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Road Damage Analysis using PCI and SDI Methods and Types Repair

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ABSTRACT

The By-Pass Pariaman road section is a National Road under the authority of the West Sumatera National Road Implementation Agency with road section number N.048 with a length of 3.600 meters with the starting point of the "simp. IV Jati" and the ending point of the "simp. Apar". In this study, an analysis of road damage conditions was carried out using PCI method and SDI method with the results: PCI method for the "simp. IV Jati – simp. Apar obtained that the most dominant percentage is good 40%, for the "simp. Apar – simp. IV Jati" the most dominant percentage is fair 36%. The SDI method for the "simp. IV Jati – simp. Apar" is good at 56%, medium at 30%, lightly damaged at 14% and heavily damaged at 0%, with a steady condition percentage of 86% and 14% unstable. The value of the road condition of the "simp. Apar – simp. IV Jati" is good at 47%, medium at 20%, lightly damaged at 33%, heavily damaged at 0%, with a steady condition percentage of 67% and unstable at 33%. For this type of road repair with PCI method for "simp. IV Jati – simp. Apar" is 2.200 meters of routine maintenance and 1.400 meters of periodic maintenance. The "simp. Apar – simp. IV Jati" can be routinely maintained for 2.000 meters and periodic maintenance for 1.600 meters. Road repairs with SDI method are generated for the "simp. IV Jati – simp. Apar" is 3.100 meters of routine maintenance and 500 meters of periodic maintenance. The "simp Apar – simp. IV Jati can be routinely maintained for 2.400 meters and regular maintenance for 1.200 meters.

Keywords: *Road Damage; PCI; SDI; Type of Repair.*

INTRODUCTION

The By-Pass Pariaman road section is a road that connects several regencies/cities in West Sumatera Province, such as connecting Padang City and Padang Pariaman Regency with Pasaman Regency and West Pasaman Regency. The condition of the By-Pass Pariaman Road, which is quite severe, must be handled immediately. Therefore, it needs to be re-evaluated to determine the condition of the existing road.

Road infrastructure that is burdened by high and repeated traffic volumes will cause a decrease in road quality. As an indicator, it can be seen from the condition of the road surface both structural and functional conditions that are damaged [1].

The causes of road damage are overloaded vehicles, puddles of water on the road surface caused by a poor drainage system, and the implementation of construction work that does not per the plan [2]. Road geometric planning using the Autodesk Infraworks application obtained results for this class III A collector road, which is 2.706,38 m long, has eight bends and six vertical curves and an excavation volume of 21.550,44 m3 and an embankment volume of 21.519,47 m3 [3]. The field load, higher than the standard load, reduces the design life. On the

Tanah Badantung - Kiliran Jao Road Section, there was a reduction of 56.8% (2 years ten months) from a design age of 5 years to 2 years two months [4]. The condition of damage to a road section needs to be analyzed to determine the damage amount and appropriate handling measures [5].

MATERIALS AND METHODS

Pavement Condition Index (PCI) Method

Pavement Condition Index (PCI) is a road pavement condition assessment system based on the type, level and extent of damage that occurs and can be used as a reference in maintenance efforts developed by the U.S Army Corp of Engineers (ASTM D6433-07). Continue to accommodate the needs of movement with a certain level of service; it is necessary to make an effort to maintain the quality of road services, where one of these efforts is to evaluate the condition of the road surface using the Pavement Condition Index (PCI) method [6].

In the Pavement Condition Index (PCI) method, the severity of pavement damage is a function of 3 main factors, namely :

1.1.1. Distress Type

Distress types are types of damage visually that can be seen on the pavement surface. According to Shahin (1994), there are 19 (nineteen) types of damage to flexible pavements in the Pavement Condition Index (PCI) method, including Alligator Cracking, Bleeding, Block Cracking, Bumps and Sags, Corrugation, Depression, Edge Cracking, Joint Reflection Cracking, Lane / Shoulder Drop Off, Longitudinal & Transversal Crack, Patching and Utility Cut Patching, Polished Aggregate, Potholes, Railroad Crossing, Rutting, Shoving, Slippage Cracking, Swell and Weathering/Ravelling. Fine crack damage can develop into alligator cracks. Crocodile skin cracks, if not treated immediately, can result in small holes due to the release of grains. This will result in very uncomfortable motorists using the road [7].

1.1.2. Distress Severity

The distress severity is the severity identified according to the condition of a pavement type. This severity level is divided into low, medium and high for each damage.

1.1.3. Distress Quantity

The distress quantity is related to the measurement, the unit of measure and the sum (total) on the survey form at each level of damage severity.

Pavement Condition Index (PCI) values with road conditions can be seen in Figure 1 below:

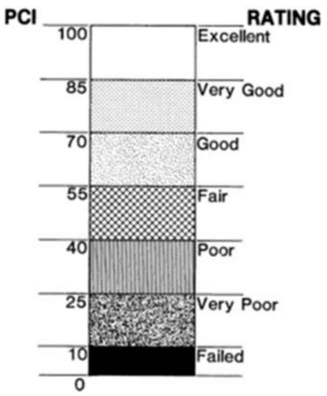

Figure 1: PCI Value Chart

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Pavement condition assessment is carried out to obtain a PCI value rating to obtain road conditions in specific segments (sample units) or the entire road being assessed. This assessment is influenced by several factors, namely:

1. Density

Density is the percentage of the area of each type of damage to the size of the road measured (sample unit).

$$\text{Density (\%)} = \frac{Ad}{As} \times 100 \quad (1)$$

2. Deduct Value (DV)

Deduct value is a deduction value for each type of road damage obtained from the curve of the relationship between density and severity level of damage.

3. Total Deduct Value (TDV)

Total deduct value is the full value of the individual Deduct value for each type of damage and the damage level in a research unit.

4. Corrected Deduct Value (CDV)

Corrected deduct value is obtained from the relationship curve between total deduct value (TDV) and deduct value (DV). The deduct value (DV) used in the calculation is the deduct value (DV), whose value is greater than 2 for roads with an asphalt surface.
To determine the amount of permit deduction (m) for asphalt pavements, use the formula:

$$m = 1 + (9/98)(100 - HDV) \quad (2)$$

The corrected Deduct Value (CDV) is determined from q and the Total Deduct Value (TDV), using the corrected value in the curve in Figure 2 below.

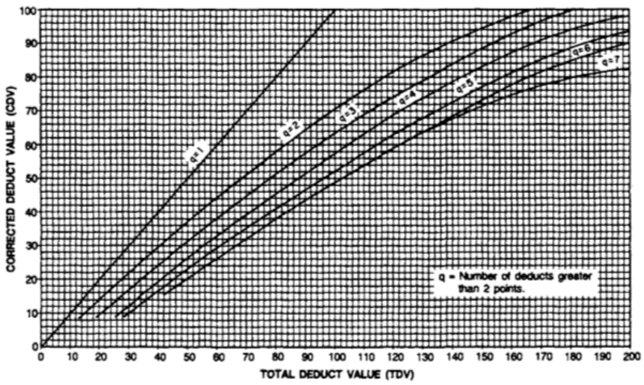

Figure 2: Corrected Deduct Value Curve

5. Pavement Condition Index (PCI) Value

After the Corrected Deduct Value (CDV) is obtained, the Pavement Condition Index (PCI) for each sample unit is calculated using the following equation:

$$PCLs = 100 - CDV \quad (3)$$

Pavement Condition Index (PCI) value of the overall pavement on certain roads is:

$$PCIr = \sum \frac{PCLs}{N} \quad (4)$$

By calculating using the Pavement Index Condition (PCI) method, an average PCI value of 56.89 is obtained, indicating that the road surface is in fair condition [8].

Surface Distress Index (SDI) Method

The classification of asphalt road conditions based on the regulation of the Minister of Public Works, number: 13/PRT/M/2011, concerning road maintenance and surveillance procedures, is as follows:

a. road in good condition
b. Road in medium condition
c. Road in lightly damaged condition
d. Road in heavily damaged condition

According to RCS or SKJ, to calculate the Surface Distress Index (SDI) value, only four elements are needed, which are used as support: % crack area, average crack width, number of holes/km and average depth of rutting ruts. The calculation of the Surface Distress Index (SDI) value can be seen in Table 1 below.

Table 1: Calculation of Surface Distress Index (SDI) Value

Main Data Related to Main Road Sections	Sub Main Data of Main Street Section	Code	Code Description	Designation For Asphalt or Soil/Gravel
Cracks	% crack area	1 2 3 4	None (SDI = 0) <10% area (SDI = 5) 10 - 30% area (SDI = 20) >30% area (SDI = 40)	Asphalt pavement
	Average Crack Width	1 2 3 4	None Low <1 mm Medium 1 – 5 mm High >5 mm (SDI = SDI x 2)	Asphalt pavement
Other Damage	1. Number of Holes	1 2 3 4	None 1/100 meters (SDI = SDI + 15) 2 – 5/100 meters (SDI = SDI + 75) >5/100 meters (SDI = SDI + 225)	Asphalt pavement & Soil/Gravel
	2. average depth of rutting ruts	1 2 3 4	None <1 cm depth (SDI = SDI+2,5) 1-3 cm depth (SDI = SDI+10) >3 cm depth (SDI = SDI+20)	Asphalt pavement & Soil/Gravel

The relationship between SDI values and road conditions is presented in Table 2 below.

Table 2: The Relationship Between SDI Values and Road Damage Conditions

SDI value	Road Damage Conditions
< 50	Good
50 - 100	Medium
101 - 150	lightly damaged
> 150	heavily damaged

Processing data from road condition survey results is carried out to determine whether the road pavement is in good condition, moderate, slightly damaged or heavily damaged [9]. Assessment of road pavement conditions using the SDI method is carried out visually using a field survey. The results of the road assessment study using SDI were 54% in good condition, 15% in medium state and 31% in heavily damaged condition [10].

The Surface Distress Index (SDI) is a visual road functional condition assessment system that can be used as a reference for maintenance efforts. Based on this opinion, the Surface Distress Index (SDI) is a visual survey that can be used as a reference for maintenance efforts [11]. The existence of road condition assessment research using the IRI, SDI, and PCI methods can provide an overview or description of road conditions that can be used as a database for planning and implementing road rehabilitation and maintenance [12].

It is necessary to measure road conditions subjectively by using the International Roughness Index (IRI), Surface Distress Index (SDI) and Pavement Condition Index (PCI) methods. Of the three parameters, it is also necessary to examine how strong the correlation is between PCI and IRI or SDI and IRI to evaluate the existing road pavement conditions [13]. Based on the analysis results, studies using the PCI and SDI methods show different results because the PCI method observes all the damage that occurs on the road pavement. In contrast, the SDI method only follows four elements of damage, so the results shown are different [14].

Type of Repair Road

In the Regulation of the Minister of Public Works Number 13 of 2011 concerning Procedures for Maintenance and Surveillance of Roads Article 5, it is stated that the preservation of road assets is a road maintenance activity which can be followed by the reconstruction of planned road sections, among others due to natural disasters. Road maintenance includes:

a. Routine Maintenance
b. Periodic Maintenance
c. Road Rehabilitation
d. Road Reconstruction

The condition of the road will decrease along with the service life caused by traffic loads and several other factors, so to restore its shape to a steady state, efforts to maintain the road are needed. However, due to limited funds, not all road sections can be handled, so a priority scale is required with the proper criteria in determining the road sections that need to be handled immediately [15]. In Table 3 below it can be seen the determination of the type of road repair based on road conditions, namely:

Table 3: Determination of the Type of Road Repair

Condition	Road Handling Type
Good	Routine Maintenance
Medium	Routine Maintenance
lightly damaged	Periodic Maintenance
heavily damaged	Reconstruction

Based on the SDI method analysis results, 100% regular maintenance was obtained. The condition of road stability is 90% for the 11 routes in Johan Pahlawan District and is suitable as an evacuation route [16]. Routine maintenance is the solution for handling road damage along the road section based on the value of the condition of the damage. Regular maintenance

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includes patching, filling surface gaps/cracks (sealing) and sprinkling asphalt [17].

RESULTS AND DISCUSSION

Determination of Road Condition Value

1.1.4. Pavement Condition Index (PCI) Road Condition Value

At stations 1+450 – 1+500, four types of damage were obtained, namely depression, patching, joint reflection cracking and slip cracks.

- Depression
  Ad = 50,54 m2, As = 375 m2
  Density(%)=50,54/375 x 100 = 13,48 %
- Patching
  Ad = 7,68 m2, As = 375 m2
  Density (%) = 7,68/375 x 100 = 2,05 %
- Joint Reflection Cracking
  Ad = 10,00 m2, As = 375 m2
  Density (%) = 10,00/375 x 100 = 2,67 %
- Slip Cracks
  Ad = 0,60 m2, As = 375 m2
  Density (%) = 0,60/375 x 100 = 0,16 %

After the density value is known, determine the Deduct Value (DV) value by looking at the Deduct Value chart corresponding to the type of damage at each station.

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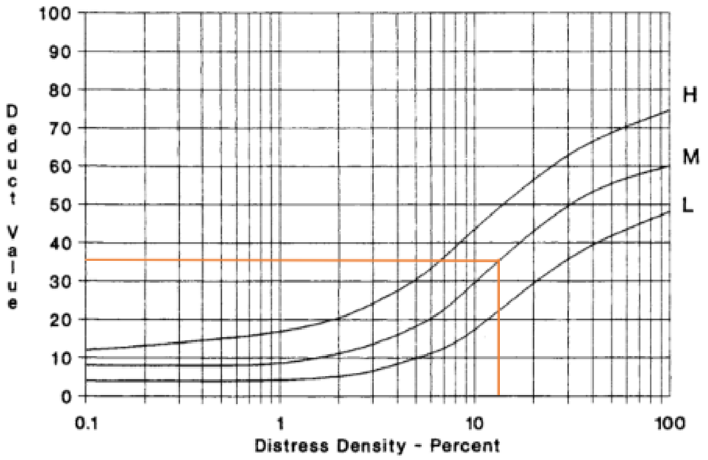

Figure 3: Graph of Deduct Value Depression for a Density of 13.48%

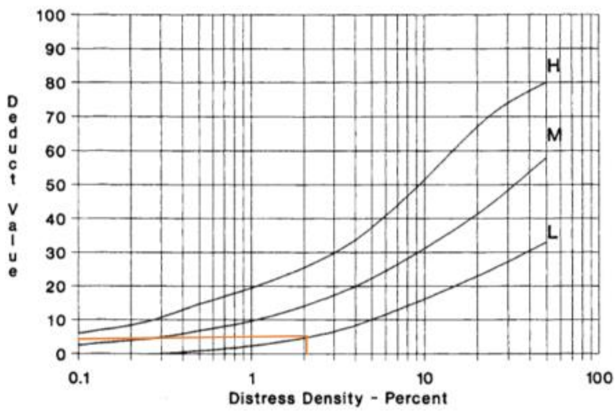

Figure 4: Graph of Deduct Value Patching for a Density of 2,05 %

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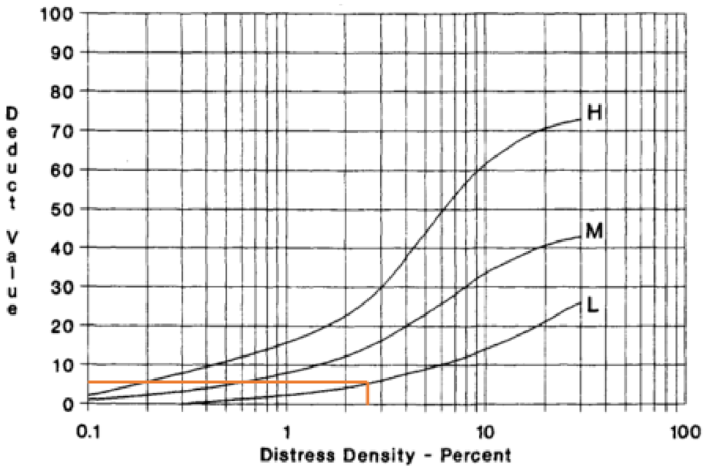

Figure 5: Graph of Deduct Value Joint Reflection Cracking for a Density of 2,67 %

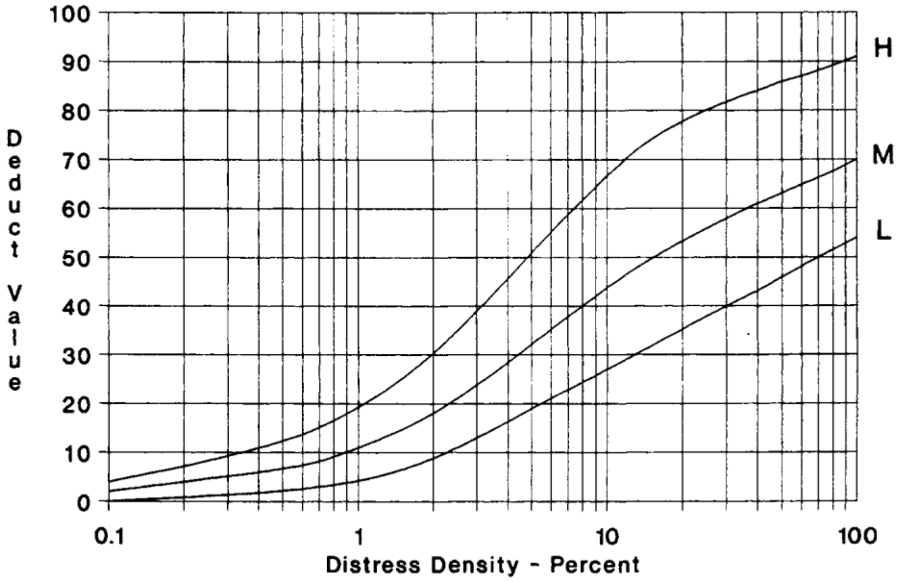

Figure 6: Graph of Deduct Value Slip Cracks for a Density of 0,16 %

After the Deduct Value (DV) for each type of damage is known, then look for the Total Deduct Value (TDV), which is the total number of Deduct Value (DV) for each segment. Deduct Valur (DV) for each type of damage can be seen in Table 4 below.

Tabel 4: Deductible Value (DV) at Sta 1+450 – 1+500

Distress Type	*Severity Level*	*Density (%)*	*Deduct Value*
6	M	13,48	35
11	L	2,05	5
13	L	2,67	6
16	L	0,16	0

After the Total Deduct Value (TDV) is obtained, then look for the Corrected Deduct Value (CDV) obtained from the relationship curve between Total Deduct Value (TDV) and Deduct Value (DV). The Deduct Value (DV) used in the calculation is the Deduct Value (DV) that is greater than 2. If there is only one Deduct Value (DV) (or none), the Total Deduct Value (TDV) is used as the deductible, not the Corrected Deduct Value (CDV). The iteration step is carried

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out if there is more than one deductible value.

The individual deductible values are arranged in decreasing values to 35, 6, 5, and 0. Then calculate the number of permit deductions (m) with the equation:

m = 1 + (9/98)(100 – HDV), where HDV value = 35 (highest individual reduction value in the sample), so

m = 1 + (9/98)(100 – 35)

= 6,97 > 4 (number 4 is the amount of data deducted value, DV)

So the individual Deduct Values used are 35, 6 and 5 with a value of q = 3 (because the DV value is more significant than two as many as three numbers). Then the Corrected Deduct Value (CDV) value is determined from q and the Total Deduct Value (TDV), using the correction value in the Corrected Deduct Value (CDV) graph in Figure 7 below.

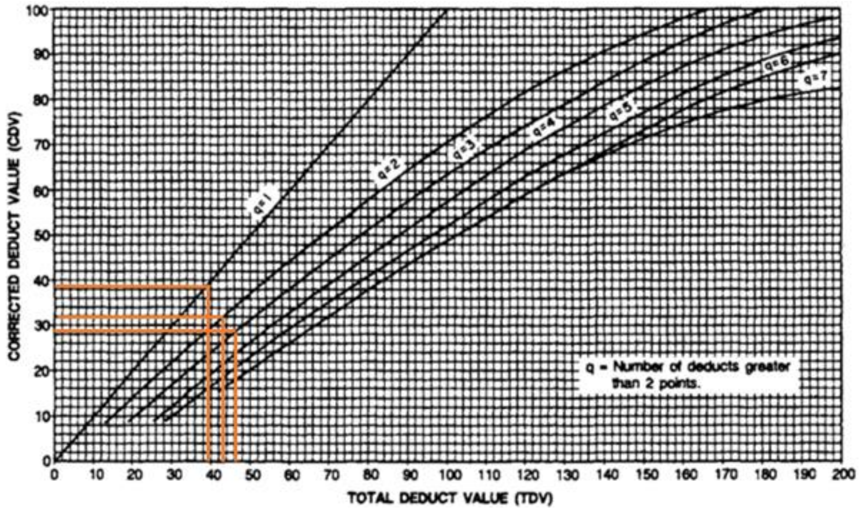

Figure 7: Graph of Corrected Deduct Value (CDV) at Sta 1+450 – 1+500

The maximum CDV value is the largest CDV value obtained from Figure 8 by looking at the Corrected Deduct Value chart. Namely, the maximum CDV is 39. Then the PCI value for Sta 1+450 – 1+500 can be calculated using the following equation:

PCI = 100 – CDV

= 100 – 39

= 61

Based on the PCI rating scale method, the value of PCI = 61 is included in good road conditions. Furthermore, the PCI value can be determined at each station. Table 5 shows the PCI values and road conditions on road two-lane By Pass Pariaman from station 1+450 to station 5+050, with a road length of 3.600 meters on each road section.

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Table 5: PCI Value and Road Conditions at Each Station

STA			Simp. IV Jati - Simp. Apar		Simp. Apar - Simp. IV Jati	
			PCI VALUE	CONDITION VALUE	PCI VALUE	CONDITION VALUE
01+450	-	01+500	61	Good	26	Poor
01+500	-	01+600	63	Good	53	Fair
01+600	-	01+700	53	Fair	69	Good
01+700	-	01+800	60	Good	53	Fair
01+800	-	01+900	60	Good	65	Good
01+900	-	02+000	61	Good	60	Good
02+000	-	02+100	62	Good	29	Poor
02+100	-	02+200	57	Good	28	Poor
02+200	-	02+300	58	Good	64	Good
02+300	-	02+400	45	Fair	55	Fair
02+400	-	02+500	47	Fair	64	Good
02+500	-	02+600	33	Poor	51	Fair
02+600	-	02+700	46	Fair	54	Fair
02+700	-	02+800	53	Fair	53	Fair
02+800	-	02+900	61	Good	65	Good
02+900	-	03+000	55	Fair	66	Good
03+000	-	03+100	63	Good	62	Good
03+100	-	03+200	59	Good	54	Fair
03+200	-	03+300	47	Fair	76	Very Good
03+300	-	03+400	52	Fair	45	Fair
03+400	-	03+500	58	Good	50	Fair
03+500	-	03+600	70	Good	58	Good
03+600	-	03+700	100	Excelent	100	Excelent
03+700	-	03+800	100	Excelent	100	Excelent
03+800	-	03+900	100	Excelent	100	Excelent
03+900	-	04+000	100	Excelent	100	Excelent
04+000	-	04+100	100	Excelent	100	Excelent
04+100	-	04+200	60	Good	80	Very Good
04+200	-	04+300	62	Good	48	Fair
04+300	-	04+400	36	Poor	47	Fair
04+400	-	04+500	54	Fair	69	Good
04+500	-	04+600	52	Fair	52	Fair
04+600	-	04+700	54	Fair	55	Fair
04+700	-	04+800	72	Very Good	72	Very Good
04+800	-	04+900	47	Fair	63	Good
04+900	-	05+000	74	Very Good	68	Good
05+000	-	05+050	76	Very Good	39	Poor

After the PCI value of each station is known, the overall value of the 3.600 meters By Pass Pariaman national road is calculated, namely:

Road section simp. IV Jati – simp. Apar:

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

$$PCI = \frac{2311}{37} = 62{,}46$$

Road section simp. Apar – simp. IV Jati :

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

$$PCI = \frac{2293}{37} = 61{,}97$$

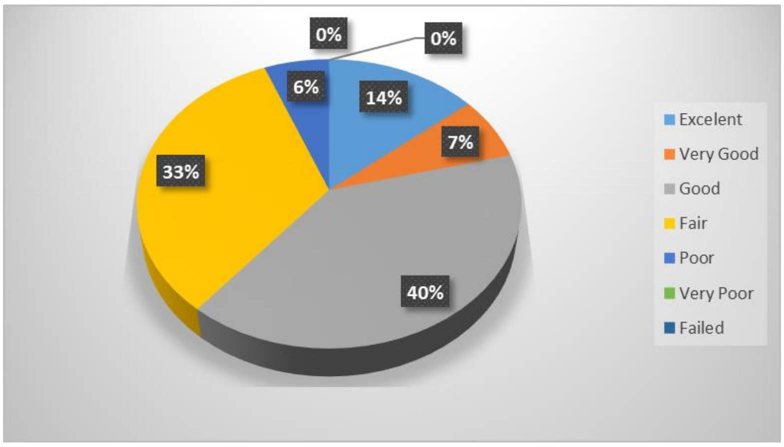

Figure 8: Percentage of Road Conditions with the PCI Method
(Road Section Simp. IV Jati – Simp. Apar)

From Figure 8, it can be seen that on the By-Pass Pariaman road for the simp. IV Jati – simp. Apar obtained the results of road conditions: excellent 14%, very good 7%, good 40%, fair 33%, poor 6%, very poor 0% and failed 0%.

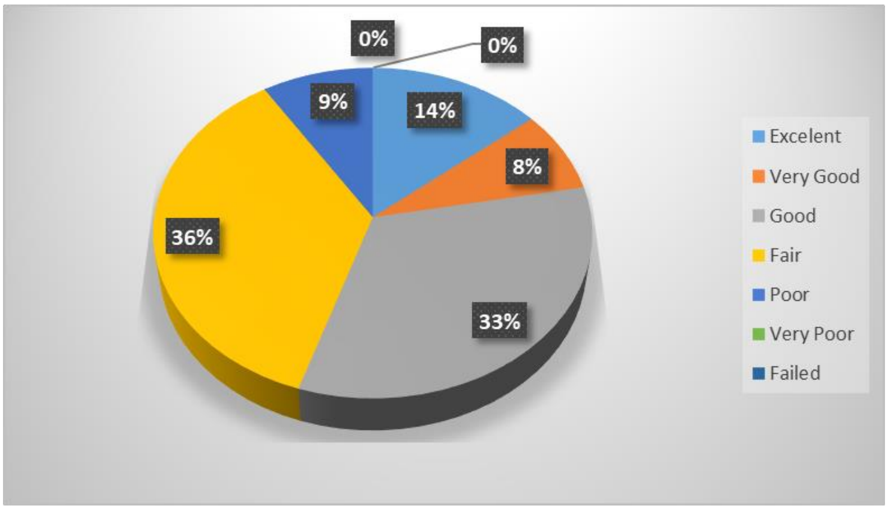

Figure 9: Percentage of Road Conditions with the PCI Method
(Road Section Simp. Apar – Simp. IV Jati)

From Figure 9, the road condition value for the simp. Apar – simp. IV Jati: excellent 14%, very good 8%, good 33%, fair 36%, poor 9%, very poor 0% and failed 0%.

Based on the percentage of functional road conditions above, the most dominant percentage is for the simp. IV Jati – simp. Apar is the condition of the road is good 40%, while the simp. Apar – simp. IV Jati, the most dominant percentage is a fair 36%.

Surface Distress Index (SDI) Road Condition Value

According to RCS or SKJ, to calculate the SDI value, only four elements are needed, which are used as support: % crack area, average crack width, number of holes/km and average depth of rutting ruts.

From the survey results at stations 1+450 – 1+500 and obtained data on % crack area, average crack width, number of holes/km and average depth of rutting ruts as follows:

• % crack area

% crack area at station 1+450 – 1+500 is <10% of the area calculated for damage, so based on Table 1 calculation of Surface Distress Index (SDI) values obtained are :

SDI = 5.

• Average crack width

The average crack width at this station obtained data of > 5 mm, so based on Table 1 calculation of Surface Distress Index (SDI) values obtained are :

SDI = SDI x 2 = 5 x 2

SDI = 10

• Number of Holes

At this station, there are no holes, then the value of SDI = 0,

SDI = SDI + 0 = 10 + 0 = 10

• Average rut depth

At this station, the data for the depth of the ruts is 2 cm. Based on Table 1, the calculation of the Surface Distress Index (SDI) value is :

SDI = SDI + 10

= 10 + 10

SDI = 20.

So the SDI values obtained at stations 1+450 – 1+500 are:

SDI = 20.

Based on the SDI method's rating scale, the SDI value = 20 is Good road conditions.

Table 6: SDI Value and Road Conditions at Each Station

STA			Simp. IV Jati - Simp. Apar		Simp. Apar - Simp. IV Jati	
			SDI VALUE	CONDITION VALUE	SDI VALUE	CONDITION VALUE
01+450	-	01+500	20	Good	135	lightly damaged
01+500	-	01+600	20	Good	75	Medium
01+600	-	01+700	25	Good	45	Good
01+700	-	01+800	10	Good	135	lightly damaged
01+800	-	01+900	10	Good	45	Good
01+900	-	02+000	20	Good	30	Good
02+000	-	02+100	28	Good	135	lightly damaged
02+100	-	02+200	45	Good	135	lightly damaged
02+200	-	02+300	88	Medium	75	Medium
02+300	-	02+400	105	lightly damaged	75	Medium
02+400	-	02+500	105	lightly damaged	30	Good
02+500	-	02+600	105	lightly damaged	75	Medium
02+600	-	02+700	95	Medium	135	lightly damaged
02+700	-	02+800	105	lightly damaged	135	lightly damaged
02+800	-	02+900	35	Good	30	Good
02+900	-	03+000	95	Medium	15	Good
03+000	-	03+100	13	Good	20	Good
03+100	-	03+200	60	Medium	40	Good
03+200	-	03+300	75	Medium	15	Good
03+300	-	03+400	20	Good	135	lightly damaged
03+400	-	03+500	75	Medium	105	lightly damaged
03+500	-	03+600	15	Good	30	Good
03+600	-	03+700	0	Good	0	Good
03+700	-	03+800	0	Good	0	Good
03+800	-	03+900	0	Good	0	Good
03+900	-	04+000	0	Good	0	Good
04+000	-	04+100	0	Good	0	Good
04+100	-	04+200	75	Medium	30	Good
04+200	-	04+300	45	Good	105	lightly damaged
04+300	-	04+400	135	lightly damaged	105	lightly damaged
04+400	-	04+500	75	Medium	90	Medium
04+500	-	04+600	75	Medium	105	lightly damaged
04+600	-	04+700	75	Medium	105	lightly damaged
04+700	-	04+800	30	Good	30	Good
04+800	-	04+900	75	Medium	90	Medium
04+900	-	05+000	15	Good	90	Medium
05+000	-	05+050	8	Good	105	lightly damaged

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At Sta 3+600 to Sta 4+100, it can be seen that the SDI value is 0 because this segment has periodic maintenance.

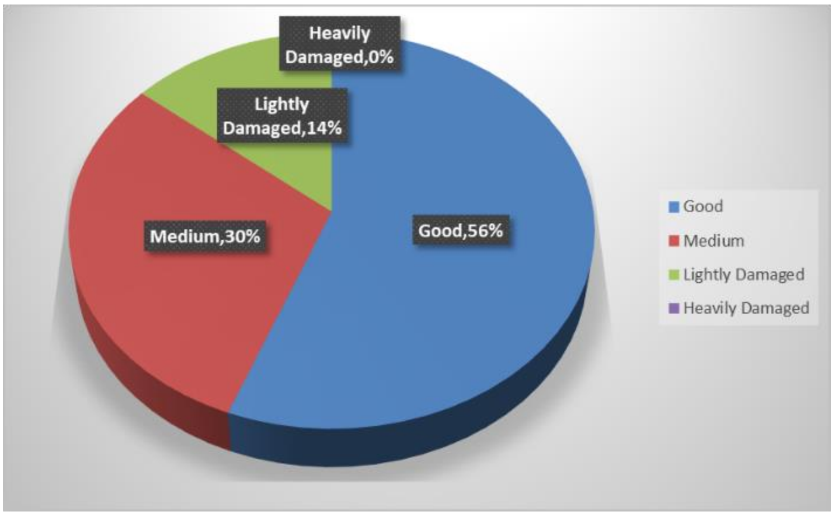

Figure 10: Percentage of Road Conditions SDI Method
(Road Section Simp. IV Jati – Simp. Apar)

Figure 10 shows the value of road conditions using the SDI method on the two lanes of the By-Pass Pariaman National road section simp. IV Jati – simp. Apar is Good 56%, Medium 30%, lightly damaged 14% and heavily damaged 0%.

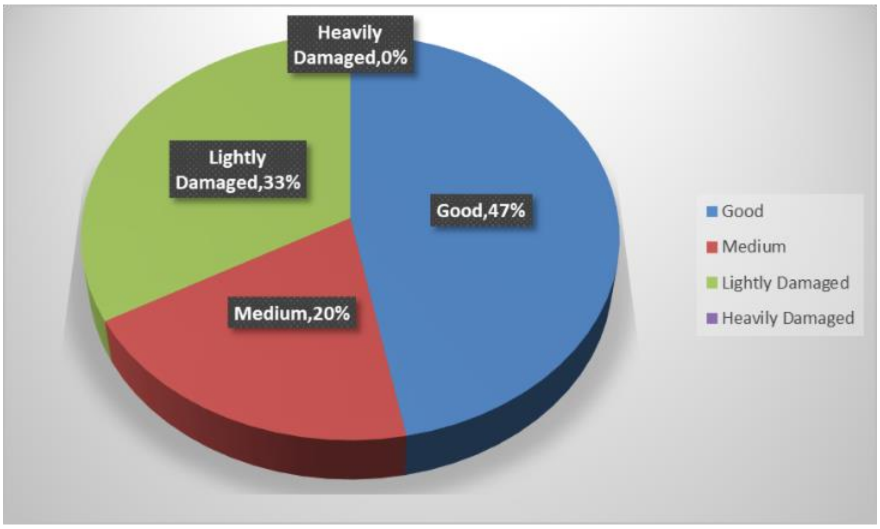

Figure 11: Percentage of Road Conditions SDI Method
(Road Section Simp. Apar – Simp. IV Jati)

Figure 11 shows the value of road conditions obtained with the SDI method for the simp. Apar – simp. IV Jati is Good 47%, medium 20%, lightly damaged 33% and heavily damaged 0%.

Determination of the Type of Road Repair

Types of road repair using the Pavement Condition Index (PCI) method are generated for the simp. IV Jati – simp. Apar repairs can be carried out with routine maintenance of 2.200 meters and periodic maintenance of 1.400 meters. While the simp. Apar – simp. IV Jati can be repaired with routine maintenance for 2.000 meters and periodic maintenance for 1.600 meters.

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Types of road repair using the Surface Distress Index (SDI) method are generated for the simp IV Jati – simp. Apar can be repaired with routine maintenance of 3.100 meters and periodic maintenance of 500 meters. While the simp. Apar – simp. IV Jati can be repaired with routine maintenance for 2.400 meters and periodic maintenance for 1.200 meters.

A comparison of the value of road conditions using the PCI method and the SDI method shows that the calculation of road conditions using the PCI method is more dominant for road conditions in fair conditions. In contrast, the SDI method is more prevalent for road conditions in good conditions; this is because the PCI method is more detailed in determining the parameters of road damage, namely alligator cracking, bleeding, block cracking, bumps and sags, corrugation, depression, edge cracking, joint reflection cracking, lane/shoulder drop off, longitudinal & transversal crack, patching and utility cut patching, polished aggregate, potholes, crossing, rutting, shoving, slippage cracking, swell, weathering/ravelling. Whereas with the SDI method, the only parameters used are cracks, holes and the depth of the ruts. Likewise, the types of road handling produced using each method can be seen in Table 7 below.

Table 7: Comparison of Types of Road Repair with PCI Method and SDI Method

Type of road repair	**Simp. IV Jati – Simp. Apar**		**Simp. Apar – Simp. IV Jati**	
	PCI (m)	**SDI (m)**	**PCI (m)**	**SDI (m)**
routine maintenance	2.200	3.100	2.000	2.400
periodic maintenance	1.400	500	1.600	1.200
Reconstruction	0	0	0	0

Based on Table 7, road maintenance using the PCI method is longer than periodic maintenance using the SDI method. It can be seen from the comparison of the advantages and disadvantages of each of these methods, namely by using the PCI method, the advantages of the results of road conditions obtained are closer to the actual conditions of road damage. In contrast, the weakness of the PCI method requires quite a long survey time due to more detailed road damage, which is determined. Using the SDI method has the advantage that the time taken for the survey is short because only a few parameters of road damage are determined, while the weakness is that the results of road conditions obtained are far from the actual road damage conditions.

CONCLUSION

In this study, an analysis of road damage conditions was carried out using the PCI method and the SDI method, and the following results were obtained. Based on the Pavement Condition Index (PCI) method on two lanes of the By-Pass Pariaman National Road for the simp. IV Jati – simp. Apar obtained the most dominant percentage is Good 40%, while for the simp. Apar – simp. IV Jati, the most dominant percentage is a fair 36%. Using the Surface Distress Index (SDI) method, the value of road conditions on the two lanes of the Pariaman By Pass National Road for the simp. IV Jati – simp. Apar, namely Good 56%, Medium 30%, Lightly Damaged 14% and Heavily Damaged 0%, with the percentage of stable conditions, namely steady condition 86% and unstable condition 14%. While the value of road conditions for the segment simp. Apar – simp. IV Jati is in good condition at 47%, medium at 20%, Lightly Damaged at 33%, and Heavily Damaged at 0%, with a percentage of stable conditions of steady condition of 67% and unstable condition of 33%.

This type of road repair using the Pavement Condition Index (PCI) method is generated for the simp. IV Jati – simp. Apar can be repaired with routine maintenance of 2.200 meters and periodic maintenance of 1.400 meters. As for the simp. Apar – simp. IV Jati can be repaired with routine maintenance for 2.000 meters and periodic maintenance for 1.600 meters. While the type of road repair using the Surface Distress Index (SDI) method is generated for the simp. IV Jati – simp. Apar can be repaired with routine maintenance of 3.100 meters and periodic maintenance of 500 meters. While the simp. Apar – simp. IV Jati can be repaired with routine maintenance for 2.400 meters and periodic maintenance for 1.200 meters.

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