Planning for Bridge Construction of bangbang Village Towards Mambang Village in Tabanan Regency

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ABSTRACT

Increased population growth, number of vehicles and traffic growth on the Denpasar-Gilimanuk line in the Tabanan Regency region resulted in traffic congestion and accidents. To facilitate the distribution of agricultural products, plantations, open social, economic and cultural relations and to overcome the level of congestion and accidents, it is planned to build a connecting bridge between Belumbang Village and Mambang Village. This study aims to identify the condition of the topology / terrain of the location of the bridge, plan the design of the bridge drawings, estimate the cost of bridge construction, analyze perceptions and community participation in bridge construction. Data collection methods are observation, interview, documentation, questionnaire and literature study. The analysis method consists of quantitative descriptive analysis, Geographic Information Systems, Autocad, unit price analysis. The results of this study are the identification of topological conditions / terrain where bridge construction plans are located on hills and mountains. The design plan for the construction of a bridge with a length of 50 meters and a width of 8.5 meters, namely the design of the upper building in the form of a bridge floor, longitudinal and transverse girder and backrest, the design of the lower building in the form of foundations and supports. The total cost of bridge construction is Rp. 19,699,662,000.00 or Rp. 393,993,240.00 per meter. Public perception of bridge construction is fully stated in the agreement. Community participation is land preparation, mutual cooperation in cleaning bridge routes and approaching the parties in the Tabanan Regency Government.

Keywords: planning, bridges, belumbang, mambang

I. INTRODUCTION

The growth and development of activities in an area as well as the number of population results in the emergence of a need (demand) to move from one place to another. These movements cause an increase in the number of vehicles and traffic growth which can result in traffic jams and accidents. Congestion and accident problems in the Tabanan Regency area occur on the Denpasar-Gilimanuk Line. To overcome this problem, a number of people began to think about building the
bridge of Bangbang Village towards Mambang Village. Land or area development especially for land transportation projects must refer to the existing Regional Spatial Planning (RTRW), this relates to the designation of the region and the impacts that may arise from the development of the region. Bridge construction planning from alternative solutions chosen not to conflict with Law of the Republic of Indonesia number 6 of 2014 concerning villages, regional regulations related to Regional Spatial Planning (RTRW) and Spatial Detail Plan (RDTR) so that it is expected that there will be no land use errors in the pattern spatial planning and spatial structure that can have a negative impact on aspects of society in the region.

The planning of the bridge construction of the village Belumbang with the village of Mambang certainly takes into account the existing condition of the village, namely the topology / terrain and financing in the construction of the bridge. In general, the topology / terrain in Tabanan Regency has a slope of land on a slope of 15-40%, which is an area of 365.67 km² (43.57%), spread widely, especially in the western region. Land with a slope of 2-15% with an area of 249.61 km² (29.74%) is widespread, especially in the eastern region. Land with a slope above 40% covering an area of 136.53 km² (16.27%) is located in the northern mountainous regions and partly on the western side of the border with Jembrana Regency while land with 0-2% slope is 10.43 km² (10.43 %) dominates the coast.

In order to reduce the level of traffic congestion and traffic accidents on the Denpasar-Gilimanuk route, alternative routes for the distribution of goods / people and to open access areas between Belumbang and Mambang villages, the planning to build a connecting bridge between the village of Bangbang to Mambang village needs to be carried out. In planning the bridge construction it is necessary to plan the design / plan of the bridge drawings that are adjusted to the topology / terrain conditions and the estimated cost of building the bridge based on the plan drawings. So the purpose of this research is to identify the condition of the topology / terrain of the bridge location, plan the design of the bridge drawings, estimate the cost of bridge construction, analyze community perceptions and participation in the bridge construction of Bangbang Village towards Mambang village in Tabanan Regency.

II. LITERATURE REVIEW

The difference between this research and previous research is the object under study and the data analysis techniques used are different. As a comparison, the research from Sudarmi (2018) with the title study of the construction plan of the bridge bridge in the Regency of Tabanan. The results of the study are the shortcut plan in the hilly terrain, the travel time of the vehicle is more efficient 0.02093 hours or 1.2558 minutes and the reduced operating costs of the vehicle are passenger cars Rp. 1,329.19, bus Rp. 2,623.09, trucks Rp. 4,690.84 and motorcycle Rp. 256.60. The results of the combination of the EFAS and IFAS SWOT matrices are in quadrant I which is the location aspect where the community supports the planning location, the socioeconomic aspect where the construction of shortcuts is an opportunity to get a job and the aspect of community participation where development is supported by the community and the government continues to improve the land acquisition system. Research from Aisyah, Abdul and Khairul (2012) with the title Development Planning West Outer Ring Road in the City of Surabaya. The results of the study are the road construction budget of almost 1.4 trillion. The internal factors of strength are the existence of a mature planning concept, adequate support resources and the support of the regional head. The weakness is that the ability of the Surabaya government's government budget is doubtful to complete land acquisition in a timely manner. Research from Suparsa (2015) with the title Study of the Capital Ring Road Plan Study in the District of Nusa Penida, Klungkung Regency. The results of the study are the length of the 4725 meter road plan, the Trace plan crossing 6 units and 7 road intersections. Community Participation has the same relative Opportunities as threats, as well as relative strengths and weaknesses. Researchers from I Made Avadhuta Austinov Mahagana and Cahya Buana with the title “Feasibility Study of the New Ploso Bridge Access Road in Jombang-East Java”.

The results of this study are that the access road is feasible to be built with the existing BOK value of Rp. 6,283,079, while the BOK if the bridge access road is built is (BOK plan) Rp. 4,006,538, NPV value of Rp. 216,903,808,587 and a BCR value of 4.92. Research from Reynaldo B. Theodorus Tampang Allo with the title "Economic and Financial Feasibility Study on Warusidoarjo Toll Road Widening Plan". The result of the research is that the Waru-Sidoarjo toll road widening project is economically and financially feasible. This is shown in terms of economics obtaining NPV (Net
Present Value) value of Rp. 16,281,034,118,129 and BCR (Benefit Cost Ratio) of 3. In financial terms, the Net Present Value (NPV) of Rp. 2,275,677,800,694, BCR (Benefit Cost Ratio) of 1.3. Payback Period for 4 years and 4 months and IRR value of 15.12%. Assuming i bank interest rate (BI Rate) = 6.75%. Break event point if the determination of the total toll tariff for Group IV at the price of Rp. 21,030 and investment in the planned expansion of the Waru-Sidoarjo toll road is risky (sensitive) to changes in the value of income provided that the cash inflows (revenue) decrease up to a minimum of 21%.

III. RESEARCH METHOD

The research was carried out in Belumbang Village, Kerambitan District at coordinates 8o54'14 "LS, 115o06'89" BT and Mambang Village Selamek Deg Timur District Tabanan Regency at 8o54'05 "LS, 115o06'83" BT from August to October 2019. The study population is the number of residents who are in the Village of Bangbang District of Kerambitan which is 2,140 people (profile of Bangbang Village, 2018) and the population in Mambang Village, East Selamek Deg District is 3,402 people (profile of Mambang Village, 2018). The research sample was taken using proportional random sampling technique with a level of significance of 10%, namely 99 people. Methods of data collection by observation, interviews, documentation, questionnaires and literature studies. The data obtained in the form of primary and secondary data. Primary data is data obtained through field surveys, namely topology / terrain measurements of bridge locations and questionnaire scoring data. Secondary data is additional data obtained by citing existing data, that is the profile data of Belumbang Village, Mambang Village profile, Maps of Yetbang Village and Mambang Village map. The analysis method consists of Geographic Information System analysis, quantitative descriptive analysis, autodcad analysis and unit price analysis (AHSP).

IV. RESEARCH RESULT

Result

Identification of topological conditions / terrain location of the bridge construction plan of Bangbang Village to Mambang Village

The length of the road route for the bridge construction plan of the village of Bangbang to Mambang Village is 500 meters with a width of 8.5 meters. Based on the results of the Geographic Information System analysis in table 1 shows that the topology / terrain condition of the bridge construction plan is stationing 0 + 000 to 0 + 250, 0 + 300 to 0 + 450 is a hilly field while 0 + 250 to 0 + 300 is a mountainous terrain.

Bridge design drawing plan

Based on the results of the analysis of the strength of the structure and components related to the planned load on the bridge loading, it is found that the design of the building in the form of a bridge floor, longitudinal and transverse girder as well as the backing / reling refers to the design standards of the Ministry of Public Works for the span of 50 meters. For underground buildings, soil testing is done in the form of a sondir test (cone penetration test) to determine the soil profile, soil characteristics, determine the carrying capacity of the foundation, know the depth of hard soil layers and carrying capacity as well as the adherence of each depth and provide a description of the type of soil. Based on these data, the type of foundation and the form of abutment from bridge construction is designed. The bridge design plan can be seen in Figure 1.
Figure 1. Design picture of a 50 meter span bridge

Bridge construction costs

The results of the unit price analysis (AHSP) in table 2 which was calculated based on the design of the bridge drawings obtained the cost of the bridge construction is Rp. 19,699,662,000.00 or Rp. 393,993,240.00 per meter.

Community Perception and Participation in Bridge Construction

Analysis of community perceptions and participation in the construction of the bridge of Bangbang Village towards Mambang Village using quantitative descriptive analysis. The questionnaire data consisted of 20 questions given to respondents totaling 99 people. The results of the analysis of community perceptions and participation in bridge construction in table 3 show that all communities agreed. The community hopes that the construction of the connecting bridge will open up access to the region, an alternative route for breaking the congestion on the Denpasar-Gilimanuk road, facilitating trade, agriculture and plantation activities.

Discussion

Based on the slope of the land most of the Tabanan Regency is on a slope of 15-40%, which is an area of 365.67 km² (43.57%), spread widely, especially in the western region. Land with a slope of 2-15% with an area of 249.61 Km² (29.74%) is widespread, especially in the eastern region. Land with a slope above 40% covering an area of 136.53 Km² (16.27%) is located in the northern mountainous regions and partly on the western side of the border with Jembrana Regency while land with 0-2% slope is 10.43 Km² (10.43 %) dominates the coast. The results of the analysis of the Geographic Information System produce the location of the coordinates of the planned bridge construction of the village Bangbang to Mambang. From the map the plan is connected to the slope map which will get the type of terrain. The slope of the bridge construction plan shows the slope is in the hilly and mountainous areas so that the bridge construction plan will have excavation and embankment work that requires a large enough budget.

The bridge is a structure that crosses rivers or other traffic barriers so the collapse of the bridge will reduce or hold traffic which consequently disturbs the comfort of the community and economic relations. In planning a bridge design must meet the main planning points namely strength, structural stability, comfort, safety, economical, durability, long-term viability, convenience, aesthetics, considering environmental, social and road safety aspects. So in planning a bridge design must use standards that refer to regulations or guidelines from the Department of Public Works.

The design of the connecting bridge plan of Belumbang Village and Mambang Village is the length of the bridge plan is 50 meters with a width of 8.5 meters. The planned bridge life is 50 years. The geometric vertical design is a 2% transverse slope on the bridge floor and a maximum length of 5% slope. Bridge building planning takes precedence over a reinforced concrete girder system. Upper structure planning uses limit states or boundary state plans in the form of ultimate limit states (ULS) and serviceability limit states (SLS). Deformation, deflection opponents and deflection of the structure of the bridge have been calculated so that it does not exceed the permitted boundary values namely simple beam (SLS) <L / 800 and L / 400 level. Paying attention to the long-term behavior of the material and the environmental conditions of the bridge which are applied to the
planned bridge structure components, especially concrete covers, concrete permeability, thick steel and galvanized elements against the risk of corrosion or potential for material degradation. Under bridge building planning has been used using limit states or boundary state plans in the form of ultimate limit states (ULS) and serviceability limit states (SLS). For heights > 4 meters, the abutment design uses the full wall type. The bottom structure is planned based on the long-term behavior of the material and environmental conditions including a concrete blanket used at least 50 mm. Foundation planning uses working stress design (WDS) with the type of foundation, namely steel pipe piles.

Referring to the design of the bridge drawings made, the cost of building the bridge of bangbang Village to Mambang Village can be calculated. The cost calculation certainly uses a cost estimate analysis that refers to the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia Number 28 / PRT / M / 2016. The calculation of each work item on the bridge construction must be accurately calculated which is then multiplied by the unit price of each work so that the total work price is obtained which is then added to the value added tax by 10%. Based on the results of the analysis, the magnitude of the cost of building the bridge of bangbang Village towards Mambang Village is Rp. 19,699,662,000.00 or Rp. 393,993,240.00 per meter. The magnitude of the cost of building the bridge is a consideration for the village government, given the limited budget owned by the village government. For this reason, it is necessary to approach the regional government, especially the parties concerned. Besides that, there needs to be support from the whole community in order to realize the construction of the bridge linking Belumbang Village and Mambang Village.

The public perception of the bridge construction of Belumbang Village towards Mambang Village all expressed their agreement and support for the bridge construction. According to the people in the two villages the construction of this bridge can have a positive impact on social, economic and tourism aspects. Bridge construction is also an alternative to traffic jams that often occur on the Denpasar-Gilimanuk road section. From the social aspect, the construction of a bridge can open access to the area and connect between the two villages. Many villagers of Belumbang work as farmers who own arable land in the Mambang Village area. With this bridge, it can facilitate the journey and distribution of agricultural products between the two villages. From an economic aspect, the construction of a bridge can indirectly increase the value of the land that is around the bridge and can facilitate trading activities. The location of Mambang Village is far from the trade center or market, with this bridge the villagers are easier to reach the trade center, the kerambitan market which is located close to Belumbang Village.

With the construction of the bridge can be a start for the development of tourism that began to grow in the village of bangbang. One of the tourism sectors that are close to Belumbang Village is Tista Tourism Village and Puri Agung Kerambitan which is starting to develop towards Belumbang Village in the form of the construction of villas that are widely leased for foreign tourists in the village of bangbang. With the construction of the bridge, Mambang Village has planned to innovate in the field of tourism by building a wisata village and cooperating with Belumbang Village. The aspect that supports tourism in the village of bangbang is a large paddy field area that is supported by a good irrigation system. Likewise with the Mambang Village which can be a place for recreation in the form of a flower garden. These programs have become the priority of the village to the front so that the village of bangbang and Mambang Village can be a tourist village.

Community participation in realizing the construction of the bridge connecting the village of bangbang with the village of Mambang is preparing land that has been released by residents as access to the bridge. From the village of bangbang, the road to the bridge already exists and the conditions are good. For the entrance to the direction of the village of Mambang there are still some trees with soil conditions. The community members have worked together in clearing the bridge route so that in its implementation there are no problems. Besides that, the community members have played an active role in making approaches with stakeholders in the Tabanan Regency Government to realize the construction of a connecting bridge between Belumbang Village and Mambang Village.

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The conclusion that can be drawn from this research is
1. Identification of topological conditions / terrain location of the bridge construction plan of Belumbang Village towards Mambang Village is located in the hills and mountains, so that the construction of the bridge requires excavation and embankment work.

2. Design drawings for the construction of the bridge ofbangbang Village towards Mambang village, namely the length of the bridge plan is 50 meters with a width of 8.5 meters. The design of the upper building in the form of bridge floors, longitudinal and transverse girder and backrest / reiling. Underwater building design in the form of foundation and abutments.

3. The amount of the cost of building the bridge ofbangbang Village towards Mambang village is Rp. 19,699,662,000.00 or Rp. 393,993,240.00 per meter.

4. The public perception of the construction of the bridge ofbangbang Village towards Mambang Village is entirely agreed. Community participation in the construction of the bridge is the preparation of land as access to the bridge, working together in clearing the bridge route and playing an active role to approach approaches with stakeholders in the Tabanan Regency Government

Recommendations

Based on the results of research, discussion and conclusions, the writer can suggest the following:

1. Bridge construction planning in addition to considering topology / terrain conditions must also consider social, economic and environmental factors where the location of the bridge will be built.

2. The results of this study can be a reference regarding the design of the bridge and the amount of costs needed in the construction of the bridge so that the village government can think of options in obtaining funding sources in realizing the construction of this bridge.

3. This research does not take into account other benefits arising from the construction of bridges such as economic analysis, namely the Net Present Value (NPV), Benefit Cost Ratio (BCR) and sensitivity analysis. For this reason, research suggests that in order to calculate these factors.

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