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Analysis of Road Damage Using The PCI Method and Alternative Handling (Case Study: Jl. Raya Dumaja - Jl. Raya Tanah Merah, Kab. Bangkalan STA 32+000 - 35+000)

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Abstract

The highway is an essential facility for the community to achieve its goal, so the community needs a safe and convenient road, and it is expected to improve the industry and the economy of the community. However, over time, the condition of the highway will decrease according to the age of the road, and it will be an obstacle for their trip.
This research is conducted to see the condition of the damaged surface flexible stiffening in Jl. Raya Dumaja - Jl. Raya Tanah Merah, Kab. Bangkalan. The method used in this study is the PCI (Pavement Condition Index) method to evaluate road stiffening by type, level, and level of damage that occurs, as well as a reference and maintenance effort.

The result of this research based on the PCI method is JL. Raya Dumaja -Jl. Raya Tanah Merah STA, 32 + 000 - 35 + 000, gets a total score of 53.68 medium (Fair) with a PCI percentage of the highest road conditions is 45% in good road conditions (Good), 38.3% in medium road conditions (Fair), 15% in bad road conditions (Poor) and very bad (Very Poor), 1.67% with the alternative handling is the treatment of abilities.

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1. Introduction

Highways are essential spaces for people to achieve their desired goals. Therefore, people need safe and comfortable roads for their users, which are expected to improve people's living standards and the economy. However, as time goes by, the condition of the road gets worse due to the age of the road, thus becoming an obstacle to smooth travel. In general, there are several causes of road breakdown, namely, the designing life of the road, stagnant water on the road surface that cannot flow due to poor drainage, and congestion which shortens the life of the road from the plan: inadequate planning, inconsistent monitoring and implementation, and no monitoring of road conditions.

In the Bangkalan district, Tanah Merah Highway is a national road connecting the Bangkalan and Sampang districts. One of the Tanah Merah highway sections where traffic jams often occur is the Tanah Merah market area; this occurs because of the large number of vehicles parked on the left and right sides of the road and vehicles that stop temporarily. In addition, the number of vehicles coming in and out of the market's direction and the large number of pedestrians crossing further worsened the road conditions. In the last few months, the road section has suffered quite severe damage at several points, such as Crocodile Skin Cracks, Longitudinal and Transverse Cracks, Edge Cracks, Block Cracks, Asphalt Weathering, Sungkur, and potholes, which have resulted in disturbing driving comfort.

This research is a study to determine the type and type of road damage, extent, and level of damage to the flexible pavement that occurs on the highway utilizing the PCI method.

2. Materials and Methods

2.1 Theoretical Frame Work

A road is a facility designed for land transportation purposes that consists of all aspects of the road, containing supporting construction and fixtures intended for public transportation and is located at land level, above and below ground level, below or over water level, in addition to railroads, lorry roads. as well as cable roads. The rules of Law No. 22 of 2009 mention the classification of functional roads in Indonesia, where there are arterial roads, collector roads, and local roads.
Flexible pavement, namely construction, is arranged on the top layer of the subgrade (subgrade) to support traffic loads and continue the load on the subgrade so that it cannot pass through the carrying capacity of the subgrade. There are two groups of road pavements: flexible pavement, rigid pavement (rigid pavement), and. Several types of damage can be used as a benchmark in this study, especially those that occur a lot on flexible pavements, such as road damage Crocodile Skin Cracks, Transverse and Longitudinal Cracks, Edge Cracks, Block Cracks, Asphalt Weathering, Shovels, and Holes.

2.2 Research Location

In order for the discussion and preparation of the thesis to be directed and not to deviate from the main problem, the limitations of the problem in this study are the limitations of the research location, several roads with flexible pavement from the direction of Jalan Raya Dumaja - Jalan Raya Tanah Merah, Bangkalan Regency. This research uses the PCI method to find the value of road damage during a field survey; this road has one lane with two lanes, the road length is 3 km, and the width is 7 m.

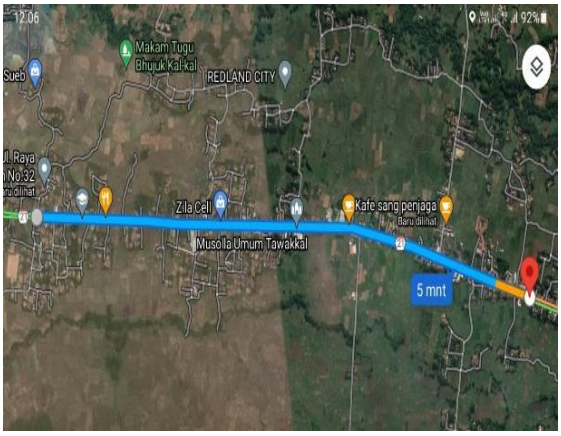


Fig.1 Research Location

2.3 Data

This study uses primary data, Road type, damage volume, and road width obtained by conducting observation surveys and direct measurements in the field. In addition to secondary data, Road Location Maps and Road Characteristics were received by the author indirectly, for example, from related agencies (BBPJN Jawa - Bali).

The sequence of actions to be executed in this study is illustrated in the accompanying flowchart,

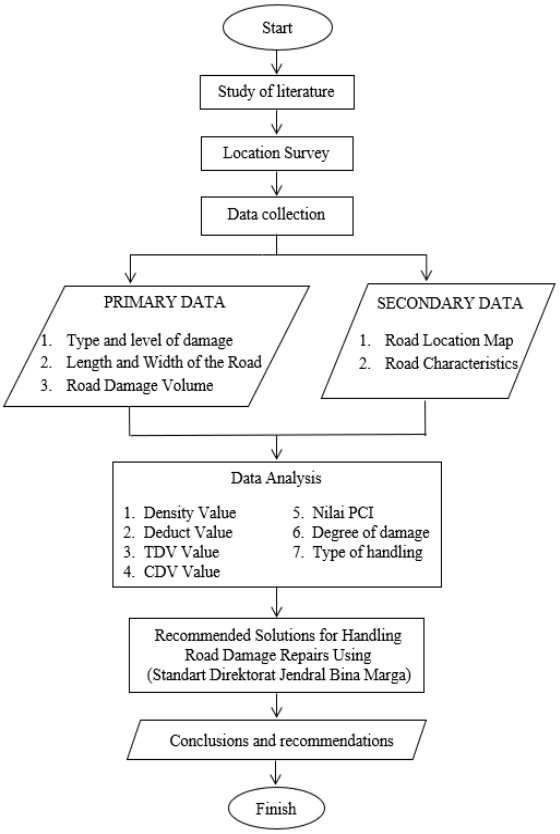


Fig.2 Diagram Flowchart

2.4 Analysis Method

The analysis method uses the PCI method. The following protocols will be implemented upon performing a damage assessment for each specimen utilizing the PCI technique.

a) **Calculate the level of damage (density)**

The density or extent of damage metric pertains to the affected region's ratio relative to the evaluated segment's general area, commonly quantified in units of square feet or meters. Furthermore, the density of a particular type of damage may exhibit variation contingent upon the extent or magnitude of the damage..

$$\text{Density} = \frac{Ad}{As} x100\% \quad (1)$$

$$\text{Density} = \frac{Ld}{As} x100\%$$

With:

Ad: The area of the total damage for each level of damage can be expressed in square meters (m^2)

Ld: The overall extent of damage for each level of damage can be measured in terms of the total length (m)

As: Total area of segment units (m^2)

b) **Determine the Deduction Value**

The deduction value refers to the reduction in value applied to each type of damage incurred in the correlation curve between density and deduct value.

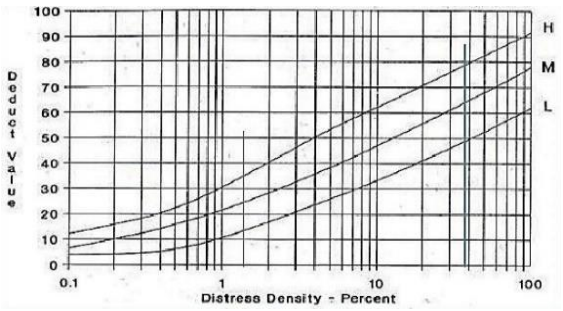


Fig.3 Crocodile Skin Cracked Deduct Value

c) **Determine Total Deduct Value**

Total Deduct Value (TDV) is the total value of individual deductible values for each damage and level of damage occurring in a segment unit.

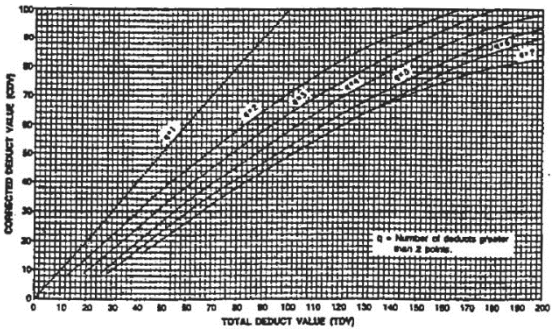
d) **Determine Correction Reduction Value (CDV)**

Determining the Corrected Deduct Value (CDV) involves analyzing the correlation curve between the Total Deduct Value (TDV) and CDV values and subsequently identifying the appropriate curve. If the CDV value acquired is less than the maximum individual deductible value, the maximum individual deductible value is employed as the CDV value. Before that, a permit reduction value (q) must be sought. For asphalt and concrete roads, an individual reduction value of at least 2, as follows:

$$Mi = 1 + (9/98) \times (100 - HDVi) \quad (2)$$

With:

Mi : Corrected value or allowable value for the deduct value



HDVi : Highest individual reduction value in one segment.

Fig.4 Corrected Deduct Value

e) **calculate the PCI value**

The pavement PCI value for each sample unit is calculated using the equation:

$$PCI(s) = 100 - CDV\ Max \quad (3)$$

With:

PCI(s): Pavement Condition Index for each segment

CDV: Corrected Deduct Value

To determine the overall pavement PCI value for a specific road section, the following formula can be utilized for calculation:

$$PCI(f) = \sum \frac{PCI(s)}{N} \quad (4)$$

With:

PCI(f) = Average PCI value of all study areas

PCI(s) = PCI value for each segment unit

N = Number of units per segment

f) **Determine the Degree of Damage**

Pavement Quality Classification

Segment unit macadam coating quality assessment can be determined by analyzing the PCI value assigned to each research unit. This assessment classifies the condition of the coating as excellent, very good, good, fair, poor, very bad, very poor, or failing.

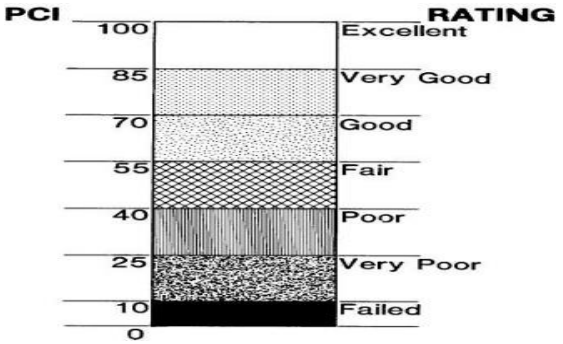


Fig.5 PCI Value Chart

g) **Method of Determining the Type of Handling**

The repair method in Highways (2011) consists of 6 methods as follows:

• Repair Method P1 (Scattering Sand)

• Repair Method P2 (Local Asphalt Melting)

• P3 Repair Method (Crack Closing)

• Repair Method P4 (Filling Cracks)

• Repair Method P5 (Patching Holes)

• Repair Method P6 (Flattening)

Table 1. Road Handling PCI Method using Highways

PCI		Road Handling Category
Upper limit	Lower limit	
100	71	Routine Maintenance
70	56	Periodic Maintenance
55	41	Rehabilitation Handling
40	0	Handling Reconstruction

3. Result and Discussion

3.1 Damage Type Data On PCI

Table 2. PCI survey form

Pavement Condition Survey Form												
Location : JL.Raya Dumaja - JL. Raya Tanah Merah STA: 32+000 - 32+100 No. Sample : 1												
Damage Type									Sketch :			
Crocodile 1. cracked skin (m²) 2. Obesity (m²) 3. Obesity (m²) 4. Curly (m²) 5. disappear (m²) 6. Edge crack (m) 7. Hole (m²) 8. channel (m²) 9. Bump and drop (m²)				10. Spade (m²) 11. Patch (m²) 12. Slippery aggregate (m) 13. Joint reflection crack (m²) 14. Path / shoulder of the road down (m) 15. Longitudinal & transverse cracks (m) 16. Slip crack (m²) 17. Development (m²) 18. Weathering & loose grain (m²)							
Damage Type	Quantity								Total	Density(%)	Deduct Value	
1M	2,34								2,34	0.67	18	
15M	3,24	2.15	4,5	3,8	3,15	3,3	2,8		22,94	6.55	28	
Total deduct value (TDV)				46					PCI = 100 - 34 = 66			
Correct Deduct Value (CDV)				34					Ratting : Good			

The calculation of the deductible value requires calculating the total value of the damage volume first. Example of road damage at No. Sample 1 STA 32+000 – 32+100:

• Crocodile Crack (1M) = 2.34 (m²)

• Longitudinal/transverse cracks (15M) = 22.94 (m²)

a. **Calculating The Level Of Damage**

Density = Ad/As × 100

or

Density = Ld/As × 100

with :

Ad: The area of the total damage for each level of damage can be expressed in square meters (m²)

Ld: The total length of the specific damage type for each level of damage is measured in meters (m)

As the total area of segment units (m²)

• Crocodile Crack (1M) = $\frac{2,34}{3,5x100}x100 = 0,67\ \%$

• Longitudinal cracks (15M) = $\frac{22,94}{3,5x100}x100$
$= 6,55\ \%$

STA width = 3.5 (m)

STA length = 100 (m)

The deduct value is calculated using the deduct value graph by plotting the density value obtained in sample 1.

b. **Determining *the Deduct Value***

After obtaining the Density (%) Crocodile Skin Crack (1M) = 0.67%, Then you can get the deduct value using the Crocodile Skin Crack deduct value chart. For Cracked Crocodile Skin (M) get a score of 18.

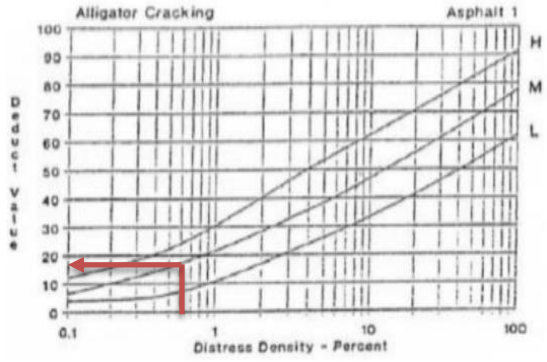


Fig.6 Crocodile Cracked Deduct Value Graph

After obtaining the Density (%) Longitudinal/transverse Crack (15M) = 6.55 %, Then you can get the deduct value using the Longitudinal/transverse Crack deduct value

chart. For Longitudinal/transverse (M) cracks get a value of 28.

Fig.7 Graph of Deduct Value Cracked Longitudinal/transverse

c. **Totaling the Deduct Value**

The aggregate deduction value can be derived by adding up the deduct values of the individual units within the sample. The aggregate deductible amount is utilized to ascertain the nature and extent of harm to a particular segment unit.

Table 3. Deduct Value and Total Deduct Value

Type Damage	Severity Level	Density	Deduct Value
1	M	0,67	18
15	M	6,55	28
	Total Deduct Value		46

d. **Corrected *the Deduct Value***

The corrected Deduct Value is obtainable from the correlation curve between the Total and Corrected Deduct values. However, before that have to find the permission reduction value (q). The individual deduction value is at least 2 for asphalt and concrete roads.

Mi = 1 + (9/98) x (100 – 28)

= 7.61 > 2, where 2 is the reduced value.

The value greater than 2 is (28.18) because everything is more than 2, so all of these data values are considered.

Table 4. Corrected Deduct Value

No.		Deduct Value	Total DV	q	CDV
1	28	18	46	2	34
2	28	2	30	1	30

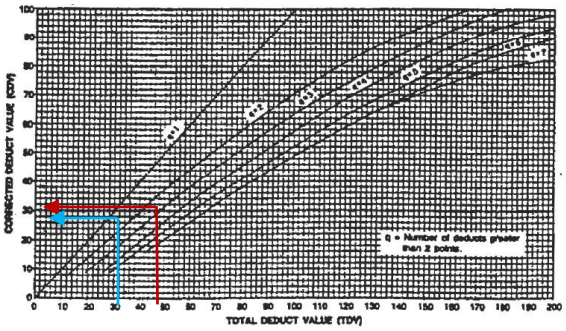


Fig.8 Graph of the Relationship between TDV and CDV

e. **calculate Pavement Condition Index value**

Since the most considerable CDV value is obtained, the PCI value can be calculated using the following:

PCIs = 100 – CDV Max

Where :

PCIs: Pavement condition values

CDV Max: The most considerable corrected reduction value.

PCIs = 100 – CDV Max

= 100 – 34

= 66

On the STA 32+000 – 32+100 section, the PCI value is 66, including the category of Good road conditions.

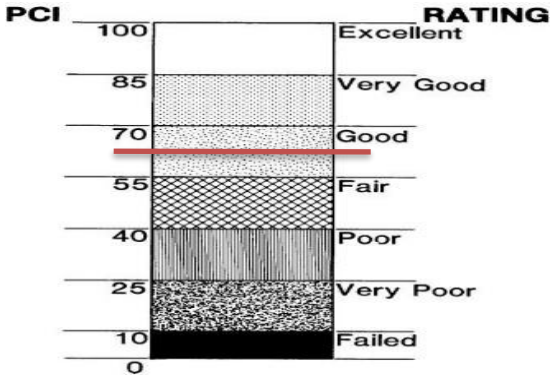


Fig.9 PCI Range Graphics

Table 5. Values and Conditions on Each Segment Direction A

Jl. Raya Dumaja–Jl. Raya Tanah Merah (Direction A)				
No	**STA**	**Segment area**	**PCI**	**Condition**
1	32+000 - 32+100	350 m²	66	Good
2	32+100 - 32+200	350 m²	70	Good
3	32+200 - 32+300	350 m²	65	Good
4	32+300 - 32+400	350 m²	47	Fair
5	32+400 - 32+500	350 m²	68	Good
6	32+500 - 32+600	350 m²	47	Fair
7	32+600 - 32+700	350 m²	53	Fair
8	32+700 - 32+800	350 m²	25	Very Poor
9	32+800 - 32+900	350 m²	43	Fair
10	32+900 - 33+000	350 m²	48	Fair
11	33+000 - 33+100	350 m²	51	Fair
12	33+100 - 33+200	350 m²	70	Good
13	33+200 - 33+300	350 m²	66	Good
14	33+300 - 33+400	350 m²	65	Good
15	33+400 - 33+500	350 m²	57	Good
16	33+500 - 33+600	350 m²	28	Poor
17	33+600 - 33+700	350 m²	27	Poor
18	33+700 - 33+800	350 m²	49	Fair
19	33+800 - 33+900	350 m²	55	Fair
20	33+900 - 34+000	350 m²	42	Fair
21	34+000 - 34+100	350 m²	44	Fair
22	34+100 - 34+200	350 m²	53	Fair
23	34+200 - 34+300	350 m²	54	Fair
24	34+300 - 34+400	350 m²	30	Poor
25	34+400 - 34+500	350 m²	29	Poor
26	34+500 - 34+600	350 m²	51	Fair
27	34+600 - 34+700	350 m²	35	Poor
28	34+700 - 34+800	350 m²	43	Fair
29	34+800 - 34+900	350 m²	40	Poor
30	34+900 - 35+000	350 m²	39	Poor
Total PCI Value			1460	

Table 6. Values and Conditions on Each Segment Direction B

Jl. Raya Dumaja–Jl. Raya Tanah Merah (Direction B)				
No	**STA**	**Segment area**	**PCI**	**Condition**
31	32+000 - 32+100	350 m²	60	Good
32	32+100 - 32+200	350 m²	62	Good
33	32+200 - 32+300	350 m²	63	Good
34	32+300 - 32+400	350 m²	69	Good
35	32+400 - 32+500	350 m²	41	Fair
36	32+500 - 32+600	350 m²	65	Good
37	32+600 - 32+700	350 m²	69	Good
38	32+700 - 32+800	350 m²	70	Good
39	32+800 - 32+900	350 m²	66	Good
40	32+900 - 33+000	350 m²	59	Good
41	33+000 - 33+100	350 m²	68	Good
42	33+100 - 33+200	350 m²	68	Good
43	33+200 - 33+300	350 m²	70	Good
44	33+300 - 33+400	350 m²	69	Good
45	33+400 - 33+500	350 m²	70	Good
46	33+500 - 33+600	350 m²	62	Good
47	33+600 - 33+700	350 m²	60	Good
48	33+700 - 33+800	350 m²	52	Fiar
49	33+800 - 33+900	350 m²	51	Fair
50	33+900 - 34+000	350 m²	43	Fair
51	34+000 - 34+100	350 m²	68	Good
2	34+100 - 34+200	350 m²	39	Poor
53	34+200 - 34+300	350 m²	48	Fair
54	34+300 - 34+400	350 m²	58	Good
55	34+400 - 34+500	350 m²	54	Fair
56	34+500 - 34+600	350 m²	53	Fair
57	34+600 - 34+700	350 m²	61	Good
58	34+700 - 34+800	350 m²	52	Fair
59	34+800 - 34+900	350 m²	51	Fair
60	34+900 - 35+000	350 m²	40	Poor
Total PCI Value			1761	

$$PCIs = \frac{\text{Total Nilai } PCI}{\text{Jumlah Segmen}} = \frac{3221}{60} = 53{,}68 \text{ (Fair)}$$

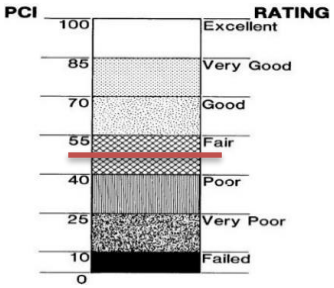


Fig 10. PCI Range Value

f. **The score of the Pavement Condition Index**

Based on the condition of the road pavement condition assessment using the PCI method on Jl. Raya Dumaja – Jl. Raya Tanah Merah, with the highest percentage of road conditions, is 45% in Good-road conditions, 38.3% in Fair-road conditions, 15% in Poor and Very Poor-road conditions, and 1,67%.

Table 7. Percentage of PCI Road Conditions

Road Conditions	Number of Segments	Percentage
Failed	0	0%
Very Poor	1	1,67%
Poor	9	15%
Fair	23	38,33%
Good	27	45%
Very Good	0	0%
Excellent	0	0%
Total	**60**	**100%**

The percentage of road conditions is determined through the following calculation:

Very Poor

Percentage of road condition = 1/60 × 100% =1.67 %

Where :

1: Number of segments

60: Total number of segments

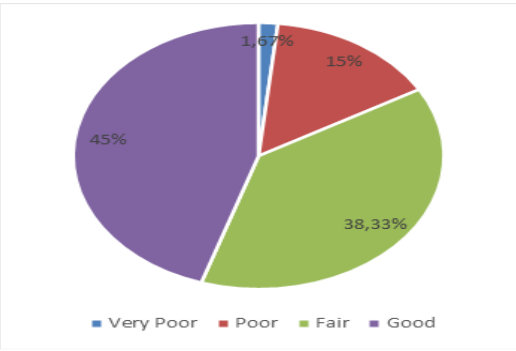


Fig.11 PCI Road Condition Percentage Diagram

Table 8. Percentage of PCI Road Conditions

No	Damage Type	Total area	Percentage
1	Cracked Cr	843,28	32,64%
2	Block Cracl	24,19	0,93%
3	Edge Crack	13,18	0,51%
4	Hole	5,91	0,23%
5	Spade	14,07	0,54%
6	Patch	1217,29	47,13%
7	R. lengthwis	263,33	10,19%
8	Weathering	201,74	7,81%
	Total	**2582,99**	**100%**

Calculation of the percentage of road damage type conditions is obtained by:

Cracked Crocodile Skin

Percentage of road damage type conditions = 843.28/2582.99 × 100% = 32.64 %

Where :

843.28: Total Area

2582.99: Total Area

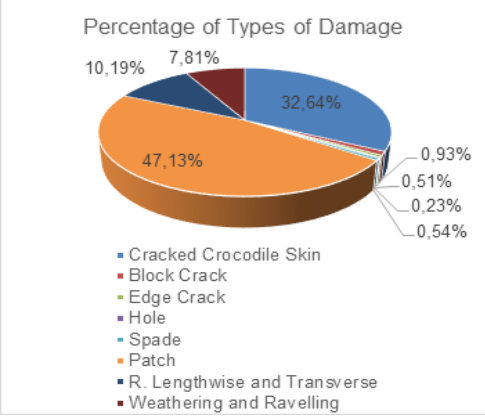


Fig 12. Percentage diagram of types and total area of road damage

g. **Road Damage Maintenance or Handling Techniques**

In carrying out road damage handling activities according to the level of road damage based on different levels of damage, the Pavement Condition Index method is used as a reference for making decisions on handling damage.

Table 9. Percentage of PCI Road Conditions

PCI		Road Handling Category
Upper limit	Lower limit	
100	71	Routine Maintenance
70	56	Periodic Maintenance
55	41	Rehabilitation Handling
40	0	Handling Reconstruction

3.2 Road Damage Maintenance or Handling Techniques

Repair or handling techniques on the Jl. Raya Dumaja–Jl. Raya Tanah Merah, Kab. Bangkalan STA 32+000 – 35+000 is carried out using the Manual from the Ministry of Public Works Directorate General of Highways, "Repair Standards for Routine Road Maintenance," by prioritizing repair or handling techniques for damage with the highest percentage in a sample.

Table 10. PCI Repair or Handling Techniques

STA 32+700 - 32+800		
Damage Type	**wide**	**Damage percentage**
1 (Cracked Crocodile Skin)	36,49	10,43%
3 (Block Crack)	24,19	6,91%
7 (Hole)	0,33	0,09%
11 (Patch)	49,99	14,28%
18 (Weathering & Ravelling)	9,76	2,79%

Table 11. Repair or Handling Technique PCI method A direction

Jl. Raya Dumaja- Jl. Raya Tanah Merah (Direction A)				
No.	**STA**	**Damage Type**	**Damage percentage**	**Repair or Handling Techniques**
1.	32+000- 32+100	R. lengthwise and transverse	6,55%	P4 (Crack Filling)
2.	32+100- 32+200	R. lengthwise and transverse	4,61%	P4 (Crack Filling)
3.	32+200- 32+300	R. lengthwise and transverse	4,25%	P4 (Crack Filling)
4.	32+300- 32+400	R. lengthwise and transverse	1,80%	P4 (Crack Filling)
5.	32+400- 32+500	R. lengthwise and transverse	4,13%	P4 (Crack Filling)
6.	32+500- 32+600	R. crocodile skin	7,11%	P4 (Crack Filling)
7.	32+600- 32+700	R. crocodile skin	4,43%	P4 (Crack Filling)
8.	32+700- 32+800	patch	11,24%	P2 (Surface Dress Asphalt)
9.	32+800- 32+900	R. crocodile skin	14,21%	P4 (Crack Filling)
10.	32+900- 33+000	R. crocodile skin	6,52%	P4 (Crack Filling)
11.	33+000- 33+100	R. crocodile skin	8,04%	P4 (Crack Filling)
12.	33+100- 33+200	R. crocodile skin	4,26%	P4 (Crack Filling)
13.	33+200- 33+300	R. lengthwise and transverse	5,60%	P4 (Crack Filling)
14.	33+300- 33+400	spade	1,99%	P6 (Alignment)
15.	33+400- 33+500	R. crocodile skin	4,96%	P4 (Crack Filling)
16.	33+500- 33+600	patch	22,47%	P2 (Surface Dress Asphalt)
17.	33+600- 33+700	R. crocodile skin	20,31%	P4 (Crack Filling)
18.	33+700- 33+800	patch	9,38%	P2 (Surface Dress Asphalt)
19.	33+800- 33+900	patch	21,72%	P2 (Surface Dress Asphalt)
20.	33+900- 34+000	patch	14,92%	P2 (Surface Dress Asphalt)
21.	34+000- 34+100	R. crocodile skin	9,49%	P4 (Crack Filling)
22.	34+100- 34+200	R. crocodile skin	7,93%	P4 (Crack Filling)
23.	34+200- 34+300	R. crocodile skin	5,17%	P4 (Crack Filling)
24.	34+300- 34+400	R. crocodile skin	29,33%	P4 (Crack Filling)
25.	34+400- 34+500	patch	35,59%	P2 (Surface Dress Asphalt)
26.	34+500- 34+600	R. crocodile skin	7,64%	P4 (Crack Filling)
27.	34+600- 34+700	patch	16,60%	P2 (Surface Dress Asphalt)
28.	34+700- 34+800	patch	8,97%	P2 (Surface Dress Asphalt)
29.	34+800- 34+900	R. crocodile skin	6,22%	P4 (Crack Filling)
30.	34+900- 35+000	patch	12,21%	P2 (local asphalt pavement)

Table 12. Repair or Handling Technique PCI method B direction

Jl. Raya Tanah Merah - Jl. Raya Dumaja (Direction B)				
No.	**STA**	**Damage Type**	**Damage percentage**	**Repair or Handling Techniques**
1.	32+000- 32+100	patch	5,71%	P2 (local asphalt pavement)
2.	32+100- 32+200	patch	16,00%	P2 (local asphalt pavement)
3.	32+200- 32+300	patch	5,15%	P2 (local asphalt pavement)
4.	32+300- 32+400	Weathering & Ravelling	1,68%	P5 (Hole Patching)
5.	32+400- 32+500	patch	7,79%	P2 (local asphalt pavement)
6.	32+500- 32+600	patch	10,43%	P2 (local asphalt pavement)
7.	32+600- 32+700	Weathering & Ravelling	0,92%	P5 (Hole Patching)
8.	32+700- 32+800	R. crocodile skin	2,13%	P4 (Crack Filling)
9.	32+800- 32+900	R. crocodile skin	2,84%	P4 (Crack Filling)
10.	32+900- 33+000	R. edge	3,34%	P3 (Crack Closing)
11.	33+000- 33+100	R. crocodile skin	1,71%	P4 (Crack Filling)
12.	33+100- 33+200	R. crocodile skin	2,32%	P4 (Crack Filling)
13.	33+200- 33+300	R. crocodile skin	4,15%	P4 (Crack Filling)
14.	33+300- 33+400	Weathering & Ravelling	4,17%	P5 (Hole Patching)
15.	33+400- 33+500	patch	4,71%	P2 (local asphalt pavement)
16.	33+500- 33+600	patch	4,41%	P2 (local asphalt pavement)
17.	33+600- 33+700	Weathering & Ravelling	4,15%	P5 (Hole Patching)
18.	33+700- 33+800	patch	1,49%	P2 (local asphalt pavement)
19.	33+800- 33+900	Weathering & Ravelling	6,99%	P5 (Hole Patching)
20.	33+900- 34+000	patch	7,35%	P2 (local asphalt pavement)
21.	34+000- 34+100	R. crocodile skin	4,00%	P4 (Crack Filling)
22.	34+100- 34+200	patch	10,98%	P2 (local asphalt pavement)
23.	34+200- 34+300	patch	1,60%	P2 (local asphalt pavement)
24.	34+300- 34+400	patch	6,86%	P2 (local asphalt pavement)
25.	34+400- 34+500	patch	10,26%	P2 (local asphalt pavement)
26.	34+500- 34+600	Weathering & Ravelling	5,36%	P5 (Hole Patching)
27.	34+600- 34+700	patch	11,71%	P2 (local asphalt pavement)
28.	34+700- 34+800	patch	10,67%	P2 (local asphalt pavement)
29.	34+800- 34+900	patch	7,71%	P2 (local asphalt pavement)
30.	34+900- 35+000	patch	9,81%	P2 (local asphalt pavement)

4. Conclusion

From the calculation analysis using the Pavement Condition Index (PCI) method, it is concluded that in the condition of Jalan Raya Dumaja - Jalan Raya Tanah Merah STA 32+000 to 35+000 with an average density percentage per segment, there are types of damage types, namely longitudinal and transverse cracks (longitudinal cracks) 10.19%, block cracking 0.93%, holes 0.23%, crocodile skin cracks (alligator cracks) 32.64%, weathering and loose granules (raveling) 7.81%, Patching 47.13%, Edge cracking (edge crackling) 0.51% and Spade 0.54% with moderate road damage conditions (Fair) and an overall PCI value of 53 .68%.

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6. Author's Note

I, at this moment, declare that the article entitled "Analysis Of Road Damage Using The PCI Method And Alternative Handling (Case Study: Jl. Raya Dumaja - Jl. Raya Tanah Merah, Kab. Bangkalan STA 32+000 - 35+000)" is an original work and has been defended in the examination to obtain a Bachelor's degree in Civil Engineering at the Civil Engineering Study Program, Faculty of Engineering, Universitas 17 Agustus 1945 Surabaya.

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