12-8-2009

Ex. 279-US-421

Unknown

ALL-WEATHER
LEVEL BOOK
No. 310
SYCAMORE
Canyon
SY-2

Ex. 279-US-421
Page 2 of 58

SY-2 Sycan R. 5/18/00

multiple transect establishment
and high flow sampling

crew: M. Gagner rod
W. Swanney π & book
C. Dayde rod
D. Harder
D. Sill

weather: sunny & warm ~65°F
no ppt in past 24 hrs

equipment: Pentax AL-M2
(721444)
Marsh McBirney
MODEL 2000

	In	Out
Time	10:00	15:45
S.G	0.0	0.0

SY-2 SYCAN RIVER 5-18-00

STATIONING LEFT BANK + RIGHT BANK
WORKING PINS

STA	Left Bank DIST	Right Bank Dist.
TR-1 to TR-2	74.5	89.5
TR-2 to TR-3	100.2	98.5
TR-3 to TR-4	91.1	83.0
TR-4 to TR-5	102.3	97.0
TR5 to TR-6	314.5	295.0
TR-6 to TR-7	111.9	95.0
TR-7 to TR-8	103.8	98.0
TR-8 to TR-9	98.7	105.0
TR-9 to TR-10	106.2	98.0

SY-2 Sycan R. 05/18/00

Upper Run Unit

Level Loop

STA	BS	HI	FS	Elevation
BM2	2.95	102.95		100.0
TR-10			2.23	100.72
TR-9			3.98	~~98.97~~
TR-8			3.36	99.59
TR-7			2.67	100.28
TR-6			3.74	99.21
TP				
TR-6	3.66	102.87		
TR-7			2.60	100.27
~~TR-8~~			3.30	99.57
TR-9			3.30	99.57
~~TR-10~~				
TP				
TR-8	3.49	103.06		99.57
TR-9			3.50	99.56
TR-10			2.35	100.71
BM2			3.07	99.99

SY-2 SYCAN RIVER 5-18-00

WATER SURFACE ELEVATIONS

STA	BS	HI	FS	ELEV	DEPTH
TR-10	1.94	102.65		100.71	
TR-10 LB			11.61	93.93	2.89
TR-10 RB			10.50	93.92	1.77
TR-9 LB			11.00	93.94	1.29
TR-9 RB			9.86	93.93	1.14
TR-8 HP	1.73	101.30		99.57	
TR-8 LB			9.86	93.94	2.50
TR-8 RB			10.39	93.92	3.01
TR-7 LB			9.95	93.89	2.54
TR-7 RB			9.79	93.91	2.40
TR-6 LB			10.63	93.87	3.20
TR-6 RB			10.19	93.90	2.79

Sy-2 Sycan R. 05/18/00
Lower Run Unit
Level Loop

STA	BS	HI	FS	Elevn	
BM	0.86	100.86		100.00	
TR-6			4.66	96.20	
TR-4			3.69	97.17	
TR-3			2.17	98.69	
TR-2			3.83	97.03	
TR-1			2.05	98.81	
TR-1	2.26	101.07		98.81	
TR-2			4.04	97.03	
TR-3			2.38	98.69	
TR-4			3.90	97.17	
TR-5			4.87	96.20	
BM			1.07	100.00	OK

Sy-2 Sycan R.
Lower Run Unit WSE

STA	BS	HI	FS	Elevn	Rod
		101.07		use this elevation	
TR-1					
RB		7.91	8.30	93.17	0.40
LB			~~8.73~~		~~1.83~~
TR-2					
RB		7.62	8.21	93.45	0.58
LB		7.50	9.93	93.57	2.43
TR-3					
RB		7.52	8.58	93.55	1.06
LB		7.52	10.30	93.55	2.78
TR-4					
RB		7.47	7.95	93.60	0.48
LB		7.45	9.23	93.62	1.78
TR-5					
RB		7.42	9.81	93.65	2.39
LB		8.40	9.95	93.67	1.55

SY-2 SYCAN RIVER 5-18-00

DISCHARGE MEASUREMENT 15:00

TAKEN at TR-2

STA	DEPTH	VEL		
12.0	0	0	REW	
14.0	0.4	0.48		
18	1.05	1.74		
22	1.7	2.02		
26	2.5	2.18 /	0.87	T/B
30	2.7	2.14 /	2.10	
34	2.55	2.12 /	2.02	
38	2.3	1.36		
42	1.9	1.93		
46	1.8	1.67		
50	1.[illegible]7	1.78		
54	2.2	1.51		
58	2.7	1.58 /	1.28	
62	3.1	1.68 /	1.30	
66	2.8	1.68 /	1.59	
70	2.7	1.77 /	0.99	
74	2.8	1.49 /	1.10	
78	1.75	1.41		
82	0.9	0.38		
86	0.8	0.33		
90	0.6	0.06		
94	0.5	0.06		
98	0.3	0.0		
102.5	0.2	0.02		
107	0	0	LEW	

SY-2 SYCAN RIVER 5-18-2000

DISTANCE BETWEEN HEAD PIN and WORKING PIN on RIGHT BANK

TR#	DIST (FT)	COMMENT
TR-1	.7	HP LOWER WP in TREE
TR-2	.9	HP UPPER WP LOWER
TR-3	2.5	HP UPPER WP LOWER
TR-4	3	
TR-5	1.5	
TR-6	44.5	
TR-7	24	
TR-8	21	
TR-9	14	
TR-10		

SY-2 SYCAN RIVER 6-28-00

MID FLOW MEASUREMENTS

CREW: W. SWANKEY
M. GALLOWAY
C. DAVOE
N. LABEDSKI

WEATHER: SUNNY and HOT
AIR TEMP ~ 90°F

EQUIPMENT: PENTAX AL-M2
721444

MARSH McBIRNEY
2000116

	IN	OUT
TIME	09:00	18:00
SG	0.0	0.0

SY-2 SYCAN RIVER 6-28-00

LEVEL LOOP - LOWER TRANSECTS

STA	BS	HI	FS	ELEV	
BM	6.01	106.01		100.00	
TR-1			7.20	98.81	
TR-2			8.99	97.02	
TR-3			7.32	98.69	
(TP)					
TR-3	7.40	106.09		98.69	
TR-2			9.07	97.02	
TR-1			7.28	98.81	
BM			6.09	100.00	WMS
(TP)					
BM	5.99	105.99		100.00	
TR-4			8.82	97.17	
TR-5			9.78	96.21	
(TP)					
TR-5	10.07	106.27		96.20	
TR-4			9.09	97.18	
BM			6.26	100.01	WMS

BM IS IN TREE JUST U/S of TR-3

54-2	54CAN RIVER			6-28-00	
	BANK PROFILES (TR-1)				
STA	BS	HI	FS	ELEV	
TR-1	2.45	101.26		98.81	HP
1.0			2.99	98.27	BASE WP.
-2.0			1.37	99.89	
-4.0			0.83		
-3.0			3.33		
5.0			5.02		
7.0			5.89		
9.0			6.99		
11.0			7.28		
13.0			7.99		
15.0			8.06		
17.0			8.01		
19.0			8.22		
21.0			8.50		
23.0			8.99		
23.6			9.38	91.88	REW/RWS
59.0			9.39	91.87	LEW/LWS
60.0			9.26		
70.0			8.82		
80.0			8.55		
90.0			8.42		
100.0			8.69		
110.0			8.96		

54-2	TR-1 PROFILE CONT			6/28/00	
STA	BS	HI	FS	ELEV	
120		101.26	9.40		
130			8.91		
140			8.30		
150			7.45		
160			6.39		
162.9			6.03		WP BASE
170			5.51		
180			5.54		
190			5.40		
200			5.16		
	APPROX. 60' TO CANYON WALL				

SY-2	SYCAN RIVER			6-28-00	
		TR-2 PROFILE			
STA	BS	HI	FS	ELEV	
TR-2	6.21	103.23		97.02	HP
1.0			6.76		WP BASE
-3.0			5.91		BACK FROM WP
-6.0			4.64		
-10.0			3.45		
2.0			7.91		
4.0			8.60		
6.0			9.42		
8.0			9.76		
10.0			9.74		
12.0			9.90		
14.0			10.19		
16.0			10.41		
18.0			10.80		
~~20.0~~			11.01		
20.8			11.03	92.20	REW/RWS
~~80.9~~			11.02	~~92.21~~	LEW/LWS
85.0			10.40		
90.0			10.34		
95.0			10.23		
100.00			9.96		
~~105.0~~ 110.0			9.43		

SY-2	TR-2 CONT			6/26/00	
STA	BS	HI	FS	ELEV	
120		103.23	8.37		
128.3			7.74		BASE WP
130			7.69		
140			7.33		
150			6.24		
	APPROX 60' to CANYON WALL				

54-2	SYCAN RIVER			6/28/00	
		TR-3 PROFILE			
STA	BS	HI	FS	ELEV	
TR-3	8.68	107.37		98.69	HP
1.0			10.53		WP BASE
-3.0			8.41		
-6.0			6.75		
3.0			11.49		
5.0			11.69		
7.0			12.62		
9.0			13.02		
11.0			13.47		
13.0			14.24		
14.6			15.14	92.23	REW/RWS
85.7			15.16	92.21	LEW/LWS
88			14.70		
90			14.61		
92			13.79		
94			13.35		
96			13.08		
98			12.16		
100			11.48		
102			11.27		
103.2			11.13		WP BASE
110			10.74		
120			10.38		

54-2		TR-3 CONT		6/28/00	
STA	BS	HI	FS	ELEV	
140		107.87	10.25		
160			10.63		
200			11.92		
220			11.28		
240			5.05		AT EDGE OF CANYON

SY-2 SYCAN RIVER 6/28/00

TR-4 PROFILE

STA	BS	HI	FS	ELEV	
TR-4	8.03	105.20		97.17	HP
1.0			9.81		WP BASE
-4.0			7.56		
-6.0			6.56		
-7.0			4.48		
3.0			10.08		
5.0			10.32		
7.0			11.10		
9.0			11.23		
11.0			11.31		
13.4			12.98	92.22	REW/RWS
72.6			12.98	92.22	LEW/LWS
75.0			12.74		
80.0			11.86		
85.0			11.16		
90.0			10.18		
92.6			9.52		WP BASE
100.0			8.13		
120.0			6.97		
140.0			8.35		
160.0			9.06		
180.0			8.66		
200.0			8.22		EDGE of CANYON WALL

SY-2 SYCAN RIVER 6/28/00

TR-5 PROFILE

STA	BS	HI	FS	ELEV	
TR-5	5.85	102.05		96.20	HP
1.0			6.71		WP BASE
-4.0			5.10		
-6.0			4.63		AT CANYON WALL
-2.0			5.69		
3.0			7.18		
5.0			7.84		
7.0			7.80		
9.0			8.21		
11.3			9.76	92.29	REW/RWS
63.2			9.79	92.26	LEW/LWS
65			9.42		
70			9.00		
75			7.55		
80			6.44		
84.1			5.83		WP BASE
95			4.46		
110			4.21		
130			4.89		
150			5.68		
170			5.43		
190			4.86		AT EDGE of CANYON
TR-6 HP					

SY-2 SYCAN RIVER 6/28/00

TR-6 CONT.

STA	BS	HI	FS	ELEV	
15		102.31	7.26		
17			7.21		
19			7.24		
21			7.82		
23			9.68		
24.1			9.97	92.34	REW/RWS
105.3			9.98	92.33	LEW/LWS
107			8.25		
109			7.47		
HH 115			6.41		
120			6.08		
125			5.49		BASE WP
130			4.76		EDGE of CANYON

SY-2 SYCAN RIVER 6/28/00

TR-7 PROFILE

STA	BS	HI	FS	ELEV	
TR-7	2.68	102.95		100.27	HP
1.0			5.23		BASE WP
-5.0			5.08		
-10.0			5.13		
-15.0			5.12		
-20			5.02		
-25			4.64		NEAR HP
-30			4.60		
-40			5.90		
-50			5.86		
-60			5.43		
-70			3.47		
-75			2.10		EDGE of CANYON
3.0			5.00		
4.0			4.99		
5.0			6.02		
7.0			7.46		
9.0			7.86		
11			8.33		
13			8.98		
15			10.10		
16.4			10.67	92.33	REW/RWS
105.0			10.61	92.34	LEW/LWS

SY-2	SYCAN RIVER TR-7 CONT			6-28-00	
STA	BS	HI	FS	ELEV	
108		102.95	8.72		
106			9.48		
110			8.20		
115			7.44		
120			6.79		
123			5.96		BASE WP
130			3.31		EDGE of CANYON

SY-82	SYCAN RIVER TR-8 PROFILE			6-28-00	
STA	BS	HI	FS	ELEV	
TR-8	3.64	103.21		99.57	HP
1.0			5.67		
-10.0			5.26		
-20			4.81		
-30			4.90		
-40			5.79		
-50			4.95		
-60			4.51		
-65			2.47		
-70			0.71		EDGE of CANYON
3.0			6.17		
6.0			6.41		
9.0			7.05		
12.0			7.42		
15			7.90		
18			8.57		
21.1			10.90		REW/RWS
20			9.53		
108			10.89		LEW/LWS
109			9.35		
112			8.40		
115			7.74		
118			7.27		
121			6.99		
124			6.63		
130			4.41		EDGE CANYON

SY-2 SYCAN RIVER 6/28/00
TR-9 PROFILE

STA	BS	HI	FS	ELEV	
TR-9	2.71	102.29		99.58	HP
1.0			5.15		BASE WP
-10			4.57		
-20			4.58		
-30			4.30		
-40			4.36		
-50			4.03		
-60			3.58		
-70			1.52		
-75			0.15		
3.0			5.62		
6.0			6.13		
9.0			6.95		
12			7.52		
15			8.25		
17			9.55		
20			9.84		
91.6			9.94		REW/RWS
96.9			9.95		LEW/LWS
98			8.96		
100			8.12		
105			7.20		
110			6.55		
115			5.98		
120			5.04		
123.4			4.42		BASE WP
125			2.08		

SY-2 SYCAN RIVER 6-28-00
TR-10 PROFILE

STA	BS	HI	FS	ELEV	
TR-10	2.17	102.89		100.72	HP
1.0			5.36		BASE WP
-10			4.93		
-20			5.12		
-30			4.99		
-40			5.48		
-50			4.15		
-60			1.80		
-65			0.35		
5			5.65		
10			6.23		
15			6.85		
20			7.35		
25			7.55		
30			7.74		
35			8.24		
40			9.17		
41			10.11		
42.3			10.55		REW/RWS
109.9			10.56		LEW/LWS
111			9.21		
114			8.49		
117			7.63		
120			5.62		
122			5.54		BASE WP

54-2 54CAN RIVER 6-28-00

TR-1 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
23.6	0.0		0.0		REW
25	0.8		-0.7		
26.5	1.3		-0.1		
28.5	1.7		-0.12		
30.5	1.8		.05		
32.5	1.7		.30		
33.5	1.95		.71		
35.0	2.15		.80		
36.5	2.2		.81		FRONT of BOULDER
38.0	2.0		-.16		BACK of BOULDER
39.5	2.3		1.04		
41.0	2.2		.95		
42.5	2.35		.59		
44.0	2.3		.54		
45.0	2.0		.62		TOP of COBBLE
46.5	2.4		.53		
48.0	2.45		.41		
49.5	2.25		.22		
51.0	2.05		.03		
52.5	1.8		.08		
54.0	1.1		-.11		
55.5	1.4		-.06		
57.0	0.7		-.04		
59.0	0.0		0.0		LEW

54-2 54CAN RIVER 6-28-00

TR-2 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
20.8	⊗		⊗		REW
22	.40		0.0		
23	.80		.18		
24.5	1.0		.93		
27	1.35		.83		
29	1.35		.84		
31	1.4		.85		
33	1.5		.86		
35	1.2		.86		
37	1.1		.60		BESIDE SMALL BLD
39	1.3		.12		BEHIND BLD ~1.6 FT U/S
41	1.2		.47		
43	.80		.46		
45	.60		.61		
47.1	.70		.55		BESIDE BLD
50	.65		.30		IN FRONT OF BLD
53	.90		.32		
56	.80		.36		TOP of BLD
59	1.55		.22		
62	1.60		.15		
65	1.75		.13		
68	1.5		.09		
70	1.5		.15		BESIDE BLD
71.5	.25		.09		TOP of BLD

SY-2 SYCAN RIVER 6-28-00
TR-2 CONT.

STA	DEPTH	V.2	V.6	V.8	COMMENT
72.5	1.4		.13		BESIDE BLD
75	1.55		.11		
77	1.0		0.0		FRONT OF BLD.
79.5	.40		0.0		
80.9	Ø		Ø		LEW

SY-2 SYCAN RIVER 6-28-00
TR-3 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
14.6	Ø		Ø		REW
15	1.6		0.0		.16 UNDERCUT BANK
17	1.8		.21		
20	1.1		.42		
23	1.3		.33		
26	1.1		.10		
29	1.3		.11		
32	0.9		.16		TOP of SMALL BLD
35	1.5		.36		
38	1.25		.38		
39	1.4		.23		FRONT of BLD
40	1.45		.16		BETWEEN BLD
43	1.8		.43		
46	1.55		.32		TOP of BLD
49	2.4		.28		
52	2.6	.15		.26	
55	2.4		.16		
58	2.4		.12		
59	2.1		.14		SIDE of BLD
61	1.3		.16		TOP of BLD
62.5	2.2		.16		SIDE of BLD
65	2.2		.10		
69	2.3		.09		
73	2.25		.12		

SY-2 SYCAN RIVER 6-28-00
TR-3 - CONT.

STA	DEPTH	V.2	V.6	V.8	COMMENT
77	2.2		.07		
80	1.7		.07		
82.5	1.1		.03		
84	0.8		0.0		
85.7	Ø		Ø		LEW

SY-2 SYCAN RIVER 6-28-00
TR-4 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
13.4	1 Ø		Ø		REW 2' UCB
13.6	1.65		.11		
13.7	1.6		.06		
15.5	1.4		.05		
17	1.35		.25		SIDE of BLD
17.2	.8		.25		
19.7	.6		.08		TOP of BLD
21	OUT .5		0.0		TOP of BLD
21.9	OUT .2		0.0		ON BLD
22	1.2		.34		SIDE of BLD
25	1.7		.24		
27	1.9		.36		SIDE of COBBLE
28	2.6	.14		.36	
30	2.3		.25		TOP of COBBLE
32	2.8	.11		.04	
34	2.9	.20		.02	
36	2.9	0.0		-.02	
39	3.05	-.03		-.10	
42	2.8	.04		-.04	
45	2.8	-.05		.49	
48	2.2		.45		BETWEEN + BEHIND BLD
50	2.1		.53		
52	2.0		.33		
55	2.25		.39		

	SY-2 TR-6	SYCAN	RIVER	6-28-00	
	DEPTH	DEPTH + VELOCITY			
STA	DEPTH	V.2	V.6	V.8	COMMENT
24.1	Ø		Ø		REW
26	.5		0.0		
29	.7		-.03		
32	.7		-.03		
35	1.1		0.0		
38	1.3		-0.5		
41	1.3		.13		
44	1.1		.22		
47	1.1		.21		
50	1.2		-.03		BEHIND BLD
53	1.5		.22		
56	1.35		.25		
59	1.45		.28		
62	1.5		.23		
65	1.6		.31		
68	1.7		.41		
71	1.7		.35		
74	1.7		.27		
77	1.3		.36		
80	1.3		.29		
83	1.3		.24		
86	1.3		.21		
89	1.4		.23		
92	1.3		.25		

	SY-2 SYCAN RIVER 6-28-00 TR-6 CONT.				
STA	DEPTH	V.2	V.6	V.8	COMMENT
95	1.1		.27		
98	1.5		.15		
101	1.6		.51		
104	1.35		.01		SIDE OF BLD
105	1.2		0.0		.5 UCB
105.3	Ø		Ø		LEW

SY-2 SYCAN RIVER 6-28-00
TR-7 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
16.4	0		0		REW
19	.9		.17		
23	1.35		.21		
27	1.0		.19		
31	1.0		.35		
35	1.0		.31		
39	.9		.23		
42'	1.55		.12		
46	2.2		.29		
50	2.05		.24		
54	2		.23		
59	1.5		.22		
62	1.3		.23		
66	1.2		.20		
69	1.2		.22		
72	.45		.32		ON BLD
75	1.0		.23		
78	1.0		.24		
81	.9		.19		
84	.7		.17		
88	.9		.13		
92	1.0		.15		
96	1.1		.01		
100	1.45		-.04		
103	1.25		-.03		
104	0.7		-.05		
105	0		0		LEW

SY-2 SYCAN RIVER 6-28-00
TR-8 DEPTH + VELOCITY

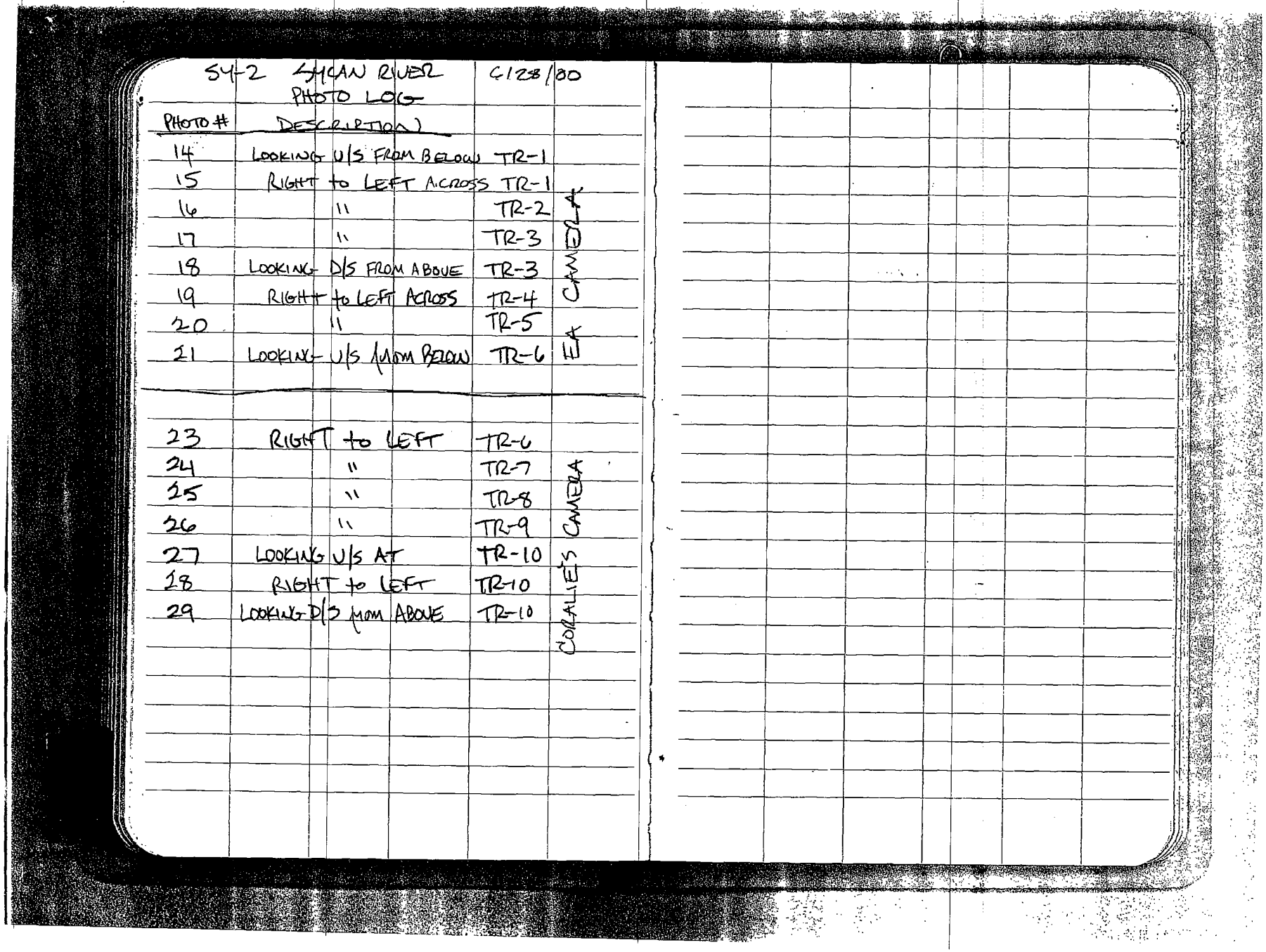
STA	DEPTH	V.2	V.6	V.8	COMMENT
21.1	0		0		REW .8 UCB
21.3	1.25		.03		
23	1.3		.19		
27	1.2		.23		
31	1.4		.26		
35	1.25		.21		
39	1.15		.27		
43	1.15		.22		
47	1.1		.27		
51	1.3		.35		
55	1.5		.23		
59	1.75		.27		
63	1.5		.29		
67	1.3		.30		
71	1.2		.20		
75	1.2		.21		
79	0.9		.21		
83	1.1		.71		
87	1.1		.15		
91	1.25		.21		
95	1.3		.15		
99	1.4		0.0		
103	1.5		-.11		
106	1.2		-.06		
108	0		0		LEW

SY-2 SYCAN RIVER 6-28-00
TR-9 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
21.6	Ø		Ø		REW
23	.5		0.0		
26	.95		.10		
30	1.4		.10		
34	1.7		.07		
38	1.5		.12		
42	1.25		.20		TOP of COBBLE
46	1.8		.27		
50	1.9		.22		
54	2.0		.16		
58	1.6		.18		TOP of BOULDER
62	2.2		.21		
66	2.1		.23		
70	1.8		.20		
71.5	1.5		.17		BESIDE BLD
73	OUT +0.4		0.0		TOP of BLD
74.4	1.65		-.02		BESIDE BLD
79	1.9		.23		
83	2.0		.20		
87	1.8		.12		
90	1.7		.10		
93	1.5		-.01		
95.5	0.7		0.0		
96.9	Ø		Ø		LEW

SY-2 SYCAN RIVER 6/28/00
TR-10 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
42.3	Ø		Ø		REW
44	.3		0.0		
46	.3		0.0		
49	.1		0.0		
52	.2		0.07		
53.5	.4		.02		
56	.4		.21		BEHIND BLD
59	.4		.65		
62	.4		.26		
65	.85		.38		
68	.9		.07		
71	1.3		.73		
73	1.3		.31		
76	1.3		.29		ON COBBLE
79	1.55		.29		
82	1.6		.43		
85	1.55		.27		
87	1.6		.75		
90	2.1		.27		
93	2.4		.56		
96	2.2		.11		DIS of BLD
99	2.1		-.05		"
102	1.95		-.03		"
105	1.4		.12		TOP of SMALL BLD
107	1.9		.26		
108.5	1.5		.02		
109.9	Ø		Ø		LEW



54-2 SYCAN RIVER 6/28/00
PHOTO LOG

PHOTO #	DESCRIPTION		
14	LOOKING U/S FROM BELOW	TR-1	
15	RIGHT to LEFT ACROSS	TR-1	
16	"	TR-2	EA CAMERA
17	"	TR-3	
18	LOOKING D/S FROM ABOVE	TR-3	
19	RIGHT to LEFT ACROSS	TR-4	
20	"	TR-5	
21	LOOKING U/S FROM BELOW	TR-6	
23	RIGHT to LEFT	TR-6	
24	"	TR-7	
25	"	TR-8	CORALLIE'S CAMERA
26	"	TR-9	
27	LOOKING U/S AT	TR-10	
28	RIGHT to LEFT	TR-10	
29	LOOKING D/S FROM ABOVE	TR-10	

SY-2 SYCAN RIVER 10-4-2000

LOW FLOW MEASUREMENTS

CREW: W. SWANEY
M. GAGNER
C. DAYDE
B. KVAM
B. ULLAMAN (MORNING)

WEATHER: SUNNY & WARM.

EQUIPMENT: SOKKISHA C3E
LOGDEN SURVEYING RENTAL)

MARSH MC BIRNEY
200016

	IN	OUT
TIME	09:45	17:30
SG	0.0	0.0

SY-2 SYCAN RIVER 10-4-2000

LEVEL LOOP = LOWER TRANSECTS

STA	BS	HI	FS	ELEV
BM	7.60	107.60		100.00
TR-3			8.92	98.68
TR-2			10.59	97.01
TR-1			8.80	98.80
(TP)				
TR-1	8.34	107.14		98.80
TR-2			10.13	97.01
TR-3			8.46	98.68
BM			7.14	(100.00) WAS
(TP)				
BM	5.05	105.05		100.00
TR-4			7.89	97.16
TR-5			8.85	96.20
(TP)				
TR-5	9.90	106.10		96.20
TR-4			8.93	97.17
BM			6.10	(100.00) WAS

SY-2 SYCAN RIVER 10-4-2000

WATER SURFACE ELEVATIONS

LOWER TRANSECTS

STA	BS	HI	FS	ELEVATION	ROD
TR 2 HP	1.94	98.95		97.01	
TR-1					
LB			8.03	91.59	0.67
RB			8.32	91.58	0.95
TR-2					
LB			8.46	92.00	1.51
RB			8.52	91.98	1.55
TR-3					
LB			7.28	92.00	0.33
RB			8.44	91.98	1.47
TR-4	7.77	104.94		97.17	
LB			13.34	92.05	0.45
RB			13.78	92.05	0.89
TR-5					
LB			13.58	92.06	0.70
RB			13.93	92.05	1.04

SY-2 SYCAN RIVER 10-4-200

ELEVATION RELATIONSHIP BETWEEN UPPER & LOWER SITES

STA	BS	HI	FS	ELEV
TR-5 HP	6.76	102.96		96.20
TR-6 HP			2.67	100.29

ELEVATIONS BASED ON LOWER BM = 100.00

TR-6 (HP) ELEVATION BASED ON UPPER BM = 100.00 IS 99.20

ELEVATION DIFFERENCE BETWEEN LOWER & UPPER BMS BASED ON TR-6 HP IS:

100.29 − 99.20 = 1.09 FT.

54-2 SYCAN RIVER 10-4-2000

LEVEL LOOP - UPPER TRANSECTS

STA	BS	HI	FS	ELEV
BM	3.00	103.00		100.00
TR-10			2.29	100.71
TR-9			3.43	99.57
TR-8			3.43	99.57
(TP)				
TR-8	3.64	103.21		99.57
TR-9			3.64	99.57
TR-10			2.50	100.71
BM			3.21	100.00
(TP)				
BM	3.12	103.12		100.00
TR-7			2.85	100.27
TR-6			3.92	99.20
(TP)				
TR-6	3.60	102.80		99.20
TR-7			2.52	100.28
BM			2.79	100.01

WMS

54-2 SYCAN RIVER 10/4/00

WATER SURFACE ELEVATIONS

UPPER TRANSECTS

STA	BS	HI	FS	ELEV	ROD
TR-10 HP	1.85	102.56		100.71	
TR-10			~~10.85~~		
LB			11.96	92.06	1.46
RB			10.85	92.06	0.35
TR-9					
LB			11.67	92.06	1.17
RB			11.11	92.06	0.61
BM	1.45	101.45			
TR-8					
LB			10.15	92.05	0.75
RB			10.43	92.04	1.02
TR-7					
LB			9.97	92.05	0.57
RB			9.94	92.05	0.54
TR-6					
LB			10.75	92.04	1.34
RB			10.73	92.04	0.82

S4-2 SYCAN RIVER 10/4/00

DEPTH + VELOCITY TR-10

STA	DEPTH	VEL.	SUB.	%E	COVER
1.0 RWP					
REW					

S4-2 SYCAN RIVER
10/4/00

SUBSTRATE CODES

1 = ORGANIC
2 = SILT
3 = SAND
4 = GRAVEL - SMALL
5 = GRAVEL - LARGE
6 = COBBLE - SMALL
7 = COBBLE - LARGE
8 = BOULDER
9 = BEDROCK

COVER

1 = INSTREAM
2 = UNDERCUT BANK
3 = OVERHEAD
4 = COMBINATION

TR-1	SY-2 SYCAN RIVER DEPTH + VELOCITY				10/4/2000
STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 24.2	Ø	Ø	1.2		
25	.40	Ø	1.2		1.0
26.5	.80	Ø	2.5		1.0
28.5	1.25	Ø	8.2	75	
30.5	1.60	Ø	9.2		
32.5	1.6	.2	9.2		
33.5	1.85	.19	9.2		
35	1.85	.65	9.1		
36.5	1.95	.58	9.8		
38	1.75	.39	9.8		1.0
39.5	2.0	.66	9.8		
41	2.1	.50	9.1		
42.5	2.0	.33	9.1		
44	2.0	.25	6.9	50	
45	1.9	.89	5.9	50	
46.5	2.1	.98	4.5	50	
48	2.2	1.0	4.2	50	
49.5	2.0	.08	4.2	50	
51	1.8	.08	2.4		
52.5	1.6	.17	1.3		
54	1.35	Ø	2.4		
55.5	1.1	Ø	2.4		1.0
57	0.7	Ø	2.1		1.0
58.1 LWE	Ø	Ø	1.2		

TR-2	SY-2 SYCAN RIVER DEPTH + VELOCITY				10/4/00	
STA	DEPTH	VEL	SUB	%E	COVER	
RWP 1.0						
RWE 21.9	Ø	Ø	1.2			
22	.1	Ø	1.2			
23	.5	.1	1.2		1.0	
24.5	.9	.46	6.5	50		
26	1.0	.39	9.5		SKIP	
27	1.15	.37	9.5			
29	1.2	.38	9.5	50		
31	1.0	.48	9.5	50		
33	1.2	.37	9.5	50		
35	1.0	.41	9.5	50		
37	.85	.13	9.6	0	1.0	BLD U/S
39	1.2	.16	9.6	50	1.0	6FT
41	.9	.24	9.6	50		
43	.6	.16	6.9	75		
45	.4	.25	6.9	75		
47.1	.4	.18	7.5	75		
50	0	0	8.5	75		at
53	.7	.07	5.9	75		
56	.5	.04	8.4	75		
59	.9	.08	4.9	75		
62	1.4	0	9.5	75		
65	1.4	0	9.4			
68	1.2	0	9.8			

TR-2 CONT. SY-2 SYCAN RIVER 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
70	1.3	0	9.8		
71.5	0	0	8.9		TOP BLDR
72.5	1.2	.02	9.8		
75	1.2	0	9.8		
77	.75	0	9.8	50	1.0
79.5	.1	0	1.2		
LWE 80.0	⊘	⊘	7.2		

SY-2 SYCAN. RIVER 10-4-00

TR-3 DEPTH + VELOCITY

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 14.6	⊘	⊘	2.1		2.0 UCB 0.6FT
15	1.3	⊘	2.1		
17	1.5	.03	2.1		
20	1.2	.04	8.2	75	
23	1.0	0	2.7	"	
26	0.9	0	7.2	"	
29	1.1	-.01	8.2	"	
32	1.4	0	8.2	"	1.0
35	1.3	.1	8.2	"	
38	1.0	.06	8.2	"	
39	0.3	.16	8.2	"	
40	0.1	.05	8.2	75	
43	1.5	.14	9.2		
46	1.5	.12	"		
49	2.15	.06	"		
52	2.3	.11	"		
55	2.2	.07	"		
58	2.2	.08	"		
59	1.9	.08	"		
61	.75	.04	"		TOP of BLD
62.5	2.05	.02	"		
65	2.0	.01	"		
69	2.0	0	"		

TR-3 CONT. | S4-2 SYCAN RIVER | 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
73	2.1	.05	9.2		
77	2.0	0	9.2		
80	1.5	0	6.2	75	
82.5	0.95	0	7.2	75	1.0 VEG
84	0.5	0	2.1		1.0 VEG
LWE 84.9	⊘	⊘	1.2		

TR-4 | S4-2 SYCAN RIVER DEPTH & VELOCITY | 10-4-2000

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 11.7	⊘	⊘	2.1		
13.4	1.2	0	2.1		2.0 - UCB 1.8 FT
13.6	1.2	0	2.1		
13.7	1.2	0	2.1		
15.5	1.2	0.2	2.3		
17	.9	.15	3.2		
17.2	.6	.19	9.3		
19.7	.45	0	9.2		EDGE of BLD
21	OUT (+.4)	0	9.2		TOP of BLD
21.9	.9	.09	8.9		
22	1.0	.06	8.9		
25	1.3	.08	8.2	75	
27	2.0	.13	8.2	75	
28	2.35	.06	8.2	75	
30	2.55	.12/.08	9.2		
32	2.55	.02/.06	"		
34	2.7	.01/.01	"		
36	2.7	.03/0	"		
39	2.75	-.03/-.06	"		
42	2.6	.02/.06	"		
45	2.5	.22/-.08	"		
48	2.0	.20	"		
50	1.8	.15	"		

TR-4 CONT. S4-2 SYCAN RIVER 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
52	1.75	.19	9.2		
55	2.0	.13	"		
58	2.0	.02	"		
61	2.0	.04	"		
64	1.85	.05	"		
67	1.2	.01	7.2	75	
70	.65	-.05	6.2	75	
71.5	.40	Q	2.1		1.0 VEG
LWE 72.5	Q	Q	1.2		

TR-5 S4-2 SYCAN RIVER DEPTH + VELOCITY 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 11.3	1.25	0	2.1		2.0 - UCB 2.0 FT.
11.5	1.25	-.04	"		
13	1.4	-.05	"		
16	1.25	0	"		
19	1.4	0	2.7	75	
22	1.5	.04	7.2	75	
25	1.8	0	8.2	75	
28	2.35	0	9.2		
31	2.35	-.05	9.2		
34	2.55	.04/-.04	"		
37	2.45	.08	"		
40	2.4	.04	"		
43	2.55	.18/.04	"		
46	2.15	.11	"		
49	2.2	.25	"		
52	2.1	.23	"		
55	1.8	.15	"		
58	1.8	.16	"		
61	1.4	0	6.2	75	
62.6	1.0	0	2.5	75	VEG
LWE 62.9	Q	Q	1.2		

TR-6 | SY-2 SYCAN RIVER DEPTH & VELOCITY | 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 26	Ø	Ø	1.2		
29	.40	0	1.2		
32	.60	0	2.1		1.0-VEG
35	.70	0	2.5	75	
38	1.0	0	2.5	"	
41	1.0	.03	5.2	"	
44	.75	.30	"	"	
47	.70	.11	"	"	
50	.90	0	"	"	1.0 - BLD U/S 2.0 FT
53	1.2	.16	"	"	
56	1.0	.15	4.2	"	
59	1.0	.16	5.2	"	
62	1.15	.13	4.2	"	
68	1.35	.19	"	"	
71	1.5	.21	"	"	
74	1.4	.17	5.2	"	
77	1.0	.19	4.2	"	
80	1.0	.10	4.2	"	
83	1.0	.09	5.2	"	
86	1.0	.13	2.5	"	
89	1.0	.10	"	"	
92	1.0	.10	"	"	
95	.80	.01	1.8	50	

TR-6 CONT. | SY-2 | 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
98	1.25	.07	2.5	75	
101	1.3	.08	"	"	
104	.90	.01	"	"	3
105	.90	-.03	2.1		3
LWE 105.3	0.5	Ø	2.1		2.0 - VCB 0.6 FT.

TR-7 — SY-2 SYCAN RIVER — DEPTH + VELOCITY — 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 16.9	Ø	Ø	1.2		
19	.75	.05	2.5	75	
23	1.10	.12	2.5	"	
27	.75	.15	5.2	"	
31	.7	.16	5.2	"	
35	.7	.14	7.2	"	
39	.7	.10	6.2	"	
42	1.2	.10	9.2		
46	1.85	.02	9.2		
50	1.8	.08	2.9		
54	1.6	.10	2.5	75	
59	1.05	.16	2.4	"	
62	1.1	.10	2.4	"	
66	.9	.15	2.7	"	
69	1.0	.08	2.7	"	
72	.7	.08	5.2	"	
75	.6	.13	2.5	"	
78	.6	.06	2.6	"	
81	.45	.04	2.6	"	
~~84~~	.40	.04	2.5	75	
~~88~~	.60	0	2.5	100	
92	.70	.01	2.6	75	
96	.80	0	2.4	100	
100	1.1	.03	2.4	100	
103	.70	-.10	2.1		3.0
104 LWE	Ø	Ø	2.1		

TR-8 — SY-2 SYCAN RIVER — DEPTH + VELOCITY — 10-4-2000

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0	—	—	—	—	—
RWE 21.1	1.0	0	2.1		↑
21.3	.9	.01	2.5	75	2 - UCB 0.6 FT
23	1.0	.13	5.2	"	
27	.9	.14	2.6	"	
31	1.1	.13	2.5	"	
35	.8	.12	2.7	"	
39	.9	.08	2.6	"	
43	.8	.11	2.6	"	
47	.65	.09	2.6	"	
51	.9	.16	2.6	"	
55	1.25	.14	2.7	50	
59	1.5	.14	2.8	75	
63	1.2	.15	2.7	"	
67	1.0	.12	2.7	"	
71	.9	.08	2.7	"	
75	.9	.03	2.7	"	
79	.55	.06	2.7	"	
83	.9	.10	2.6	100	
87	.8	.08	2.5	100	
91	.95	.13	2.5	"	
95	1.1	.06	2.5	"	
99	1.0	-.02	2.5	"	
103	1.1	-.06	2.4	"	
106	.9	-.04	2.4	"	
108 LWE	Ø	Ø	2.1	—	

SY-2 SYCAN RIVER 10/4/00

TR-9 DEPTH & VELOCITY

STA	DEPTH	VEL	SUB	%E	COVER
RWE 21.7	⊗	⊗	1.2		
23	.2	0	1.2		
26	.7	0	2.4	75	
30	1.15	.02	2.6	50	
34	1.5	.01	2.5	75	
38	1.3	.08	5.2	"	
42	1.2	.10	2.5	"	
46	1.4	.13	2.9		
50	1.6	.13	9.2		
54	1.5	.05	9.2		
58	1.8	.04	8.2	75	
62	1.8	.08	2.7	"	
66	1.7	.05	2.8	"	
70	1.1	.13	8.2	"	
71.5	0	0	"	50	SIDE of BLD
73	OUT (+1.0)	0	"	"	TOP of BLD
74.4	1.3	.02	"	"	
79	1.6	.08	2.6	75	
83	1.55	.08	"	100	
87	1.45	.04	"	100	
90	1.3	-.02	"	75	
93	1.1	.02	2.1		
LWE 95.5	⊗	⊗	1.2		VEG

SY-2 SYCAN RIVER 10-4-00

TR-10 DEPTH & VELOCITY

STA	DEPTH	VEL	SUB	%E	COVER
RWP → RWE	OUT		1.2		
RWE 53.5	⊗	⊗	1.7		
56	0.1	0	1.7		
59	.05	0	1.7		
62	.2	.12	1.8	75	1.0
65	.2	.03	8.7	"	ON BLD
68	.8	-.01	8.7	"	
71	1.0	.05	7.8	"	
73	1.0	.14	7.8	50	
76	1.25	.15	7.8	50	
79	.7	.15	8.7	75	
82	1.25	.10	7.6	"	
85	1.2	.05	6.7	"	
87	1.3	.37	6.7	"	
90	1.8	.21	7.6	50	
93	2.05	.17	8.7	50	
96	1.9	-.06	9.2		
99	1.8	0	9.2		BLD 4.0 FT U/S
102	1.6	-.09	9.2		
105	1.2	0	7.6	50	
107	1.6	.1	2.6	50	
108.5	1.1	.05	2.1		
LWE 109.4	⊗	⊗	1.2		

SY-2	SYCAN RIVER	10/4/00

PHOTO LOG

#	COMMENT	
1	RIGHT to LEFT at	TR-1
2	LOOKING U/S FROM BELOW	TR-1
3	~~LEFT~~ RIGHT to ~~RIGHT~~ LEFT	TR-2
4	RIGHT to LEFT	TR-3
5	LOOKING U/S FROM BELOW	TR-3
6	LEFT to RIGHT	TR-4
7	LEFT to RIGHT	TR-5
8	LOOKING U/S FROM BELOW (LB - RIGHT SIDE OF PICTURE, RB - LEFT SIDE OF PICTURE)	TR-5
9	LOOKING U/S FROM BELOW	TR-5
~~10~~	~~BEDROCK~~	
11	RIGHT to LEFT	TR-6
12	" " "	TR-7
13	LEFT to RIGHT	TR-8
14	LOOKING U/S FROM BELOW	TR-8
15	LEFT to RIGHT	TR-9
16	LOOKING U/S FROM BELOW	TR-9
17	LEFT to RIGHT	TR-10
18	LOOKING D/S FROM ABOVE	TR-10

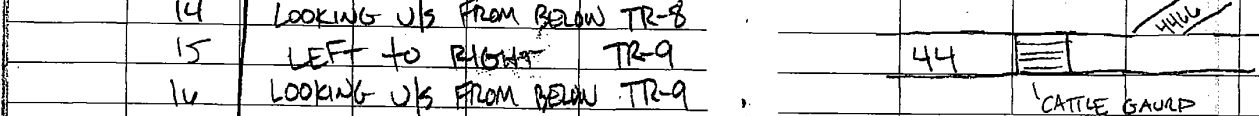
SY-2 SYCAN RIVER
10/4/2000

ADDITIONAL INFORMATION on DIRECTIONS TO SITE

FROM CHILOQUIN TAKE SPRAGUE RIVER HWY to WILLIAMSON RIVER HWY AND FOLLOW SIGNS to "HEAD of the RIVER" CAMPGROUND.

AT JUNCTION 4648, CONTINUE STRAIGHT ONTO HWY 46 (GRAVEL ROAD) FOR APPROX. 0.4 MILES. TURN RIGHT ON HWY 44. DRIVE APPROX. 7.4 MILES and TURN LEFT ON 4466

NOTE: 4466 WAS NOT MARKED. IT IS THE FIRST LEFT PAST the CATTLE GAURD AFTER MILE MARKER 17.

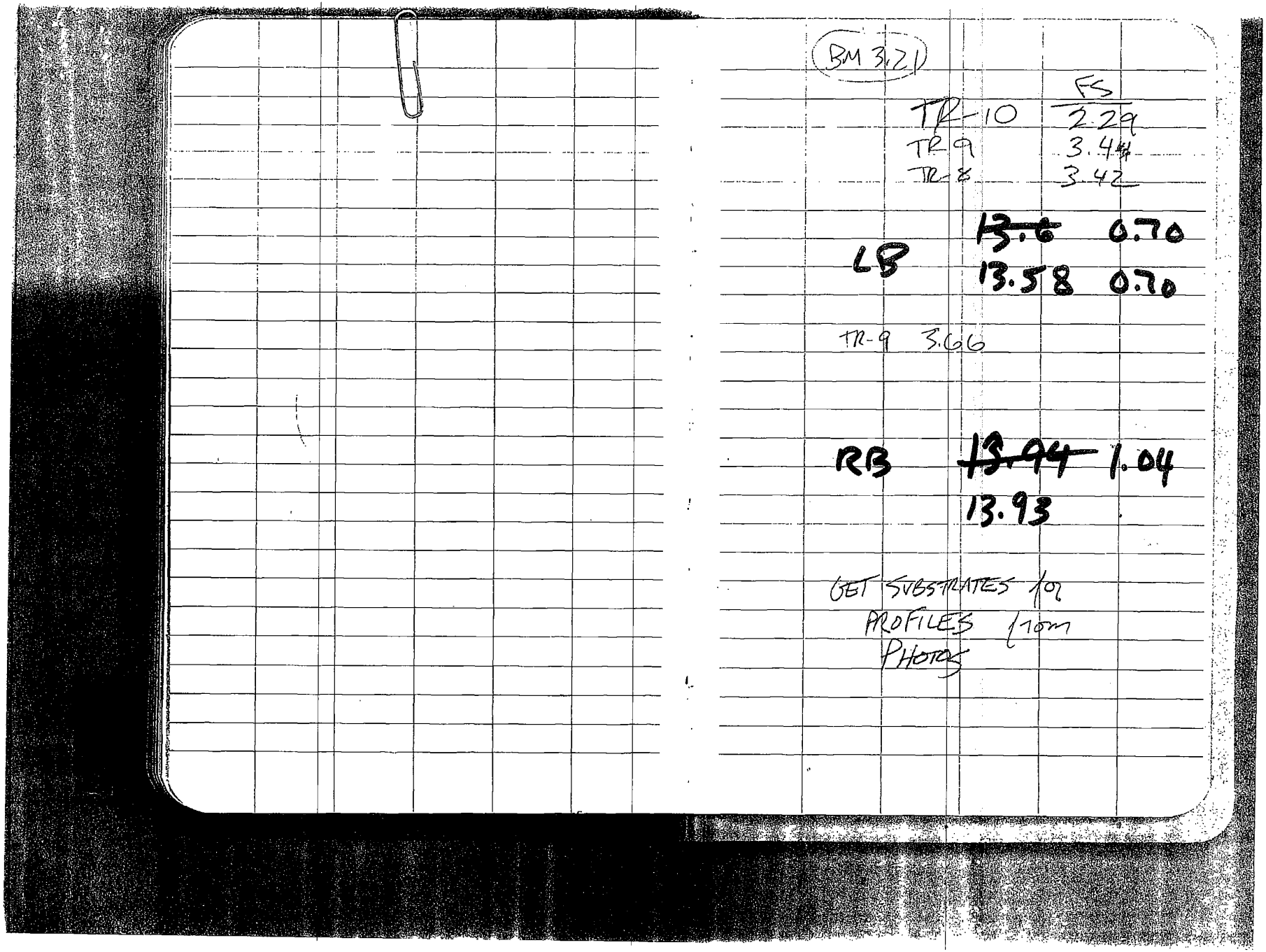


KEEP LEFT at 0.7 MILES
AT 1.3 MILES TURN LEFT ONTO 130. (THIS IS A 4 WAY INTERSECTION)

54-2 SYCAN RIVER
10/4/2000

DIRECTIONS CONT.

FOLLOW 130'
AT 0.4 MILES, KEEP to LEFT
AT 1.0 MILES, ROAD WILL
APPROACH the RIVER AT A
SMALL CAMP.
FOLLOW ROAD U/S FOR APPROX
0.4 MILES, to SMALL PARKING AREA,
ON LEFT.


BM 3.21

		FS
TR-10		2.29
TR-9		3.44
TR-8		3.42
	~~13.6~~	0.70
LB	13.58	0.70

TR-9 3.66

RB	~~13.94~~	1.04
	13.93	

GET SUBSTRATES for PROFILES from PHOTOS

TE-1	LWE 59.0
	RWE 23.6
TE-2	20.8
TE-3	14.6
TE-6	24.1
	105.3
TE-7	16.4
	105.0
	31.1
	103.5

5/17/93

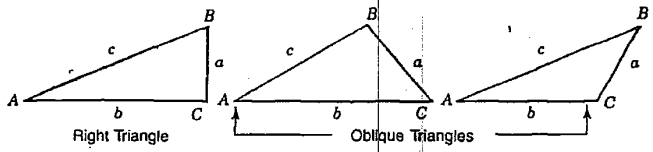
Sycan R.

in

Canyon

SY-2

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

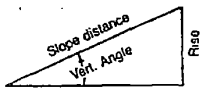
For Angle A: $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL



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

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

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

SY-2 SYCAN RIVER 6-28-00
TR-2 CONT.

STA	DEPTH	V.2	V.6	V.8	COMMENT
72.5	1.4		.13		BESIDE BLD
75	1.55		.11		
77	1.0		0.0		FRONT OF BLD.
79.5	.40		0.0		
80.9	Q		Q		LEW

SY-2 SYCAN RIVER 6-28-00
TR-3 DEPTH & VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
14.6	Q		Q		REW
15	1.6		0.0		.6 UNDERCUT BANK
17	1.8		.21		
20	1.1		.42		
23	1.3		.33		
26	1.1		.10		
29	1.3		.11		
32	0.9		.16		TOP of SMALL BLD
35	1.5		.36		
38	1.25		.38		
39	1.4		.23		FRONT of BLD
40	1.45		.16		BETWEEN BLD
43	1.8		.43		
46	1.55		.32		TOP of BLD
49	2.4		.28		
52	2.6	.15		.26	
55	2.4		.16		
58	2.4		.12		
59	2.1		.14		SIDE of BLD
61	1.3		.16		TOP of BLD
62.5	2.2		.16		SIDE of BLD
65	2.2		.10		
69	2.3		.09		
73	2.25		.12		

SY-2 SYCAN RIVER 6-28-00
TR-3 CONT.

STA	DEPTH	V.2	V.6	V.8	COMMENT
77	2.2		.07		
80	1.7		.07		
82.5	1.1		.03		
84	0.8		0.0		
85.7	⊘		⊘		LEW

SY-2 SYCAN RIVER 6-28-00
TR-4 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
13.4	1⊘		⊘		REW 2' UCB
13.6	1.65		.11		
13.7	1.6		.06		
15.5	1.4		.05		
17	1.35		.25		SIDE of BLD
17.2	.8		.25		
19.7	.6		.08		TOP of BLD
21	OUT .5		0.0		TOP of BLD
21.9	OUT .2		0.0		ON BLD
22	1.2		.34		SIDE of BLD
25	1.7		.24		
27	1.9		.36		SIDE of COBBLE
28	2.6	.14		.36	
30	2.3		.25		TOP of COBBLE
32	2.8	.11		.04	
34	2.9	.20		.02	
36	2.9	0.0		-.02	
39	3.05	-.03		-.10	
42	2.8	.04		-.04	
45	2.8	-.05		.49	
48	2.2		.45		BETWEEN + BEHIND BLD
50	2.1		.53		
52	2.0		.33		
55	2.25		.39		

54-2 SYCAN RIVER 6-28-00
TR-7 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
16.4	Ø		Ø		REW
19	.9		.17		
23	1.35		.21		
27	1.0		.19		
31	1.0		.35		
35	1.0		.31		
39	.9		.23		
42'	1.55		.12		
46	2.2		.29		
50	2.05		.24		
54	2		.23		
59	1.5		.22		
62	1.3		.23		
66	1.2		.20		
69	1.2		.22		
72	.45		.32		ON BLD
75	1.0		.23		
78	1.0		.24		
81	.9		.19		
84	.7		.17		
~~88~~	.9		.13		
92	1.0		.15		
96	1.1		.01		
100	1.45		-.04		
103	1.25		-.03		
104	0.7		-.05		
105	Ø		Ø		LEW

54-2 SYCAN RIVER 6-28-00
TR-8 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
21.1	Ø		Ø		REW .8UCB
21.3	1.25		.03		
23	1.3		.19		
27	1.2		.23		
31	1.4		.26		
35	1.25		.21		
39	1.15		.27		
43	1.15		.22		
47	1.1		.27		
51	1.3		.35		
55	1.5		.23		
59	1.75		.27		
63	1.5		.29		
67	1.3		.30		
71	1.2		.20		
75	1.2		.21		
79	0.9		.21		
83	1.1		.71		
87	1.1		.15		
91	1.25		.21		
95	1.3Ø		.15		
99	1.4		0.0		
103	1.5		-.11		
106	1.2		-.06		
108	Ø		Ø		LEW

SY-2 SYCAN RIVER 6-28-00
TR-9 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
21.6	⊘		⊘		REW
23	.5		0.0		
26	.95		.10		
30	1.4		.10		
34	1.7		.07		
38	1.5		.12		
42	1.25		.20		TOP of COBBLE
46	1.8		.27		
50	1.9		.22		
54	2.0		.16		
58	1.6		.18		TOP of BOULDER
62	2.2		.21		
66	2.1		.23		
70	1.8		.20		
71.5	1.5		.17		BESIDE BLD
73	OUT +0.4		0.0		TOP of BLD
74.4	1.65		-.02		BESIDE BLD
79	1.9		.23		
83	2.0		.20		
87	1.8		.12		
90	1.7		.10		
93	1.5		-.01		
95.5	0.7		0.0		
96.9	⊘		⊘		LEW

SY-2 SYCAN RIVER 6/28/00
TR-10 DEPTH + VELOCITY

STA	DEPTH	V.2	V.6	V.8	COMMENT
42.3	⊘		⊘		REW
44	.3		0.0		
46	.3		0.0		
49	.1		0.0		
52	.2		0.07		
53.5	.4		.02		
56	.4		.21		BEHIND BLD
59	.4		.65		
62	.4		.26		
65	.85		.38		
68	.9		.07		
71	1.3		.73		
73	1.3		.31		
76	1.3		.29		ON COBBLE
79	1.55		.29		
82	1.6		.43		
85	1.55		.27		
87	1.6		.75		
90	2.1		.27		
93	2.4		.56		
96	2.2		.11		DIS of BLD
99	2.1		-.05		"
102	1.95		-.03		"
105	1.4		.12		TOP of SMALL BLD
107	1.9		.26		
108.5	1.5		.02		
109.9	⊘		⊘		LEW

54-2 SHCAN RIVER 6/28/00

PHOTO LOG

PHOTO #	DESCRIPTION		
14	LOOKING U/S FROM BELOW	TR-1	
15	RIGHT to LEFT ACROSS	TR-1	
16	"	TR-2	EA CAMERA
17	"	TR-3	
18	LOOKING D/S FROM ABOVE	TR-3	
19	RIGHT to LEFT ACROSS	TR-4	
20	"	TR-5	
21	LOOKING U/S FROM BELOW	TR-6	
23	RIGHT to LEFT	TR-6	
24	"	TR-7	
25	"	TR-8	CORALLIE'S CAMERA
26	"	TR-9	
27	LOOKING U/S AT	TR-10	
28	RIGHT to LEFT	TR-10	
29	LOOKING D/S FROM ABOVE	TR-10	

SY-2 SYCAN RIVER 10-4-2000

LOW FLOW MEASUREMENTS

CREW: W. SWANEY
M. GAGNER
C. DAYDE
B. KVAM
B. ULLAMAN (MORNING)

WEATHER: SUNNY & WARM.

EQUIPMENT. SOKKISHA C3E
LOGDEN SURVEYING RENTAL)

MARSH McBIRNEY
200016

	IN	OUT
TIME	09:45	17:30
SG	0.0	0.0

SY-2 SYCAN RIVER 10-4-2000

LEVEL LOOP = LOWER TRANSECTS

STA	BS	HI	FS	ELEV	
BM	7.60	107.60		100.00	
TR-3			8.92	98.68	
TR-2			10.59	97.01	
TR-1			8.80	98.80	
(TP)					
TR-1	8.34	107.14		98.80	
JR-2			10.13	97.01	
TR-3			8.46	98.68	
BM			7.14	(100.00)	WMS
(TP)					
BM	5.05	105.05		100.00	
TR-4			7.89	97.16	
TR-5			8.85	96.20	
(TP)					
TR-5	9.90	106.10		96.20	
TR-4			8.93	97.17	
BM			6.10	(100.00)	WMS

SY-2 SYCAN RIVER 10-4-2000

WATER SURFACE ELEVATIONS

LOWER TRANSECTS

STA	BS	HI	FS	ELEVATION	ROD
TR 2 HP	1.94	98.95		97.01	
TR-1					
LB			8.03	91.59	0.67
RB			8.32	91.58	0.95
TR-2					
LB			8.46	92.00	1.51
RB			8.52	91.98	1.55
TR-3					
LB			7.28	92.00	0.33
RB			8.44	91.98	1.47
TR-4	7.77	104.94		97.17	
LB			13.34	92.05	0.45
RB			13.78	92.05	0.89
TR-5					
LB			13.58	92.06	0.70
RB			13.93	92.05	1.04

SY-2 SYCAN RIVER 10-4-200

ELEVATION RELATIONSHIP BETWEEN UPPER & LOWER SITES

STA	BS	HI	FS	ELEV
TR-5 HP	6.76	102.96		96.20
TR-6 HP			2.67	100.29

ELEVATIONS BASED ON LOWER BM = 100.00

TR-6 (HP) ELEVATION BASED ON UPPER BM = 100.00 IS 99.20

ELEVATION DIFFERENCE BETWEEN LOWER + UPPER BMS BASED ON TR-6 HP IS:

100.29 − 99.20 = 1.09 FT.

SY-2 SYCAN RIVER 10-4-2000

LEVEL LOOP - UPPER TRANSECTS

STA	BS	HI	FS	ELEV
BM	3.00	103.00		100.00
TR-10			2.29	100.71
TR-9			3.43	99.57
TR-8			3.43	99.57
(TP)				
TR-8	3.64	103.21		99.57
TR-9			3.64	99.57
TR-10			2.50	100.71
BM			3.21	100.00
(TP)				
BM	3.12	103.12		100.00
TR-7			2.85	100.27
TR-6			3.92	99.20
(TP)				
TR-6	3.60	102.80		99.20
TR-7			2.52	100.28
BM			2.79	100.01

WMS

SY-2 SYCAN RIVER 10/4/00

WATER SURFACE ELEVATIONS

UPPER TRANSECTS

STA	BS	HI	FS	ELEV	ROD
TR-10 HP	1.85	102.56		100.71	
TR-10			~~10.85~~		
LB			11.96	92.06	1.46
RB			10.85	92.06	0.35
TR-9					
LB			11.67	92.06	1.17
RB			11.11	92.06	0.61
BM	1.45	101.45			
TR-8					
LB			10.15	92.05	0.95
RB			10.43	92.04	1.02
TR-7					
LB			9.97	92.05	0.57
RB			9.94	92.05	0.54
TR-6					
LB			10.75	92.04	1.34
RB			10.23	92.04	0.82

S42 SYCAN RIVER 10/4/00

DEPTH + VELOCITY TR-10

STA	DEPTH	VEL.	SUB.	%E	COVER
1.0 RVP					
REW					

S1-2 SYCAN RIVER
10/4/00

SUBSTRATE CODES

1	=	ORGANIC
2	=	SILT
3	=	SAND
4	=	GRAVEL - SMALL
5	=	GRAVEL - LARGE
6	=	COBBLE - SMALL
7	=	COBBLE - LARGE
8	=	BOULDER
9	=	BEDROCK

COVER

1	=	INSTREAM
2	=	UNDERCUT BANK
3	=	OVERHEAD
4	=	COMBINATION

TR-1	SY-2 SYCAN RIVER DEPTH + VELOCITY				10/4/2000
STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 24.2	Q	Q	1.2		
25	.40	Q	1.2		1.0
26.5	.80	Q	2.5		1.0
28.5	1.25	Q	8.2	75	
30.5	1.60	Q	9.2		
32.5	1.6	.2	9.2		
33.5	1.85	.19	9.2		
35	1.85	.65	9.1		
36.5	1.95	.58	9.8		
38	1.75	.39	9.8		1.0
39.5	2.0	.66	9.8		
41	2.1	.50	9.1		
42.5	2.0	.33	9.1		
44	2.0	.25	6.9	50	
45	1.9	.89	5.9	50	
46.5	2.1	.98	4.5	50	
48	2.2	1.0	4.2	50	
49.5	2.0	.08	4.2	50	
51	1.8	.08	2.4		
52.5	1.6	.17	2.3		
54	1.35	Q	2.4		
55.5	1.1	Q	2.4		1.0
57	0.7	Q	2.1		1.0
58.1 LWE	Q	Q	1.2		

TR-2	SY-2 SYCAN RIVER DEPTH + VELOCITY				10/4/00	
STA	DEPTH	VEL	SUB	%E	COVER	
RWP 1.0						
RWE 21.9	Q	Q	1.2			
22	.1	Q	1.2			
23	.5	.1	1.2		1.0	
24.5	.9	.46	6.5	50		
26	1.0	.39	9.5	—	SKIP	
27	1.15	.37	9.5			
29	1.2	.38	9.5	50		
31	1.0	.48	9.5	50		
33	1.2	.37	9.5	50		
35	1.0	.41	9.5	50		
37	.85	.13	9.6	0	1.0	BLD U/S 6FT
39	1.2	.16	9.6	50	1.0	
41	.9	.24	9.6	50		
43	.6	.16	6.9	75		
45	.4	.25	6.9	75		
47.1	.4	.18	7.5	75		
50	0	0	8.5	75		at
53	.7	.07	5.9	75		
56	.5	.04	8.4	75		
59	.9	.08	4.9	75		
62	1.4	0	9.5	75		
65	1.4	0	9.4			
68	1.2	0	9.8			

TR-2 CONT. SY-2 SYCAN. RIVER 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
70	1.3	0	9.8		
71.5	0	0	8.9		TOP BLDR
72.5	1.2	.02	9.8		
75	1.2	0	9.8		
77	.75	0	9.8	50	1.0
79.5	.1	0	1.2		
LWE 80.0	Ø	Ø	7.2		

TR-3 SY2 SYCAN. RIVER DEPTH + VELOCITY 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 14.6	Ø	Ø	2.1		2.0 UCB 0.6FT
15	1.3	Ø	2.1		
17	1.5	.03	2.1		
20	1.2	.04	8.2	75	
23	1.0	0	2.7	"	
26	0.9	0	7.2	"	
29	1.1	-.01	8.2	"	
32	1.4	0	8.2	"	1.0
35	1.3	.1	8.2	"	
38	1.0	.06	8.2	"	
39	0.3	.16	8.2	"	
40	0.1	.05	8.2	75	
43	1.5	.14	9.2		
46	1.5	.12	"		
49	2.15	.06	"		
52	2.3	.11	"		
55	2.2	.07	"		
58	2.2	.08	"		
59	1.9	.08	"		
61	.75	.04	"		TOP of BLD
62.5	2.05	.02	"		
65	2.0	.01	"		
69	2.0	0	"		

TR-3 CONT. SY-2 SYCAN RIVER 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
73	2.1	.05	9.2		
77	2.0	0	9.2		
80	1.5	0	6.2	75	
82.5	0.95	0	7.2	75	1.0 VEG
84	0.5	0	2.1		1.0 VEG
LWE 84.9	Ø	Ø	1.2		

SY-2 SYCAN RIVER 10-4-2000 DEPTH + VELOCITY

TR-4 STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 11.7	Ø	Ø	2.1		
13.4	1.2	0	2.1		2.0 - UCB 1.8 FT
13.6	1.2	0	2.1		
13.7	1.2	0	2.1		
15.5	1.2	0.2	2.3		
17	.9	.15	3.2		
17.2	.6	.19	9.3		
19.7	.45	0	9.2		EDGE of BLD
21	OUT (+.4)	0	9.2		TOP of BLD
21.9	.9	.09	8.9		
22	1.0	.06	8.9		
25	1.3	.08	8.2	75	
27	2.0	.13	8.2	75	
28	2.35	.06	8.2	75	
30	2.55	.12/.08	9.2		
32	2.55	.02/.06	"		
34	2.7	.01/.01	"		
36	2.7	.03/0	"		
39	2.75	-.03/-.06	"		
42	2.6	.02/.06	"		
45	2.5	.22/-.08	"		
48	2.0	.20	"		
50	1.8	.15	"		

TR-4 CONT. | SY-2 SYCAN RIVER | 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
52	1.75	.19	9.2		
55	2.0	.13	"		
58	2.0	.02	"		
61	2.0	.04	"		
64	1.85	.05	"		
67	1.2	.01	7.2	75	
70	.65	-.05	6.2	75	
71.5	.40	Ø	2.1		1.0 VEG
LWE 72.5	Ø	Ø	1.2		

TR-5 | SY-2 SYCAN RIVER DEPTH + VELOCITY | 10/4/2000

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 11.3	1.25	0	2.1		2.0 - UCB 2.0 FT.
11.5	1.25	-.04	"		
13	1.4	-.05	"		
16	1.25	0	"		
19	1.4	0	2.7	75	
22	1.5	.04	7.2	75	
25	1.8	0	8.2	75	
28	2.35	0	9.2		
31	2.35	-.05	9.2		
34	2.55	.04/-.04	"		
37	2.45	.08	"		
40	2.4	.04	"		
43	2.55	.18/.04	"		
46	2.15	.11	"		
49	2.2	.25	"		
52	2.1	.23	"		
55	1.8	.15	"		
58	1.8	.16	"		
61	1.4	0	6.2	75	
62.6	1.0	0	2.5	75	VEG
LWE 62.9	Ø	Ø	1.2		

TR-6 — SY-2 SYCAN RIVER DEPTH + VELOCITY — 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 26	⊗	⊗	1.2		
29	.40	0	1.2		
32	.60	0	2.1		1.0 - VEG
35	.70	0	2.5	75	
38	1.0	0	2.5	"	
41	1.0	.03	5.2	"	
44	.75	.30	"	"	
47	.70	.11	"	"	
50	.90	0	"	"	1.0 - BLD U/S 2.0 FT
53	1.2	.16	"	"	
56	1.0	.15	4.2	"	
59	1.0	.16	5.2	"	
62	1.15	.13	4.2	"	
68	1.35	.19	"	"	
71	1.5	.21	"	"	
74	1.4	.17	5.2	"	
77	1.0	.19	4.2	"	
80	1.0	.10	4.2	"	
83	1.0	.09	5.2	"	
86	1.0	.13	2.5	"	
89	1.0	.10	"	"	
92	1.0	.10	"	"	
95	.80	.01	1.8	50	

TR-6 CONT. — SY-2 — 10-4-00

STA	DEPTH	VEL	SUB	%E	COVER
98	1.25	.07	2.5	75	
101	1.3	.08	"	"	1
104	.90	.01	"	"	3
105	.90	-.03	2.1		3
LWE 105.3	0.5	⊗	2.1		2.0 - VCB 0.6 FT.

TR-7	54-2 SYCAN RIVER DEPTH + VELOCITY			10-4-00	
STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 16.9	⊗	⊗	1.2		
19	.75	.05	2.5	75	
23	1.0	.12	2.5	"	
27	.75	.15	5.2	"	
31	.7	.16	5.2	"	
35	.7	.14	7.2	"	
39	.7	.10	6.2	"	
42	1.2	.10	9.2		
46	1.85	.02	9.2		
50	1.8	.08	2.9		
54	1.6	.10	2.5	75	
59	1.05	.16	2.4	"	
62	1.1	.10	2.4	"	
66	.9	.15	2.7	"	
69	1.0	.08	2.7	"	
72	.7	.08	5.2	"	
75	.6	.13	2.5	"	
78	.6	.06	2.6	"	
81	.45	.04	2.6	"	
84	.40	.04	2.5	75	
88	.60	0	2.5	100	
92	.70	.01	2.6	75	
96	.80	0	2.4	100	
100	1.1	.03	2.4	100	
103	.70	-.10	2.1		3.0
104 LWE	⊗	⊗	2.1		

TR-8	54-2 SYCAN RIVER DEPTH + VELOCITY			10-4-2000	
STA	DEPTH	VEL	SUB	%E	COVER
RWP 1.0					
RWE 21.1	1.0	0	2.1	—	—
21.3	.9	.01	2.5	75	↑ 2- UCB 0.6 FT
23	1.0	.13	5.2	"	
27	.9	.14	2.6	"	
31	1.1	.13	2.5	"	
35	.8	.12	2.7	"	
39	.9	.08	2.6	"	
43	.8	.11	2.6	"	
47	.65	.09	2.6	"	
51	.9	.16	2.6	"	
55	1.25	.14	2.7	50	
59	1.5	.14	2.8	75	
63	1.2	.15	2.7	"	
67	1.0	.12	2.7	"	
71	.9	.08	2.7	"	
75	.9	.03	2.7	"	
79	.55	.06	2.7	"	
83	.9	.10	2.6	100	
87	.8	.08	2.5	100	
91	.95	.13	2.5	"	
95	1.1	.06	2.5	"	
99	1.0	-.02	2.5	"	
103	1.1	-.06	2.4	"	
106	.9	-.04	2.4	"	
108 LWE	⊗	⊗	2.1	—	

TR-9 — SY-2 SYCAN RIVER 10/4/00 — DEPTH & VELOCITY

STA	DEPTH	VEL	SUB	%E	COVER
RWE 21.7	Ø	Ø	1.2		
23	.2	0	1.2		
26	.7	0	2.4	75	
30	1.15	.02	2.6	50	
34	1.5	.01	2.5	75	
38	1.3	.08	5.2	"	
42	1.2	.10	2.5	"	
46	1.4	.13	2.9		
50	1.6	.13	9.2		
54	1.5	.05	9.2		
58	1.8	.04	8.2	75	
62	1.8	.08	2.7	"	
66	1.7	.05	2.8	"	
70	1.1	.13	8.2	"	
71.5	0	0	"	50	SIDE of BLD
73	OUT (+1.0)	0	"	"	TOP of BLD
74.4	1.3	.02	"	"	
79	1.6	.08	2.6	75	
83	1.55	.08	"	100	
87	1.45	.04	"	100	
90	1.3	-.02	"	75	
93	1.1	.02	2.1		
LWE 95.5	Ø	Ø	1.2		VEG

TR-10 — SY-2 SYCAN RIVER 10-4-00 — DEPTH & VELOCITY

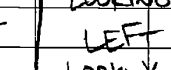
STA	DEPTH	VEL	SUB	%E	COVER
RWP → RWE	OUT		1.2		
RWE 53.5	Ø	Ø	1.7		
56	0.1	0	1.7		
59	.05	0	1.7		
62	.2	.12	1.8	75	1.0
65	.2	.03	8.7	"	ON BLD
68	.8	-.01	8.7	"	
71	1.0	.05	7.8	"	
73	1.0	.14	7.8	50	
76	1.25	.15	7.8	50	
79	.7	.15	8.7	75	
82	1.25	.10	7.6	"	
85	1.2	.05	6.7	"	
87	1.3	.37	6.7	"	
90	1.8	.21	7.6	50	
93	2.05	.17	8.7	50	
96	1.9	-.06	9.2		
99	1.8	0	9.2		BLD 4.0 FT U/S
102	1.6	-.08	9.2		
105	1.2	0	7.6	50	
107	1.6	.1	2.6	50	
108.5	1.1	.05	2.1		
LWE 109.4	Ø	Ø	1.2		

SY-2	SYCAN RIVER	10/4/00
	PHOTO LOG	
#	COMMENT	
1	RIGHT to LEFT at	TR-1
2	LOOKING U/S FROM BELOW	TR-1
3	~~LEFT~~ RIGHT to ~~RIGHT~~ LEFT	TR-2
4	RIGHT to LEFT	TR-3
5	LOOKING U/S FROM BELOW	TR-3
6	LEFT to RIGHT	TR-4
7	LEFT to RIGHT	TR-5
8	LOOKING U/S FROM BELOW (LB - RIGHT SIDE of PICTURE, RB - LEFT SIDE of PICTURE)	TR-5
9	LOOKING U/S FROM BELOW	TR-5
~~10~~	~~BEDROCK~~	
11	RIGHT to LEFT	TR-6
12	" " "	TR-7
13	LEFT to RIGHT	TR-8
14	LOOKING U/S FROM BELOW	TR-8
15	LEFT to RIGHT	TR-9
16	LOOKING U/S FROM BELOW	TR-9
17	LEFT to RIGHT	TR-10
18	LOOKING D/S FROM ABOVE	TR-10

SY-2 SYCAN RIVER
10/4/2000

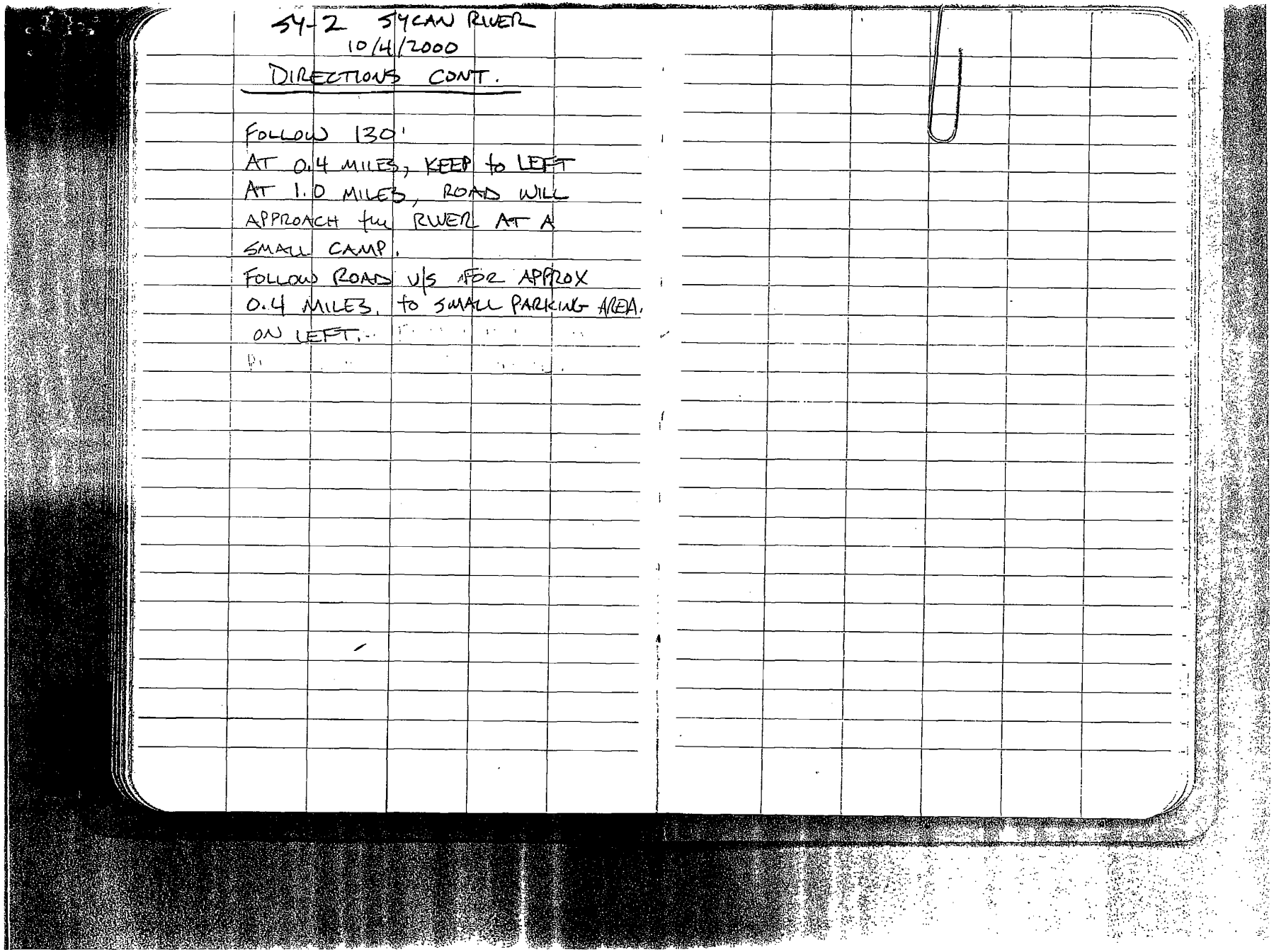
ADDITIONAL INFORMATION on DIRECTIONS TO SITE

FROM CHILOQUIN TAKE SPRAGUE RIVER HWY TO WILLIAMSON RIVER HWY 4 AND FOLLOW SIGNS to "HEAD of the RIVER" CAMPGROUND.
AT JUNCTION 4648, CONTINUE STRAIGHT ONTO HWY 46 (GRAVEL ROAD) FOR APPROX. 0.4 MILES. TURN RIGHT ON HWY 44. DRIVE APPROX. 7.4 MILES and TURN LEFT ON 4466
NOTE: 4466 WAS NOT MARKED. IT IS THE FIRST LEFT PAST the CATTLE GAURD AFTER MILE MARKER 17.



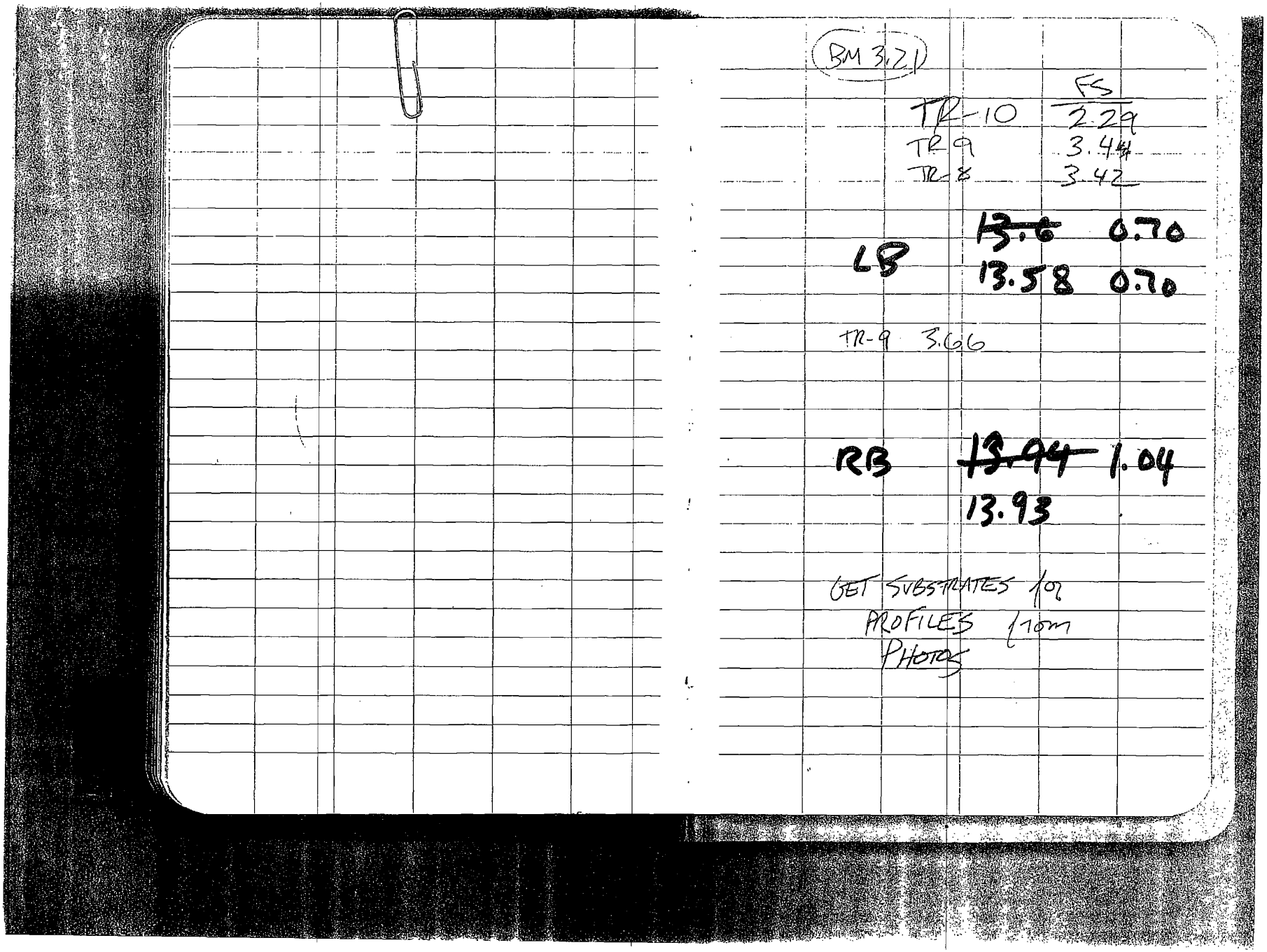
CATTLE GAURD

KEEP LEFT at 0.7 MILES
AT 1.3 MILES TURN LEFT ONTO 130. (THIS IS A 4 WAY INTERSECTION)


54-2 SYCAN RIVER
10/4/2000

DIRECTIONS CONT.

FOLLOW 130'
AT 0.4 MILES, KEEP to LEFT
AT 1.0 MILES, ROAD WILL
APPROACH the RIVER AT A
SMALL CAMP.
FOLLOW ROAD U/S FOR APPROX
0.4 MILES, to SMALL PARKING AREA,
ON LEFT.


BM 3.21
FS
TR-10 2.29
TR 9 3.44
TR 8 3.42
LB ~~13.6~~ 0.70
13.58 0.70
TR-9 3.66
RB ~~13.94~~ 1.04
13.93
GET SUBSTRATES for PROFILES from PHOTOS

TR-1	Lower	59.0
	Rider	23.6
TR-2		20.8
TR-3		14.6
TR-6		24.1
		105.3
TR-7		14.4
		105.0
		21.1
		103.0

5/17/93

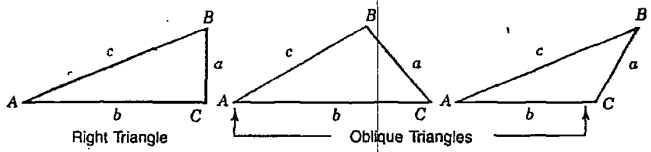
Sycan R.

in

Canyon

SY-2

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

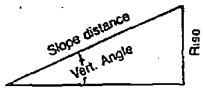
For Angle A: $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

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

Solution of Oblique Triangles

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

REDUCTION TO HORIZONTAL



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

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

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