Analysis of Road Damage Levels Using the Surface Distress Index Method and Handling Cracked Roads

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</thead>
<tbody>
<tr>
<td>Published: May 21, 2024</td>
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ABSTRACT

Analysis of the Level of Road Damage Using the Surface Distress Index Method and Evaluation and Handling of Cracked Roads (Case Study: Jalan Ciherang Cutak-Jalan Suka Mulya, Ciomas District, Bogor Regency. The existence of roads is very necessary to support the rate of agricultural and other economic growth, considering the important benefits. So the road construction and maintenance sector is a priority for research and development in planning, implementation and maintenance. The road sections experienced damage which includes several factors such as road sections that are frequently used, poor drainage channels. The aim of this research is to determine the type of damage, evaluate and handle damage to road sections, as well as obtain damage values on Jalan Ciherang Cutak-Jalan Suka Mulya, Ciomas District, Bogor Regency based on the parameters of the Surface Distress Index (SDI) method. The length of the road used in this research is ± 1000m which is divided into 10 segments with The length of each road is ± 100m. In this research the author used the Surface Distress Index (SDI) method and used data on damage dimensions including length, width and depth of damage. Based on the results obtained, there are 4 types of damage found on the Jalan Ciherang Cutak-Jalan Suka Mulya section, Ciomas District, Bogor Regency, namely: pavement edge defects, potholes, alligator cracks, longitudinal cracks and the results of the percentage of SDI values in the average damage. The average is 34, which states that the Jalan Ciherang Cutak-Jalan Suka Mulya section, Ciomas District, Bogor Regency is in good condition, and there is an evaluation and handling of SDI values on the Ciherang Cutak-Jalan Suka Mulya road so that the damage does not spread.

Keywords: road damage; SDI value; evaluation; handling.

INTRODUCTION

The rapid development of the Bogor Regency area has had an impact on increasing the flow of traffic, people and goods. An increase in traffic flow that is not balanced with an increase in infrastructure will result in congestion, accidents, noise, and a high risk of stress due to inappropriate traffic infrastructure. The existence of highways is very necessary to support the rate of agricultural and other economic growth, considering that the benefits are so important, the road construction and maintenance sector is a priority for research and development in planning, implementation and maintenance. Roads are land transportation infrastructure that is very important in facilitating economic relations activities. Good road conditions will facilitate population mobility in carrying out economic relations and other social activities.

Frequent use of roads can result in road damage to the road pavement layer, so an analysis is needed to determine the type and level of damage to roads in areas with poor drainage and high levels of rain intensity that cause road conditions to become damaged, such as which occurred on the Jalan Ciherang Cutak - Jalan Suka Mulya road, Ciomas District, Bogor Regency. Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency is a road that connects several sectors, such as the education and tourism sectors.

The aim of this research is: To determine the types of damage that occur on flexible road sections on Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, to determine the
value of the damage conditions of flexible road pavement on Jalan Ciheroang Cuta - Jalan Suka Mulya, Ciomas District. Bogor Regency using the Surface Distress Index (SDI) method. As well as to evaluate and handle flexible road cracks on Jalan Ciheroang Cuta-Jalan Suka Mulya, Ciomas District, Bogor Regency.

According to Bina Marga (2011), the surface distress index (SDI) method is a visual check of data on the total area of cracks, average width of cracks, number of holes and depth of vehicle ruts. The value obtained in the examination will then be calculated using the assessment standard. The following calculations use the SDI method.

**Determining SDI Value 1 (Crack Area)**

SDI 1 Crack Area calculations are carried out at every 100 m interval, so the distance interval is the percentage of the total area of cracks that occur in the pavement layer obtained from field surveys. The total value of the crack area can be seen in equation 1.

\[
\% \text{ crack area} = \frac{A}{100 \times b} \times 100
\]

with:

- \( A \): total crack area (m²)
- \( b \): The width of the road (m)

After getting the crack percentage, then enter the weight as in table 8, below is the SDI 1 calculation

<table>
<thead>
<tr>
<th>Crack Area</th>
<th>SDI 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10%</td>
<td>5</td>
</tr>
<tr>
<td>10% - 20%</td>
<td>20</td>
</tr>
<tr>
<td>&gt;30%</td>
<td>40</td>
</tr>
</tbody>
</table>

**Determine the SDI Value (Crack Width)**

After obtaining the SDI 1 value, the next step is to find the SDI 2 value by determining the total weight of the crack width as listed in table 7. Then the SDI 1 value is entered into the calculation as listed below, namely:

There isn't any

- Crack width <1 mm (fine), then SDI 2 = SDI 1
- Crack width 1-5 mm (medium), then SDI 2 = SDI 1
- Crack width >5 mm (width). Then SDI 2 = SDI 1 \times 2

**Determine the SDI 3 value (Number of Holes)**

After getting an SDI value of 2 (Crack Width), then SDI 2 is included in the SDI 3 (Number of Holes) calculation. The following is the SDI 3 calculation based on the weights as listed in table 9, namely as follows:

There isn't any

- Number of Holes <10/100 m, then SDI 3 = SDI 2 + 15
- Number of Holes 10 - 50/100 m, then SDI 3 = SDI 2 + 75
- Number of Holes >50/100 m, then SDI 3 = SDI 2 + 225

**Determine SDI 4 (Wheel Depth)**

After getting the SDI value weight 4 as in table 11, then enter the SDI value 3 into the following calculation:

There isn't any
Wheel Mark Depth <1 cm (X=0.5), then SDI 4 = SDI 3 + 5 x
Wheel rut depth <1-3 cm (X = 2), then SDI 4 = SDI 3 +5 x
Wheel rut depth >3cm (X= 5), then SDI 4 = SDI 3 +20 x

Road comfort is a crucial aspect in ensuring safe and efficient travel for motorized vehicles. Road surface quality is one of the main factors influencing comfort. A smooth road without potholes, cracks, or rough patches is essential. A smooth road surface not only provides a more comfortable driving experience but also reduces wear and tear on the vehicle. In addition, the road surface must have good grip, especially in wet conditions, to avoid the vehicle slipping. An effective drainage system is also needed to prevent water from pooling on the road surface, which can reduce tire grip and increase the risk of accidents (Syaiful S et.al, 2024; Syaiful S et.al, 2024; Syaiful S et.al, 2024).

The geometric design of the road plays an important role in driving comfort. A road that is wide enough allows two vehicles to pass each other safely, while a standard road slope prevents accidents, especially on curves and inclines. Corners with a large enough radius help avoid overly sharp maneuvers, which can be dangerous for the driver. Apart from that, the existence of supporting facilities such as street lighting is very important. Sufficient street lights ensure good visibility at night, reducing the risk of accidents. Clear and easily visible road signs and markings also provide necessary guidance and warnings to motorists, helping them make the right decisions during their journey (Syaiful S et.al, 2022; Syaiful S, Rusfana H, 2022; Syaiful S, Hariyadi D, 2019; Syaiful S et.al, 2020).

Routine road maintenance is very important to ensure road conditions remain optimal. Regular inspections and repairs on road damage need to be carried out as soon as they are detected. This includes cleaning the road from debris, rubbish and other materials that could interfere with driving comfort. Apart from that, road safety aspects must also be considered. Road barriers and guardrails are needed in dangerous locations such as sharp bends and ravines to prevent vehicles from leaving the road. Roadside safety zones are also needed for emergencies, such as temporary parking or stops, which provide enough space for motorists to resolve problems without disrupting traffic (Syaiful S et.al, 2020; Syaiful S et.al, 2021; Syaiful S Fadly A, 2020; Syaiful S, Andana R, 2021; Syaiful S et.al, 2021; Syaiful S, Irbah AF, 2021).

By taking all these factors into account, road comfort and safety can be significantly improved, providing a better driving experience for all road users. The combination of physical quality of roads, good design, supporting facilities, controlled traffic conditions, routine maintenance, as well as technology and innovation, all contribute to the creation of roads that are comfortable and suitable for motorized vehicles to pass on (Syaiful S et.al, 2022; Syaiful S et.al, 2021; Syaiful S et.al, 2022; Syaiful S et.al, 2022).

Technology and innovation in road management can significantly increase comfort. The use of traffic information systems such as electronic information boards provides real-time traffic information to motorists, helping them take the best route. Sensors and cameras installed on roads can monitor road and traffic conditions, and help with faster and more effective management and repairs (Syaiful S et.al, 2023; Mudjanarko SW et.al, 2023; Syaiful S et.al, 2023; Pratama FA et.al, 2023).

The environment and conditions around the road also affect driving comfort. Vegetation management around roads needs to be done to prevent roots from damaging the road surface and to avoid obstructed views. Providing comfortable and safe rest facilities for drivers traveling long distances is also very helpful. This facility allows drivers to rest, reduces fatigue and improves road safety (Syaiful S et.al, 2023; Syaiful S et.al, 2023; Syaiful S, Suherman S, 2024).

RESEARCH METHODS
This research uses the Surface Distress Index (SDI) method. This method is a visual assessment of road conditions through a location survey of road conditions which produces SDI values. The factors that determine the SDI value are the condition of cracks on the road surface with average crack width, total area, number of holes per 100 m as well as depth of ruts/running. The stages in this
research are divided into 4 stages, namely literature review, data collection, data analysis and conclusions and suggestions. The following is an explanation of the stages and flow diagram in researching the level of damage to Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency:

The literature review stage is the collection of sources of information related to the research topic to help facilitate research. In the form of journals, scientific articles, and other sources.

1. The data collection stage is the collection of primary data and secondary data in order to obtain the information needed to achieve the research objectives.

2. The data analysis stage is the stage in obtaining research results after conducting a survey of road damage conditions, in the form of types of road surface damage and values of road pavement conditions.

3. The conclusion and suggestion stage is obtaining a conclusion from the results of data analysis with road condition values in accordance with the Surface Distress Index (SDI) method. Along with suggestions that can be submitted for road maintenance.

![Research Flow Diagram](image-url)

**Figure 1. Research Flow**

This research is located on Jalan Ciherang Cutak-Jalan Suka Mulya, Ciomas District, Bogor Regency, 1km long, and this road was determined by a letter from the Regent of Bogor Regency with the Dramaga-Ciherang road section with section number 22.01.212 and the length of the road is 3.052km which has a function. Local Primary 1 (LP1). The time for carrying out this research begins in April 2023. The following is a picture of the data collection location.
RESULTS AND DISCUSSION

Identify the type of road damage

To determine the damage value of Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, which is 1km long, this can be done by identifying the condition of the flexible pavement and measuring the damage to the pavement. The following are the types of damage, namely in table 1 below.

Table 1. Types of Damage

<table>
<thead>
<tr>
<th>Location Per STA</th>
<th>Type of Road Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+000 - 0+100</td>
<td>Pavement Edge Defects</td>
</tr>
<tr>
<td>0+300 - 0+400</td>
<td>Hole</td>
</tr>
<tr>
<td>0+500 - 0+600</td>
<td>Crocodile Crack</td>
</tr>
<tr>
<td>0+600 - 0+700</td>
<td>Longitudinal Crack</td>
</tr>
</tbody>
</table>

Based on the description in the table above, the existing types of road pavement damage are one way to make it easier to determine the type of road damage in studying the following discussion. The following are the results of the field survey according to the research location which is along Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency.
Figure 4. Pavement Edge Defects at Sta 0+100. Source: Research data

Figure 4 is the result of documentation of the types of damage that occurred on the road pavement of Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, namely defects in the edge of the pavement surface and the shoulder of the dirt road or on the edge of the shoulder of the asphalt road and the soil around the asphalt.

Figure 5. Holes 0+300 - 0+400. Source: Research data

Figure 5 is the result of documentation of the type of damage that occurred on the pavement of Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, namely holes causing surface cracks and grain release or both. In this study, cracking then occurred in wide cracks followed by the release of aggregate material at the edge of the crack due to traffic loads.

Figure 6. Crocodile Crack 0+500 - 0+600. Source: Research data

Figure 6 is the result of documentation of the type of damage that occurred on the pavement of Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, namely that crocodile cracks can occur due to poor pavement materials, poor subgrade, weathering of the ground surface or the pavement below. The surface layer is less stable and the road surface is unable to withstand the weight of traffic vehicles.
Figure 7. Longitudinal crack 0+600 - 0+700. Source: Research data

Figure 7 is the result of documentation of the type of damage that occurred on the pavement of Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, namely that longitudinal cracks can occur due to reflection cracks, if the asphalt layer is carried out on a cement foundation layer including soil-cement and with cement stability. The asphalt layer will crack due to reflection.

Pavement Condition Assessment Analysis Using the Surface Distress Index (SDI) Method

The research results obtained were in the form of road condition data using visual survey data collection, namely categories of road damage, size and percentage of road damage using the Surface Distress Index (SDI) method and Surface Distress Index (SDI) data which was taken on the Ciherang Cutak road section. – Suka Mulya Road, Ciomas District, Bogor Regency at STA 0+100 – 0+1000 which shows that most of the damage occurred due to crack damage to the road layer.

The calculation and assessment of the Surface Distress Index (SDI) for segments taking sample units for the Ciherang Cutak - Suka Mulya road, Ciomas District, Bogor Regency at STA 0+500, can be seen in the calculations below:

Table 2. Calculation of Field Results

<table>
<thead>
<tr>
<th>STA</th>
<th>Crack (m)</th>
<th>Total Crack Area (m²)</th>
<th>Segment Area (m²)</th>
<th>Crack Area (m)</th>
<th>Total % Crack Area</th>
<th>Number of Holes</th>
<th>Tire Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0+100</td>
<td>0,81</td>
<td>1,1</td>
<td>0,891</td>
<td>430</td>
<td>0,0021</td>
<td>0,0021</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0,7</td>
<td>0,700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0,54</td>
<td>3,8</td>
<td>2,052</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0,7</td>
<td>1,4</td>
<td>0,980</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0,73</td>
<td>0,730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0+200</td>
<td>0,65</td>
<td>5,5</td>
<td>3,575</td>
<td>430</td>
<td>0,0083</td>
<td>0,8314</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0,6</td>
<td>2,2</td>
<td>1,320</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,3</td>
<td>1,1</td>
<td>3,630</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0,74</td>
<td>0,35</td>
<td>0,259</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0+300</td>
<td>2</td>
<td>1,2</td>
<td>2,400</td>
<td>430</td>
<td>0,0056</td>
<td>0,5581</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4,3</td>
<td>0,9</td>
<td>3,870</td>
<td></td>
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</table>
### Analysis of Road Damage Levels Using the Surface Distress Index Method and Handling Cracked Roads

<table>
<thead>
<tr>
<th>Segment</th>
<th>Crack Extent</th>
<th>Crack Area 1</th>
<th>Crack Area 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+400</td>
<td>1.7</td>
<td>0.7</td>
<td>1.190</td>
<td></td>
</tr>
<tr>
<td>0+500</td>
<td>3.08</td>
<td>0.6</td>
<td>1.848</td>
<td>14.0</td>
</tr>
<tr>
<td>0+600</td>
<td>3.2</td>
<td>0.1</td>
<td>0.320</td>
<td>1.0</td>
</tr>
<tr>
<td>0+700</td>
<td>2.8</td>
<td>0.75</td>
<td>2.100</td>
<td>0.0</td>
</tr>
<tr>
<td>0+800</td>
<td>25</td>
<td>0.6</td>
<td>15.000</td>
<td>0.0</td>
</tr>
<tr>
<td>0+900</td>
<td>23.8</td>
<td>0.5</td>
<td>11.900</td>
<td>1.0</td>
</tr>
<tr>
<td>1+000</td>
<td>5.4</td>
<td>0.7</td>
<td>3.780</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Crack Extent**
- Crack Area 1
  - Crack Length: 3.08m
  - Crack Width: 0.6m
  - Road Width: 4.3 m
  - Per Segment: 100m
  - \( L = \text{p} \times l \)
  - \( L = (3.08 \times 0.6)/100 = 0.018 \text{ m}^2 \)

**Segment Area**
- \( = \text{p} \times l \)
- \( = 4.3 \times 100 = 430 \text{ m}^2 \)

**Percentage of Crack Area**
- \( (\text{Crack Area})/(\text{Segment Area}) \)
  - \( = (0.018 \text{ m}^2)/430 \text{ m}^2 = 0.0000041 \text{ m}^2 \)
  - \( = 0.0000041 \times 100\% = 0.0041\% \)

**Crack Area 2**
- Crack Length: 5.9m
- Crack Width: 0.4m
- Road Width: 4.3 m
- Per Segment: 100m
- \( L = \text{p} \times l \)
- \( L = (5.9 \times 0.4)/100 = 0.236 \text{ m}^2 \)

**Segment Area**
- \( = \text{p} \times l \)
- \( = 4.3 \times 100 = 430 \text{ m}^2 \)
= 430 m²

Percentage of Crack Area

\[
\frac{\text{Crack Area}}{\text{Segment Area}} = \frac{0.236 \text{ m}^2}{430 \text{ m}^2} = 0.00054 \text{ m}^2
\]

= 0.054%

Crack Area 3

Crack Length: 0.43 m

Crack Width: 0.25 m

Road Width: 4.3 m

Per Segment: 100 m

\[
L = p \times l
\]

\[
L = \frac{0.43 \text{ m} \times 0.25 \text{ m}}{100 \text{ m}} = 0.00108 \text{ m}^2
\]

Segment Area

\[
= p \times l
\]

\[
= 4.3 \text{ m} \times 100 \text{ m}
\]

= 430 m²

Percentage of Crack Area

\[
\frac{\text{Crack Area}}{\text{Segment Area}} = \frac{0.00108 \text{ m}^2}{430 \text{ m}^2} = 0.00000025 \text{ m}^2
\]

= 0.00000025 x 100 %

= 0.00025%

From the results above the sum is 0.0041 + 0.054 + 0.00025 = 0.05835%

Determine SDI 1 based on crack area:

The crack area presentation at STA 0+500 is 0.05835% based on the table

From road conditions based on 2.12 If less than 10% then the SDI value = 5.

Establish SDI 2 based on average crack width:

Because the crack width is at a medium level, namely <5mm at STA 00+500, namely 10.

Set SDI 3 based on number of holes:

The number of holes in STA 0-500 is 14 if holes are 10-50 then SDI3 = SDI2 + 75 = 85

Setting SDI 4 based on wheel depth:

Because there are no ruts on STA 0-500, the value of SDI4 = SDI3 where SDI3 is 85 so SDI4 = 85.

From the road conditions based on table 2.12, the SDI value in the 0-500 segment is obtained, namely SDI 50-100, so the road condition is moderate. The following is a calculation table from the analysis of road condition assessments on Jalan Ciherrang Cutak-Jalan Suka Mulya, Ciomas sub-district, Bogor Regency using the SDI (surface distress index) method from STA 0-100 to 1-000.

Table 3. Research Analysis Calculation Results

<table>
<thead>
<tr>
<th>STA</th>
<th>% Crack Area</th>
<th>Crack Width (m²)</th>
<th>Number of Holes</th>
<th>Wheel Marks (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+100</td>
<td>0.012</td>
<td>1.546</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>0+200</td>
<td>0.831</td>
<td>2.2875</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>0+300</td>
<td>1.735</td>
<td>0.9333</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>0+400</td>
<td>0.840</td>
<td>0.8075</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>0+500</td>
<td>1.004</td>
<td>0.4167</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>0+600</td>
<td>0.116</td>
<td>0.2333</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0+700</td>
<td>12.284</td>
<td>0.775</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0+800</td>
<td>3.488</td>
<td>0.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0+900</td>
<td>4.401</td>
<td>0.5167</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1+000</td>
<td>2.765</td>
<td>0.9</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
From the road conditions based on table 3, the following is a table of advanced calculations from the analysis of road condition assessments on Ciherang Cutak Road - Suka Mulya Road, Ciomas District, Bogor Regency using the Distress Index (SDI) Survey method from STA 0+100 - 0+1000

<table>
<thead>
<tr>
<th>STA Segment</th>
<th>SDI 1</th>
<th>SDI 2</th>
<th>SDI 3</th>
<th>SDI 4</th>
<th>SDI Per Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Road Conditions</strong></td>
<td>Crack Area</td>
<td>Crack Width</td>
<td>Number of Wheel Holes</td>
<td>Crack Width</td>
<td>Number of Wheel Holes</td>
</tr>
<tr>
<td>0+100</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+200</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+300</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+400</td>
<td>4</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+500</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>0+600</td>
<td>6</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+700</td>
<td>7</td>
<td>20</td>
<td>40</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>0+800</td>
<td>8</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>0+900</td>
<td>9</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>1+000</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>34</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 4 above, the average surface distress index (SDI) value is 35 with good road conditions. However, there are several damaged segments with moderate conditions at STA 0+500. The following are graphic results of road conditions.

**Figure 8.** Road Damage Graph

The results of the graph above are the results of dividing the percentage (%) for each condition of damage, namely good condition 80%, moderate 20%, slightly damaged 0% heavily damaged 0%.

**Evaluation Results of SDI Values and Handling on Cracked Roads**

Based on the relationship between the surface distress index value and the resulting values for the area and width of cracks and handling on the Ciherang Cutak road-Suluyu road, it is presented in table 5.
The graph of the number of crack areas from segments 1 to 10 is presented in Figure 9 below.

The graph above shows the value of the area of cracks on Jalan Ciherang Cutak - Jalan Suka Mulya, showing the large number of crack areas from segments 1 to 10. However, the largest number of crack areas is shown in segment 7 with a crack area value of 12.2%.

CONCLUSION

Based on the analysis that has been carried out in research using the Surface Distress Index (SDI) method on Jalan Ciherang Cutak - Jalan Suka Mulya, Ciomas District, Bogor Regency, it can be concluded as follows: a). There are 4 types of damage on the Ciherang Cutak-Suka Mulya road, namely: pavement edge defects, potholes, crocodile cracks and longitudinal cracks. b). From the results of the percentage of road damage with the average value of the Surface Distress Index (SDI), the condition of the Ciherang Cutak - Suka Mulya road, Ciomas District, Bogor Regency, namely 34, the Ciherang Cutak - Suka Mulya road, Ciomas District, Bogor Regency is in good condition and the results from the graph road conditions with a percentage value (0%) divided into each condition of damage with good condition 80%, moderate 20%, slightly damaged 0%, and heavily damaged 0%. c). From the results of the evaluation and handling of the surface distress index value on Jalan Ciherang Cutak - Jalan Suka Mulya, the road is in segments 1-4.8-10 in good condition. while 5 and 7 indicate moderate conditions, however, to prevent widespread cracking, routine and periodic maintenance is needed along the Ciherang Cutak Suka Mulya road so that the damage does
not spread. Meanwhile, for the area of cracks, there are ups and downs per each segment, but in segment 7 there is a high damage area value, namely 12.2%.

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