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SEC A

SUBJ Hydraulic Structures

Submitted to Engr. Adeed

ASSIGNMENT

Stage discharge relationship for a concrete rectangular Box culvert!"

Given data;

→ width = 1.2m

→ Height = 0.6m

→ Length = 30m

→ slope = 1 in 1000

→ Manning's = n = 0.013

→ head water level for investigation = 0.3

solution

$H/D \leq 1.2$

For $H < 0.6m$

* the depth at the inlet is critical. For $H = 0.2m$

$$y_c = \frac{2}{3}(0.2)$$

$$= 0.133m$$

$$v_c = 1.142 m s^{-1}$$

→ Critical slope $= (vn)^2 / R^{4/3}$

by putting value we get-

$$(vn)^2 / R^{4/3} \Rightarrow 0.00424.$$

* The slope of the culvert is mild and here subcritical flow analysis gives the following result.

$$Q = 1.2y_0 [1.2y_0 / (1.2 + 2y_0)]^{2/3} (0.001)^{1/2} / 0.013$$

$$Q = 2.92y_0 [1.2y_0 / (1.2 + 2y_0)]^{2/3}$$

Loads on Bridge foundation due to scour and their working mechanism:

scour of sediments around bridge foundations by the stream is the most significant contributing factor for bridge failures. The scour failures tend to fatalities and economic loss every year a significant amount of work has been conducted on bridge scour.

* scour cause lowering the river bed level around pier and destabilize the foundation.
* water flows faster around piers and abutments making them susceptible to local scour at bridge openings, contraction scour through an opening that is narrow than the channel upstream from the bridge.
Degradation scour occurs both upstream and downstream from a bridge over large areas over long periods of time, this can result in lowering of stream bed.

mechanism:

vortex system formed in front of the obstruction, and has the form of horseshoe River flow and boundary condition give rise to the energy of the vortex incresed Shear sediments transport.

* Stream channel instability resulting in river erosion and changing angles of attack can contribute to bridge scour. Debris can also have a substantial impact on bridge scours in several ways. A build up of material can reduce the size of the waterway under a bridge causing contraction scour in the channel. A build up of the debris on the abutments can increase the obstruction area and increase local scour. Debris can deflect the water flow, changing the angle of attack, increasing local scour. Debris might also shift the entire channel around the bridge causing increased water flow and scour in another location.