ABSTRAK

Sistem drainase merupakan prasarana penting dalam menjaga fungsi jalan dengan mengalirkan limpasan air hujan secara efektif. Ketidaksesuaian kapasitas saluran dengan debit limpasan dapat menyebabkan genangan dan mempercepat kerusakan perkerasan jalan. Penelitian ini bertujuan mengevaluasi debit banjir rencana, kapasitas hidrolika saluran drainase eksisting, tingkat kerusakan jalan menggunakan metode *Surface Distress Index* (SDI), serta memberikan rekomendasi teknis pada ruas Jalan Simp. Santur–SMEA Talawi Kota Sawahlunto. Penelitian menggunakan metode kuantitatif dengan analisis hidrologi Metode Rasional dan analisis hidrolika menggunakan Persamaan Manning. Kondisi jalan dinilai melalui survei visual menggunakan metode SDI. Hasil analisis periode ulang 5 tahun menunjukkan debit banjir rencana Saluran 1 sebesar 0,228 m^3/detik, Saluran 2 sebesar 0,040 m^3/detik, dan Saluran 3 Pengumpul sebesar 0,294 m^3/detik. Kapasitas eksisting Saluran 1 sebesar 0,564 m^3/detik dan Saluran 2 sebesar 0,882 m^3/detik, sehingga masih mampu menampung debit rencana. Saluran 3 memiliki kapasitas 0,236 m^3/detik, lebih kecil dari debit rencana, sehingga berpotensi meluap. Pada STA 2+300–STA 2+400, kondisi jalan termasuk kategori rusak berat dengan nilai SDI 285. Rekomendasi penanganan berupa normalisasi Saluran 3 melalui pengerukan sedimen dan pelapisan dinding. Hasil perhitungan menunjukkan kapasitas saluran meningkat menjadi 0,899 m^3/detik, lebih besar dari debit rencana 0,294 m^3/detik. Normalisasi tersebut dapat meningkatkan kapasitas drainase dan mengurangi risiko genangan serta kerusakan jalan berulang.

Kata Kunci: Drainase Jalan, Debit Banjir Rencana, Kapasitas Hidrolika, SDI, Normalisasi Saluran.

ABSTRACT

The drainage system is an important infrastructure component for maintaining road function by effectively conveying rainwater runoff. An imbalance between drainage capacity and runoff discharge can cause water ponding and accelerate pavement deterioration. This study aims to evaluate the design flood discharge, the hydraulic capacity of the existing drainage channels, the level of road damage using the *Surface Distress Index* (SDI) method, and provide technical recommendations for the Simp. Santur–SMEA Talawi Road in Sawahlunto City. This quantitative study applies the Rational Method for hydrological analysis and Manning's Equation for hydraulic analysis. Road conditions were assessed through visual surveys using the SDI method. The results for a 5-year return period show that the design flood discharges of Channel 1, Channel 2, and Collector Channel 3 are 0.228 m^3/s, 0.040 m^3/s, and 0.294 m^3/s, respectively. The existing capacities of Channel 1 and Channel 2 are 0.564 m^3/s and 0.882 m^3/s, respectively, indicating sufficient capacity to convey the design discharge. However, Collector Channel 3 has an existing capacity of 0.236 m^3/s, which is lower than the design discharge, resulting in a potential overflow. At STA 2+300–STA 2+400, the road condition is classified as severely damaged, with an SDI value of 285. The recommended treatment is to normalize Channel 3 by removing sediment and improving the channel lining. The proposed normalization increases the channel capacity to 0.899 m^3/s, exceeding the design discharge of 0.294 m^3/s. Therefore, channel normalization can improve drainage capacity and reduce the risk of water ponding and recurring road damage.

Keywords: Road Drainage, Design Flood Discharge, Hydraulic Capacity, SDI, Channel Normalization.