ANALYSIS OF DISTRICT MAINTENANCE ROAD ACCORDING TO THE ROAD MINIMUM SERVICE STANDARD
(Case Study of the Jepara Regency Road Section in the District & Pecangaan Industrial Zone)

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ABSTRACT

The convenience of road management has changed from the pattern of achieving the use of road stability models to achieving road Minimum Service Standards (MSS). In order to realize the minimum road service standards in Jepara, the regional government is still having difficulties in drafting the budget needed for road maintenance. The purpose of this research is to know the standard of road conditions, the condition of the existing district road and the strategy to realize the condition of district roads that are in accordance with Road MSS. Data analysis is done by calculating the standard of road conditions where the method of determining conditions uses IRI (International Roughness System) and RCI. Road conditions standarts according to the MSS Road are roads that have good and moderate conditions of 60% of the overall road segment in the region, with a standard assessment value of $0 \leq IRI \leq 8$ or equivalent to $10 \geq RCI \geq 4.5$. The condition of the good and moderate Pecangaan road - Damarjati is 2.7 km (87%), Bakalan-Pendosawalan-Pancur is 1.9 Km (32%), Damarjati - Gotri is 1.93 Km (35%) roads in good and moderate conditions, and Lebuawu – Banyuputih is all good and moderate: 1.64 Km (100%). MSS Road conditions are only fulfilled in Lebuawu – Banyuputih (MSS 100%) and Pecangaan - Damarjati roads (87%). The handling strategy in order to reach MSS is prioritized on Bakalan - Pendosawalan - Pancur which requires a budget of Rp. 2,942,814,918, - and Damarjati - Gotri need a budget requirement of Rp. 2,228,207,878, -.

Keywords: *Road Maintenance; Minimum Service Standards; Road Conditions; IRI; RCI*

1. Introduction

Road is one of the important land transportation infrastructure to support economic, social and environmental activities. Often the increase in the movement of goods and services on the road makes road damage occur faster than the age of the road plan. The road will still be able to function properly if the road conditions are in good service conditions. To maintain the steady state of the road, road maintenance is carried out both routine maintenance and periodic maintenance. Road maintenance carried out must be arranged to realize road services that refer to the Minimum Service Standards set by the Ministry of Public Works and Spatial Planning. Minimum service standards have benchmarks of qualitative and quantitative achievements used to measure the goals to be achieved.

As an infrastructure service provider at the district level, the district government has the responsibility to provide minimum service standards for the community include service provision of district road to fulfill the needs of community transportation infrastructure with parameters of the level of good and moderate district road conditions; and the value of the percentage of the production center (connectivity) in the district/city that is connected to the activity center in accordance with Public Works and Spatial Planning Ministerial Number 01 of 2014. The results of the studies (Iskandar, 2011) state that the way to declare the success of road management has changed from the pattern of achieving road stability models to achieving road MSS, and at least 50% of district / city roads that must be sought to improve the lowest conditions medium, especially for the district / city area where conditions of road stability are very low and the financing capacity is limited to achieving the MSS value of the road.

In order to reach a minimum road service standard in Jepara Regency, the regional government, especially the Highways Sector, the Public Works and Spatial Planning Office of Jepara Regency is still having difficulties in drafting the budget needed for regency road maintenance, either routine maintenance or periodic maintenance. Looking at these problems, a research study is conducted that aims to analyze the standard road conditions required in the Minimum Service Standards roads use the IRI (International Roughness Index) and RCI (Road Condition Index) measures, inventory the existing district road conditions (real in the field) at

the study location and develop a handling strategy to realize district road conditions that are in accordance with minimum road service standards.

2.   Methodologi

A. Literature Review

1) Road Maintenance

The road according to Law No. 38 of 2004, is land transportation infrastructure covering all parts of the road, including complementary buildings and equipment intended for traffic, which is on the surface of the land, above ground level, below the surface of the land and / or water, and above the water surface, except railroads, lorry roads and cable road. According to Kustamar, et al. (2014) the road has the characteristics of always decreasing quality, whether used or not, so to maintain the quality of the road so that it stays good or at a minimum reduces quality degradation, it must be done continuously or routine maintenance. Road maintenance according to Minister of Public Works Regulation No. 13 of 2011 is a road handling activity in the form of prevention, maintenance, repairs needed to maintain road conditions in order to continue to function optimally to serve traffic so that the stipulated plan age can be achieved.

There are several types of maintenance that are carried out:

a. **Routine maintenance** is the activity of caring for and repairing damages that occur on road segments with steady service conditions, namely roads with good or moderate conditions according to the age of the plan that is calculated and follows a certain standard.

b. **Periodic maintenance** is a prevention of the occurrence of wider damage and any damage calculated in the design so that the reduction in road conditions can be restored to the condition of conformity in accordance with the plan.

c. **Road Rehabilitation** is the prevention of extensive damage and any damage that is not taken into account in the design, which results in a decrease in the condition of stability in certain parts / places of a road with mild damage, so that the condition of stability can be restored to the condition of conformity in accordance with the plan.

    d. **Reconstruction** is an increase in structure which is a handling activity to be able to increase the ability of parts of the road that are in a state of severe damage so that the part of the road has a steady condition again according to the age of the plan set.

Implementation of road maintenance activities according to Minister of Public Works Regulation No. 13 of 2011 requires technical data, namely road inventory data and road conditions, so that the type of road maintenance will be obtained according to needs. There are two kinds of surveys to assess road conditions according to Iskandar (2015), visual methods and detailed survey of road conditions. The visual method was carried out using RCI visual observation (Road Condition Index), while the detailed survey of road conditions was in accordance with Minister of Public Works Regulation No. 15 of 2007.

There are three type of asphalt road damage according to Bina Marga (1983) and Shahih (1994) stated by Djalante (2011):

1.   Surface Texture defects, includes: delimination, bleeding, wear, revelling, holes (Pot Holes).

2.   Cracking which includes: longitudinal cracks, transverse cracks, crocodile cracks, hair cracks, edge cracks, block cracks.

3.   Deformation includes: collapse (Depression), grooves (rutting), curling, plastic deformation.

According to Umi Tho'atin, et al. (2016) one of the pavement performance parameters can be determined objectively, namely the International Roughness Index (IRI) or road surface roughness standard developed by the World Bank about twenty years ago, while determining pavement performance parameters subjectively use the Road Condition Index (RCI) or road condition index. Determination of the RCI value (Road Condition Index) is carried out by a survey of road surface roughness visually by three people who interpret the condition of the road surface into the RCI value according to the provisions using the RCI form. Determination of the RCI value is based on table 1.

The equation of correlation of RCI value (Road Condition Index) with the value of IRI (International Roughness Index) according to Suherman (2008):

$$RCI = 10 \, EXP \, (1)^{-0,09 x IRI} \qquad\qquad ………….....(2.1)$$

With value RCI 1-10, EXP (1) = e = 2.718281828182

Assessment of road conditions according to Iskandar (2015) can be done in two ways, namely by the visual method (RCI) and a detailed condition survey to determine the type and extent of road damage. To determine the type of handling, it is more applicable to use data on types and extent of road damage, so that it will also facilitate the preparation of the Budget Plan in the management of road management procedures. Determination of the types of asphalt / concrete road handling activities from road damage data can be seen in table 3.

Tabel 1 RCI Value Determination

Num	Surface Type	Conditions Visually Visible	RCI Value	Estimated IRI Value
1	Roads with poor drainage, and all types of surfaces that are not considered at all	Can not be passed	0 – 2	24 – 17
2	All types of pavements that have not been noticed for a long time (4-5 years or more)	Severely damaged, many holes and all pavement areas were damaged	2 – 3	17 – 12
3	Pen. Mac. Old , old Gravel Land / Stone Gravel Conditions good and medium	Broken, bumpy, Many holes on the road	3 – 4	12 – 9
4	Pen. Mac after 2 years of use, old Latasbum	Somewhat broken, sometimes there are holes, uneven surfaces	4 – 5	9 – 7
5	New Pen. Mac., new Latasbum, Lasbutag after 2 years of use	Enough, no or very few holes, the road surface is rather uneven	5 – 6	7 – 5
6	Old thin layer from Hotmix, new Latasbum, new Lasbutag	Well	6 – 7	5 – 3
7	Hot-mix after 2 years, thin Hot-mix above Pen. Mac	Very good, generally flat	7 – 8	3 – 2
8	New hot mix (Lataston, Laston) (Increase with use more than 1 layer)	Very flat and regular	8 – 10	2 – 0

Source: Appendix Minister of Public Works Regulation No. 33 of 2016

Table 2 Criteria for Road Conditions Based on IRI Values in Surface Types

a. Pavement Road	b. Penmac Road	c. Soil/Gravel
• $IRI \leq 4$ » Good Condition • $4 \leq IRI \leq 8$ » Moderate Condition • $8 \leq IRI \leq 12$ » Mild Damaged Conditions • $IRI > 12$ » Severely Damaged	• $IRI \leq 8$ » Good Condition • $8 \leq IRI \leq 10$ » Moderate Condition • $10 \leq IRI \leq 12$ » Mild Damaged Conditions • $IRI > 12$ » Severely Damaged	• $IRI \leq 10$ » Good Condition • $10 \leq IRI \leq 12$» Moderate Condition • $12 \leq IRI \leq 16$ » Mild Damaged Conditions • $IRI > 16$ » Severely Damaged Conditions

Source: Appendix Minister of Public Works Regulation No. 33 of 2016

Table 3 Determination of Road Management Programs from Road Damage Data

Condition	Percentage of Damage Limits (Percentage of Surface Layer Area)	Handling Program
Good (G)	<6%	Routine Maintenance
Moderate (M)	6% - <11%	
Mild Damaged (MD)	11% - <15%	Periodic Maintenance /Rehabilitation
Severely Damaged (SD)	>15%	Structure / Development Improvement

Source: Minister of Public Works Regulation No. 13 of 2011

Calculation of construction costs handling road damage based on road handling programs is calculated by multiplying the volume of work with the Work Unit Price. The Unit Price of Work used is the Price of Work Unit which has been set by the Government of Jepara Regency in 2018.

2) Minimum Service Standart (MSS) of Road (SPM)

Minister of Public Works Regulation Number 01 of 2014 states that Minimum Service Standards in the Field of Public Works and Spatial Planning, hereinafter referred to as MSS in the Field of Public Works and Spatial Planning, are provisions concerning the type and quality of basic services in the field of public works and spatial planning obtained by each citizen minimally. Quantitative and qualitative benchmarks which are indicators of SPM in the form of input, output process and / or basic service benefits. The minimum service standard for district roads is the provision of roads in order to service and fulfill community needs with indicators:

1. The percentage value of class conditions for district / city roads is good and moderate;
2. The percentage value of the connection between production centers (connectivity) and activity centers in the district / city area.

Referring to minimum road service standards, the priority of road maintenance programs to reach minimum service standards is to increase road conditions from previously mild damaged or severely damaged to at least a road surface with moderate conditions with a minimum target of 60% of the total road length.

$$\textbf{Road Condition MSS} = \frac{\sum^{end\ of\ year\ achievment\ MSS}\ the\ lenght\ of\ road\ is\ good\ and\ moderate}{\sum^{eksisting}\ the\ actual\ length\ of\ national/provinsi/city/district\ road} \quad .....(2.2)$$

B. Research Method

There are 4 segments that will be used as research objects: Pecangaan – Damarjati Road, Bakalan – Pendosawalan Road, Gotri – Damarjati Road , and Lebuawu – Banyuputih Road.

The primary data that be used in this study is collected from the results of a visual survey of road conditions using the road condition assessment format based on the RCI format and surveying the detailed conditions of the road in the sections which are the locations of research studies.

Data analysis steps include:

a. Analysis of road conditions required by MSS in IRI and RCI

-   Calculate the length of the road Good and Moderate Conditions

$$\sum \textit{Good and moderate Road Lenght} = Road\ MSS(60\%) x \sum research\ road\ lenght$$
...3.1

- road conditions based on IRI and RCI: that is translating how the road is in good condition or moderate to the required IRI and RCI values.

b. Inventory of Road Condition (RCI and IRI)

- Visual Survey of Road Conditions (RCI) and Detailed Road Conditions: produce RCI values, then the RCI value is converted to IRI values. Survey of detailed road conditions results in information on road damage data in the form and extent of road damage. Convert the RCI value to IRI using formula 3.2

$$IRI = \frac{\ln(\frac{RCI}{10})}{-0,094} \dots\dots\dots\dots.3.2$$

- Calculate the level of damage to the road: detailed road conditions survey produces real data on road damage in the field, including the type and extent of damage to the thickness of the damage layer in the field

- Calculate the SPM achievement level for Road Provision / Road Conditions

- Comparative Analysis of Road Conditions required in MSS with real road conditions.

c. Road handling strategies to achieve SPM values for road conditions

3. DISCUSSION

A. Analysis of Road Standards Required in MSS

1) Analysis Road Condition According MSS

Minister of Public Works Regulation No. 01 of 2014 states that the type of service providing roads to meet the needs of the community with the aim of improving the quality of district road services has a good / moderate level of road condition indicators of 60% of the district road section. The total length of the road in Jepara Regency which is the object of research is in accordance with Regent Regulation number 620/405 in 2016 concerning the Determination of the Number and Name of the Road Section is 16.29 Km. In order to achieve minimum road service standards for road supply services, it can be calculated how long the good / moderate road conditions that must be achieved by Jepara Regency are as follows:

$$\sum \textit{Good and moderate Road Lenght}$$

$$= MSS \ of \ Road \ condition(60\%) \ x \sum research \ road \ lenght$$

$$\sum \textit{Good and moderate Road Lenght} = 60\% \ x \ 16.29 \ Km = 9.77 \ Km$$

Table 4 Analysis of Path Lengths Corresponding to MSS

No	Road Name	Lenght (Km)	The length of the road with good and moderate conditions (Km)
1	Pecangaan – Damarjati	3.11	1.86
2	Bakalan – Pendosawalan – Pancur	6.01	3.60
3	Damarjati – Gotri	5.53	3.32
4	Lebuawu – Banyuputih	1.64	0.99
	Totally	**16.29**	**9.77**

2) Analysis Road Condition IRI - RCI

Determination of good or moderate road conditions, according to Ministerial Regulation No. 01 of 2014 uses the IRI value standard, and if there is a situation where the road being studied cannot be reached by an IRI tool or the absence of an IRI tool, the IRI value can be obtained from the conversion of RCI values resulting from visual surveys in the field. By

referring to the rules of IRI values, the value of the IRI condition that must be achieved by each road that becomes the object of research so that it can achieve the Minimum Service Standards of road conditions as mentioned in table 5 The IRI value is then converted to RCI value using the formula 2.1, namely RCI = 10 EXP $(1)^{-0,09 \times IRI}$.

Table 5 Analysis of Value of IRI & RCI corresponding to MSS

Num	Road Name	The length of the road with good and moderate conditions (Km)	Estimated IRI Value that must be achieved	Estimated RCI Value to be achieved
1	Pecangaan – Damarjati	1.86	0≤IRI ≤ 8	10≥RCI ≥4.7
2	Bakalan – Pendosawalan – Pancur	3.60	0≤IRI ≤ 8	10≥RCI ≥4.7
3	Damarjati – Gotri	3.32	0≤IRI ≤ 8	10≥RCI ≥4.7
4	Lebuawu – Banyuputih	0.99	0≤IRI ≤ 8	10≥RCI ≥4.7

B. Inventory of Existing Road Conditions

The visual survey conducted on four road segments of the field research object provides results in the form of road surface condition data based on the Road Condition Index (RCI) method and data on road damage conditions. The road condition survey in the field is carried out by 3 (three) people per road which is the location of the study to avoid the assessment effectiveness. Each 100 m segment is observed to determine the RCI value. Determination of the RCI value is obtained from the average value of the assessment or perception of three surveyors on road surface conditions that are interpreted to RCI values.

Data on road surface conditions obtained were then analyzed and presented where the RCI values were correlated to IRI values using formulas: $IRI = \dfrac{\ln(\frac{RCI}{10})}{-0,094}$ o that it can be used as the basis for determining the condition of the road surface in accordance with the MSS rules.

Table 6 Recapitulation of RCI Surface Condition Survey Results

Num	Length (Km)	RCI Value	IRI Value *	Road Conditions
1	**Pecangaan – Damarjati Road**			
a	0.40	7.33 – 8.00	3.30 – 2.37	Good
b	2.30	5.00 – 6.67	7.37 – 4.31	Moderate
c	0.41	4.00 – 4.33	9.75 – 8.90	Mild Damage
d	-	-	-	Severely Damaged
2	**Bakalan – Pendosawalan – Pancur Road**			
a	1.41	7.00 – 7.67	3.79 – 2.83	Good
b	0.50	5.00 – 5.33	7.37 – 6.69	Moderate
c	3.00	4.00 – 4.33	9.75 – 8.90	Mild Damage

Num	Length (Km)	RCI Value	IRI Value *	Road Conditions
d	1.10	3.00	12.81	Severely Damaged
3	**Damarjati – Gotri Road**			
a	0.50	7.00	3.79	Good
b	1.43	5.00 – 6.33	7.37 – 4.86	Moderate
c	3.10	3.33 – 4.67	11.69 – 8.11	Mild Damage
d	0.50	3.00	12.81	Severely Damaged
4	**Lebuawu – Banyuputih Road**			
a	0.70	7.00	3.79	Good
b	0.94	5.00 – 6.33	7.37 – 4.86	Moderate
c	-	-	-	Mild Damage
d	-	-	-	Severely Damaged

Information: * : calculated using a formula IRI$=\dfrac{\ln(\frac{RCI}{10})}{-0,094}$

Table 7 Data Recapitulation of Road Condition Survey Results

Num	Road Name	Length of Road According The Regent's Decree (Km)	Length of Road Research (Km)	Length of Condition (Km)			
				Good	**Moderate**	**Mild Damaged**	**Severaly Damaged**
1	Pecangaan – Damarjati	3.11	3.11	0.40	2.30	0.41	-
2	Bakalan – Pendosawalan – Pancur	6.01	6.01	1.41	0.50	3.00	1.10
3	Damarjati – Gotri	5.53	5.53	0.50	1.43	3.10	0.50
4	Lebuawu – Banyuputih	1.64	1.64	0.70	0.94		
		16.29	16.29	3.01	5.18	6.51	1.60
	Percentage of length of the road section of the researcher (%)			**18.45%**	**31.79%**	**39.94%**	**9.82%**

Data on road damage obtained from surveys is used as a basis for determining the type of construction of maintenance activities to be carried out, so that maintenance activities can be effective and efficient. Recapitulation of road damage data for each segment is described in table 8.

Table 8 Recapitulation of Road Damage Data

Num	Roads	DEFECTS / DAMAGE OF SURFACE TEXTURES		CRACKING		DEFORMATION	
		TYPE	**LARGE (m²)**	**TYPE**	**LARGE (m²)**	**TYPE**	**LARGE (m²)**
1	Pecangaan – Damarjati			Hair Crack	1290.5		
				Edge Crack	108		

Num	Roads	DEFECTS / DAMAGE OF SURFACE TEXTURES		CRACKING		DEFORMATION	
		TYPE	LARGE (m²)	TYPE	LARGE (m²)	TYPE	LARGE (m²)
2	Bakalan - Pendosawalan – Pancur	Potholes	926.35	Crocodile Crack	771.5	Depression	113.1
		Delimination	70	Edge Crack	238	Rutting	68
		Ravelling	298	Hair Crack	131		
3	Damarjati – Gotri	Delimination	329	Crocodile Crack	685	Depression	132
		Ravelling	1152.75	Edge Crack	80.5		
				Block Crack	60		
4	Lebuawu – Banyuputih			Hair Crack	320		

1) **Fulfillment MSS**

MSS of road condition calculated using a formula 2.2 that is by counting percentage of comparison of accumulated road length with good and moderate condition with the length of the entire road:

MSS of Road condition

$$= \frac{\sum^{\text{end of year achievment MSS}} \text{the lenght of road is good and moderate}}{\sum^{\text{eksisting}} \text{the actual length of city/district road}}$$

In according with Minimum Service Standards od Road Condition, MSS value that reach standards minimum is 60%, if the MSS value below the 60%, it means that it cannot fulfill MSS for road conditions.

Table. 9 Comparison of Minimum Road Length According to MSS with Real Conditions

Road Name	Length of Road Research (Km)	Road Length with the real Moderate Condition (Km)	Road Length with the real Good Condition (Km)	MSS Voalue of Road Condition (%)	Information
Pecangaan – Damarjati	3.11	0.40	2.30	86.96	*MSS Fulfilled*
Bakalan – Pendosawalan – Pancur	6.01	1.41	0.50	31.72	*MSS is not fulfilled*
Damarjati – Gotri	5.53	0.50	1.43	34.95	*MSS is not fulfilled*
Lebuawu – Banyuputih	1.64	0.70	0.94	100.00	*MSS Fulfilled*
	16.29	**3.01**	**5.18**	**50.24**	***MSS is not fulfilled***

Table 8 states that the length of the road is in good and moderate conditions which fulfill the minimum requirements of MSS road condition on Pecangaan – Damarjati road and Lebuawu – Banyuputih road. While the Bakalan – Pendosawalan – Pancur road and Damarjati – Gotri road not able to fulfill the MSS because the number of road lengths in good and moderate conditions is below the required road length (60%).

2) Comparison of road conditions analysis

The results of the assessment of road conditions from the visual survey will be compared with the assessment of road conditions that are standardized in the Minimum Road Service Standards.

Table 10 Deviation of Road Length MSS Conditions With Real Conditions

Road Name	Road Length with the real Moderate Condition which required in MSS (Km)	Road Length in Real Good and Moderate Condition (Km)	Length Condition Deviation (Km)	
			(Km)	(%)
Pecangaan – Damarjati	1.86	2.70	0.84	144.93
Bakalan – Pendosawalan – Pancur	3.60	1.90	-1.70	52.87
Damarjati – Gotri	3.32	1.93	-1.39	58.25
Lebuawu – Banyuputih	0.99	1.64	0.66	166.67
	9.77	8.18	-1.59	83.73

Lebuawu – Banyuputih Road exceeded the minimum MSS target for road conditions up to 166.67%, and the lowest on Bakalan - Pendosawalan - Pancur Road could only get 52.87% of the target MSS conditions. Seeing the overall real road condition which is still below the MSS target for road conditions, the road condition improvement efforts must be prioritized on the Bakalan - Pendosawalan - Pancur Road where at least 1.7 Km of road must be upgraded to moderate condition and Damarjati – Gotri Road must increase 1.39 Km the road becomes moderate.

C. Handling Strategies according to Minimum Service Standards

In accordance with the conditions of each road section, the handling of roads in the form of improvements and maintenance is much needed at Bakalan - Pendosawalan - Pancur and

Damarjati - Gotri. Pecangaan Damarjati requires regular and periodic maintenance activities, while Lebuawu - Banyuputih road requires sufficient routine maintenance activities.

Table 11 Handling Strategy of Road Damage

Road Name	Road Condition	Percentage od Road Damage	Length Condition		Handling Strategy
			(Km)	(%)	
Pecangaan – Damarjati	Good	-	0.40	12.88	Routine Maintenance
	Moderate	6.0% - 10.7%	2.30	74.07	
	Mild Damage	12.0% - 14.0%	0.41	13.04	Periodic Maintenance
			3.11	100.0	
Bakalan – Pendosawalan – Pancur	Good	-	14.05	23.4	Routine Maintenance
	Moderate	6.3% - 10.0%	0.50	8.33	
	Mild Damage	11.1% - 14.0%	3.00	49.96	Periodic Maintenance
	Severely Damage	15.0% - 17.5%	1.10	18.32	Improvement
			6.01	100.0	
Damarjati – Gotri	Good	0.8% - 1.0%	0.50	9.04	Routine Maintenance
	Moderate	6.0% - 9.0%	1.43	25.91	
	Mild Damage	11.1% - 14.4%	3.10	56.02	Periodic Maintenance
	Severely Damage	15.6% - 20.0%	0.50	9.04	Improvement
			5.53	100	
Lebuawu – Banyuputih	Good	1.0%	0.70	42.58	Routine Maintenance
	Moderate	6.0% - 7.8%	0.94	57.42	
			1.64	100	

Preparation of a handling strategy in addition to paying attention to data on road damage obtained from the survey results must also pay attention to the priority of handling, because the limited resources available are expected to provide an effective and efficient handling program. From the analysis of the deviation of the MSS road conditions to the real conditions in the field, the priority of handling the road is prioritized on Bakalan - Pendosawalan - Pancur, the second priority is Damarjati - Gotri. Pecangaan - Damarjati is the third priority, and then the last priority is Jalan Lebuawu - Banyuputih. While for the type of election activities are based on standard handling of paved road maintenance and determination of the type of construction for routine maintenance using coldmix and latasir construction, periodic maintenance using HRS-WC 3cm thick, and increasing road structure use AC-WC with a minimum thickness of 4 cm. The construction cost needed is calculated by

multiplying the damage volume of the road with the price of the work unit from the Jepara Regency Government.

Table 12 Recapitulation of Budget Need for Road Handling Strategies

Num	Road Name	Budget Need (Rp)
1	Jalan Bakalan – Pendosawalan – Pancur	2,942,814,918
2	Jalan Damarjati – Gotri	2,228,207,878
3	Jalan Pecangaan – Damarjati	427,304,966
4	Jalan Lebuawu – Pancur	34,279,880
		5,632,607,640

4. Conclusion And Acknowledgment

A. Conclusion

1. Road conditions standards that are in accordance with Road SPM are roads that have good and moderate conditions of 60% of the overall road segment in the area, so that overall on the four road sections studied there must be at least 9.77 Km of roads that are good and moderate conditions which are which has a value of $0 \leq IRI \leq 8$ or $10 \geq RCI \geq 4.5$.

2. Real road conditions in the Pecangaan – Damarjati is in good condition and is 2.7 km (87%), Bakalan - Pendosawalan - Pancur has good and moderate conditions 1.91 Km (32%), Damarjati - Gotri only has 1.93 Km (34%) which are in good and moderate condition. The total condition of Lebuawu - Banyuputih is good and moderate, which is 1.64 Km (100%). Roads that reach the Minimum Service Standards for Road Conditions are Lebuawu - Banyuputih section with a value of 100% MSS and Pecangaan - Damarjati with an MSS value of 86.79%.

3. Management strategies in order to reach Minimum Service Standards road conditions to improve road conditions to be good or moderate, the first priority with the required budget of Rp. 2,942,814,918, -. The second priority for handling damage is the Damarjati - Gotri road with a budget requirement of Rp. 2,228,207,878,-

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