

Name: Muhammad Hamza

Class: BE(C)

Sec: A

ID # 7692

Subject: Hydraulics Structure

Assignment # sessional

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Topic : 01

Establish the stage discharge relationship for a concrete rectangular box culvert use suitable data of your own choice.

As

$$V = \sqrt{2g\Delta h} = 8.02 \sqrt{\Delta h}$$

$$Q = AV$$

$$V = 8.02 \sqrt{\Delta h}$$

Velocity head, h (ft)	Velocity (ft/s)
0.05	1.79
0.10	2.54
0.15	3.11
0.20	3.59
0.25	4.01
0.30	4.39
0.35	4.74
0.40	5.07
0.45	5.38
0.50	5.67

measurements: Computation of discharge using velocity head rod (VHR)

Distance along section (ft)	depth of flow using VHR		Δh (col(3) - col(2)) (ft)	Velocity		mean depth from cd (2) (ft)	width from col (1) (ft)	Area col(7) * col(8) (ft ²)	Discharge col(9) * col(8) (ft ³ /sec)
	cutting edge (ft)	float edge (ft)		At point (ft/s)	Average for section (ft/s)				
3.5	0	0	0	0					
4.5	1.35	1.4	0.05	1.8	0.9	0.68	1.00	0.68	0.61
4.9	2.75	2.85	0.1	2.5	2.15	2.05	0.4	0.82	1.76
5.9	3.05	3.32	0.27	4.2	3.35	2.9	1.00	2.9	9.72
7.4	3.01	3.25	0.24	3.9	4.05	3.03	1.5	4.54	18.39
7.9	2.18	2.31	0.13	2.9	3.40	2.6	0.5	1.3	4.12
10.7	0.78	0.83	0.05	1.8	2.35	1.48	2.8	4.14	9.73
12.3	0	0			0.9	0.39	1.6	0.62	0.56
Total is								15.00	45.19

$$Q = \frac{1.486 A R^{2/3} S^{1/2}}{n}$$

$$K_d = \frac{Q}{S^{5/2}} = \frac{1.486 A R^{2/3}}{n}$$

Topic : 2

Describe loads on bridge foundation due to scour and their working mechanism -

Answer: -

Scour is an erosional process that can occur in rivers due to the interaction between any type of structure located underwater and the river flow. It is by far the leading cause of bridge failure worldwide, resulting in significant direct losses and disruption to road networks in terms of transportation operation, petrol etc.

Bridge scour is the removal of sediment such as sand and gravel from around bridge abutments or piers. Scour, caused by swiftly moving water, can scoop out scour holes, compromising the integrity of a structure.

* Working Mechanism: -

Scour of sediments around bridge foundations by the stream is the most significant contributing factor for bridge failure. The scour failures tend to occur without prior warning and have led to fatalities and economic loss every year -

Bridge scour has been an important subject of interest to people from the time of earliest

civilizations. These efforts can be mainly divided into two categories, i.e., driven by science or engineering.

The former aims to find the mechanism of scour process from an academic perspective, while the latter is important to provide guidance for practice -