CR 343(5) 10th West

Levels
Contours

TELEDYNE POST

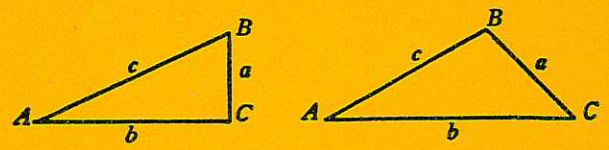
NEW ALIGNMENT

1974 - 1976

COLLEGE
FIELD BOOK

48QC-05B

FORMULAE FOR SOLVING RIGHT TRIANGLES



$$\text{Sin } A = \frac{a}{c} = \text{Cos } B \quad , \text{Cot } A = \frac{b}{a} = \text{Tag } B$$

$$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$$

$$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$$

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

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, C = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, 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 $= \frac{a^2 \sin B \sin C}{2 \sin A}$

Index

1

CR 343 Tenth West.

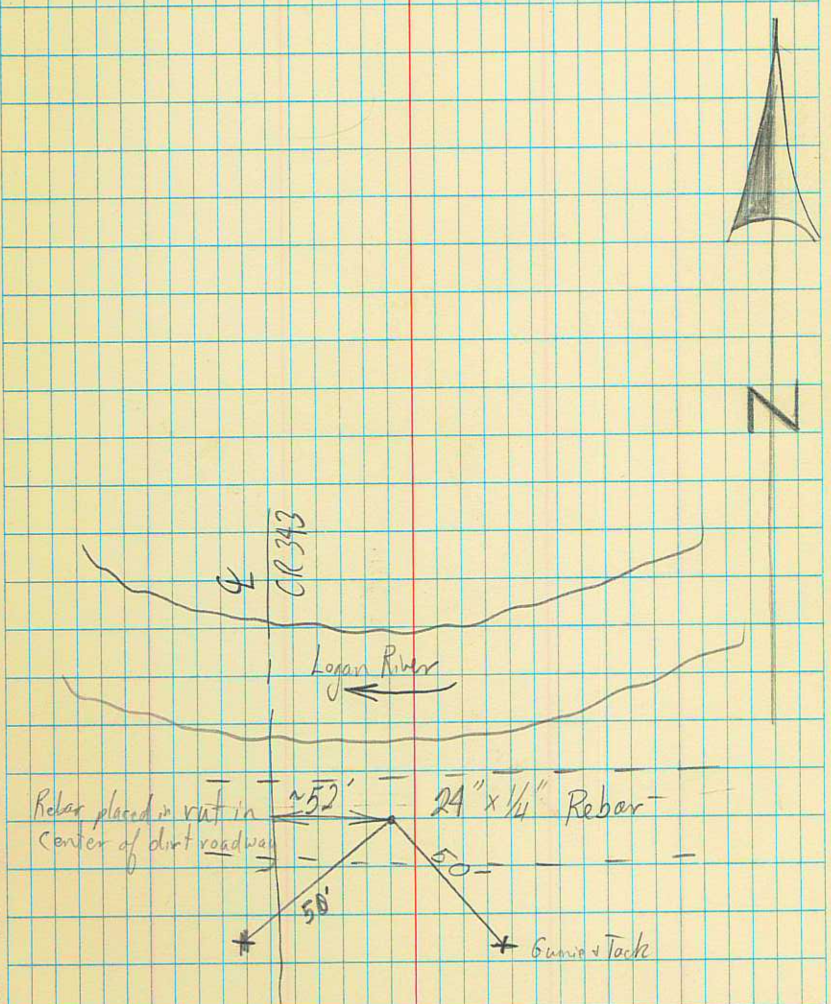
See page 49 for rerun

	+	HI	−	ELEV.
BM	—	—	5.29	4471.37 (6178, 6028)
South Side of Logan River				
T.P.	4.48	4466.07	6.23	4461.59
T.P.	3.06	4467.38	7.32	4464.76
T.P.	0.89	4472.08	4.44	4471.79
T.P.	4.32	4475.63	4.61	4471.31
BM	3.29	4474.92	—	4473.63

Utah State Highway R/W Marker Sta 399+00
US 89/91 South of Logan Corp Limit

11 Sept 1974

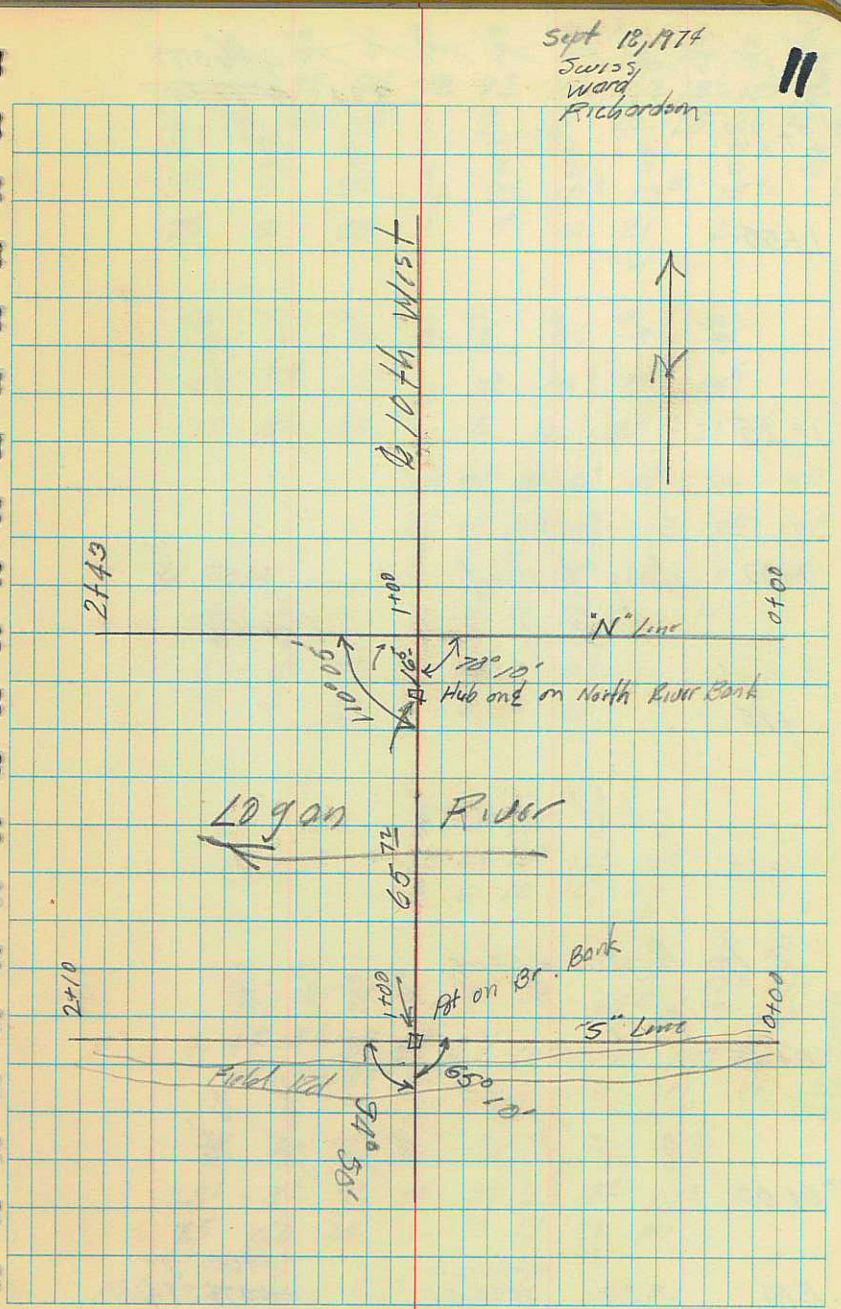
R.E. Swiss
G. P. Foreman
R.B. Ward



Contour Bridge over Logan River

Sept 18, 1974
Swiss, Ward Richardson

11



			3.34	~~4460.78~~ ~~4471.37~~ 61.75
"5" 2+10				
1+50				
1+25				
1+00	along ℄ Road			4458.39 (~~44574~~ original)
+75				
+62				
+60	Section = same			
0+45				
"5" 0+00				
BM	3.34	~~4466.12~~ 4474.71		~~4460.78~~ ~~4471.37~~ 4466.78
		44 65.09		

13

Rebar in road 52' rt. sta 4479.71

"N" 2+43					
1+57					
0+00	Along ℄ road				
0+50					
0+35					
0+05					
"N" 0+00					
0-15					
Hub on bank		4456.49	4.80	4	(4456.49)
↳	4.80	~~4469.55~~		55.13	
		56.59 62.26 ~~4464.29~~	7.13	~~4464.75~~	
	0.51	~~4471.88~~		~~4471.37~~	4460.78

HI = 4459.93

NDW 4-7-76

56.5 59.5 61.3 63.2 Ditch 64.2 63.5 64.0 64.6 64.4 64.5 64.5 64.6

13.1 10.1 8.3 5.9 5.6 6.1 5.6 5.1 5.2 5' 5' 5'

56 46 42 37 33 30 27 18 ℄ 25 50 75

w

58.3 61.2 62.6 63.2 64.5 64.5 64.3 63.5

11.4 8.9 7.0 5.9 5.1 5.1 5.3 6.1

31 26 25 20 ℄ 25 50 75

w

54.73

13.2 8.3 4.8 5.2

26 20 16 ℄

57.6 60.6 61.2 62.4 63.8 64.2 64.9 64.2 63.8 64.1

12.0 9.0 8.4 7.2 5.8 4.7 4.7 5.4 5.8 5.5

32 22 21 20 18 14 ℄ 25 50 75

w

60.2 61.2 64.1 65.0 64.9 64.6 64.3 64.5

9.4 8.4 5.5 4.6 4.7 5.0 5.3 5.1

32 22 19 4 ℄ 25 50 75

w

63.4 64.6 64.2

6.2 5.1 4.8

15.1 ℄

65.0

4.6

61.2 63.2 63.8 64.6 64.8 64.9 64.2 65.1

Same slope 5'

8.3 6.1 5.8 5.0 4.8 4.7 4.7 4.5

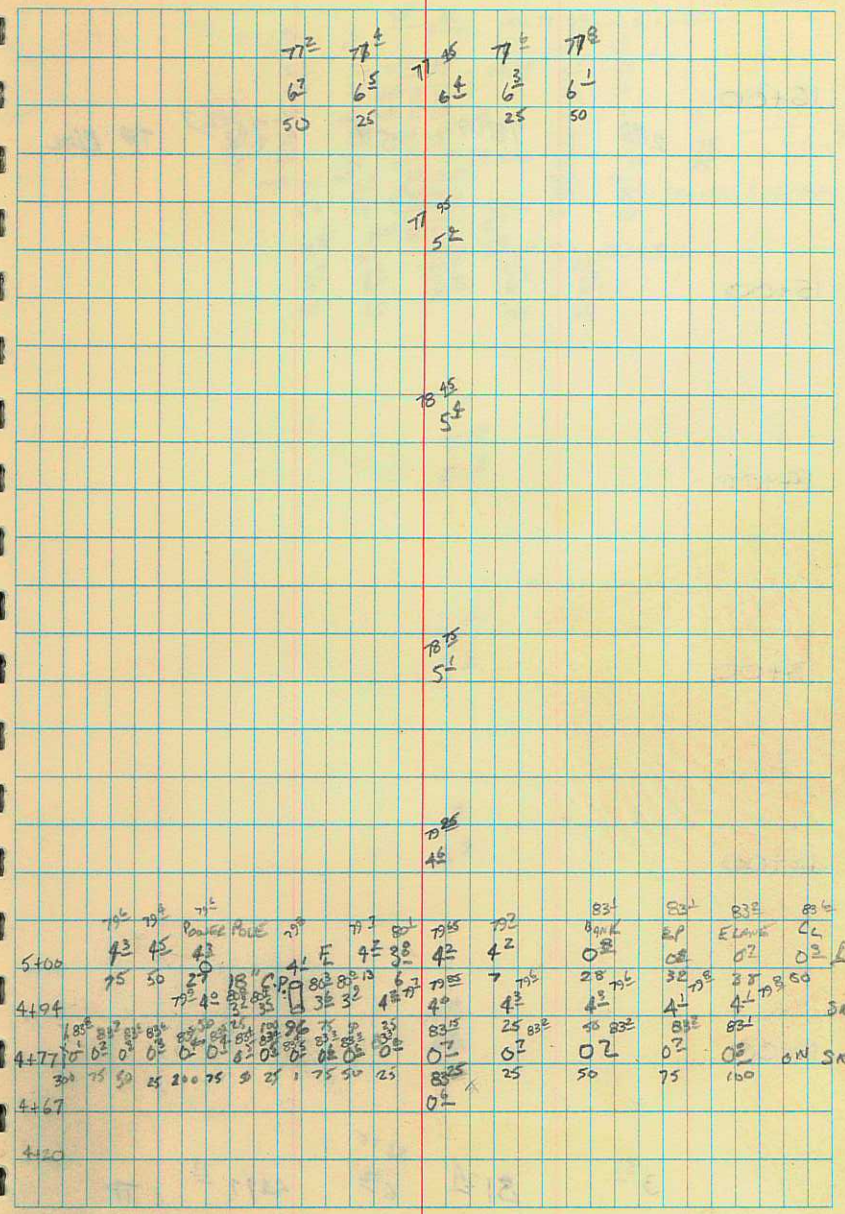
16 13 10 8 ℄ 25 50 75

w

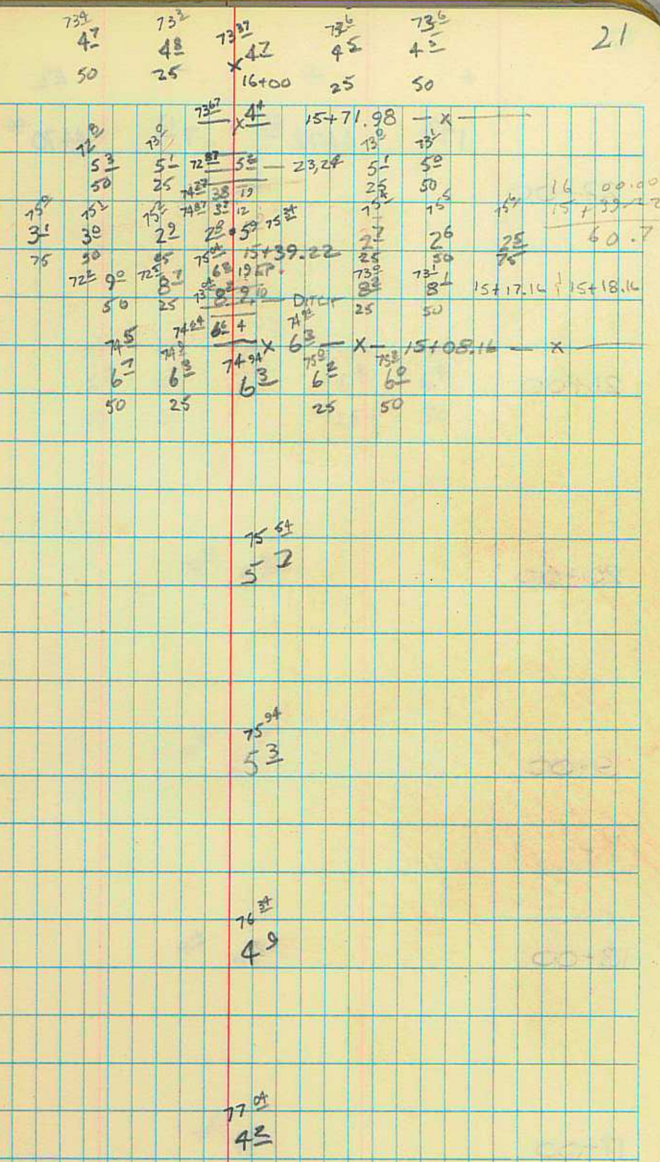
Rebar in road, 52' Rt. Sta

GLEN RICHARDSON
PRESTON WARD
NEIL WILLIAMS

	+	HI	−		
10+00					
9+00					
8+00					
7+00					
6+00					
5+00					
4+94					
EDGE PV 4+77					
4+67					
4+20					
BM	3 73	4483 85		4480.12	ST 373+00



	+	HI	-	EL	
16+00					
	2 30	78 07	5 92	75 27	TP Nail
15+00					
14+00					
13+00					
12+00					
11+00					
	3 51	81 24	83 55 6 12	4491 73	TP



	+	HI	−	EL	
	$1\frac{42}{}$	$4472\frac{36}{}$	$7\frac{13}{}$	$4470\frac{94}{}$	TP
22+00					
21+00					
20+00					
19+00					
18+00					
17+00					
		$78\frac{07}{}$			

70.47
$7\frac{5}{}$

$71\frac{2}{}$ $71\frac{5}{}$ $71\frac{57}{}$ $71\frac{8}{}$ $71\frac{8}{}$
$6\frac{8}{}$ $6\frac{4}{}$ $6\frac{5}{}$ $6\frac{3}{}$ $6\frac{7}{}$
50 25 25 50

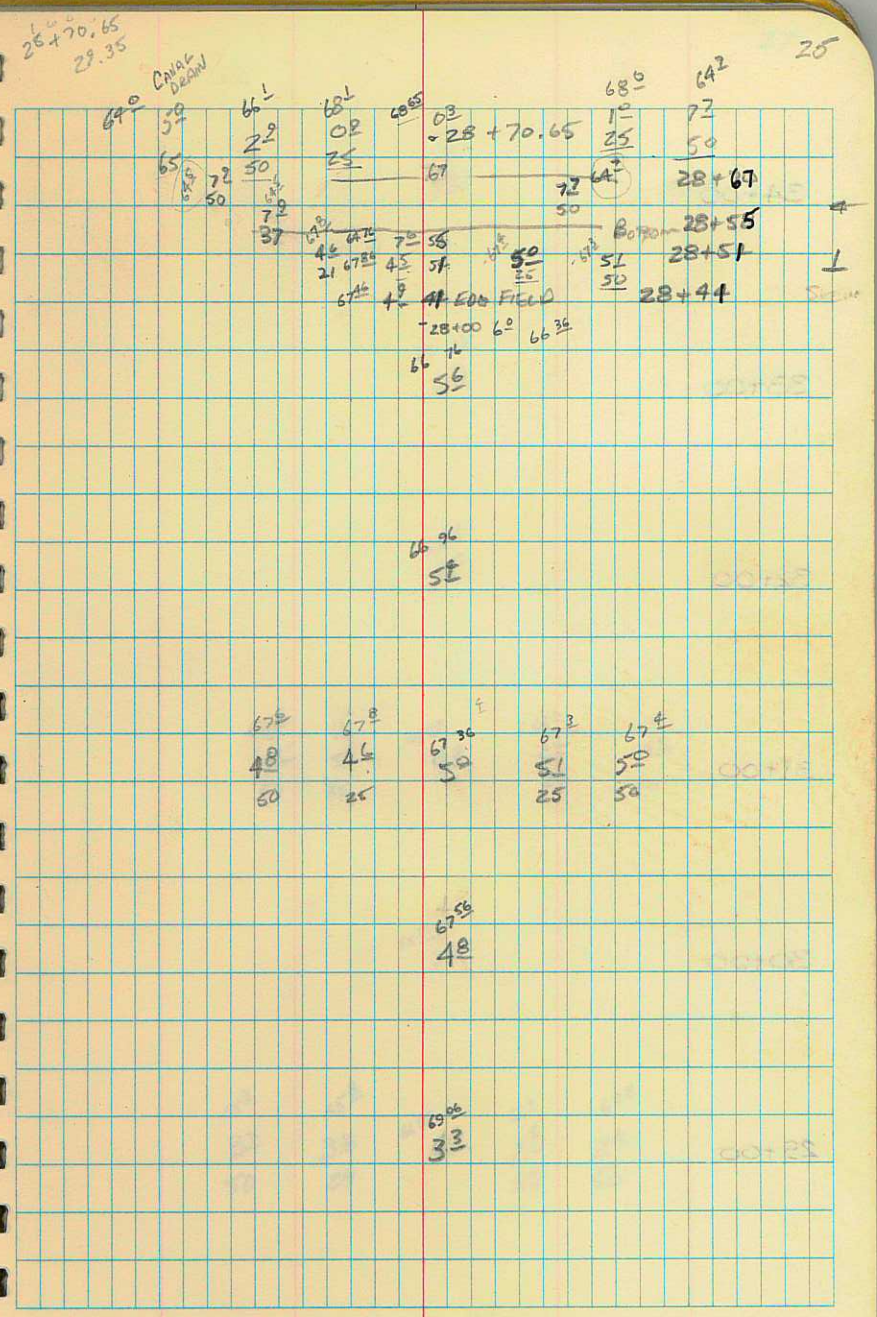
$72\frac{77}{}$ $5\frac{3}{}$

$72\frac{97}{}$ $5\frac{1}{}$

$73\frac{14}{}$ $4\frac{9}{}$

$73\frac{27}{}$ $4\frac{8}{}$

	+	HI	−	EL	
	0 24	68 25	4 35	68 01	TP
28+00					
27+00					
26+00					
25+00					
24+00					
23+00					
		72 36			



34+00			61^{65} 7^{3}		
33+00			62^{65} 6^{3}		
32+00			63^{45} 5^{5}		
31+00	63^{9} 5^{1} 50	63^{9} 5^{1} 25	64^{05} 4^{9}	64^{5} 4^{1} 25	64^{8} 4^{2} 50
30+00			65^{55} 3^{6}		
29+00	65^{3} 3^{7} 50	65^{8} 3^{2} 25	66^{25} 2^{7}	66^{6} 2^{4} 25	67^{0} 2^{0} 50

68^{95}

	+	HI	−	EL	
40+00					
39+00					
38+00					
	4^{99}	61^{19}	12^{75}	56^{20}	TP Down
			10^{60}	58^{35}	EL HUB BRIDGE
37+00					
36+00					
35+00					
		68^{95}			

55^{2}	55^{8}	55^{69}	55^{7}	55^{2}
5^{5}	5^{4}	5^{5}	5^{5}	5^{5}
50	25		25	50

54^{29}
6^{2}

54^{99}
6^{2}

LOGAN RIVER

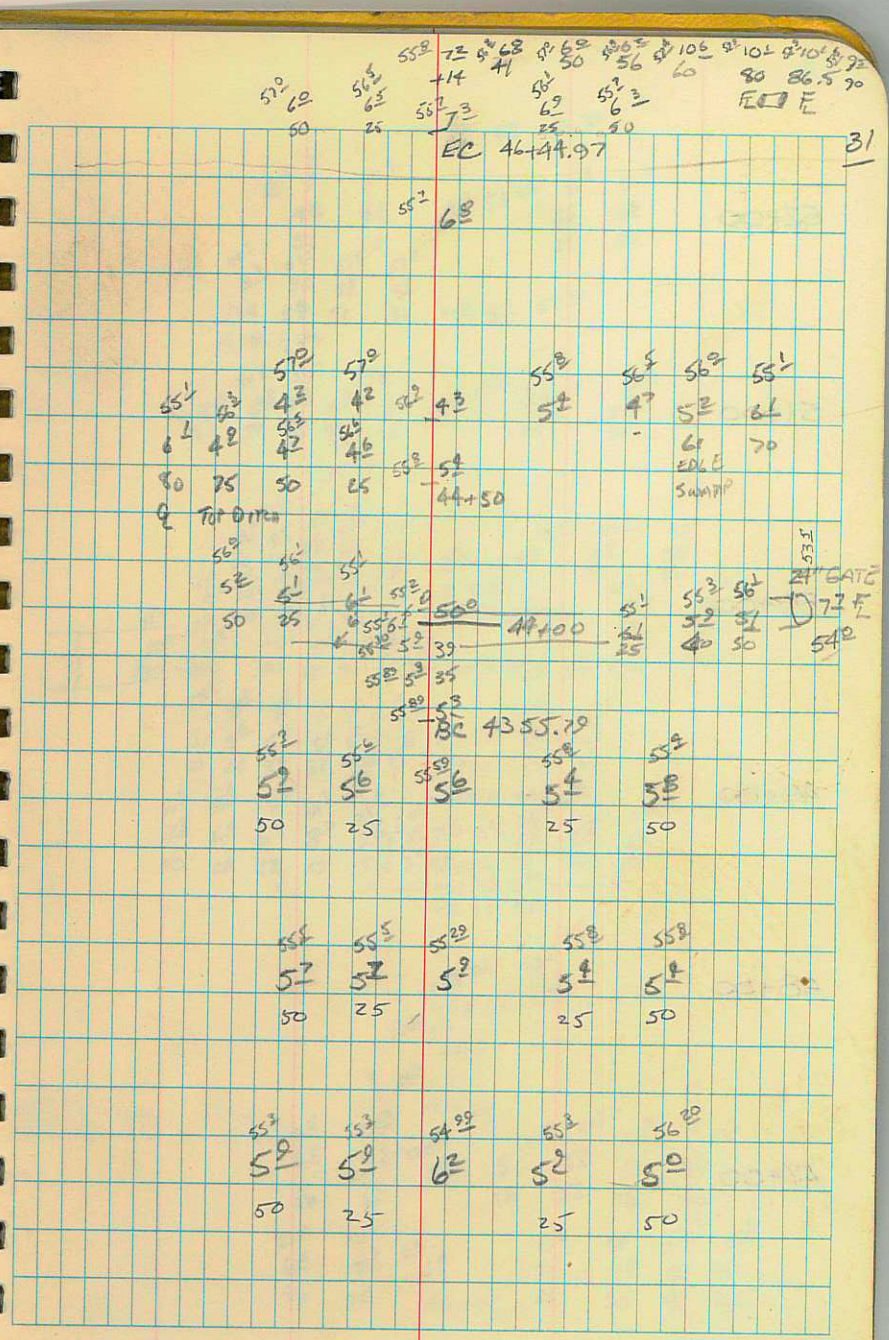
58^{35}
10^{6} 37+29 ^{46}

56^{4}	57^{4}	59^{35}	61^{0}	61^{9}
12^{6}	11^{6}	9^{6}	8^{0}	7^{1}
50	25		25	50

57^{2}	58^{2}	60^{55}	61^{5}	62^{0}
11^{8}	10^{1}	8^{4}	7^{5}	7^{0}
50	25		25	50

59^{4}	59^{2}	60^{25}	60^{7}	61^{1}
9^{6}	9^{1}	8^{7}	8^{3}	7^{2}
50	25		25	50

	+		−		
	6 60	63 00	6 08	56 40	TP HUB
46+00					
	5 45	62 48	4 16	57 03	TP
45+00					
44+00					
43+00					
42+00					
41+00					
		61 12			



52+00

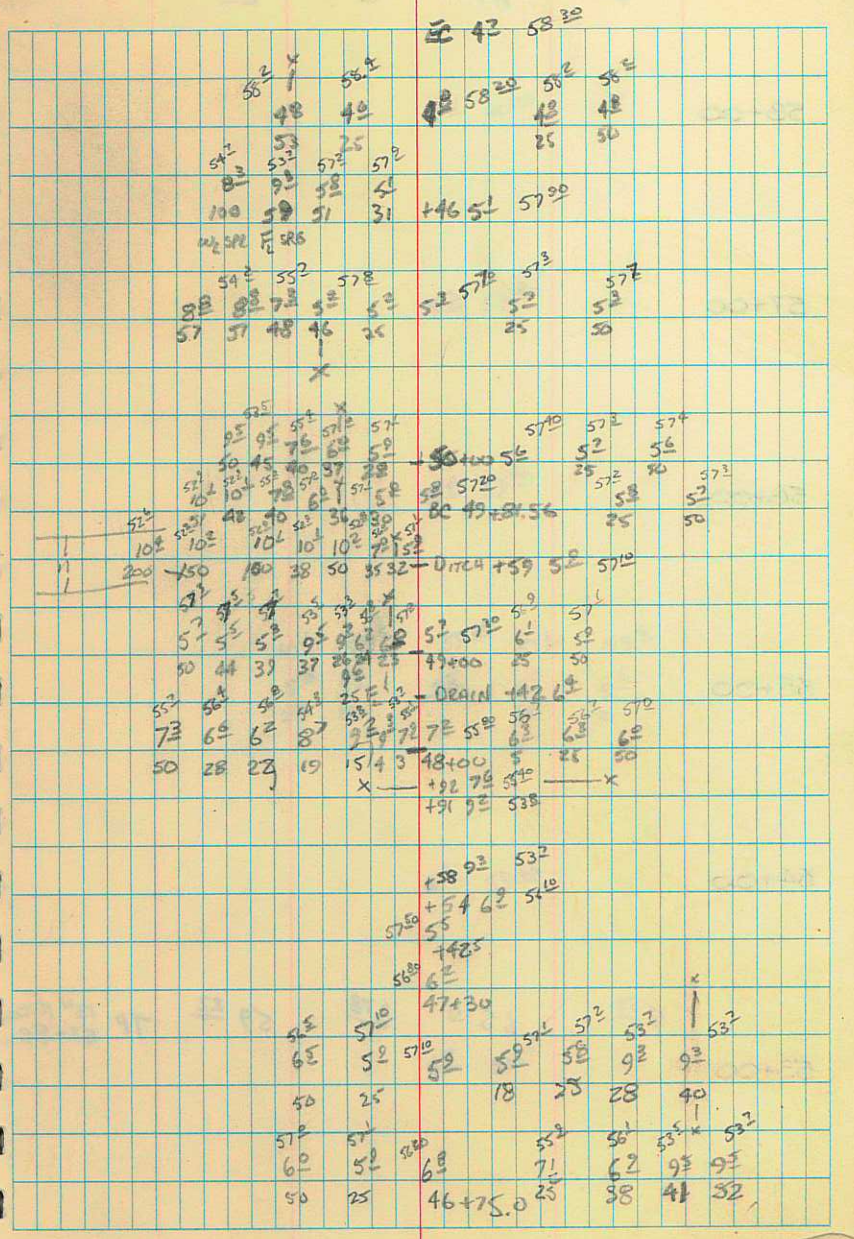
51+00

50+00

49+00

48+00

47+00



	+	HI	–	EL	
58+00					
57+00					
56+00					
55+00					
54+00					
	5^{89}	65^{11}	3^{78}	59^{22}	TP 18" ROCK 52+80 – X
53+00					
		63^{00}			

		5^{1} 60^{00}			
		5^{3} 59^{80}			
		5^{4} 59^{70}			
60^{1}	59^{8}	59^{60}	59^{6}	59^{6}	
5^{2}	5^{3}	5^{5}	5^{5}	5^{5}	
50	25		25	50	
		6^{2} 59^{00}			
		4^{7} 58^{30}			

	+	HI	−	EL	
64+00					
63+00					
62+00					
61+00					
	6^{86}	66^{81}	4^{86}	60^{25}	TP
60+00					
59+00					
		65^{11}			

43.3 to FENCE

64+00 5^{2} 61^{6}

61^{6} 5^{2} 50 — 61^{4} 5^{4} 25

+20 5^{3} 61^{2} — +16 5^{2} 61^{1} — +11 5^{4} 61^{4} — 6^{3} 60^{6} 25

6^{3} 60^{6} 50 — 63+91.89

62^{5} 4^{3} 50 — 62^{6} 4^{4} 25

+8 4^{3} 62^{1}

−4^{12} 62^{69} 63+75.89 ←

62^{8} 4^{9} 25 — 63^{0} 3^{8} 50

+7 4^{4} 62^{4}

62^{3} 4^{5} — 61^{1} 5^{7}

+4 5^{4} 61^{4} — +2 5^{8} 61^{0} — 60^{8} 6^{0} 25 — 60^{6} 6^{2} 50

5^{6} 61^{2}

63+58.85

X — X

−5 5^{8} 61^{6}

5^{6} 61^{2}

6^{2} 60^{6}

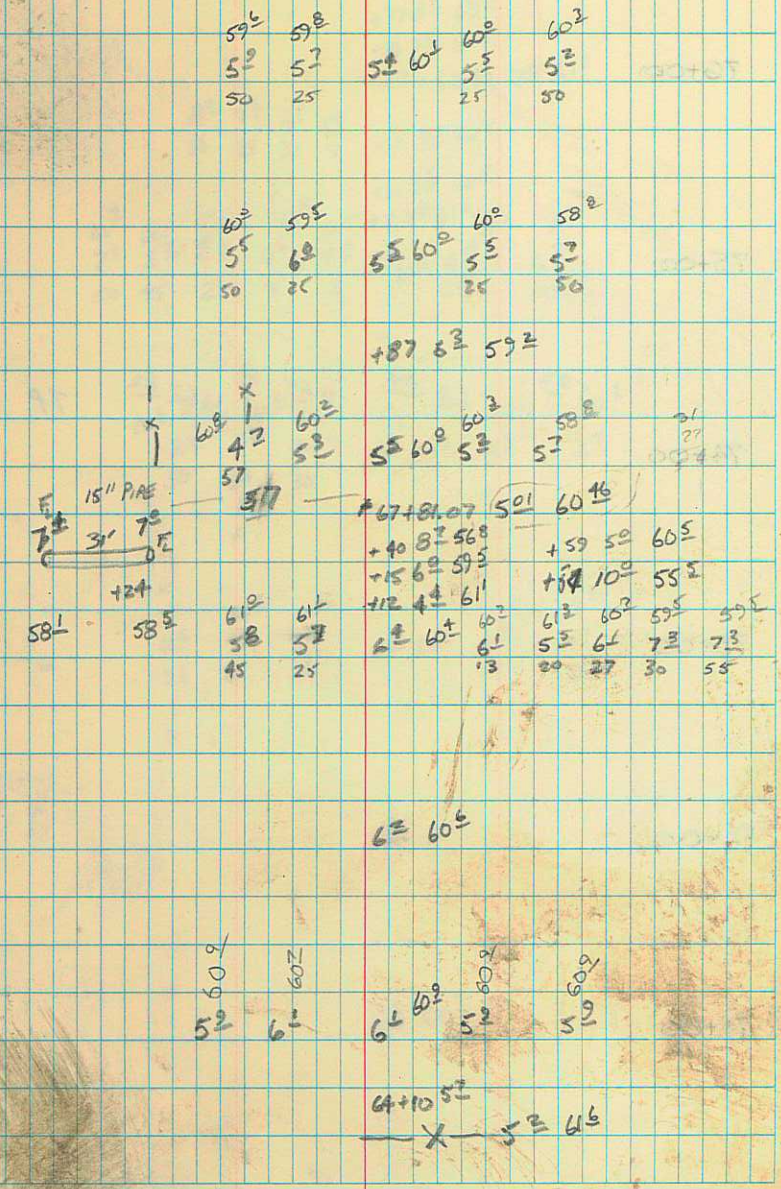
6^{8} 60^{5}

60^{7} 4^{4} 50 — 60^{8} 4^{3} 35 — 60^{5} 4^{6} 25

4^{9} 60^{3} — 60^{5} 4^{6} 25 — 60^{5} 4^{6} 50

5^{1} 60^{0}

	+	HI	−	EL	
70+00					
69+00					
68+00					
	$4\frac{83}{}$	$65\frac{17}{}$	$6\frac{17}{}$	$60\frac{64}{}$	TP HUB 67+04.17
67+00					
66+00					
65+00					
		$66\frac{81}{}$			



	+	HI	-	EL	
76+00					
75+00					
	5^{22}	68^{04}	2^{65}	62^{82}	TP
74+00					
73+00					
72+00					
71+00					
		65^{47}			

60^{4} 7^{0} — 76+00

+98.85 HUB 7^{56} 60^{48}

+92 9^{6} 58^{4} +93 8^{8} (59^{2})

+81 8^{6} 58^{4}

+79 8^{3} 59^{2}

+68 7^{2} 60^{0}

— 75+63.46 7^{0} 61^{0}

8^{0} 7^{3} 6^{9} 5^{4}

50 45 31 17

+50 6^{0} 62^{0}

+30 5^{5} 62^{5}

60^{7} 62^{8} E.Rd. 63^{2} 62^{5} 61^{0} +27 7^{0} 61^{0} 61^{2} 61^{3}

7^{3} 5^{2} 4^{8} 5^{5} 7^{0} 7^{2} 60^{8} 6^{8} 6^{7}

50 45 23 9 3 25 50

62^{9} E.Rd. 62^{3} 60^{6} 61^{1} 61^{3}

2^{9} 3^{2} 4^{9} 4^{6} 60^{9} 4^{4} 4^{2}

50 38 32

60^{5} 60^{5} 60^{8} 61^{1}

2^{6} 5^{9} 5^{9} 4^{8} 60^{7} 4^{7} 4^{4}

56 51 25 25 50

5^{1} 60^{4}

5^{3} 60^{2}

	+	HI	-	EL	
82+00					
81+00					
80+00					
79+00					
	6^{88}	73^{25}	3^{14}	66^{37}	TP
78+00					
77+00					
	6^{91}	69^{48} / 68^{04}	5^{47}	62^{57}	TP RR PILE NW EAST SIDE

5^{2} 67^{4}

66^{9} 67^{8} 67^{5} EL 67^{5} 67^{6} 67^{5}

6^{2} 6^{1} 5^{8} 5^{8} 5^{7} 5^{8}

43 33 7 25 50

5^{9} 67^{4}

64^{8} 65^{7} 66^{4} ERL 66^{3} 67^{3} X 67^{0} 66^{2} 66^{7}

8^{5} 7^{6} 6^{9} 7^{0} 6^{0} 6^{3} 6^{4} 6^{6} ✓

50 32 18 10 14 25 50

+95 3^{9} 65^{6} HUB PT

X 61^{9} 62^{5} 64^{1} 64^{4} ERL 64^{3} X 63^{7} 63^{7} 63^{7} 63^{6}

7^{6} 7^{0} 5^{4} 5^{1} 5^{2} 5^{8} 5^{8} 5^{8} 5^{9} ✓

47 43 36 13 7 18 33 50

6^{8} 62^{7}

64^{1} 63^{0} 63^{0} 65^{0} X 63^{3} 63^{3}

7^{6} 6^{5} 6^{5} +60 6^{5} 6^{3} 6^{3}

50 40 25 12 25 50

60^{0} 58^{6} 59^{2} 60^{4} +10 5^{9} 62^{1} 59^{5} 58^{6} 58^{6}

FL REF (+10 100) 8^{0} 9^{4} 8^{8} 75 76+00 7^{6} 60^{4} 8^{5} 9^{4} 9^{4} ✓

50 45 30 20 6 33 38 50

FL OUTLET ... -10^{0}

	+	HI	-	EL	
88+00					
87+00					
86+00					
	5^{56}	73^{64}	5^{17}	68^{08}	TP ROCK NEAR T.P. POLE
85+00					
84+00					
83+00					
		73^{25}			

68 [illegible]

5^{2}

20

℄

5^{2} 67^{6}

6^{0} 67^{3}

82+71.26 5^{63} 67^{62}

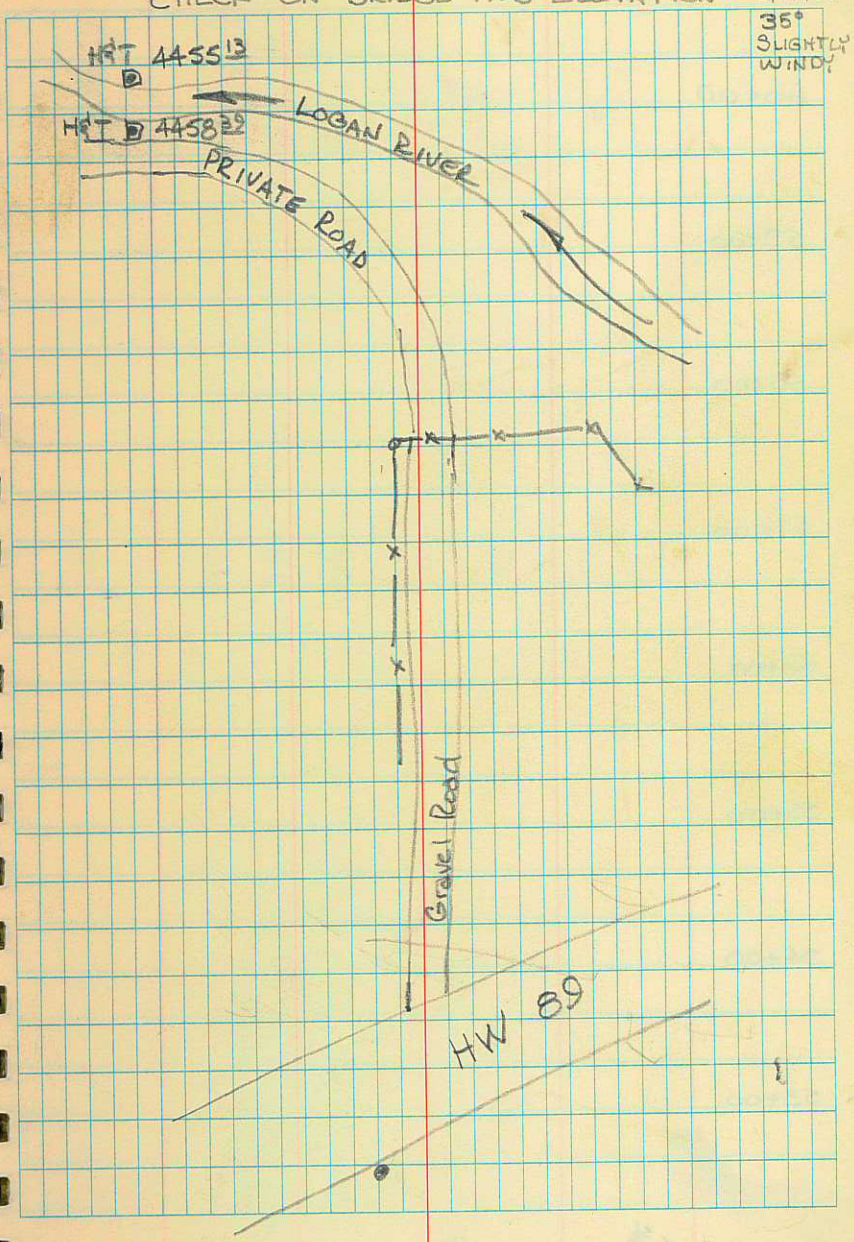
	+	HI	−	EL	
91+58.06					
91+00					
			2.27	71.37	BM Tack Pile 4471.43
90+00					
89+00					
		73.64			

	+	HI	−	EL	
		T WARD	SNOWING		
3-25-76	NOTES - WILLIAMS				
			4 66	4455 13	North Bridge Hub
	+1 40	4459 79		4458 39	South Bridge Hub
			5 38	4455 17	NORTH BRIDGE HUB.
	4 15	4460 55		4456 40	OLD EC
CORRECTED BRIDE HUB EL. 4458 39					
			4 02	4473 67	ST. 399+00 NW 91
	5 49	4477 69	0 54	4472 20	TP 5
	8 10	4472 74	2 95	4464 64	TP 4
			9 18	4458 41	BRIDGE EL. SOUTH HUB
	5 65	4467 59	11 02	4461 24	TP 3
	2 63	4472 96	6 67	4470 33	TP 2
	4 18	4477 00	5 03	4472 82	TP 1
	4 22	4477 85		4473 63	STA 399+00 HW 91 EL 4473 63

PRESTON 49 WARD
NEIL WILLIAMS

CHECK ON BRIDGE HUB ELEVATION 2/14/75

35° SLIGHTLY WIND.



NEW ALIGNMENT

	+	HI	-	EL	
60+00					
59+00					
58+00					
57+00					
56+00					
55+00					
54+00					
53+00					
	5 3/6	4466 99		4460 64	BM HUB EDGE SWAMP

NEW ALIGNMENT

68+00

67+00

66+00

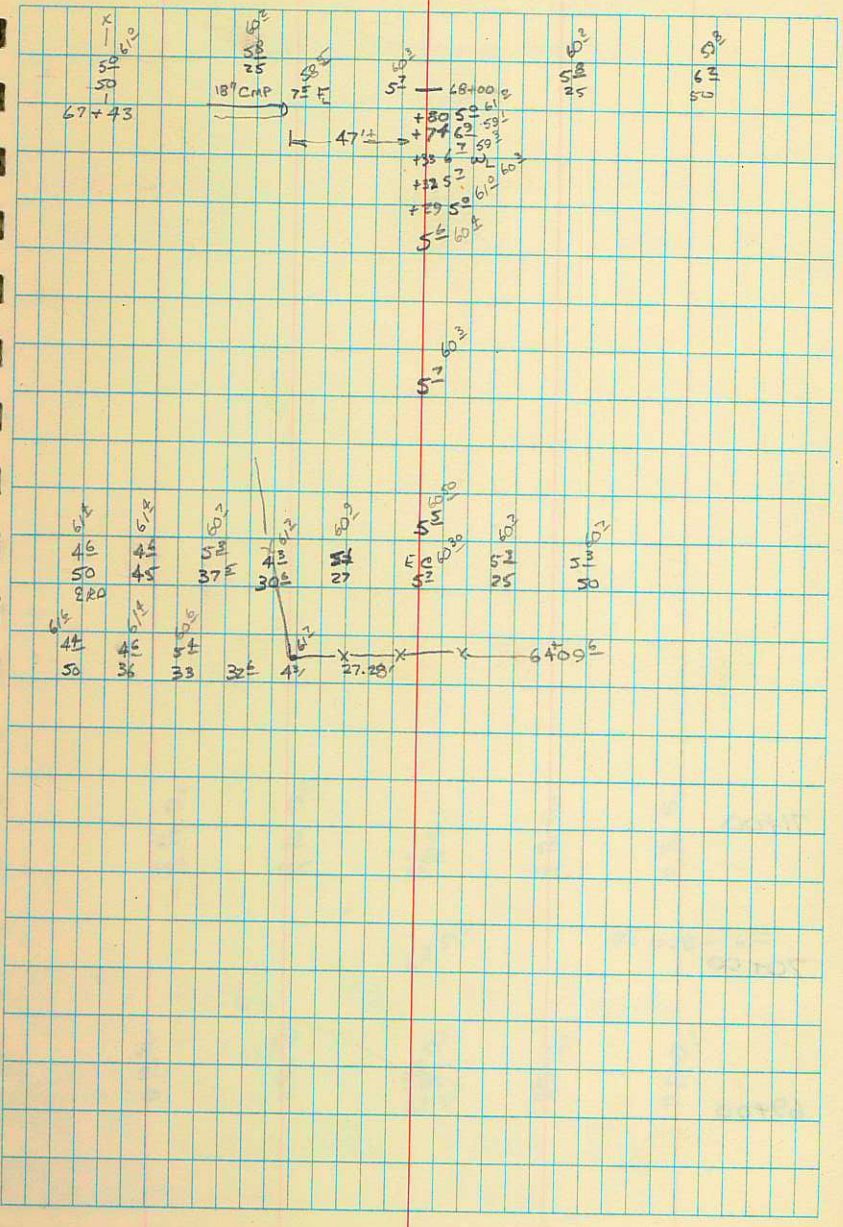
65+00

64+00

63+00

62+00

61+00



71+00

70+00

69+00

PI HUB — 6.06

CHECK OF DECK ELEVATION
6th West Bridge at the Logan River.

π & NOTES – Williams 4-7-76
φ – Hoenh Warm, Sunny

	+	HI	–	EL	
	4478^{19}	7^{00}	4^{52}	4473^{67}	BM STA. 399+00 HW 89 R/W MAR
			3^{10}	4471^{19}	TP2 ROCK
			5^{78}	4468^{51}	SW CORN. TOP OF ABUTMENT
	0^{57}	4474^{29}	4^{42}	4473^{72}	TP1 FP
	4^{51}	4478^{14}		4473.63	BM ST. 399+00 HW 89

Polar observation made
5-14-76 at 4:45 AM

T & NOTES- Williams
ϕ - Ward

Instrument was set up on Sta 5+00.12 of CR 343(5), and sighted on the centerline at Young ward Road.

POLAR OBSERVATION

MAY 10th, 1976 4 hr. 58m 12sec
MAY 20th, 1976 4 hr. 19m 00sec
* MAY 14th = 4 hr. 42m 31 sec

LATTITUDE = 41°41'50" (FROM USGS.)
CORRECTION FOR LATTITUDE: +0h 00m 10sec
CORRECTION FOR DST (May, 14, 1976); +1h 00m 00s
TIME OF EAST ELONGATION
5h 42m 41s OR 5:42:41 AM

TIME	HOR ∠	VERT ∠
4:45:56	1°55'45"	48°23'00"

POLAR DIST:
May 14, 1976 = 0°50'45.6"
Z = 1°07'59"
BEARING AT EAST ELONGATION = N1°07'59"E

BEARING OF LINE = N 0°47'46" W

+ HI − El

15 4463 8 House Foundation

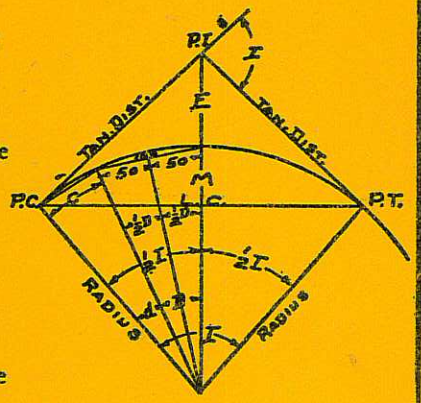
5 68 4466 32 4460 64 Bm

1°16'04"

3/15 4 3/20 6 2/20 6 0/15 for water edge

CURVE FORMULAE

D=Degree of Curve
1°=1-Degree of Curve
2°=2-Degree of Curve
P.C.=Point of Curve
P.T.=Point of Tangent
P.I.=Point of Intersection
I=Intersection of Angle, Angle Between Two Tangents
L=Length of Curve, from P.C. to P.T.
T=Tangent Distance
E=External Distance
R=Radius
L.C.=Length of Chord
M=Length of Middle Ordinate
c=Length of Sub-Chord
d=Angle of Sub-Chord



$$R = \frac{L.C.}{2 \sin \frac{1}{2} I} \quad T = R \tan \frac{1}{2} I = \frac{L.C.}{2 \cos \frac{1}{2} I}$$

$$\frac{L.C.}{2} = R \sin \frac{I}{2}, \; D\,1° = R = 5730, \; D\,2° = \frac{5730}{2}, \; D = \frac{5730}{R}$$

$$M = R\,(1 - \cos \tfrac{1}{2} I), = R - R \cos \frac{I}{2}$$

$$\frac{E + R}{R} = \sec \frac{I}{2}, \; \frac{R - M}{R} = \cos \frac{I}{2}$$

$$c = 2R \sin \tfrac{1}{2} d, \; d = \frac{c}{2R}$$

$$L.C. = 2R \sin \tfrac{1}{2} I, \; E = R\,(\sec \tfrac{1}{2} I - 1), = R \sec \frac{I}{2} - R$$

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	.8657
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 .0052	3/32 .0078	1/8 .0104	3/16 .0156	1/4 .0208	5/16 .0260	3/8 .0313	1/2 .0417	5/8 .0521	3/4 .0625	7/8 .0729
1 .0823	2 .1667	3 .2500	4 .3333	5 .4167	6 .5000	7 .5833	8 .6667	9 .7500	10 .8333	11 .9167