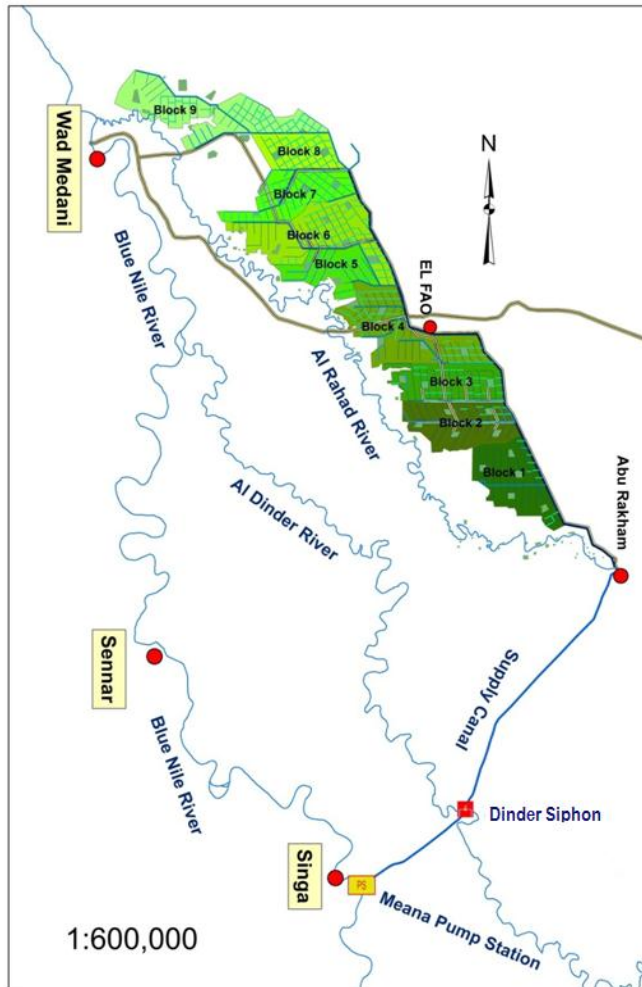


Calibration of Some Hydraulics Structures - RAS



By: Associate Prof. Abu Obieda B. Ahmed

Rahad Agricultural Scheme

- **Commissioned** :Seventies of last century
- **Area** :300,000 – 350,000 fd
- **Water consumption** :1.0 -1.5 bcm (including drinking).
- **Water Sources** : RR + BNR

- **I&D System Components:**

- Maina pumps.
- Dinder syphon.
- Outfall
- Link canal
- Abu Rakhm Barrage
- K22, k36, k76 & K101 Head Regulators.
- Irrigation & Drainage Networks including main canal.



Background

- **Sponsor:** RIRP/OPEC – Local component
- **Duration:** April – November, 2015
- **Amount:** 626,000 SDG

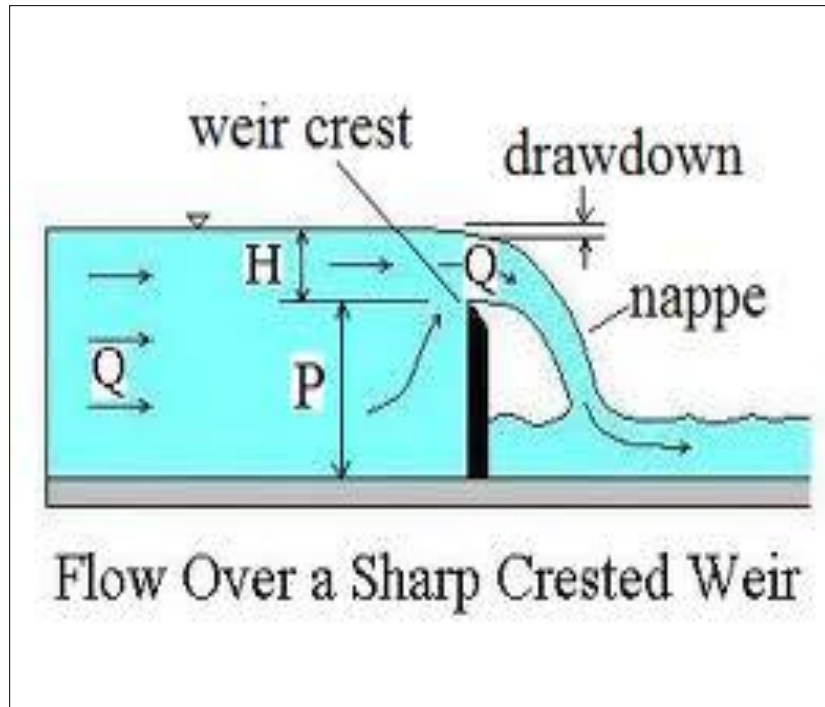
item	Description	April				May				June				July				August				Sept.				Oct.				Nov.			
		w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4
1	Reconniaince																																
2	office data collection																																
3	inception report																																
4	Field measurements																																
5	Field trips																																
6	Data analysis																																
7	installation of WL gauges																																
8	draft report																																
9	one-day seminar																																
10	final report																																
11	training course																																

Components

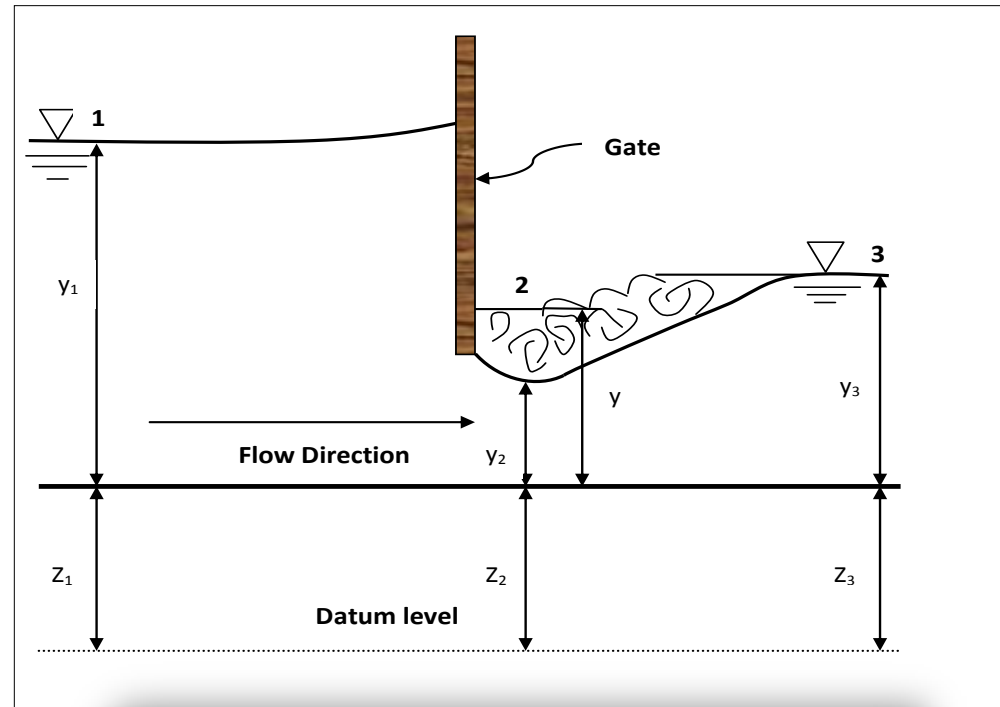
- Calibration of 20 structures.
- Erection of 40 gauges.
- Organizing training course.



Theory & Concept



$$Q_{th.} = B \times \sqrt{2g} \times H^{1.5}$$

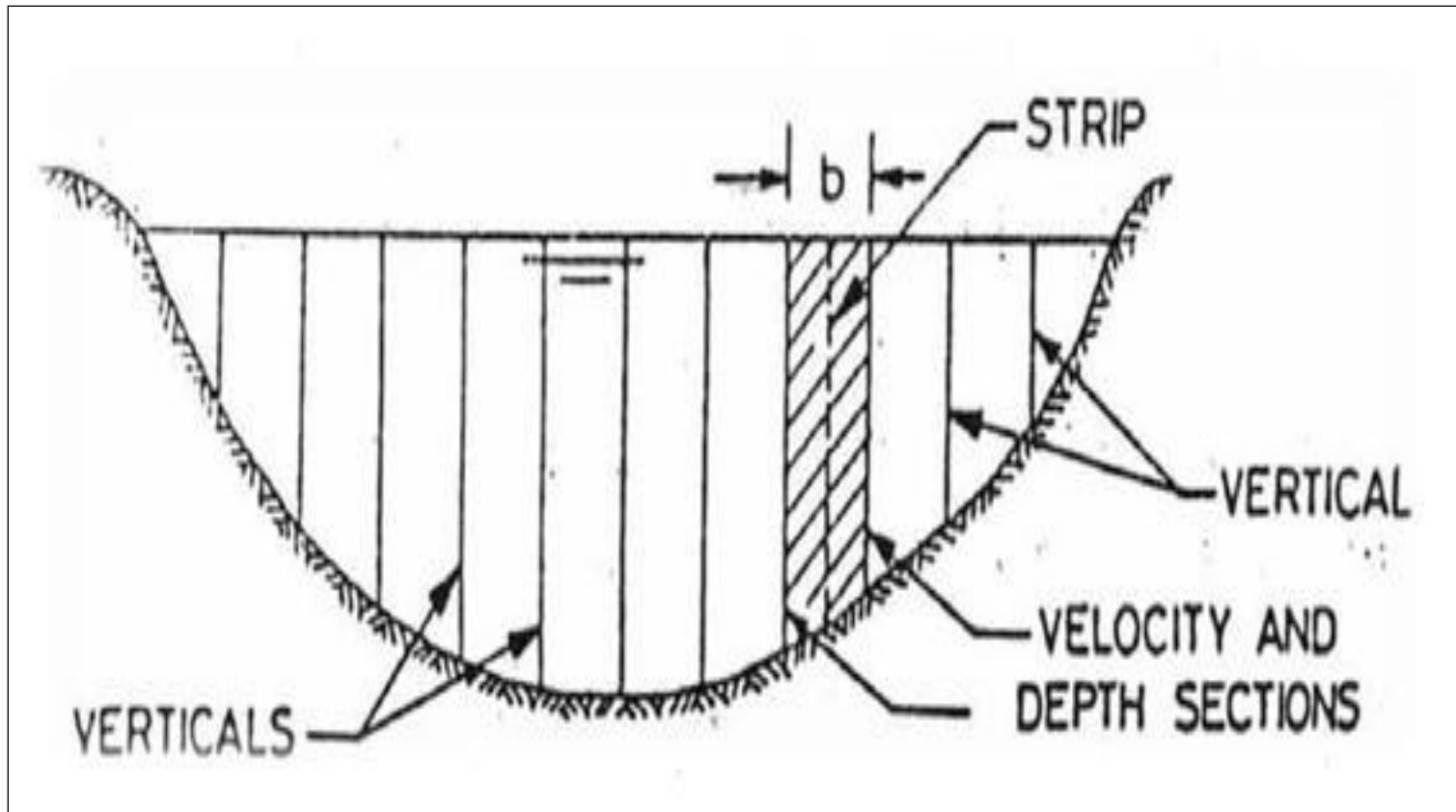


$$Q_s = C_d \times O \times B \times \sqrt{2g(h_u - h_d)}$$

Linear Regression:

- Gates $\{Q\sqrt{h} = C \cdot O\}$.
- Weirs $\{\text{Log}(Q) = \text{Log}(K) + n\text{Log}(H)\}$.
- Q-H relationship $\{\text{Log}(Q) = \text{Log}(a) + b\text{Log}(H - H_0)\}$.

Method

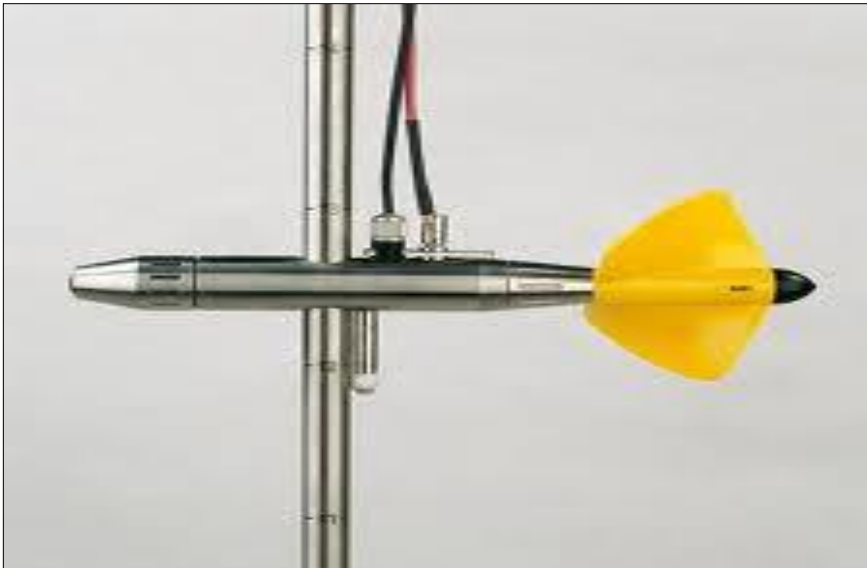


$$q = b \times \left(\frac{d_1 + d_2}{2} \right) \times \left(\frac{v_1 + v_2}{2} \right)$$

$\rightarrow Q = \sum_{i=1}^n q_i$

Equipment & Devices

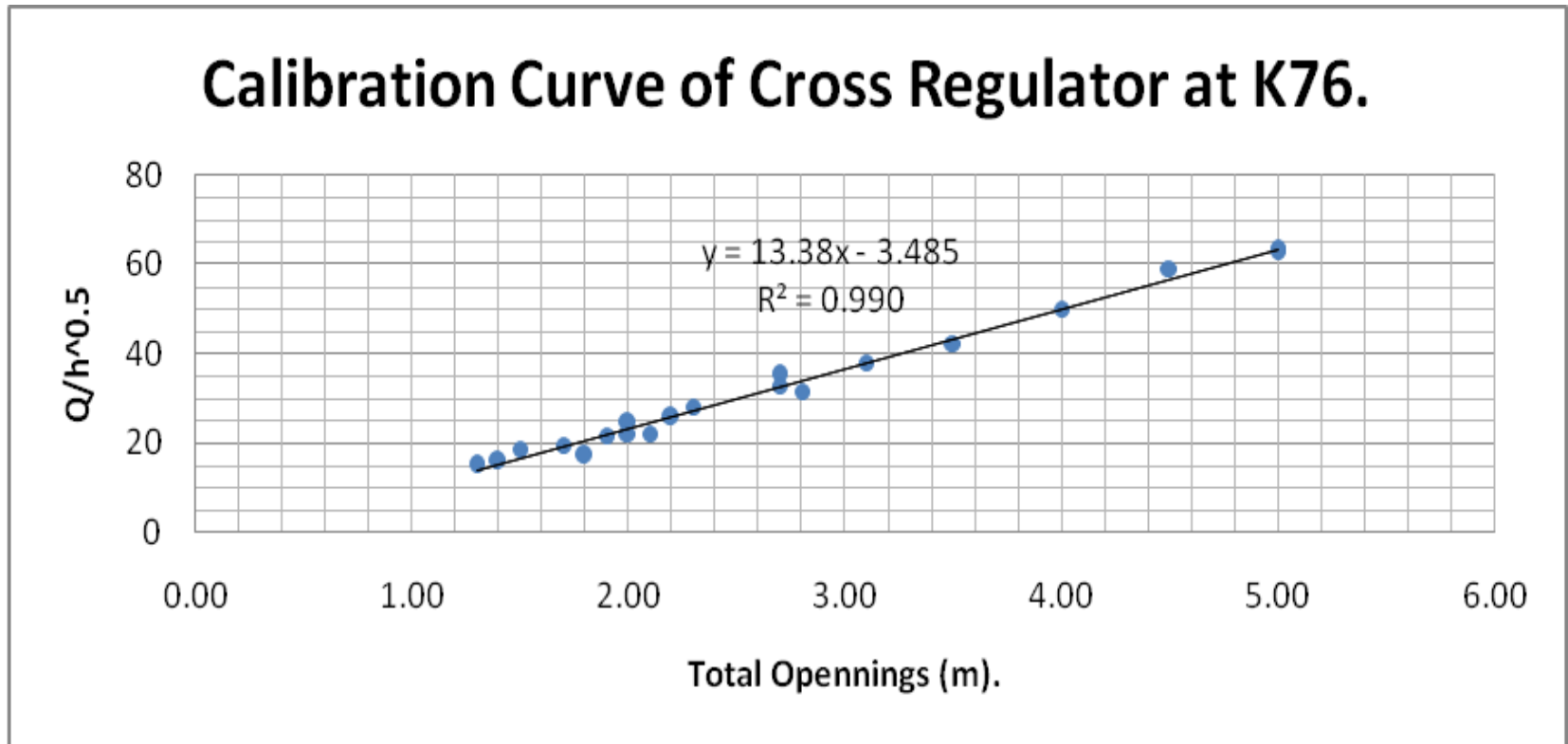
- Propeller-type Current-meter its accessories.
- Ordinary level & its accessories.
- GPS.
- Rubber boat and its accessories.



$$v = 0.3261n - 0.0063$$



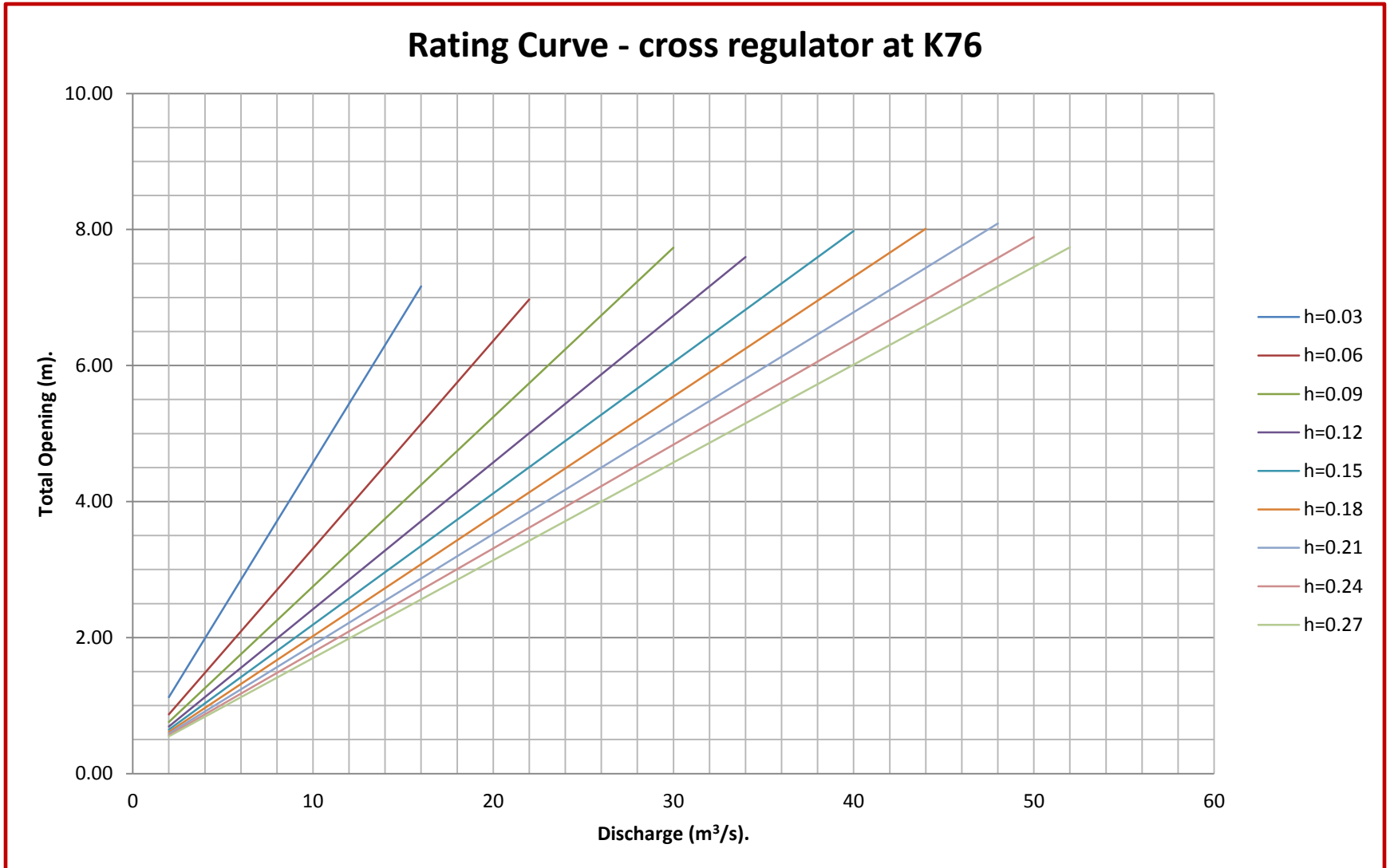
Findings



$$Q = 13.38(O_T - 0.260)\sqrt{h}$$

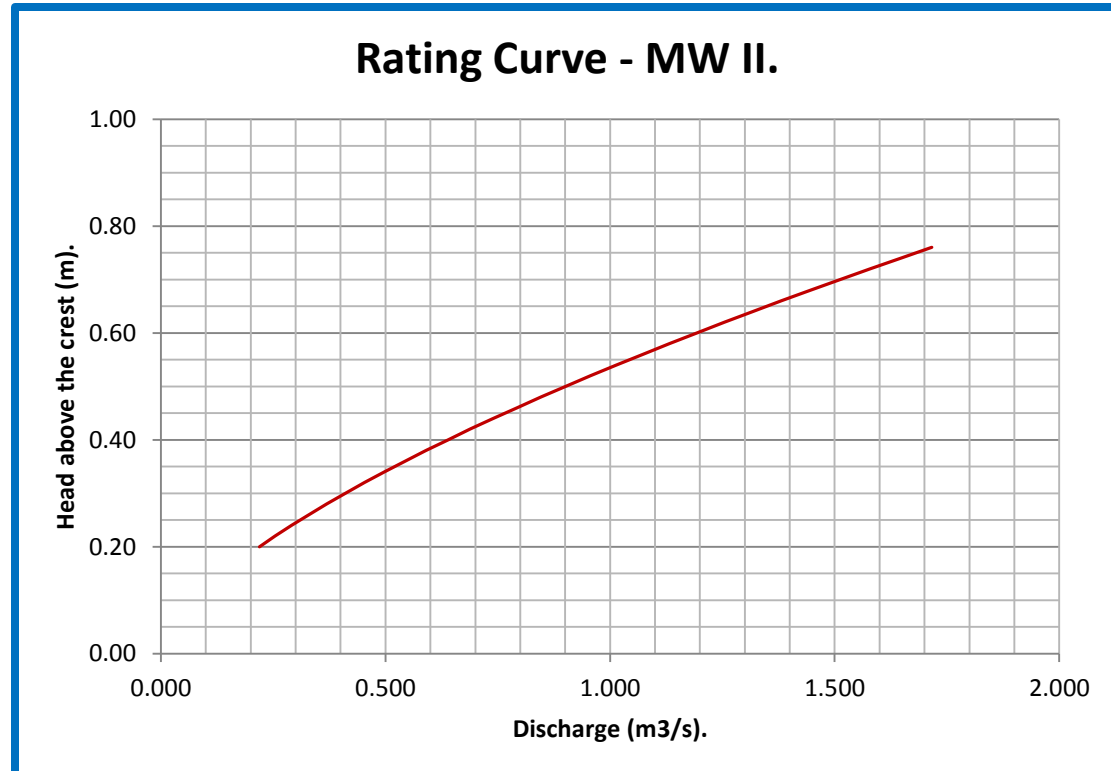
$$(0.12 \leq h \leq 1.03 \text{ \& } O_T > 0.26 \text{ m})$$

Rating Curve (sluice gate)



Rating Curve & Table (MW II)

H (m)	Q (m ³ /s)	H (m)	Q (m ³ /s)
0.20	0.220	0.50	0.901
0.22	0.254	0.52	0.957
0.24	0.291	0.54	1.014
0.26	0.329	0.56	1.072
0.28	0.369	0.58	1.132
0.30	0.410	0.60	1.193
0.32	0.453	0.62	1.254
0.34	0.497	0.64	1.317
0.36	0.543	0.66	1.381
0.38	0.590	0.68	1.446
0.40	0.639	0.70	1.512
0.42	0.689	0.72	1.579
0.44	0.740	0.74	1.647
0.46	0.792	0.76	1.716
0.48	0.846	0.78	1.786



Thanks for your Attention



?s are highly Appreciated