Water Fluctuation Channels of Jakabaring Sport City (JSC) as a Flood Control in Urban Area

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Water Fluctuation Channels of Jakabaring Sport City (JSC) as a Flood Control in Urban Area

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Abstract - The phenomenon of flood events in the event of rain with a duration of 3 hours in the city of Palembang alone can lead to flooding. This condition is very disturbing activities of people. Various attempts have been made, but these efforts have not been optimal in addressing the problem of flooding. The effort is in the form of maintenance of drainage channels, improvement rivers crossing the city, various studies related to the city flood control, construction of flood control facilities as well as some of the rules have been issued for flood control. These efforts turned out less rapidly with the development of the city. Palembang southern region have land elevations tend to be flat, while the higher locations are Palembang northern region. As a result of the area is relatively flat, in certain locations are often experienced flooding / inundation caused by storm water runoff that is unable to be accommodated channels. In addition to the specific locations flooding also caused by runoff of Musi River.
Jakabaring area as an area of Palembang city development has primary channels along the ± 1.200 m. At the time of extreme rainy season in January 2016, the water in the channel almost overflow so necessary to study changes in water level in the main channel.
The result showed the maximum water level in the main channel ranged from 2.10 to 2.25 m as. tolerance limit of the water level in the channel is not overflow.

1 Introduction

Jakabaring Sport City (JSC) as an area of Palembang city development requires adequate urban drainage system so that with the construction of facilities / infrastructure floodwaters drainage can anticipate what will happen. Primary drainage channel that has been built based on aspects of hydraulics and aspects of regional development requires a fundamental study and based on data both secondary data and primary data. [1].

Palembang city as the capital of South Sumatra province, located at position 104 '37-104' 52'BT and 2 '52'- 3' 05 LS which is currently growing rapidly, but in the midst of these developments Palembang City was always wracked with flooding problems. The phenomenon of the current flood events not only occur during the rainy season, but in the event of rain with a duration of 3 hours alone can lead to flooding. This condition is very disturbing activities of people of Palembang Various attempts have been made, but these efforts have not been optimal in addressing the problem of flooding. The effort is in the form of maintenance of drainage channels, to be blow up rivers a cross the city, various studies related to the city flood control, flood control facilities development of fiber a few rules have been issued for flood control. These efforts turned out less rapidly with the development of the city. The city of Palembang South Side has more land elevations tend to be flat, while the higher locations are in the region of Palembang Northern. As a result of the area is relatively flat, in any locations often experienced flooding / inundation caused by storm water runoff / run off that is not able to be accommodated channels. In addition to locations tetentu flooding also caused by runoff of Musi River. Palembang city is divided into 19 sub-watershed drainage system that includes: Gandus, Gasing, Lambidaro, , Sekanak, Borang, Lawang Kidul, Buah, juaro, Batang, Selincah, Nyiur, Sriguna, Aur, Kedukan, Jaka Baring, Kertapati and Keramasan. Flood- prone areas that have been recorded are in Sub watershed Sekanak, Sriguna, Buah, Lawang Kidul,

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Lambidaro, Gandus, Jakabaring, Aur, and Kedukan that there are several puddles locations were the priorities of society.

To overcome the above problems required an arrangement of integrated flood control to prioritize the handling and financing in accordance with the conditions of actual serata predicted development of the future in order to inundation occurred not interfere and spoil the smooth economic, infrastructure and facilities of life, especially in Jakabaring area that was once a swampy area pairs receding. For that, we need a study of changes in water level in the channel with a descriptive qualitative approach which hydraulic modeling program used MIKE 11 Flow Model [2].

2 Methodology

Based on the results of the initial field suevey known that flooding occurred in several drainage system in the city of Palembang, especially for Jakabaring area caused by decreased river discharge capacities and the addition of river discharge due to changes in land use in the catchment.

The research location is the main channel contained in the Jakabaring Sport City Figure 1.

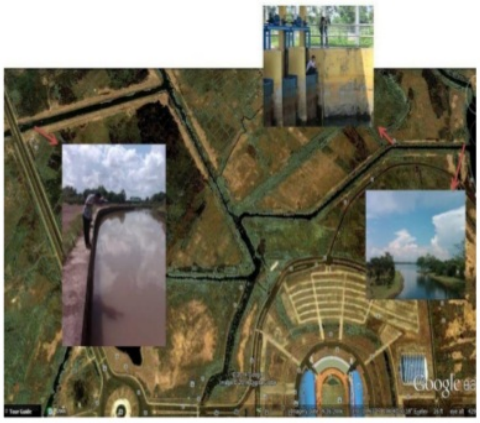

Figure 1. Location of the study

This study is based on secondary data and field data.All data will be collected through observation and measurement field as well as in simulating the flow of movement / change of water level used software MIKE 11 Flow Model. The initial condition as a data input program is the main channel cross-sectional profile [6] as in Figure 2.

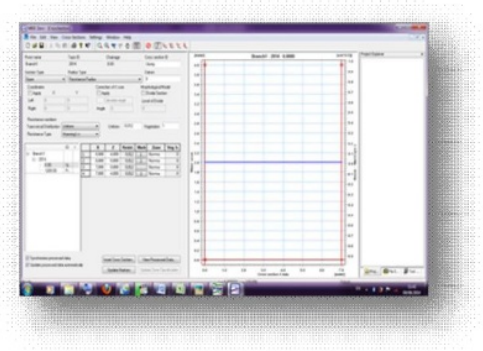

Figure 2. The transverse profile of primary channel

Visually, the channel which is currently still has not done routine maintenance. It can be seen that although the channel has been done "dredging" or excavation, but the erosion of the cliff and grass so it is possible to keep erosion and sedimentation at the bottom of the channel and avalanches of rock / erosion on the channel side.

The study was based on secondary data and field data and all data will be collected through observation and measurement field. Relevant secondary data will also be collected from the agencies and offices related institutions as primary data or main data. The data will be collected, among others as contained below.

Topography of Palembang, in general, is a lowland with an average altitude is found in places like Kenten, Bukit Sangkal, Bukit Siguntang 4-12 meters above sea level with a composition: 48% of land plains are not flooded, 15% of the land seasonally inundated and 35% of land were flooded continuously throughout the season. The location is in the highest area Siguntang Hill District of Ilir Barat I, with a height of about 10 meters above sea level. While the condition of the lowest areas are in Sungai Lais, Ilir Timur II.

Palembang city is divided into areas with horizontal tofografi up with ramps, with a gradient ranging from ± 0 - 3o and areas with undulating topography with slopes ranging between ± 2-10o. Most of the city of Palembang is lowland sloping ground height average + 12 meters above sea level, while the area while areas surging found in places like Kenten, Bukit Sangkal, Bukit Siguntang.

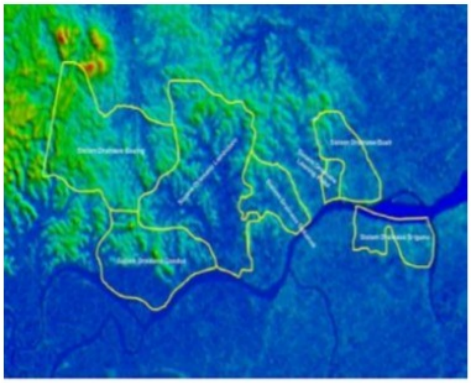

Figure 3. Height level of Land in Ogan

There are differences between Ilir topographical character. Seberang Ulu region generally has a relatively flat topography and partly Seberang Seberang Ulu and large with the original soil is below the maximum high-water mark of the Musi River (± 3.75 m). above sea level) unless the lands have been built and will be built where the land surface has undergone backfilling and reclamation. Section area Ilir encountered variations of topography (elevation) from 4 m to 20 m above sea level and it was found that uses micro and valleys "continuous" and there are no steep topography. Thus aspects of topography in principle there is no limiting factor for the development of space, either the inclination or slope great.
The boundary conditions (boundary condition) program is the result of tidal changes as shown in Figure 3.

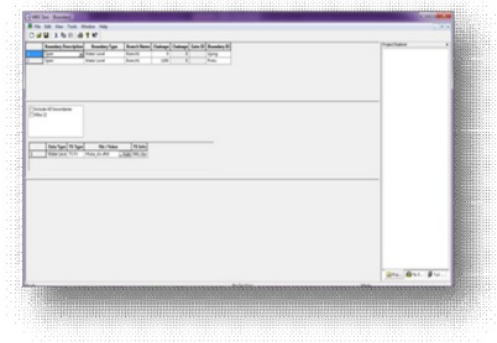

Figure 3. Changes due to tidal flow

3 Results and Disussion

Movement of water surface in the channel at a certain distance look like in figure 4.

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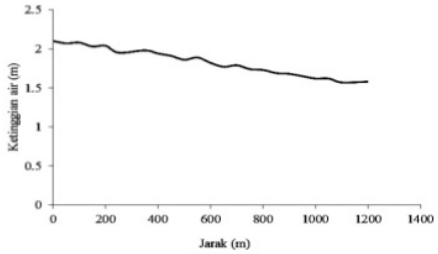

Figure 4 High water level in the channel

From Figure 4. The water level at the earliest point in the main channel is 2,10 m and then a decline in the change of water level up at a distance of 550 m and then a change in the water level at a distance of 1,000 m and 1,200 m.

The simulation results of the program MIKE-11 [6] as in Figure 5.

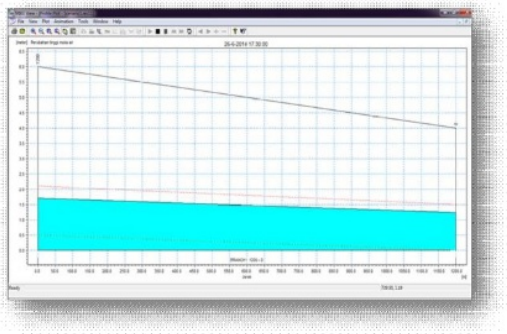

Figure 5. The simulation results in a change in water level The main channel

The simulation results using the program MIKE 11 Flow Model as shown in Figure 4, visible changes in water levels on average in the main channel ranges from 0.1 to 0.3 m. In the main channel for the time being still within tolerable limits, but for the foreseeable future should be the concern of the technical aspects of all parties, especially the South Sumatra provincial government because there is a height difference in the event of heavy rain with a long duration or in extreme conditions.

4 Conclusion

Program MIKE 11 Flow Model one-dimensional [2] can be used to predict changes in water level in the main channel Jakabaring Sport City in Palembang [4] in which the change in water level

for this time have not led to an overflow in the agency channel.

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