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Okigbo, N. (2012). Causes of highway failures in Nigeria. International Journal of Engineering Science and Technology, 4(11), 4695–4703.

Sawaludin, A., Syafarudin, A., & Mayuni, S. (2018). Evaluasi kerusakan jalan pada perkerasan lentur dengan menggunakan metode binamarga (studi kasus ruas jalan desa kapur) [Evaluation of road damage on flexible pavement using the binamarga method (case study of lime village road section)]. *Jurnal PWK, Laut, Sipil, Tambang, 5*(1) (in Indonesian).

Udiana, I. M., Saudale, A. R., & Pah, J. J. S. (2014). Analisa faktor penyebab kerusakan jalan (studi kasus ruas jalan w. J. Lalamentik dan ruas jalan gor flobamora) [Analysis of factors causing road damage (case study of W. J. Lalamentik road section) and Gor Flobamora road section)]. *Jurnal Teknik Sipil*, *3*(1), 13–18 (in Indonesian).

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# Study of Road Surface Damage due to Rainwater Puddles using the Pavement Condition Index

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Abstract. Damage to the road surface will cause many losses that users can feel directly. One of the factors that influence the damage is waterlogging. In Mataram City, several roads experience inundation and water runoff when it rains, such as Jalan Swasembada Kekalik and Jalan Kesra Raya Perumnas. The impact on road construction is a change in the shape of the road surface layer, which causes road service performance to decline. So, it needs to be analyzed to determine the damage to the pavement structure in several segments, both flooded and not. The method used to carry out road damage analysis is the method (Pavement Condition Index) PCI. Surveying road conditions in the field collected data. The PCI value is obtained after calculating the parameters, namely: density, deduct value (DV), total deduct value (TDV), and corrected deduct value (CDV). The results showed that the types and average values of damage to Jalan Swasembada Kekalik were: subsidence (6.22%), edge cracks (3.22%), vertical downhill road edges (8.22%), patches (4.25 %), holes (1%), grain release (27.33%). The average value of the Pavement Condition Index (PCI) for each segment is 36.33%, which is at a lousy level (Poor). In comparison, on Jalan Kesra Raya Perumnas, the PCI value is 82.5%, which is at a reasonable level (Good) evidence that the inundated section has a worse condition than the unflooded section is seen in the Jalan Swasembada Kekalik section, where the inundated area has a poor to poor condition. In contrast, the unflooded team has a very good to perfect condition. For the Jalan Kesra Raya Perumnas section, although in flooded areas, the road conditions are less than those that are not flooded. overall, the roads are in good to perfect condition. By looking at the conditions on each lane, it is necessary to deal damage to several road segments immediately to have a decent performance in serving traffic.

Keywords: Road Damage; Pavement Condition Index; Puddles.

#### INTRODUCTION

The components that cause road damage are increased traffic loads, inadequate drainage systems and asphalt pavement materials. Other causes are climate, unstable soil conditions, and planning and execution of work that is not by specifications [1]. Road damage is not caused by one factor alone but can be a combination of several interrelated causes [11].

Factors causing road damage, in general, are increased traffic volume loads, poor drainage systems, poor pavement construction material properties, weather, unstable soil conditions, very thin pavement layer planning, and inappropriate work implementation processes with specifications [5, 10, 12]. Drainage channels not functioning properly lead to puddles on the road surface. Other things that cause inundation are changes in land function and reduced catchment areas [7]. Empirical observations show that the dominant pool of water above the road surface occurs because of the road drainage system. This is due to the lack of integration with the spatial water system of the area around the road and uncontrolled spatial planning. Water in this puddle enters through the pores of the pavement surface so that it can damage the asphalt bond [9].

Several road segments in Mataram City experience inundation and water runoff when it rains. These areas include Kekalik (Jalan Swasembada) and Perumnas (Jalan Kesra Raya). The condition of the road shows that there are puddles in several segments during the rain and persist after the rain has stopped. The impact on road pavement is a change in the shape of the road surface layer in the form of potholes, rutting, cracks, ravelling, and edge scouring. This causes road service performance to decline. According to [6], waterlogging causes the pavement base to be entirely or partially saturated in the road drainage system.

The damage that occurred in the segment that experienced inundation appeared to be more severe than that which was only inundated when it rained. The effect of inundation on road damage can be determined by comparing the analysis results of road damage analysis on the flooded (submerged) and the un-submerged segments. Several methods can be used to analyze road damage, including the Pavement Condition Index (PCI). PCI is a road pavement condition assessment system based on the type and level of damage that occurs and can be used as a reference in maintenance efforts. Identify the type of damage, the severity of the injury, and its size based on the observations during the visual condition survey [8].

It is necessary to study the effect of inundation on road surface damage by looking at the conditions on two roads (Jalan Swasembada Kekalik and Jalan Kesra Raya Perumnas). The purpose of the study was to determine the damage to several road segments in the inundated and unflooded sections when it rains using the PCI method. Based on the results of the analysis, it can be seen the condition of the road surface, whether it is in a state of failure, good to perfect. This is needed to provide recommendations for handling, so that road conditions are feasible to serve traffic.

Types of Pavement Damage [2], divided into 19 damages, namely:

- 1) Crocodile Cracking (Alligator Cracking)
- 2) Overweight (Bleeding)
- 3) Block Cracking
- 4) Basin (Bumb and Sags)
- 5) Curly (Corrugation)
- 6) Depression
- 7) Edge Cracking
- 8) Joint Reflec Cracking
- 9) Vertical Downhill Edge (Lane/Shoulder Drop Off)
- 10) Longitudinal Crack /Transverse Cracking)
- 11) Patching (Patching end Utility Cut Patching)
- 12) Wearing Aggregate (Polished Aggregate)

- 13) Pothole
- 14) Damaged Railroad Crossing (Railroad Crossing)
- 15) Groove (Rutting)
- 16) Sungkur (Shoving)
- 17) Broken Slip (Slippage Cracking)
- 18) Swelling (Swell)
- 19) Grain Release (Weathering/Raveling).

Pavement Condition Index (PCI) is the level of the condition of the pavement surface and the size in terms of road capability, which refers to the state and damage to the pavement surface. PCI is a numerical index whose value ranges from 0 to 100. A value of 0 indicates the pavement is in a failed condition, and a weight of 100 means that the pavement is still perfect. This PCI is based on the results of a visual condition survey. The type of damage, the extent of the damage, and its size are identified when surveying the condition. PCI was developed to provide an index of pavement structural integrity and surface operational conditions. Damage information obtained as part of the PCI condition survey includes information on the causes of the damage and whether the damage is load-related or climate-related.

In the PCI method, the severity of pavement damage is a function of 3 main factors: a) Type of damage, b) The severity of the damage, and c) The amount or density of the damage. The PCI method only provides information on pavement conditions when the survey is conducted but cannot provide a predictive picture in the future. However, by conducting periodic condition surveys, information on pavement conditions can help predict future performance. In addition, it can also be used as input for more detailed measurements.

#### Theoretical basis

Determination of Pavement Condition Index Value. PCI values are obtained in the following order: a) determine the density, b) determine the deduct value, c) determine the total deduct value, d) find the value of q, e) find the correct deduct value (CDV), f) calculate Pavement Condition Index (PCI) value.

*Density*. Density is the percentage of the total area or length of one type of damage to the size or total length of the measured road section. Thus, the damage density can be expressed in equations 1 or 2.

$$Density = \frac{Ad}{As} \times 100, \qquad (1)$$

$$Density = \frac{Ld}{As} \times 100, \qquad (2)$$

Where Ad – total area of damage type for each level of damage (m<sup>2</sup>), Ld – full length of damage type for each level of damage (m), As – total area of segment unit (m<sup>2</sup>).

*Deduct Value*. Deduct value is a deduction value for each type of damage obtained from the curve (Figure 1) of the relationship between density and severity level of damage.



Figure 1 – Graph of deducting value (deduct value)

*Total Deduct Value*. Total Deduct Value (TDV) is the full value of the individual deduct value for each type of damage and the damage level in a research unit (Table 1).

Table 1 – TDV Nilai value

STA	l	TDV				
0+*** to 0+***	13	23	18	27	42	123

Finding the value of q. The requirement to determine the value of q is determined by the sum of the individual deduct values greater than 5 in each road segment under study (Table 2). For example, if there are five values of DV>5, then q=5.

Table 2 – q value

STA	Deduct Value (DV)							
0+*** to 0+***	13>5	23>5	18>5	27>5	42>5	4<5	5	

*Finding the Correct Deduct Value*. The Correct Deduct Value (CDV) value can be found after the *q*, and TDV values are obtained (see points *c* and *d* using the curve in Figure 2.



*Calculating PCI Nilai Value*. The PCI value is obtained using equation 3, using the CDV value.

$$PCI = 100 - CDV , \qquad (3)$$

The overall pavement PCI value is N. The overall PCI value on a particular road pavement segment is researched using equation 4 [4].

$$PCI_f = \sum_{i=1}^{N} PCI , \qquad (4)$$

where  $PCI_f$  – Average PCI value of all research segments; PCI – PCI for each sample unit or research unit; N – number of sample units.

The condition of road damage based on PCI values can be seen in Table 3.

Table 3 – PCI Value Magnitude

PCI value	Condition
0-10	Failed
11-25	Very bad (very poor)
26-40	Bad (poor)
41-55	Medium (fair)
56-70	Good (good)
71-85	Very good (very good)
86-100	Perfect (excellent)

*Repair Method*. According to the practical instructions for routine maintenance of roads UPR.02.1 of 1992, the Director General of Highways has several methods of handling that can be done, among others: Met Handling ode 2 (P2) and Handling Method 5 (P5). Handling Method 2 (P2) is Local Sealing, while Handling Method 5 (P5) is Hole Patching [3].

Method (P2) (Local Sealing), performed on damage: Cracking lines (cracking) and Crocodile skin cracking (alligator cracking). The handling steps are cleaning the area to be handled, marking the square in the place to be dealt, spraying 1.5 kg/m<sup>2</sup> emulsion asphalt on the marked area until evenly distributed, spreading coarse sand or fine aggregate and levelling when using fine aggregate compacted with a light compactor [3].

Method (P5) Hole Patching can be done on damage: rutting Edge cracking, Holes (potholes), Deformation (deformation). Handling steps: making square marks on the area to be treated with paint or chalk, digging the road layer in the area that has been marked square until it reaches a solid layer, compacting the bottom of the excavation, filling the dug hole with substitute material (aggregate foundation layer or cold asphalt mix), consolidating layer by layer, and applying local asphalt over the last layer [3].

#### **METHODS**



Figure 3 - Research areas

*Research Stages.* The research stages include 1) the Research preparation stage, 2) the Data collection survey stage, and 3) the analysis of road damage data and discussion of the results.

The preparation stage is a series of activities before starting data collection and processing. This stage is carried out by preparing a plan to obtain efficiency and effectiveness of time and work. At this stage, preliminary observations are also carried out to get a general picture of identifying and formulating problems in the field. This preparatory stage includes 1) Study of literature/literature from the latest publications related to research; 2) Listing agencies and institutions that can be used as data sources; 3) Determining data needs, data collection methods and personnel needs in the field as well as data analysis methods and discussion of results.

Survey phase of direct visual data collection at the study site on the condition of road damage. The survey location is Section Mataram Self-Sufficiency Street and Perumnas Kesra Raya Street. The survey focuses on the current problems and the state of the damaged pavement under study. The data used to determine the level of road damage is in the form of data on the length, width, area, and depth of each type of damage. The tools used include stationery, roll meter, camera, and motor spray paint. At the same time, the materials used at the data collection stage are the first step after the preparation stage in the critical evaluation and planning process. Because from here, the problem can be determined, and a series of determining alternative problem solving is taken. The data needed include primary data and secondary data. The data analysis is carried out by finding the value of road conditions and knowing how to handle them, including maintenance or rehabilitation.

The analysis and discussion stage is carried out after the data is collected using the PCI method. The analysis results in PCI values are used to determine the level of damage and appropriate repair plans/recommendations. Besides that, there is also a discussion about the effect of the inundated and not flooded parts.

#### **RESULTS AND DISCUSSION**

*Data on road conditions and damage*. Based on the survey results, the condition and road damage on the Kekalik Self-Sufficiency Road and Perumnas Kesra Raya Road can be seen in Table 4.

*Determine the Deduct Value (DV).* The analysis is carried out for each segment on each segment. For example, the analysis used segments STA 0+100 to 0+150 Self-Sufficiency of Kekalik. In Table 4, it can be seen that the total value of each level of damage is: Side of the vertical descending road = 29 m; Patch= 22.5 m; Grain release= 39 m; Edge crack= 8 m; Amblas= 20 m.

#### Table 4 – Values of damage area of two road sections

Airfield asphalt pave	ement sketch: co	ondition survey	data she	et for the sa	ample un	it	Length	50 m	
1. Crocodile crack (r	m²)		9. Sidewalk Downhill Vertical (m <sup>2</sup> )				17. Broken Slip (m <sup>2</sup> )		
2. Overweight (m <sup>2</sup> )	2		10. Longitudinal / Transverse				18. Inflated Head (m <sup>2</sup> )		
3. Checkered Crack	(m <sup>2</sup> )		Crack (	m <sup>2</sup> )			19. Grain Release (m <sup>2</sup> )		
4. Basin (m <sup>2</sup> )			11. Pate	ches (m <sup>2</sup> )					
5. Curly $(m^2)$			12. Agg	regate Wea	r (m²)				
6. Amblas (m <sup>2</sup> )			13. Hole	e (count)					
7. Edge Cracks (m <sup>2</sup> )			14. Rail	Intersectio	n (m²)				
8. Joint Crack (m <sup>2</sup> )			15. Gro	ove (m²)					
			16. Sun	gkur (m²)					
	Kek	alik Self-Sufficie	ency Roa	d Section		Perum	nas Raya Sect	Welfare	e Road
STA		Ouanti	tv. m				Ouant	tv. m	
	19					12		-,,,	
0+000 to 0+050	12					12			
Total	12					12			
1000		Quanti	tv. m		1		Ouanti	tv. m	
	9	11	19				Quant		
0+050 to $0+100$	15	2	20						
0.000100.100	10		4						
			5						
Total	15	2	29						
Total	10	Ouanti	tv m				Ouanti	itv m	
	6	7	9	11	19	1	6	7	19
	20	8	2	15	20	2	7	10	8
0+100  to  0+150	20	0	5	4.5	4		,	10	0
0 100 10 0 1150			7	1.5	15				
			12	1.5	15				
			2	1.5					
Total	20	ß	20	225	20	2	7	10	8
I Otal	20	Ouanti	<u> </u>	<i>LL</i> .J	37	<u> </u>	Ouanti	10	0
0+150  to  0+200	11	13 (counts)	19			1	Quant	12	
011301001200	2	13 (counts)	10			1	4	15	
Total	2	1	10			4	4	15	
I Otal	3	I Ouantii	10 tv m			4	Ouanti	15 ity m	
0,200 to 0,250	C	Qualiti	Ly, III			11	Quant	10	1
0+200 10 0+230	10	7	19		-	2	12	19	
Total	10	7	0 Q			2	40	7	
I Utal	10				1	<u>ک</u>		/	
0,250 to 0,200	12(acumta)		(y, 111 			10		.cy, 111	
0+250 10 0+300		19				12	19		
Tatal	2	10				12	0		
Total	۷.	10				12	0		

*Calculating density*. Density is calculated by equation 3, as follows:

Side of the road down vertically =  $29/(6 \times 50) \times 100 = 9.67 \%$ 

Patches = 22.5/(6×50)×100 = 7.75 %

Grain release = 39/(6×50)×100 = 13 %

Edge Crack=8/(6×50)×100 = 2.67 %

Sink = 20/(6×50)×100 = 6.67 %

Deduct value is the reduction value for each type of damage obtained from the graph. Deduct Value (DV) STA 0+100 to 0+150 on Jalan Swasembada Kekalik can be seen in Figure 4.

Finding the maximum corrected subtraction (CDV). The CDV value in the STA segment 0+100 to 0+150 on the Jalan Swasembada Kekalik section is q = 5 (there are 5 DV values > 5), see Table 5 the CDV value = 65.

100

90

80

70 60

50

30

18

0

100

90

80

70

60

50 V al

40

30 20

0

100 90 80

> 10 0 0.1

0.1

Dedaut

0.1

Deduct

> a- 3 a 40





Table 5 - STA CDV value 0+100 to 0+150 Jalan Swasembada Kekalik

STA	Deduct Value (DV)					Total	q	CDV
0+100 to 0+150	13	23	18	27	42	123	5	65

Calculating PCI. After the CDV value on the Jalan Swasembada section with STA 0+100 to 0+150 is obtained, the PCI value is obtained by equation 3.

PCI value = 100–65 = 35.

Furthermore, the PCI values for all segments on Jalan Swasembada Kekalik and Jalan Kesra Raya Perumnas can be seen in Tables 5, 6.

Road Conditions and Recommendations for Han*dling*. Based on the analysis that has been carried

out above, the value of the pavement condition for six segments of two roads is obtained, which is calculated using the following formula: PCIs = *100 – CDV.* The results are shown in Table 7.

The average PCI value of the number of 6 segments that have been calculated on the Swasembada Kekalik road section is the following value 36.33 %

From the average PCI value of each segment shown in Table 7, the classification of damage to the pavement structure in each part can be seen, so it can be seen that the average PCI value on the Kekalik Swasembada road section is 36.33% which is a lousy level (Poor). The average PCI value on the Perumnas Kesra Raya road section is 82.5%, which is reasonable (Good).

STA	Damage Type	Damage Class, m	Size(m/m <sup>2</sup> )	Density (%)	DVD	CDV	PCI
0+000s / d0+050	Grain release	19	12	4.00	12		
					12	12	88
	Sidewalk down vertical	9	15	5.00	7		
0+050s / d0+100	Patches	11	2	0.67	8		
	Grain release	19	29	9.67	18		
	33	19	81				
	Sink	6	6.67	2.22	13		
	Edge crack	7	2.67	0.89	23		
0+100s / d0+150	Sidewalk down vertical	9	9.67	3.22	18		
	Patches	11	7.75	2.58	27		
	Grain release	19	13	4.33	42		
				-	123	65	35
	Patches	11	3	1.00	123 10	65	35
0+150s / d0+200	Patches Hole, count	11 13	3	1.00 0.33	123 10 35	65	35
0+150s / d0+200	Patches Hole, count Grain Release	11 13 19	3 1 10	1.00 0.33 3.33	123 10 35 15	65	35
0+150s / d0+200	Patches Hole, count Grain Release	11 13 19	3 1 10	1.00 0.33 3.33	123 10 35 15 60	65 48	35 52
0+150s / d0+200	Patches Hole, count Grain Release Sink	11 13 19 6	3 1 10 12	1.00 0.33 3.33 4.00	123 10 35 15 60 18	65 48	35
0+150s / d0+200 0+200s / d0+250	Patches Hole, count Grain Release Sink Edge crack	11 13 19 6 7	3 1 10 12 7	1.00 0.33 3.33 4.00 2.33	123 10 35 15 60 18 12	65 48	35 52
0+150s / d0+200 0+200s / d0+250	Patches Hole, count Grain Release Sink Edge crack Grain release	11 13 19 6 7 19	3 1 10 12 7 8	1.00 0.33 3.33 4.00 2.33 2.67	123 10 35 15 60 18 12 10	65 48	35
0+150s / d0+200 0+200s / d0+250	Patches Hole, count Grain Release Sink Edge crack Grain release	11 13 19 6 7 19	3 1 10 12 7 8	1.00 0.33 3.33 4.00 2.33 2.67	123 10 35 15 60 18 12 10 40	65 48 26	35 52 74
0+150s / d0+200 0+200s / d0+250	Patches Hole, count Grain Release Sink Edge crack Grain release Hole, count	11 13 19 6 7 19 13	3 1 10 12 7 8	1.00 0.33 3.33 4.00 2.33 2.67 0.67	123 10 35 15 60 18 12 10 40 52	65 48 26	35 52 74
0+150s / d0+200 0+200s / d0+250 0+250s / d0+300	Patches Hole, count Grain Release Sink Edge crack Grain release Hole, count Grain release	11 13 19 6 7 19 19 13 19	3 1 10 12 7 8 8 2 10	1.00 0.33 3.33 4.00 2.33 2.67 0.67 3.33	123 10 35 15 60 18 12 10 40 52 15	65 48 26	35 52 74

Table 5 – PCI value of each segment on Jalan Swasembada Kekalik

Table 6 - The PCI value of each segment on the Jalan Kesra Raya Perumnas section

STA	Damage Type	Damage Class, m	Size(m/m <sup>2</sup> )	Density (%)	DVD	CDV	PCI
0+000s / d0+050	Aggregate Wear	12	12	4.00	2		
					2	0	100
	Crocodile crack	1	2	0.67	19		
0+050s / d0+100	Edge crack	7	10	3.33	17		
	Grain release	19	8	2.67	12		
					48	30	70
	Sink	6	7	2.33	8		
0+100s / d0+150	Aggregate Wear	12	20	6.67	4		
	Grain release	19	10	3.33	17		
					29	22	78
	Crocodile crack	1	4	1.33	24		
0+150s / d0+200	Sink	6	4	1.33	8		
	Aggregate Wear	12	15	5.00	4		
					36	27	73
	Patches	11	2	0.67	8		
0+200s / d0+250	Aggregate Wear	12	40	13.33	9		
	Grain release	19	7	2.33	10		
					27	14	86
0.250c/d0.200	Aggregate wear	12	12	4.00	2		
0+2505/ u0+300	Grain release	19	8	2.67	12		
					14	12	88

ርጥ ለ	Kekalik Se	lf-Sufficiency I	Road Section	Perumnas Raya Welfare Road Section			
31A	PCI value	<b>Road Status</b>	Damage rate	PCI value	<b>Road Status</b>	Damage Rate	
0+000 to 0+050	88	Not flooded	Perfect	100	Not flooded	Perfect	
0+050 to 0+100	81	Not flooded	Very good	70	Flooded	Well	
0+100 to 0+150	35	Flooded	Bad	78	Not flooded	Very good	
0+150 to 0+200	52	Flooded	Currently	73	Flooded	Very good	
0+200 to 0+250	74	Not flooded	Very good	86	Not flooded	Perfect	
0+250 to 0+300	52	Flooded	Currently	88	Not flooded	Perfect	

Table 7 – Comparison of the PCI values of flooded and unflooded roads

Based on the above conditions, then by the instructions/regulations of Binamrga [3], it is recommended that the appropriate type of treatment is treatment method 2 (P2)local asphalt sealing (Local Sealing), handling method 5 (P5) Hole Patching on the Jalan Swasembada Kekalik section. In contrast, for the Jalan Kesra Raya Perumnas section, it is recommended to only use handling method 2 (P2).

#### CONCLUSIONS

The average Pavement Condition Index (PCI) on Jalan Swasembada Kekalik is 36.33%, which is at a poor level with the lowest PCI segment value of 35%. While on the Jalan Kesra Raya Perumnas section, 82.5% is reasonable, with the lowest PCI segment value of 70%. The method of maintenance and repair of damage to the road pavement structure on the Jalan Swasembada Kekalik section is the P2 and P5 Repair method. In contrast, the P2 method is used in the Jalan Kesra Raya Perumnas section.

#### REFERENCES

- Arta, Y., Yosritzal, Y., & Yuliet, R. (2017). *Identifikasi Jenis Masalah dan Jenis Penanganan KerusakanJalan Suliki-Simpang Sungai Dadok Kabupaten Lima Puluh Kota* [Identification of Problem Types and Types of Damage Handling for Suliki-Simpang Sungai Dadok Road, Lima Puluh Kota Regency]. Retrieved from https://www.researchgate.net/publication/320977412\_Identifikasi\_Masalah\_dan\_Jenis\_Penang anan\_Kerusakan\_Jalan\_Suliki\_-\_Simpang\_Sungai\_Dadok\_Kabupaten\_Lima\_Puluh\_Kota (in Indonesian).
- 2. Departemen Pekerjaan Umum. (1997). *Tata Cara Perencanaan Geometrik Jalan Kota* [Geometric planning procedure for inter-city roads]. Retrieved from https://library.umy.ac.id/en/koleksi/view/5738/Tata-cara-perencanaan-geometrik-jalan-antar-kota (in Indonesian).
- 3. Direktorat Jenderal Bina Marga. (1992). *Petunjuk praktis pemeliharaan rutin jalan* [A practical guide to routine road maintenance]. Retrieved from https://adoc.pub/petunjuk-praktis-pemeliharaan-rutin-jaland6e9e28339eb6aae75f35979983264a377321.html (in Indonesian).
- 4. Hardiyatmo. (2015). *Pemeliharaan Jalan Raya* [Highway Maintenance]. Yogyakarta: Gadjah Mada University Press, 2015 (in Indonesian).
- 5. Mardianus. (2013). Studi penanganan jalan berdasarkan tingkat kerusakan perkerasan jalan (studi kasus: jalan kuala dua kabupaten kubu raya) [Road handling study based on the level of pavement damage (case study: kuala dua road kubu raya district)]. *Jurnal Teknik Sipil Untan, 13*(1), 12 (in Indonesian).
- 6. Mochtar, I.B., Agung, A.A., Kartika, G.R., & Sipil, T. (2012). Studi pengaruh genangan air terhadap kerusakan jalan aspal dan perencanaan subdrain untuk ruas Jl. Rungkut industri raya, Jl. Rungkut kidul raya, Jl. Jemur sari, Jl. Nginden raya, Jl. Manyar dan Jl. Mulyosari raya [Study of the effect of waterlogging on pavement damage and subdrain planning for Jl. Rungkut industri raya, Jl. Rungkut kidul raya, Jl. Jemur sari, Jl. Nginden raya, Jl. Manyar and Jl. Mulyosari raya.]. Retrieved

from https://www.semanticscholar.org/paper/STUDI-PENGARUH-GENANGAN-AIR-TERHADAP-KERUSAKAN-DAN-Mochtar-Agung/79afbebea6fd261305fbb2d06ecd5c511e8f06bb (in Indonesian).

- 7. Muliawan, I. W. (2019). Dampak genangan air hujan terhadap kondisi jalan antasura di kecamatan denpasar timur [Impact of rainwater inundation on the condition of antasura road in east denpasar sub-district]. *Paduraksa, 8*(1), 44–50 (in Indonesian).
- 8. Munandar, A., Widodo, S., & Sulandari, E. (2014). Analisa kondisi kerusakan jalan pada lapisan permukaan (studi kasus : jalan adi sucipto sungai raya kubu raya) [Analysis of road damage conditions in the surface layer (case study: adi sucipto river raya kubu raya road)]. *Jurnal Mahasiswa Teknik Sipil Universitas Tanjungpura*, *3*(2), 1–11 (in Indonesian).
- 9. Nurhudayah, Dato, A. K., & Parung, H. (2009). *Studi Genangan Air terhadap Kerusakan Jalan di Kota Gorontalo* [Study of Waterlogging on Road Damage in Gorontalo City]. Retrieved from https://dokumen.tips/documents/studi-genangan-air-terhadap-kerusakan-jalan-studi-genangan-air-terhadap.html (in Indonesian).
- 10. Okigbo, N. (2012). Causes of highway failures in Nigeria. *International Journal of Engineering Science and Technology*, *4*(11), 4695–4703.
- 11. Sawaludin, A., Syafarudin, A., & Mayuni, S. (2018). Evaluasi kerusakan jalan pada perkerasan lentur dengan menggunakan metode binamarga (studi kasus ruas jalan desa kapur) [Evaluation of road damage on flexible pavement using the binamarga method (case study of lime village road section)]. *Jurnal PWK, Laut, Sipil, Tambang, 5*(1) (in Indonesian).
- 12. Udiana, I. M., Saudale, A. R., & Pah, J. J. S. (2014). Analisa faktor penyebab kerusakan jalan (studi kasus ruas jalan w. J. Lalamentik dan ruas jalan gor flobamora) [Analysis of factors causing road damage (case study of W. J. Lalamentik road section and Gor Flobamora road section)].*Jurnal Teknik Sipil*, *3*(1), 13–18 (in Indonesian).