

CHAPTER I

PRELIMINARY

1.1. The Background of the Study

One of the Indonesian government masterplans for acceleration and expansion on Indonesia's economic development is by developing a national highway project to reach out to underdeveloped regions in Indonesia. An underdeveloped region mostly exists because of the lack of access of transportation to enter or exit the area, which is why by developing new road is an important job for Indonesian Government. Trans-Sumatra as one of the government project to connect cities from Lampung to Aceh which is 2818 Km end to end has some section project, one of them is 288 Km highway to connect Padang to Pekanbaru. Padang-Pekanbaru highway project itself divided into 3 sections, there are Padang-Sicincin section with 28 Km length, Sicincin-Bangkinang section along 189 Km length, and Bangkinang-Pekanbaru section with 38 Km length. When this project is done, many zones alongside the highway itself will be changing on land usage, some may have to be sterilized from the human neighborhood and the other could generate trip attraction for people and it will benefit the state around them hence the local economy could develop better.

Padang-Sicincin section project planned to cross some major river 7 times on its way, the rivers are Batang Anai, Batang Ulakan, and Batang tapakis. In order to build a highway to cross over the river, a bridge

needed to be built to connect one side to another. Change of land use on this watershed area will lead to the change of water runoff in the river watershed area, the land that used to be a forest, bushes, and agricultural land that slow down precipitation and infiltration of water to the ground will be changed if the land use turning into highway, suburb and etc. Water run-off will go faster on that area after the project is done and it affects water outflow in Batang Anai to be increased after a few years.

Batang Anai as one of the three rivers in this subject located in West Sumatra province, Indonesia. The Upstream of Batang Anai taking place from the hillside of Singgalang Mountain in Tanah Datar regency, it channels water outflow to the river downstream in Padang Pariaman regency. Batang Anai as the biggest water outflow that the project has to cross, has 453.27 Km² area of watershed (bridge as outlet post) that channel approximately 1250.17 m³/s of water outflow to the Hindian Ocean on the west coast of Sumatra island.

The alteration of water outflow on Batang Anai has to be calculated in order to elude flooding or narrowing of the river. Based on PERMEN PUPR No.28 2015 (Yesserie, 2015) a big river (more than 500 Km²) without dyke outside urban area must have 100m minimum of borderline from the edge of the left side and the right side of the river cliffs along the river that prohibit civilian to make any building. This regulation is made to prevent any harm that may happen to the civilian in case of unexpected things happen related to the river.

Building a bridge pillar also has an influence on the river hydraulic section. Water debris that carries sediment and other things

leads to sediment storing or river degradation depend on the amount of sediment supply and water scouring. Referring to Bridge Design Manual (BMS 92) a bridge with the age of plan 50 years must have 5.1 m a minimum vertical freeboard under the bridge, the vertical and horizontal freeboard under the bridge adjusted to the need of watercraft traffic by taking minimum 1m length of freeboard from flooded water surface elevation. That is why the need of calculating Batang Anai's hydrology and hydraulic section on the pillars is important for designing a perfectly safe bridge which is a necessity to build a public structure.

1.2. Purpose and Benefit

Purpose of this final project is

1. To calculate the hydrology peak flow of the river by using Rational method, SUH (Synthetic Unit Hydrograph) ITB-I and SUH ITB-II.
2. Using HEC-RAS® software to evaluate river's hydraulic on the pillar of the bridge at Padang-Sicincin highway section.
3. To compare the results between writer's analysis and Wiratman Ltd. (consultant) report on river hydraulic and hydrology of Batang Anai river.

Meanwhile, the benefit of this final project is learning the ability to operate HEC-RAS® software to analyze water surface on the river

hydraulic section on Batang Anai per cross-section due to construction of Padang-Sicincin highway bridge.

1.3. Limitation of the Study

In this research, the writer limits the problem that will be examined, the focus in this research revolves around calculating the form of water surface of Batang Anai hydraulic section without taking sediment transport into calculation, calculating a return period of 50 years and 100 years of hydrology of Batang Anai watershed using rational method and calculate the synthetic unit hydrograph by using SUH ITB-1 and SUH ITB-2 method to predict water discharge plans. Data that required to calculate Batang Anai hydraulic and hydrology are:

1. Batang Anai bridge design (Hutama Karya Ltd. 2018)
2. Automatic Water Level recorder (AWLR) data of Batang Anai watershed from 1978 – 2017 (PSDA Sumbar)
3. Cross section data of Batang Anai (Hutama Karya Ltd. 2018)
4. Road trace design of Padang-Sicincin highway section (Hutama Karya Ltd. 2018)

1.4. Map of Object Location

The object of this research is Batang Anai river which is located on Padang Pariaman State in West Sumatra and Padang-Sicincin highway bridge.



Figure 1.1. Map of Batang Anai watershed (Retrieved from Google Earth)



Figure 1.2. Map of bridge Sta.15+870 location (Hutama Karya Ltd. 2018)

