

PERFORMANCE EVALUATION OF THE DRAINAGE NETWORK SYSTEM IN THE AIR PUTIH RO-RO PORT AREA

Student Name : Doni IRANDA
Student ID Number : 4204221520
Supervisor : Armada, S.T., M.T.

ABSTRACT

The Air Putih Ro-Ro Port is a transportation area that plays an important role in supporting passenger mobility and goods distribution. An effective drainage system is required to prevent inundation that may disrupt port operations. This study aims to identify the existing condition of the drainage network, analyze the channel capacity against runoff discharge, evaluate the performance of the drainage network, redesign a more structured drainage system directed to a single main outlet, and estimate the construction cost of the proposed drainage network. The methods employed in this study include hydrological and hydraulic analyses. The design rainfall was determined using the Log Normal distribution method, rainfall intensity was calculated using the Mononobe method, runoff discharge was estimated using the Rational Method, and channel capacity was analyzed using Manning's equation. The data used consisted of annual maximum rainfall data, existing channel dimensions, topographic data, and land-use data within the port area. The results indicate that the 10-year return period design rainfall obtained from the Log Normal method is 143.296 mm. The evaluation of the existing drainage network shows that all drainage channels have capacities greater than the runoff discharge ($Q_{\text{channel}} > Q_{\text{runoff}}$), with capacity percentages ranging from 101.59% to 1,989.28%, indicating that all channels are in a safe condition. The redesigned drainage network provides a more integrated system directed to a single main outlet. The estimated total construction cost of the proposed drainage network is IDR 540.082.489,00.

Keywords: Drainage Network, Air Putih Ro-Ro Port, Runoff Discharge, Rational Method, Manning Equation, Drainage Planning.