UNIVERSITI TEKNOLOGI MARA

CRITICAL BED LOAD TRANSPORT ZONES IN THE PRESENCE OF STABLE CLAST

MOHD RIZAL BIN SHUKOR

MSc

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MOHD RIZAL BIN SHUKOR

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Mohd Rizal bin Shukor
Student's I.D. No.	:	2009772475
Programme	:	Master of Science (EC 780)
Faculty	:	Civil Engineering
Title	:	Critical Bed Load Transport Zones in the Presence of Stable Clast
Signature of Student	:	.....
Date	:	April 2014

ABSTRACT

Protruding clast that having low relative submergence was among the vital morphological features found on the mountain rivers in Malaysia. The protrusion of these grains is expected to have significant influence on the turbulent flow field and bed load transport. A field study was conducted to examine the turbulent properties of the flow around naturally formed protruding cobbles at mountain river reach namely Rasil River. The application of Acoustic Doppler Velocimeter (ADV) was adopted in this study as to measure three-dimensional velocity components (stream-wise, vertical and span-wise) at high frequency measurement. Bed shear stress which is the fundamental variable to link flow conditions to bed load transport was used to characterize the turbulent flow field in this study. Overlay Analysis in GIS was used as a tool to graphically evaluate performance of bed shear stress in bed load transport study. The initial result from bed shear stress reveals that protruding cobble had significantly modified the turbulent flow structure. High magnitude of bed shear stress that corresponds with the prevalent bed load transport activities was found to be concentrated on lower bed elevation zone. On the other hand, sheltering effect existed on the zone behind the protruding cobble thus result in weak or zero bed load transport actions. The derived critical bed load transport zones then were further confirmed by the zonation of sweeps and ejections event from turbulent bursting cycle. The most transported bed load was found to be coincided with high magnitude of sweeps and ejections events. It is evident that river hydraulic survey needs to be done first to identify the most transported bed load zones before deploying bed load sampler to get an accurate measurement of bed load transport. Deploying the sampler on the right locations may help to reduce error in measurement so that river bed erosion can be monitored wisely.

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