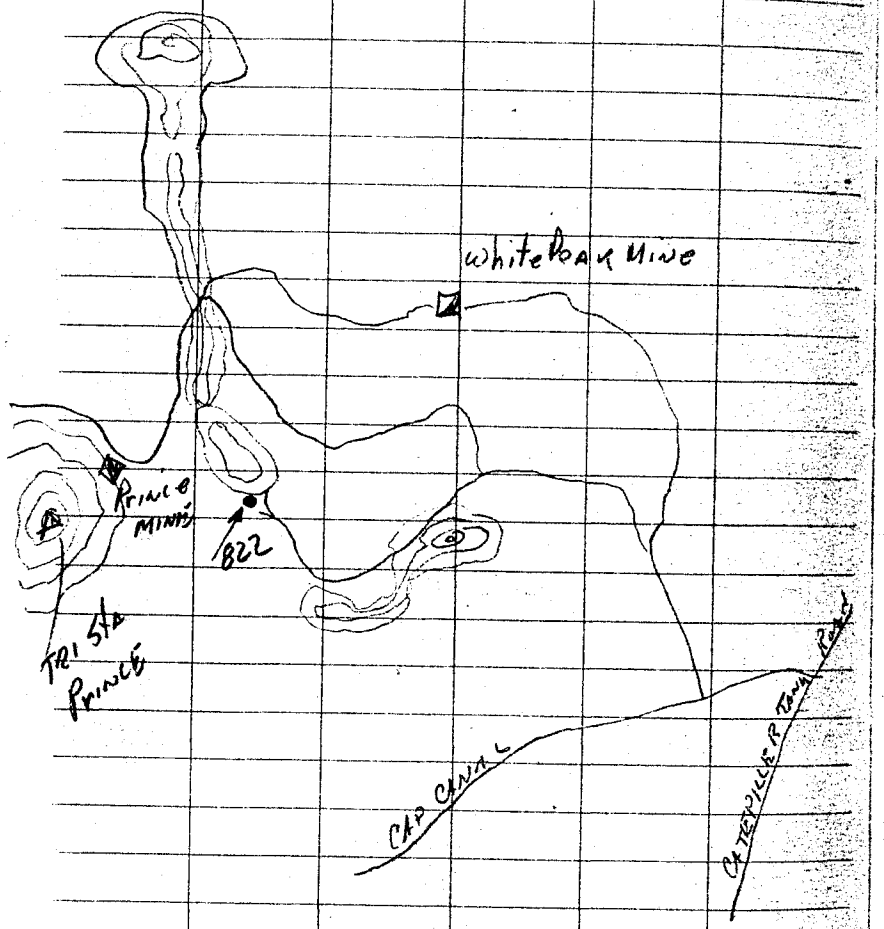


(12)

321 ✓ Set 1/2" RB & Alum Cap stamped
T.D. - 321
Located Approx 2000' North of SW COR of Sec 11 T5NR1W & 1100' East.



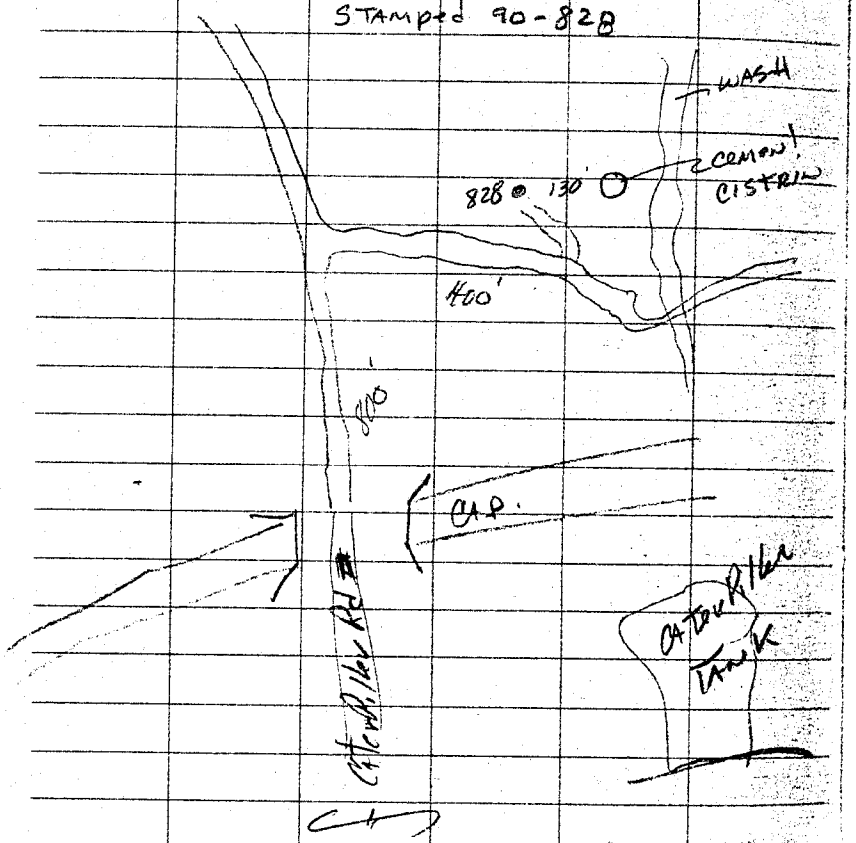
822 Set ½" RB & Alum Cap
Stamped 90-822
IN NW ¼ Sec 15 T5N R1W
ON Flat Area At end of
Road 35' SE of Mine Shaft



823 TRI STA Prince
NEAR Center Sec 16
T5N R1W

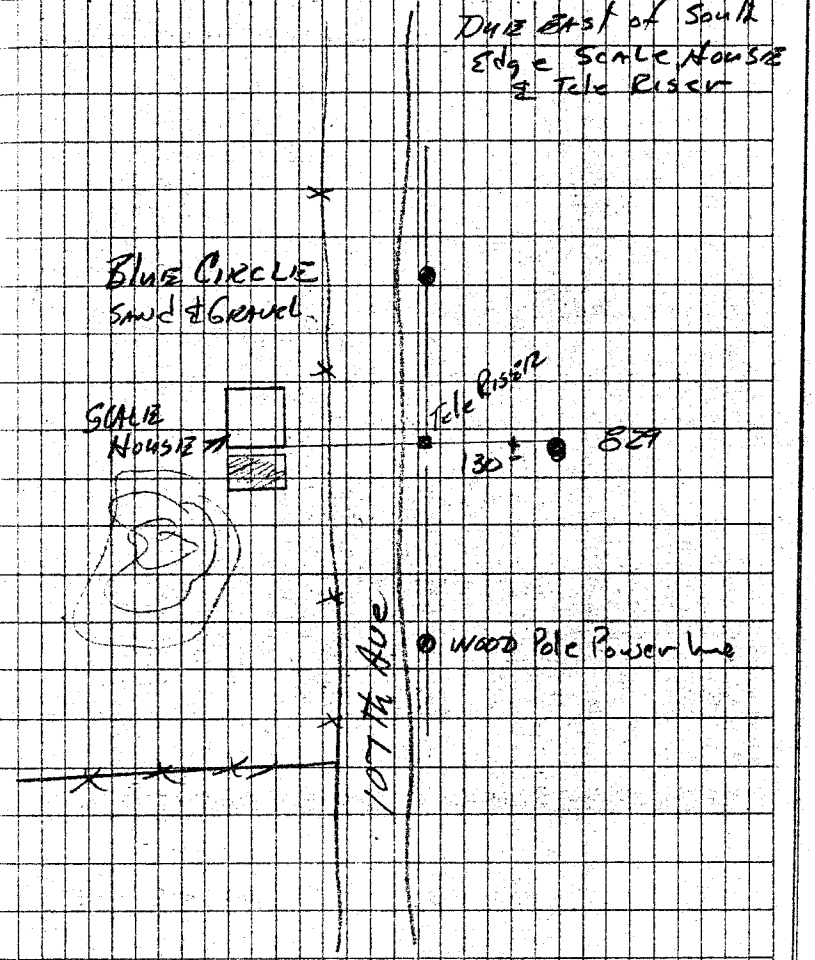
824 ADOT TRI STA
TOE ON South
BANK of Beardsley
CANAL IN SW ¼ Sec
31 T5N R1W

828 Set 1/2" RB Alum Cap. 1200'E & 500'N of The SouthWest Cor of Sec 12 T5N R1W STAMPED 90-828



1/2" RB. EL. TRANSFER is East of 828 for 820 EL. TRANSFER

829 Set 1/2 RB Alum Cap STAMPED 90-829



730 ✓ ERM GLO BC
NE COR Section 35 T5N R1W
Lies on West side of Trace
Road

CH

(ERM 533) ✓ GLO BC East 1/4 Sec 35
T5N R1W
NO Panel or Hoez

CH

ERM ✓ ~~610~~ 518 (83) # BM USC&G BC West
side Aqua Fria River
SW 1/4 Sec 32 T5N R1W
L 366

CH

ERM BM L 365 USC&G BC
Located East side of 107th
AVE SW 1/4 Sec 17 T4N R1E

732 ✓ Fd Stone NW Cor Sec 18
T4N R1E 0.26 Above Gr

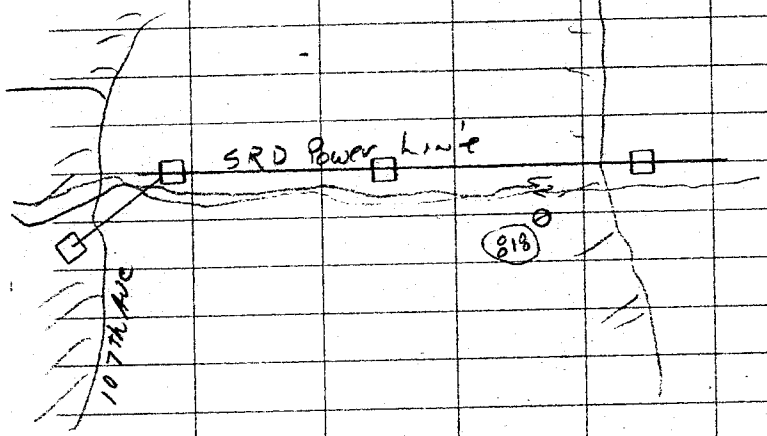
CH

731 ✓ BC HH intersection
Happy Valley Road &
Lake Pleasant Rd

CH

(ERM 534) ✓ USC&GS S-366
Located in concrete
Footer west side Caterpillar
Tank Rd & Beardsley Canal
Pt Set in Footer of Pier.

818 ✓ Set 1/2" RB - No CAP
Approx 2620 East & 1300 South
NW Cor Sec 8 T4N R1E,



903 (83) ✓ Fd 1/2" RB w/Alum Cap on The SW End of Calderwood Butte Near Petroglyfs on top of High Knob. Pmk 0.30 Below Point 12' S of North Edge of Bluff in S1/2 Sec 32 T5N R1E

544 ✓ (83) Fd PK & Bottle cap & Black top North of intersection 107th Ave & Tomax (Pg 10 T.B. 83 022)

733 ✓ Glo BC NE Cor Sec 25 T5N R1W
Panel No Vent or Horz Control

734 ✓ NE COR Sec 23 T5N R1W
GLO B.C.
PANEL No Vert or Horz

735 ✓ NE COR Sec 22 T5N R1W
GLO BC
PANEL No Vert or Horz

736 ✓ NW COR Sec 6 T4N R1E
GLO BC
PANEL No Vert or Horz

826 ✓ Fd USC&GS B.C. in Stone Per Published Descrip
LOCATED NE 1/4 Sec 30
T5N R1E

827 ✓ Set 1/2 RB w/ALUM CAP
100' EAST ± 200 South
of N 1/4 COR of Sec
25 T5N R1W

825 ✓ ADOT A STA MAC
on EAST End of
DIKIE, McMicken outlet
channel NW Sec 11 T4N R1W

891 Set 1/2" RB. & Panel
600' ± West of NE COR
of Sec 24 T5N R1W
Set For X Sections only
NO VALUES on PA.

Sta	HI	R@	RH	T/P	PPM/%
828	4.92	850	9.15	82/29.4	14/65
D	90	55	41		
R	269	04	56		
M =	90	55	22.5	✓	

R@ E. most Dot BC

007	F	2214.631	
020	F	2214.602	2214.3342
003	M	675.021	

.2225

		T @ 828			
820	P	00	00	30	35
	R	180	00	40	
BC (850)	D	138	43	52	52
Bot I SIB CHD	R	318	43	52	
			CM		
	D	45	02	30	25.5
	R	225	02	21	
	D	183	45	44	40
	R	003	45	36	
			CM		
	D	90	05	30	28
	R	270	05	26	
	D	228	48	44	39.5
	R	48	48	35	
			CM		
	D	135	07	30	27.5
	R	315	07	25	
	D	273	50	46	43.5
	R	93	50	41	

17.0 ✓

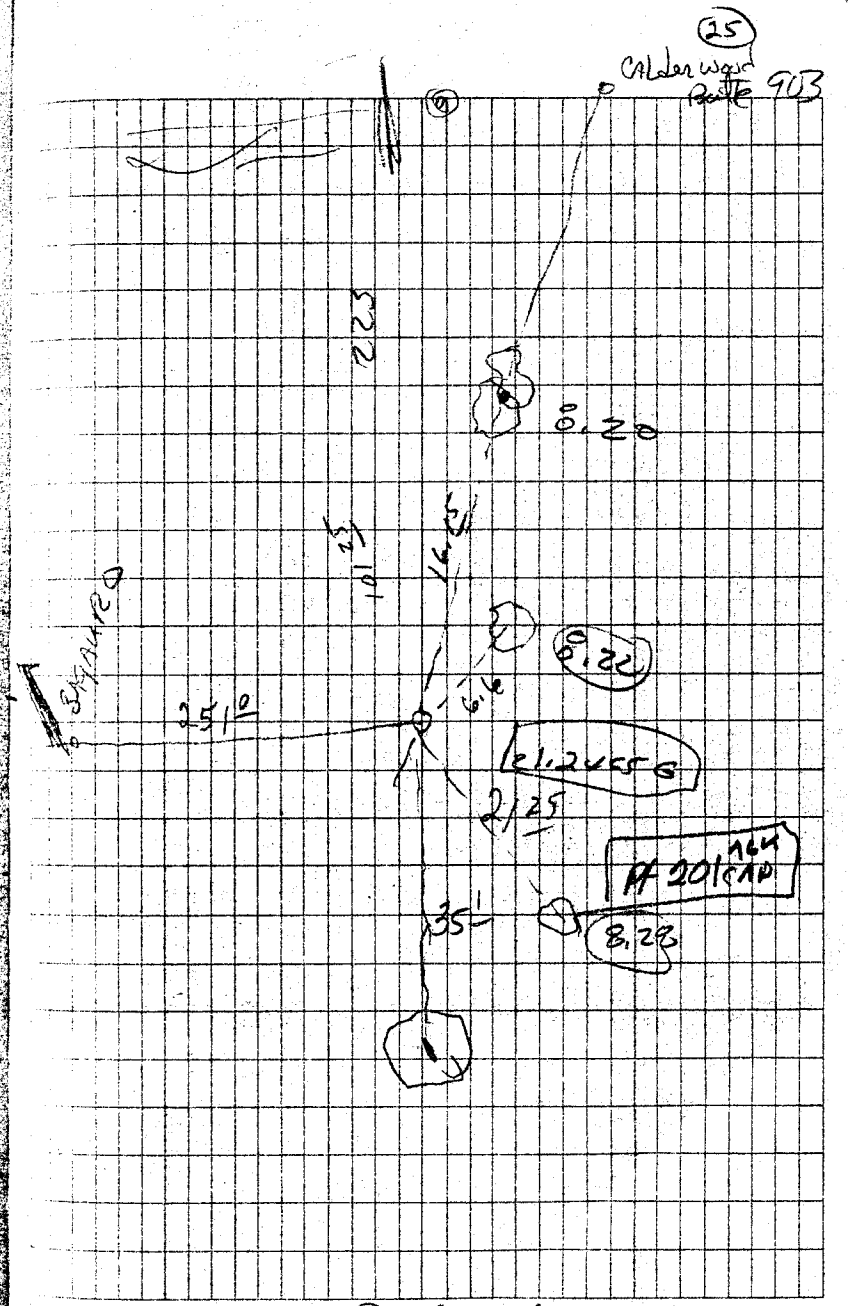
14.5 ✓

M = 188° 43' 14.75"

11.5 ✓

16.0 ✓

		π	Sec Cor	
903	00	00	00	
	180	00	00	
16.15	00	00	00	
	180	00	00	
6.6	20	38	32	
	200	38	32	
2125	147	18	50	
	327	18	50	
35¼	173	31	09	
	353	31	09	
251 00	249	26	57	
	69	26	57	
101 25	335	15	27	
small Basin				



Picture Point at Rock Sec Cor

		1 @ Joe 824			
903 D	00	00	30		27.0
R	180	00	24		
818 D	43	54	13		13.0
Powerline R	223	54	13		
D	45	02	30		22.0
R	225	02	24		
D	88	56	09		08.5
R	268	56	08		
D	90	05	30		32.5
R	270	05	35		
D	133	59	13		18.5
R	313	59	24		
D	135	07	30		33.0
R	315	07	36		
D	179	01	15		18.0
R	359	01	21		

46.0

41.5

M = 43° 53' 44.625"

46.0

45.0

STA	HI	R@	RH	T/P	DPM/
820	4.85	offset 8290	4.92	70/29.3	+12/65
D	91	05	41		
R	268	54	37		
M	91	05	32	✓	
828	5.12	820			
Offset D	88	54	46		Rec
0°/R	271	05	45		
Tgt 6 m	88	54	30.5		
824 JOE	4.80	POWER LINE 818	4.91		
D	90	16	36	80/29.6	+13/50
TGT 6.90 R	269	43.	57		
m	90	16	19.5	✓	
818 P.L.	5.11	~~824~~ JOE			Rec
D	89	44	56		
TGT 6.0 R	270	15	39		
m	89	44	38.5	✓	

013	F	4467.814	.906		
009	F	4467.907			4467.0977
002	M	1361.813			
013	F	11036.584	.3745		
013	F	11036.565			11036.4501
007	M	3363.962			

		A @ 822			
820 D	00	00	30		31.5
R	180	00	33		
821 D	01	23	54		56.5
R	181	23	59		
D	45	02	30		32.0
R	225	02	34		
D	46	25	56		57.5
R	226	25	59		
D	90	05	30		33.0
R	270	05	36		
D	91	28	55		57.5
R	271	29	00		
D	135	07	30		33.5
R	315	07	37		
D	136	30	58		58.5
R	316	30	59		

25.0

25.5

M = 1° 23' 25.00"

24.5

25.0

Sta	HI	RO	RH	T/P	Plan %
"L" 6.0	5.43	821	5.10		
R/R D	89	54	45		RECIP
R	270	05	35		
M	89	54	35 ✓		
		CH			
L	5.43	822			
R/R D	86	23	19		Recip
Tgt 6.0 R	273	36	58		
M	86	23	10.5 ✓		
		CH			
✓ "H" ½"RB	4.70	821	5.10		Recip
½"RB D	89	56	26		
R	270	03	58		
M	89	56	14 ✓		
		CH			
✓ "H" ½"RB	4.70	8.22			Recip
½"RB D	86	22	36		
Tgt 6.0 R	273	37	51		
M	86	22	22.5 ✓		
		CH			
824	4.80	828			Recip
D	89	28	13		
Tgt 6.0 R	270	32	03		
M	89°	28'	05" ✓		

STA	HI	RO	TH	Temp/P	PPM/%
822	5.03	2" RR	5.23	66/29.1	+11/60
D	93	36	54		
R	266	23	17		
M	93	36	48.5	✓	
822	5.03	821	5.10	66/29.1	+11/50
D	92	00	24		
R	267	59	53		
M	92	00	15.5	✓	
822	5.03	'H 1/2" RR	8.55	66/29.1	+11/60
D	93	33	20		
Tot 8.55' R	266	26	48		
M	93	33	16	✓	
824	5.04	826			
D	88	55	55		
Tot 6.00 R	271	04	15		Reopoint
M	88	55	50'		

(30)

007	F3363.343		
000	F3363.358	.3579	3357.5596
000	M1025.152		
013	F5944.951		
003	F5944.869	.8844	5941.2473
000	M1812.001		5940.2747
020	F3331.906		
010	F3331.925	.9187	3326.2875
004	M1015.573		

STA	HI	RQ	RH	T/P	RDM %
821	4.44	" L" R/R	5.23	65/293	+9/64
D	90	05	30		
R	269	54	45		
M	90	05	22.5		
821	4.44	" H" ½" R/R	8.55	65/293	/80
D	89	58	28		
R	270	01	46		
M	89	58	21		
821	4.44	822			
D	87	59	47		
6.0 R	272	00	25		Recip
TGT M	87	59	41		
824	5.00	825			
D	90	14	35		
TGT R	269	45	32		Recipt
6.00 M	90°	14'	31.5"		

000 F	2617.304			
000 F	2617.275	.2893		2617.2843
000 M	797.754			
003 F	2646.887			
007 F	2646.881	.8852		2646.8849
002 M	806.770			

CURVE FORMULAS

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

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

$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$

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

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

$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$

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

..chords $= \frac{I}{D}$

..def. $= \frac{1}{2}$ chord def.

The square o ... e radius, will equal the distance from

To find angle ... (def. for 1° for 1 ft.)

Rule 1. Mul ... divide the product by and divide given

Rule 2. Mul ... e. Multiply the angle the given distanc

To find defle ... by .01745, and th

RIGHT ANGLE ... divide by twice the base. Add quoti

Given Base ... =100.5 hyp.

Given Hyp. ... 3.125 = 96.875 = Base.

... .045.

To find Ton ... ltiply weight per yard by 11, and divi

LEVELING. ... d refraction, in feet and decimals of ... the distance in miles. The correction f ... The combined correction is negati

PROBABLE E ... screpancies of various results from the ... squares of these differences and n=th ... probable error of the mean = ±0.674

T. MERCATOR - ARIZONA CENTRAL

	LATITUDE	LONGITUDE	NORTHING	EASTING
	33 44 42.858	112 19 46.299	988,700.000	374,501.000
	0 13 45.646 CONVERGENCE		0.9999180 SCALE FACTOR	
	1710.000 ELEVATION		0.9998363 GRID FACTOR	

90 138

1'	.0167	11	
2	.0333	12	
3	.0500	13	
4	.0667	14	
5	.0833	15	
6	.1000	16	
7	.1167	17	
8	.1333	18	
9	.1500	19	
10	.1667	20	

GREE

11'	.6833	51'	.8500
12	.7000	52	.8667
13	.7167	53	.8833
14	.7333	54	.9000
15	.7500	55	.9167
16	.7667	56	.9333
17	.7833	57	.9500
18	.8000	58	.9667
19	.8167	59	.9833
20	.8333	60	1.0000

OOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Elan Publishing Co., Inc., Meredith, N.H. 03253

Sept 1990

Bill Barbee

Don May

Book 5 Control

Job No. 90138

CAP Overshoots FCO 90-09

Book #5

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6	824	828	820	
7	828	820	822	
8-9	822	823	826	
	822	823	825	
10	820	822	823	
11	—	—	—	
12-13	823	825	826	
	823	825	824	
	823	825	903	
14-	903	826	824	
	903	826	825	
	903	826	827	
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	BS	TO	FS		
23	732	903	824		
	Measurements				
	From		to		
24	903		824	Recipical ∡	
	903		826	"	"
	731		903	"	"
	829		903	"	"
	732		903	"	"
25	826		824	Dist	
	826		903	"	
	903		731	"	
	903		829	"	
	903		825	Recipical ∡	
26	825		826	"	"
	825		823	"	"
	827		826	"	"
	826		827	Dist	
	903		732	"	
27	823		825	"	
	823		822	"	
	822		823	Recipical ∡	
	825		903	Dist	
	825		824	"	

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	From	To	
28	730	824	Recipical ∡
	730	826	" "
	828	820	
	820	828	Dist
	822	820	Recipical ∡
29	824	903	Dist
	824	730	"
	828	824	"
	820	822	"
	824	828	Recipical ∡

				⊼ @ 824 (Joe)		
730	D	00	00	30		29.0
	R	180	00	28		
826	D	66	40	51		56.0
AGUA	R	246	41	01		
807	D	96	45	20		21.5
	R	276	45	23		
903	D	137	00	21		18
	R	317	00	15		
825	D	282	21	26		26
MAC	R	102	21	26		
		45	02			

①

27.0

52.5

M = 66° 40' 31.25"

M = 96° 44' 59.375"

49.0

M = 136° 59' 56.125"

M = 282° 21' 03.75"

58.0

		T@ 824 Cont			
D	45	02	30		35.5
R	225	02	41		
D	111	43	00		04.5
R	291	43	09		
D	141	47	33		36.5
R	321	47	40		
D	182	02	27		34.5
R	2	02	42		
D	327	23	40		42.5
R	147	23	45		

29

01.0

57.0

07.0

		1 824 cont			
D	90	05	30		37.0
R	270	05	44		
		1			
D	156	46	10		13.0
R	336	46	16		
D	186	50	36		40.5
R	06	50	45		
D	227	05	32		36.0
R	47	05	40		
D	12	26	39		45.5
R	192	26	50		

30

03.5

59.0

08.5

		TC 824 Cont			
D	135	07	30		31.0
R	315	07	32		
D	201	48	02		04.0
R	21	48	06		
D	231	52	27		31.5
R	51	52	36		
D	272	07	24		28.5
R	92	07	33		
D	57	28	30		33.5
R	237	28	37		

33.0

00.5

57.5

02.5

		AQ 730			
826 D	00	00	30		33.5
R	180	00	37		
824 D	71	52	07		08.5
R	251	52	10		
		LH			
D	45	02	30		30.5
R	225	02	31		
D	116	54	01		06.0
R	296	54	11		
		LH			
D	90	05	30		32.0
R	270	05	34		
D	161	57	13		09.5
R	341	57	06		
		LH			
D	135	07	30		34
R	315	07	38		
D	206	59	06		07.5
R	26	59	09		

35.0

35.5

M=71° 51' 35.375"

37.5

33.5

		T @ 828			
824 D	00	00	30		30.0
R	180	00	30		
820 D	192	06	55		58.0
R	12	07	01		
		LH7			
D	45	02	30		30.5
R	225	02	31		
D	237	09	00		00
R	57	09	00		
		LH7			
D	90	05	30		30.5
R	270	05	31		
D	282	11	57		59.5
R	102	12	02		
		LH7			
D	135	07	30		33.5
R	315	07	37		
D	327	14	04		04.0
R	147	14	04		

28.0

29.5

192° 06' 29.25"

29.0

30.5

		T @	870		
828 D	00	00	30		31.0
R	180	00	32		
822 D	61	30	38		36.5
R	241	30	35		
		LH			
D	45	02	30		32.0
R	225	02	34		
D	106	32	35		36.0
R	286	32	37		
		LH			
D	90	05	30		34.0
R	270	05	38		
D	151	35	33		37.0
R	331	35	41		
		LH			
D	135	07	30		32.0
R	315	07	34		
D	196	37	35		36.0
R	16	37	37		

05.5

04.0

M = 61° 30' 04.125'

03.0

04.0

			823 To PRINCE		
822 D	00	00	30		30.0
R	180	00	30		
Aqua D	50	31	39		39.5
826 R	230	31	40		
MAC D	99	06	03		03.0
825 R	279	06	03		
D	45	02	30		36.0
R	225	02	42		
D	95	33	43		47.5
R	275	33	52		
D	144	08	03		03.0
R	324	08	03		
~~D~~	~~90~~	~~05~~	~~30~~		
~~R~~					
~~D~~					
~~R~~					

09.5

33.5

M = 56° 31' 11.25"

M = 99° 05' 30.625

11.5

27.0

823

		Π Prince		Con't	
D	90	05	30		30.0
R	270	05	30		
D	140	36	41		43.0
R	320	36	45		
D	189	11	02		02.0
R	9	11	02		
D	135	07	30		31.0
R	315	07	32		
D	185	38	42		42.0
R	5	38	42		
D	234	13	00		01.0
R	54	13	02		

13.0

32.0

11.0

30

		T @ 822			
820 D	00	00	30		29.5
R	180	00	29		
PRINCE D	178	29	03		03.5
823 R	358	29	04		
		CH			
D	45	02	30		30.0
R	225	02	30		
D	223	31	10		09.0
R	43	31	08		
		CH			
D	90	05	30		31.5
R	270	05	33		
D	268	34	15		17.0
R	88	34	19		
		CH			
D	135	07	30		31.5
R	315	07	33		
D	313	36	10		09.5
R	133	36	09		

34.0

39.0

M = 178° 28' 36.625"

35.5

38.0

		T @ MAC			
PRINCED	00	00	30		
R					
D					
JOE R					
		LM			
D	45	02	30		
R					
D					
R					
		LM			
D	90	05	30		
R					
D					
R					
		LM			
D	135	07	30		
R					
D					
R					

		Ka	825 M+C		
PRINCE	D	00	00	30	32.5
823	R	180	00	35	
Aqua	D	54	58	20	25.0
826	R	234	58	30	
Joe	D	71	58	16	20.5
824	R	251	58	25	
903	D	85	00	50	53.5
	R	265	00	57	
			C+7		
	D	45	02	30	32.5
	R	225	02	35	
	D	105	00	23	28.0
	R	280	00	33	
	D	117	00	22	25.5
	R	297	00	29	
	D	130	02	54	56.5
	R	310	02	59	

52.5

48.0

M = 54° 57' 54.25"

21.0

M = 71° 57' 51.50"

M = 85° 00' 22.50"

55.5

53.0

24.0

Ro Mac Cont

D	90	05	30		33.5
R	270	05	37		
D	145	03	26		25.5
R	325	03	25		
D	162	03	23		26.5
R	342	03	30		
D	175	05	54		56.0
R	355	05	58		
		47			
D	135	07	30		34.5
R	315	07	39		
D	190	05	26		31.5
R	10	05	37		
D	207	05	21		26.5
R	27	05	32		
D	220	07	55		57.0
R	40	07	59		

52.0

53.0

22.5

57.0

52.0

22.5

			T @ 824		
903	D	00	00	30	29.5
	R	180	00	29	
	m				
824	D	39	14	47	45.5
	R	219	14	44	
	m				
MAC	D	57	55	11	16.0
825	R	237	55	21	
	m				
827	D	112	14	43	44.5
	R	292	14	46	
	m				
PRINCE	D	134	23	05	06.5
823	R	314	23	08	
	m				

16.0 ✓

m = 39° 14' 13.125"

46.5 ✓

m = 57° 54' 45.125"

15.0 ✓

m = 112° 14' 11.25"

37.0 ✓

m = 134° 22' 35"

			826 Cont		
D	45	02	30		29.0
R	275	02	28		
D	84	16	45		42.5
R	264	16	40		
D	102	57	14		14.0
R	282	57	14		
D	157	16	36		38.0
R	337	16	40		
D	179	25	04		07.0
R	359	25	10		

13.5 ✓

45.0 ✓

09.0 ✓

38.0 ✓

A 826 Con't

D	90	05	30		29.5
R	270	05	29		
D	129	19	40		39.5
R	309	19	39		
D	148	00	14		14.5
R	328	00	15		
D	202	19	42		41.0
R	22	19	40		
D	224	28	00		00.0
R	44	28	00		

10.0

45.0

11.5

30.5
~~40.5~~

T 326 Cont

D	135	07	30		28.0
R	315	07	28		
D	174	21	39		42.0
R	354	21	45		
D	193	02	12		13.0
R	13	02	14		
D	247	21	36		38.5
R	67	21	41		
D	269	30	02		03.5
R	89	30	05		

13.0 ✓

44.0 ✓

09.5 ✓

34.5 ✓

824

			↑ @ JOE		
MAC	D	00	00	30	26.0
825	R	180	00	22	
828	D	116	51	59	03.0
	R	296	52	07	
			LM		
	D	45	02	30	31.5
	R	225	02	33	
	D	161	54	02	05.0
	R	341	54	08	
			LM		
	D	90	05	30	25.0
	R	270	05	20	
	D	206	57	02	01.0
	R	26	57	00	
			LM		
	D	135	07	30	29.0
	R	315	07	28	
	D	251	59	00	58.0
	R	71	58	56	

37.0

33.5

M = 116° 51′ 33.875″

36.0

29.0

			T@ 903			
MAC	D	00	00	30		31.5
825	R	180	00	33		
Joe	D	21	36	45		46.5
824	R	201	36	48		
807	D	48	05	18		19.5
	R	228	05	21		
826	D	92	03	20		21.0
AGUA	R	272	03	22		
731	D	264	17	40		41.0
	R	84	17	42		
829	D	303	41	34		35.5
	R	123	41	37		

15.0 ✓

m = 21° 36' 17.25"

48.0 ✓

m = 48° 04' 48.25"

49.5 ✓

m = 92° 02' 49.625"

09.5 ✓

m = 264° 17' 10"

04.0 ✓

m = 303° 41' 04.5"

			T 903	CONT		
MAC	D	45	02	30	30 34.0	31.0
825	R	225	02	32	38	34 ✓
JOE	D	66	38	53	50 51.5	53.0
824	R	246	38	53	53	51.5 ✓
807	D	93	07	19	19 20.0	22.0
	R	273	07	25	21	20 ✓
AQUA	D	137	05	27	23 24	26.0
826	R	317	05	25	25	24 ✓
731	D	309	19	47	41 43.5	48.0
	R	129	19	49	46	43.5 ✓
829	D	348	43	42	34 35.5	46.0
	R	168	43	50	37	35.5 ✓

~~22.0~~
17.5 ✓
~~51.0~~
46 ✓
~~55.0~~
50 ✓
~~17.0~~
9.5 ✓
~~15.0~~
1.5 ✓

			T @ 903	CONT		
MAC	D	90	05	30		33.5
825	R	270	05	37		
JOE	D	111	41	50		53.0
824	R	291	41	56		
807	D	138	10	20		22.5
	R	318	10	25		
826	D	182	08	22		22.5
AQUA	"	2	08	23		
731	D	354	22	40		43.5
	R	174	22	47		
829	D	33	46	43		43.5
	R	213	46	44		

19.5

49.0

49.0

10.0

10.0

			π @ 903	Cont		
MAC	D	135	07	30		31.5
825	R	315	07	33		
[illegible]E	D	156	43	47		48.5
824	R	336	43	50		
807	D	183	12	19		21.5
	R	3	12	24		
806	D	227	10	20		21.5
[illegible]	R	47	10	23		
731	D	39	24	43		42.5
	R	219	24	42		
829	D	78	48	34		34.0
	R	258	48	34		

17.0

50

50

11.0

02.5

		π @ 903			
NW Cor 732	D	00	00	30	32.0
	R	180	00	34	
JOE 824	D	54	14	24	26.5 ✓
	R	34	14	29	
			L41		
	D	45	02	30	30.5 ✓
	R	225	02	31	
	D	99	16	27	28.0 ✓
	R	279	16	29	
			L41		
	D	90	05	30	31.0 ✓
	R	270	05	32	
	D	144	19	30	30.0 ✓
	R	324	19	30	
			L41		
	D	135	07	30	32.0 ✓
	R	315	07	34	
	D	189	21	38	35.0 ✓
	R	9	21	32	

54.5 ✓

57.5

M = 54° 13' 58.25" ✓

59 ✓

03.0

914		H1	RQ	RH	T/P	AM/Tc
903		5.02	Joe (824)			
	D	90	49	18		
6.00	R	269	11	22		Recip
	M	90	48	58		
903		5.02	Figur (826)			Recip
	D	89	28	58		
6.00	R	270	31	40		
	M	89	28	39"		
731		5.65	903			
	D	88	59	25		Recip
8.00	R	271	01	24		
	M	88	59	00.5		
829		5.25	903			
	D	88	52	22		Recip
8.00	a	88	52	24 23		
	R	271	08	08		
	R	271	08	06 07		
M		88	52	08		
732		481	903			Recip
	D	89	02	21		
8.00	R	270	58	07		
	M	89°	02'	07"		

STA	H'	R@	RH	T/P	ppm/%
826	4.92	824	4.25	90/29.6	19/70
D	91	04	33		
8.50 R	268	56	02		
M	91	04	15.5		
		CD			
826	4.92	903	4.82	90/29.6	19/70
D	90	32	19		
R	269	28	30		
TGTA M	90	31	54.5		
		CD			
903	5.02	731	5.46	78/29.6	13/65
D	91	01	15		
R	268	59	03		
5.46 M	91	01	06		
		CD			
903	5.02	829	5.0	78/29.6	13/60
D	91	06	52		
9.25 R	268	53	41		
M	91	06	35.5		
		CD			
903	5.02	825 MAC			
D	90	30	15		
6.00 R	269	30	17		Recip
M	90	29	59		

010	F	10245.215	.2193	
013	F	10245.225		10,243.4296
006	M	3122.755		
000	F	10236.228	.2279	
072	F	10236.219		10,235.7870
036	M	3120.018		
013	F	7072.685	.6850	7071.5679
013	F	7072.685		
03	M	2155.761		
010	F	9972.043	.0211	9970.1503
009	F	9972.020		
002	M	3039.488		

STA		H1	RQ AQUA	RH	T/P	PPM/%
MAC 825		4.21	826			RECIP
	D	89	20	57		
Tgt 6.00	R	270	39	28		
	M	89	20	44.5		
			CH			
MAC 825		4.21	823 PRINCE			RECIP
	D	88	24	56		
Tgt 6.00	R	271	35	28		
	m	88	24	44		
			CH			
827		5.11	826			RECIP
	D	88	33	53		
827 5.11	R	271	26	56		
TGT 8.95		88	33	28.5		
Tgt 6.00	M					
GLASS 4.91			CH			
826		4.92	827	5.11	90/29.6	19/75
	D	91	24	52		
	R	268	36	01		
8.95	m	91	24	25.5		
			CH			
Tgt 903		5.20	732	4.70	80/29.6	14/60
	D	90	58	42		
	R	269	01	42		
TGT 7.19	m	90	58	30		

007	F	5469.290	2880		
018	F	5469.283			5467.6388
014	M	1667.024			
016	F	13442.764	7640		13440.8177
007	F	13442.741			
002	M	4097.356			

TC	HI	R@	RH	T/P	ppm/%
Prince 823	4.96	MAC 825	4.2	80/29.2	18/55
D	91	38	44		
R	268	21	54		
TGT 6.45 M	91	38	25		
		CM			
823 Prince	496	822	5.11	80/29.2	180/60
D	94	10	26		
TGT 5.11 R	265	50	30		
M	94	09	58		
		CM			
822	5.31	823 Prince			
D	85	50	03		
6.0 R	274	10	44		Recip.
TGT M	85	49	39.5		
		CM			
MAC 825	4.21	C.13. 903	4.55	76/29.75	11/70
D	89	31	54		
TGT 8.00 R	270	28	33		
M	89	31	40.5		
		CM			
MAC 825	4.21	Joe 824	4.25	76/29.75	11/70
D	89	46	30		
6.45 R	270	13	54		
TGT M	89	46	18		

013	F	26505.397		
072	F	26505.407	.985	26,494.5376
029	M	8078.871		
010	F	3192.359		3183.9316
010	F	3192.375	.3670	
002	M	973.034		
016	F	17323.533		17322.9310
007	F	17323.513	.5790	
003	M	5280.208		
000	F	11219.619		11219.5266
003	F	11219.596	6.57	
002	M	3419.746		

Recip Vert ⊥s

	RC	HI	RC	RH		
✓	730	4.10	824	5.04		
	D	90	05	40	✓	
TGH 6.15	R	269	55	03		Recip
	M	90	05	18.5		
✓	730	4.10	826			
	D	88	57	50		
TGH 6.0	R	271	02	51	✓	Recip
	M	88	57	29.5		
✓	828	5.23	820			
	D	88	56	32		
TGH 6.0	R	271	03	55	✓	Recip.
	M	88	56	18.5		
✓	820	5.20	828	5.03	85/29.35	19/60
	D	91	04	21		
	R	268	56	25	✓	
	M	91	03	58		
✓	822	5.07	820			
	D	90	50	03	✓	RECIP
TGH 6.0	R	269	10	32		
	M	90	49	45.5		

003 F 4498.422 4497.6418 ✓
003 F 4498.419
004 M 1371.122 ✓

Sta	HI	Re	RH	T/P	ppm/%				
Joe 824	3.66	90 3	4.7	93/29.7	+24/70				
D	89	11	47	✓		010	F 6876.537		6875.8515 ✓
R	270	48	52			013	F 6876.537	.5370	
M	89	11	27.5			003	M 2095.975 ✓		
		CH							
Joe 824	5.04	730	3.90	80°/29.70	13/70	016	F 7137.406		
D	89	55	53			010	F 7137.383	.3948	7137.3858 ✓
R	270	04	49	✓		002	M 2175.482 ✓		
M	89	55	32						
		CH							
828	5.23	824	4.30	70/29.4	11/60	007	F 21221.698		21,220.6834 ✓
D	90	33	00			007	F 21221.684	.6910	
R	269	26	00	✓		002	M 6468.380 ✓		
M	90	33	30						
		CH							
820	5.07	822	4.80	85/29.35	19/60	007	F 12496.302		12,495.0486 ✓
TTD	89	11	41			023	F 12496.306	.3029	
R	270	49	06	✓		011	M 3808.913 ✓		
M	89	11	17.5						
824	4.80	828							
D	89	28	13		Recip				
R	270	32	03						
M	89	28	05	✓					

CURVE FORMULAS

$T = R \tan \frac{1}{2} I$	$R = T \cot. \frac{1}{2} I$	Chord def. $= \frac{\text{chord}^2}{R}$
$T = \frac{50 \tan \frac{1}{2} I}{\text{Sin.} \frac{1}{2} D}$	$R = \frac{50}{\text{Sin.} \frac{1}{2} D}$	No. chords $= \frac{I}{D}$
$\text{Sin.} \frac{1}{2} D = \frac{50}{R}$	$E = R \text{ ex. sec } \frac{1}{2} I$	Tan. def. $= \frac{1}{2}$ chord def.
$\text{Sin.} \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$	$E = T \tan \frac{1}{4} I$	

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

To find angle for a given distance and deflection.

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

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

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

GENERAL DATA

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

Given Base 100, Alt. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 =$ Base.

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

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

Leveling. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574 d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{2}{3} d^2$. The combined correction is negative.

Probable Error. If d_1, d_2, d_3, etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean $= \pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$

MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

INCHES IN DECIMALS OF A FOOT

1-16	3-32	⅛	3-16	¼	5-16	⅜	½	⅝	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Elan Publishing Co., Inc., Meredith, N.H. 03253

Bill Barbee
Don Moy

Book 6
X Sections
Various angles & Dist's

Book #6

PAGE		INDEX		
1	π Joe	BS 890	FS 828	
2	Meas	890 To 824		
	"	850 To 890		
	"	890 To 850		
	"	890 To 891		
	"	890 To 824		
3	π 850	BS 890	FS 828	
4	π 890	BS 891	FS 850	FS 824
5	"	" "	" "	" "
6	ANGLE	for x sect at catapiller Tank		
7-11	x Sect	CATAPILLER Tank		
12-14	x Sect	WASH West Catapiller Tank Rd		
15-28	Long	x Sect To 890 From (3,2) Analytic		
29-30	x Sect	North BM S366		
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46	check	levels of Long Section		
47	Recipical	Ks & Dist		
	824 To	825		
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48	TBM	Set to Level 4-72" pipes		
49	Misc	Dist for x sections		
	Catapiller	Tank		

①

		Ta	824	Joe	
890 X. Sect D	00	00	30		31
60 Penny R	180	00	32		
Nail					
828 D	23	55	36		36
R	203	55	36		
D	45	02	30		31.5
R	225	02	33		
D	68	57	34		35.5
R	248	57	37		
D	90	05	30		31.5
R	270	05	33		
D	114	00	33		35.5
R	294	00	38		
D	135	07	30		30.5
R	315	07	31		
D	159	02	32		34.5
R	39	02	37		

05.0

04.0

M = 23° 55' 04.250"

04.0

04.0

STA	HI	RE	RH	T/P	FPM/SF
890 X Section	5.29	824 (6.0)	4.60	74/29.6	+10/60
60 P. Nail D	89	31	53		
R	270	28	23		
6.5 M	89°	31'	45"		
		~~890~~			
850	5.16	60 P.N.			Recept
D	90	16	09		
R	269	44	02		
6.0 M	90°	16'	03.5"		
		LH			
890 60 PN	5.29	850	4.96	74/29.6	+10/60
D	89	43	53		
R	270	16	41		
9.30 M	89°	43'	36"		
		LH			
890 60 PN	5.29	4321 29.20 891	8.0	74/29.6	+10/70
D	89	40	10		
R	270	20	14		
8.0 M	89°	39'	58"		
		LH			
890 PN	5.29	JOE 824	5.09		Recep
D	90	30	07		
R	269	30	20		
M	90°	29'	53.5"		

013F	14682.823	.8412	
039F	14682.896		14682.3455
004M	4475.324		
036F	9157.205	.2023	
043F	9157.199		9157.0981
002M	2791.119		
013F	6773.575	.5738	
020F	6773.572		6773.4588
003M	2064.852		

		π @ 850			
60 FN D	00	00	30		32.0
890 R	180	00	34		
818 D	100	40	13		14.0
R	280	40	15		
		LM			
D	45	02	30		34.0
R	225	02	38		
D	145	42	21		23.5
R	325	42	26		
		LM			
D	90	05	30		31.5
R	270	05	33		
D	190	45	20		19.5
R	10	45	19		
		LM			
D	135	07	30		33.5
R	315	07	37		
D	235	47	17		19.5
R	55	47	22		

42.0

49.5

$m = 100^\circ 39' 46.375''$

48.0

46.0

			π	60 PN	890	
432+28.20	D	00	00	30		31.0
891	R	180	00	32		
850	D	58	21	53		55.5
	R	238	21	58		
824	D	164	16	45		46.5
Jot	R	344	16	48		
			LM			
	D	45	02	30		33.5
	R	225	02	37		
	D	103	23	51		55.0
	R	283	23	59		
	D	209	18	46		48.5
	R	29	18	51		

④

24.5

15.5

m = 58° 21' 23"

m = 164° 16' 14.25"

21.5

15.0

		T	890 60 AM	CONT	
D	90	05	30		35.0
R	270	05	40		
D	148	26	52		59.0
R	328	27	06		
D	254	21	45		49.5
R	74	21	54		
		L/7			
D	135	07	30		31.0
R	315	07	32		
D	193	28	51		53.0
R	13	28	55		
D	299	23	41		43.0
R	119	23	45		

24.0

14.5

22.0

12.0

		T @ 850			
CAP WX-5013	00	00	30		21.5
R	180	00	13		
828 D	60	36	42		46.0
R	240	36	50		
		LM			
D	45	02	30		
R					
D					
R					
		LM			
D	90	05	30		32.0
R	270	05	34		
D	150	41	55		56.0
R	330	41	57		
		LM			
D	135	07	30		
R					
D					
R					

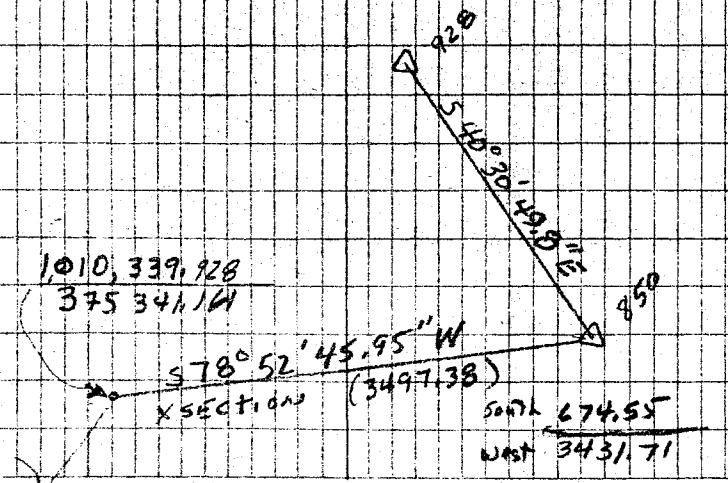
∡ to west along X section (6)

Random X section to Tetrapilar trunk

24.5

MZ 60° 36' 24.25"

24.0



(351)

850 1,011,014.483
378 772.872

X Section Caterpillar Tank

Pt	H1	Dist	Vert ∡	EL	
0+00	7.0	362.72	88 52-22	1532	16
West					
(1)	7.0	268.4	89-22-10	1527	97
		–			
(2)	7.0	263.61	90.09-34	1524	29
	–	–			
(3)	7.0	225.1	92 21-43	1507	90
		–			
(4)	7.0	132.5	93°10'	1517	70
		–			
5	7.0	109.3	98°09'40	1509	50
	+5 −5 Since EL	–			
6	7.0	84.4	93°53	1519	30
		–		1512	62
(7)	7.0	64.7	101°03'	1512	62
	−3 +3 Since			1512	62
8		– 35	9.7	1522	32
9	Level R.R.		7.6	1524	42
10		11.0	5.3	1526	72
A.	5.3 ⊼	0	5.3	1526	72

	Ver Diff	Horz	STA	
	+7.14	362.66	0+00 Lost Dof 3 BC	571+54.79 (80)
	+29.5	248.35	0+97	401
	−0.73	263.61	0+99	402
	−17.12	224.45	1+38	403
	−7.32	182.30	2+30	404
	−15.52	−108.19	2+54	405
	−5.72	84.2	2+78	406
			2+96	407
	−12.40	63.5	2+99	408
			3+01	409
	−9.7	35	3+28	410
Level	−7.12	21	3+42	411
	−5.30	11	3+52	412
		0	3+62.66	413

	HI	Dist	Vert		RH	Vert Diff	Horz	STA (8)	
"A" π	5.3			1526	72			3+62.60	(413)
Weed									
level		+12.00	7.7	1524	.32			3+75	414
Bottom		67.5	111°22'						
Lake	Catepillar	62.86 water	-24.59	1500	43	-24.59	62.86	4+25.5	415
	Catepillar Trunk W+R Level This Date			1500	43	-24.59		6+60	416
4	7'	328	90°57'	1519	57	-5.45	328.55	6+91.21	417
5	7'	418 8	90°39'	1520	27	-4.75	418.77	7+81.43	418
6	7'	513 6	90°44'	1518	45	-6.57	513.56	8+76.22	419
7	7'	612 1	90°19	1528	.40	-3.38	612.09	9+74.75	420
8	7'	711 0	90°16	1521	71	-3.31	710.99	10+73.65	421
9	7'	807 6	89°52	1526	90	+1.88	807.00	11+49.66	422
10	7'	898 3	89°50'	1527	63	+2.61	898.30	12+69.90	423
11	7'	993 2	89°42	1530	22	+5.20	993.19	13+55.85	424
12	7'	1062 5	89°29	1534	60	+9.58	1062.46	14+25.12	425
"B" π	9.18	1131 5	89°12'14"	1538	64	+15.72	1131.39	14+94.05	426
								(GRID 1493.81)	

	H1	Dist	Vert	RH	1	Vert Diff	H2	STA ⑨	
"B" ⊼	5.2			1538	64			14+94.05	(426)
West Level	Rod Rodk 5.2	35		1538	64			15+29.05	427
Level	10.4	125'		1533	44			16+19.05	428
	RR 15.3	214 ⊥	90°24	1527	05	-1.49	214.09	17+08.14	429
Wash Stall	7	261 ⊥	91°26	1530	30	-6.54	261.42	17+55.47	430
		Bottom Hair	Mid	Top					
		7.47	9.00-10.53	1507	76	206' -5.60	205.95	18+59.86	431
		91° 02- 54							
		8.90	10.0-11.1	1506	77	220' -5.59	219.93	19+45.88	432
		91 27 25							
		5.03	6.10-6.07	1507	03	104 -9.33	103.58	20+62.23	435
		95° 08 50							
		8.02	9.00-9.68	1510	21	136 -3.15	135.96	20+29.85	433
		91° 19 37"							
		5.41	6.00-6.58	1505	20	117 -11.16	116.47	20+49.34	434
		95° 28 30							
		6.69	7.00-7.31	1509	12	62 -4.24	61.68	21+04.13	436
		95	46.41						
"C"	5.5	Back to cover area (ow)				-17.98	671.76	21+65.81	437
	RR 20	672	91°32'	1516.86					

	HI	Dist	Vert	EL
"B" π	5.2			
(W. Edge Wash) Pt "C"	9'	672°	91°32'	1516 86
	9'	789 2	90°31	1527 72
	9'	879 1	90°03'	1534 07
Pt "D"	9'	988 1	89°52 30"	1537 00
"D" π	5.28			1537 00
Level	RR 5.2	50'		1537 08
①	9'	134.1	90°38'	1531 80
②	9'	202.0	91°45'	1527 11
③	9'	219 2	92°33'	1523 51
④	9'	231 1	92°21'	1523 80
⑤	9'	311 7	90°43	1529 38
⑥	9'	350.5	90°14'	1531 85
⑦	9'	393.9	90°23	1530 64
⑧	9'	450.8	90°52'	1526 46
⑨	11 4	511.5	89°56'	1531 48
	11 4	518.9	90°26'	1526 96
	11 4	577 4	90°19'	1527 69
	11 4	621 1	90°31	1525 28
		640	9' Lower	1516.28
				1503.00

Vert	HZ	STA	
		21+65.81	437
-7.12	789.17	22+83.22	438
-0.77	879.7	23+73.75	439
+2.16	988.70	24+82.75	440
℄ RR		24+82.75	440
		25+32.75	441
-1.48	134.09	26+16.84	442
-6.17	201.91	26+84.66	443
-9.77	219.48	27+02.23	444
-9.48	230.91	27+13.66	445
-3.90	311.68	27+94.43	446
-1.43	350.50	28+33.25	447
-2.64	393.89	28+76.64	448
-6.82	450.75	29+33.50	449
+0.60	511.5	29+94.25	450
-3.92	518.89	30+01.64	451
-3.19	577.39	30+60.14	452
-5.60	621.07	31+03.82	453
		31+22.75	454
		31+30	455

	H1		V	EL	
"D" cont					
				1516	.20
	11.4	1717.4	91°10	1516	2
	11.4	907 3	90°32'	1522	43
	11.4	1015 2	90°09'	1528	22

Vert	HZ		
			24+82.75
			31+63 454
-14.61	717.25		32+00 457
- 8.45	907.26		33+90.01 458
- 2.66	1015.20		34+97.95 459
			pt # 351
END CATERPILLER			
TANK X SECTION			
			MWS 34+97.95

X Section used 72" Pipe

STA	HI	Horz Dist	Vert ∡	RH	EL
0+00				~~7.0~~	1527.18
	5.07	606.82	89°34'	7.0	1527.18
(2)		507.5	89°59'	"	1522.74
(3)		460.3	91°35'	"	1509.87
(4)		450.1	91°54'		1507.67
(5)		442.8	91°47		1508.81
(6)		423.6	91°39'		1510.39
Side (7) Wash 72"	+3'E.W	374.2	92°14		1507.99
	+	10	- 1.0		1506.99
	+30		- 12.3		1495.69
℄ W11	+45		- 15.3		1492.69
	+55		- 13.6		1494.39
	⊥ ✗		- 9.8		1498.19
			- 7.2		1500.79
-	- 20				

Level

1525.432

Horz Dist	Vert Diff Bottom ⊥	STA (12)
1/2" RB		
606.80	+4.59	0+00 (341)
507.9	-0.15	0+98.92 (460)
460.12	-12.72	1+46.70 (461)
449.85	-14.92	1+56.97 (462)
442.59	-13.78	1+64.23 (463)
423.42	-12.20	1+83.40 (464)
374.42	+14.6	2+32.40 (465)
365	-15.3	2+41.82 (466)
345	-26.94	2+61.82 (467)
330	-29.9	2+67.82 (468)
320		2+86.82 (469)
310		2+96.82 (470)
267		3+40.76 (471)

STA	HI	Slope Dist	Vert	RH	EL
W. Mansfield (12)		246.7	94°01'		1505.31
(13)		211 6	93°17'		1510.47
(14)		145 7	93°19'		1514.48
(15)		101 0	93°35'		1516.28
(16)		131 9	91°18'		1519.60
^CAP "A"	5.07	Horz 192°	∡ BS East/West 32°33'		1524.52
(1)		66.07	89°50'		1522.78
(2)		156 4	90°14'		1521.95
(3)		248 8	90°04'		1522.30
		339 2	89°28'		1525.75
		431 7	89°31'		1526.23

(13)

Horz	Diff EL	STA
246.09	-17.23	3+60.76 (472)
211.25	-12.12	3+95.57 (473)
145 47	-8.11	4+61.35 (474)
131 87	-6.31	4+74.95 (475)
100.8	-2.99	5+06.02 (476)
Angle Point Rt.		6+06.80 (352)
66.07	+0.19	6+72.89 (477)
156 4	-0.64	7+63.22 (478)
248 8	-0.49	8+55.62 (479)
339 69	+3.14	9+46.51 (480)
431 48	+3.64	10+38.50 (481)

STA	HI	Dist	Vert ∠	RH	EL
		521 L	89°41		1525.47
		597	89°41		1525.89
		689 L	89°57'		1523.19
No	ET	718 L	90°10'		1520.50
		738	90°24		1517.44
		768	90°13'		1519.69
		778	90°13'		1519.65
		800	90°56'		1512.34
		810	90°55'		1512.54
		820	90°28		1515.91
		820	90°02'		1522.11
		837	90°01		1522.35
ERM		862+	89°49''		1525.35
					1525.432 R
ERM					

HZ	V.A Diff	(14) STA
521.59	+2.88	11+28.41 (482)
594.99	+3.9	12+03.81 (483)
689 L	+0.60	12+96.42 (484)
718 L	-2.09	13+25.42 (485)
738	-5.15	13+44.82 (486)
768	-2.90	13+74.82 (487)
778	-2.94	13+84.82 (488)
800	-13.08	14+06.82 (489)
810	-12.96	14+16.82 (490)
820	-6.88	14+26.82 (491)
830	-0.48	14+36.82 (492)
837	-2.24	14+43.82 (493)
862 40	+2.76	14+68.22
		(340)

END SECTION

Sl	N1	Dist	Vert ∡	RH	
0+00	5.24	317.87	82°55'	1494	69
		25.4	85°47'	1473	98
		218.6	88°25	1461	53
		153.8	94°10	1444	32
315.44		124.0	96°55'	1440	56
		83.1	97°41'	1444	38
East ↑		27.0	88°45	1456	07
"A"	5.24	000	——	1457	25
West ↓		18'	88°25	1455	99
		42.8	101°11'	1447	34
		55	Same El	1447	34
		80.0	95°19	1448	08
		96'	94°35'	1447	82

(15)

	Long	Y Section	Sta	
	+39.20	315.44	0+00	542
↑	+18.49	250.72	+64.72	520
	+6.04	218.52	+96.92	521
	−11.17	153.39	1+62.05	522
	−14.93	123.10	1+92.34	523
	−11.11	82.35	2+33.09	524
	+0.58	26.99	2+88.45	525
		π	3+15.44	526
	+0.50	17.99	3+33.43	527
	−3.15	41.20	3+56.64	528
			3+69	529
	−7.41	79.66	3+95.10	530
	−7.67	95.69	4+11.13	531

	105	95°35'	1445	27
	118	94°33	1446	13
	137	93°07'	1448	04
	180	92°17	1448	32
	187	92°34'	1447	12
	211	92°29'	1446	35
	216	92°11'	1447	26
	305	91°02	1449	99
	388	89°57'	1455	83
	445	89°19'	1460	80
	485	89°19	1461	27
	513	89°44	1457	88

16

V	H	STA	
-10.22	104.50	4+19.94	532
-9.36	117.43	4+33.07	533
-7.45	134.80	4+52.24	534
-7.17	179.86	4+95.3	535
-8.37	186.81	5+02.25	536
-9.14	210.80	5+26.24	537
-8.23	215.84	5+31.28	538
-5.50	304.95	6+20.39	539
+0.34	388.0	7+03.44	540
+5.31	444.97	7+60.41	541
+5.78	484.97	8+00.41	542
+2.39	512.99	8+28.43	543

						V	H	STA	
Edge Wash Top Bank		526	89°45"	1457	79	+2.30	526.0	8+44.44	544
↓									
	7'								
Bottom		33	RR 8.16	1454	52			8+74.44	545
~~Temp Set up~~		67'	RR 10.34	1452	34			9+08.44	546
8.00									
π ↑									
Wide Wash	π 5.12	618	89°20	1462	68	+7.19	617.96	9+33.40	547 9+24
℄		680	89°00	1467	36	+11.87	679.90	9+99.34	548
7									
		754	88°56	1469	53	+14.04	753.87	10+69.31	549
"B" ℄	7	822	88°59	1470	08	+14.59	821.87	11+37.31 "B"	550
		821.87	+14.585						
"B"									
↑									
7									
℄									

(B)	~~H~~ To"4" →	1136.2 1136.19	90°15' -4.958	1470	08
	7'	1046.6	90°14'	1470	78
		947.4	90°12'	1471	73
		845.1	90°08'	1473	07
		752.1	90°16	1471	54
		666.7	90°52	1464	96
		571.8	90°49	1466	89
		504.7	91°12'	1464	47
		471.7	90°58'	1467	08
		426.9	91°21'	1464	98
5.25		349	91°13'	1467	63

(18)

V	HZ	STA	
-4.96	1136.19	11+37.31 ✓	(550)
-4.26	1046.59	12+26.91	(551)
-3.31	947.39	13+26.11	(552)
-1.97	845.70	14+27.80	(553)
-3.50	751.99	15+21.51	(554)
-10.08	666.62	16+06.88	(555)
-8.15	571.74	17+01.76	(556)
-10.57	504.59	17+68.91	(557)
-7.96	471.63	18+01.87	(558)
-10.06	426.78	18+46.72	(559)
-7.41	348.92	19+24.58	(560)

525	7'	271.2	90°33	1472	44
		199.5	89°58'	1475	16
		124.3	89°29'	1476	16
"C"	5.25	00	00	1476	79
	℄	30	Same	1472	79
		65'	89°50'	1475	23
		141.0	92°13	1469	59
		218.2	93°23	1462	16
		243.6	94°11'	1457	27
		265.2	93°25'	1459	23
		275.5	93°46'	1456	94
		295.9	93°04'	1459	21
		399.7	93°25'	1451	22
		449.8	93°39	1446	41

V	HZ	STA	
-2.60	271.19	20+02.31	561
+0.12	199.5	20+74.0	562
+1.12	124.39	21+49.21	563
Point "C"		22+73.50	564
		23+03.5	565
+0.19	65.0	23+38.5	566
-5.45	140.89	24+14.39	567
-12.88	217.82	24+91.32	568
-17.77	242.95	25+16.45	569
-15.81	264.83	25+38.33	570
-18.10	274.90	25+48.40	571
-15.83	295.48	25+68.98	572
-23.82	398.99	26+72.49	573
-28.63	448.89	27+22.39	574

	5.25	463.1	72°59'	1450	94
		543.4	91°34	1460	18
		623.7	90°46'	1466	69
"D"		695.8 / 695.76	90°37 / -7.489		
7'	522			1467	55
	℄ Rd	30	-1°	1466	55
7'					
		117	93°22'	1458	90
		173°	94°26'	1452	40
		236.5	93°25	1451	68
		267.5	94°01	1447	03
		296.5	93°41	1446	72
		353.5	93°51'	1442	03
		372.9	93°14'	1444	74
				1439	.11

"D" Tap 1540.1 Wire 1539.57 N 90°44' E 530

-15.70

	V	N2	STA	
	-24.10	462.47	27+35.97	575
	-14.86	543.20	28+16.70	576
	-8.35	623.64	28+97.14	577
"D"	-7.49	695.76	29+69.26	578 "D"
	℄ Road		29+99.26	579
	-6.37	116.80	30+86.06	580
	-13.37	172.48	31+41.74	581
	-14.09	236.08	32+05.34	582
	-18.74	266.84	32+36.10	583
	-19.05	295.89	32+65.15	584
	-23.74	352.70	33+21.96	585
	-21.03	372.31	33+41.57	586
			33+61	587

D ↓ 7'		43.1	93°42	1439	11					
		BK 20'	Same CL							
		421.8	93°13'	1442	10		-23.67	421.14	33+90.40	589
		463.2	92°17'	1447	32		-18.45	462.83	34+32.09	590
		510.2	91°49'	1449	60		-16.17	509.94	34+75.20	591
		550.1	92°09'	1445	13		-20.64	549.71	35+18.97	592
		624.5	91°19'	1451	42		-14.35	624.34	35+93.60	593
		662.1	91°28'	1448	82		-16.95	661.88	36+31.14	594
		706.6	91°21'	1449	12		-16.65	706.40	36+75.66	595
		807.5	90°54'30"	1452	97		-12.80	807.40	37+76.66	596
" E " 7'		842.9	91°02	1450	57		-15.20	842.76	38+12.02	597
		655.1	89°51'	1446	11		+1.72	655.50	38+53.73	598
		"	+1.715	1446	11					
		628.2	89°37'	1449	51		+5.12	628.18	38+81.05	599

840 - 91°00'

-14.22 [illegible]

						V	Hz	Sta	(22)	
	5.24	538 3	90°01'	1444	23	-0.16	538.3	39+70.93		(600)
		441 5	90°27	1440	92	-3.47	441.49	40+47.74		(601)
		399 9	92°00	1430	43	-13.96	399.66	41+09.57		(602)
		388 1	92°11	1429	60	-14.79	387.82	41+12.41		(603)
		303 5	91°47	1434	94	-9.45	303.45	42+05.78		(604)
		244 5	93°14'	1430	59	-13.8	244.21	42+65.02		(605)
		232 1	93°59'	1428	23	-16.16	232.14	42+77.09		(606)
		217 9	95°15	1424	46	-19.93	216.99	42+92.24		(607)
		152 3	97°00'	1425	83	-18.56	151.16	43+58.07		(608)
		107 3	100°04'	1425	63	-18.76	105.65	44+03.50		(609)
		98.9	102°13	1423	46	-20.93	96.66	44+12.57		(610)
		77 2	103°32'	1426	37	-18.02	74.86	44+34.37		(611)
		50.6	105°55'	1430	51	-13.88	48.66	44+60.57		(612)

				Elev	
		15'	-2°00	1444	.15
"F"	5.24	HI 1451.39		1446	15 ✓
	7	27'	88°00	1445	33
		54	97°04'	1437	08
		101	90°27	1443	59 ✱
	1	139'	94°04	1430	99
	9	268	93°08'	1429	69
	1	5'	-3	1426.69	
		330	92°49	1428	16
		405	92°19'	1427	99
		498	91°54	1427	85
		577	91°44'	1426	92
		676	91°4	1429	82
G - φ		720.00	90°98'	1440	62 ✓
		720.19	-3.771		

V	HZ	STA (23)	
		44+94.23	613
		45+09.23 ✓	614
+0.94	26.98	45+36.21	615
-7.31	58.95	45+68.18	616
-0.80	101.50	46+10.73	617
-13.40	188.52	46+97.75	618
-14.70	268.50	47+77.73	619
-16.23	329.80	48+39.03	620
-14.40	405.37	49+14.60	621
-16.54	498.53	50+07.76	622
-17.47	577.24	50+86.47	623
-14.57	676.54	51+85.77	624
-3.77	720.19	52+29.42 ✓	625

'G'	7°	864 ℄	88-59-30 +0.126	1440	62
		761 ℄	90°04'	1439	60
PICK TO ↑		674 ℄	90°31	1434	41
		567 ℄	90°23	1436	69
		478 ℄	90°39'	1435	06
		407 ℄	90°38'	1435	99
		355 ℄	91°09'	1433	36
		318 ℄	90°41'	1439	19
		188 ℄	90°05'	1440	22
		142 ℄	89°34'	1441	57
		87'	89°44'	1440	89
		45'	90°03	1440	45
H ⅄	5.14			1442	35

HI ↑

(24)

V	Hz		STA	
+0.13	864.70		52+29.42	(625)
-0.189	761.00		53+33.12	(626)
-6.08	674.57		54+19.55	(627)
-3.80	567.39		55+26.73	(628)
-5.43	478.57		56+15.55	(629)
-4.50	407.08		56+87.04	(630)
-7.13	355.13		57+38.99	(631)
-1.30	318.60		57+75.52	(632)
-0.27	188.8		59+05.32	(633)
+1.08	142.40		59+51.72	(634)
+0.40	87.0		60+07.12	(635)
-0.04	45.00	℄ Road	60+49.12	(636)
			60+94.12	("H") (637)

H	514			1442	35	1447.49		60+94.12	(637)	("H")
↓										
		24°	84°31'	1442	78	+2.29	23.89	61+18.01	(638)	
		100°	91°54'	1437	17	-3.32	99.95	61+94.07	(639)	
		166°	91°35'	1435	84	-4.65	166.44	62+60.56	(640)	
	℄ wash	177°	91°35	1433	60	-4.89	176.93	62+71.05	(641)	
		189°	91°26'	1435	60	-4.74	189.44	62+83.56	(642)	
		300°	89°56'	1440	84	+0.35	300.50	63+94.62	(643)	
		371°	89°55'	1441	03	+0.54	371.00	64+65.12	(644)	
		435°	90°21'	1437	83	-2.66	435.09	65+29.21	(645)	
		458°	90°13'	1438	76	-1.73	458.20	65+52.32	(646)	
		488°	90°29'	1436	37	-4.12	488.38	65+82.50	(647)	
		516°	90°17'	1437	94	-2.55	516.09	66+10.21	(648)	
	↓									
I		608°	89°41'	1443	85	+3.36	608.29	℄ 7+02.41	(649)	
		608.29	+3.362							

						V	HZ	Sta	
I		767.9	89°49'	1443	85	+2.46	767.90	67+02.41	649
	7	743±	89°49'	1443	77	+1.38	743.80	67+26.51	650
		710±	90°00	1441	39	-0-	710.8	67+59.51	651
		667'	89°44'	1444	49	+3.10	666.99	68+03.32	652
		617±	89°56'	1442	11	+0.72	617.10	68+53.21	653
		562±	89°43'	1444	17	+2.78	562.79	69+07.52	654
	9	488±	90°25	1437	84	-3.55	488.39	69+81.92	655
	9	424±	90°28	1435	93	-3.46	424.29	70+46.02	656
		Same	30+	1435	93			70+76.02	657
		330.5	89°28'	1444	47	+3.08	330.49	71+39.82	658
		282±	90°45'	1437	69	-3.70	282.78	71+87.53	659
		270±	91°07'	1436	12	-5.27	270.35	71+99.96	660
		239±	92°07'	1433	06	-8.83	238.94	72+31.37	661
		225±	92°35'	1431	24	-10.15	225.07	72+45.24	662

							V	H2		(27)	
		193.5	92°24'	1433	29		-8.10	193.33		72+76.98	663
		184	93°28'	1430	26		-11.13	183.66		72+86.65	664
		95'	92°22'	1437	47		-3.92	94.92		73+75.39	665
		33'	92°12	1440	12		-1.27	32.98		74+37.33	666
J-I ↑		767.9 / 767.90	89°49' / 2.457								
J ↓	5.33			1443	06 ✓		1448.39			74+70.31	667
		15'	Level	1443	06			15		74+85.31	668
	7	70'	96°54	1432	94		-8.45	69.49		75+39.80	669
		103.3	95°25'	1431	64		-9.75	102.84		75+73.15	670
	7	131.3	95°58'	1427	74		-13.65	130.59		76+00.90	671
[illegible]		147.0	96°21'	1425	13		-16.26	146.1		76+16.41	672
	7 Same	163		1427	74			163		76+33.31	673
			↑								
[illegible]	9	210.7	92°16	1431	06		-8.33	210.54		76+80.85	674

						V	N2	STA	
	7	241 ±	91°11'	1436	40	-4.99	244.35	77+11.66	675
B.R.		276'	90 08	1440	75	-0.64	276.10	77+46.41	676
		346 ±	87°40'	1455	49	+14.10	346.11	78+16.42	677
		410 ±	86°28'	1466	67	+25.28	409.42	78+79.73	678
		457 ±	85°27	1477	68	+36.29	456.06	79+26.37	679
		483 ±	84°58'	1483	77	+42.38	481.14	79+51.45	680
		501 ±	84°29'	1489	59	+48.20	499.08	79+69.39	681
	7	530 ± 528.22	84°41'	49.16		+49.16	528.22	79+98.54	682
PANEL					1490.55	Black Hill	60' Penny Nail Set by others		

END LONG X SECTION

69.39
26.36
675

Pt	HI	Dist	Vert ∡	EL	
½" R13	5.31				
0+00 Rod (305)				1339	944
8'		82'	91°20'27"	36	334
8'		100'	90-03-58	37	134
8'		116'	91-03-57	35	094
8'		136	90-56-28	35	024
8'		194	90-48-19	34	524
10'		232	90-55-45	31	494
9'		270	91-20-35	29	924
10'		282	91-36-24	27	344
8'		316	91-36-10	28	414
8		322	91-36-10	27	964
10'		360	91-37-00	25	094

X Section
Sypon By BM 5 36 L

(29)

Vert Diff	Horz	Sta	
			(395)
-4.92	81.98	0 + 81.98	(494)
-0.12	100'	1 + 00	(495)
-2.16	115.98	1 + 15.98	(496)
-2.23	135.98	1 + 35.98	(497)
-2.77	193.98	1 + 93.98	(498)
-3.76	231.97	2 + 31.97	(499)
-6.33	269.93	2 + 69.93	(500)
-7.91	281.89	2 + 81.89	(501)
-8.84	315.88	3 + 15.88	(502)
-9.29	331.87	3 + 31.87	(503)
-10.16	359.86	3 + 59.86	(504)
(Bottom WASH			

Pt	Rod	HI	Dist	Vert ∡	12L	
	9'		378	90-58-18	1329	844
	4'		416	90-00-14	41	224
	7'		450	89-03-16	45	684
	5 (304)		466	89-05-46	47 (48	604 003)
				Previous		

(30)

Vert Diff	Horz	Sta	
-6.41	377.95	3+77.95	(505)
-0.03	416	4+16	(506)
+7.43	449.54	4+49.54	(507)
+7.35	465.54	4+65.54	(334)

End Section

AT Rod	HI	Dist	Vert ∠	EL	
0+00 (303)	5.3			1346	902
6'		34'	90-46-19	45	74
2'		72	90-15-10	42	36
5'		98	95-47-29	37	31
10'		202	92-49-59	32	22
9'		300	93-07-21	26	86
10'		342	94-02-52	18	06
9		456	93-22-19	16	38
8'		574	93-04-40	13	38
6'		590	92-31-35	20	19
5'		650	90-06-51	45	90
5		670	90-08-24	45	56
				45	584
				ADJ	
				45.584	

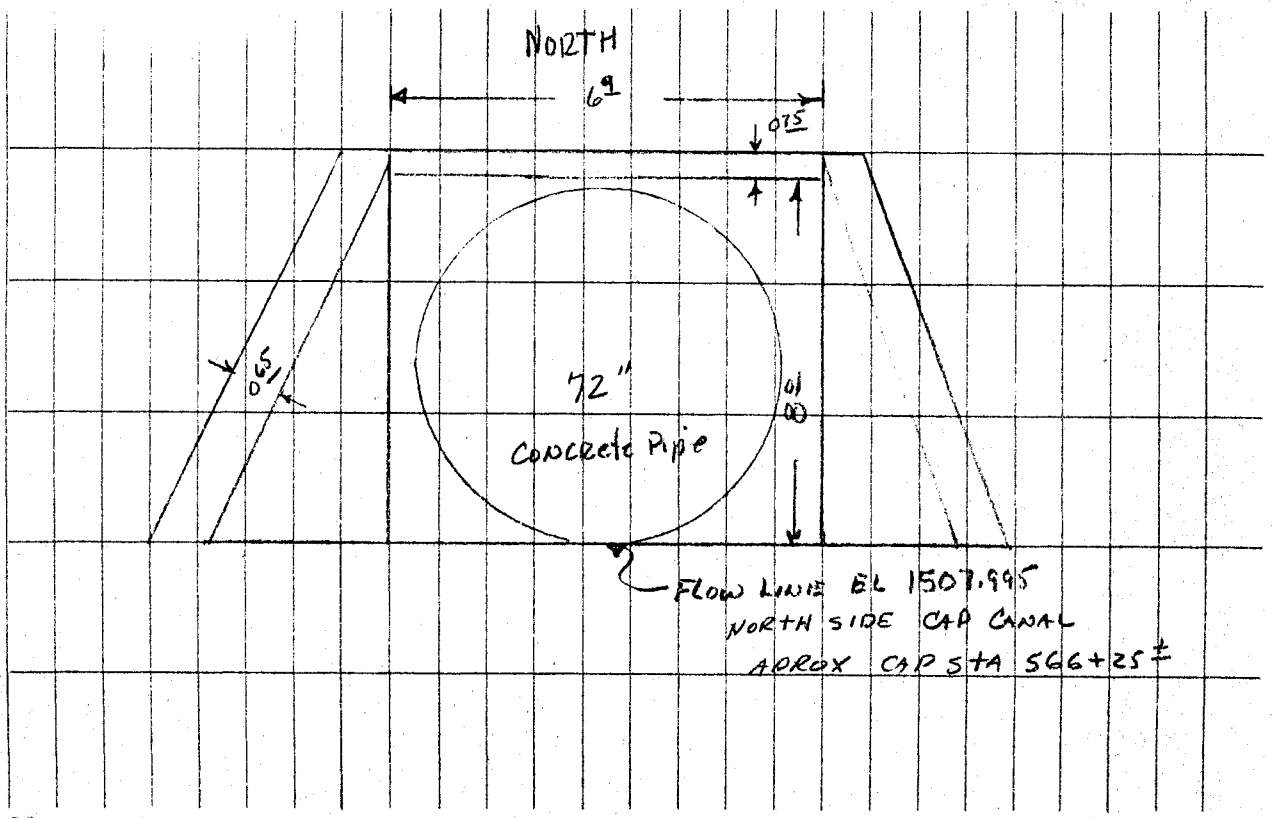
(302)

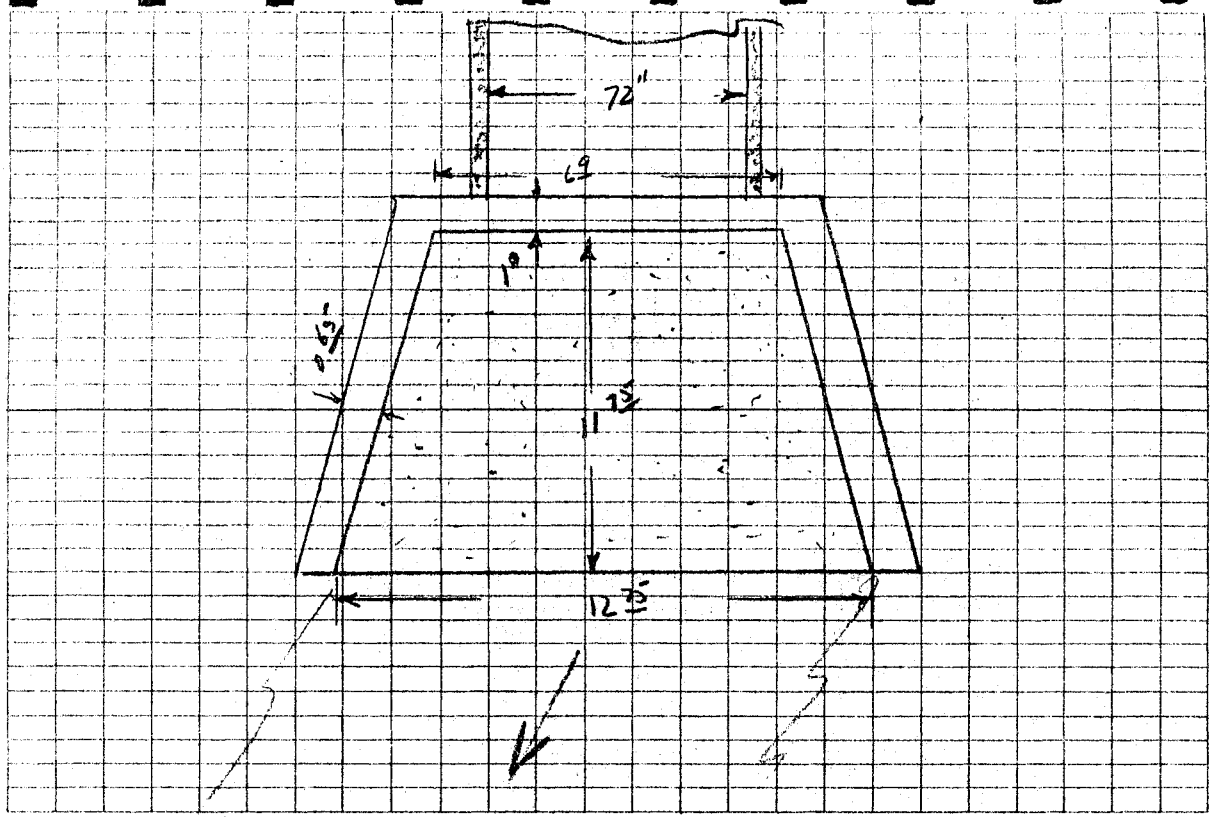
(31)

X Section by BM J-266

Vert Dist	Hz	STA	
1/2" R Bar	& Panel	0+00	(333)
-0.46	34	0+34	(508)
-7.84	71.57	0+71.57	(509)
-5.89	97.50	0+97.50	(510)
-9.98	201.75	2+01.75	(511)
-16.34	299.55	2+99.55	(512)
-24.14	341.15	3+41.15	(513)
-26.82	455.21	4+55.21	(514)
-30.82	573.17	5+73.17	(515)
-26.01	589.43	5+89.43	(516)
-1.30	650.0	6+50.00	(517)
-1.64	670.0	6+70.00	(334)

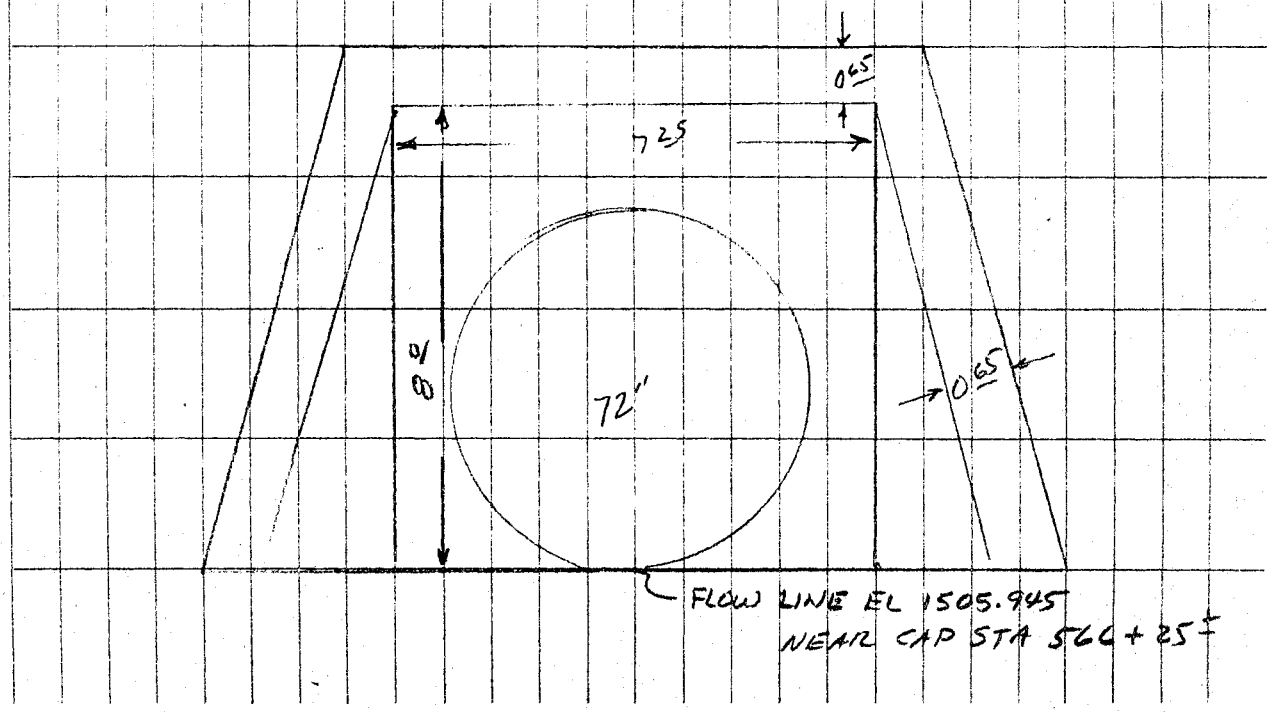
1/2" Rebar & Panel
End Section.

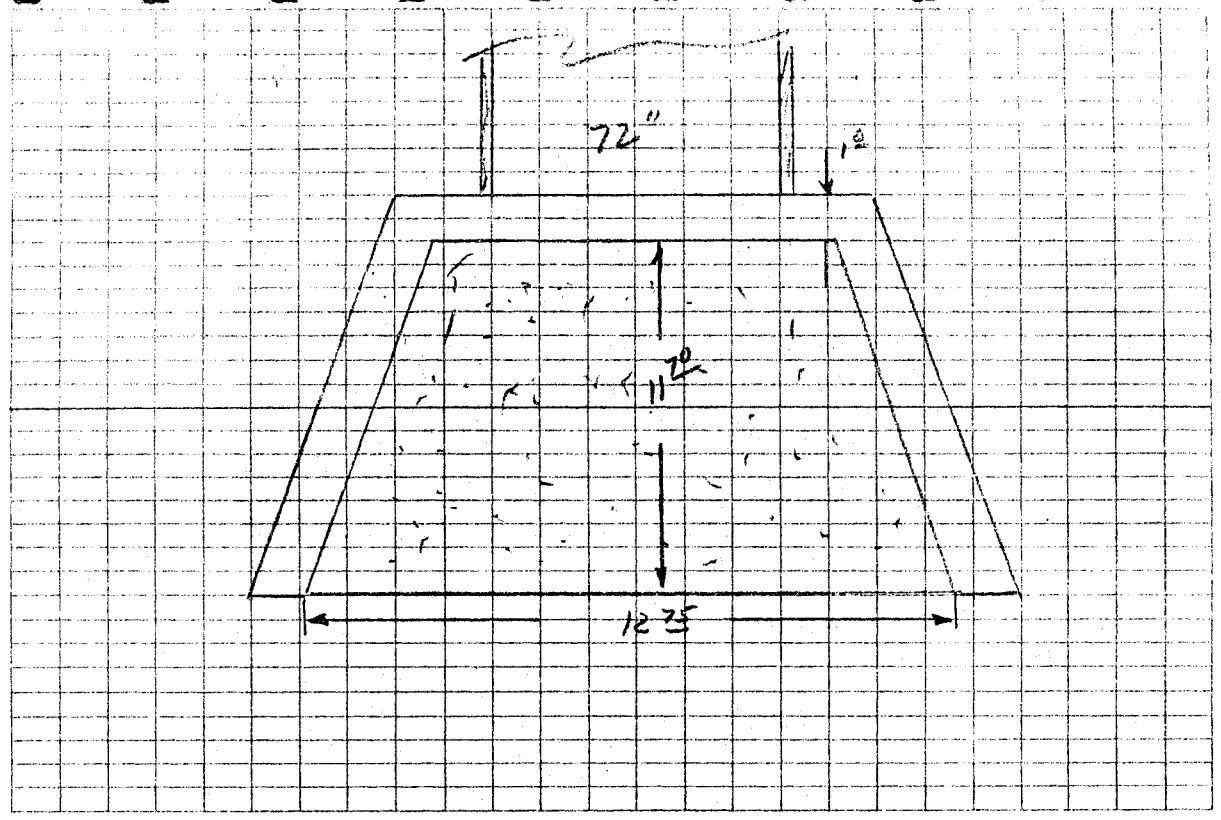

NORTH
69
0.75
0.65
72"
Concrete Pipe
0.1
00
FLOW LINE EL 1507.995
NORTH SIDE CAP CANAL
APROX CAP STA 566+25±


72"
69
1.0
0.75
11.75
12.75

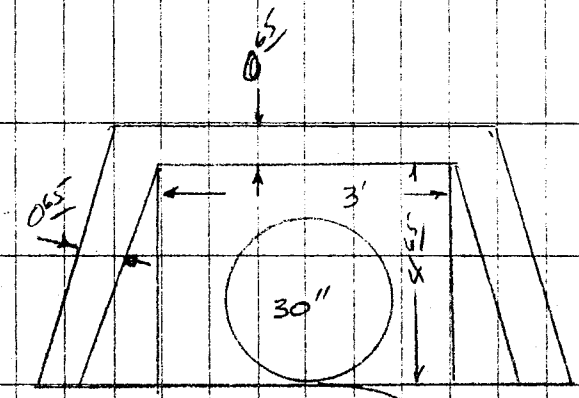
32

South


0'6.5
7'25
0'8
72"
0'6.5
FLOW LINE EL 1505.945
NEAR CAP STA 566 + 25±

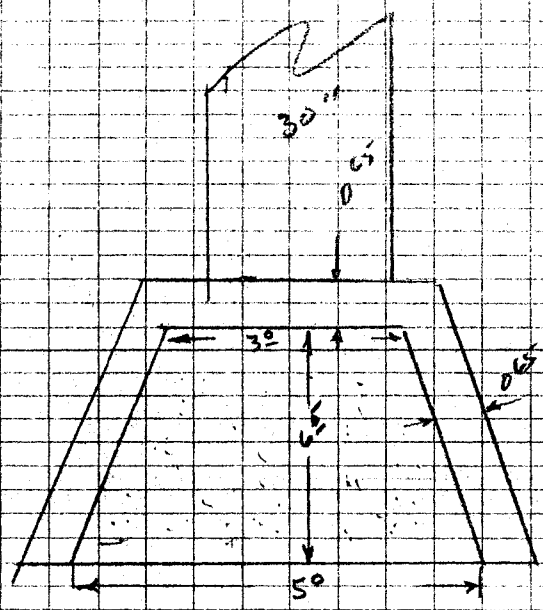

72"
1"
11'2
12'5

North Side CAD

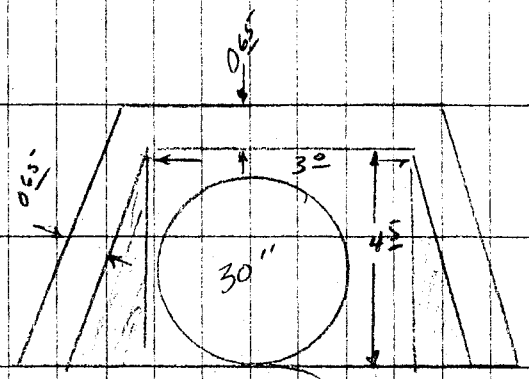


Flow Line Pipe 1513.937

NEAR CAD STA 546+00±

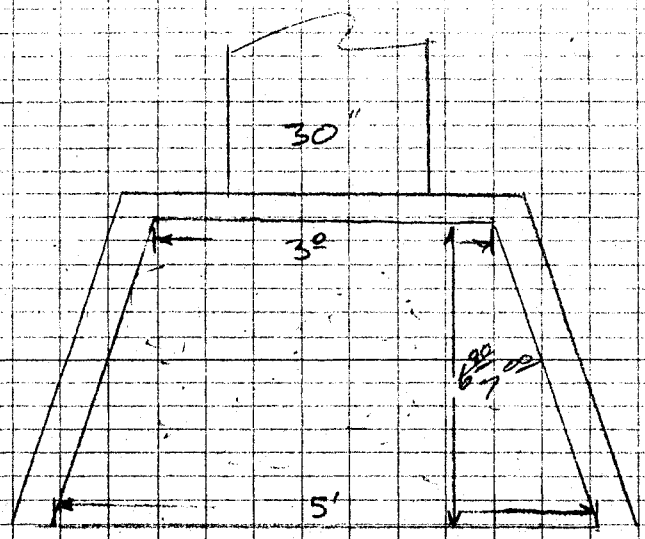


SOUTH SIDE CAP



FLOW LINE OF PIPE 1508.085

NEAR CAD STA 546+00 ±



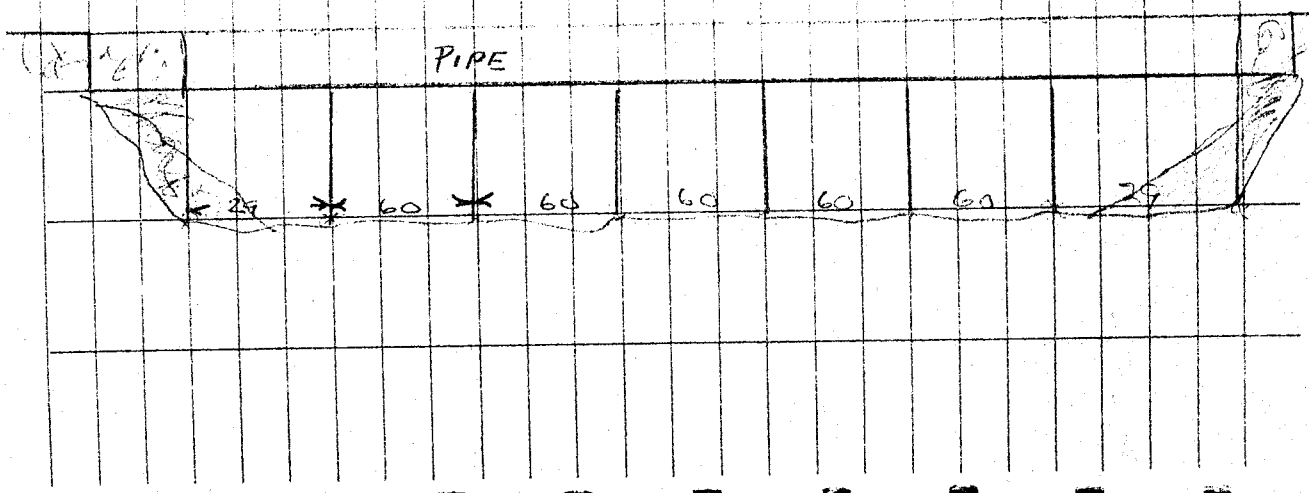
Flume at BM J-266 (37)

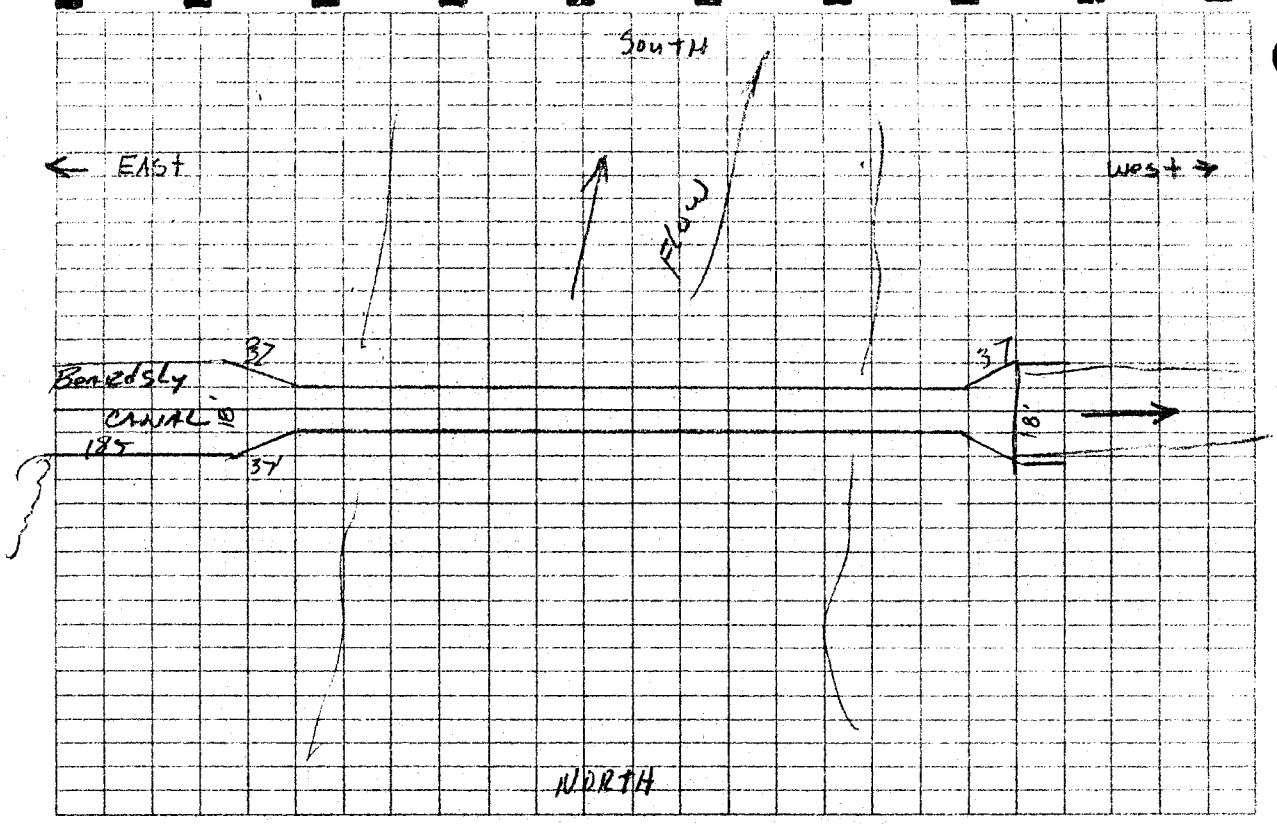
BM	1.10	48.00		13.46	90	Vz R 3 Nail
-232	TC.		0.8	47.2		
-222	TC		0.96	47.04		
-212	Gr		5.9	42.1		
-137			9.7	Gr 38.3 TC 46.6		
-37			10.6	37.4 46.55		
0+00			11.5	36.5		Start Aqua Duct
TP.	1.71	35.51	14.20	33.30		
0+00			+1.10	36.61		Bottom Pipe
0+13	Gr		0.6	34.91		
0+29	Gr		4.3	31.21		Pier
Pillar	TC		2.29	33.22		
Bot	Pipe	+	1.09	36.60		Bottom Pipe
0+74	Gr		17.3	18.21		
0+89	Gr		17.9	17.61		Pier
Pillar	TC		16.89	18.62		
Bottom	Pipe	+	1.06	36.57		Bottom Pipe
1+00			17.0	16.51		
1+49	Gr		18.5	17.01		Pier
	TC		17.04	18.47		
	Bott Pipe	+	1.01	36.52		Bottom Pipe

209		35,51			Pier
Pier	Gr		19.7	15.81	
TC.			17.05	18.46	
Pipe			+0.91	36.42	Bottom Pipe
225	Gr		19.4	16.11	
240			18.7	16.81	
2+69	Gr		20.0	15.51	Pier
	TC.		19.69	15.82	
Bot Pipe			+0.85	36.36	Bottom Pipe
2+89			23.2	12.31	
3+09			20.2	15.31	
3+29	Gr		5.25	30.26	Pier
P[illegible]	TC		5.25	30.26	
Bottom	Pipe		+0.77	36.28	Bottom Pipe
3+58			+0.70	36.21	Bottom Pipe
	16.33	51.00	1.34	34.17	
3+58	Gr		13.30	37.70	End Pipe
3+58	TC		4.15	46.85	
3+61	TC		4.15	46.85	
3+61	TC		4.38	46.62	
3+58	Top Pipe		4.92	46.08	End of Pipe
3+95			4.94	46.06	
3+29	Top Pipe		4.75	46.25	
3M			5.43	45.57	
Pond West				45.58R	End section

	5.5	51.08		45	58	
2+69			4.72	46	36	Top Pipe
2+09			4.65	46	43	Top Pipe
1+49			4.57	46	51	Top Pipe
0+89			4.53	46	55	Top Pipe
0+29			4.47	46	61	
0+00			4.44	46	64	
0+00			3.66	47	42	Top Concrete
TBM			4.18	1346	90	TBM PANEL

AQUA DUCT AT BM J-266





(88)

BM	21.09			1317	02 ~~01~~
		38.11			
0+00	GR		0.01	38	10
	Bot Pipe		+0.89	39	00
0+16			-0.80	37	31
			+0.91	39	02
0+21	Cement Flat		-1.19	36	92
		GR	-2.9	35	21
0+29		T.C	5.10	30	01
			5.88	32	23
		Bot. Pipe	+0.87	38	98
0+39			8.8	29	31
0+73			21.3	16	81
0+89		TC	21.09	17	02
		GR	22.1	16	01
		Bot Pipe	+0.84	38	95
1+09		GR	24.4	13	71
1+49		TC	21.27	16	84
		GR	23.3	14	81
		Bot Pipe	+0.76	38	87
2+09		TC.	19.82	18	29
		GR	22.5	15	61
		Bot Pipe	+0.69	38	80

Tail 0.98 1337.13

AQUA DUCT BM S 366

(41)

PIER

PIER

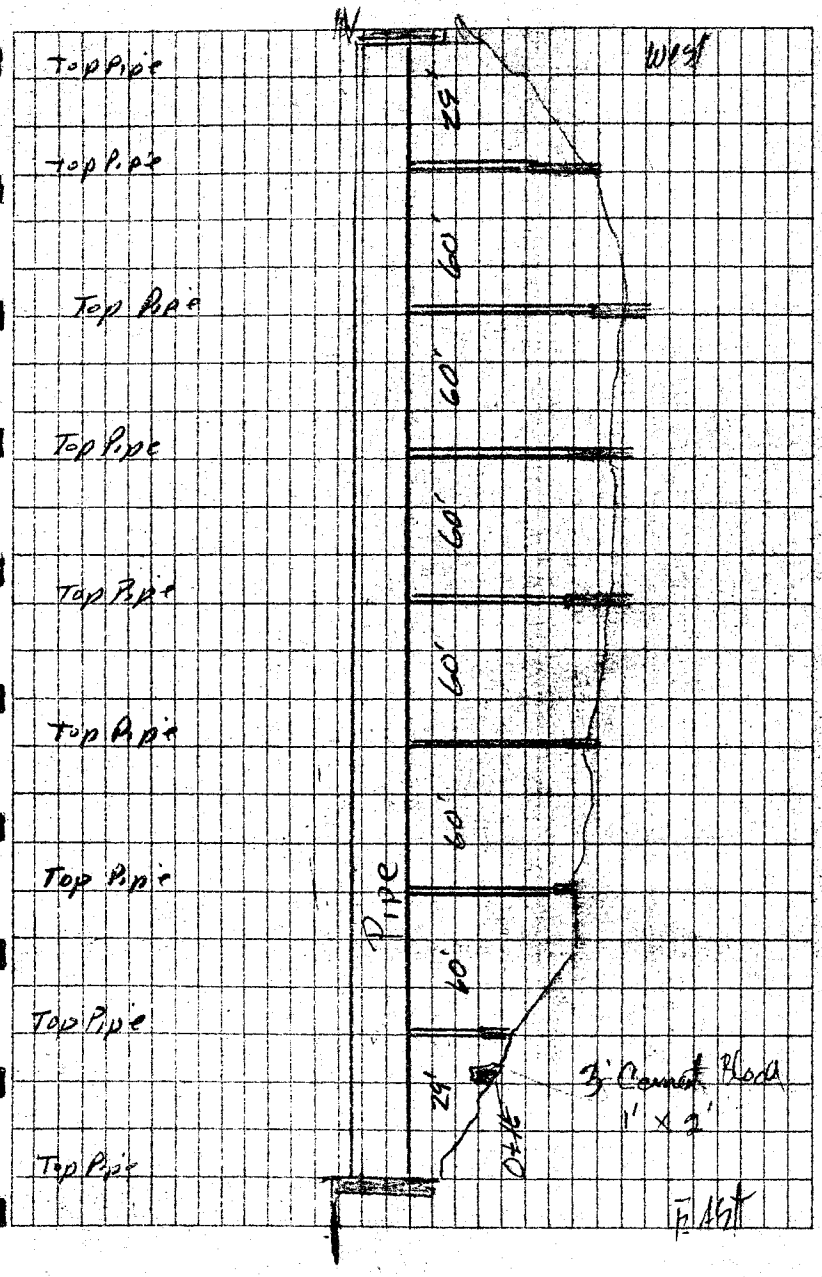
PIER

PIER

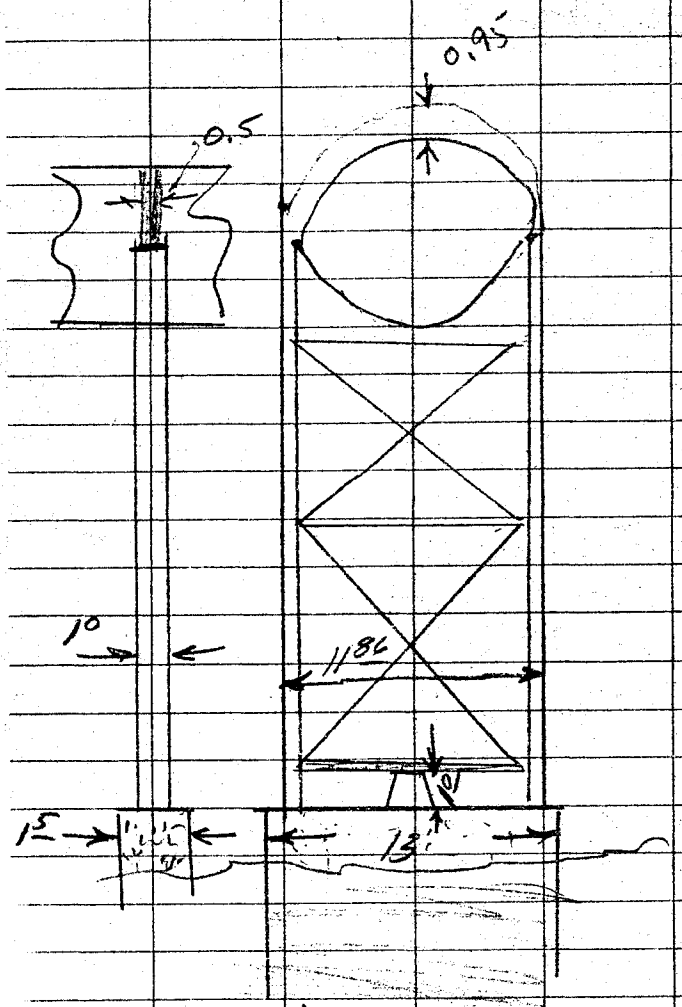
2+69		TC.	17.43	20	68	Pier
		Gr	19.5	18	61	
		B. Pipe	+0.59	38	70	
3+29		TC	17.59	20	52	Pier
		Gr	17.9	20	21	
		P. pe	+0.54	38	65	
3						
3+84		TC.	7.80	30	31	Pier
		Gr	8.1	30	01	
			+0.35	38	46	Bottom Pipe
4.18 End		GR	1.81	36	30	End of Pipe
		Pipe	+0.43	38	54	
T.P	9.86		9.52	28	59	
		38.45				
T.P.	13.56		1.57	36	88	
		50.44				
4+18	T.C.			1.12		

BM		HI	•	1317	016
4+18		50.44	1.9	48	54
3+89			1.89	48	55
3+29			1.77	48	67
2+69			1.69	48	75
2+09			1.59	48	85
1+49			1.50	48	94
0+89			1.43	49	01
0+29			1.41	49	03
0+00			1.42	49	02
0+00	Top Concrete		0.57	49	87

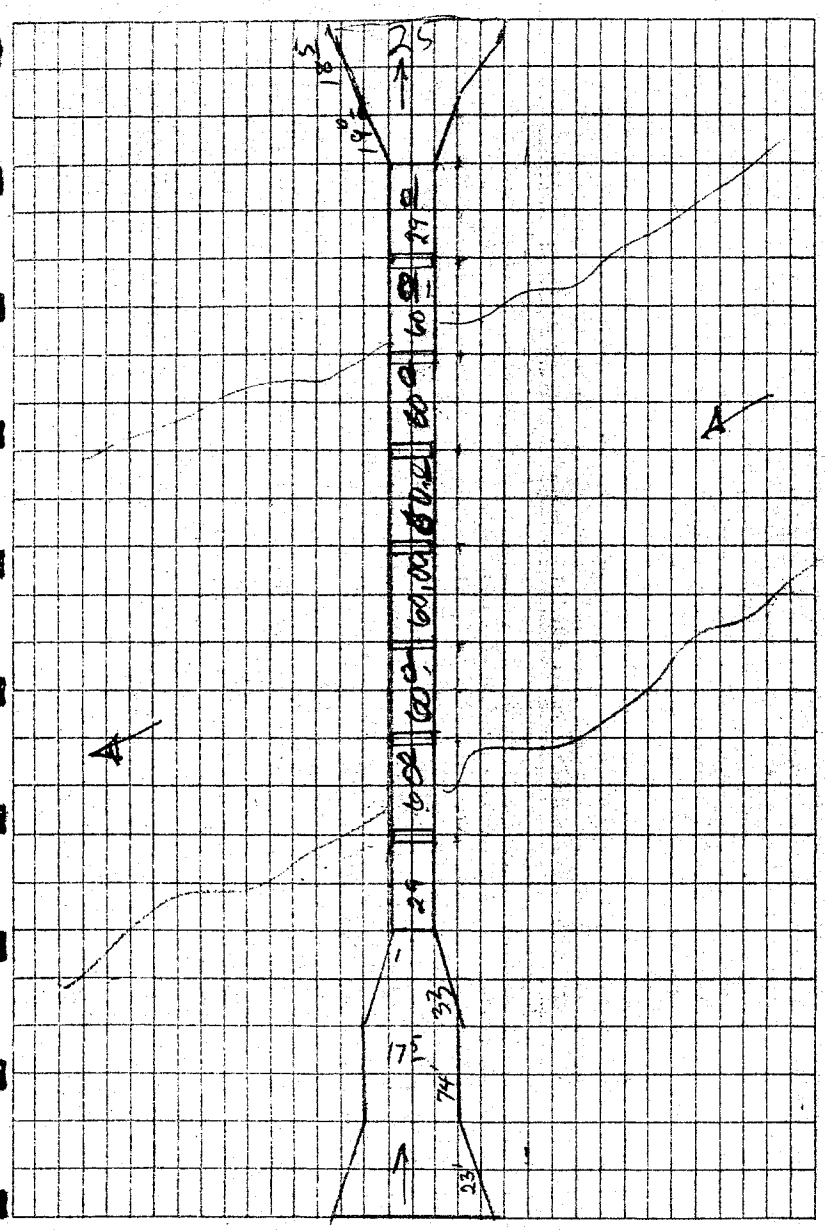
BM 5366



TYPICAL ALL PIERS
BOTH AQUA DUCTS



Girders sit on 1.5' x 1.2' Pad



		Level Check		Large V Scale	
503	4.22			1477	815
			7.05		
	2.88				
Lth E. Rd			6.07	1471.	795
	5.62				
CRl SS			5.20	1472	215
Lth W Rd			4.13	1473.	285

STA	HI	RD	RH		
824	4.85	825	6.00		
D	90	14	35		
Tgt 6.00 OR	269	45	32		Recipt
M					
		CH			
807	5.02	824	4.82		
D					
R					Recpt
M					
		CH			
824	4.81	807		T/P	PPM/%
G D	90	34	52	60/29.8	+2/70
Tgt D	90	30	22		
G R	269	25	07		
Tgt R	269	29	40		
G M	90	34	525		
Tgt M	90	30	21		
		CH			
807	5.02		4.81		
G D	89	25	43		
Tgt D 6.00	89	24	34		
G R	270	34	14		
Tgt R	270	35	24		
G M	89	25	445		
Tgt M	89	24	350		

013 F 3337.089
020 F 3337.086 .0026
006 M 1017.146

3336.9161
.9998363
3336.3698

X Seat	3.31			1527	183
D. Spine	331				
ERM			6.06	1524	433
D of F BC	583				
Panel			3.08	1527	183

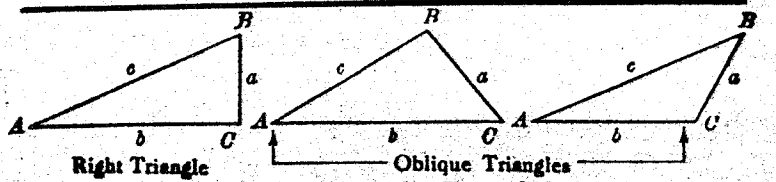
Deck SPINE East of 4-72" PIPES

D of E BC STA 504+95 47 125' RT CAP.

Deck SPINE East of 4-72" PIPES

	X	Feet	Cut Tank		
H 1 5.16			Tot		
571+54.79		0+00	West		
A 5.16		362.73	5.16		E side Cut Tank
		V88 52 22			
		H 362.66	V 7.14		
B 5.30					
C To NAIL By Rd		968.7	EAST		
		821.9	West		
	+11	Rod			
"D" THE ⊼	5.3	7.00	840	90°00'	
"D" To F			1540.1	90°44'	
			1539.97		
			19.71	1	

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

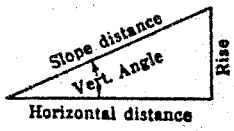
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

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	$s = \frac{a+b+c}{2},\ \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	$\text{area} = \frac{bc \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

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 the table, cos 5°10' = .9959. Horizontal distance = 319.4 X .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 X .0041 = 1.31. 319.4—1.31 = 318.09 ft.

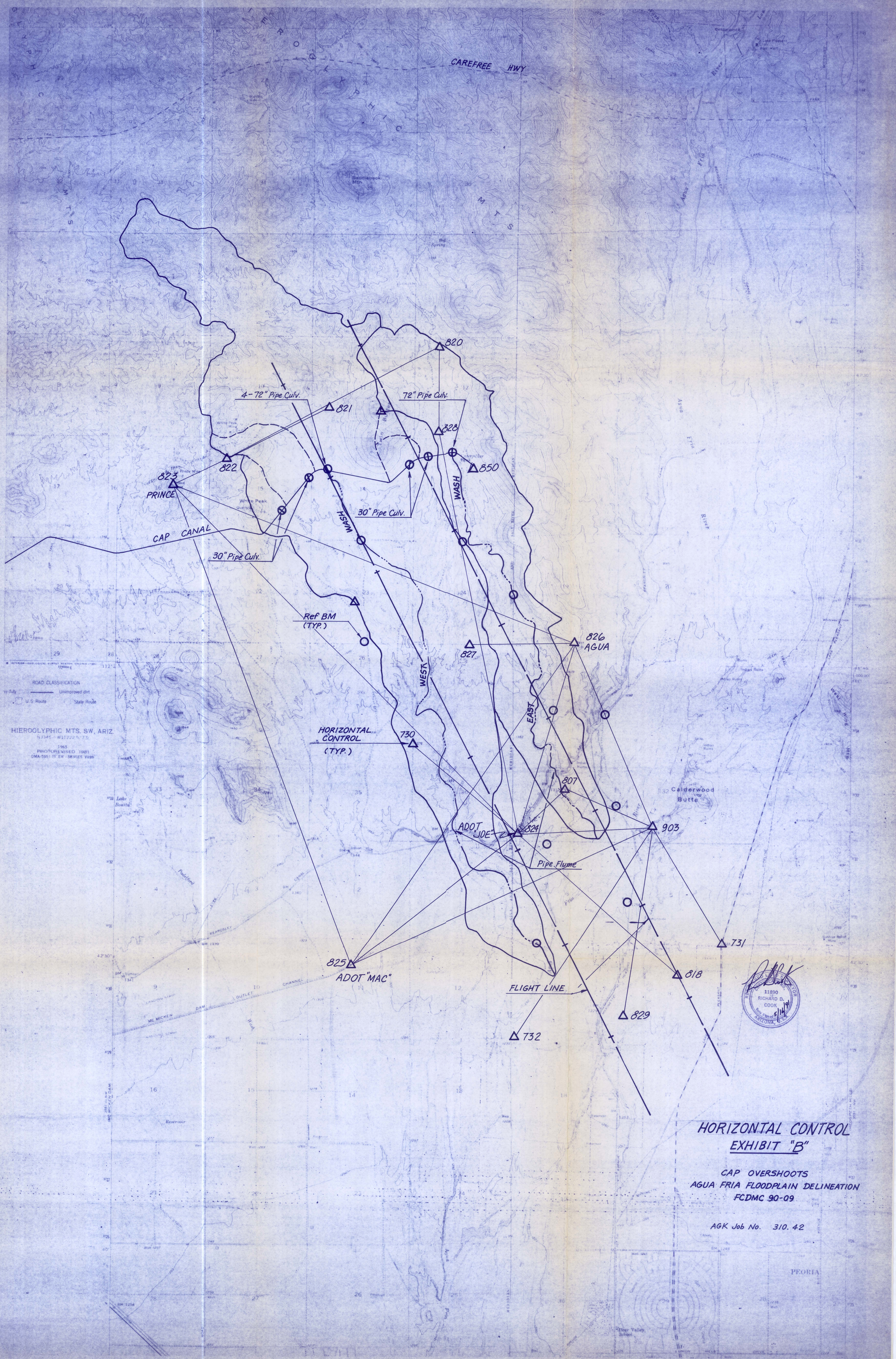
When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

VERTICAL CONTROL

EXHIBIT A

CAP OVERSHOOTS
AGUA FRIA FLOODPLAIN DELINEATION
FCDMC 90-09

AGK Job No. 310.42



HORIZONTAL CONTROL
EXHIBIT "B"

CAP OVERSHOOTS
AGUA FRIA FLOODPLAIN DELINEATION
FCDMC 90-09

AGK Job No. 310.42