

## C615014 : MAJOR CIVIL ENGINEERING

KEY WORD: HYDRAULICS / VERTICAL SLUICE GATES / HYDRAULIC MODEL /

FLOW CONTRACTION

ADISAK YAWAPAT : HYDRAULICS OF FLOW UNDER SLUICE GATES BY

HYDRAULIC MODELS. THESIS ADVISOR : Assoc.Prof.Dr.CHAIPAN

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This thesis presented the results of an experimental study on the hydraulics of free flow under sluice gates. The flow was contracted in 4 different patterns namely 1-side contraction due to the gate ; 2-side contraction due to the gate and the elevated invert ; 3-side contraction due to the gate and contraction on 2 sides ; and 4-side contraction due to the gate, elevated invert and contraction on 2 sides. The effects of each type of flow contraction were investigated on the flow rate (Q), the coefficient of discharge (Cd) and flow patterns.

The study concluded that each type of flow contraction had some effects on the flow under gates. Expansion of downstream channel had little effect upon the flow due to the fact that it was free flow condition. According to the theoretical formula  $Q = C_d A_o \sqrt{2gH}$  when  $A_o$  = area of gate opening,  $H$  = head above the gate, the value of  $C_d$  is approximately 0.6 . However this study found that the value of  $C_d$  varied between 0.48-0.74 . In addition if a more general formula  $Q = kH^x$  was used, it was found that the exponent  $x$  varied between 0.39-0.76 . The value of  $C_d$  were computed and varied with the value of  $x$ . If the exponent  $x$  was low, the value of  $C_d$  was high and vice versa.

The analysis was made on the relationship of  $C_d$  computed from the formula  $Q = C_d A_o \sqrt{2gH}$  with the ratio  $(H/G)$  when  $G$  = height of gate opening. It was found that the value of  $C_d$  was low at the low value of  $(H/G)$  and increased with  $(H/G)$ . There was a tendency that the value of  $C_d$  increased to a constant value with a very high value of  $(H/G)$ . From the experiment, the value of  $C_d$  was about 0.45-0.75 for the value of  $H/G$  0-25.

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