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# ANALYSIS OF NATIONAL ROAD STABILITY ON NATIONAL ROAD SECTIONS IN BANGKA REGENCY, BANGKA BELITUNG PROVINCE

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**Abstract—** Roads are traffic spaces where vehicles and people move to change places. Road infrastructure is one of the main pillars of public welfare and has an important role in supporting the economic, social, cultural, and environmental fields. The development of quality infrastructure with adequate and equitable capacity will facilitate connectivity, reduce transportation costs and logistics costs to increase product competitiveness, and accelerate the pace of economic growth. To support Bangka Regency to become a resilient, productive, and sustainable region, the Ministry of Public Works and Public Housing through the Bangka Belitung National Road Implementation Center has organized road preservation to maintain the stability of the road connecting Pangkalpinang City as the capital of Bangka Belitung Province with Sungai Liat City, Bangka Regency by implementing an improvement strategy national road connectivity through routine maintenance, preventive maintenance, and rehabilitation activities. Based on the results of a survey on the achievement of road stability in 2021 on 4 National Road Sections in Bangka Regency, showed that the programmed road preservation activities have succeeded in increasing steady conditions by 1.21% with an average IRI value of less than 6 m/km so it can be concluded that The National Road Section in Bangka Regency is a Steady Road Construction.

**Keywords—** National Road, Road Preservation, Road Stability.

## I. INTRODUCTION

### Background

Roads are traffic spaces where vehicles and people move to change places. Law Number 2 of 2022 concerning the Second Amendment to Law Number 38 of 2004 concerning Roads states that road infrastructure is one of the main pillars of public welfare and has an important role in supporting the economic, social, cultural, and environmental fields. Developed through a regional development approach, to achieve balance and equitable development between regions in the context of realizing national development goals, as well as forming and strengthening national unity to strengthen defense

and security and form a spatial structure to realize national development targets based on Pancasila values.

<sup>[1]</sup>Based on the National Medium-Term Development Plan (RPJMN) 2020-2024 as stated in Presidential Regulation No. 18 of 2020 with 5 main directions for Infrastructure Development, namely to connect large infrastructure with people's production areas (such as tourism areas, small industrial areas), Human Resources Development, Encouraging investment, bureaucratic reform and the use of a focused and targeted APBN. In line with this, <sup>[4]</sup>the Bangka Regency Government prepares the Bangka Regency Medium-Term Development Plan (RPJMD) for 2019-2023, one of which is to improve community welfare through the Development of Tourism Areas for the eastern part of Bangka Island which consists of natural tourism areas, artificial tourism, cultural tourism, and others.

Infrastructure development with adequate and equitable capacity is one of the most important factors encouraging economic growth between regions. Adequate quality and capacity of infrastructure will facilitate connectivity, reduce transportation costs and logistics costs to increase product competitiveness, and accelerate economic growth. Transportation connectivity can create smoothness and convenience so that the effect of maintained connectivity will stimulate economic growth. Transportation connectivity will enable Sungai Liat City as a tourist city that can be connected to Pangkalpinang City as the capital of Bangka Belitung Province so the Bangka Regency can become a formidable, productive, and sustainable region.

<sup>[2] [3]</sup>To improve national road connectivity in the province of Bangka Belitung Islands, the Ministry of Public Works and Public Housing has implemented a strategy through the Bangka Belitung National Road Implementation Center by conducting routine maintenance, preventive maintenance, and rehabilitation activities to maintain road stability. Road stability which is usually expressed in % was used as an indicator of the comfort and safety of road users<sup>[5]</sup>.

Based on the background above, it is necessary to conduct research related to the stability of the National Road in Bangka Belitung Regency.



### Formulation of the Problem

1. What is the Road Stability Condition on the existing National Roads in Bangka Regency?
2. What kind of handling can be done to maintain road stability?

## II. LITERATURE REVIEW

### Road Stability

Road stability is a concept used by the Directorate General of Bina Marga to state the condition of a national road section. The services provided by a road segment are categorized as steady and unsteady, according to the condition of the pavement, which is indicated by the size of the IRI, the width of the pavement, or the width of the traffic lane along with the road shoulder, which serves a certain traffic volume.

According to Sowolono, B.O. and W. Santosa (2021) The definition of each term road stability are as follows<sup>[5]</sup>:

1) Steady Road Construction is a road with a construction condition in a steady corridor, which only requires

maintenance activities to handle it. Steady road construction determined according to the Minimum Service Standards is a road in moderate condition, which in this study is used a limit with an IRI value of less than 6 m/km.

2) Unstable Road Construction is a road with a condition outside the steady corridor, where the minimum handling is periodic maintenance and the maximum handling is road improvement, to add to the value of the construction structure. The value of the IRI range in Indonesia is different from several other countries, in developed countries such as America, the range of condition values is very small, where an IRI value greater than 5 (five) indicates a poor condition, while in Indonesia an IRI value above 12 only indicates a poor condition. In Indonesia, the IRI (International Roughness Index) scores are divided into 6 groups, which are used to describe road conditions<sup>[6]</sup>. The highest criterion is very good and the lowest criterion is very bad, as shown in Table 1. While the relationship between the visual condition of the road and the IRI value of the road can be seen in Table 2.

| IRI (m/km) | Asphalt Road Surface Condition Visually                                 | Examples of Surface Types                                                                                  |
|------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 0-3        | Very flat and straight                                                  | New Hotmix after upgrade using multiple layers                                                             |
| 3-4        | Very good, generally flat                                               | Hotmix after several years of use, the new hotmix is overlaid as a thin layer over the macadam penetration |
| 4-6        | Good                                                                    | Thin Layer of Old Hotmix, new Latasbum, new Labustag                                                       |
| 6-8        | Enough, few or no potholes but the road surface is not flat             | New Macadam penetration, new Latasbum, Labustag after years of use                                         |
| 8-10       | Bad, sometimes there are holes, the road surface is not flat            | Macadam penetration after 2 or 3 years of use, old Latasbum, poorly maintained gravel road                 |
| 10-12      | Damaged, bumpy, lots of holes                                           | Penetration of the old Macadam. Old Latasbum, poorly maintained gravel road                                |
| 12-16      | Heavy damage, lots of holes and entire pavement area destroyed          | All pavement types that were neglected for a long time                                                     |
| > 16       | The road is impassable, except by Jeep 4WD. A completely neglected road | Dirt roads with poor drainage, all types of surfaces                                                       |

Source: Sinaga (2011)

**Table 1.** Range of IRI Values in Indonesia

| IRI (m/km) | Surface Type | Information |
|------------|--------------|-------------|
| <4         | Asphalt      | Very Good   |
| 4 - 8      | Asphalt      | Good – Fair |
| 8 – 12     | Asphalt      | Fair – Poor |
| 12 – 16    | Asphalt      | Poor – Bad  |
| 16 – 20    | Asphalt      | Bad         |
| >= 20      | Asphalt      | Very Bad    |
| Any        | Unsealed     | Unsealed    |

Source: Sinaga (2011)

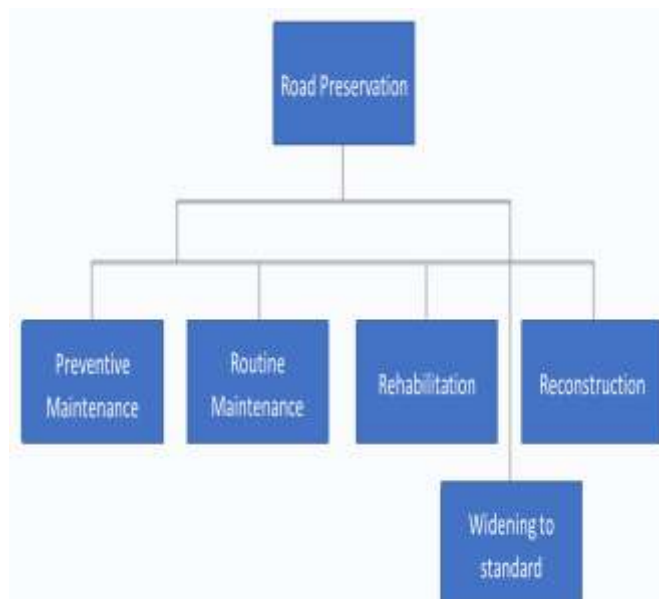


### Road Preservation

Road preservation is a program carried out at a road network level as a long-term strategy that aims to improve pavement performance in an integrated and cost-effective manner to extend pavement life, improve safety and achieve road user expectations<sup>[7]</sup>.

Road Preservation is conducted by road maintenance needs, including routine road maintenance and road completeness. This road maintenance aims to improve the quality of national roads as measured by the average value of road roughness (IRI), pavement index (PCI), age of road structure, and road drainage. Fulfillment of road maintenance needs is encouraged through improved road management governance that prioritizes routine, periodic maintenance, rehabilitation, and reconstruction activities.

Based on the Directorate of Preservation (2019), road preservation is divided into 5 (five) activities, namely routine maintenance, preventive maintenance, rehabilitation, reconstruction and widening to standards in order to maintain road stability<sup>[7]</sup>.



**Figure 1.** Road Preservation Handling

Source: Directorate of Preservation (2019)

### III. METHOD

This study used a literature study method, namely collecting data from regulations, Circulars of the Directorate General of Bina Marga, and the internet in the form of news and articles that can support this journal.

### IV. DISCUSSION

From the survey data on the achievement of stability in semester 1 and semester 2 of 2021, the IRI scores on 4 Road Sections in Bangka Regency are as follows:

**Table 3.** Recap of Stability of IRI Sem 1 Year 2021

| Road Sections                       | Steady (%) | Unsteady (%) | IRI Average (m/km) |
|-------------------------------------|------------|--------------|--------------------|
| Tanjung Gudang - Lumut              | 99,32      | 0,68         | 3,29               |
| Lumut - Sei Liat                    | 99,06      | 0,94         | 2,99               |
| Sei Liat - Bts. Kota Pangkal Pinang | 97,58      | 2,42         | 3,18               |
| Lumut - Puding Gebak                | 93,93      | 6,07         | 4,12               |
| Recapitulation                      | 97,46      | 2,54         | 3,40               |

Source: Babel National Road Implementation Center (2021)

**Table 4.** Recap of IRI Stability Semester 2 2021

| Road Sections                       | Steady (%) | Unsteady (%) | IRI Average (m/km) |
|-------------------------------------|------------|--------------|--------------------|
| Tanjung Gudang - Lumut              | 99,32      | 0,68         | 3,24               |
| Lumut - Sei Liat                    | 99,49      | 0,51         | 2,94               |
| Sei Liat - Bts. Kota Pangkal Pinang | 99,64      | 0,36         | 3,08               |
| Lumut - Puding Gebak                | 95,78      | 4,22         | 4,05               |
| Recapitulation                      | 98,67      | 1,33         | 3,33               |

Source: Babel National Road Implementation Center (2021)

**Table 5.** Difference in IRI Stability Score in 2021 Semester 1 and Semester 2

| Road Sections                       | IRI Average Difference (m/km) | Stability Difference (%) |
|-------------------------------------|-------------------------------|--------------------------|
| Tanjung Gudang - Lumut              | 0,05                          | 0,00                     |
| Lumut - Sei Liat                    | 0,05                          | 0,43                     |
| Sei Liat - Bts. Kota Pangkal Pinang | 0,10                          | 2,07                     |
| Lumut - Puding Gebak                | 0,07                          | 1,86                     |

Based on these data, it can be concluded that there was an increase in the value of road stability by 1.21% on the National Road Section in Bangka Regency, that there was also an increase in the average IRI value of 0.07 m/km, from 3.40 m/km to 3.33 m/km. It can be concluded that the National Road Section in Bangka Regency is a Steady Road Construction with an average IRI value of less than 6 m/km.



#### IV.CONCLUSION

From the results of the discussion, it can be concluded that the programmed road preservation activities have succeeded in improving the steady condition of the National Road Section in Bangka Regency, this can be seen from the increase in the achievement of road stability at the end of the 2021 fiscal year.

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