HEAD AND DISCHARGE RELATIONSHIP FOR SHARP-CREST DRAINPIPE WEIRS

THESIS SUBMITTED

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ABSTRACT

This study was performed to test the use of a sharp crested weirs in circular drainpipes to measure discharge and to develop a head-discharge relationship for these weirs. The drainpipe weirs of appropriate sizes were used for the available pipe diameters. A horizontal sharp crested weir installed at the outfall of a subsurface drain into a sump or a manhole was simulated in the laboratory of CEWRE.

After taking observations in the laboratory, a relationship between head and discharge was developed for the horizontal crest assuming a pipe slope of 0.1 %. Regression analysis was performed to find a mathematical equation on the observed data. The quality of fit was found to be sufficiently accurate i.e. $r^2 > 0.99$.

The weir was also tested on tilted positions (5 mm and 10 mm from horizontal) and for different pipe slopes to check the sensitivity of the H vs Q relationship to these parameters. The head-discharge relation for drainpipe weir was also checked for submerged condition. The water surface profiles were also recorded in the pipe for 0.1 % slope to check extent of observation caused by the weir.

The result of the study show that the weirs are useful in discharge measurement. A general equation resulting from the regression analysis is proposed.