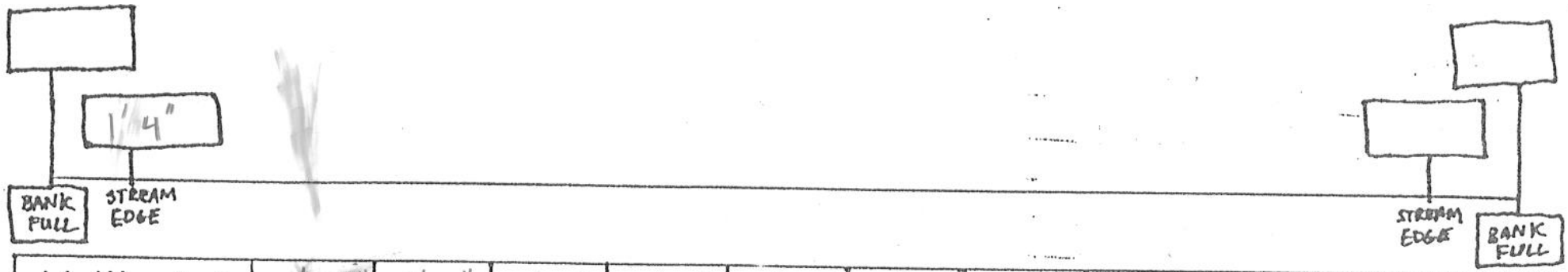
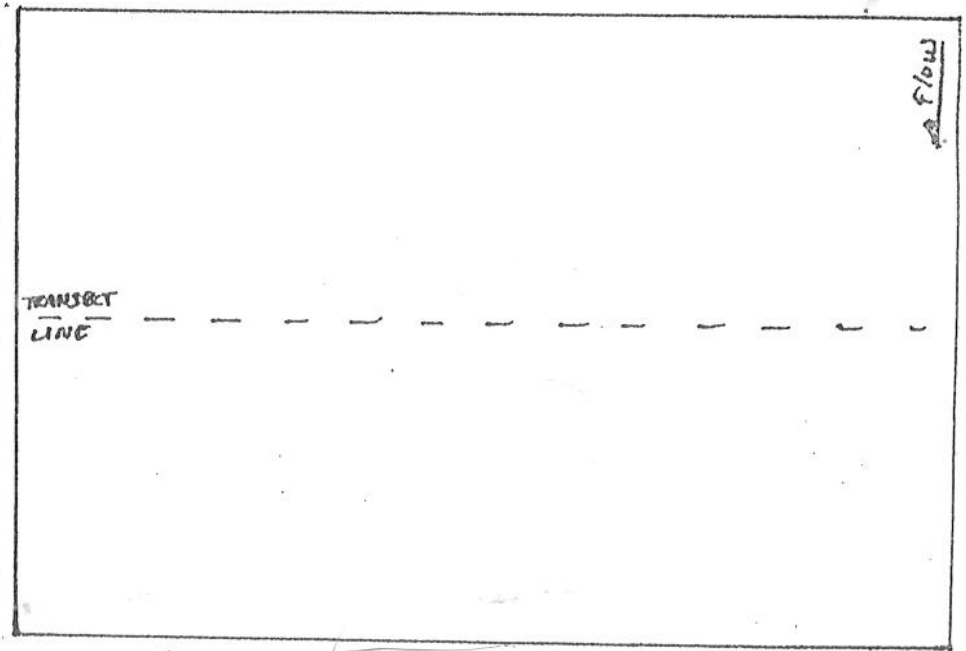


Width ' "	2' 4"	3' 7"	4' 11"	7' 0"	8' 10"	10' 6"	12' 7"	14' 7"	17' 7"	20'	22' 5"
Depth	0.55	0.8	0.95	0.8	1.05	0.85	0.75	0.8	0.7	0.07	0.55
Substrate/Veg	|	|	|	|	|	|	|	|	|	|	|
% Plant Coverage											
Mean Column Velocity m/s	0.01	0.08	0.08	0.15	0.19	0.34	0.25	0.22	0.17	0.14	0.2
Surface Vel. m/s	0.06	0.09	0.08	0.13	0.33	0.39	0.23	0.21	0.18	0.19	0.2
Bottom Velocity m/s	0.02	0.06	0.09	0.12	-.04	0.18	0.23	0.18	0.17	0.05	0.0

DATE	7-14-03
TIME	9:54
OBSERVER	JIM + MYRA
STREAM	LALAKEA
REACH	ABOVE UW WATER GAUGE
TRANSECT #	1
LOCATION	

HYDROLAB			
WIDTH			
TEMP			
D.O.			
Conductivity			
pH			
Redox			



SITE PICTURE

BANK FULL

2' 1"

STREAM EDGE

26' 7"

STREAM EDGE

BANK FULL

Width	3' 1"	6' 2"	8' 9"	11' 7"	14' 4"	17' 3"	19' 9"	22' 2"	23' 1"		
Depth	0.6	1.0	1.0	.95	.75	.85	.75	.65	.45		
Substrate/Veg											
% Plant Coverage											
Mean Column Velocity	.08	.06	.19	.36	.27	.27	.23	.13	.02		
Surface Vel.	.07	.09	.18	.38	.21	.20	.25	.14	.02		
Bottom Velocity	.01	.09	.18	.00	.19	.18	.03	.07	.00		

m/s

DATE 7-15-03

TIME 4:43pm

OBSERVER JIM + KAY

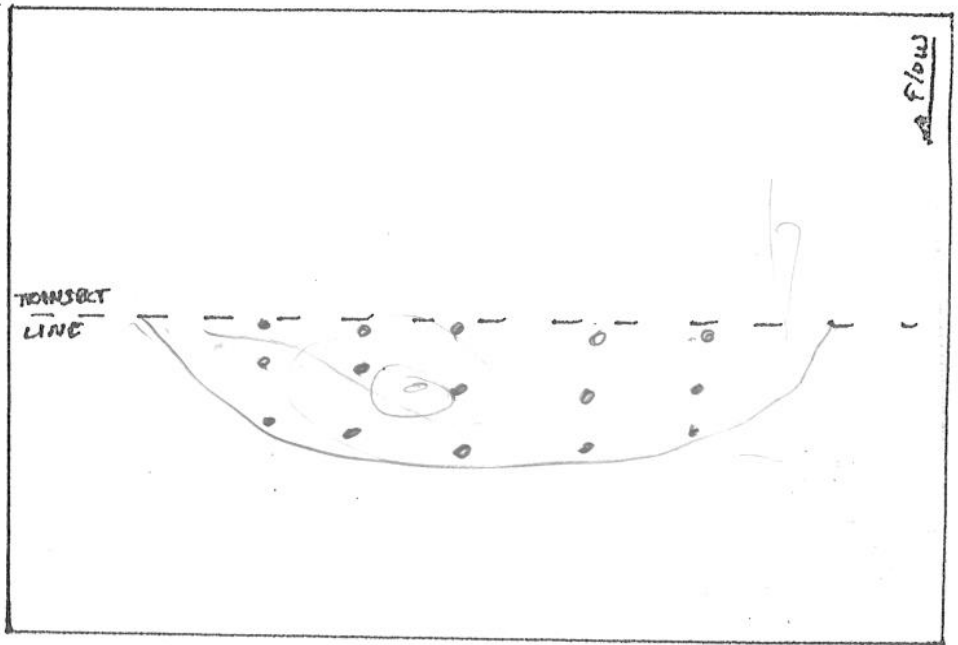
STREAM Lalakea

REACH just above road

TRANSECT #:

LOCATION Discharge measurement

HYDROLAB			
WIDTH			
TEMP			
D.O.			
Conductivity			
pH			
Redox			

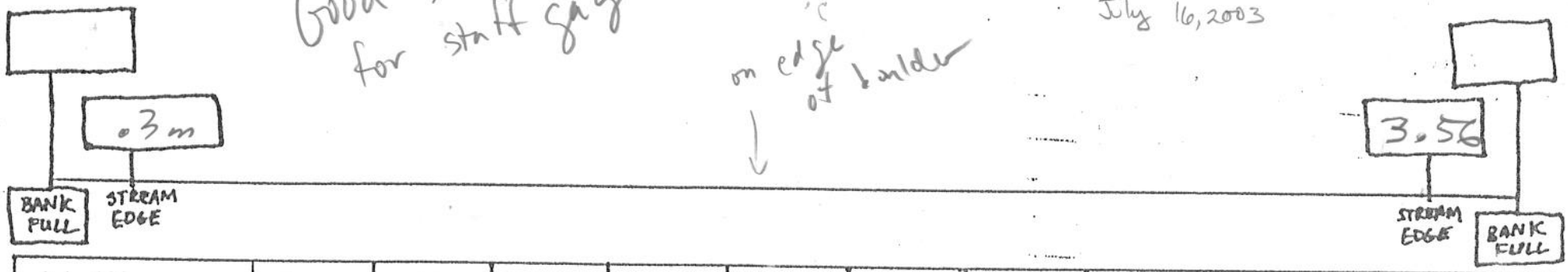


SITE PICTURE

site #16 on Lalakea Ditch discharge sheet.
July 16, 2003

Good site for staff gage

on edge of boulder



Width m	0.7	1.0	1.4	2.0	2.3	3.05	3.4				
Depth f ten	1.6	1.5	1.5	1.7	.75	.5	.6				
Substrate/% Veg											
% Plant Coverage											
Mean Column Velocity	.09	.13	.17	.24		.02	-.05				
Surface Vel.	.12	.13	.17	.26	.18	.05	-.00				
Bottom Velocity	.05	.12	.10	.12		.01	-.10				

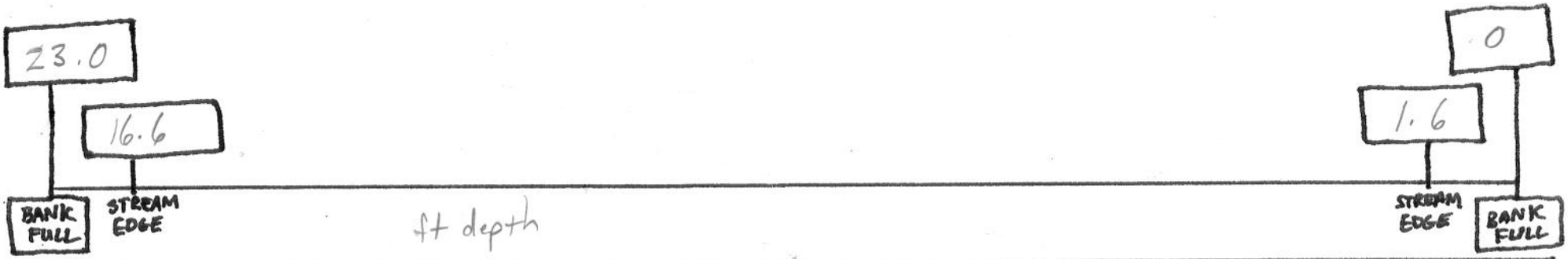
DATE	7-16-03
TIME	3:37 pm
OBSERVER	Jim + myra
STREAM	Lalakea
REACH	upper lalakea
TRANSECT #	discharge
LOCATION	≈ 100 yd downstream of diversion

HYDROLAB			
WIDTH			
TEMP			
D.O.			
Conductivity			
pH			
Redox			

flow

TRANSECT LINE

SITE PICTURE



ft depth

Width (ft)	16.6	16.0	14.5	13.0	11.5	10.0	9.0	7.0	5.5	4.0	2.5
Depth (ft)	0	0.4	0.6	0.8	0.6	1.0	0.6	0.005	0.01	0.2	0.005
Substrate											
% ~~Plant~~ surface Coverage	0	0.04	0.03	0.03	0.02	0.02	0.02	0	0	0.03	0
Mean Column Velocity	0	0.02	0.03	0.03	0.03	0.02	0	0	0	0.01	0
Bottom Velocity m/s	0	0.03	0.01	0.01	0.04	0.01	0	0	0	0.02	0

DATE	17/07/03
TIME	3:50pm
OBSERVER	ARS/RE
STREAM	Hakalaoa
REACH	just abgve road
TRANSECT #	
LOCATION	GPS N/A 20m above road

HYDROLAB			
WIDTH			
TEMP			
D.O.			
Conductivity			
pH			
Redox			

flow

TRANSECT LINE

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | STREAM EDGE | BANK FULL

Below Lalukea Diversion ≈ 75 m, at New Staff Gage
Staff Gage Read; 1.6 Ft.

Stream Edge Width (feet)	3 Ft	4	5	6	8	10	12	13	14	14.5 Ft.								
Stream Edge Depth (feet)	0.1	0.7	0.5	0.9	1.0	0.4	0.6	0.6	0.8	0.6								
Flow Rate Width (ft/sec)	0																	
Flow Rate Depth (ft/sec)	0																	
Substrate/ % Vegetation																		
% Plant Coverage	0 → Bedrock																	
Mean Velocity[1] (ft/sec)	0	0.07	.04	.03	.04	.04	.06	.09	.07	.14								
Surface Velocity[2] (ft/sec)	0	0.04	.06	.04	.01	.24	.48	.52	.42	.30								
Bottom Velocity[3] (ft/sec)	0	0.01	.03	.0	0	.04	-0.11	-0.16	.17	.05								

↓ ? (Neg. Flow)

DATE 16 Sep 2003	HYDROLAB			
TIME 1500 hrs	WIDTH (feet)			
OBSERVER RE	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Lalukea	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

No GPS here

FLOW ↓

Transect Line

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | STREAM EDGE | BANK FULL

Discharge In Lalakea Tunnel

Stream Edge Width (feet)	1.0'	2.0'	3.0'															
Stream Edge Depth (feet)	1.2'	1.2'	1.2'															
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)	0.70	0.87	0.81															
Surface Velocity[2] (ft/sec)	0.90	0.87	0.75															
Bottom Velocity[3] (ft/sec)	0.70	0.66	0.45															

DATE 9/16/03	HYDROLAB		
TIME 3:40 pm	WIDTH (feet)		
OBSERVER RE/DJP	TEMPERATURE (°C)		
REACH	DISSOLVED OXYGEN (mg/L)		
TRANSECT#	CONDUCTIVITY (mS/cm)		
DAR_CODE	pH		
STREAM	TURBIDITY (NTU)		
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)		

3.5' downstream wooden stake

Staff gauge = 1.1 ft. @ 3.52p in tunnel.

FLOW

Transect Line

SITE PICTURE

Installed Water Gage #5 at 4:30 pm Temp on staff gage
4:30 pm reading = 1.03 ft

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | STREAM EDGE | BANK FULL

Hiilawe - 1st Gage ≈ 200m above Rd Xing, Gage about 20ft. downstream
Nice Pool, laminar flow

Stream Edge Width (feet)	17 ft	16	14	12	10	8	6	4	2	1 ft.									
Stream Edge Depth (feet)	.1 ft	0.4 ft	0.9	1.6	2.2	2.3	2.2	2.0	1.6	.2									
Flow Rate Width (ft/sec)	0																		
Flow Rate Depth (ft/sec)	0																		
Substrate/ % Vegetation																			
% Plant Coverage																			
Mean Velocity[1] (ft/sec)	0	.02	.06	.00	.00	.09	.47	.57	.13	0									
Surface Velocity[2] (ft/sec)	0	.04	.08	.01	.09	.14	.16	.48	.19	0									
Bottom Velocity[3] (ft/sec)	0	(-.02)	.01	(-.03)	.01	(-.07)	.29	.34	.48	0									

DATE 17 Sept. 03	HYDROLAB			
TIME 1042	WIDTH (feet)			
OBSERVER RE/DP	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Hiilawe	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Staff Gage Level = 1.02 ft.

FLOW

Rocks

Transect Line

(WGS 84) Wypt. 74
GPS = N20.10690
155.59648

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

(reading)

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | Hilawe above EKF diversion Intake, below ~~staff~~ new staff gage | STREAM EDGE | BANK FULL

Stream Edge Width (feet)	25.6A	24	22	19	16	13	10	7	4	3	1.5	1.1A						
Stream Edge Depth (feet)	0.9ft	1.6	1.6	1.5	1.3	2.0	1.7	1.4	1.1	0.6	0.6	0						
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage							0.49											
Mean Velocity[1] (ft/sec)	2.23	0.78	0.39	0.25	(0.43)	0.26	0.49	0.13	1.04	0.58	0.50							
Surface Velocity[2] (ft/sec)	2.06	1.03	0.19	(-0.20)	(-0.30)	0.23	1.07	0.79	1.07	0.99	0.77							
Bottom Velocity[3] (ft/sec)	1.68	1.09	0.19	0.18	(-0.19)	0.08	0.32	(-0.05)	1.02	0.25	0.28							

DATE 17 Sept. '03	HYDROLAB			
TIME 3:20 pm	WIDTH (feet)			
OBSERVER RFD SD	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Hilawe	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Put in staff gage here today
Water Level = 0.52 Ft
Water Temp. Probe attached to gage (#4)

FLOW ↓

Transect Line
(Wypt. 75) – N 20.10114
155.59499
run/riffle,
taking flow in ~~pool~~ just below staff gage

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

-Collected Swordtails Here

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | STREAM EDGE | BANK FULL

Installed staff gage at "Hakalaoa" road xing, also water temp. probe #3, at 1220 pm

Stream Edge Width (feet)	2.6'	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	12.4ft end.					
Stream Edge Depth (feet)	0	0.3	0.3	0.6	0.7	0.7	0.8	0.7	0.6	0.1	0.1	0 depth					
Flow Rate Width (ft/sec)	0										0						
Flow Rate Depth (ft/sec)											↓						
Substrate/ % Vegetation											↓						
% Plant Coverage											↓						
Mean Velocity[1] (ft/sec)	0	0.08	0.04	0.09	0.14	0.09	0.10	0.06	0.07	0.05	↓						
Surface Velocity[2] (ft/sec)	↓	0.07	0.09	0.12	0.09	0.08	0.08	0.09	0.07	↓ shallow							
Bottom Velocity[3] (ft/sec)	↓	0.04	0.03	0.03	0.05	0.07	0.06	0.03	0.02	↓							

DATE 18 Sept 2003	HYDROLAB			
TIME 1220	WIDTH (feet)			
OBSERVER RE/DJP	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Hakalaoa	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Staff Gage = 0.91 ft. @ 1220 pm

FLOW ↓

- Installed water Temp probe on streamgage

Transect Line

Flow taken - just above road xing where staff gage was put in

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | Staff Gage just below Lalakea Diversion, shallow run | STREAM EDGE | BANK FULL

Stream Edge Width (feet)	13.9ft	13	12	11	10	9	8	7	5	3	2.1 Ft							
Stream Edge Depth (feet)	0.6ft	1.2	1.0	0.5	0.4	0.5	0.9	1.2	0.6	0.6	0.1							
Flow Rate Width (ft/sec)											Ø							
Flow Rate Depth (ft/sec)											↓							
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)	0.17	0.08	0.06	0.05	(0.05)	0.02	0.08	0.07	0.01	0.06								
Surface Velocity[2] (ft/sec)	0.36	0.66	0.45	0.23	0.02	0.06	0.07	0.09	0.06	0.08								
Bottom Velocity[3] (ft/sec)	0.05	0.01	(0.04)	(0.07)	(0.06)	0.01	0.02	0.06	0.01	0.03								

DATE 9/18/03	HYDROLAB			
TIME 1334	WIDTH (feet)			
OBSERVER REIDJP	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Lalakea	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

FLOW ↓

Transect Line

Staff Gage = 1.58 Ft

SITE PICTURE

1.04 staff gag

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL | STREAM EDGE | Inside Tunnel - Very little rocks, nr. entrance, about 4 ft. behind board hole | STREAM EDGE | BANK FULL

Stream Edge Width (feet)	1	2	3A.																
Stream Edge Depth (feet)	1.1A.	1.1	1.1																
Flow Rate Width (ft/sec)																			
Flow Rate Depth (ft/sec)																			
Substrate/ % Vegetation																			
% Plant Coverage																			
Mean Velocity[1] (ft/sec)	0.64	0.79	0.74																
Surface Velocity[2] (ft/sec)	0.48	0.74	0.69																
Bottom Velocity[3] (ft/sec)	0.25	0.55	0.54																

DATE 18 Sept. 2003	HYDROLAB			
TIME 2:36 pm	WIDTH (feet)			
OBSERVER RE/DJP	TEMPERATURE (°C)			
REACH Lalaka Tunnel	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

FLOW ↓

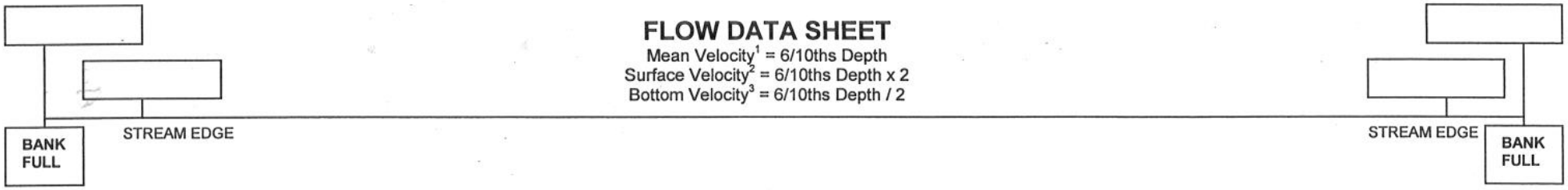
Transect Line

Tunnel Staff A Gage = [redacted] ft.
1.04

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)	3.7	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11	12	12.8							
Stream Edge Depth (feet)	0.2	1.6	1.6	1.6	1.8	2.0	1.8	1.3	1.4	1.1	0							
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation	Ø%																	
% Plant Coverage	Ø																	
Mean Velocity[1] (ft/sec)	–	0.51	0.27	0.53	0.45	0.43	0.88	0.88	0.60	0.38								
Surface Velocity[2] (ft/sec)	0.40	0.38	0.85	1.35	1.71	1.33	1.19	1.71	1.82	0.48								
Bottom Velocity[3] (ft/sec)	–	0.10	0.12	0.40	-0.36	-0.25	-0.25	0.23	-0.51	-0.37								

DATE Dec 9, 2003	HYDROLAB		
TIME 1402 hrs.	WIDTH (feet)		
OBSERVER RE/DSP/MM	TEMPERATURE (°C)		
REACH	DISSOLVED OXYGEN (mg/L)		
TRANSECT#	CONDUCTIVITY (mS/cm)		
DAR_CODE	pH		
STREAM Lalakea	TURBIDITY (NTU)		
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)		

Take Out Stream Temp Hobo Logger

FLOW

Transect Line

Level Stream Gage: 2.19 Ft.

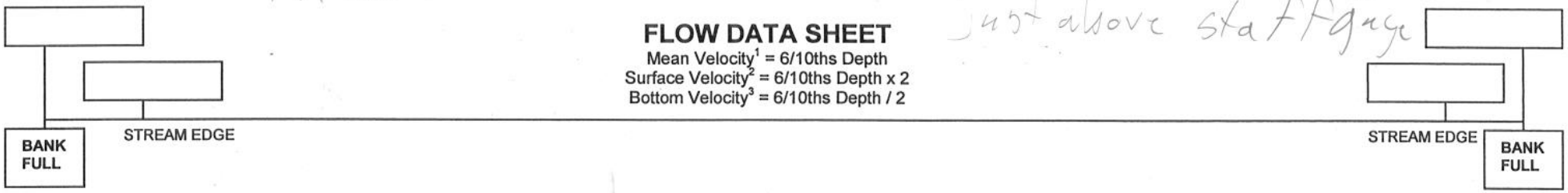
Just below main Lalakea Diversion, at guage

SITE PICTURE

At Hakaloa stream, downstream from diversion at Rd xing, just above staff gage

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)	4	6	7	8	9	10	11	12	13	14.3								
Stream Edge Depth (feet)	0	0.6ft	0.8	0.8	0.8	1.0	0.8	0.8	0.5	0.1								
Flow Rate Width (ft/sec)	0																	
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.08	0.11	0.11	0.13	0.14	0.13	0.11	0.08									
Surface Velocity[2] (ft/sec)		0.10	0.10	0.12	0.11	0.11	0.11	0.11	0.11									
Bottom Velocity[3] (ft/sec)		0.05	0.06	0.07	0.09	0.09	0.09	0.06	0.06									

DATE 12-9-03	HYDROLAB			
TIME 1614	WIDTH (feet)			
OBSERVER RE/DJP/MM	TEMPERATURE (°C)			
REACH "Hakaloa" - V	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Hakaloa	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Silty - Nr. Road Xing

FLOW

Transect Line

Pulled Hobo Data Logger at 1605 hrs.
(Gage Height = 1.02 ft.
Hobo #3

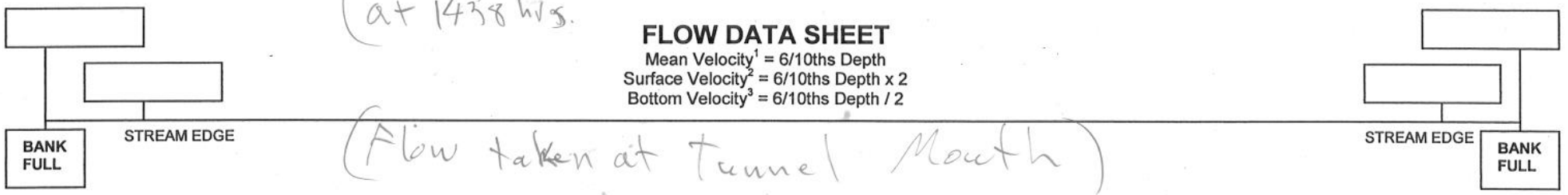
SITE PICTURE

DIVISION OF AQUATIC RESOURCES GRH 2/02

(Pulling Gage out - Below Rivers)
at 1438 hrs.

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



(Flow taken at Tunnel Mouth)

Stream Edge Width (feet)	1	2	3															
Stream Edge Depth (feet)	1.7																	
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)	1.48	1.53	1.40															
Surface Velocity[2] (ft/sec)	1.22	1.19	1.46															
Bottom Velocity[3] (ft/sec)	0.42	1.23	1.20															

DATE 9 Dec. 2003	HYDROLAB			
TIME 1505 hrs.	WIDTH (feet)			
OBSERVER AE/DJP/MM	TEMPERATURE (°C)			
REACH Lalakea Tunnel	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Lalakea Tunnel	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Gage Below Dam = # 18045 FLOW
taken out today

Hobo Serial #2 Below Dam - A few minutes after stream flow Gage Stuff

Transect Line

Gage Height Inside Tunnel = 1.39 ft,

Hobo # 1 = Inside Tunnel, out at 1515 hrs

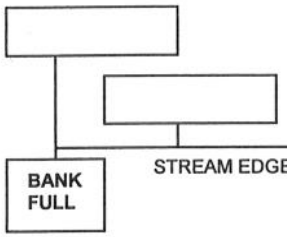
DIVISION OF AQUATIC RESOURCES GRH 2/02

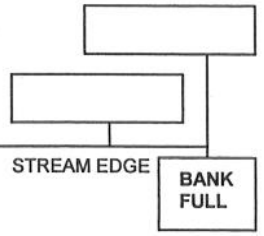
SITE PICTURE

FLOW DATA SHEET

Riffle

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2





Stream Edge Width (feet)	3.8ft	5ft	6ft	7ft	8ft	9ft	10ft	11ft	12ft	12.9ft								
Stream Edge Depth (feet)	—	1.5ft	1.5ft	1.3ft	1.6ft	1.2ft	2.1ft	1.3ft	1.1ft	0								
Flow Rate Width (ft/sec)	0																	
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.09	0.34	0.35	0.21	0.31	0.61	0.68	0.18									
Surface Velocity[2] (ft/sec)		0.38	1.17	1.51	1.23	0.74	0.90	1.68	1.24									
Bottom Velocity[3] (ft/sec)		0.08	0.48	0.05	-0.39	0.36	0.22	-0.02	-0.49									

DATE Dec 10 2003	**HYDROLAB**			
TIME 11:34am	**WIDTH** (feet)			
OBSERVER RE, DJP, MKM.	**TEMPERATURE** (°C)			
REACH	**DISSOLVED OXYGEN** (mg/L)			
TRANSECT#	**CONDUCTIVITY** (mS/cm)			
DAR_CODE	**pH**			
STREAM Lalakea	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

Gage below Lalakea diversion.

FLOW

Transect Line

Staff Gage = 2.1 ft.

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

10 Dec 2003
"Hakalaca" Stream gage by car park = 1.0 ft. at 1613 hrs.

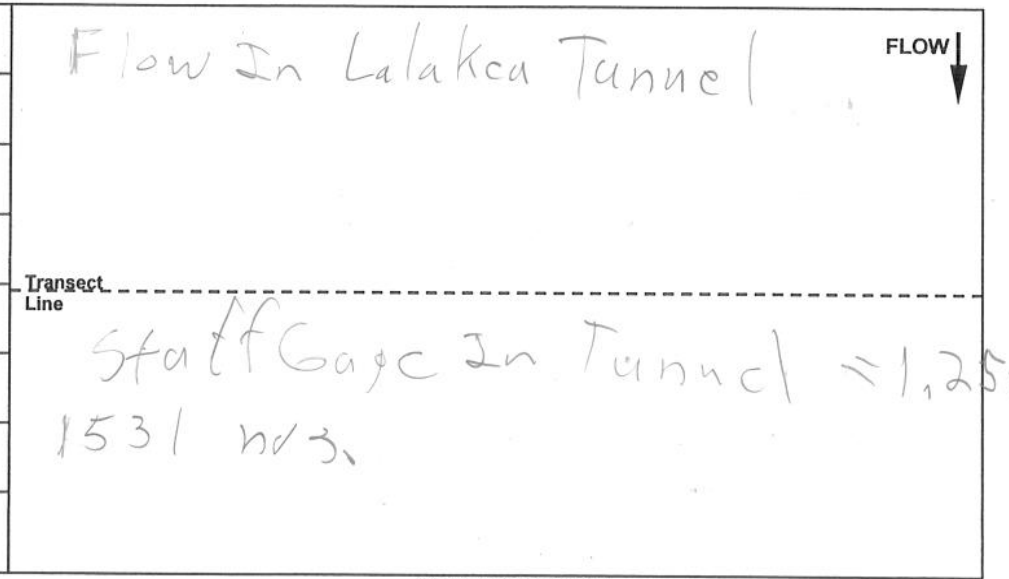
FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL — STREAM EDGE — STREAM EDGE — BANK FULL

Stream Edge Width (feet)	1	2	3																
Stream Edge Depth (feet)	1.3ft	1.3f	1.3ft																
Flow Rate Width (ft/sec)																			
Flow Rate Depth (ft/sec)																			
Substrate/ % Vegetation																			
% Plant Coverage																			
Mean Velocity[1] (ft/sec)	1.21	1.36	1.36																
Surface Velocity[2] (ft/sec)	1.30	1.27	1.07																
Bottom Velocity[3] (ft/sec)	0.68	1.03	0.57																

DATE Dec 10, 2003	HYDROLAB			
TIME 15:39	WIDTH (feet)			
OBSERVER RE, DSP, mcm	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			



DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL — STREAM EDGE — STREAM EDGE — BANK FULL

Hiilawe Stream, above EKF Diversion

Stream Edge Width (feet)	6ft	~~7ft~~	8ft	10ft	12ft	14ft	16ft	~~18ft~~	20ft	22ft	24ft	26ft	28ft	30ft	32ft	33.1ft		
Stream Edge Depth (feet)	Ø	~~0.2~~	0.4ft	0.6ft	0.5ft	0.7ft	1.2ft	1.4ft	1.5ft	1.6ft	~~1.8ft~~ 2.0ft	1.6ft	1.3ft	0.8ft	0.6ft	Ø		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.08	0.35	0.37	0.35	0.49	0.47	0.53	0.67	0.83	0.60	0.90	0.36	0.19	0.04			
Surface Velocity[2] (ft/sec)			0.42	0.36	0.54	0.60	0.54	0.69	0.87	0.92	0.88	0.88	0.81	0.13	0.07			
Bottom Velocity[3] (ft/sec)			0.20	0.31	0.26	0.19	0.43	0.24	0.08	0.17	0.16	0.27	0.05	-0.02	0.01			

DATE 11 Dec 2003	**HYDROLAB**			
TIME 1055	**WIDTH** (feet)			
OBSERVER RE/DSP/MM	**TEMPERATURE** (°C)			
REACH Above EKF Diversion	**DISSOLVED OXYGEN** (mg/L)			
TRANSECT#	**CONDUCTIVITY** (mS/cm)			
DAR_CODE	**pH**			
STREAM Hiilawe	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

FLOW ↓

Transect Line

Gage Height = 0.65 ft.

HP60 #4 removed @ 11:16

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2

BANK FULL — STREAM EDGE — Just above Road at Hilltawe Xing, above Araki — STREAM EDGE — BANK FULL

Stream Edge Width (feet)	2.7ft	4ft	6ft	8ft	10ft	12ft	14ft	16ft	18ft	20ft	~~22ft~~ 22.3ft							
Stream Edge Depth (feet)	0	0.8ft	1.3ft	1.7ft	2.0ft	2.1ft	1.9ft	2.0ft	1.5ft	1.3ft	0							
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.10	0.13	0.28	0.30	0.27	0.38	0.60	0.59	0.30								
Surface Velocity[2] (ft/sec)		0.11	0.25	0.31	0.36	0.32	0.45	0.72	0.81	0.22								
Bottom Velocity[3] (ft/sec)		0.05	0.07	0.08	0.10	0.13	0.21	0.04	0.39	0.02								

DATE 11 Dec 2003	HYDROLAB			
TIME 12:09	WIDTH (feet)			
OBSERVER RE / mm	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

FLOW ↓

Transect Line

1.3 ft. staff gage Reading

Hobo #5 12:25

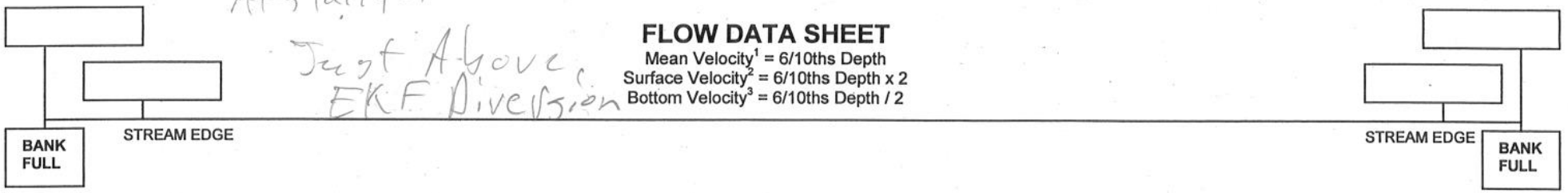
DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

At staff gage
Just Above
EKF Diversion

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)	7ft.	9ft.	11	13	15	17	19	21	23	25	27	29	31	33.0				
Stream Edge Depth (feet)	~~0~~	0.4	0.6	0.5	0.6	0.6	0.9	1.4	1.7	1.6	1.3	0.7	0.7	—				
Flow Rate Width (ft/sec)	0																	
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)	~~0.23~~	0.23	0.30	0.39	0.44	0.87	0.65	0.89	0.91	0.70	0.75	0.34	0.09	—				
Surface Velocity[2] (ft/sec)	~~0.21~~	0.21	0.41	0.41	0.60	0.84	0.75	1.01	0.82	0.75	0.77	0.40	(0.01)					
Bottom Velocity[3] (ft/sec)		0.18	0.28	0.18	0.19	0.70	0.33	0.05	0.09	0.18	0.23	0.19	0.02					

DATE	13 Dec 2003
TIME	1251
OBSERVER	RE/DSP/M
REACH	
TRANSECT#	
DAR_CODE	
STREAM	Hillawe
TRIBUTARY	

HYDROLAB			
WIDTH (feet)			
TEMPERATURE (°C)			
DISSOLVED OXYGEN (mg/L)			
CONDUCTIVITY (mS/cm)			
pH			
TURBIDITY (NTU)			
TOTAL SUSPENDED SOLIDS (mg/L)			

Hobo Gage # 4 - Installed at 12:51 pm (re-installed)

Staff Gage Reading = 0.6 ft.

FLOW ↓

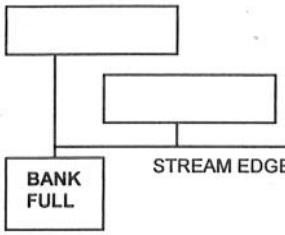
Transect Line

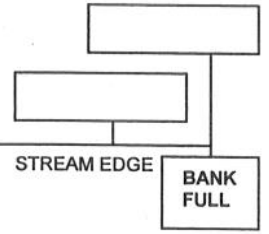
SITE PICTURE

Above Araki/Hilawe Stream Rd xing

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2





Stream Edge Width (feet)	23.0'	21.0	19.0	17.0	15.0	13.0	11.0	9.0	7.0	5.0	3.0	2.6						
Stream Edge Depth (feet)	0	0.06	0.07	1.5	2.1	2.8	1.7	1.7	1.7	1.6	1.1	0						
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.06	0.18	0.11	0.38	0.48	0.42	0.39	0.41	0.22	0.15							
Surface Velocity[2] (ft/sec)		0.07	0.11	0.39	0.42	0.46	0.55	0.56	0.40	0.17	0.13							
Bottom Velocity[3] (ft/sec)		0.03	0.17	0.03	0.11	0.16	0.10	0.15	0.26	0.07	0.13							

DATE 13 Dec 2003	HYDROLAB			
TIME 1623	WIDTH (feet)			
OBSERVER BE/LP	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Hobo #5 Installed at 16:50 (re-installed)

FLOW

Transect Line

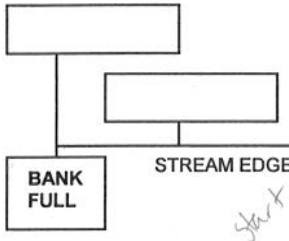
Staff gage = 1.25 ft

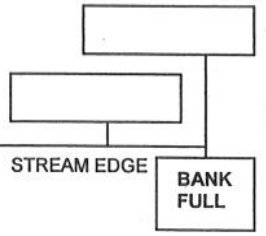
DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2





start

end

Stream Edge Width (feet)	3.4	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	12.5							
Stream Edge Depth (feet)	.2	1.4	0.8	1.4	1.7	1.7	2.0	1.9	1.1	0.9	\							
Flow Rate Width (ft/sec)	\										\							
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)		0.15	0.17	0.31	0.26	0.27	0.41	0.24	0.42	(-0.6)								
Surface Velocity[2] (ft/sec)		0.26	0.23	0.28	0.39	0.46	0.65	1.23	1.11	0.19								
Bottom Velocity[3] (ft/sec)		0.11	0.13	0.09	(-0.08)	(-0.04)	0.05	(-0.01)	(-0.19)	(-.35)								

DATE 12/15/03	HYDROLAB			
TIME 10:32(est)	WIDTH (feet)			
OBSERVER LPIMMC	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Lalakea	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

staff gauge = 1.98

FLOW

GPS = WGS84. 90
20.08858
-155.60051

Transect Line

Upper Lālākea, just below diversion

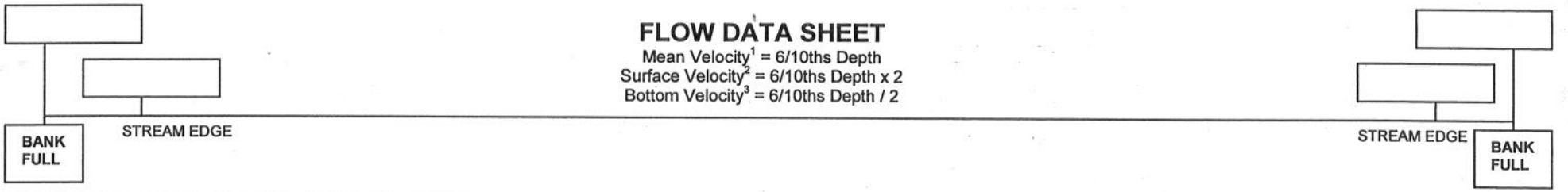
10:45 Hobo #6 installed at staff gauge

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)	1.0	2.0	3.0																
Stream Edge Depth (feet)	1.2	1.2	1.2																
Flow Rate Width (ft/sec)																			
Flow Rate Depth (ft/sec)																			
Substrate/ % Vegetation																			
% Plant Coverage																			
Mean Velocity[1] (ft/sec)	1.39	1.28	1.30																
Surface Velocity[2] (ft/sec)	1.13	0.84	1.21																
Bottom Velocity[3] (ft/sec)	(-0.17)	1.29	1.35																

DATE 15 Dec. 2003	HYDROLAB			
TIME 11:16 am	WIDTH (feet)			
OBSERVER CP/MMa	TEMPERATURE (°C)			
REACH	DISSOLVED OXYGEN (mg/L)			
TRANSECT#	CONDUCTIVITY (mS/cm)			
DAR_CODE	pH			
STREAM Lalukea Tunnel	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

Staff Gage inside tunnel 1.23ft. → (1.23A)
Installed Hobo #1 @ 11:28am

1135 AM - Relaunched Rain Gage at Dam

FLOW

Transect Line

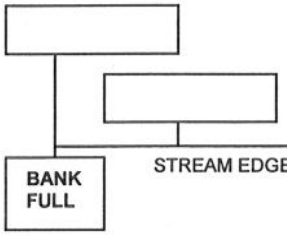
1100 hrs. - Installed Hobo #2 below Lalukea Diversion, to streampipe

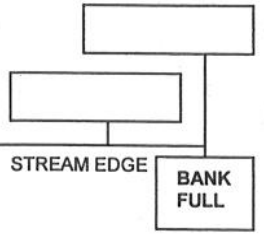
DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2





Stream Edge Width (feet)	7.9ft	6ft	5ft	4ft	3ft	2ft	1.3ft											
Stream Edge Depth (feet)	0.4ft	0.5ft	0.5ft	0.6ft	0.4ft	0.3ft ~~0.1ft~~	∅											
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)	0.08	0.14	0.14	0.10	0.08	0.07	—											
Surface Velocity[2] (ft/sec)	0.11	0.13	0.13	0.11	0.10	0.08	/											
Bottom Velocity[3] (ft/sec)	0.08	0.09	0.09	0.06	0.06	0.07	/											

DATE Dec 15, 2003	**HYDROLAB**			
TIME 12:47	**WIDTH** (feet)			
OBSERVER RE/DDS mm/LP/BE	**TEMPERATURE** (°C)			
REACH Hakalaoa Stream crossing	**DISSOLVED OXYGEN** (mg/L)			
TRANSECT#	**CONDUCTIVITY** (mS/cm)			
DAR_CODE	**pH**			
STREAM Hakalaoa	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

FLOW ↓

Transect Line

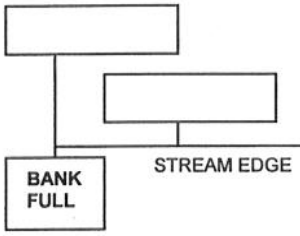
Staff Gage @ Hakalaoa = 1.05

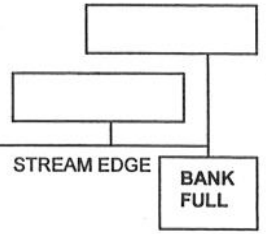
DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2





Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

DATE 16 Dec 2003	**HYDROLAB**			
TIME 1010	**WIDTH** (feet)			
OBSERVER RE/MM	**TEMPERATURE** (°C)	17.4		
REACH	**DISSOLVED OXYGEN** (mg/L)	7.40		
TRANSECT#	**CONDUCTIVITY** (mS/cm)	39.6		
DAR_CODE	**pH**	7.01		
STREAM Lalukea	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

Water Quality – At Boardwalk, below Lalukea Diversion

FLOW ↓

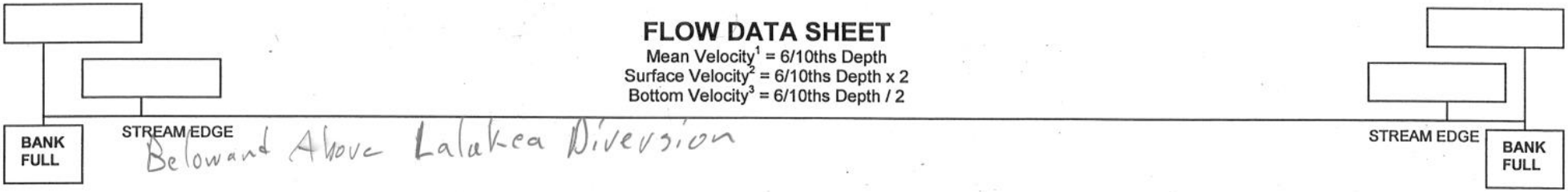
Transect Line

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

		HYDROLAB (Below D.V.)	(Above D.V.)	
DATE 16 Dec 2003				
TIME 1221	WIDTH (feet)	↓	↓	
OBSERVER RE/MM	TEMPERATURE (°C)	17.4	17.5	
REACH Just below Lalakea Div. and above Diversion	DISSOLVED OXYGEN (mg/L)	8.5	7.58	
TRANSECT#	CONDUCTIVITY (mS/cm)	37.1	37.6	
DAR_CODE	pH	6.99	6.98	
STREAM Lalakea	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

→ In Deep Pool

FLOW ↓

Transect Line

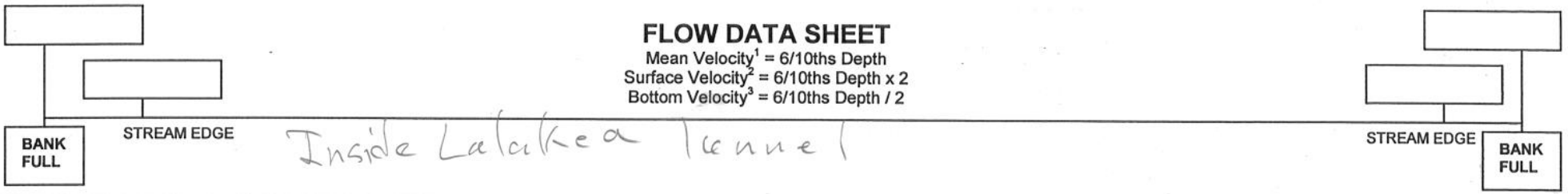
→ Conductivity = First Reading on YSI

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity [1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

DATE 16 Dec 2003	**HYDROLAB**			
TIME 1513	**WIDTH** (feet)			
OBSERVER KE/MM	**TEMPERATURE** (°C)	18.1		
REACH In Tunnel	**DISSOLVED OXYGEN** (mg/L)	9.86		
TRANSECT#	**CONDUCTIVITY** (mS/cm)	44.1		
DAR_CODE	**pH**	6.48		
STREAM Lalakea Tunnel	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

Staff Gage In Tunnel
1619 hrs. = 1.3: A.

FLOW

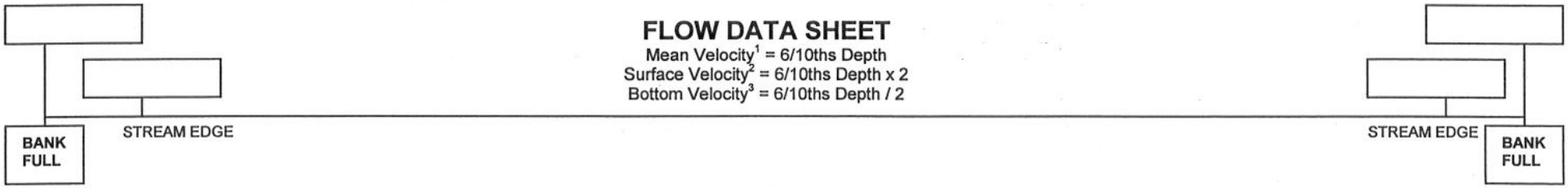
Transect Line

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

DATE 16 Dec 2003	**HYDROLAB**			
TIME 1544	**WIDTH** (feet)			
OBSERVER RE/MM/DP	**TEMPERATURE** (°C)	19.0		
REACH "At Road xing"	**DISSOLVED OXYGEN** (mg/L)	4.27		
TRANSECT#	**CONDUCTIVITY** (mS/cm)	97.2	(1st Reading)	
DAR_CODE	**pH**	6.79		
STREAM Hakalaoa	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

Staff Gage = 1.04 ft at 1544 hrs.

Putting #3 Hobo Stream Temp

Transect Line

(Gage in at 1546 hrs. at Staff Gage - reinstalling)

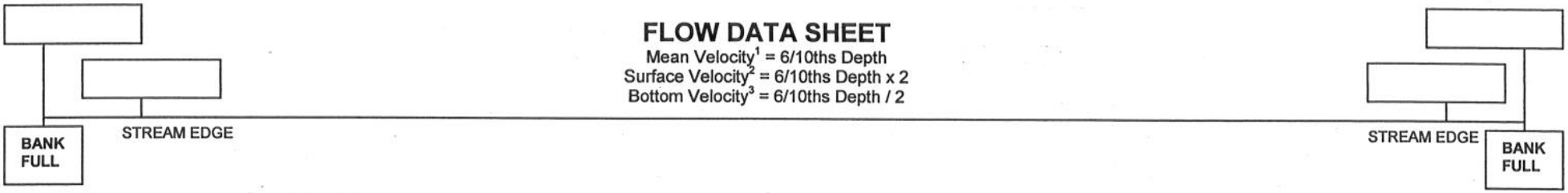
FLOW

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

DATE 17 Dec 2003	**HYDROLAB**			
TIME 0920	**WIDTH** (feet)			
OBSERVER RE/MM/DJP	**TEMPERATURE** (°C)	20.3		
REACH Above County Rd Xing	**DISSOLVED OXYGEN** (mg/L)	5.16		
TRANSECT#	**CONDUCTIVITY** (mS/cm)	125.9 → (1st Reading)		
DAR_CODE	**pH**	7.54		
STREAM Hilawe	**TURBIDITY** (NTU)			
TRIBUTARY	**TOTAL SUSPENDED SOLIDS** (mg/L)			

Staff Gage above Hilawe Rd Xing = 1.25 @ 0918 hrs.

Gage @ 1233 hrs = 1.25 ft

FLOW

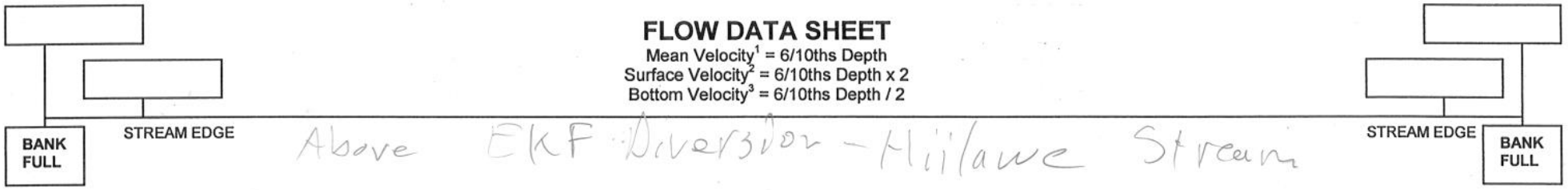
Transect Line

DIVISION OF AQUATIC RESOURCES GRH 2/02

SITE PICTURE

FLOW DATA SHEET

Mean Velocity[1] = 6/10ths Depth
Surface Velocity[2] = 6/10ths Depth x 2
Bottom Velocity[3] = 6/10ths Depth / 2



Stream Edge Width (feet)																		
Stream Edge Depth (feet)																		
Flow Rate Width (ft/sec)																		
Flow Rate Depth (ft/sec)																		
Substrate/ % Vegetation																		
% Plant Coverage																		
Mean Velocity[1] (ft/sec)																		
Surface Velocity[2] (ft/sec)																		
Bottom Velocity[3] (ft/sec)																		

DATE 17 Dec 2003	HYDROLAB			
TIME 1207	WIDTH (feet)			
OBSERVER RE/MM	TEMPERATURE (°C)	20.6		
REACH Above EKF Diversion	DISSOLVED OXYGEN (mg/L)	8.74		
TRANSECT#	CONDUCTIVITY (mS/cm)	126.9		
DAR_CODE	pH	7.63		
STREAM Hillawe	TURBIDITY (NTU)			
TRIBUTARY	TOTAL SUSPENDED SOLIDS (mg/L)			

(No staff Gage reading above EKF because of heavy rain)

FLOW

Transect Line

SITE PICTURE