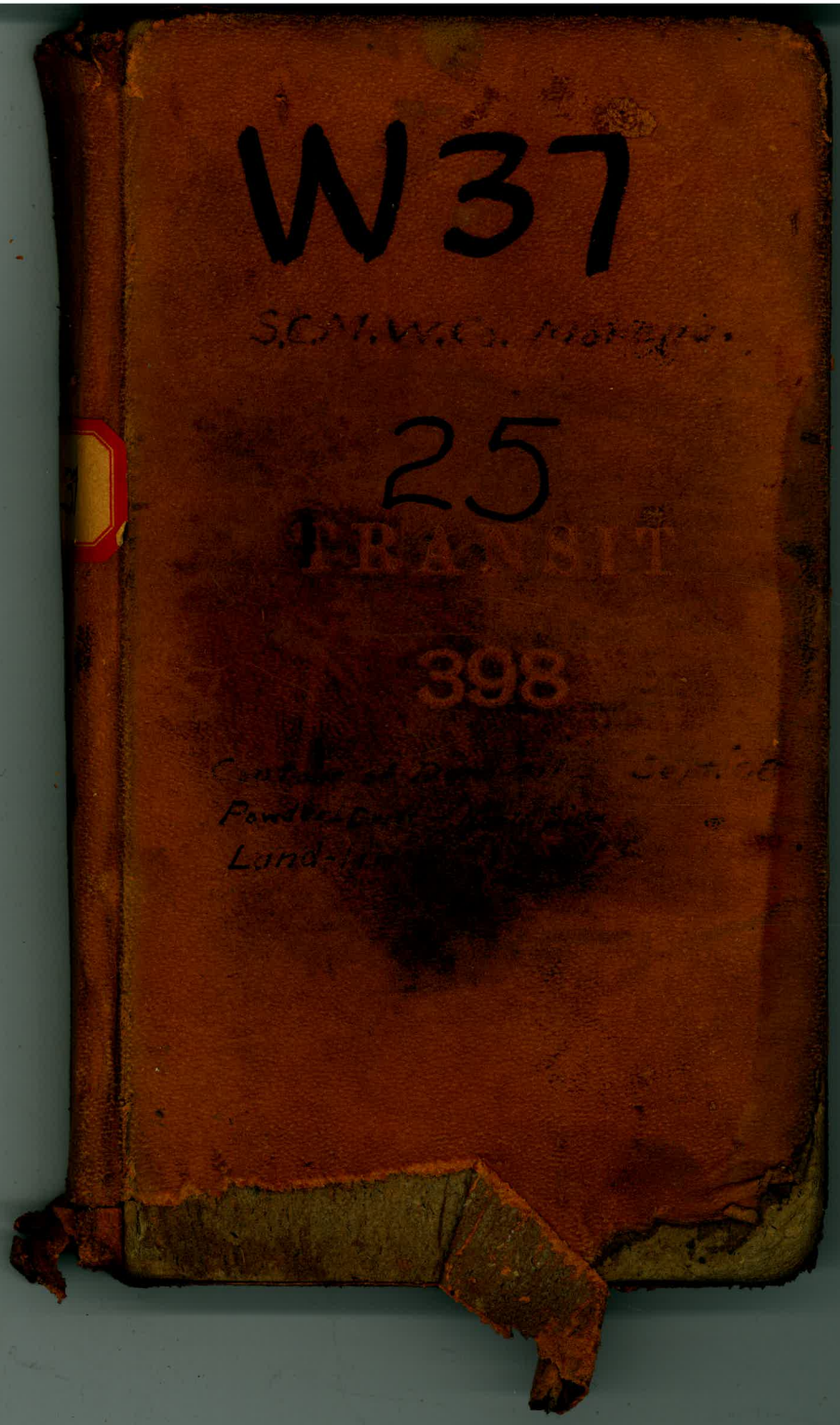
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TRANSIT
398

H. S. CROCKER COMPANY

DRAWING MATERIALS AND SURVEYING INSTRUMENTS

SAN FRANCISCO

TABLES FOR EXCAVATIONS AND EMBANKMENTS

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING

Roadway 18 Feet Wide. Side Slopes 1 to 1.
For Single Track Excavation.

"Copyright, 1895, by Kueffel & Esser Co."

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

MICROFILMED
JAN 1965

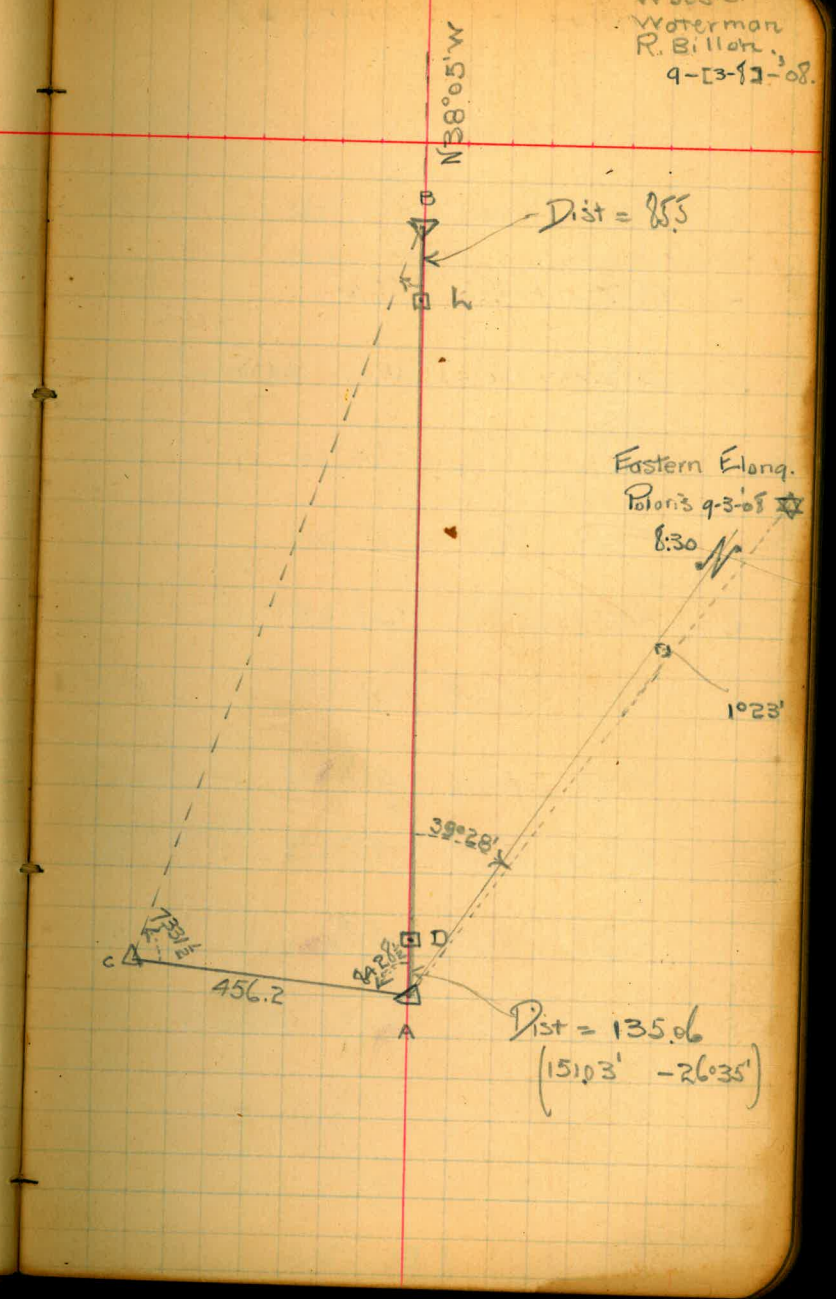
Index.

Index cont.

1. Notes of Control.

Slope measurement Baseline AC 461.9'
Depression angle 8°59'
Length Base AC 456.2'

∠BAC	84°28½'	168°58'	84°28½'	168°57'	
∠BCA	73°31'	147°03'	294°06'		
∠ABC					
∠Polaris AD	39°28'	78°55'	118°24'	157°51'	

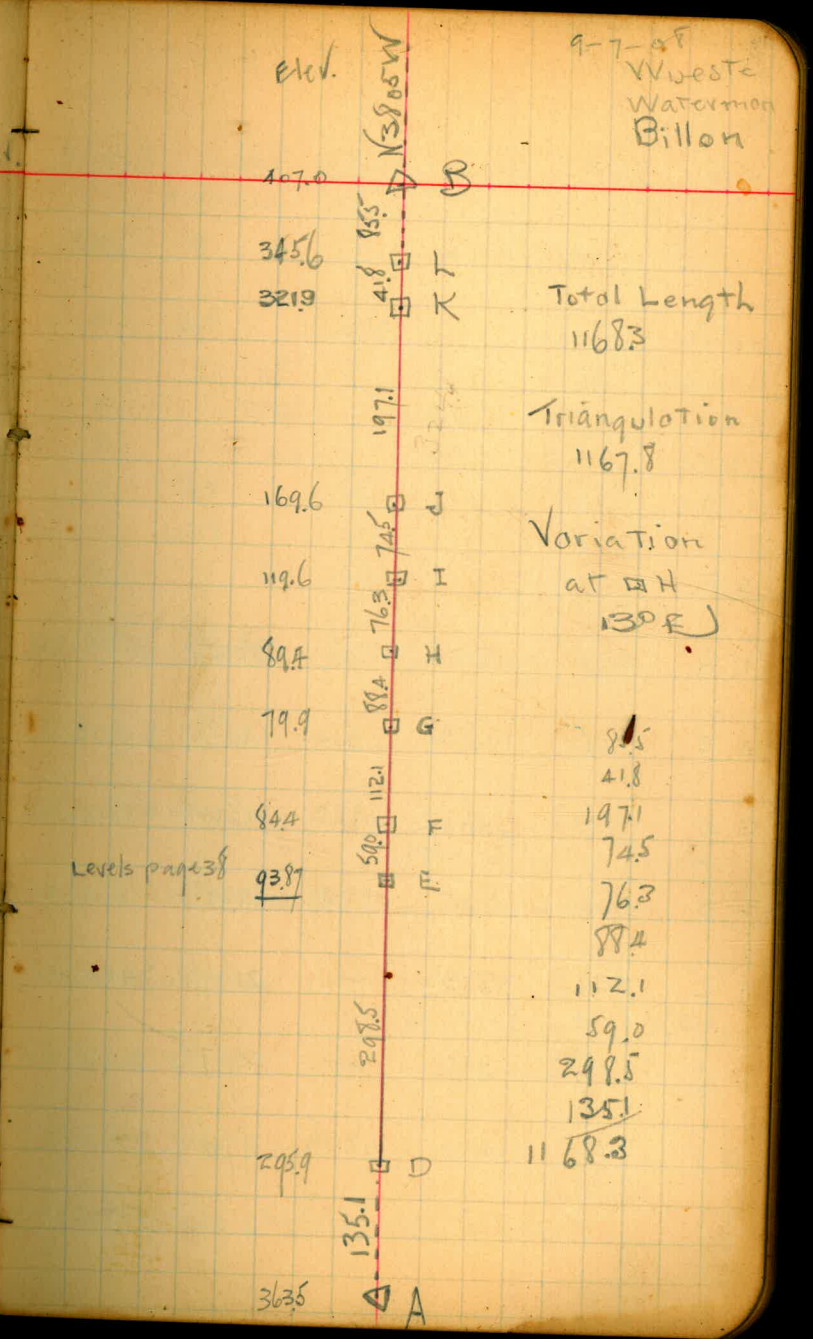


2

Division of Reference Line

□ D To □ L

	Vert L	Chain	Hor Dist		Diff. Elev.
D-E	-3405	360.41	298.5		202.0
D-F	-3037	415.33	357.4		211.5
F-G	-218	112.2	112.1	See page 3	4.5
G-H	+608	88.9	88.4		9.5
H-I	+2134	82.01	76.3		30.2
I-J	+3350	79.7	74.5		50.0
J-K	+3741	249.2	197.1		152.3
K-L	+2931	48.0	41.8		23.7
K-B	+3344	153.2	127.3		85.1
A-D	-2635	151.03	135.06		67.6
E-F	-906	59.76	59.0	See page 26	9.5



9-7-08
W. W. Estes
Watermon
Billon

Total Length
1168.3

Triangulation
1167.8

Variation
at □ H
13° E

8.5
41.8
197.1
74.5
76.3
88.4
112.1
59.0
298.5
135.1
1168.3

3

Location of Outlet Tunnel.

8'x9'

Sta	Dist	Chain	Vert ∠	Def.	Course
F					
G	112.1	11220	+218	13250 Rt	S 38 07 E
5	144.7	145.30	+514	145 3 Lt	N 90 3 E
4 +17	203.8	206.02	+823	118 01 Rt	N 23 56 E
3	56.6	57.12	+733	44 44 Rt	S 85 55 W
2 +32.3	339.3	339.3	—	313 9 Rt	S 41 11 W
1	48.82	48.82	—	129 57 Rt	S 9 32 W
F	131.5	141.10	-2116	97 40 Rt	N 59 35 E
					N 38 05 W

Wheeler
Watermon
Billon
9-4-08.

Traverse Sheet

Sta	N	S	E	W	Lat	Dep
F	66.5		113.4		+66.5	+113.4
1		48.1		9.1	+18.4	+105.3
2		255.5		233.4	-237.1	-118.1
3		4.0		56.4	-241.1	-174.5
4	186.3		82.5		-54.8	-92.0
5	142.8		22.7		+88.0	-69.3
G		88.1	69.2		-0.1	-0.1
F						

= Reverse Bearing Reference Line

= Sta of portal exit

Original ctr 3' from this pt on reverse course

= old tunnel plug

= Sta of portal entrence

= Bearing of Reference Line

4 Topography from Ref. Line

Wheeler
Waterman
Billon
9-5-08.

Sta	Dist	Stadia	Vert ∠	Elev	Def.	Bearing	Mag to	
				−5.6				
RP	200	199	−143	88.3	9721 Rt	N59 16 E		
				+23.4				
RP	218	220.	+607	117.3	11052 Rt	N72 47 E		Inside edge road
				+11.4				
RP	144	145	+432	105.3	11426 Rt	N76 21 E		Inside edge road
				+22.5				
RP	215	217	+559	116.4	10634 Rt	N68 09 E		
				+3.6				
RP	100	99	+200	97.5	11443 Rt	N76 38 E		
				+5.4				
RP	76	76	+403	99.3	12928 Rt	S88 37 E		
				+2.3				
RP	27	26	+457	96.2	18017 Rt	S37 48 E		
				−3.7				
RP	27	27	−745	90.2	15300 Rt	S65 05 E		
				−5.0				
RP	33	33	−840	88.9	13230 Rt	S85 35 E		
				−7.4				
RP	25	26	−1651	86.5	9059 Rt	N52 54 E		
				−11.0				
RP	30	33	−2010	82.9	6015 Rt	N22 10 E		
				−5.0				
RP	9.5	11	−2832	88.9	1912 Rt	N 1 53 W		
⊡ E	HI 5.36			93.9				
						N38 05 W		

5

9-5-08

Sta	Dist	Stadia	Vert	Elev	Def	Bearing	Mag Co	
				+0.7				
CP	55	54	+043	101.6	9129 Lt	S7427E		
				-1.8				
CP	37	36	-253	99.1	7646 Lt	S5944E		
				-1.7				
CP	35	34	-255	99.2	5306 Lt	S3604E		
				-0.9				
CP	26	25	-204	100.0	2850 Lt	S1148E		
				-3.6				
CP	57	56	-339	97.3	13941 Rt	N2317W		on fill of Dam
				-1.4				
CP	22	21	-342	99.5	15633 Rt	N625W		on fill of Dam
☐ E			-1224					
☐ 10	HI 529			100.9				on fill of Dam
				+7.0				
☐ 10	319	33 327	+1228	100.9	12453 Lt	S1702W	S17°-W	
				-15.6				
CP	39	44	-2110	78.9	7753 Rt	N3928E		
				-13.0				
CP	37	41	-1912	80.9	11140 Rt	N7335E		
				-8.1				
CP	63	63	-725	85.8	12055 Rt	N8250E		
				-6.3				
CP	101	101	-335	87.6	10213 Rt	N6408E		

9-5-08

Sta	Dist	Stadia	Vert ∠	Elev	Def	Bearing	Mag to	
				+534				
CP	192	206	+1532	154.3	12305 Lt	N7357E		
				-2.2				
CP	145	144	-052	98.7	9722 Lt	S8020E		
				+26				
CP	157	156	+057	103.5	11457 Lt	N8211E		
				+13.0				
CP	173	173	+419	113.9	12925 Lt	N6737E		
				+19.1				
CP	176	177	+614	120.0	10919 Lt	N8743E		
				+18.8				
CP	171	172	+616	119.7	10157 Lt	S84.55E		
				+16.8				
CP	161	162	+555	117.7	9523 Lt	S7821E		
				+28.7				
CP	176	180	+917	129.6	12347 Lt	N7315E		
				-3.5				
CP	123	122	-140	97.4	12040 Lt	N7622E		
				+2.3				
CP	51	50	+235	103.2	1924 Lt	S6222E		Rock pile
				-0.7				
CR	47	46	-053	100.2	9034 Lt	S6332E		
				+31.9				
CR	180	185	+1002	132.8	11330 Lt	N8332E		
				+42.5				
CR	194	202	+1222	143.4	11021 Lt	N8641E		against fence wall

9-5-08

Sta	Dist	Stadia	VertL	Elev	Def	Bearing	Mag to	
				-0.3				
CP	126	125	-0.09	100.6	8730 Lt	S70°28E		
				+7.0				
FP	143	142	+247	107.9	8749 Lt	S70°47E		
				+17.0				
CP	128	129	+734	117.9	7817 Lt	S61°15E		
				+102.6				
CP	168	230	+3129	203.5	8049 Lt	S63°47E		
				+27.5				
CP	110	116	+1406	1284	6910 Lt	S52°08E		
				+89.2				
CP	193	233	+2456	190.1	10041 Lt	S83°39E		
				+71.5				
CP	206	230	+1908	172.4	11136 Lt	N79°26E		
				+34.0				
CP	148	155	+1254	1349	6951 Lt	S52°49E		
				+14.1				
CP	152	152	+517	115.0	9524 Lt	S68°22E		against vert wall
				+65.2				
CP	207	227	+1726	166.1	11504 Lt	N81°58E		
				+57.7				
CP	201	217	+1559	158.6	11937 Lt	N79°25E		
				+6.4				
CP	157	156	+221	107.3	9017 Lt	S73°15E		against vert wall
				-3.8				
CP	140	139	-135	97.1	9305 Lt	S76°03E		

8

9-5-89

Sta	Dist	Stadia	Vert∠	Elev	Det	Bearing	Mag to
				−49.8			
CP	83	112	−3055	51.1	9044 Rt	N7214W	
				+48.4			
CP	83	110	+3018	159.3	4900 Lt	S3158E	
				+49.6			
CP	94	119	+2755	150.5	5640 Lt	S3938E	
				+72.8			
CP	129	169	+2935	173.7	6021 Lt	S4319E	
				−43.8			
CP	107	124	−2217	57.1	7321 Rt	N8937W	
				−25.5			
CP	43	57	−3048	75.4	6010 Rt	S7712W	
				+86.4			
CP	136	191	+3238	187.3	6122 Lt	S4420E	
				+89.9			
CP	149	203	+3112	190.8	6531 Lt	S4129E	
				−4.2			
CP	100	99	−241	96.7	10406 Lt	S8704E	
				+105.9			
CP	159	229	+3345	206.8	6247 Lt	S4545E	
				+3.9			
CP	62	61	+336	104.8	4947 Lt	S3245E	
				+3.9			
CP	95	94	+222	104.8	6810 Lt	S5108E	
				+0.2			
CP	110	109	+019	101.1	7758 Rt	S6056E	

9

9-5-98

Sta	Dist	Stadia	Vert'l	Elev	Def	Bearing	Mag to	
				+39.0				
CP	191	198	+1133	139.9	12357 Rt	N 73 05 E		
				+31.3				
CP	183	187	+945	132.2	12642 Rt	N 70 20 E		
				+31.8				
CP	98	107	+1803	132.7	0231 Lt	S 16 39 W		
				-0.5				
CP	89	88	-019	100.4	2815 Rt	S 45 17 W		
				+0.4				
CP @ 9	87	86	+017	101.3	3919 Rt	S 56 21 W		= offset bush little bush
				+19.9				
CP	157	158	+713	120.8	1327 Rt	S 30 29 W		
				-34.0				
CP	125	133	-1516	66.9	8444 Rt	N 78 14 W		
				-38.2				
CP	142	151	-1504	62.7	9126 Rt	N 71 32 W		on secondary cross fell
				-32.6				
CP	169	174	-1058	68.3	9853 Rt	N 64 05 W		on secondary cross fell
				+51.5				
CP	151	169	+1842	152.4	5222 Lt	S 11 40 W		
				+56.3				
CP	126	150	+2407	157.2	15721 Lt	S 1 40 W		
				-54.0				
CP	130	151	-2238	46.9	10915 Rt	N 53 43 W		
				+40				
CP	79	98	+2703	104.9	26551 Lt	S 9 53 E		

10 Topography on Ref Line Cont.

Sta	Dist	Stadia	Vert ∠	Elev	Del	Bearing (Mag Co)	
				-9.3			
CP	30	32	-1721	75.1	3106 Lt	N65°W	
				-25.0			
CP	70	78	-1939	59.4	3743 Rt	N02°W	
				-10.9			
CP	57	58	-1052	73.6	637 Lt	N44°W	
				-7.2			
CP	168	167	-228	77.2	856 Lt	N47°W	
				+2.3			
CP	227	226	+033	86.7	2187 Lt	N40°W	
				+4.8			
CP	202	201	+124	89.2	001 Rt	N38°W	
				+1.4			
CP	139	138	+036	85.8	237 Rt	N35°W	
				-5.5			
CP	97	96	-316	78.9	336 Rt	N34°W	
				-2.4			
CP	128	127	-186	82.0	452 Lt	N42°W	
				-40.6			
CP	162	171	-1486	43.8	2927 Lt	N67°W	
				-30.3			
CP	177	181	-946	54.1	3300 Lt	N71°W	
				-32.5			
CP	170	176	-1052	51.9	3753 Lt	N75°W	on secondary cross-fill
B.F	HI 5.09			84.4			
						N37°W	

9-5

11.

9-8-0[illegible]

Sta	Dist	Stadia	Vert ∠	Elev	Def.	Bearing Magnetic	
				-14.3			
CP	105	106	-746	70.1	12447 R+	N86 42 E	Determining open curve
				-37.3			
CP	211	216	-1004	47.1	9806 R+	N59 55 E	
				-48.7			
CP	183	195	-1444	36.2	9211 R+	N54 06 E	
				-22.7			
CP	93	97	-1350	61.7	12149 R+	N83 44 E	Determining open curve
				-51.8			
CP	133	152	-2116	32.6	9456 R+	N56 51 E	
				-53.3			
CP	128	149	-2248	31.1	10407 R+	N66 02 E	Determining open curve
				-19.5			
CP	82	86	-1321	64.9	12640 R+	N88 35 E	
				-54.3			
CP	121	144	-2412	30.1	10209 R+	N64 04 E	Determining open curve
				-15.8			
CP	28	36	-2916	68.6	9901 R+	N50 56 E	
				-51.5			
CP	93	114	-3156	32.9	9312 R+	N55 07 E	
				-20.8			
CP	36	47	-3005	63.6	6129 R+	N23 24 E	
				-28.8			
CP	51	66	-2936	55.6	5008 R+	N12 03 E	
				-3.0			
CP	17	17	-1612	81.4	0401 R+	N3 45 W	

12

9-5-88

Sta	Dist	Stadia	Vert ∠	Elev	Def	Bearing	Mag Co
				-8.0			
CP	158	157	-256	76.4	11429 R	N76ZAE	
				-4.3			
CP	211	210	-111	80.1	10818 R	N7015E	
				-22.0			
CP	173	175	-714	624	106 14 R	N6809E	
				-35.0			
CP	157	164	-1234	49.4	10326 R	N6521E	
				-26.0			
CP	129	134	-1120	58.4	11032 R	N7227E	
				-35.6			
CP	210	215	-937	48.8	10225 R	N6420E	
				-14.5			
CP	118	119	-700	69.9	12154 R	N934E	

13 Topography on Ref. Line Cont. 9-5-88

Sta	Dist	Stadia	Vert ∠	Elev	Def	Bearing Mag ∠0
				-32.7		
ep	114	122	-1550	56.7	7137R+	N3332E
				-27.4		
ep	102	109	-1531	62.0	6857R+	N3052E
				-21.6		
ep	110	113	-1110	67.8	6118R+	N2313E
				-23.4		
ep	92	97	-1416	66.0	6009R+	N2204E
				-18.4		
ep	79	82	-1305	71.0	5148R+	N1343E
				-33.8		
ep	74	88	-2447	55.6	11804R+	N795 9E
				-55.3		
ep	98	128	-2932	34.1	11534R+	N7729E
				-54.2		
ep	134	155	-2156	35.2	9856R+	N6051E
				-17.3		
ep	60	64	-1610	72.1	15346R+	S6419E
				-15.1		
ep	59	60	-1042	74.3	15914R+	S5851E
				-50.9		
ep	186	199	-1519	38.5	9718R+	N5913E
				-8.5		
ep	28	30	-1653	80.9	15144R+	S6621E
☐ H	HI	479		89.4		
						N3805W ✓

9-5-58

Sta	Dist	Stadia	Vert	Elev	Def	Bearing	Mag Cv
				+67.8			
CP	155	183	+2340	157.2	4039 L+	N78 44 W	
				+2.8			
CP	220	219	+044	92.2	7338 R+	N3533 E	
				+46.3			
CP	134	149	+1905	135.7	4728 L+	N8533 W	
				-20.4			
CP	202	203	-545	69.0	7932 R+	N4127 E	
				+18.0			
CP	107	109	+935	107.4	6458 L+	S7657 W	
				-45.9			
CP	185	195	-1357	43.6	9334 R+	N5529 E	
				-36.7			
CP	189	195	-1100	52.7	9117 R+	N5312 E	
				-46.3			
CP	133	148	-1913	43.1	9528 R+	N5723 E	
				-44.8			
CP	115	131	-2125	44.6	8432 R+	N4627 E	
				+2.8			
CP	100	99	+135	92.2	7825 L+	S6330 W	
				-11.9			
CP	96	97	-700	77.5	9138 L+	S5017 W	
				-38.2			
CP	106	119	-1950	51.2	8250 R+	N4445 E	
				-28.5			
CP	42	60	-3347	60.9	9940 R+	N6135 E	

15

9-5-58

Sta	Dist	Stadia	Vert r	Elev	Def	Bearing	Magneo
				+78.7			
UP	205	234	+2105	168.1	2159 Rt	N1608W	
				+80.6			
UP	228	255	+1930	170.0	3147 Rt	N618W	
				+77.4			
CR	185	216	+2248	166.8	1933 Rt	N1832W	
				+71.1			
UP	162	192	+2343	160.5	1503 Rt	N2302W	
				+79.3			
CR	161	199	+2615	168.7	936 Rt	N2829W	
				+82.9			
CR	258	284	+1746	172.3	4504 Rt	N659E	
				+79.5			
CR	141	184	+2906	167.9	1501 Lt	N3955W	
				+77.3			
CR	155	193	+2630	166.7	1527 Lt	N5332W	
				+73.3			
CR	218	219	+607	112.7	6504 Rt	N2659E	
				+59.1			
CR	130	156	+2426	148.5	2600 Lt	N6405W	
				+52.9			
CR	129	151	+2202	142.3	3151 Lt	N6956W	
				+63.5			
CR	138	166	+2450	152.9	3123 Lt	N6928W	
				+74.7			
CR	150	186	+2634	164.1	2747 Lt	N6552W	

16.

9-5-08

Sta	Dist	Stadia	Vert∠	Elev	Obj	Bearing	Images
				-139			
CP	123	123	-630	75.5 -8.0	7505 Rf	N37.00E	
CP	127	127	-335	81.4 -5.6	6958 Rf	N3153E	
CP	120	119	-242	83.8 +3.7	6552 Rf	N2747E	
CP	124	123	+142	93.1 +5.5	5539 Rf	N1734E	
CP	74	73	+418	94.9 +24.0	3418 Rf	N347W	
CP	70	77	+1904	113.4 +21.0	1830 Rf	N1935W	
CP	94	98	+1234	110.4 +47.8	3457 Rf	N308W	
CP	133	149	+1950	137.2 +43.8	2545 Rf	N1220W	
CP	118	133	+2026	133.2 +55.4	1439 Lf	N5244W	
CP	125	149	+2352	144.8 +55.2	409 Lf	N4214W	
CP	159	177	+1909	144.6 +66.3	2551 Rf	N1214W	
CP	223	242	+1635	155.7 +14.3	3712 Rf	N053W	
CP	204	230	+2000	163.7	2933 Rf	N832W	

9-5-88

Sta	Dist	Stadia	Vert L	Elev	Def	Bearing	Mag Co
				+11.6			
CP	58	59	+1128	101.0	2613 L+	N64 18 W	
				+21.9			
CP	94	98	+1306	111.3	4851 L+	N86 56 W	
				-2.2			
CP	70	69	-150	87.2	6739 L+	S74 16 W	
				+0.5			
CP	39	38	+050	89.9	6038 L+	S81 17 W	
				+21.6			
CP	63	69	+1902	111.0	1030 L+	N48 35 W	
				+25.2			
CP	73	81	+1901	114.6	43 R L+	N 42 37 W	?? Sign of L
				+22.2			
CP	53	61	+2251	111.6	634 R+	N31 31 W	
				+23.9			
CP	64	72	+2028	113.3	144 R+	N23 24 W	
				+30.9			
CP	70	83	+2341	120.3	1004 R+	N29 01 W	
				+32.7			
CP	89	100	+2012	122.1	2202 L+	N60 07 W	
				+35.2			
CP	101	112	+1919	124.6	2313 L+	N61 18 W	
				+40.1			
CP	111	124	+2000	129.5	711 L+	N45 16 W	
				+37.1			
CP	99	112	+2035	126.5	155 R+	N 36 10 W	

18

Wueste
Watermon
Billon
9-7-08

Sta	Dist	Stadia	Vert ∠	Elev	Def	Bearing	Mag. Co	
				+99.7				
VP	363	380	+1549	168.1	9924 R+	N 80 10 W		
				-9.0				
VP	118	118	-421	59.4	12416 R+	N 55 18 W		
				+97.0				
VP	408	430	+1323	165.4	9156 R+	N 87 38 W		
				+99.4				
VP	424	446	+1309	167.8	8602 R+	S 86 28 W		
				+27.3				
VP	164	169	+948	95.7	13356 R+	N 45 39 W		
				+118.0				
VP	462	490	+1421	186.4	8942 R+	N 89 52 W		base pnp cut
				+53.8				
VP	203	216	+1451	122.2	13732 R+	N 42 02 W		
				+152.0				
VP	473	477	+1945	220.4	10822 R+	N 61 12 W		base pnp cut
				+184.4				
VP	432	510	+2305	252.8	11822 R+	N 61 12 W		base pnp cut
				+205.3				
VP	452	545	+2425	273.7	12951 R+	N 49 43 W		base 5/8 pnp cut mon top
				+20.9				
⊡ H	162	163	+724					
⊡ H	HI 457			68.4				
				-21.0				
⊡ H	160.7	162.05	-728	68.4	14129 L+	S 02 26 W	S 02 30 W	= pt on RR on smaller indge

19

9-7-88

Sta	Dist	Stadia	VertAr	Elev	Def	Bearing	Mag Co
				-28.5			
CP	91	99	-1726	39.9	6004	S534E	
				+52.9			
CP	371	377	+807	121.3	8722 Pt	S8748W	
				-47.9			
CP	84	110	-2953	20.5	1935 Pt	S2001W	
				-34.0			
CP	51	73	-3356	34.4	4703 Pt	S4729W	
				+39.7			
CP	220	226	+1014	108.1	10821 Pt	N7113W	
				-50.0			
CP	70	105	-3545	18.4	4729 Pt	S4755W	
				-54.5			
CP	91	123	-3055	13.9	6449 Pt	S6515W	
				-41.4			
CP	74	96	-2915	27.0	10457 Pt	N7437W	
				-31.5			
CP	97	106	-1805	36.9	10446 Pt	N7448W	
				-23.8			
CP	124	128	-1050	44.6	9334 Pt	N8600W	
				+86.7			
CP	274	300	+1734	155.1	12029 Pt	N5905W	
				+87.7			
CP	293	318	+1641	156.1	11709 Pt	N6226W	
				+102.0			
CP	330	360	+1711	170.4	10942 Pt	N6952W	

Sta	Dist	Stadia	VertAr	Elev	Deg	Bearing	Mag Co	
				+10.3				
cp	250	249	+223	78.7	054Lt	S028E		
				+7.3				
cp	199	198	+202	75.7	350Lt	S324E		natural spr cut
				+101.4				
cp	349	377	+1614	169.8	7933Rt	S795W	Thrienon cut	
				-13.0				
cp	191	191	-354	55.4	615Rt	S641W		determining natural open cut at another portal
				-8.3				
cp	167	166	-253	60.1	226Rt	S252W		
				-2.2				
cp	163	162	-046	66.2	920Lt	S854E		
				+0.1				
cp	142	141	+003	68.5	1646Lt	S1620E		
				-3.1				
cp	147	146	-114	65.3	1057Lt	S1031E		
				+6.6				
cp	376	385	+937	132.0	8240Rt	S836W		
				-43.0				
cp	169	179	-1418	25.4	1740Rt	S1806W		
				-41.5				
cp	147	159	-1618	26.9	926Rt	S952W		
				-32.4				
cp	157	163	-1139	36.0	125Rt	S151W		
				+35.3				
cp	358	360	+538	103.7	7225Rt	S825W		

Begin here

21

Sta	Dist	Stadia	Vert	Elev	Def	Bearing	Magco
				+5.14			
CP	227	239	+13.26	119.8	20.46 L+	S 20 20 E	
				+52.0			
CP	213	225	+13.41	120.4	16.04 L+	S 15 38 E	
				+6.3			
CP	208	207	+1.44	74.7	9.747 R+	N 81 47 W	
				+34.3			
CP	195	200	+10.00	102.7	22.53 L+	S 22 27 E	
				+10.8			
CP	224	223	+2.46	79.2	8.710 R+	S 87 36 W	
				+15.8			
CP	236	236	+3.51	84.2	9.158 R+	N 87 26 W	
				+15.8			
CP	266	266	+3.24	84.2	8.904 R+	S 89 30 W	
				+27.7			
CP	185	188	+1.93	96.1	16.10 L+	S 15 44 E	
				+19.7			
CP	181	182	+6.13	89.1	18.13 L+	S 17 47 E	
				+33.9			
CP	201	205	+9.39	102.3	19.09 L+	S 18 43 E	
				+25.3			
CP	223	225	+6.27	93.7	10.28 L+	S 10 02 E	
				+9.9			
CP	311	310	+1.50	78.3	9.338 R+	S 84 04 W	
				-10.5			
CP	267	266	-2.16	57.9	5.26 R+	S 5 52 W	

22

Sta	Dist	Stadia	Vert.	Elev	Def	Bearing	Mag Co
				-67.5			
CR	205	226	-1817	0.9	4338 R+	S44 04 W	
				-66.4			
CR	108	148	-3140	2.0	4614 R+	S47 15 W	
				-58.2			
CR	196	212	-1638	10.2	5811 R+	S58 37 W	
				-53.4			
CR	117	141	-2426	15.0	2203 R+	S22 29 W	
				-51.7			
CR	170	195	-1653	16.7	5530 R+	S55 56 W	
				-41.1			
CR	171	180	-1331	27.3	7056 R+	S71 22 W	
				-6.7			
CR	217	216	-146	61.7	8601 R+	S87 16 W	
				+85.3			
CR	258	295	+1820	153.7	2936 L+	S29 10 E	
				+1.1			
CR	152	151	+027	69.5	11114 R+	N68 20 W	
				+69.6			
CR	244	263	+1552	138.0	2551 L+	S25 25 E	
				+70.5			
CR	242	262	+1618	138.9	2347 L+	S23 21 E	
				+19.6			
CR	153	160	+705	88.0	11304 R+	N66 30 W	
				+8.4			
CR	163	162	+254	76.8	10900 R+	N70 24 W	

23

Sta	Dist	Stadia	Vert ∠	Elev	Def	Bearing	Mag Co	
⊡ 13	HI							
				-63.7				
⊡ 13	241	257	-1449	4.7	3820 Rt	S38.4W	S3835W	
				-40.9				
cp	230	237	-1005	27.5	1008 Rt	S1034W		etr open cut
				-37.5				
cp	238	248	-857	30.9	952 Rt	S1018W		
				-66.0				
cp	230	248	-1602	2.4	2937 Rt	S3004W		
				-37.4				
cp	224	229	-931	31.0	931 Rt	S957W		Step, at tunnel outlet
				-60.9				
cp	189	207	-1757	7.5	2813 Rt	S2839W		
				-58.4				
cp	173	192	-1839	10.0	2105 Rt	S2131W		
				-59.3				
cp	146	168	-2150	10.1	1923 Rt	S1949W		

24

Sta	Dist	Stadia	Vert	Elev	Def	Bearing	Magnetic

Sta	Dist	Stadia	Vert	Elev	Def	Bearing	Mag to

26.

Auxiliary Traverse

Locating BM 169.073

Sta	Dist	Chain	Vert L	Def	Bearing
F					
	59.0				
E		59.76	-906	8414H	N3803W
	113.7				
9				8749Rt	N4611E
	119.5				
8		135.88	-2825'	3331t	N4138W
	167.9				
7		1855	-25°10'	9000Rt	N3905W
	55.9				
6		70.47	-37°33		
	49.8				
D				9000Lt	35155W
					N3905W

9-3-08
Wwest
Waterman
Billen

Traverse Sheet

Sta	N	S	E	W	Lat	Dep
D		652		832	-652	-832
7	1321			1036	+669	-186.8
8	893			793	+1562	-266.1
9	787		820		+2349	-184.1
E	464			363	+2813	-2204
F						
	3465	652	820	3024		

27 Bench ✓ Tail-towers.

Westc
Waterman
Billon
9—7—08.

Sta	Dist	Stadia	VertL	Elev	Def	Bearing	
—		45	—		1038 Rt	N27 27 W	NE cor movable Tower platform
—		15	—		1953 Rt	N18 12 W	SE cor movable tower platform
—		37	—		5942 Rt	N21 37 E	ctr track outside
—		43	—		4510 Rt	N7 05 E	ctr track middle
—		121	—		7126 Rt	N33 21 E	ctr track (inside East end)
				+4.4			
VR	76	101	+3013	390.0	2727 Rt	N10 38 W	upper edge
—		50	—		3618 Rt	N1 47 W	ctr track (inside)
				+1.0			
VR	174	173	+020	346.6	8240 Rt	N44 35 E	inside edge road
				+36.1			
VR	168	175	+1206	381.7	6527 Rt	N27 22 E	upper edge
				+20.1			
VR	193	184	+618	365.7	7751 Rt	N39 46 E	on upper edge
				+1.5			
VR	179	178	+029	347.1	8836 Rt	N5 31 E	outside edge bench
				+0.2			
CP	166	165	+003	345.8	7700 Rt	N38 55 E	NE cor bench
BL	#1 539			345.6			on outside edge shelf
						N38 05 W	

28 9-7-58

#

Sta	Dist	Stadia	Vert ∠	Elev	Dep	Bearing	
—		16	—		R03Rt	N3602 W	SE cor 7^{5} x 7^{5} tower on boat-shaped movable platform
				−2.3			
up	65	64	−149	343.3	9228Lt	S4927 W	outside edge shelf
				+13.8			
—	75	77	+1026	359.4	6230Lt	S7925 W	NE cor stationary tower
				+12.1			
—	72	73	+1004	358.3	7323Lt	S6832 W	SE cor stationary tower
				+13.2			
—	82	83	+911	358.8	7523Lt	S6632 W	SW cor stationary tail tower
				+22.6			
up	93	98	+1335	368.2	6758Lt	S7357 W	upper edge
				−0.1			
up	66	65	−005	345.5	4917 Lt	N8722 W	NW cor cut
				+31.3			
up	70	83	+2414	376.9	A627Lt	N8432 W	upper edge
		17	—		3613Lt	N7418 W	SW cor movable tower platform

29. Shelf at about 170' Elev. — North side Dam site

9-7-58

Sta	Dist	Stadia	Vertl	Elev	Dy	Bearing	Images	
				+1433				
BP	176	292	+3913	325.7	453 Ft	N6104 W		upper edge cut
				-1.5				
BP	18	17	-505	180.9	6934 Ft	S4429 W		
				-8.8				
BP	96	96	-516	173.6	5512 Ft	S5951 W		
				+213				
BP	121	124	+1001	203.7	3780 Ft	S7643 W		
				+17.9				
BP	90	93	+1114	200.3	2261 Ft	N6923 W		
				+6.3				
BP	71	70	+509	188.7	1394 Ft	N6736 W		
				+16.6				
BP	28	37	+3024	199.0	10332 Ft	N3725 E		
				+12.4				
BP	48	50	+1437	194.8	18001 Ft	N2757 W		
				+0.6				
BP	17	16	+217	183.0	11025 Ft	N4428 E		
☐ J		47	-1617					
☐ 12	AT 492			1824				
				+12.8				
☐ 12	44	47	+1615	1824	2752 Ft	N6557 W	N6555 W	
☐ 1	AT 510			169.6				on edge shelf about 170 Elev
						N3906 W		

30.

9-7-08

Sta	Dist	Stadia	Vert ∠	Elev	Del	Bearing	
				+70.6			
CP	155	186	+2434	253.0	2552 Lt	S88 11 W	
				+104.5			
CP	164	230	+3235	286.9	112 Rt.	N6445 W	
				+79.3			
CP	172	208	+2447	261.7	2444 Lt	S89 19 W	
				+74.6			
CP	434	446	+945	257.0	6105 Lt	S5258 W	upper edge
				+39.1			
CP	149	158	+1445	221.5	4900 Lt	S6503 W	
				+76.8			
CP	379	398	+1251	269.2	5621 Lt	S5742 W	upper edge
				+100.0			
CP	353	380	+1551	282.4	5116 Lt	S6247 W	upper edge
				-14.6			
CP	124	125	-643	167.8	9334 Lt	S3029 W	outer edge
				+116.3			
CP	293	334	+2046	298.7	4225 Lt	S7139 W	upper edge
				+102.3			
CP	237	280	+2320	284.7	3321 Lt	S8042 W	on upper edge
				-14.3			
CP	78	80	-1020	168.1	8321 Lt	S3042 W	
				-10.9			
CP	28	31	-2126	171.5	14352 Rt	N7755 E	
				+118.3			
CP	184	260	+3248	300.7	15031 Lt	N8100 W	upper edge

31. Exit of Outlet Tunnel

9-7-08
Wwest-c
Waterman
Billon

				-11.5			
OP	76	77	-834	25.3	2611 Rt	N215W	
				+7.5			
OP	53	53	+805	44.3	1107 Rt	N3503E	
				-13.4			
OP	58	60	-1305	23.4	036 Lt	N2320E	
				+4.0			
OP	39	39	+549	40.8	5311 Rt	N7707E	
				+15.7			
OP	56	57	+1127	52.5	3420 Rt	N5816E	
				-7.4			
OP	39	40	-1044	29.4	5817 Rt	N8213E	= Rt side exit
				-6.0			
OP	38	39	-1222	30.8	6829 Rt	S8735E	= left side exit
				+3.9			
OP	29	29	+732	40.7	8423 Rt	S7141E	
4	HI 4.89			36.8 by Levels page 4		near outlet tunnel Exit	
						N2336E N2335E	= Corner 4 to 5 page 3

32 Shelf with BM 169.073

9-8-08
W Weste
W Waterma
Billom

Sta	Dist	Stadia	Vert	Elev	Dep	Bearing	Magnetic
				+4.1			
VP	55	55	+414	170.2	5452R	S13 14 W	
				+81.4			
VP	122	176	+3348	247.5	2500L	S66 38 E	
				+9.0			
VP	76	76	+646	175.1	5713L	N81 09 E	
				+15.6			
VP	99	91	+1014	181.7	4404L	S85 42 E	
				+8.2			
VP	59	59	+757	174.3	3257L	S74 35 E	
				+25.5			
VP	103	110	+1340	191.6	5644L	N13 38 E	
				+5.8			
VP	29	29	+1131	171.9	2223L	S64 01 E	
				+2.9			
BM 169.073	14	14	+1145	169.0	2034L	S6 12 E	
				+9.7			
VP	86	86	+624	175.8	7452L	N63 30 E	
				+4.2			
⊡ 14	24	24	+951	170.3	6922R	S27 44 W	S27 00 W
				+2.5			
VP	62	61	+221	168.6	9106L	N47 16 E	
				+0.6			
VP	22	21	+138	166.7	8243R	S41 05 W	
⊡ 8	HI	5.08		166.2			
				(213-508)			

S42 25 E

S43 38 E = Runner Cw 8-9 page 26

33

9-8-08

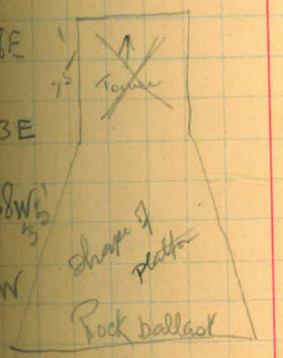
Sta	Dist	Stadia	Vert ∠	Elev	Det	Bearing	Magco	
				+100.3				
VP	243	283	+2226	270.6	4954 Rt	S2210E		
				+100.8				
VP	213	260	+2519	271.1	5544 Rt	S2800E		
				-6.8				
VP	103	102	-349	163.5	2606 Rt	S138W		
				-11.7				
VP	140	140	-455	158.6	808 Rt	S1936W		
				+100.9				
VP	192	244	+2745	271.7	6757 Rt	S4013E		
				-35.5				
VP	139	147	-1422	134.8	1449 Rt	S4233W		
				-36.8				
VP	92	106	-2145	133.5	1412 Rt	S4156W		
				-35.0				
VP	95	107	-2019	135.3	421 Rt	S3805W		
				-28.8				
VP	48	65	-3130	141.5	2038 Rt	S4122W		
				+89.9				
VP	168	215	+2814	260.2	7719 Rt	S4935E		
				-4.2				
☐ 8	24	24	-949	166.1				
☐ 14	HI	532		170.3		S2744W	on wooden frame 2 feet above ground	
				+101.2				
VP	155	220	+3311	267.3	1534 Rt	S5712E		

34

Sta						
				+248		
VP	141	144	+1004	195.1	4247 ft	S16 03 E
				+125		
VP	175	176	+404	182.8	1831 ft	S9 13 W
				+7.1		
VP	198	197	+205	177.4	2759 ft	S 015 E
				+555		
VP	184	200	+1646	225.8	4112 ft	S 1328 E
				-934		
VP	176	225	-2759	76.9	4142 ft	S 6944 W
				+70.7		
VP	199	223	+1933	241.0	4337 ft	S 1553 E

35 Bench with Head Tower.

Sta	Dist	chain (76ft)	Malony	also	−0.6 anelth	stak 8' wide	
—	78	77	−026	295.3 +4.2	8243 Pk	N5912E	~ ? of Concrete core
UP	110	131	+2406	345.1 +3.2	951 Pk	S1656E	upper edge curb
—	29	28	+622	298.1 +3.2	4714 Pk	S9519E	NW NE cor movable platform
UP	141	148	+1315	329.1 +3.4	4143 Pk	S7948E	upper edge curb
—	18	18	+1056	299.3 +3.1	1042 Pk	S2723E	NW cor movable platform
—	59	58	+303	299.0 +3.6	6843 Pk	S3038W	W end ctr #4
—	90	69	+302	299.5 +3.5	5535 Pk	S7130W	W end ctr #3
—	92	91	+211	299.4 +3.0	3643 Pk	S122E	W end ctr #1
—	90	89	+157	298.9 +3.7	4317 Pk	S512W	W end ctr #2 moving out
UP	113	112	+152	299.6 +8.8	4520 Pk	S715W	
—	189	188	+240	304.7 +12.7	4314 Pk	S509W	= SE cor ⌂ 31×26 Engine house
UP	142	142	+508	308.6	5158 Pk	N8057E	
(⌂ 1)	HI SAD			295.9			



S35-05E S3710E = Reverse co Reference Sta

To east side concrete (Miguel)					9327 Lt	N3422W	
To east stake of concrete core					9250 Lt	N5905E	
				+49.4			
—	237	246	+1148	345.3 +7.5	3810 Rt	S155E	= NE cor station and tower 12x12 25' high
—	27	28	+1536	303.4 +3.9	3811 Lt	S7616E	= NE cor tower on station 16x16 40' high
—	128	127	+146	299.8 +3.8	5239 Lt	N8916E	= E end ctr ⌀ 1 track
—	124	123	+146	299.7 +3.6	5643 Lt	N8512E	= E end ctr ⌀ 2 track
—	126	125	+138	299.5 +2.8	6952 Lt	N7203E	= E end ctr ⌀ 3 track
—	120	119	+123	298.7 +21.5	7724 Lt	N6431E	= E end ctr ⌀ 4 track
ep	172	173	+711	317.4 +31.8	3936 Rt	S131W	
ep	132	138	+1337	327.7 +37.6	3156 Rt	S609E	
ep	110	122	+1856	333.5	1559 Rt	S2208E	

37 Levels to radiating hubs

BM	064	169.71		169.073
⊡ 8				357
0			1123	158.48
	116	159.64		
0			1146	148.18
	106	149.24		
0			1193	13731
	018	137.49		
0			1087	12662
	084	127.46		
0			1045	117.01
	1.23	11824		
0			1072	107.52
	5.11		6666	

16614

38

	118	108.70		10752		
D					7.28	101.42
			10.79	9791		
	299	100.90				
E					7.03	9.37
			1045	9045		
	121	91.66				
			1121	8045		
	030	80.75				
			1141	6934		
	117	7051				
			1129	5922		
	093	6015				
			1108	49.07		
	7.78		66.23			

	128	503.5		4907
0			973	4062
	079	4141		
0			776	3365
	355	3720		
			778	2942 = Top Concrete wall near S end
			162	3558 = temporary BM
			808	2912 = Top Concrete wall near N end
0			311	3409
	042	3451		
			47	2978 = Bottom Tunnel portal entrance
0			295	3156
	283	3439		
	887		2355	

		3439				
⑥			5.9	29.20		
	443	33.63				
					4.7	28.9
⑦			1.90	31.73		
	1047	42.20				
日4					5.45	36.75

← bottom of portal vein

= 日 at exit time

14.90

7.09

4-17-09

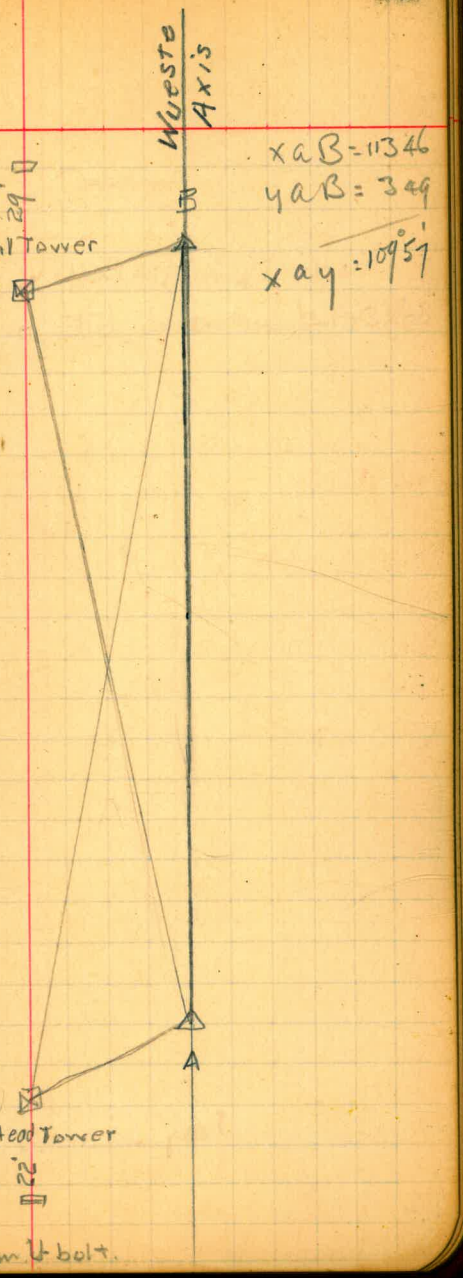
Take pro- old map
found ar Moreno

Notes of Outher Tunnel

337 2/ = long course
42 °30' = dif angle ar lower ent

0.10 % = grade
30 % = grade upper ent Tunnel

	Single	Double
∠XAB	113°46'	227°33'
∠YAB	3°49'	7°39'
∠ABY	53°27'	106°53'
ABX	6°43'	13°26'



Note: when jewel is entirely back, the distance between heart block and rear end of jewel is 29'. To this must be added the lap of splice

Note: 22' = distance from heart block to back of jewel when latter is down to end of threads on U bolt.

xaB = 113 46
yaB = 3 49
xay = 109 57

44 Stadia Readings for X-section
Powder Drift

June 23/24. '89.
Wueste
Salisbury

Sta.	Dist	Stadia	Vert'l	Elev	Diff.	HI	Elevation of Transit point from Levels in back of book.
	62	63	-945	-10.7			
				159.7			
	44	44	-820	-6.5			
				163.9			
	26	47	-4310	-24.4			
				146.0			
	20	43	-4805	-22.0	90° L+		
				148.4			
	45	52	+2325	+19.4			
				189.8			
	23	26	+2130	+9.3			
				179.7			
⊡3	20	20	+930	+3.4	90° R+	450	1704
				173.8			
	89	88	-300	-1.6			
				171.6			
	55	54	-505	-4.8			
				168.4			
	21	20	+420	+1.6			
				174.8			
	13	15	-2600	-6.8			
				166.4			
	2			-2.3	90° L+		
				170.9			
⊡4	22	29	+3135	+13.4	90° R+	592	173.2
				186.6			

						HI	Elev.
	49	52	-1502	-12.8 201.5	90° L+		
□8	28	39	+3326	+18.5 232.8	90° R+	456	214.3
	79	79	-730	-10.3 179.9	90° L+		
□7	24	28	+2338	+10.7 200.9	90° R+	449	190.2
	98	99	-8°40'	-14.9 170.8	90° L+		
	20	22	+2110	+7.8 193.5			
□6	7			+4.9 190.6	90° R+	472	185.7
	116	117	-740	-15.5 169.0			
	70	71	-11°02'	-13.5 171.0	90° L+		
□5	23	25	+1934	+8.1 192.6	90° R+	461	184.5
	18	19	-1926	-6.2 162.8	90° L+		
	37	36	-0726	-0.3 168.7			
□2	23	22	+0220	+0.1 169.1	90° R+	472	169.0

Sta	Dist	Stadia	Vert'l	Elev	Dep.	HI	Elev
	63	65	-1244	-14.7 188.9			
□ 3A	47	50	-1178	-14.6 188.5	90° L+	496	203.1
□ 2B	78	83	+1532	+21.7 236.5	90° R+	490	214.8
	44	64	+3452	+30.8 214.8		= □ 2B	
	16	18	+1240	+6.8 140.8	90° R+		
	14	16	-1550	-6.7 177.3			
□ 2A	48	50	-1350	-11.8 172.2	90° L+	491	184.0
	63	76	-2458	-29.5 145.9			
□ 1A'	17	39	-4858	-19.6 155.8	90° L+	405	175.4
□ 1B	55	57	+1210	+11.9 212.4	90° R+	5.11	200.5
	11	11	+1656	+3.4 175.4	90° L+	= □ 1A'	
	41	60	+3448	+29.5 200.5		= □ 1B	
□ 1A	13	12	-134	-0.4 171.6	90° R+	5.11	170

47

		75	81	-1704	-23.0		
					220.9		
	5A	30	36	-2446	-14.0	90°L+	6.5
					229.9		
	4B	95	102	+1620	+27.8	90°R+	3.56
					201.1		
		62	73	+2334	+27.2		= 4B
					253.3		
		34	35	+1314	+8.0	90°R+	
					234.1		
		58	61	-1348	-14.4		
					211.7		
	4A	27	34	-2800	-14.6	90°L+	4.94
					211.5		
		91	98	+1540	+25.8		
					259.5		
		58	60	+1310	+13.5		
					247.2		
	3B	2			-4.4	90°R+	4.73
					229.3		
		45	65	+3418	+30.6		= 3B
					233.7		
		32	36	+2056	+12.4	90°R+	
					215.5		
	3A	12	11	+178	+0.3	90°L+	
					203.4		

HΣ

2439

2533

2361

2337

This reading must be taken for profile rather than this transit point which is on rock

2031

48

	41	43	+1520	+113				
				311.0				
	9	8	+138	+0.1	90° R+			
				299.8				
⊡ 8A	55	61	-1850	-19.0	90° L+	461	299.7	
				280.7				
	147	169	+2118	+57.5				
				344.2				
	93	101	+1730	+29.2				
				315.9				
	25	24	-256	-1.2	90° R+			
				285.5				
	64	75	-2340	-27.0				
				259.7				
⊡ 7A	10	16	-3858	-8.2	90° L+	461	286.7	
				278.7				
	91	101	+1840	+30.6	90° R+			
				299.2				
	65	75	-2336	-27.0				
				237.9				
⊡ 6A	39	45	-2330	-16.2	90° L+	493	264.9	
				248.7				
	107	119	+1912	+37.2				
				284.1				
⊡ 5A	39	45	+2336	+16.9	90° R+		243.9	
				260.8				

						HI	Elev.
	21	50	-714	-2.6 244.2	90° R+		
☐ 11A	44	45	-1134	-9.0 237.8	90° L+	437	2468
	22	24	+2138	+8.6 341.6	90° R+		
☐ 10A	61	68	-1910	-21.3 311.7	90° L+	453	3330
	68	76	+2002	+24.9 340.2			
	16	22	+3416	+7.9 323.2	90° R+		
☐ 9A	62	66	-1520	-17.1 298.2	90° L+	1200	3153
☐ 8A	117	133	+2048	+44.5 344.2			2997

HI Geol.

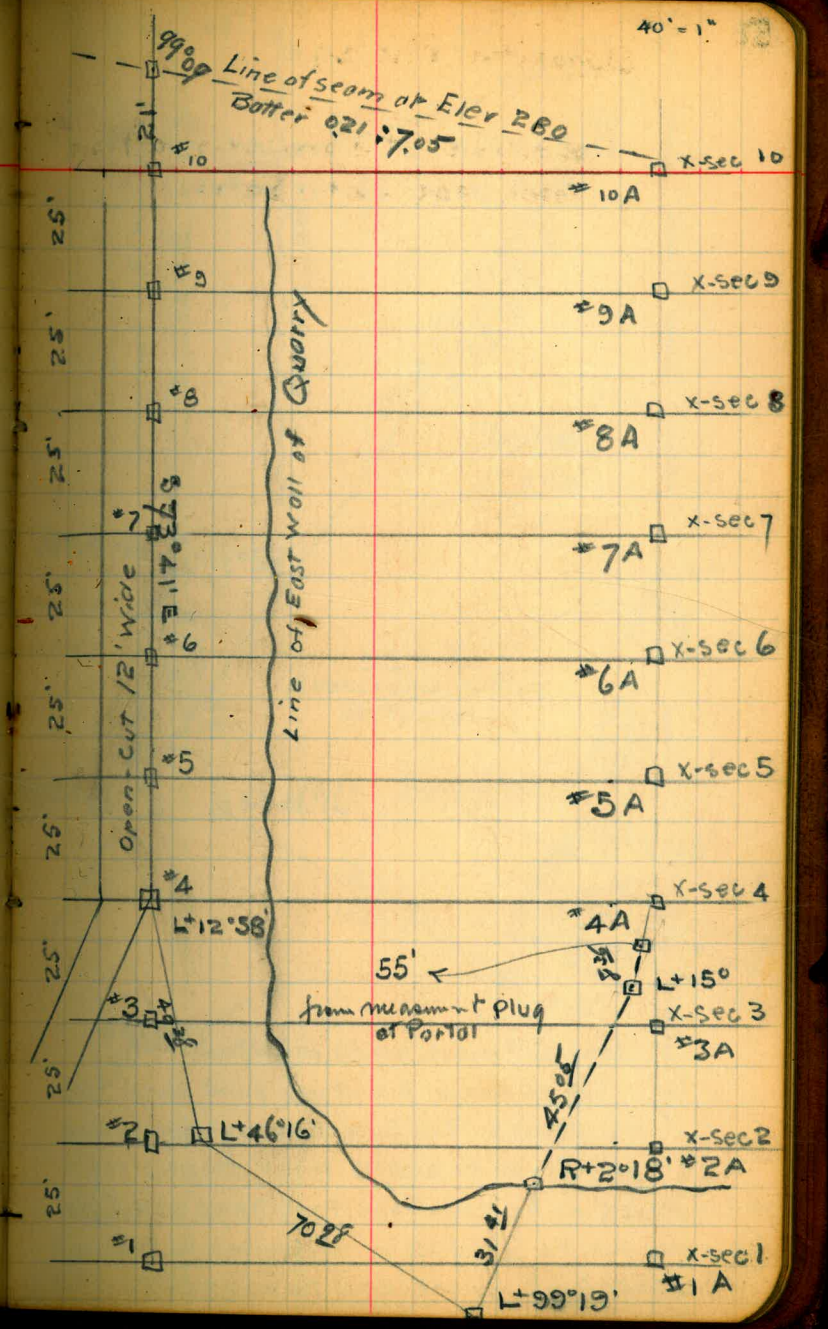
This seam has a Battery of 0.21 : 7.05

= Strike and direction of seam forming back wall of quarry.

10+21					99°9'R	
	21	27	+1852	+8.6	90°R	
				288.4		
⊡10+18	72	79	-1858	-24.6	90°L	431 2798
				255.2		
	29	34	+2438	+13.1		
				281.2		
	11	10	+350	+0.7	90°R	
				2688		
⊡10	67	70	-1434	-17.3	90°L	400 2681
				250.8		
	28	28	+1006	+5.0	90°TR	
				246.1		
	91	91	-550	-9.3		
				231.8		
⊡9	47	51	-1834	-15.7	90°L	494 2411
				225.4		

Opposite Page:

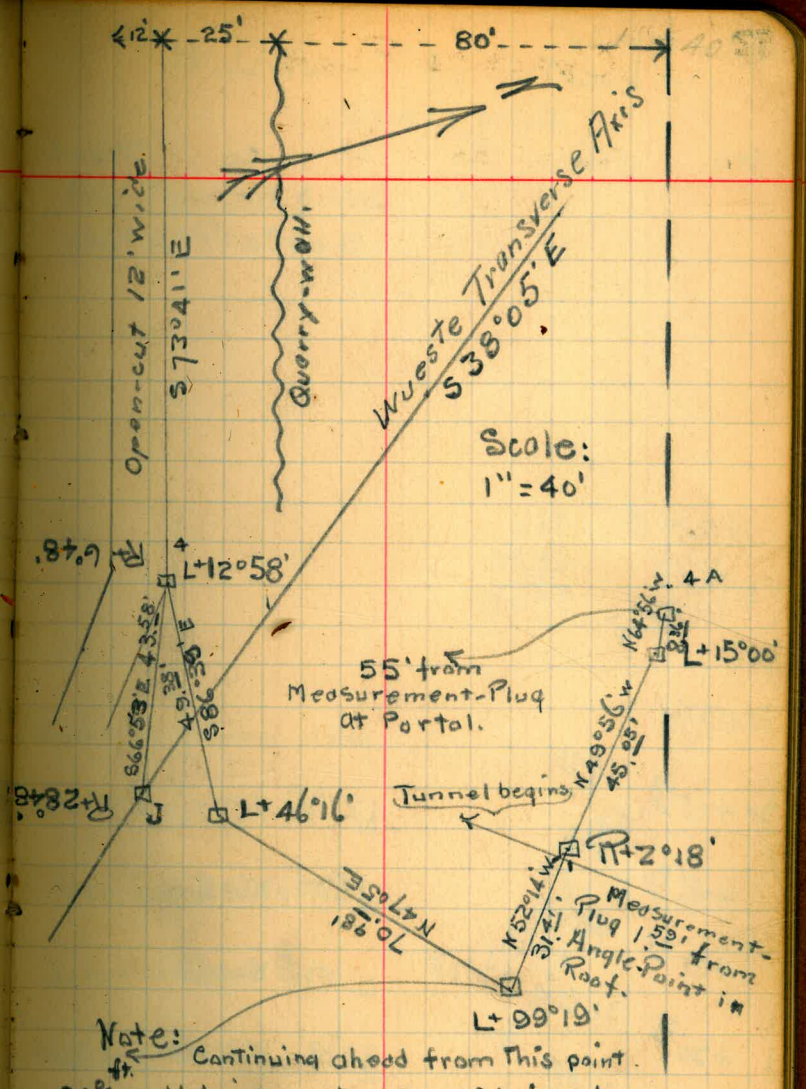
Graphic Representation of Notes pages 44 - 50 incl.



Opposite Page

Location of Powder-Drift.

See page 53 for notes.



53

Location of Powder-Drift.
Notes copied.

Wueste
Solisbury.

Sta	Dist	Rt	Lt	Co	mags
+25[1/2]					
	19[2]				
2 +05[18]			12°36'	N77°32'W	N77°-W
	8[36]				
+96[82]			15°00'	N64°W	
	45[05]				
+51[27]		2°18'		N49°W	
	31[41]				
1 +20[36]			99°19'	N52°14W	N51°35W
	70[21]				
+49[38]			46°16'	N47°05E	N48°00E
	49[38]				
0+00			12°58"	S86°39E	S85°15E
Line 75' from Quarrywall				S73°41E	

Note: Open-cut detects about 75° Rt at 0+00

Plug in roof = 175' measured along

Plug in roof of Drift.

In roof at Tunnel Portal

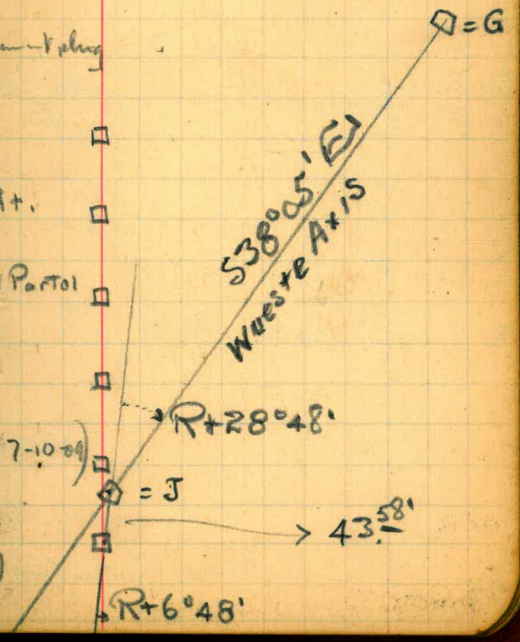
Plug under track

P from PK (undisturbed 7-10-09)

P from PK at edge of cut; now (7-10-09) shot out.

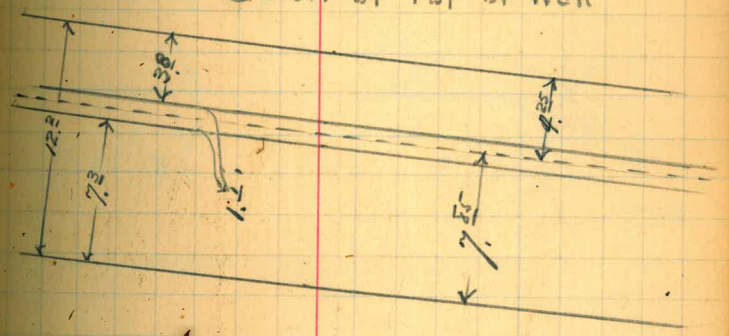
648
2846
3536

S73°41E
3536
S38°05E



54 Location of Core-Wall

Detail of Top of Wall



Ctr Groove	86°01' Rt	N34°36'W ✓
F	90° Rt	N55°55'E

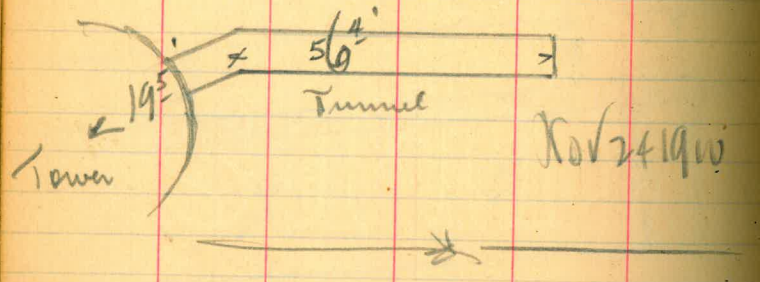
N38°05'W ✓

3°59'

∠ Amount of Inclination - Wall to axis.

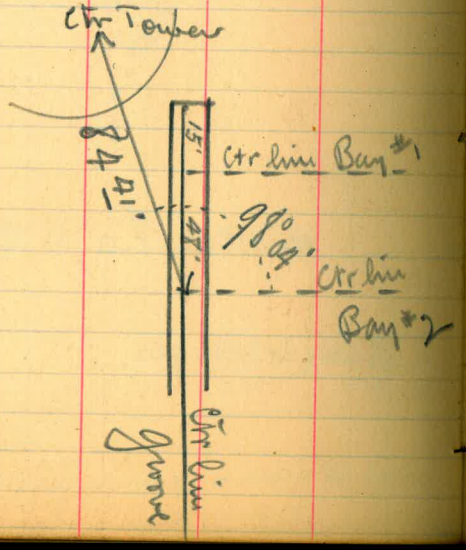
= Bearing Wueste axis.

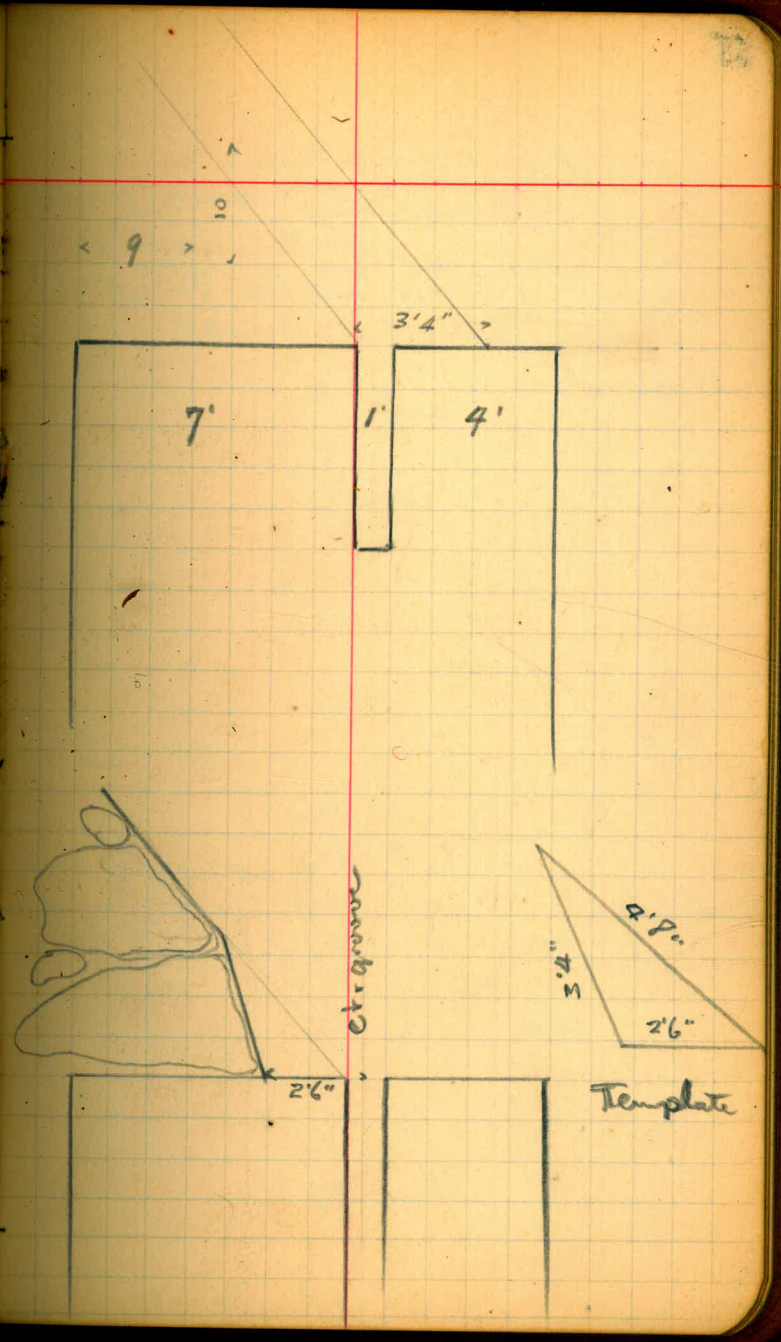
Amount of Concrete wall & and Traverse Outlet Tunnel



Xav 24 1/2"

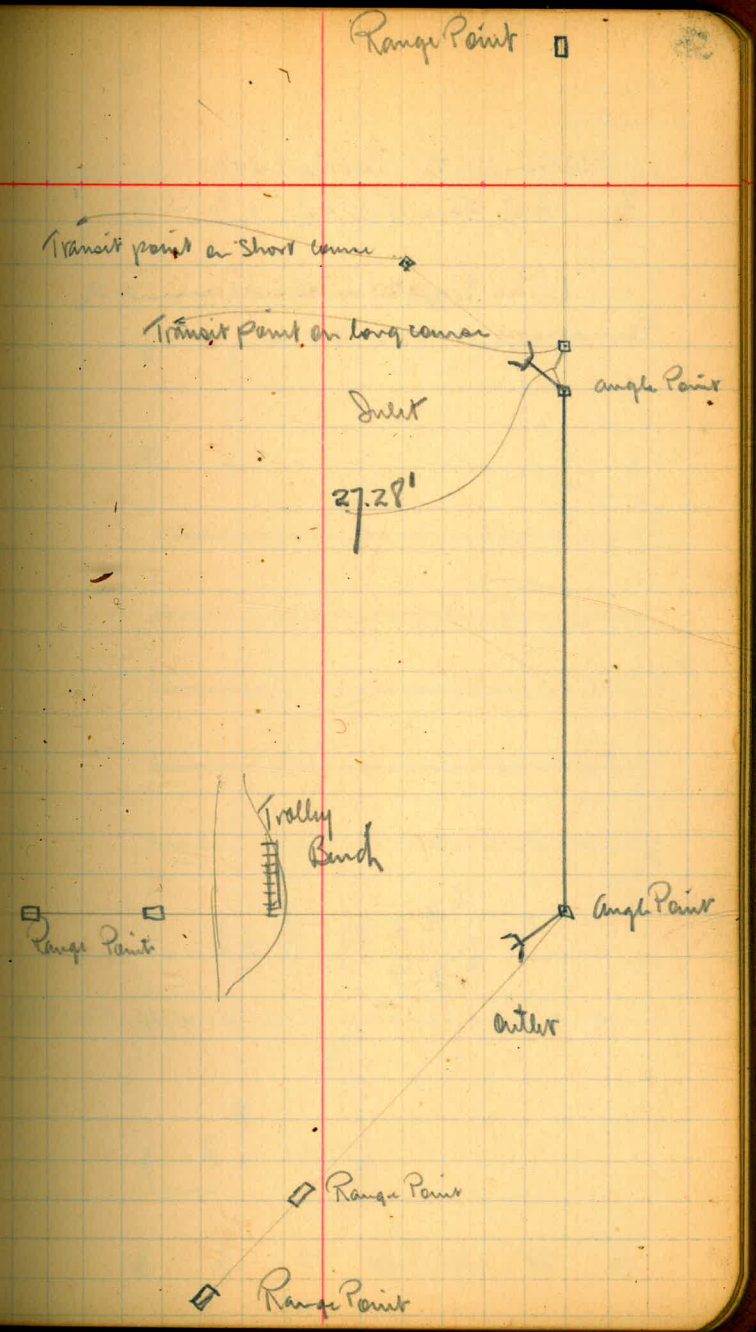
Relative positions of toe-wall and outlet Tower.





Location of Angle Points
Tie-out Point Moreno Tunnel

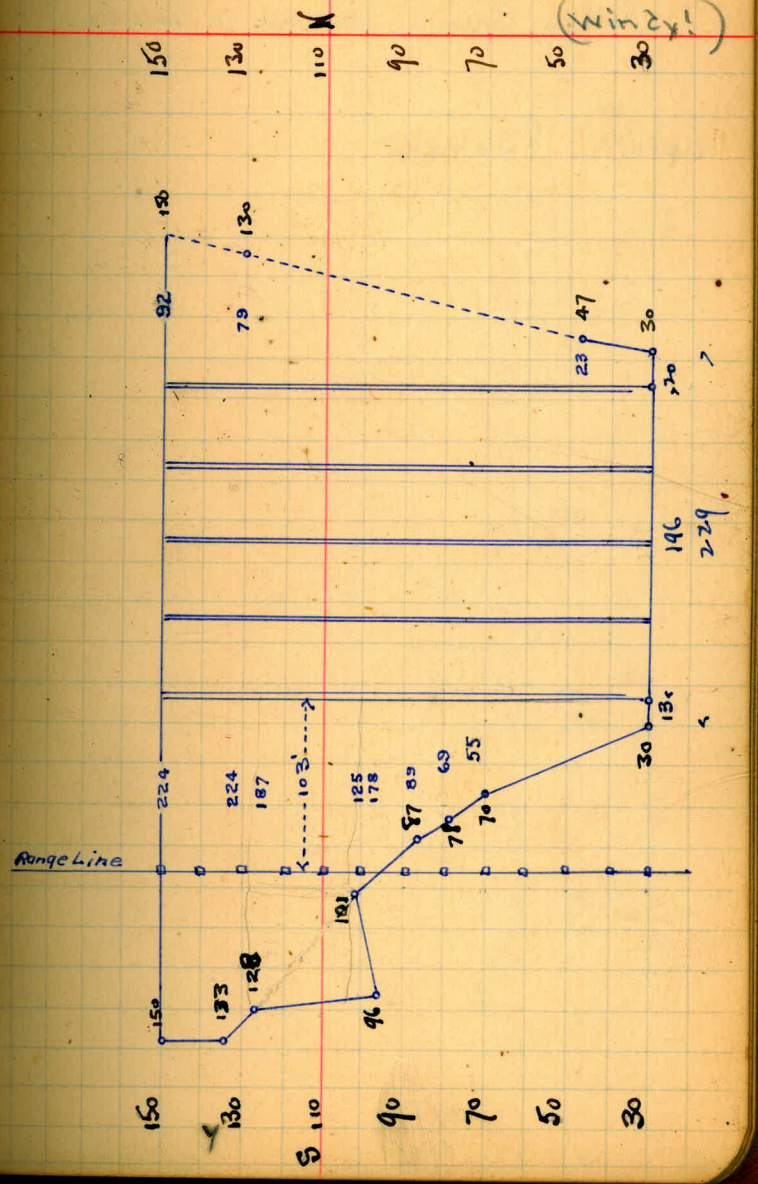
3-1-10 Wueste - McIntosh



Measurements for Concrete garage
of face of Dam

6544 Sq Ft in Development of
Elevation on opp. page.

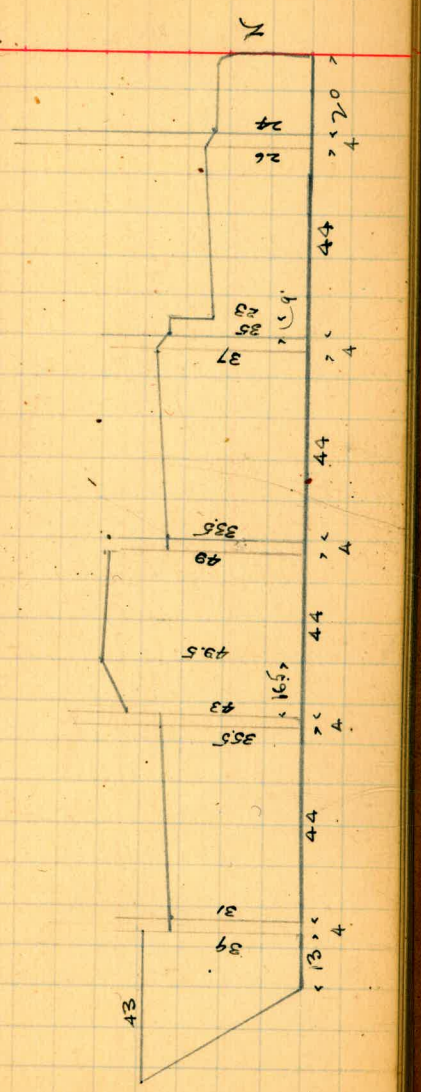
4-15-10
Inspected
O'Byrne
(Windy!)



Surface Area of Masonry in Place April 6, 10

April 6 10. 8360 sq ft.

Normal View of Completed Masonry 4-16-10.



60 Random Line To show relative Positions of 2 corners shown R. Wreath by Mr. Chas. Hook and the "School-house Cor"

June 16th & 17th 1910.
R. Wreath
H.D. Hubbard
Clements Salazar.

Sta.	Dist.	Rt.	Sr.	Cac. Co.	Mag. Co.	Vert. Angle	Hund. Inst. corr.	Hund. Inst. corr.	1st Rating	2nd	3rd	4th	Average Station	
7	498				N 88½ E	-350	✓		9935 4vo	9930 4vo			56	Hub at west edge of oak timber
6	1799				N 89½ E	-730	✓		10135 1vo	11'3 2vo	10155 1vo		1828	Hub on rocky hill about 4vo Below. ridge (foot of)
5	989				S 89½ E	-1616	✓		11765 1vo	11578 080	11675 1vo	11655 1vo	1073	Hub below brow to right of bunch of rocks.
4	303				N 89½ E	-710	✓		907 4vo	907 5vo			308	Hub on brow of hill
3.	577	Sub-station to locate ½ mile corner by				-770	✓		886 3vo	886 2vo			586	Hub in brush in shallow ravine.
3	1158				N 89½ E	-450	✓		892 3vo	9135 4vo			1166	Hub in brush
2	664				N 89½ E	-645	✓		10725 4vo	11225 4vo			673	MK on Blk Rk
1	1651			N 89½ E	N 89½ E	+116	✓		9725 1vo	902 ✗	9265 1vo	9265 1vo	16552	Corner shown Rec. by Chas Hook mound of rock 3' high on rocky hill-side.

577

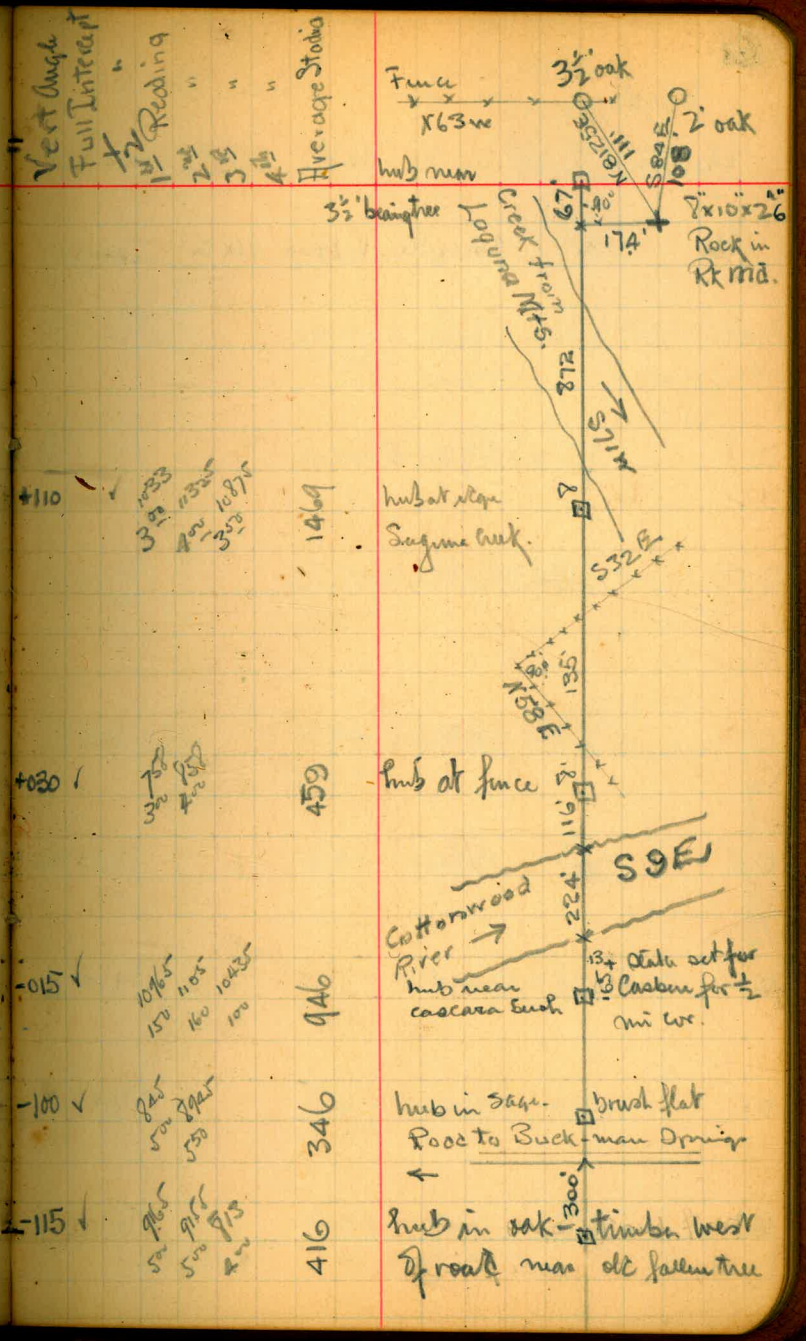
1525.
S 66½ E 1525
½ mi Cor shown Rec by Hook 6x8x36 RK in mound 15" oak bears S 69 E 19'

61

Sta	Dist	Rt	Lt	Calc	Mag
12					
Memo.	111 ft to 3½" oak N81¾E mag Bearing				
	108 ft to 2" oak S84 E "				
12	1468				
11	459				N 93 0 E
10	946				N 95 0 E
9	346				East
8	416				N 91 0 E

Vert Angle
Full Intercept
Rod Reading
1 2 3 4
Average Stadia

+110 ✓ 3 10.33 11.35 10.87 — 1469
+030 ✓ 3 7.50 4 8.50 — 459
-015 ✓ 1 10.65 2 11.05 3 10.435 4 10.00 — 946
-100 ✓ 1 8.45 2 8.95 3 8.45 4 8.50 — 346
-115 ✓ 1 9.65 2 9.15 3 9.15 4 9.13 — 416



62.

Random Line South from corner
Shown Plotted by Mr Rooke = ☐ 1 page 60.

Sta	Dist.	Magnetic Station	Vertical Angle	Cal to	Mag Co.
☐ 19	678	768	-200N +200S		S 10° E
☐ 18	73	73	Level		S 05° E
☐ 17	259	263	+652 -658		S 10° E
☐ 16	1398	1413	+558 -555		S 10° E
☐ 15	288	290	-450		S 10° E
☐ 14	1421	1440	-640 +640		S 12° E
☐ 13	101	102	-415 +417		S 11° E
☐ 1	767	767	-200		S 12° E

S 04° 32' E

June 20 1910.
Weste
H.D. Hubbard
Clements Salazar.

Hub on Pict Hill overlooking
Moreno Reservoir Site

Hub on Pict line

Prom Pk on Pict Mtn. 6x6x20 Pk in Rock md. corner

110' - 10°39'
5°13
5°15 W

Hub at edge cañon

Prom Pk

Hub in cleft of Rock

Prom Pk Ledge

mine run 90°
on page 60-61

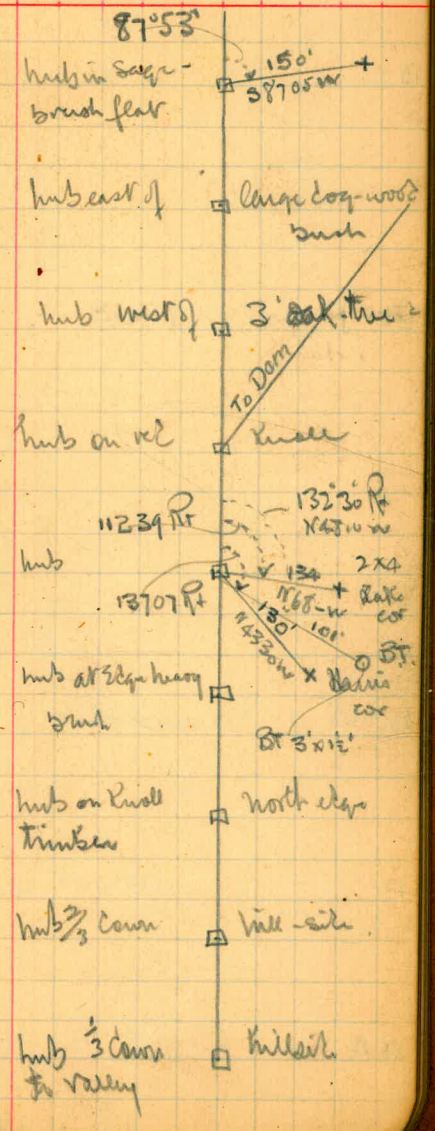
106' Horn Scale

63

Sta	Dist	av Stadia	Vert angle	Cal Co	Mag Co
28					S 50 E
27	475	475	-100		S 05 E
26	700	700	-123		S 04 E
25	959	960	-200 +152		S 04 E
24	388	388	-033		S 04 E
23	546	546	-106 +108		S 05 E
22	619	624	-457 +417		S 05 E
21	1111	1148	-1020 +1015		S 10 E
20	599	664	-1813 +1845		S 05 E

S 04 3/4 E

Full Intercept
1st Reading
2nd "
3rd "
4th "



64

Determination of azimuth of lines on pages 60-63 inclusive,

June 22 1910
Wheeler
Hubbard
Salazar.

Sta	Lt	Rt	Cal Co.	Mag Co.	
12,					See page 61
1		9000	N89 16½ E	N89½ E	See page 60
75	4435½		N 043½ W	N 045 W	See page 63
	11101½		N 43 52 E	N 44 30 E	
A		1258½	S 25 06½ E	S 25 - E	Triangulation point ▲ A page 1
	15537	10258½ ✓	S 39 05 E		

Co of Sun page 60-61

Reverse Co of Sun pages 62-63

65 Meander for Boundary of work-place

Sta	Dist	LT	RT	Co.	Mag Co	Station		Towers Hubbard Ritchie
+ 995	316.1	1011		S 10°30' E	S 14 30 E	100 45	+ 5 58'	March 31 & Apr 1
8								
+ 355	164.0		4903	S 0°19' E	S 4 30 E	200 36	+ 4°12'	Edge road near Dishman tent
7								
6								
5								
4								
+ 343	401.2		1115	S 49°22 E	S 55 30 E	200 603	+ 10 08'	
3								
2								
+ 237	210.6	7734		S 60°37 E	S 63 40 E	200 411	+ 3°41'	
1								
0 + 00	123.7		1657	S 16°57 W	S 15 05 W	300 426	+ 7 45'	= 4 x 4 Pw Stake on 15° contour
	12156 ✓	8745 ✓	7715 ✓		S 1 55 E			Corner bar above stake and ½ mile too on north line of Sec 23

□ + 86.0

19

□ +87.6 10984 128 S38°00E S41.50E 300.85 = ½ intercept + 2°06 □ 2' west of Spring

18

17

16

15

14

13

□ + 15.6 6720 2602 S36°32E S40°25E 300.87 +

12

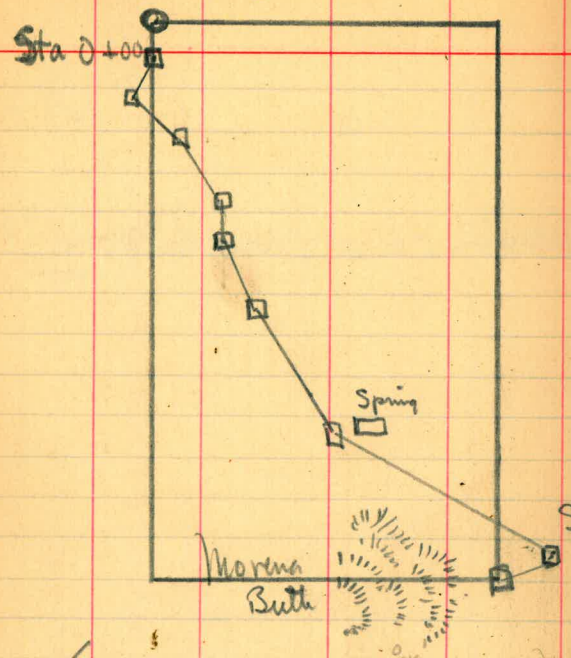
11

10

9 1770A 2730'

67 Diagram of Survey page 65-67 inc

Ctr Sec 23



0 + 15 ✓ 35° 53' West 586.5 W

33

32

31

30

29 + 86 329.1 ✓ 329.1 9207 S 54° 07' W S 50° 10' W 1064.5 0° 00

12 8° 00' ✓

Movement to West of
70' Contour Reference Point
May 16 1911

#1 22/32 38/32
2
3 29/32

69 Angles to establish azimuth of Highland Reservoir to a certain Reference point of known angular position from various tubs on 49° contour. This Ref Pt is located above upper Boiler Supply Reservoir above South Bench.

Waterman No.	Tubs No	Lt	Rt	Mag	Cal	Remarks
66	1	42°23'	8°45'			
				N 79 05 W		On South slope in N W cor Res.
						This far Feb 21. 1912 Wm St. Hubbard.
						Waterman, Paredes.
						Beginning here Feb 22 1912
61	" 2		47°54'	95°48'	N 23 00 E	Cal N 22 42½ E on Rocky point opp pump
56	" 3		71°52½	143°45½	N 47 00 E	N 46° 46 E on Rocky Pt opp next gulch
47	" 4		96°59	193°58	N 72 00 E	N 71° 52 E West end rocky promontory
44	" 5		104°01	208°02	N 89 10 E	N 78° 54½ E ✓
32	" 6		97°12	194°24½	N 72°20 E	N 72° 05½ E
28	" 7		101°55	203°51	N 77° E	N 76° 48½ E ✓
21	8		101°17½	202°35	N 76°30 E	N 76° 11 E ✓
15	9		104°18	208°37	N 79°30 E	N 79° 11½ E
10	10		105°21	210°42	N 80°30 E	N 80° 14½ E
6	11		108°17	216°35	N 83°30 E	N 83° 11 E ✓
0	12		91°08	182°16	N 66°30 E	N 66° 01½ E
73	13		79°36	159°12	N 54°30 E	N 54° 28½ E

70

Traverse of 49' contour

Sta	dist	Lt	Rt	Cal Co	Mag
58	315.7		12 > 36½	S 58° 04 E	S 57 35 E
59	85.2	52° 59'		N 5° 40½ W	N 5° 30 W
60	79.0	30° 12'		N 47° 18½ E	N 47 30 E
61	85.00		5443	N 77 30½ E	N 78 00 E
				N 22 47½ E	
PP		9235	24632		
61			94 28½	S 22 47½ W	S 73 30 W
62	86.50	1208		S 71 36 E	S 71 10 E
63	165.90		5244	S 59 28 E	S 59 00 E
64	285.60		2712	N 67 41 E	N 68 00 E
65	133.00	2641		N 40 36 E	N 41 00 E
66	~~153.00~~		~~9646~~	~~N 67 17 E~~	~~N 67 00 E~~
		3849	27105½	N 29 29 W	N 29 30 W
				S 25 06½ E	

West Kubbutz
Watterman Paredes
Feb 22 1912

S 22 47½
54 43
3155½

7730½

N 22 47½ E

STA	DIST	L	R	CALCO	M
47			130.25	S 71 53 W	S 72 W
48	269.0	24.12		S 58 32 E	S 58 35 E
49	67.5		63 28	S 34 20 E	S 34 E
50	34	48°18'		N 82 12 E	N 82 30 E
51	69.3		31° 47'	S 49 30 E	S 49 30 E
52	142.5	10°44'		S 81°17 E	S 81 E
53	131.0	14 39½		S 70 33 E	S 70 10 E
54	95.2	23 31		S 55 53½ E	S 55 35 E
55	102.4		110 33½	S 32 22½ E	S 32 E
56	200.7	9°42'		N 37 04 E	N 37 25 E
		13 10 6½	33 6 13½	N 46 46 E	
56			114 12½	S 46 44½ W	S 47 10 W
57	142.1	9 24		S 67 28 E	S 67 E

TRUE COURSE S 71° 52' W error 0.1'

FEB. 23 1912

N 46 46 E error 8 1/2

72

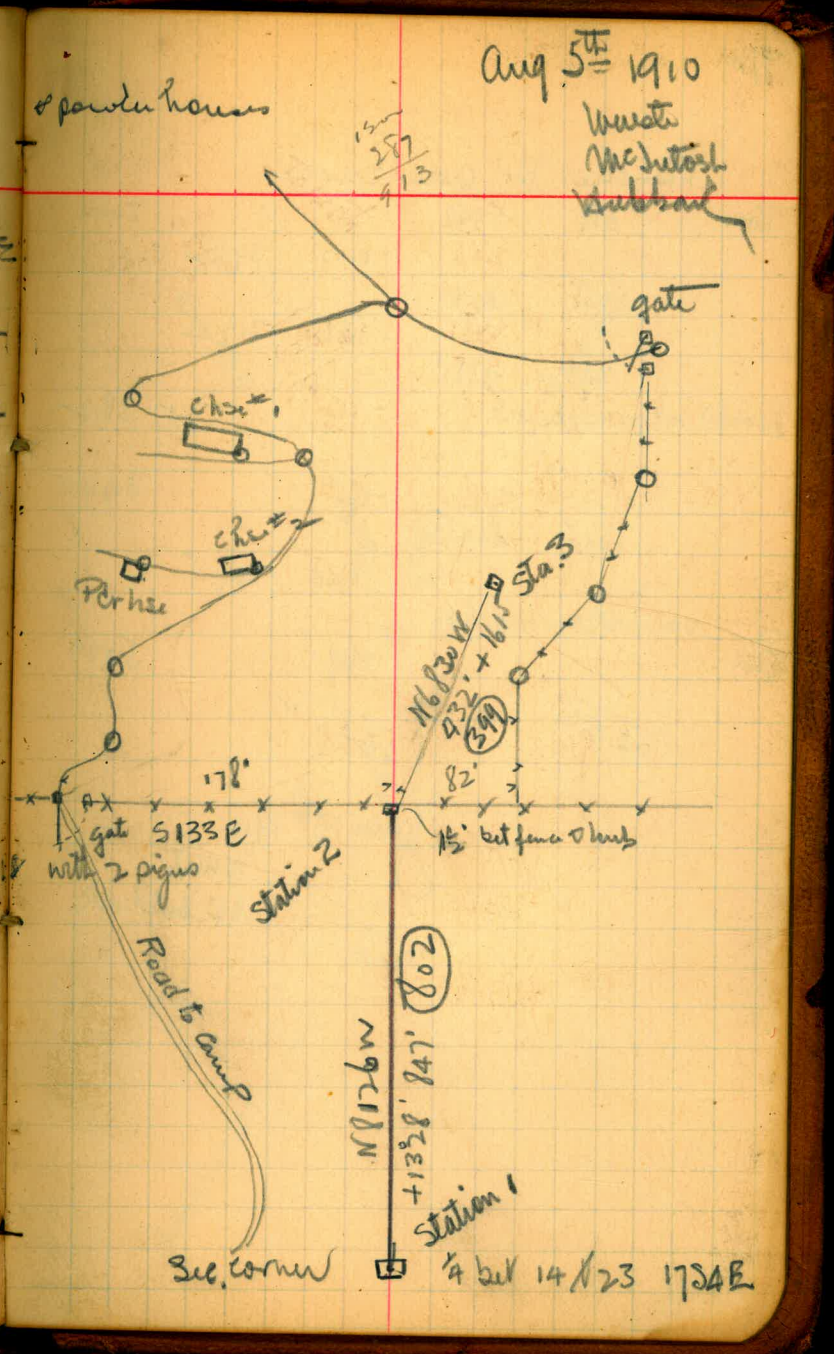
STA	DISC	L	R	CALC'd	M C
36	128.9	110° 01½'		N69 54E	N69 50W
37	181.0	23° 37½'		N40 07E	N40 10E
38	66.6	24° 45'		N63 44½E	N64E
39	64.5		30° 47'	N88 29½E	N88 30E
40	137.2	25° 39½'		N57 42½E	N57 50E
41	210.3	24° 06'		N83 22E	N83 30E
42	73.4		30 54	S72 32E	S72 30E
43	106.0		26° 41'	N76° 34E	N76 30E
44	85.1.	29 01½'		N49 53E	N50E
		32107½	13416	N78 54½E	
44			153 22	S78 54W	S79W
45	131.0	2212		S74 28	S74 10E
46	~~1056~~		3216	S52 16E	S52 15E
47	328.2	26° 00'		S84 32E	S84 15E
		4812	18538	S58 32E	

TRUE COURSE S78 54½W ERROR 0½'

73 Notes for Sketch to show position of Survey Improvements around corner

Name	Dist	Station	Vert angle	Mag to
L pr in road	249	288	-2200	S 23 20 E
L pr in road	357	381	-1450	S 15 30 E
NW cor Pond house	515	514	-1125	S 16 30 E
NE cor Cement house	388	396	-910	S 2 00 E
Junc of Rd with corner hse Rds	569	577	-715	S 16 00 W
N.E. cor Corner house	702	710	-630	S 5 15 W
Shirttail bench	910	913	-345	S 6 20 W
Junc. of Rds with North bench road	557	556	-140	S 25° 30 W
Cr gate	310	315	+810	N 7 30 W
L pr in fence	216	218	+630	N 50 45 W
L pr in fence	118	118	+430	N 16 45 W
L pr in fence	247	272	-1804	S 76 - E

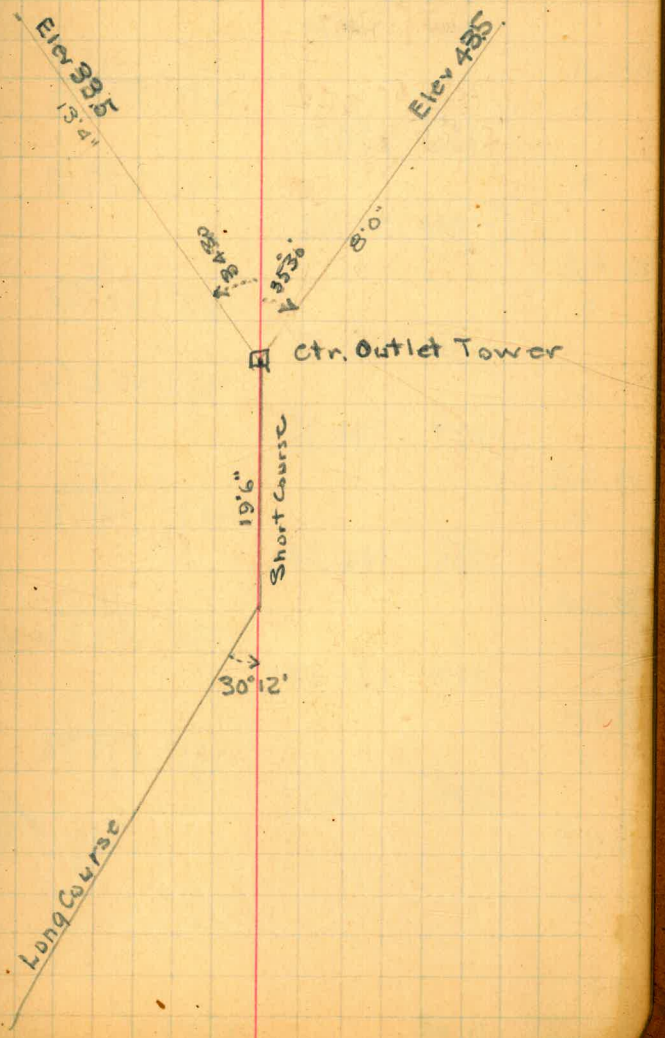
Sta 3



Benches for Outlet Tower

Bm	0.89	5.089			5.000
			11.07	3.982	
	0.55	4.037			
			8.65	3.172	
	3.93	3.565			
Inverted rod on angle pr.				2.47	3.812
			1.65		3.400
	1.045	4.445			
			0.40	4.405	
	6.64	5.069			
Bm			0.69		5.000
	2.246		2.246 ✓		

June 15th 1910
W. Mast
H.D. Hubbard C.



75

		256.91			
O			11.21	245.70	
	0.00	245.70			
□5A					
			1183	18 / 233.87	243.9
O	556	239.43			
O			11.76	227.67	
	(−003)	227.64			
□4A				15	
O			1165	21 599	216.1
	026	216.25			
O			11.73	204.52	
	026	204.78			
□3A				1.7	203.1
O			1107	193.71	
	059	194.30			
□2A				103	184.0
O			1098	183.32	
	102	184.34			
□1A				123	172.0
O			1195	172.39	
	328	175.67			
OnB				3.19 ✓	172.48

(17.45)

10.94 9537 ✓

76

Levels on ⊡S A 11 to A 1

June 24th 09
W. Waste
Salisbury

On Rock at entrance North Bench

Bm 30				350.04	
	1.99	352.03			
⊡ 11A				52	346.8
⊙			11.79	340.24	
	1.49	341.73			
⊡ 10A				8.7	333.0
⊙			11.49	330.24	
	1.01	331.25			
⊙			11.97	319.28	
	0.70	319.98			
⊡ 9A				4.7	315.3
⊙			11.77	308.21	
	1.18	309.39			
⊡ 8A				9.7	99 9.7
⊙			10.27	299.12	
	0.31	299.43			
⊙			11.62	287.81	
	0.64	288.45			
⊡ 7A				1.8	286.7
⊙			11.09	277.36	
	0.69	278.05			
⊙			11.98	266.07	
	1.04	267.11			
⊡ 6A				3.2	264.9
⊙			10.83	256.28	
	0.63	256.91			
	9.68		102.81 ✓		

		×5.57			
			.59	×4.98	
	11.63	×6.01			
			1.01	×5.96	
	11.75	×7.135			
			.78	×6.85	
	11.23	×7.9.80			
□ 10				11.7	×6.81
8 × 10 + 8 □			2.00	×79.78	
	34.1		6.40 ✓		

78

Smiles or Tramair Point
Pioneer Drift X-Section

January 23 & 24, 09
Wueste
Salisbury

Sm13				17245	
	532	17777			
⊡2				99	169.0
⊡3				74	170.4
⊡4				46	173.2
⊙			048	17729	
	1288	19015			
⊡5				57	184.5
⊡6				41	185.7
⊡7				00	190.2
⊙			068	189.47	
	238	191.85			
			081	191.04	
	1192	202.96			
			270	200.26	
	1020	210.46			
			007	210.39	
	1067	2106			
⊡8				68	214.3
			022	220.84	
	1141	232.25			
			280	229.45	
	1154	240.99			
			109	239.90	
	1167	251.57			
⊡9				105	241.1
	8797		885	✓	

44 35½ R

S 43 40 W

89/1
44 35½

410
290
1000
102
767
2709
2640
69

11 01 W 22203.
N 44 30 E 11 01½

378
960
700
3048
475
2573

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

For Single Track Embankment.

Roadway 14 feet wide. Side Slopes 1½ to 1.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	27
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.