STUDI ALTERNATIF PENGENDALIAN BANJIR SUNGAI TONDANO DI KOTA MANADO

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ABSTRACT

Tondano River, along with its tributary Tikal a River, is very potential to cause flood in Manado City. It is recorded that flo od occurred three times during the recent decade, that is in 1996, 2000 and 2005 y ear. In order to overcome the flood occurrences, the controlling effort that can be applied soon in the field is required through short term flood control plan usin g structural measures. To ensure the effective controlling effort, the river' s most critical sections should be determined for construction priority purposes and t he available alternative plans should be studied to define the best plan based bot h on the hydraulics feasibility and their effects on the river uses.

The study is carried out through the 5 year return period flood routing using the version 3.1 HEC-RAS software. The 5 year flood hydrograph is obtained using Nakayasu Synthetic Unit Hydrograph by elabora ting design rainfall derived from partially series rainfall data frequency analy sis of Tondano and Tikala watersheds. Flow simulation is conducted in steps by modeling the Tikala River as the lateral inflow. The first simulation is carr ied out for existing condition through steady flow analysis using bankfull capacit y discharge to define the flood characteristic and critical sections. The second s imulation is carried out for 5 year return period flood through unsteady flow anal ysis on each flood control plan to study the hydraulics feasibility. The study conducted herein is elaborated on water surface profile and velocity due to the pl ans effectiveness to carry off the flood discharge safely as well as the effect on river uses.

Based on the existing condition simulation, result shows that the river's most critical sections are the right bank of RS 44 (sta 2+799) to RS 46 (sta 2+953), the left bank of RS 72 (sta 4+492) to RS 73 (sta 4+515) , and the left bank of RS 84 (sta 5+233) to RS 88 (sta 5+642) respectively. The result of flood control simulation indicates that there are no significant differences on velocity among plans, but there are disparities on the capacity to carry off flood discharge safely with no overtopping. For the normalization plan, th e overtopping of 2.761 m in overall length is occurred and there is 1.150 m le ngth of critical section, whereas both for dike plan and combination of dike and norm alization plan, no overtopping are occurred but 783 m length of critic al sections are still existed. Revised plans for dike and combination of dike and normalization are equally effective in carrying off flood discharge securely, but have different effects on water utilization during low flow period. At maximu m tidal elevation of +2, 50 m, backwater occurs to upstream as far as 3.514 m on d ike plan compared to 4.847 m on combined dike and normalization plan, while th e latter has more adverse effect on the fresh water supply due to sea water i ntrusion. Referring to the study result, the best alternative is revised dike plan .