MISC. SURVEY

MAY 1974 - APRIL 1976

BOOK 1-74

82-0020

JOB NO. 1-74-001 TO 1-74-018

Weatherproof Field Book

"Rite in the Rain" paper

32 pages

4⅝" x 7¼"

Keuffel & Esser Co., Morristown, N.J. 07960 Made in U.S.A.

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. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 = \text{Base}$.

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	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.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

Index

Elevations of water surface of Bridge over Little Bear River on each side of the Road. (MENDON ROAD)

Shots taken at approximately 500' intervals. (paced).

RICHARDSON ϕ

WARD T

JOB No. 1-74-001

6		$6\frac{3}{}$	95.6	7^{4}	$94\frac{5}{}$
5		$6\frac{2}{}$	95.7	$7\frac{3}{}$	94.6
TP	5.06	101.85	$5.45\frac{}{}$	96.79	
4		$6\frac{5}{}$	95.7	$7\frac{7}{}$	94.5
3		~~6~~ $6\frac{4}{}$	95.8	$7\frac{4}{}$	94.8
TP	4.02	102.24	5.12	96.22	
2		$7\frac{5}{}$	95.8	$8\frac{1}{}$	95.2
1.		$7\frac{9}{}$	96.0	$7\frac{8}{}$	95.5 west side of bridge
BM	3.34	103.34		100.00	

May 14 1974

To Mendon

Elevations taken at 500' intervals

Z

ϕ Mendon Rd

6 Pipe

5 Pipe

4

3 Pipe

2

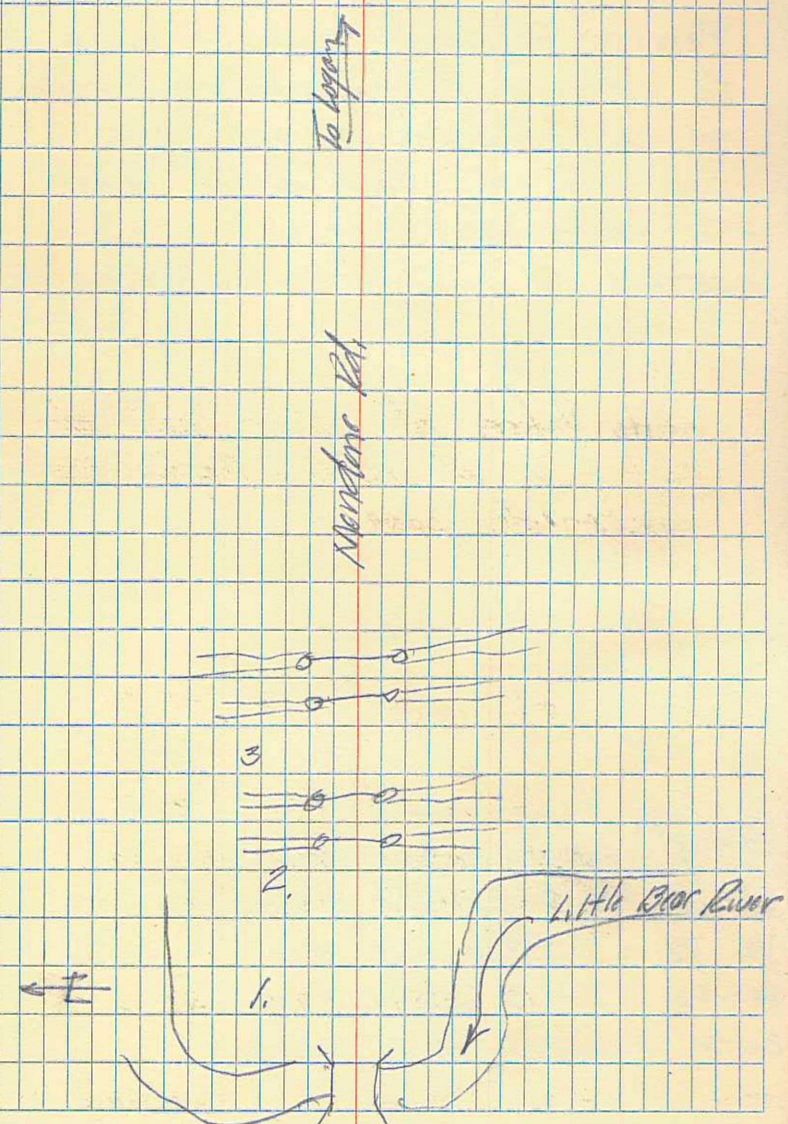
1

Little Bear River

shots taken at water level at each side of road — Approx. 500' intervals pead

	Lt		Lt	
4	7^{3}	92^{1}	6^{8}	93.2
3	7^{3}	92^{1}	6^{8}	93.2
TP	4.80	100.03	7.32	95.23
2	9^{8}	92.8	9^{5}	93.1
1	7^{4}	95.2	7^{2}	95.4
BM	2.55	102.55		100.00

May 14, 1974



	SLP DIST	V∠	HOR DIST	7-2-75 90°
				⊼ WILLIAMS ⊕ WARD

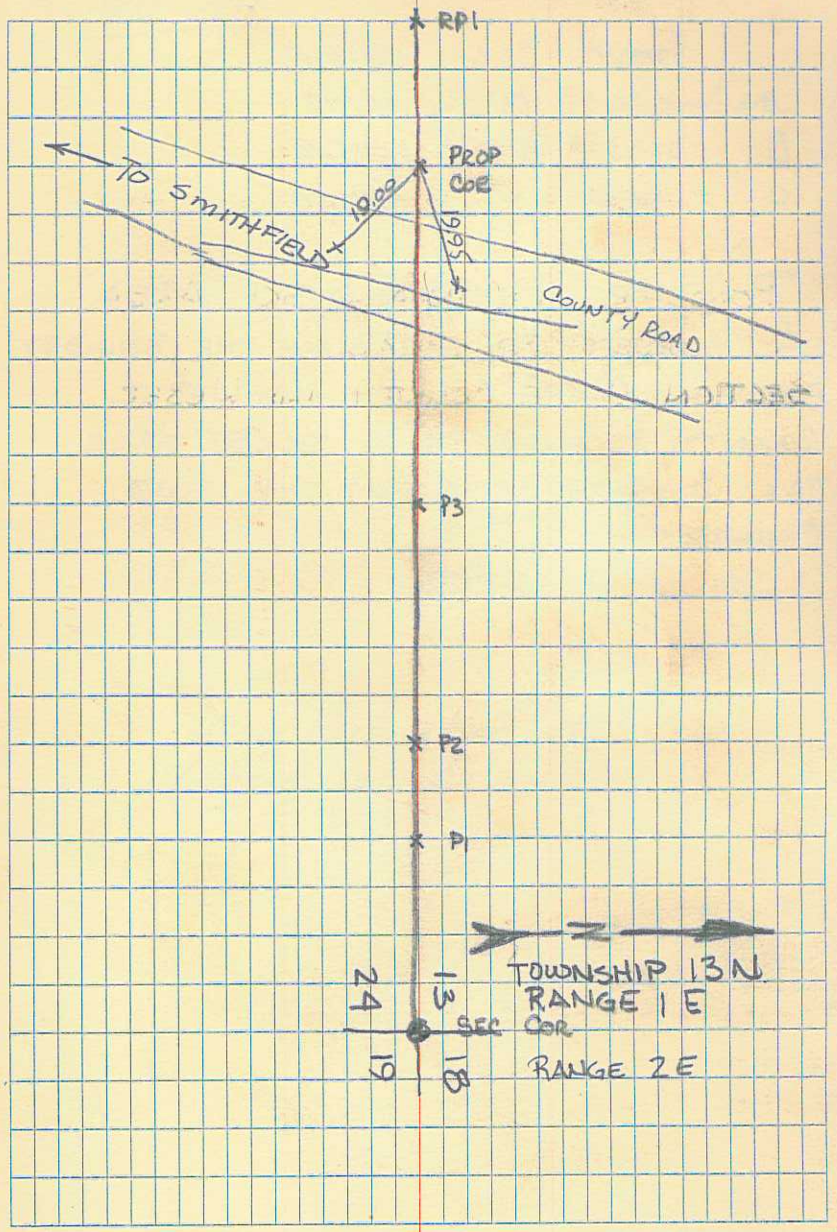
JOB No. 1-74-002

PRIVATE PROPERTY SURVEY, DONE TO REPLACE FENCE CORNER DESTROYED BY COUNTY ROADS MAINTENANCE DEPT. ON THE PROP OF MR. OREN G. MILES IN SMITHFIELD CANYON.

SECTION 13 TOWNSHIP 13 No RANGE 1 E.

4364.95
3702.27

PROP COR - RP1	665.78	84°28'20"	662.68
P3 - PROP COR	2410.02	112°09'10"	2232.12
P2 - P3	552.18	103°09'10"	537.69
P1 - P2	194.13	93°59'10"	193.66
COR - P1	360.84	110°07'50"	338.80



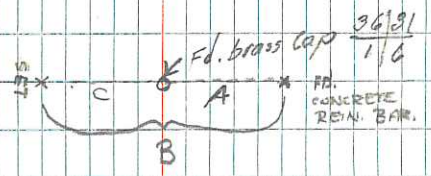
	Dist	U L	Cor. Dist
A	1224.60	104°12'40"	1187.12
B	2633.29	94°30'0"	2625.12
C	1408.64		1438.00

"POWDER MOUNTAIN SKI AREA"
A SURVEY TO ESTABLISH THE BOUNDRY BETWEEN CACHE COUNTY AND WEBER COUNTY BECAUSE OF A TICKET SALE TAX DISPUTE BETWEEN THE TWO COUNTIES
JOB NO 1-74-003

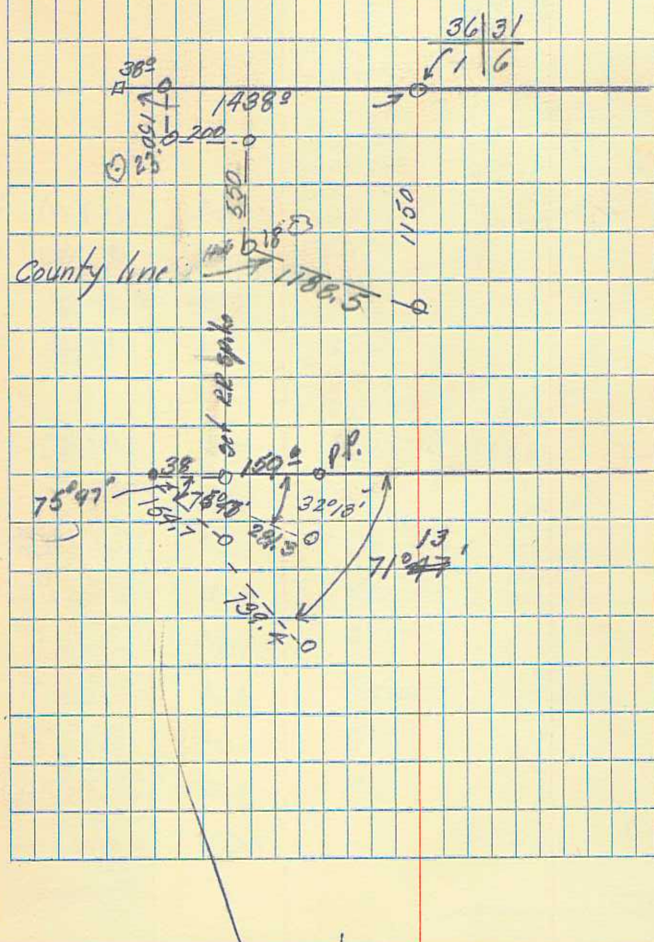
Powder Mt.

AUG 1, 1974 5

↑ Ward
↓ Richardson

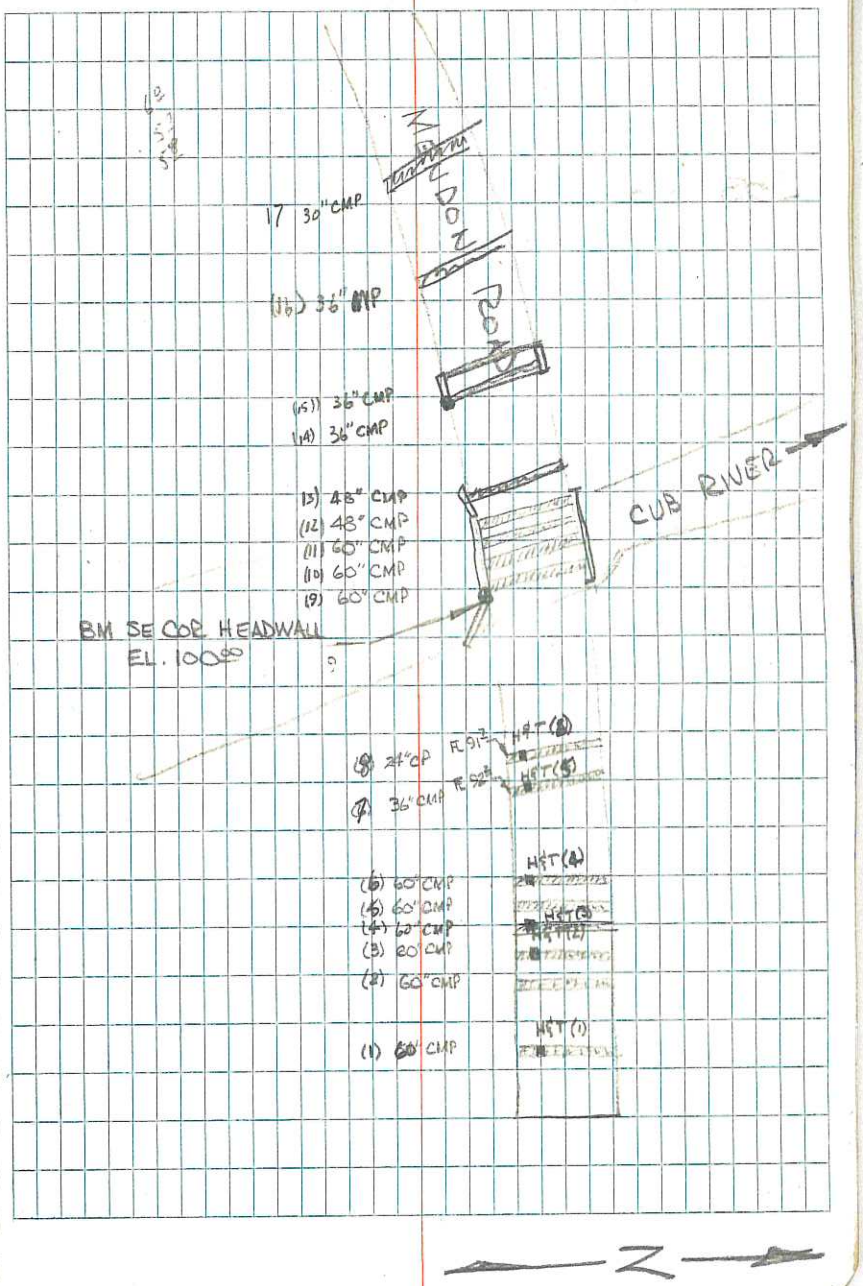


using declination 17½° the bearing is due west.


36 | 31
1 | 6
38'
1438'
200
550
1150
18
County line
1188.5
set RR spike
38
150'
P.P.
75°47'
32°18'
164.7
71°13'
739.4

MENDON CULVERT SURVEY

+	HI	−	EL	
π - WARD		3-19-76	9:00 AM	
¢ & NOTES - WILLIAMS		COLD, WINDY		
JOB No 1-74-004				
SEE JOB 1-74-001				
			96 7	H¢T (1)
		4 50	96 71	H¢T (2)
		4 71	96 50	H¢T (3)
		5 03	96 18	H¢T (4)
4 03	101 21	5 00	97 18	H¢T (5)
		5 16	97 02	H¢T (6)
		7 41	94 77	OUTLET WATER SURFACE ELEV.
		7 26	94 92	INLET WATER SURFACE ELEV.
		12 0	90 2	INLET FL 60" CMP (9)
		12 0	90 2	INLET FL 60" CMP (10)
		11 7	90 5	INLET FL 60" CMP (11)
		11 2	91 0	INLET FL 48" CMP (12)
2 18	102 18		100 0	BM SE COR CONCRETE HEADWALL (ASSUMED)



	PIPE No.	3-25-76 Inlet EL / Outlet EL	3-26-76	PIPE IN / OUT
ELEV AT BEND			94^{7}	
HGT 0^{0}	17	-2^{7} / -2^{7}	-2^{6} / -2^{6}	-4^{4} / 4^{9}
HGT	16	-2^{3} / -2^{5}	-2^{3} / -2^{4}	-5^{2} / -5^{5}
	15	-3^{2} / -2^{6}	-3^{1} / -3^{3}	-4^{8} / -5^{2}
HEADWALL 0^{0}	14	-3^{2} /	-3^{1} / -3^{2}	-5^{0} / -5^{7}
	13	95.4 / 95.1	95^{5} / 95^{2}	91^{6} / 91^{4}
	12	"		/ 90^{2}
	11	"		/ 90^{0}
3^{4}	10	"		/ 89^{0}
100	9	"		/ 92^{0}
5^{2} ⑥ 97^{0}	8	93.8 / 93.7	94^{0} / 93^{2}	92.3 / 92.2
5^{2} ⑤ 97^{2}	7	93.7 / 93.6	94^{0} / 93^{2}	91.7 / 91.2
5^{2} ④ 96^{2}	6	93.8 / 93.7	94^{0} / 93^{9}	90.2 / 90.2
5^{2} 96^{5}	5	93.7 / 93.6	94^{0} / 93^{9}	90.8 / 90.7
③ 5^{1} 96^{5}	4	93.7 / 93.6	93^{2} / 93^{8}	90.5 / 90.4
② 96^{7}	3	93.7 / 93.6	"	89.2 / 88.7
5^{3}	2	93.8 / 96.7	"	89.0 / 88.8
① 96^{71}	1	93.8 / 93.6	"	89.8 / 89.8

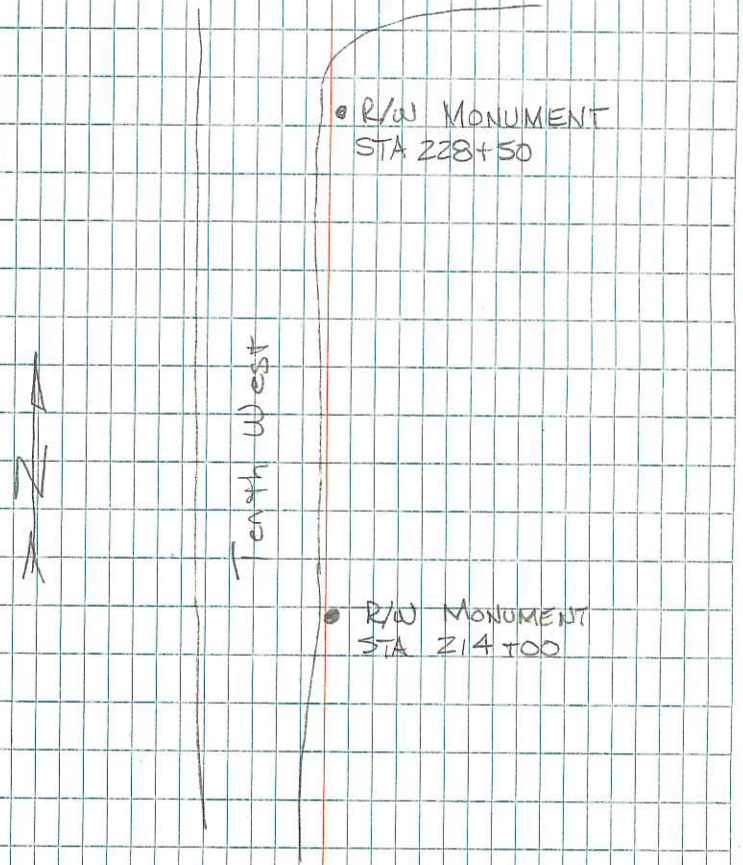
TEST NO.	SLOPE DIST.	V ∠	HOR DIST.
1-74-005			

The instrument was set up ~~at~~ STA 214+00 on a R/W monument on the east R/W line of Tenth West, between 10th No. and 14th No. The slope distance was then measured and the verticle angle recorded. The horizontal distance was then computed, and is to be used as a future reference for the calibration of the microranger. The offset number was previously determined on the State Calibration Pedestals as recorded on page 32.

1	1449.02	89°59'40"	1449.02

SET PERMANENT R.P.
FOR MICRORANGER
CALIBRATION

4-14-76 T = 50° PPM = 30
T & NOTES - Williams OFFSET = +.257
ϕ - Ward



Porcupine Bridge

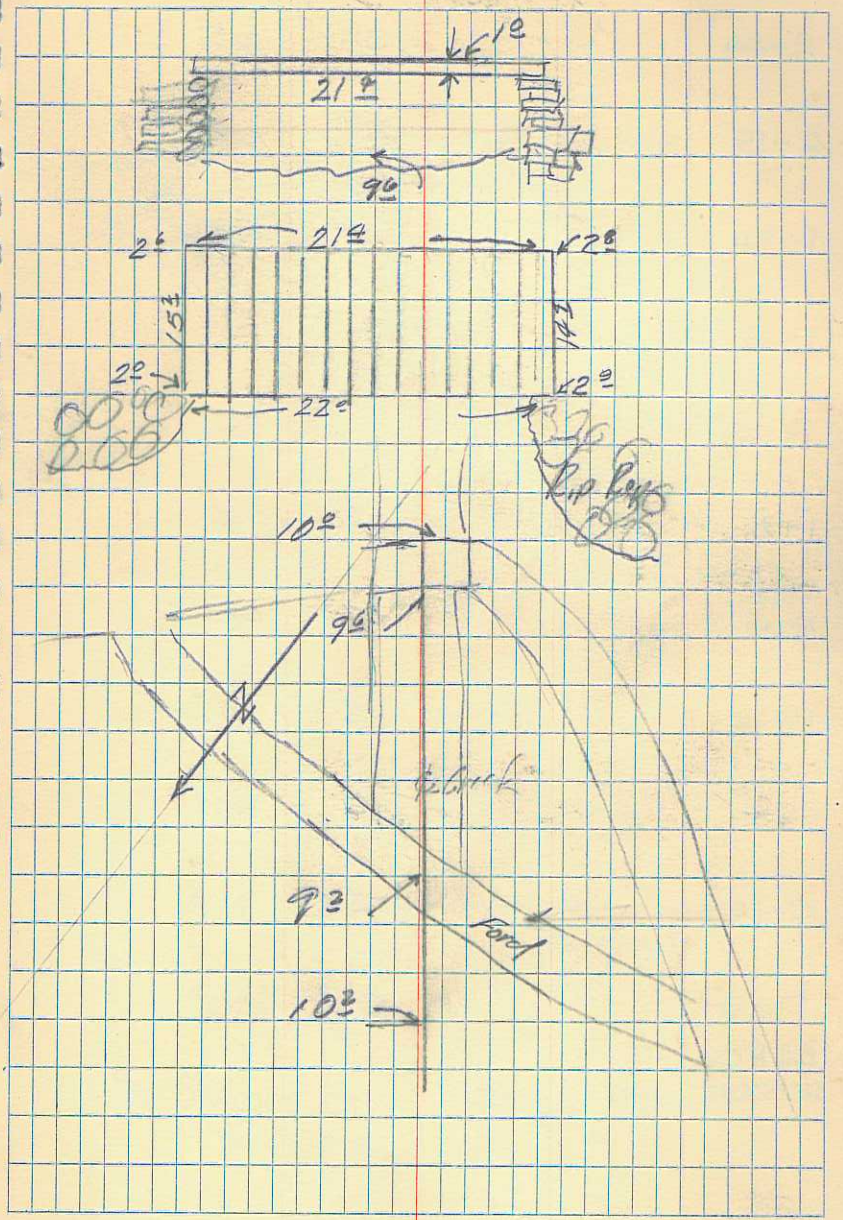
JOB NO.
1-74-0006

G. L. RICHARDSON
N. WILLIAMS
P. WARD

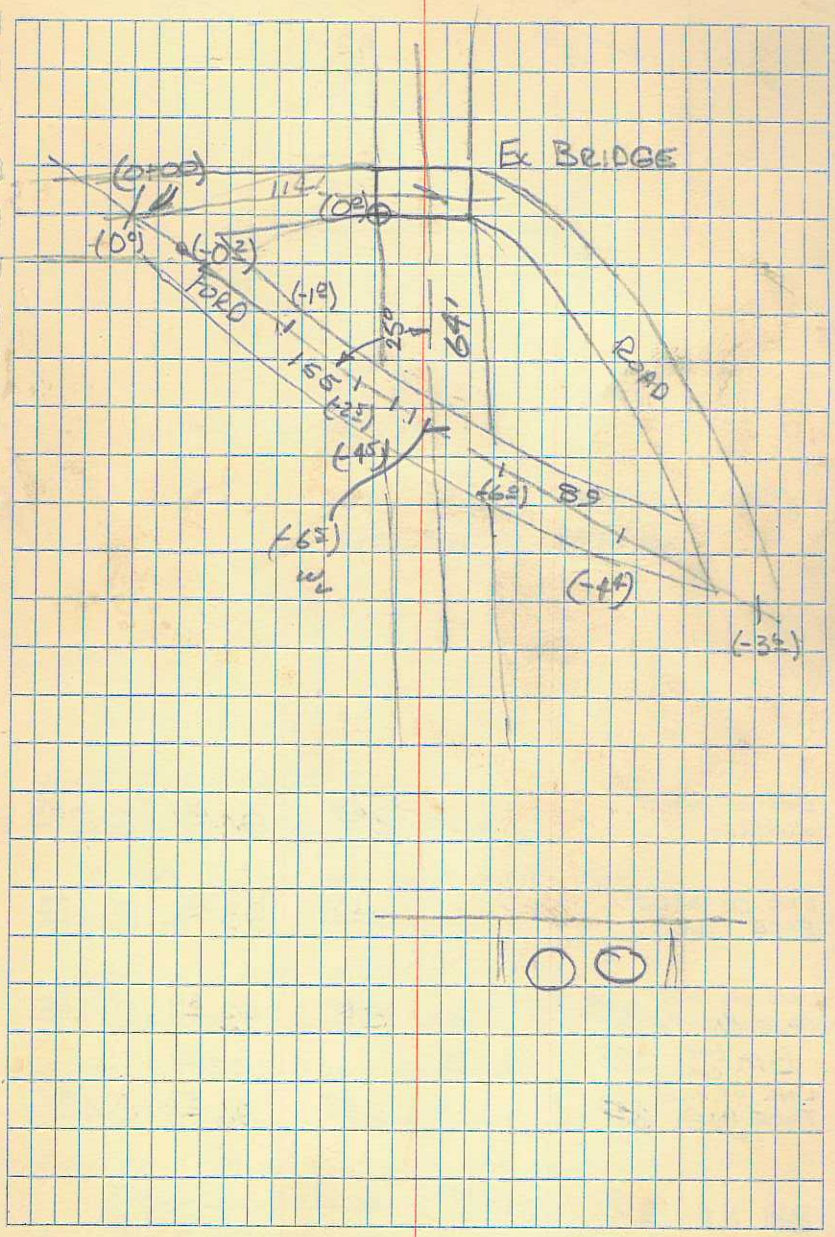
upstream Ford Br. 10°
Downstream " " 9½
9¾

middle of Ford 9½
50' below Ford 10½

BM 3.54
Hub under tree 50'N +50E of Ford



2+44			3.6	96.4
2+19			4.4	95.6
1+94			6.0	94.0
1+69				
1+50				
1+25			6.5	93.5
1+00			4.5	95.5
0+75			2.5	97.5
0+50			1.0	99.0
0+25			+ 0.2	99.8
0+00			0.0	100.0
BM N COR. OF BRIDGE	0.00	100.00		100.00

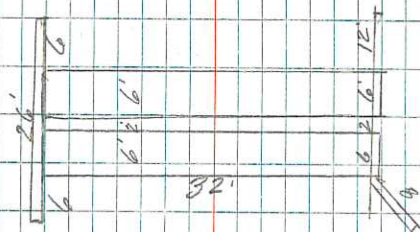


102^{75} − 8^{87} = 93^{88}, 91^{76}, 102

102^{75} − 9^{23} = 93^{52}, 91, 1^{72}

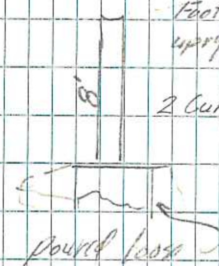
102^{75} − 8^{69} = 94^{06}, 91^{80}, 2^{26}

LINE OF OUTLET 55 OFFSET		8^{69}	94^{06}	C 2^{26}
LINE OF OUTLET FACE (N.W.)		9^{23}	93^{52}	C 1^{72}
LINE OF INLET FACE (N W) ~~8^{87}~~		8^{87}	93^{88}	C 1^{88}
BM (NE COR) 2^{75}	102^{75}		100^{00}	
LINE OF INLET FACE (NE) ~~6^{25}~~	2	6^{25}	96^{52}	C 4^{52}
BM N.E COR. BRIDGE 2^{77}	102^{77}		100^{00}	



West wall
Footing - 312'
uprights 192'

East wall
Footing - 408'
uprights - 424



2 Curtains 1' Center n walls. = 1800

Total 3136' an 2095 lbs.

April 18, 1975 GLL.

Back hoe - 10 AM - 3:00 PM

2 man, pick up - trailer start - 10 AM - 5:00 PM

April 19

pump + 2 man 9:00 AM

Concrete - 10:00 AM 1-7 Cu yd - 1-9 cu yd.

April 21 - 2 men + Foreman

setting forms. Poured East wall after 6:00 PM

April 22 - Poured west wall, striped East wall
Honey comb, No evidence of Tamping.

April 23 - striped west wall, I told savage to get a plasterer out to fix it. No luck

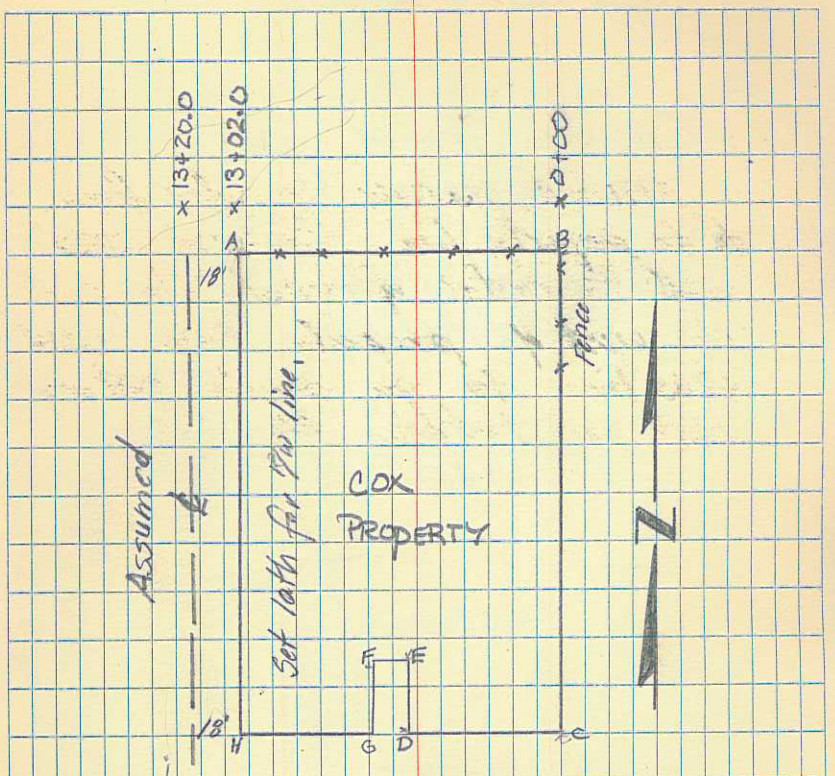
April 24 - County crew

April 24 (cont'd)
Finishing got there about 2:00 worked till 5:00 PM - Ran out of Cement. Said he would come back in AM
Back hoe came @ 2:00 and worked to six.
April 28. County working. Finisher had not shown up.

JOB No. 1-74-007

ADDITIONAL R/W FOR ROAD THROUGH COX PROPERTY

Assumed Easterly boundry fence to be property line. Measured 1320' west to center of road. This point 18' west of property Fence. Used this line to go South setting lath on tentative R/w.

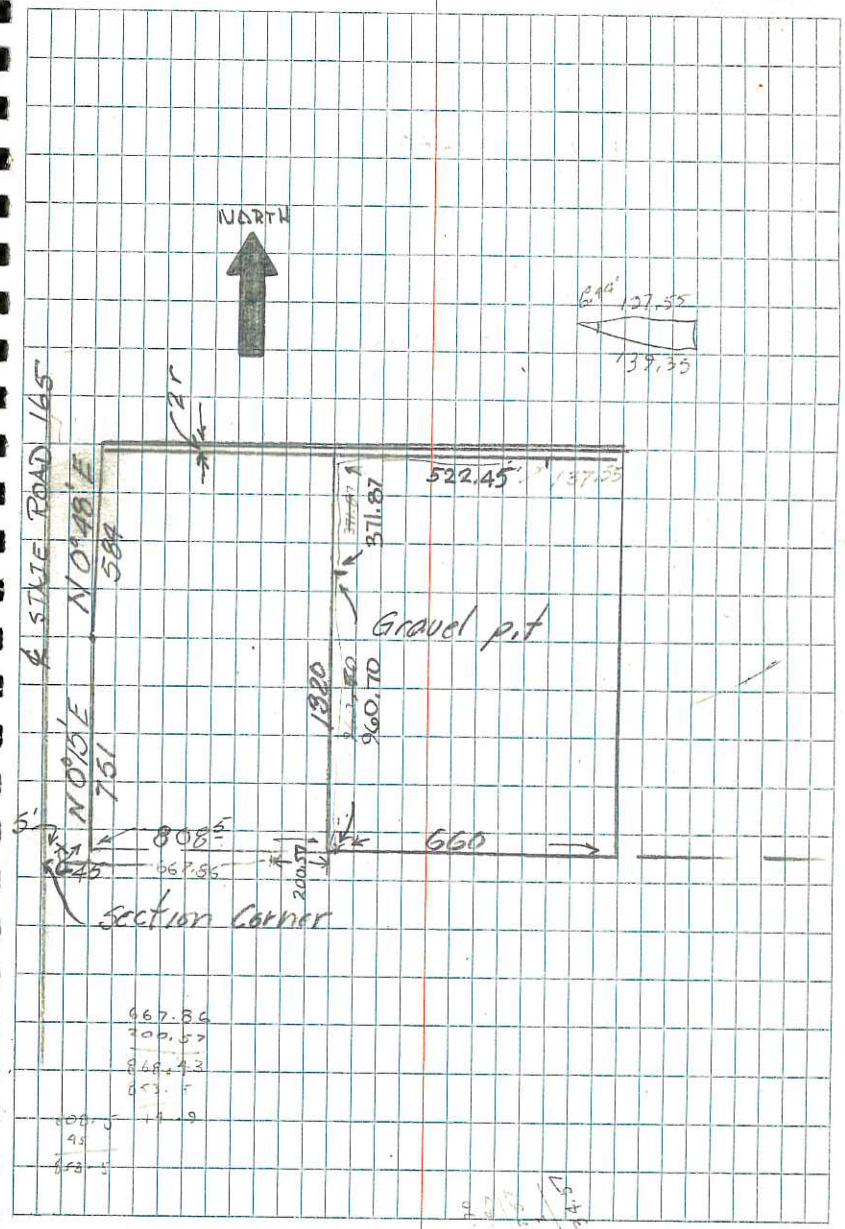


A-B	1320	E
B-C	1973 82	S
C-D	651 82	W
D-E	354 62	N
E-F	140	W
F-G	354 62	S
G-H	528	W
H-A	1973 82	N

JOB NO 1-74-008

County Gravel pit
in Hiram

obtained from
Tuddenham



County Gravel Pit in County
by Legrand Johnsons,
NW 1/4 Sec 34 T11N R1E

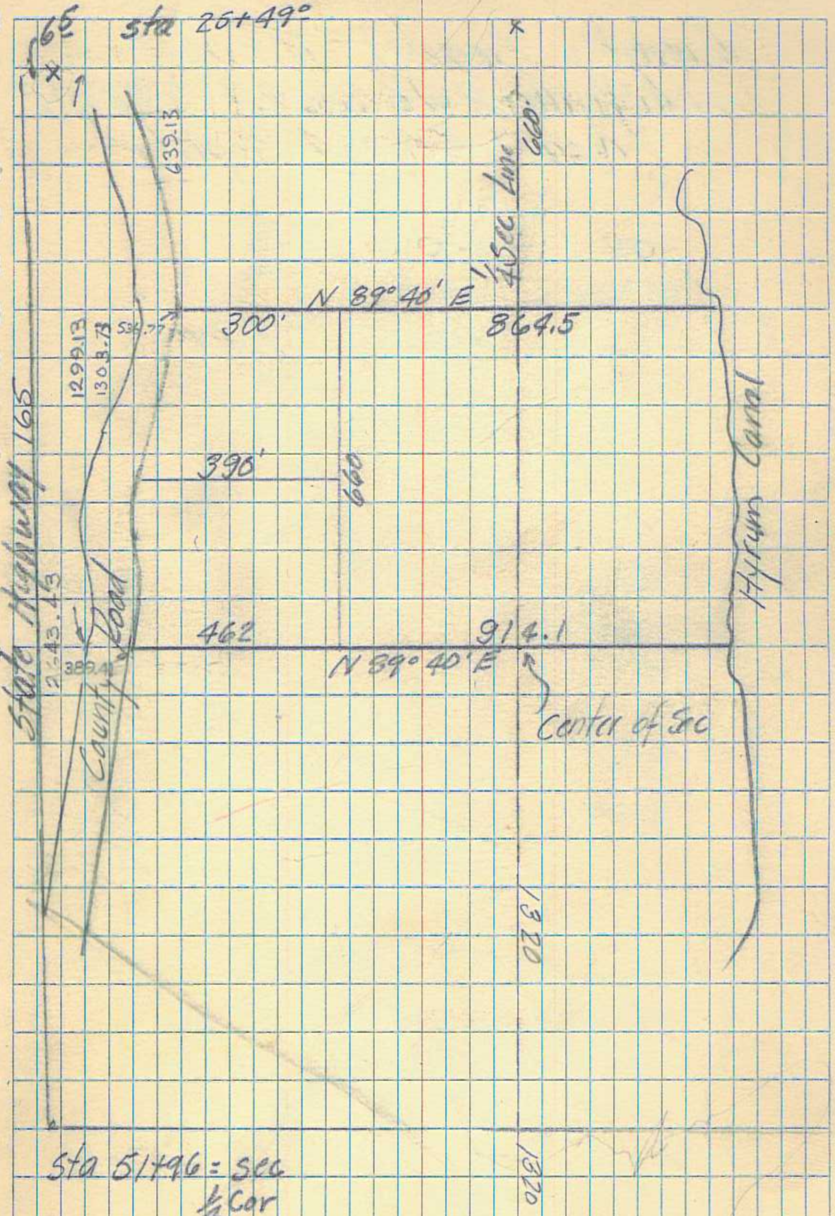
CONT. ON PAGE 28.

JOB NO. 1-74-009
(SEE 53 2-77-006)

1299.13
660
639.13

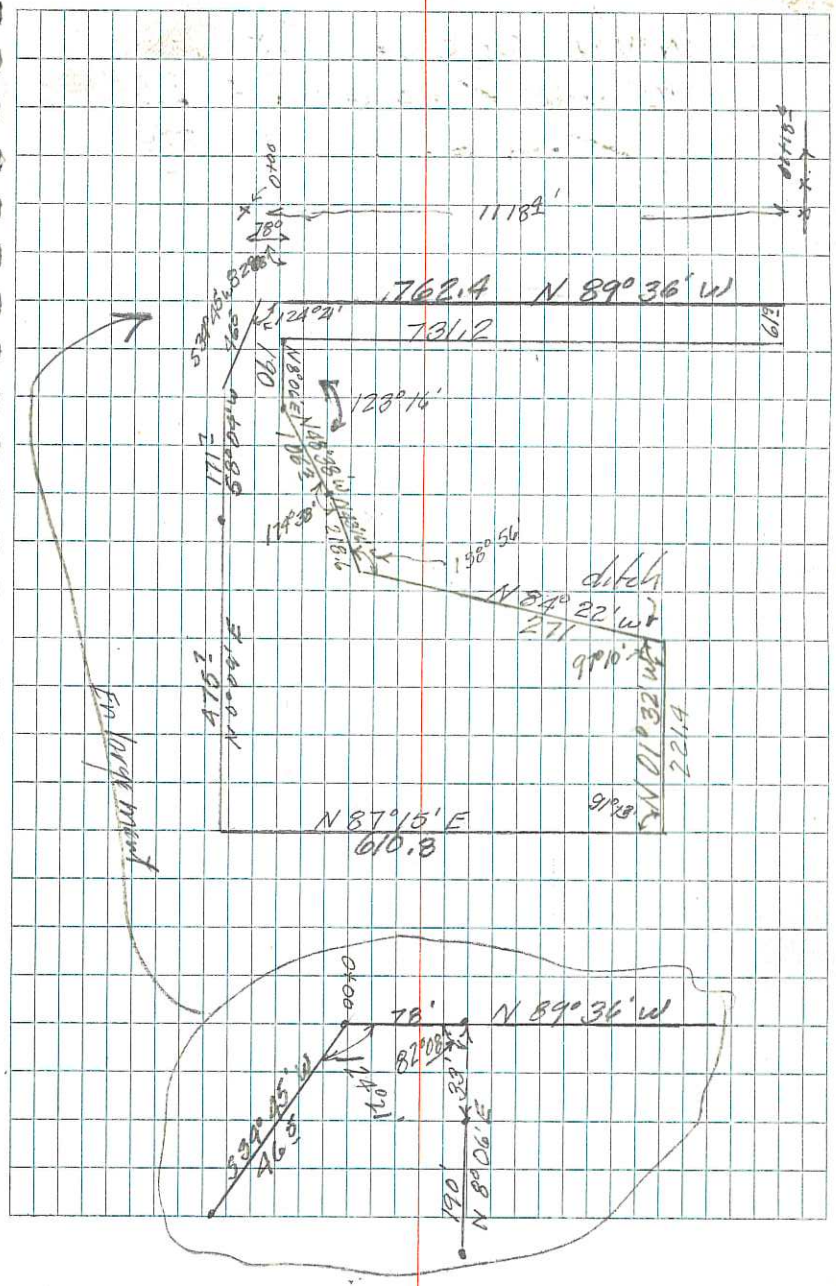
33565
38921

1299.31
1303.65
4.34



County Gravel Pit in
Mulkilla NW¼ Sec 27 T1NR2E
Adjacent to Jessop Property

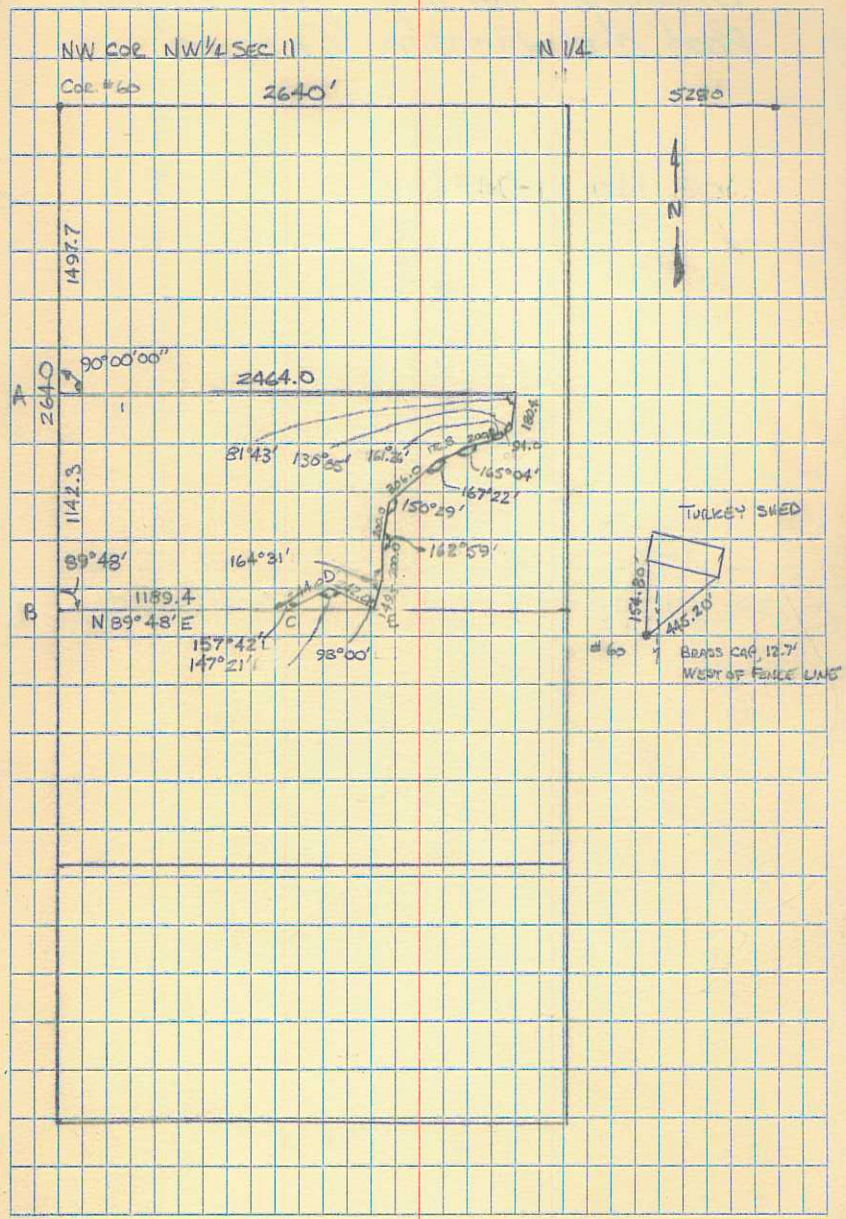
JOB 1-74-010



TUDDENHAM PROPERTY
NW 1/4, SEC 11, TOWNSHIP 10 NORTH, RANGE 1 EAST

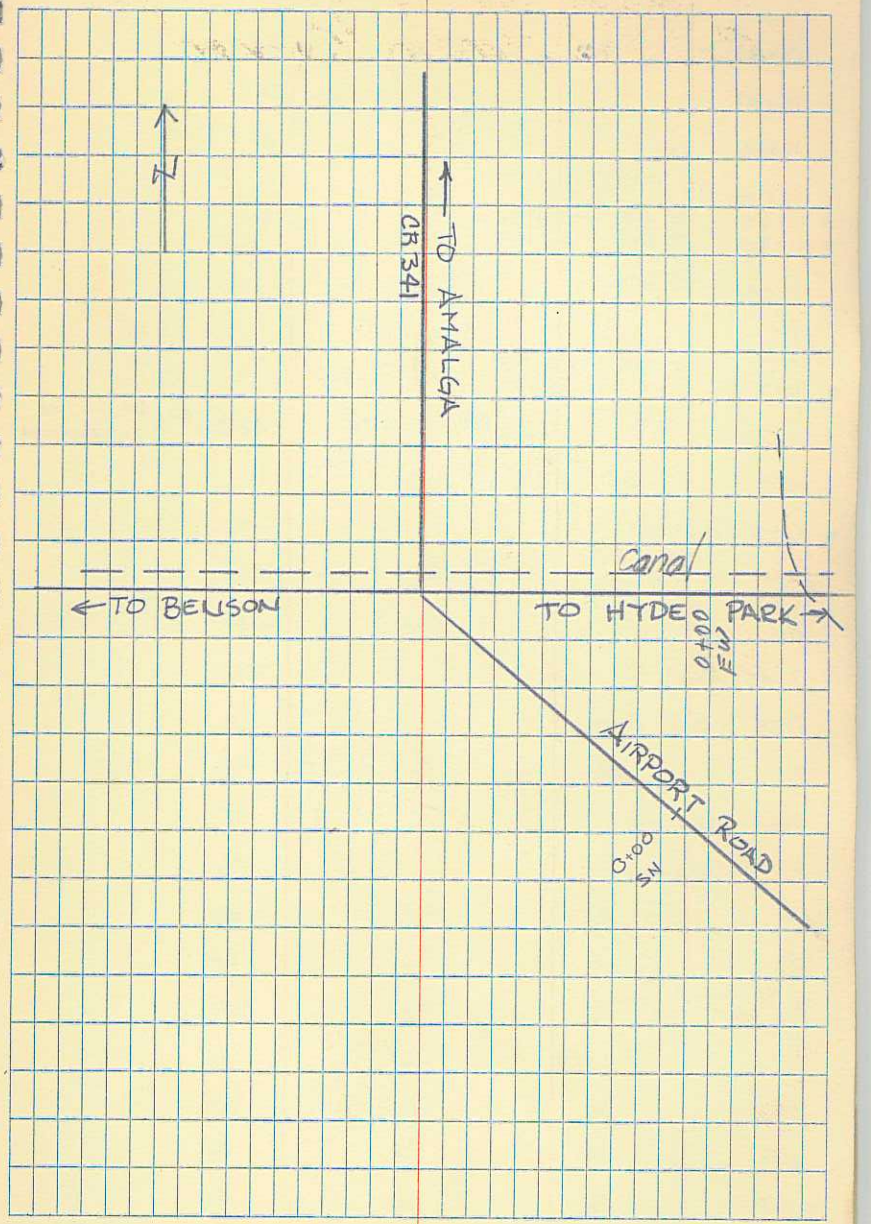
JOB NO 1-74-011

D TO E	242		142°21'	
C TO D	244		157°42'	
B TO C	1189.65	89°09'	89°53'30"	1189.69
S.C TO B	2639.49			
SC. TO A	1497.10			
	DIST	V.A.	Δ	Tan DIST



Drainage Survey for Airport Road and Benson Corner

JOB No 1-74-012



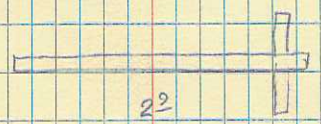
	+	HI	−	EL	
13+00					
12+80					
12+60	DW				
12+00					
* 11+65	18" CMP				
o 11+40	18" CMP				
11+08	℄ INTER				
11					
o 10+80	18" CMP				
	4^{34}	4430^{64}	5^{90}	4426^{30}	BM TEL. POLE INTERSECTION
10−					
* 9+18	PIPE 18"				
9−					
8−					
7+45	DW				
7+25	DW				
7+					
6+67	DW				
6+45	DRIVE WAY				
6−					
5−					
4−					
3−					
2−					
1−					
0+00					
EW	3^{20}	4432^{20}		4430	BM CONC. HEADWALL SW OPENING 4430

7^{7} 4^{3} 7^{2}
7^{7}
7^{6}
7^{8} 4^{3} 8^{7}
8^{6} PIPE CANAL
7^{3} 5^{5}
3^{5}
3^{6}
PIPE CANAL
7^{3} 5^{5}
6^{1} 9^{5}
10^{1}
9^{4} 5^{9} 9^{7}
9^{5} 5^{8} 9^{2}
9^{4}
8^{9}
8^{7} 5^{4} 9^{3}
8^{2}
8^{8}
8^{6} 5^{0} 9^{2}
9^{0} 4^{9} 9^{1}
9^{9} 4^{5} 9^{0}
8^{9} 4^{5} 8^{2}
8^{8} 4^{4} 8^{2}
8^{8} 4^{3} 8^{7}
8^{5} 4^{2} 8^{0}

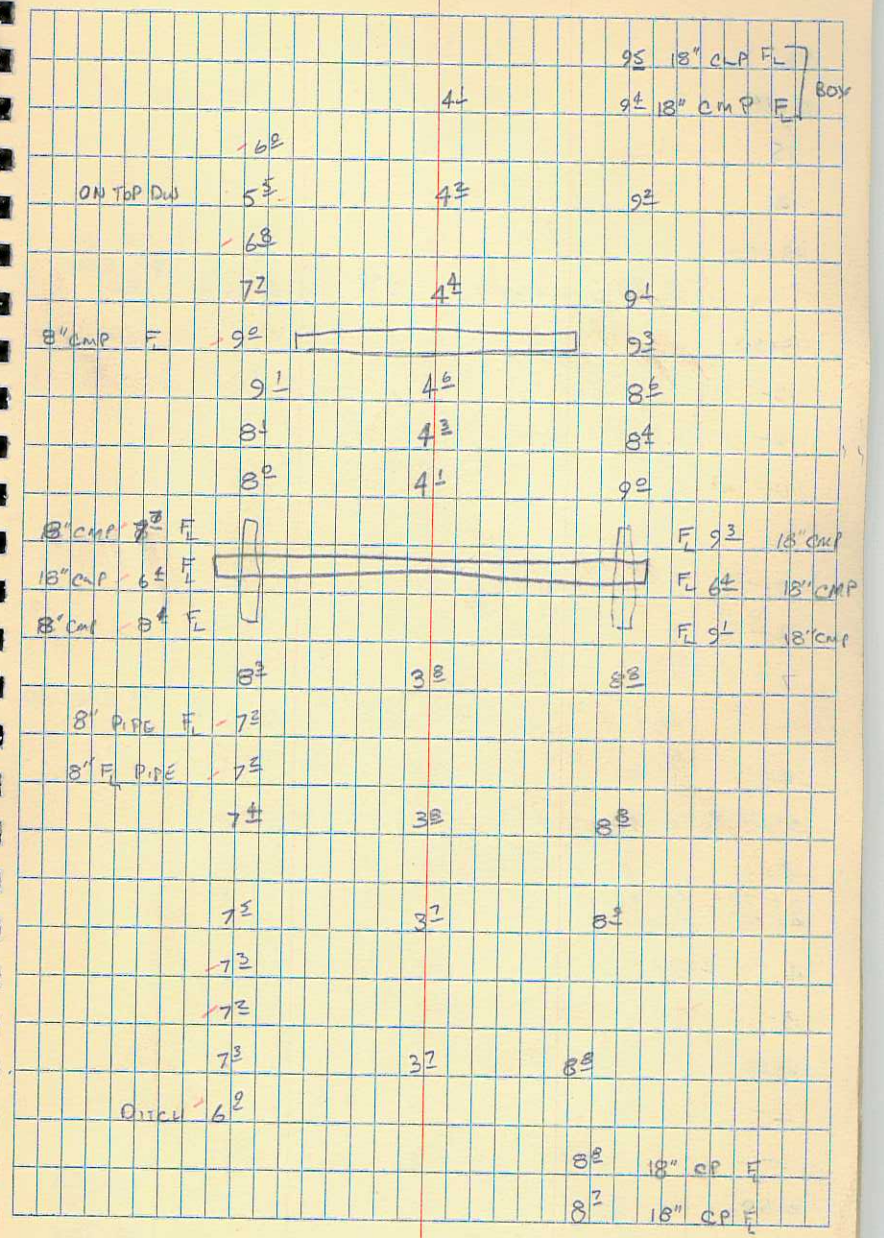
4430

	+	HI	−	EL	
32+					
31+					
30+					
29+					
28+					
27+					
26+					
	4.66	4430.40	4.72	4425.72	TP EDGE RD
25					
24					
23					
22					
21+					
20+					
19+					
	4.18	4430.44	4.38	4426.26	TP EDGE RD
18+					
17+30					
17+15					
17					
16+					
15+					
14+					
13+70	RIGHT DITCH				
13+35	℄ MERIDIAN RD				
	LEFT DITCH				
		4430.64			

6.3	3.5	8.7
7.3	3.7	9.3
7.2	3.8	9.0
7.0	4.0	8.9
7.5	4.2	8.6
7.6	4.5	9.0
7.5	4.5	8.6
7.7	4.7	7.9
7.5	4.7	8.6
7.6	4.6	8.8
7.3	4.5	8.5
7.9	4.4	8.5
8.0	4.4	8.7
8.0	4.0	8.5
7.7	3.5	7.8
7.2		6.9 ℄ PIPE 12" CMP
5.5		4.2 18" PIPE
6.5	2.9	7.5 ℄ PIPE DITCH 12" CMP
7.2	3.8	7.8
7.3	4.1	8.9
7.2	3.2	7.7
7.5		
7.5		



	+	HI	−	EL	
			4^{73}	4425^{85}	BM sw Cor Box
42+74					
42+10	DW				
42					
41+90	DW				
41−					
40+05					
40−					
39−					
38−					
37+40					
37+30					
37+15					
37					
36+36					
36+15					
35−					
	4^{00}	4430^{58}	3^{32}	4426^{58}	TP EDGE PAVEMENT
34−					
33+67	DW				
33+20	DW				
33					
32+73					
32+61					
32+38					
		4430^{40}			



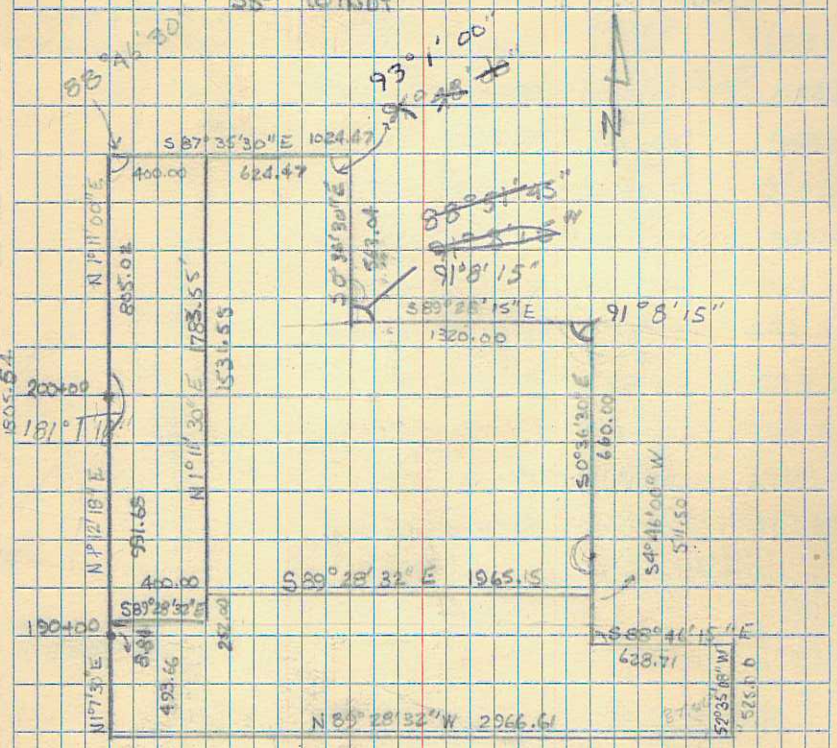
	+	HI	−	EL	
16					
15+25					
15					
14					
13+90					
	4 00	4429 76	5 40	4425 76	TP EDGE RD.
13+90					
13−					
12−					
11−					
10−					
9−					
8−					
7−					
	5 13	4431 16	4 47	4426 63	TP EDGE RD.
6−					
5+82 PIPE					
5−					
4+70	BEGIN DITCH				
4+43	CANAL				
4 −	INTERSECT OF RDS				
3−					
2+22					
2−					
1−					
0+00					SIGN ⊕
SOUTH-NORTH RD.	4 22	←	4430 52	4426 30	BM TELE POLE AT INTER

	8 7	3 9	5 3
F 12" CP	8 8		
	5 5	3 4	4 1
TP	4 1	3 5	5 6
F 12" CP	7 9		
DW 12" CP	8 4		
	8 7	4 8	7 6
	8 1	4 4	6 7
	8 9	4 0	5 6
	8 9	4 2	6 4
	8 9	4 5	7 3
	8 5	4 7	7 7
	7 6	4 8	7 8
	8 0	4 0	7 6
	8 0		8 2 12" CMP
	7 7	3 2	7 1
	7 2		6 9
	7 1	3 3	
	7 6	4 1	
			7 3 F 6" CP END DITCH
	7 6	3 9	7 4
	7 9	3 7	7 6
	7 6	3 5	7 8

			–	Elev					
			5^{76}	$442\,4^{00}$	BM BOLT ON GUARD SOUTH POST OF BRIDGE				
21+50						FL 18" CMP –	18^{3}		
21–							11^{6}	7^{0}	13^{2}
20–							7^{6}	5^{8}	6^{3}
19+34						FL 18" CMP –	11^{5}		
19							10^{6}	4^{3}	5^{4}
18–							9^{3}	4^{2}	5^{3}
17–							8^{6}	4^{2}	6^{1}
		29^{76}							

CACHE COUNTY MULTIPLE USE PARK

MARCH 15, 1975 JOB NO. 1-74-013



PARK IS LOCATED BETWEEN HYDE PARK AND NORTH LOGAN ON STATE H'WAY 85 (US H'WAY 91)

87 35 30 89 28 32
36 30 2 35 08
87 71 60 91 63' 40"
87 72 00 92° 03' 40"
88 12 00
88 46 15
4 46 00
93 22 15"
(86° 37' 45")

88° 46' 15"
0 36 30"
88° 09 45"

179 59 60
91 21 23
(88° 38' 37")

179 60
88 12
91 48
0 36 30
5' 22 30

87° 35' 30"
36' 30"
88° 12 00

179 60
88 12
4 46 00
91° 48'

88 46 15
35 08
53 23

179 59 60
5 22 30
174° 37' 30"

87 35 30
1 1 100 90
91° 21' 23"
88 46 30

89° 28' 15"
36' 30"
88° 51 45"

179 59 60
88 51 45
91° 8' 15"

89° 28' 15"
36 30

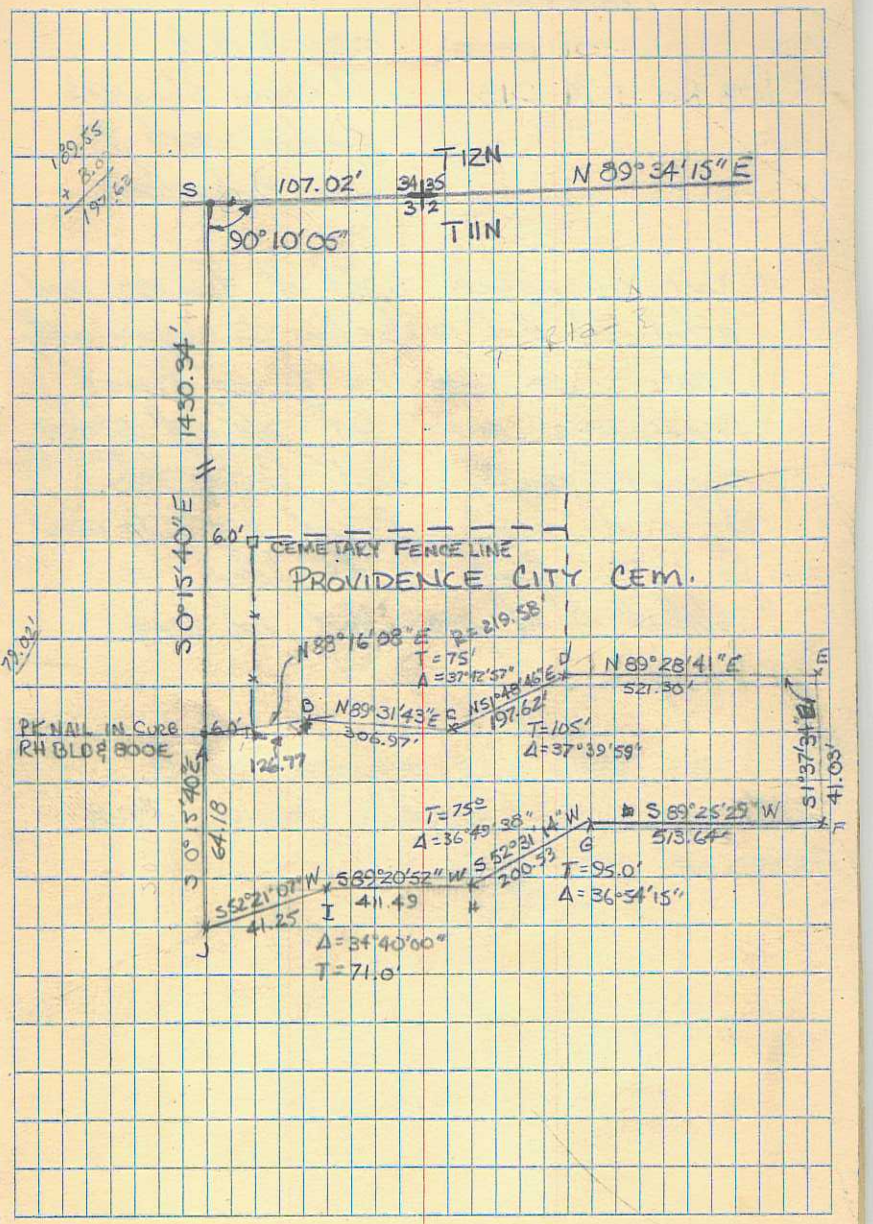
87° 56' 20"

EAST PARCEL
RIVER HEIGHTS ROAD ANNEXATION
NEAR CEMETARY

176 00 55 JOB No. 1-74-014

T & S NOTES - WILLIAMS
ϕ - WARD & HOANH
75° NO WIND

STA.	DOUBLE ANGLE	ANGLE	HOR. DIST.
			AB
∡SAB	176°00'55"	88°00'28"	126.77'
∡ABC	360-231'10"	178°44'20"	306.97'
∠BCD	360-75°25'55"	128°11'14"	197.62'
∠CDE	360-75°19'50"	142°20'05"	521.30'
			EF
∠DEF	182°12'30"	91°06'15"	41.03'
∠EFG	177°53'55"	88°56'57"	513.64'
∠FGH	360°-73°48'30"	143°05'45"	200.53
∠GHI	360-73°39'15"	143°10'22"	411.49
∠HIJ	360-73°59'30"	143°00'15"	41.25
∠IJA	104°19'05"	52°09'33"	64.18



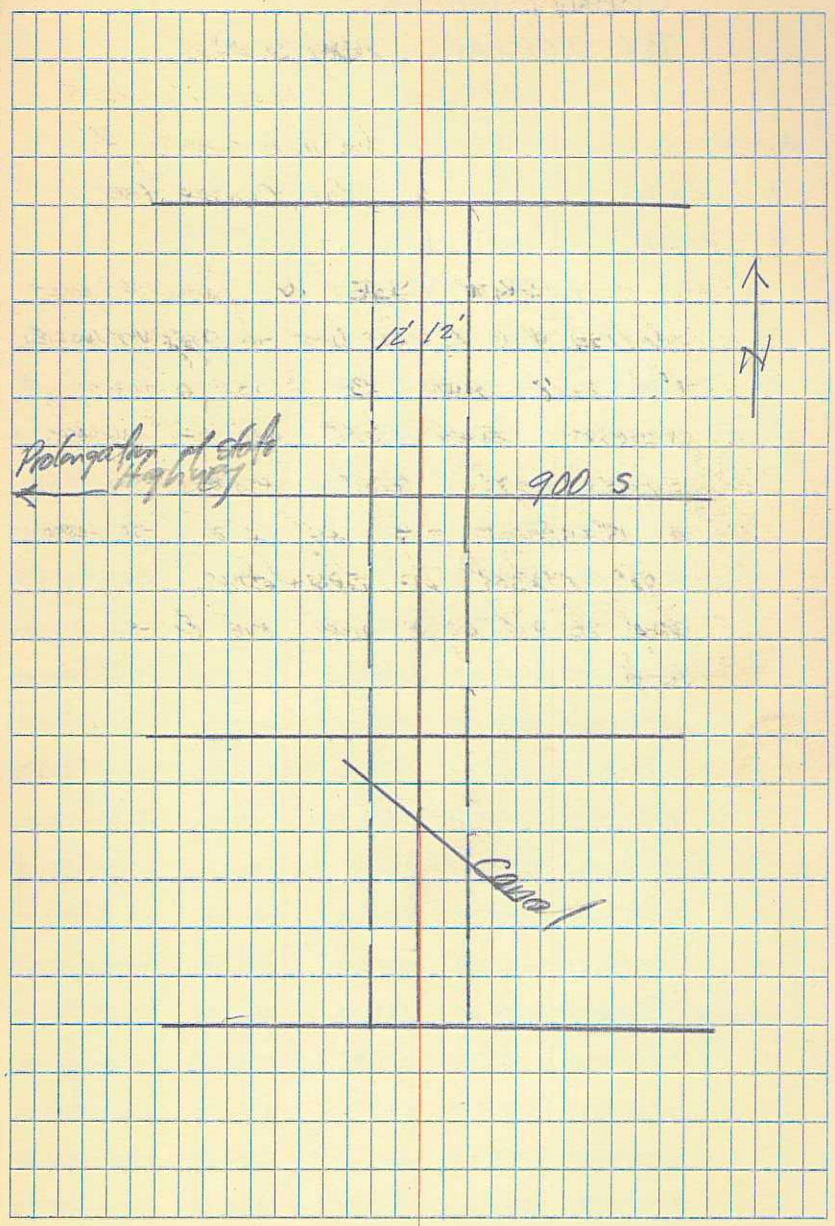
Paradise

JOB No 1-74-015

May 6 1975
Snow showers
Partly word ↑
G. Richardson

We averaged split of fenders and established ℄ centerline ⊥ approximately 100'. We ran a ℄ we about measuring and set offset stakes approximately 200' intervals for a distance out of 17' to clear for 5' offset to shoulder, staked ℄ at pipe but not long enough

THIS ROAD SURVEY WAS DONE TO FOR A BI-CENTINIAL PROJECT FOR PARADISE CITY



COUNTY GRAVEL PIT

BY LEGRAND JOHNSON

HYRUM

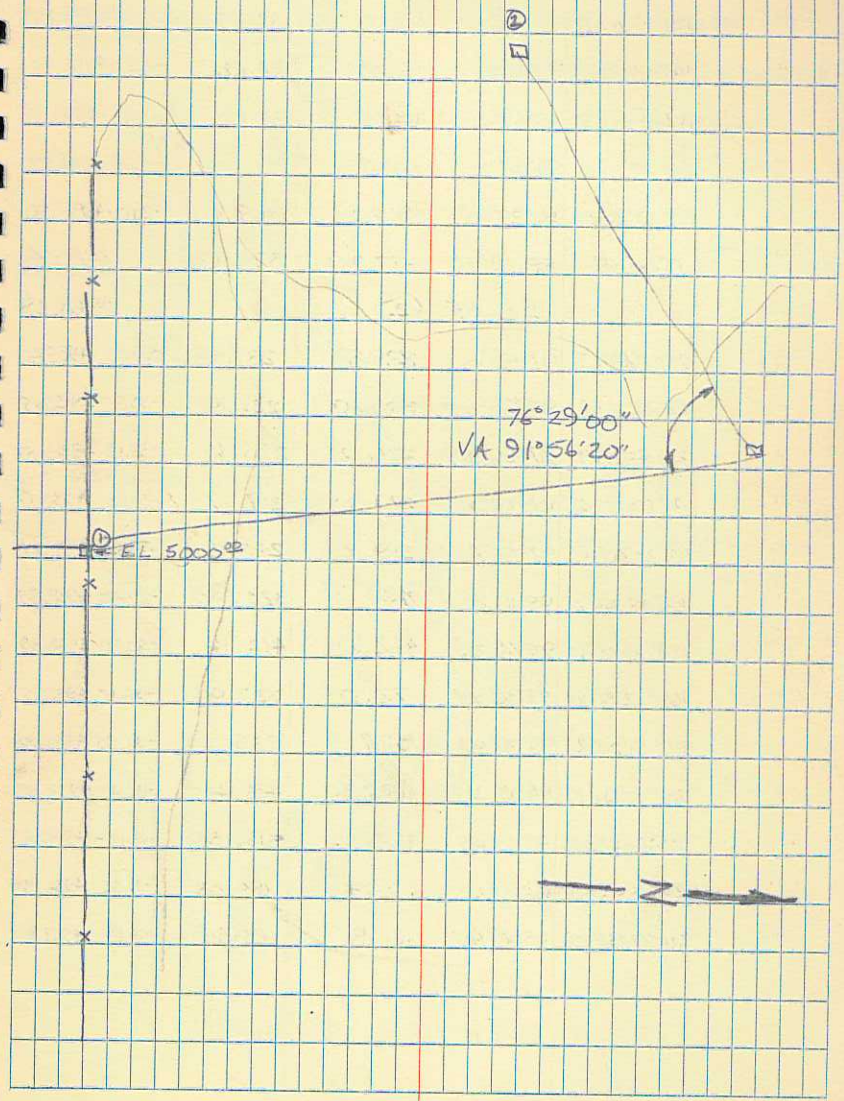
NOTES: WILLIAMS 12/16/75

T : WARD COLD, CLOUDY (30°)

ϕ : HOANH JOB NO 1-74-009

FROM PAGE 16

①	HOR. ~~ANG.~~	VERT ∠	SLP DIST	HOR. DIST	VERT. DIST - EL
"	~~0°28'30"~~ 0°00'00"	~~89°~~ 59'10"	153.~~84~~	153.34	4.04 - 5000.04
"	1°20'00" RT	90°29'45"	480.95	480.93	-4.16 - 4995.84
"	5°29'45" RT	90°38'05"	463.84	463.81	-5.14 - 4994.86
"	6°28'15" RT	90°37'40"	315.20	315.81	-3.45 - 4996.55
"	16°07'50" RT	90°33'10"	277.70	277.69	-2.68 - 4997.32
"	27°34'50" RT	90°46'00"	378.28	378.25	-5.06 - 4994.94
"	44°44'20" RT	91°13'10"	288.00	287.93	-6.13 - 4993.87
"	60°40'20" RT	93°33'00"	281.24	280.70	-17.41 - 4982.59
"	73°12'00" RT	92°54'50"	473.13	472.52	-24.05 - 4975.95
"	76°41'05" RT	92°20'00"	489.75	489.~~34~~	-19.~~94~~ - 4980.06
"	87°12'00" RT	92°30'30"	434.05	433.63	-19.00 - 4981.00
"	91°46'35" RT	91°58'20"	545.86	545.54	-18.79 - 4981.21
"	79°47'00" RT	92°12'50"	583.62	583.18	-22.55 - 4977.45
"	79°18'00" RT	92°04'10"	643.24	642.82	-23.23 - 4976.77
HUB North side, "	79°37'05" RT	91°40'30"	671.26	670.97	-19.62 - 4980.38
"	103°05'50" RT	91°41'30"	679.30	679.00	-20.05 - 4979.95
"	109°14'50" RT	91°59'00"	524.00	523.69	-18.14 - 4981.86
"	116°41'05" RT	92°12'10"	463.00	462.66	-17.80 - 4982.20



COUNTY GR. PIT CONT.

STA	HOR ∠	VERT ∠	SLP DIST	HOR DIST	VERT DIST – EL
①	137°40'40" RT	92°38'30"	333.15	332.80	-15.35 - 4984.65
"	141°20'00" RT	94°15'00"	214.55	213.96	-15.90 - 4984.10
"	178°14'20" RT	91°38'10"	183.10	183.08	-5.25 - 4994.77
"	141°57'00" RT	92°31'00"	36.25	36.22	-1.59 - 4998.41
"	112°44'00" RT	99°33'00"	83.45	82.29	-13.85 - 4986.15
"	60°37'10" RT	94°18'20"	203.57	203.00	-15.28 - 4984.72
"	43°57'20" RT	90°39'40"	181.80	181.79	-2.10 - 4997.90
② TO HUB North SIDE	0°00'00"	88°13'30"	377.30	377.12	4980.38
		EL OF ②			4968.69
②	2°02'45" LT	97°59'10"	239.50	237.18	-33.27 4935.42
"	18°05'00" RT	98°55'00"	229.33	226.56	-35.55 4933.15
"	30°09'05" RT	97°56'00"	276.25	273.61	-38.13 4930.57
"	41°08'05" RT	100°02'15"	221.05	217.67 (SAME EL, LINE, DIST = 240)	-38.52 4930.17
"	95°20'40" RT	97°58'40"	219.25	217.13	-30.43 4938.26
"	106°15'05" LT	95°16'15"	324.75	323.38	-29.82 4938.87
"	127°25'00" LT	93°45'35"	462.10	461.11	-30.30 4938.39
"	166°22'50" RT	92°36'30"	727.75	727.00	-33.12 4937.57
"	183°51'20" RT	93°39'40"	577.13	575.95	-36.85 4931.84
"	235°32'50" RT	94°19'30"	482.81	481.44	-36.41 4932.28
"	259°34'30" RT	98°10'40"	198.55	196.53	-28.24 4940.45
"	318°54'05" RT	101°51'30"	157.45	154.09	-32.35 4936.34
"	316°09'10" RT	95°19'40"	181.87	181.08	-16.89 4951.87

RIVER HEIGHTS ANNEXATION 29

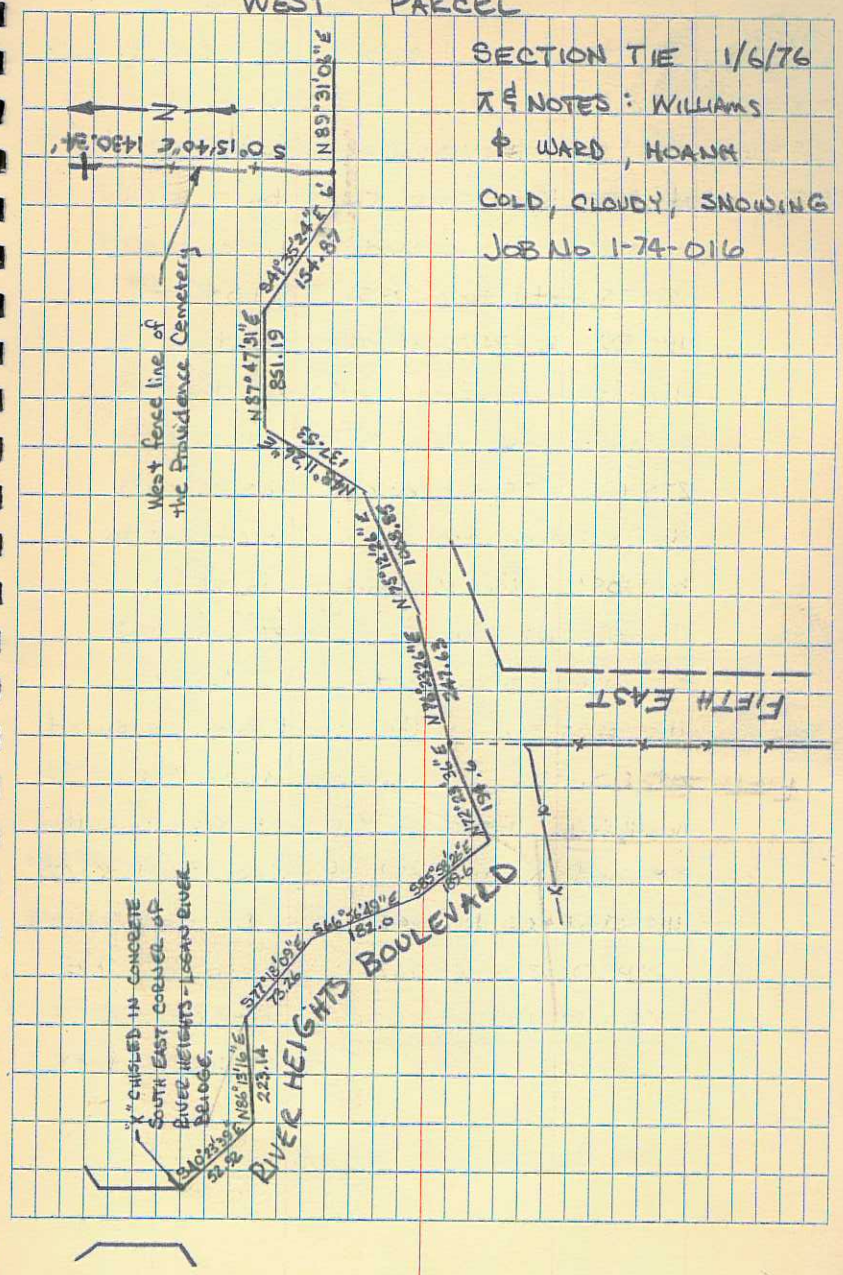
WEST PARCEL

SECTION TIE 1/6/76

T & NOTES: WILLIAMS & WARD, HOANM

COLD, CLOUDY, SNOWING

JOB No 1-74-016



91° 02' 00"

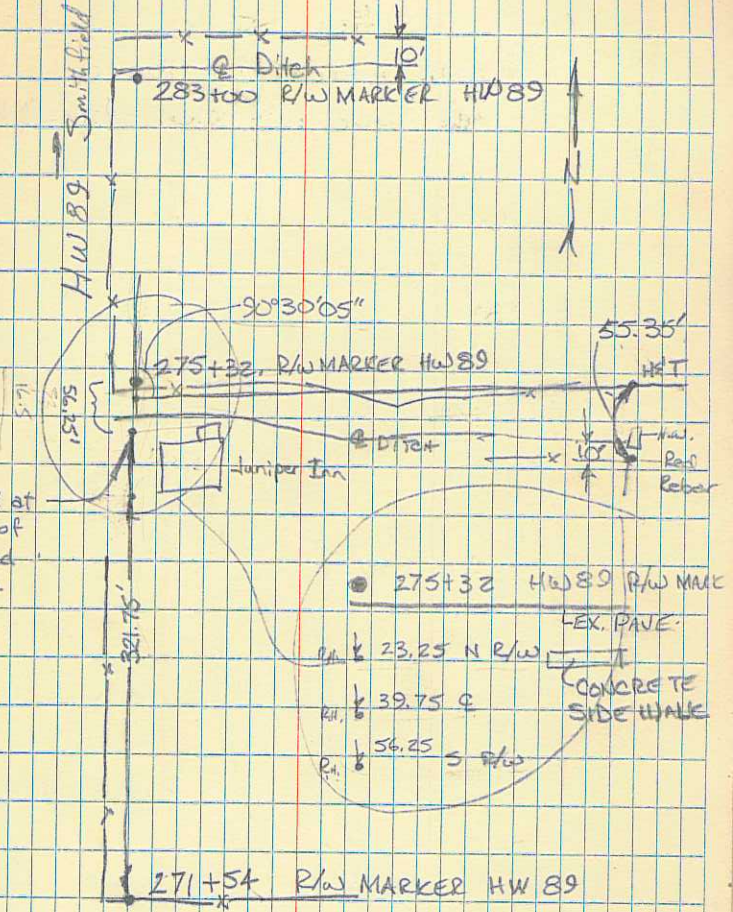
We set the south R/W line of the Hyde park road by measuring the recorded distance (321.75 feet) from STA. 271+54 of HW 89, in a northerly direction, along the bearing between the aforementione R/W STA, AND STA 275+32. From previous measurements, the existing R/W was determined to be 33'. The ℄ and north R/W R/W Line Corners at the east ~~edge~~ of Hw 89 were also set. The R/W at the east end of the road was measured at 55.35'. The angle along the north R/W between the east R/W line Hw 89 and North R/W of H.P. Rd. = 90° 30' 05"

The distance between the NW R/W CORNER AND THE NE R/W CORER = 2416.56 feet.

SLP DIST = 2416.72
VA = 89° 19' 50"

HYDE PARK ROAD
R/W SURVEY
1-74-017

T & Notes - Williams 4/12/76
℄ Ward Cloudy, Windy
Hoanh



LEVELS OF AREA NEAR MENDON ROAD FLOOD SITE

MARCH 11, 1976

T WARD — COOL AND SNOWING

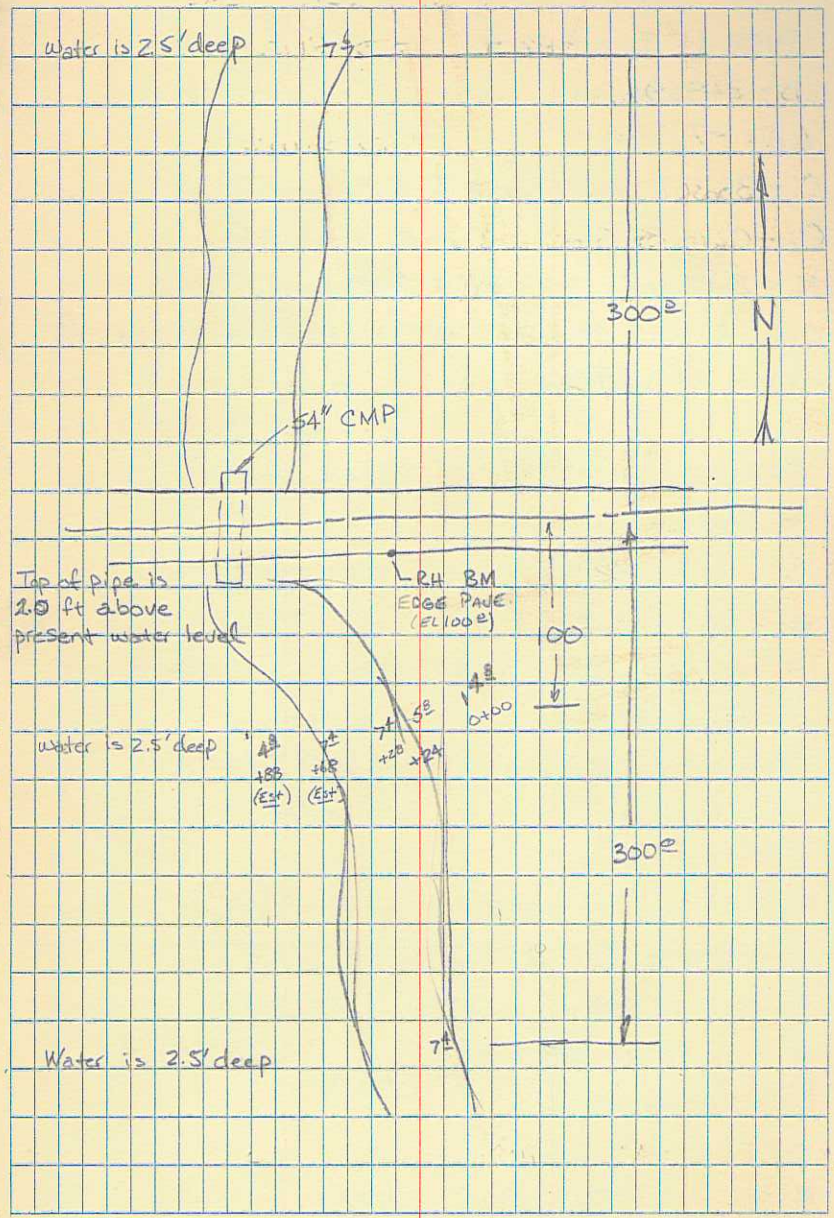
ϕ HOANH

ϕ WILLIAMS (NOTES)

JOB NO 1-74-018

SEE JOB 1-74-001 AND 004

+2.1	102.1	100.0	ELEV OF BM SOUTH EDGE Mendon Road (ASSUMED)



903
988
,986 3

PIER 1 TO PIER 4

D = 349.967 m

Δz = -7.384 m

C_i = 393.70 mm C_c = 76.20 mm

$C_i - C_c$ = .3175 m $C_c - C_i$ = -.3175 m

K = ~~.3117~~ .909 mm ΔM = ~~.335~~ .118 mm

SLP DIST. = 349.967 + (7.384)(~~.002117~~ .000909) + .000~~335~~ 118

SD = 349.9~~74~~ 77 m

OFFSET = +257 PPM = 34

Tests = 10

$\bar{x}$ = 349.9~~48~~ 30 s = .011

OFFSET = +260

TESTS = 10

$\bar{x}$ = 349.935 s = .011

OFFSET = +250

$\bar{x}$ = 349.931 s = .005

TOO FAR !!

PIER 1 to PIER 6

D_1 = 2000.50 Δz = -12.003 m

$C_i - C_c$ = .3175 m $C_c - C_i$ = -.3175 m

K = .000159 ΔM = 0

SD = 2000.502

OFFSET = +257

= 5 $\bar{x}$ = s =

MICRORANGER CALIBRATION

ON THE STATE PEDISTALS

4-13-76 COOL-WINDY

61° F

Temp. Correction 34

C_i = 393.70 mm +258

C_c = 76.20 mm

PIER 1 to Pier 3

D_m = 150.009 m 7 tests

s_x = 0.006 m

$C_i - C_c$ = 317.50 mm = .3175 m

$C_c - C_i$ = -317.50 mm = -.3175 m

K = ~~.3176~~ 2.117 mm ΔM = ~~.476~~ .335 mm

SLP DIST. = 149.9~~96~~ 98 + (4.001)(+.002117) + .000335

S.D. = 150.005

+257 10 TESTS $\bar{x}$ = 150.004 s = .008

Pier 1 to Pier 6 D_1 = 999.945 m Δz = 11.518

$C_i - C_c$ = .3175 K = .3175 mm M = .0175

SD = 999.940 m

= 5 $\bar{x}$ = 999.970 s = .039 OF = +257

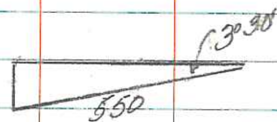
(7-A)

N 89° 34' 15" E

159.96
154.7
4.8

1841.29

497.60
86° 35'

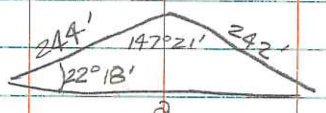


12.89
500.75
513.64

549.08 549.08
31.66 497.60
32.78 51.48
51.4

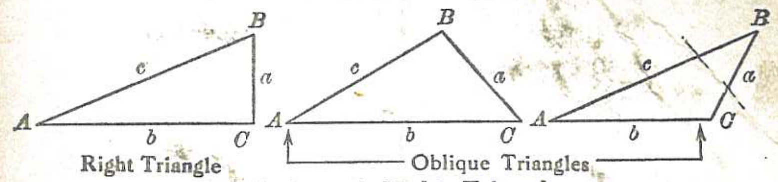
90° 15' 55" LT

27'
0° 8' 10" L.T.



$a = \frac{242(\sin 147° 21')}{\sin(22° 18')} = 344.07$

TRIGONOMETRIC FORMULAS



Solution of Right Triangles

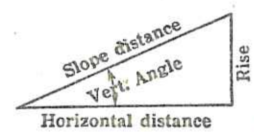
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10'. Since cos 5° 10' = .9959, horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10' = .9959. 1 − .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 − 1.31 = 318.09 ft.

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