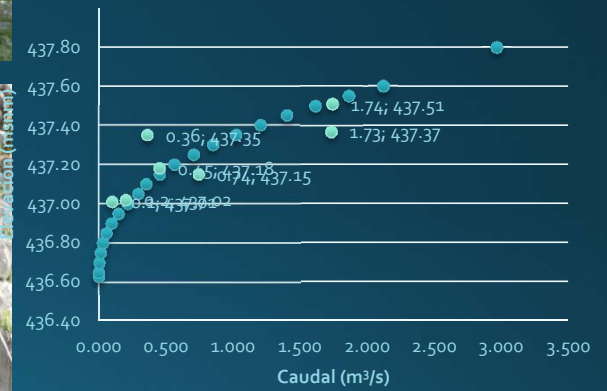


Equipos para Aforo

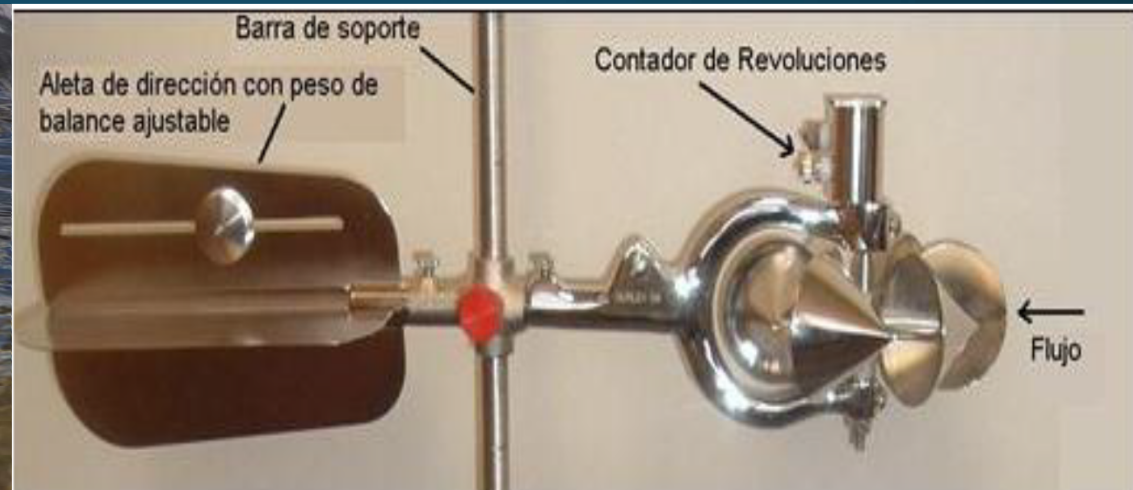
Cortesía de Consultoría, Estudios y Diseños, S.A.



Datos de caudales reales y calculado



Aforo por Vadeo- Molinete





Aforo y Batimetria en el Rio La Villa, Los Santos



Aforo desde CABLEVIA



Aforo desde Cable Via



Central Hidroeléctrica
Los Valles

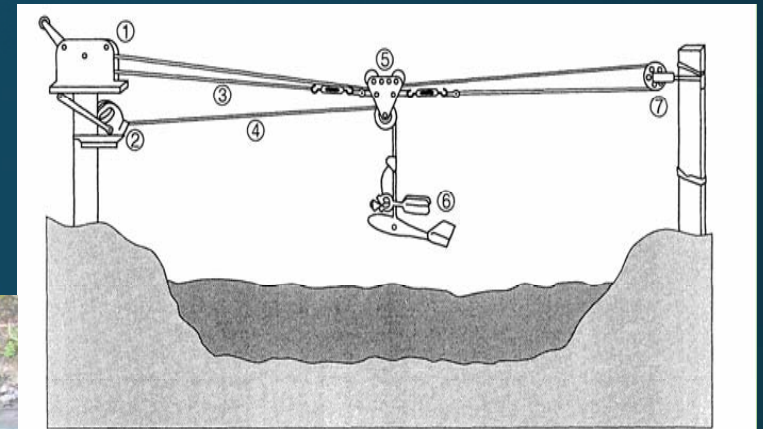


Figure 2: Schematic of the cableway system with sounding reel and current meter in use. (1) near post with pulley drive housing, (2) sounding reel, (3) cableway cable, (4) sounding reel cable, (5) traveling block, (6) current meter, and (7) tailhold on far post. (J. VanDeWater)

Central Hidroeléctrica
Esti



Central Hidroeléctrica
Los Valles





Rio Chiriqui, La Esperanza, Gualaca, Chiriquí

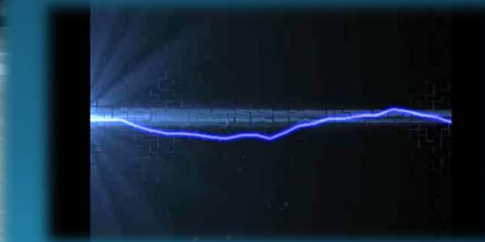


Rio Gualaca, Veladero, Gualaca, Chiriquí

Aforo desde Puente



Hidrometría

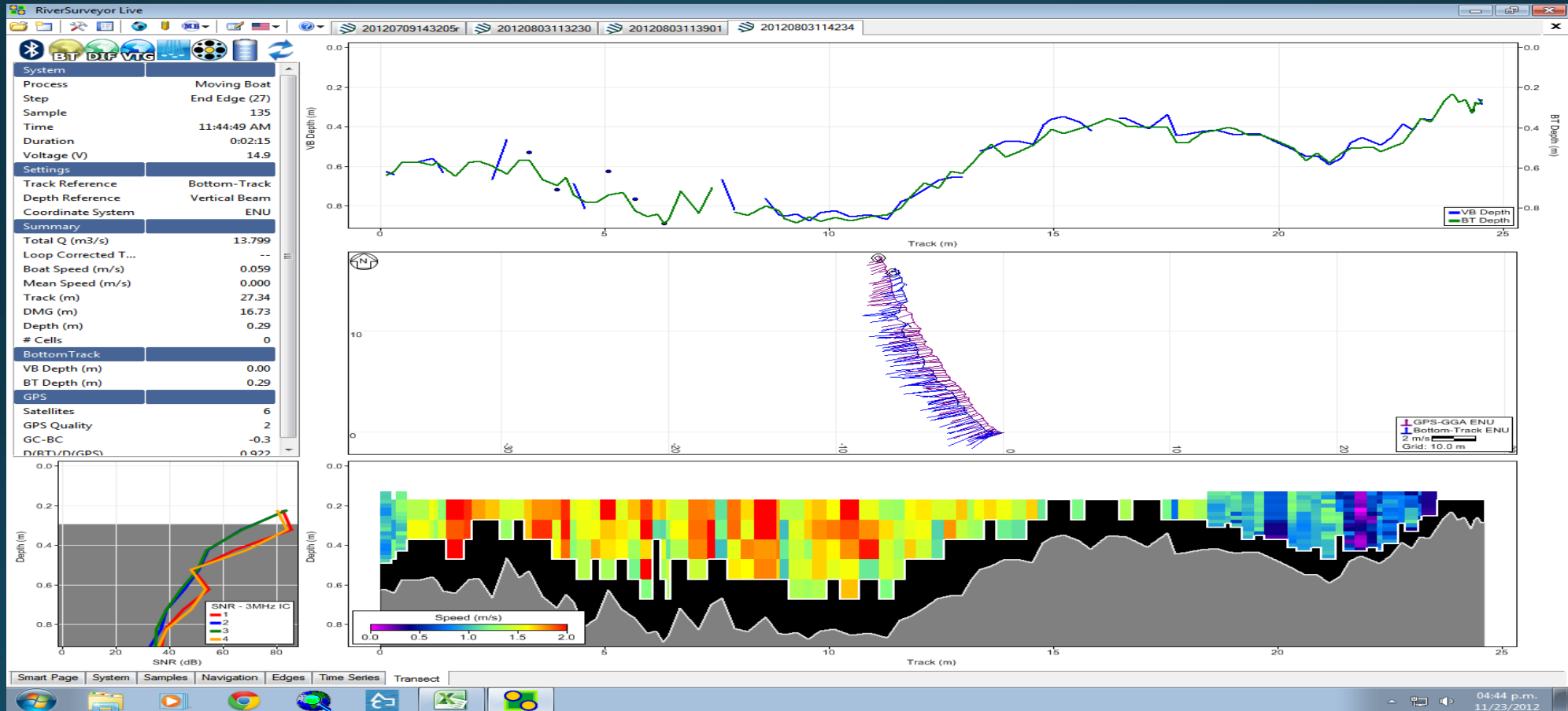


ADCP



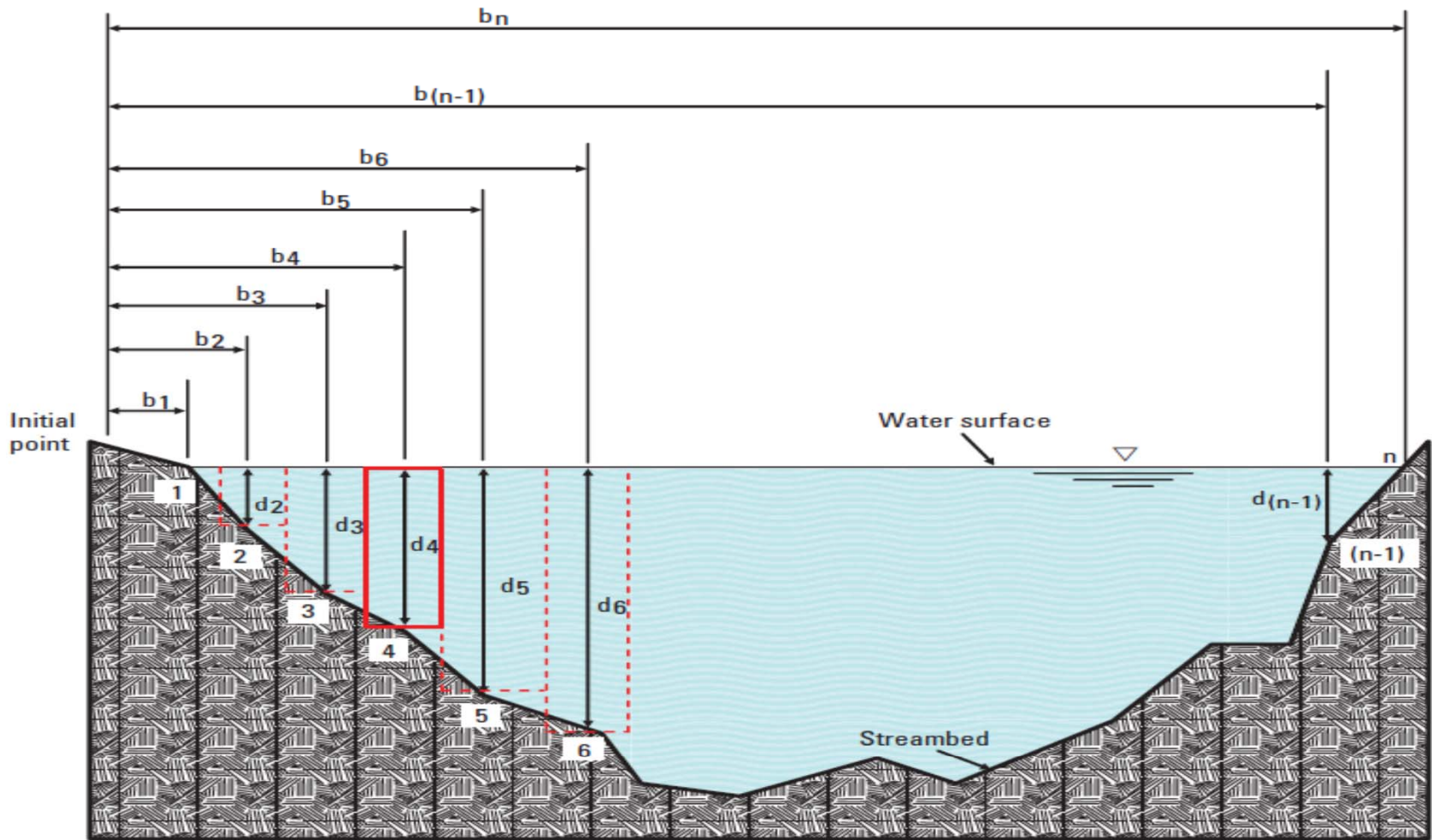
RIVERSURVEYOR S-5

Registro de aforos



Hoja de Resultados

LOCALIZACIÓN DEL AFORO		CONDICIONES AMBIENTALES															
PROVINCIA:	CHIRIQUÍ	CLIMA:	SOLEADO														
DISTRITO:	RENACIMIENTO	VEGETACIÓN:	MEDIA														
CORREGIMIENTO:	PLAZA CAISÁN Y SANTA CLARA	TEMPERATURA DEL AGUA:	20.3 °C														
SITIO DE AFORO:	TRAMO 2.00																
NOMBRE DE RIO:	RIO CHIRIQUI VIEJO																
COORDENADAS UTM-WGS84		CARACTERÍSTICAS DEL RIO:															
Norte (m)	973755.78	TIPO DE LECHO:	CANTOS RODADOS														
Este (m)	308474.74	MARGEN Izquierdo:	ROCCOSO														
Elevación (m)	944.00	MARGEN Derecho:	ROCCOSO														
DECLINACIÓN MAGNÉTICA: -1.7		MAXIMA VELOCIDAD (m/s)	1.187														
EQUIPO DE AFORO:		PROFUNDIDAD MEDIA (m)	0.55														
AFORADORES:	Erick Vallster	PROFUNDIDAD MAXIMA (m)	0.91														
	María Nuñez	ANCHO PROMEDIO (m)	21.53														
	Daniel Nieto	AREA (m ²)	11.800														
		VELOCIDAD PROMEDIO(m/s)	1.17														
		CAUDAL TOTAL (m ³ /s)	13.823														
MÉTODO DE AFORO		OBSERVACIONES GENERALES															
INSTRUMENTACIÓN:	RIVER SURVEYOR	Condiciones climáticas favorables															
PLATAFORMA:	HIROBOTTE																
PROF. TRANSDUCTOR (m)	0.07																
RESULTADOS DE AFORO																	
Aforo	Margen	Ancho sección (m)	Nombre de archivo			Área (m ²)	Velocidad media (m/s)	Ctotal (m ³ /s)	Observaciones								
			Hora	Min	Seg												
20120803																	
1	Izquierdo	22.040	11	32	30	32.000	1.154	13.858									
2	Derecho	21.810	11	39	01	11.700	1.177	13.811									
3	Izquierdo	20.730	11	42	43	11.600	1.187	13.799									
Promedio		21.527				11.767	1.173	13.823									
Dev. Estandar		0.699				0.208	0.017	0.011									
Coef. Variación		3.25%				1.77%	1.44%	0.23%									
<table border="1"> <tr> <td>Calibración de brújula</td> <td>Puntuación de calibración: 83.0009</td> </tr> <tr> <td>Resultado: Aprobado</td> <td></td> </tr> <tr> <td>EL resultado es excelente.</td> <td>Análisis del sistema</td> </tr> <tr> <td>La interferencia magnética es muy baja.</td> <td>Análisis de sistema: Aprobado</td> </tr> </table>										Calibración de brújula	Puntuación de calibración: 83.0009	Resultado: Aprobado		EL resultado es excelente.	Análisis del sistema	La interferencia magnética es muy baja.	Análisis de sistema: Aprobado
Calibración de brújula	Puntuación de calibración: 83.0009																
Resultado: Aprobado																	
EL resultado es excelente.	Análisis del sistema																
La interferencia magnética es muy baja.	Análisis de sistema: Aprobado																
Elaborado por: María Nuñez Revisado por: Erick Vallster																	



EXPLANATION

- | | |
|-----------------------------|--|
| 1, 2, 3,..... n | Observation points |
| $b_1, b_2, b_3, \dots, b_n$ | Distance, in feet, from the initial point to the observation point |
| $d_1, d_2, d_3, \dots, d_n$ | Depth of water, in feet, at the observation point |
| ----- | Boundary of partial sections; one heavily outlined discussed in text |

$$Q = \sum_{i=1}^n a_i v_i$$

$$q_i = v_i \left[\frac{(b_i - b_{(i-1)})}{2} + \frac{(b_{(i+1)} - b_i)}{2} \right] d_i, \text{ or}$$
$$= v_i \left[\frac{b_{(i+1)} - b_{(i-1)}}{2} \right] d_i,$$

where q_i discharge through partial section i ,
 v_i mean velocity at location i ,
 b_i distance from initial point to location i ,
 $b_{(i-1)}$ distance from initial point to preceding location,
 $b_{(i+1)}$ distance from initial point to next location, and
 d_i depth of water at location i .

Thus, for example, the discharge through partial section 4 (heavily outlined in figure 1) is

$$q_4 = v_4 \left[\frac{b_5 - b_3}{2} \right] d_4. \quad (4)$$

AquaCalc Pro Discharge Summary

Gage ID:

SALIDA 1

User ID:

CEDSA

Original AquaCalc Values Re-Calculated Values

Beg Time:

05/10/13 12:04

Discharge Summary

Measurement Information

Meter Information

Vertical Count:	23	End Time:	05/10/13 14:26	Measure time:	40	Meter name:	CEDSA A
Section Velocity:	0.22	Meas Time:	2.37	Measure standard:	METRIC	Meter Id:	A
Section Width:	3.40	Section Diff:	0.60	Measure equipment:	Sect.Rod	Meter type:	NonStd
Section Area:	2.77	Beg Gage height:	0.00	Sounding Weight:	NA	Meter Standard:	METRIC
Section Q:	0.60	End Gage height:	0.00	Measure Ice:	No	Meter Revs/Pulses:	1/1
Section Diff:	0.60	Beg Staff height:	0.00	Flood Measurement:	No	Meter Const.S1:	0.6704
Section Pct Err:	0.00%	End Staff height:	0.00	Flood Coef:	0.00	Meter Const.O1:	0.0009
Section Quality:	na	Estimated Q:	0.00	Max Vertical Q:	10%	Meter Const.C1:	0.0000
Section WetPerim:	3.40	Adjusted Q:	0.00	Percent Slope:	0.00	Meter Const.S2:	0.0000
Section Hyd Rad:	0.84	AquaCalc		Measure Start at:	REW	Meter Const.O2:	0.0000
Section Manning:	0.000	S/N:	0000008F5E54			Meter Const.C1:	0.0000
Section Chezy:	0.000	Firmware Version:	AQP-1V1.2.1			Meter Const.S3:	0.0000
		File Version:	V1.5			Meter Const.O3:	0.0000

Vertical Number	Distance	Total Depth	Ice Draft	Effective Depth	Observation Location	Time	Revolutions	Horz Angle	HC:VF	Method Coef	Clock Time	Measured Velocity	Obs Velocity	Vertical Velocity	Sub-section Area	Sub-Section Q	Sub-Section % of Total Q
1	0.00	0.84	0.00	0.84	E	0.00	0	0	0.00	0.00	12:04			0.00	0.06	0.00	0.00%
2	0.15	0.84	0.00	0.84	0.2	41.03	14	0	1.00	1.00	14:04	0.23	0.23				
2	0.15	0.84	0.00	0.84	0.6	41.43	12	0	1.00	1.00	12:31	0.20	0.20				
2	0.15	0.84	0.00	0.84	0.8	41.05	12	0	1.00	1.00	13:34	0.20	0.20	0.20	0.13	0.03	5.00%
3	0.30	0.84	0.00	0.84	0.2	40.48	14	0	1.00	1.00	14:05	0.23	0.23				
3	0.30	0.84	0.00	0.84	0.6	42.25	12	0	1.00	1.00	12:33	0.19	0.19				
3	0.30	0.84	0.00	0.84	0.8	40.39	13	0	1.00	1.00	13:37	0.22	0.22	0.21	0.13	0.03	5.00%
4	0.45	0.84	0.00	0.84	0.2	40.71	15	0	1.00	1.00	14:06	0.25	0.25				
4	0.45	0.84	0.00	0.84	0.6	42.59	14	0	1.00	1.00	12:36	0.22	0.22				
4	0.45	0.84	0.00	0.84	0.8	42.66	13	0	1.00	1.00	13:38	0.21	0.21	0.22	0.13	0.03	5.00%
5	0.60	0.84	0.00	0.84	0.2	41.79	15	0	1.00	1.00	14:07	0.24	0.24				
5	0.60	0.84	0.00	0.84	0.6	40.36	14	0	1.00	1.00	12:37	0.23	0.23				
5	0.60	0.84	0.00	0.84	0.8	40.73	13	0	1.00	1.00	13:39	0.21	0.21	0.23	0.13	0.03	5.00%
6	0.75	0.84	0.00	0.84	0.2	42.22	16	0	1.00	1.00	14:08	0.25	0.25				
6	0.75	0.84	0.00	0.84	0.6	40.41	13	0	1.00	1.00	12:39	0.22	0.22				
6	0.75	0.84	0.00	0.84	0.8	42.31	14	0	1.00	1.00	13:40	0.22	0.22	0.23	0.13	0.03	5.00%
7	0.90	0.84	0.00	0.84	0.2	41.99	17	0	1.00	1.00	14:10	0.27	0.27				
7	0.90	0.84	0.00	0.84	0.6	40.21	13	0	1.00	1.00	12:40	0.22	0.22				

AquaCalc Pro Discharge Measurement Summary

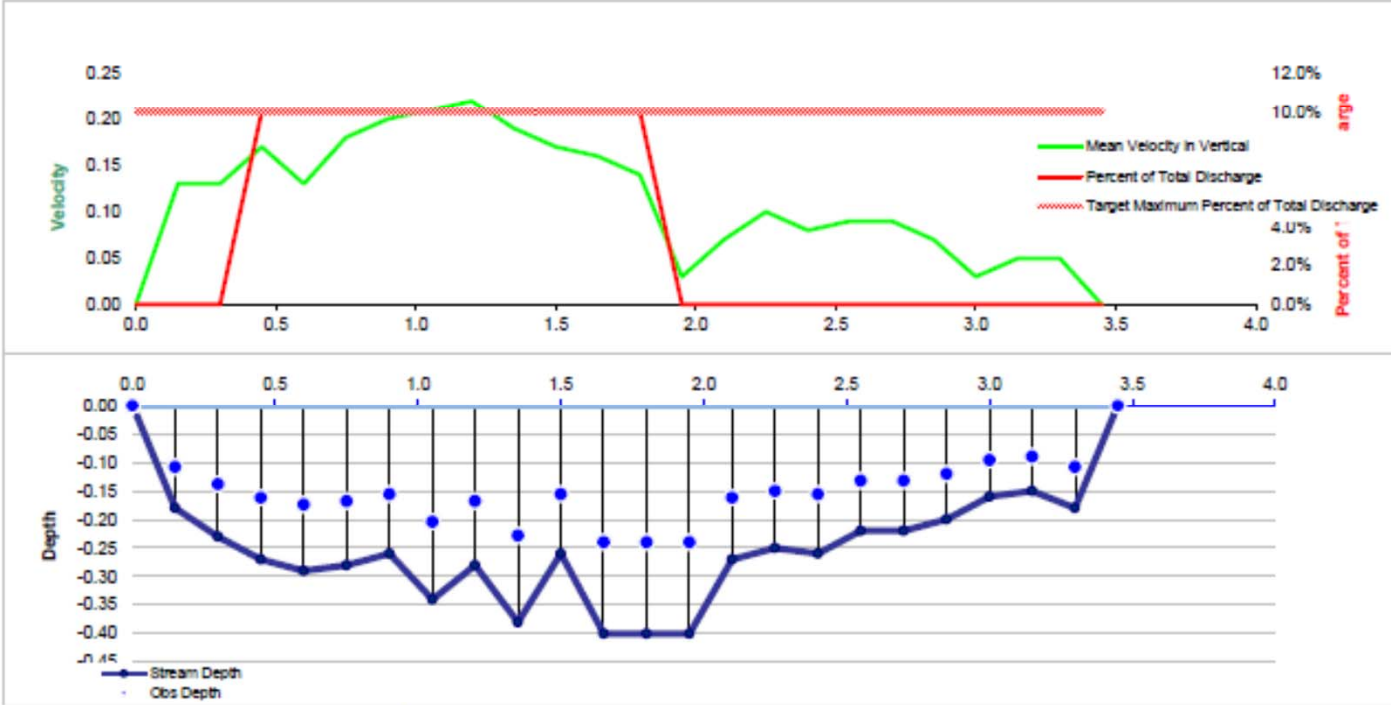
Station: **MELO MARZO 2013**

● Imported Values

CEDSA

○ Re-Calculated Values

3/27/13 11:33



Measurement Information

Measure standard:	METRIC	Max Vertical Q:	0.10
Measure equipment:	Sect.Rod	Percent Slope:	0.00
Sounding Weight:	NA	Measure Start at:	REW
Measure Ice:	No	Vertical Count:	24.00
Flood Measurement:	No		
Flood Coef:	0.00		

Section Summary

Section Velocity:	0.11	Section Pct Err:	0.00
Section Width:	3.45	Section Quality:	na
Section Area:	0.88	Section WetPerim:	3.86
Section Q:	0.10	Section Hyd Rad:	0.23
Section Diff:	0.10	Section Manning:	0.00