

TUGAS AKHIR

ANALISA CHECK DAM DALAM UPAYA PENGENDALIAN SEDIMEN (Studi Kasus Batang Muaro Samuik Malalo)

*Diajukan Sebagai Salah Satu Syarat
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Oleh :

FEBRI HAMDANI

NPM : 1610015211050



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FebruHamdani, IndraFarni, LusiUtama

Program Studi Teknik Sipil, Fakultas Teknik Sipil dan Perencanaan,
Universitas Bung Hatta, Padang

Email: febrihamdani1998@gmail.com, indrafarni@bunghatta.ac.id,
lusi_utama@bunghatta.ac.id

Abstrak

Sungai Batang Muaro Samuik merupakan sungai yang terletak di nagari Padang Laweh Malalo, Kecamatan Batipuh Selatan, Kabupaten Tanah Datar, Provinsi Sumatera Barat. Sungai ini mempunyai luas DAS $6,23 \text{ km}^2$, dengan panjang sungai utama $4,06 \text{ km}$ dan kemiringan yang tajam sebesar $0,097$. Kondisi DAS dengan kemiringan lereng yang besar, jenis tanah yang mudah tererosi serta curah hujan yang tinggi merupakan salah satu faktor penyebab besarnya laju sedimentasi. Sehingga dapat mengakibatkan terjadinya bencana yang menimbulkan korban dan merusak Kawasan di sekitar sungai. Salah satu penyelesaian untuk masalah sedimentasi adalah dengan membangun bangunan pengendali sedimen atau biasa disebut *check dam*. Perhitungan hidrologi menghasilkan analisa debit rencana Q_{50} sebesar $160,097 \text{ m}^3/\text{detik}$, sedangkan perhitungan USLE dan MUSLE menghasilkan analisa laju sedimentasi sebesar $3.802,40 \text{ m}^3/\text{tahun}$. Berdasarkan perencanaan yang dilakukan, *check dam* memiliki fisik sebagai berikut: puncak mercu pelimpah main dam direncanakan pada elevasi $+472,50 \text{ m}$ dengan tinggi main dam sebesar 5 m dan kedalaman pondasi sebesar 3 m , lebar mercu pelimpah main dam sebesar 22 m , tinggi sayap main dam sebesar $3,5 \text{ m}$ dengan tinggi jagaan 1 m , kontruksi main dam berupa pasangan batu kali, lantai olak direncanakan pada elevasi $+467,5 \text{ m}$ dengan panjang lantai olak 22 m dan tebal lantai 1 m , elevasi mercu sub dam pada elevasi $+468 \text{ m}$ dengan tinggi mercu $0,5 \text{ m}$, kontruksi sub dam berupa pasangan batu kali. Pada perhitungan stabilitas *check dam* dalam keadaan air normal didapat angka keamanan terhadap guling $= 1,80 > 1,5$, terhadap geser $= 1,41 > 1,2$, dan daya dukung tanah $26,03 \text{ ton/m}^2 < 210 \text{ ton/m}^2$. Sedangkan stabilitas dalam keadaan air banjir didapat angka keamanan terhadap guling $= 1,59 > 1,5$, terhadap geser $= 1,31 > 1,2$, dan daya dukung tanah $34,22 \text{ ton/m}^2 < 210 \text{ ton/m}^2$. Dari hasil perhitungan yang didapat maka konstruksi *check dam* aman dan stabil terhadap guling, geser dan daya dukung tanah.

Kata Kunci: Sungai Muaro Samuik, DAS, Hidrologi, Sedimen, *Check Dam*

CHECK DAMS ANALYSIS IN THE SEDIMENT CONTROL EFFORTS (CASE STUDY: BATANG MUARO SAMUIK MALALO)

FebriHamdani, IndraFarni, LusiUtama

Civil Engineering Study Program, Faculty of Civil Engineering and Planning,
Bung Hatta University, Padang
Email: febrihamdani1998@gmail.com, indrafarni@bunghatta.ac.id,
lusi_utama@bunghatta.ac.id

ABSTRACT

The Batang Muaro Samuik River is a river located in the Nagari Padang Laweh Malalo, South Batipuh District, Tanah Datar Regency, West Sumatra Province. This river has a watershed area of 6.23 km^2 , with the main river length of 4.06 km and the sharp slope of 0.097. Watershed conditions with large slopes, soil types which were easily eroded and high rainfall are one of the factors causing the high sedimentation rate. So that it can lead to disasters that cause casualties and damage to the area around the river. One of the solution to the sedimentation problem is to build a sediment control building or commonly called a *check dam*. The hydrological calculations resulted in analysis discharge plan of Q_{50} as $160,097 \text{ m}^3/\text{second}$, while the USLE and MUSLE calculations resulted in analysis of the sedimentation rate of $3,802.40 \text{ m}^3/\text{year}$. Based on the planning carried out, the *check dam* had the following physical characteristics: lighthouse spillway crest dam was planned on the +472,50 m elevation with the main dam height of 5 m and foundation depth of 3 m, the width of the lighthouse spillway dam of 22 m, the height of main dam wing of 3,5 m with height of 1 m surveillance, construction of main dam was in the form of stone masonry, stilling basin was planned on the +467,5 m elevation with the stilling basin length of 22 m and stilling thickness of 1 m, the elevation of sub dam crest was on the +468 m elevation with crest height of 0,5 m, construction of sub dam was in the form of stone masonry. In the calculation of the stability of the check dam under normal water conditions, the numerical value of safety factor against overturning moment = $1,80 > 1,5$, against sliding = $1,41 > 1,2$, and soil bearing capacity of $26,03 \text{ ton/m}^2 < 210 \text{ ton/m}^2$. While the stability in the flood water conditions obtained the numerical value of safety factor against overturning moment = $1,59 > 1,5$, againts sliding = $1,31 > 1,2$, and soil bearing capacity of $34,22 \text{ ton/m}^2 < 210 \text{ ton/m}^2$. From the calculation results which was obtained, the *check dam* construction is safe and stable against overturning, shearing and soil bearing capacity.

Keywords: Muaro Samuik River, Watershed, Hydrology, Sediment, *Check Dam*

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