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Sec: "C"

Dep: BE (Civil)

Assignment of Sessional of hydraulic structure.

Submitted To: Engr. Adeed Khan.

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Q: Establish the Relation Ship Stage discharge  
Relation Ship for a concrete rectangular box  
Culvert use suitable data for your own

Choice: ?  
and also describe load on bridge and  
foundation due to Scour and their working  
mechanism. ?

Ans: → the stage discharge Relation Ship  
is based on upon the Relation Ship  
between Stream water depth "stage"  
and discharge at a cross section.  
the applied method at the cross-section  
to Estimate discharge over a wide  
range of value of discharge ("low flow -  
to peak flow") as known as are-velocity method.

Establish the stage discharge (head water level) discharge relationship for a concrete rectangular box, using own data.

$b = \text{width} = 1.2 \text{ m}$        $\text{slope} = 1 \text{ in } 100 \text{ m}$

$h = \text{height} = 0.6 \text{ m}$        $n = 0.013$

$L = \text{length} = 30 \text{ m}$

Solution:  $H/D \leq 1.2$  for  $H < 0.6 \text{ m}$  free flow open channel condition previl and assuming that a steep slope entry gives entrance control. i.e. the depth at the inlet is critical for  $H = 0.2 \text{ m}$  ignoring  $Y_c =$

$Y_c = \left(\frac{2}{3}\right) \times 0.2 = 0.133 \text{ m}$  and  $V_s = 1.142 \text{ m/s}$ . This gives the critical slope  $(V_s)^2 / 12^{4/3} = 0.00124$ . therefore the slope of the culvert is mild and hence subcritical flow analysis gives the following result.

$$Q = 1.2 Y_0 \left( 1.2 Y_0 (1.2 + 2 Y_0) \right)^{2/3} (0.001)^{1/2} / 0.013$$

$$Q = 0.92 Y_0 (1.2 Y_0) (1.2 + 2 Y_0)^{2/3} \quad \text{--- (i)}$$

$Y_0 \text{ (m)}$	$Q \text{ (m}^3\text{/s) (equation)}$	$Y_c \text{ (m)}$
0.2	0.105	0.124
0.4	0.451	0.243
0.6 (=D)	0.785	0.352

at the inlet flow reach

$$H = Y_0 + \frac{v^2}{2g} + K_e \frac{v^2}{2g} \quad \text{--- (ii)}$$

$H(0.6) = 0.72 = Q = 2.08 (H - 0.57)^{1/2} \quad \text{--- (iv)}$

$Y_0 = 0.6$

and also describe load: bridge. foundation (3)

Scour of ~~the~~ <sup>due to scour: ?</sup> sediment around bridge foundation by the stream is the most significance contributing factor for bridge failure. the Scour failures tends to occur without prior warning and have led to fatalities and economic loss every year.

A significance amount of work has been conduct on bridge Scour. Such effort can be broadly two major categories namely ① Science driven. ② Engineering driven. the ① Science driven research focuses on understanding the Scour mechanism and aim to explained the cause of Scour due to different factor. ② Engr driven focuses on the estimation monitoring and counter measure of bridge Scour

failure cause bridge Scour.