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Evaluation of The Implementation of The Periodic Maintenance of The Road Project Limit-Kudangan-Penopa West Kalimantan Province Republic Indonesia

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Abstract: To support the integrated urban infrastructure development, the Government through the Ministry of public works and public housing perform periodic maintenance of road projects to promote the smooth progress of the economy. One of the national roads in the Lamandau Regency Central Kalimantan is the road of West Kalimantan Limit -Kudangan - Penopa. Current road conditions are inadequate for the development of traffic. The goal of the research is to (1) Obtain the required fee for the Periodic maintenance of the project Boundary Road West Kalimantan - Kudangan - Penopa, Regency Lamandau, (2) get the most appropriate time required implementing periodic alimony in the streets the street boundaries of West Kalimantan - Kudangan - Penopa in the Lamandau Regency. The location of the research is the implementation of section roughness of the road the Road West Kalimantan Limit - Kudangan - Penopa, Regency Lamandau. Periodic Road Maintenance Package Program limit of West Kalimantan - Kudangan - Penopa, with a contract value of Rp 9.75 billion, contract no. HK. At 02/PPK. Penopa-Wil. I/KTRK/IV/2015/37, 30 April 2015 and long road km. 7.846

Keywords: Maintenance intervals, Critical Path, National Road

1. Introduction

1.1. Background

To support the integrated urban infrastructure development by the Central Government through the Ministry of public works and Housing conducted periodic maintenance project of the road to promote the smooth progress of the economy, especially in the area Lamandau Regency. One of the national roads in the Lamandau Regency Central Kalimantan is the road of West Kalimantan Limit – Kudangan – Penopa. Current road conditions are inadequate for the development of traffic, arising out of damage layers of aus, i.e., horizontal crack, crack, crack the edge of crocodile skin, cracked the connection, the connection road widening crack, crack, crack, shrink reflection crack skid and Groove. It becomes a problem that merely interferes with the user of the road Department of West Kalimantan – Kudangan – Penopa.

Direktoral General of Bina Marga as one of the relevant agencies anticipate holding a regular road maintenance project boundaries of West Kalimantan - Kudangan -

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Penopa. Thus the capability and capacity of the road on the road is expected to be maintained to support the smoothness and comfort of berlalulintas so that all obstacles can bereduced. Of these problems need to be evaluated for the periodic maintenance of the roads in West Kalimantan Boundary roads – Kudangan – Penopa in the Lamandau Regency, that Periodic Road Maintenance Package Program limit of West Kalimantan – Kudangan – Penopa, with contract No.: HK. At 02/PPK. Penopa-Wil. I/KTRK/IV/2015/37, on April 30, 2015, by which

time the implementation of 180 calendar days starting from the date of April 30, 2015, until

1.2. The formulation of the problem

From the background of the wording of the question can be made as follows:

- 1. What is the cost required for the periodic maintenance of the project Boundary Road West Kalimantan Kudangan Penopa Lamandau Regency?
- 2. How much time is necessary for the implementation of periodic maintenance of the roads in the West Kalimantan Boundary roads Kudangan Penopa in the Lamandau Regency?
- 3. What work Activities is critical work?

1.3. Research objectives

January 2015.

Research objectives are as follows:

- 1. Get the cost of the necessary expenses for periodic Boundary road maintenance project of West Kalimantan Kudangan Penopa Lamandau Regency.
- 2. Get the time required for the implementation of regular maintenance of the roads in West Kalimantan Boundary roads Kudangan Penopa in the Lamandau Regency.
- 3. Getting the activity work that is critical work.

2. Literature Review

2.1. Previous Research

1. Fleet's son Tommy [1][2][3]

Title test is in this research is Economic analysis of road repair Palembang – BetungKab. Betung Against Value loss due to congestion, the conclusion is as follows: 1. Get the economic value of improvements to road Kilkenny – Betung Kab. Betung. 2. loss due to overcrowding and comparison between them

2. Amin Khairi [4]

The title of the thesis in this research are: the evaluation of the type and degree of damage by using the method of Pavement Condition Index (PCI), the conclusion is as follows: In this study aims to evaluate the time required for periodic maintenance utilizing the technique of Pavement Condition Index (PCI).

2.2. Basic Theory

The road is one of the infrastructures of transport links are vital for economic growth and social society. Ground transportation supported by an extensive road network serves as the physical infrastructure facilities for the benefit of the people[5][6].

2.2.1. Definition Of The Road

The highway is the main road that connects one region with the area of the other. Usually the way this big has the following characteristics[7][8]:

- 1. used for motor vehicles
- 2. Used by the general public
- 3. Financed by State enterprises
- 4. The laws of the transport govern its use

The existence of the road infrastructure is excellent and smooth for an essential role in the continuous flow the movement of commodities that will be able to move the development of peri's social life and improve the economy of the community.

2.2.2. Parts Of The Road

Part-road section consists of space benefits the street right of way, space, space surveillance of the road[9][10][11].

1. Road Benefits Space

Space road benefits include road, a street, and the threshold of security. Road benefits space is the space along the way which is limited by the width, height, and depth of a specific set by organizers of the road in question based on the guidelines set out by the Department of authorities.

2. Spaces Of Way

Space right of way is comprised of spaces one-lane roads and benefits of certain land in outer space benefits the way. The power of way is space spaces along the road which is bounded by the width, depth, and height[12][13].

3. Space Surveillance Road

Space surveillance of the road is specific space in outer space belongs to the way that its use under the supervision of the organizers of the way. Space surveillance of the form reserved for a free view of the driver and road construction as well as the safeguarding of the function of the security road[14][15].

2.2.3. Road Construction

Basically road construction is the process of opening traffic space that overcomes various geographic obstacles. This process involves the transfer of the face of the earth, the development of bridges and tunnels, even the transfer of vegetation and also the removal of forests. Water drainage is one of the factors that must be taken into account in the construction of roads. Water that collects on the road surface after rain does not only endanger road users, it will even erode and damage the road structure[16][17].

2.2.4. Roadworks

Road works include the work of installing edge stones and onderlaag, work of slytlaag stone layered work, penetrating stone and penetration pavement with a thickness of 4 cm in solid with 4.5 kg / m2 asphalt, 3 cm thick lataston emission work, work on the left and right sides of the road[18][19][20].

3. Research Methods

The population of this study is a project in the area of the National Road Implementation Unit of Region I of Central Kalimantan Province. The sample of this study is an increase in the boundary of the boundary of Kalbar - Kudangan - Penopa, Lamandau Regency with contract no .: HK.02. 03 / PPK.Penopa-Wil.I / KTRK / IV / 2015/37, dated 30 April 2015, with an implementation time of 180 calendar days starting from 30 April 2015 to 26 October 2015.

4. Discussion and Data Analysis

4.1 Planning Periodic Maintenance Activities

a. Data collection of periodic maintenance plans and metrics used

The ideas for periodic and meterial maintenance activities used are as follows:

			Harga Satuan	Jumlah Harga
Uraian Pekerjaan	Satuan	Kuantitas	(Rp)	(Rp)
1. Umum				
Mobilisasi	Ls	1,00	57.742.165,05	57.742.165,05
2. Pekerjaan Drainase				
Pasangan Batu dengan Mortar	m ³	810,00	880.021,00	712.817.010,00
3. Pekerjaan Tanah				
Timbunan Pilihan Dari Sumber	m ³	900,00	89.517,00	80.560.800,00
Galian				
4. Pelebaran Perkerasan dan Bahu				
Jalan				
Lapis Pondasi Agregat Kelas S	m ³	3.008,80	550.751,00	1.657.099.608,80

Table 1. Activity Plan for Periodic Maintenance Work and Materials Used (in	ı Indonesia)
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- b. Job weight assessed in a percentage of activities towards all activities "Work Weight" (%) = "Activity Fee" / "Project Cost" x100%
- c. Periodic Maintenance Activity Plans From table 2, we then make a weight distribution in the schedule of the regular maintenance activity plan and calculate the progress plan of the activity with the formula:

"Progress Plan" (%) = "Cost of Activities That Have Been Used" / "Project Cost" x "100%"

4.2 Determination of Critical Pathways (Critical Path)

In Table 3, it has known that the schedule for a regular maintenance activity plan with an implementation time of 180 calendar days starting from 30 April 2015 to 26 October 2015. When the periodic maintenance activities are carried out, it is still possible to accelerate to less than 180 days. To speed up the regular maintenance activities the determination of critical paths is carried out.

The steps for determining a critical path are:

a. Making a schedule plan for periodic maintenance work activities with Microsoft Project

Table 2. Periodic Maintenance Activity	ies Plan with Microsoft Project
--	---------------------------------

ID	Name	Duration	Start	Finish	Predecessors
1.	Mobilisasi Awal	18 days	Thu 4/30/15	Mon 5/25/15	-
2.	Pasangan Batu dengan Mortar	61 days	Mon 7/27/15	Thu 9/17/15	7
3.	Timbunan Pilihan Dari Sumber	17 days	Mon 8/3/15	Tue 8/25/15	10
	Galian				
4.	Lapis Pondasi Agregat Kelas S	17 days	Fri 9/18/15	Sat 10/10/15	3, 5, 6, 9
5.	Lapis Perekat - Aspal Cair (Tack	83 days	Tue 5/26/15	Thu 9/17/15	1
	Coat)				
6.	Lataston Lapis Aus (HRS-WC)	55 days	Fri 7/3/15	Thu 9/17/15	7
	(gradasi senjang / semi senjang)				
7.	Lataston Lapis Aus Perata	11 days	Thu 6/18/15	Thu 7/2/15	8
	(HRS-WC) (L) (gradasi senjang				
	/ semi senjang)				
8.	Lataston Lapis Pondasi Perata	17 days	Tue 5/26/15	Wed 6/17/15	1
	(HRS-Base(L)) (gradasi senjang				
	/ semi senjang)				

9.	Bahan Anti Pengelupasan	83 days	Tue 5/26/15	Thu 9/17/15	1
10.	Pasangan Batu	33 days	Thu 6/18/15	Sun 8/2/15	8
11.	Marka Jalan Termoplastik	17 days	Fri 9/18/15	Sat 10/10/15	2
12.	Mobilisasi Akhir	6 days	Mon 10/19/15	Mon 10/26/15	4,11

b. Network diagrammaking of the schedule of periodic maintenance work activities is as follows:



Figure 1. Network Diagram Schedule of Periodic Maintenance Work Activities with Microsoft Project

From the network diagram the plan for regular maintenance work activities with Microsoft Project can be determined as a critical path, and the time periodic maintenance activities are accelerated.

In Figure 2. shows the network diagram after the advanced calculation and countdown calculation, then the time needed to complete the periodic maintenance work activities is 130 calendar days, can be accelerated 50 days or 27.78% of the original planning 180 calendar days. Periodic maintenance work activities that should not delayed (critical work) are:

- 1: Initial mobilization, for 18 days
- 8: Grading Base Lataston (HRS-Base (L)) (slope / semi-gap gradation), for 17 days
- 7: Straight-level Auspicious Lataston (HRS-WC) (L) (gap / semi-gap gradation), for 11 days
- 2: Stone pair with Mortar, for 61 days
- 11: Thermoplastic Road Markings, for 17 days
- 12: Final Mobilization, for six days

			Harga Satuan	Jumlah Harga	Bobot	2	lei.		Juni			Ę			A	gustus			Septe	ember			Okto	ber	
Uraian Pekerjaan	Satuan	Kuantitas	(Rp)	(Rp)	(%)	0-0203-1	011-1718	-2526-02	03-1011-1	17 18-25	26-02 (03-10 1	1-17 18	25 264	03-1	0 11-11	18-25	26-02	03-10	11-17	18-25	26-02	03-10	11-17	18-26
5. Umum																									
Mobilisasi	r,	1,00	57.742.165,05	57.742.165,05	0,651	0,000,0	0,150 0,	150																0,098	0,098
Pekerjaan Drainase																									
Pasangan Batu dengan Mortar	" e	810,00	880.021,00	712.817.010,00	8,042				\vdash			0,731 0	731 0,7	31 0.7	31 0.75	1 0,731	0,731	0,731	0,731	0,731	0,731				
7. Pekerjaan Tanah																									
Timbunan Pilihan Dari Sumber	" 8	900'005	89.517,00	80.560.800,00	0,909)5,0	0,302	0,303								
8. Pelebaran Perkerasan dan Bahu Jalam															-										
Lapis Pondasi Agregat Kelas S	°e	3.008.80	250.751.00	1.657.000.608.80	18.605	+	t	+	╈			╈	╈	+	+						6.232	6.232	6.232	T	Τ
8. Perkerasan Aspal						-	t		\vdash			\vdash	╞		\vdash									t	Γ
Lapis Perekat - Aspel Cair (Tack Coat)	Liter	11.553,00	16.226,00	187.458.978,00	2,115			0,035	0,0350,02	85 0,053	0,053	0,190 0	190 0,1	90 0,1	90 0,15	0 0,190	0,190	0,190	0,190	0,190					
Lataston Lapis Aus (HR.S-WC) (gradasi senjang / semi anjang)	Ton	3.045,77	1.783.241,00	5.431.341.940,57	61,277							6,128 6	,128 6,1	28 6,12	28 6,12	\$ 6,125	6,128	6,128	6,128	6,128					
Lataston Lapis Aus Pesata (HRS-	Tom					-	F		\vdash			\vdash	\vdash		\vdash									F	Γ
WC) (L) (gradasi senjang / semi senjang)		20,25	1.775.578,00	35.955.454,50	0,406					0,203	0,203														
Lateston Lapis Pondasi Perata	Ton												\vdash												Γ
(HRS-Base(L)) (gradasi senjang / semi senjang)		70,19	1.625.918,00	114.123.184,42	1,288			0,425	0,4290,45	8															
Bahan Anti Pengelupasan	Kg	657,48	97.000,00	63.775.560,00	0,720			0,017	0,0170,01	1 0,011	0,011	0,065 0	065 0,0	65 0,0	65 0,06	5 0,065	0,065	0,065	0,065	0,065					
9. Struktur													-												
Pasangan Batu	" B	180,00	924.981,00	166.496.580,00	1,878					0,313	0,313	0,313 0	313 0,3	13 0,31	2										
10. Pengembalian Kondisi dan Peleriaan Minor																									
Marka Jalan Tennoplastik	"H	2.346.86	151.805.00	356.265.082.30	4.019		t		\vdash			F	┢		\vdash						1340	1340	1.340	F	Γ
A. Jumlah Harga Pekerjaan				8.863.636.363,64	100,000				\vdash			\vdash	\vdash												
C. Pajak Pertambahan Nilai (PPn) = 1(A 1 960			886.363.636,36					-																
C. Jumlah Total Harga = A + B				9.750.000.000,00		\vdash			\vdash				\vdash		\vdash	\mid									Π
			Kemajuan (%)	Dipercepat	_	0,000,0	0,150 0,	1500,000	0,1500,15	50 0,150	0,481	0,481 0	481 0,5	80 0,51	00 7,42	7,421	7,427	7,427	7,417	7,417	7,417	7,114	7,114	7,114	8,303
				Rencana Kumulatif		0,000 0.1	d0,30d 0.	4560,006	0,1560,30	06 0,456	0.937	1.418 1	899 2,4	79 3.0	9 10,4	86 17,91	3 25,340	32,767	40,184	47,601	55,018	62,132	69.246	76,360 8	14,663

Figure 2. Network Diagram Schedule of Periodic Maintenance Work Activities

5. Conclusion

Based on data analysis and discussion, as well as research objectives, it can conclude that:

- Costs needed for the Periodic Maintenance Project for the Limit Road of West Kalimantan - Kudangan - Penopa, Lamandau Regency amounting to Rp. 9,750,000,000.00, with an implementation time of 180 calendar days starting from 30 April 2015 to 26 October 2015 and a road length of 7.846 km.
- 2. The time needed for periodic maintenance is 130 calendar days, can be accelerated by 50 days or 27.78% of the original planning of 180 calendar days.
- 3. Periodic maintenance work activities that should not postpone (critical work) are: a. Initial Mobilization, for 18 days,
 - b. Grading Base Lataston (HRS-Base (L)) (gap / semi-gap gradation), for 17 days,
 - c. Layered Aus Lapata Lataston (HRS-WC) (L) (gap / semi-gap gradation), for 11 days,
 - d. Stone Pair with Mortar, for 61 days, Thermoplastic Road Markings, for 17 days,

e. Final Mobilization, for six days

Although Periodic Maintenance Activities accelerated to 130 calendar days, most activities are by the plan. This indicated by the deviation indicator has a value of 0, and the project work packages that implemented are more than the program. The deviation indicator suggests this has a positive value.

The suggestions that need to be submitted are as follows:

- 1. Use of network diagrams, beneficial for analyzing time and costs.
- 2. To get more optimal results, it is recommended to shift the schedule of work activities first, if it is not possible to add new working days.

REFERENCES

- [1] T. P. Armada, "Analisa Ekonomi Perbaikan Jalan Palembang-Betung Kab. Banyuasin Terhadap Nilai Kerugian Akibat Kemacetan," *J. Civ. Environ. Eng.*, vol. 2, no. 3, 2014.
- [2] Depkimpraswil, *Campuran Beraspal Panas, Modul Prasarana Transportasi, Modul B.1.1.* Badan Penelitian dan Pengembangan Departemen Pemukiman dan Prasarana Wilayah., 2003.
- [3] Depkimpraswil, *Campuran Beraspal Panas, Modul Prasarana Transportasi, Modul B.1.2.* Badan Penelitian dan Pengembangan Departemen Pemukiman dan Prasarana Wilayah., 2003.
- [4] M. I. Amin Khairi and H. Saleh, "Evaluasi Jenis dan Tingkat Kerusakan dengan Menggunakan Metode PCI (Studi Kasus Di Jalan Soekarno Hatta 05+ 000-10+ 000)," *Politek. Negeri Bengkalis*, 2012.
- [5] Depkimpraswil, "Tinjauan Penanganan Kerusakan Jalan dan Jembatan pada Ruas Jalan Nasional/Propinsi di Jawa Timur," in *Makalah Seminar Badan Penelitian dan Pengembangan Pusat Litbang Sarana Transpostasi Departemen Pemukiman dan Prasarana Wilayah*, 2003.
- [6] D. J. B. Marga, "Pedoman Pelaksanaan Pemeliharaan Jalan dan Jembatan." Jakarta, 1992.
- [7] I. Indrayana and G. N. G. Agung, "Analisis Kinerja Ruas Jalan dan Biaya Perjalanan Akibat Tundaan Pada Ruas Jalan," J. Ilm. Elektron. Infra Strktur Tek. Sipil, vol. 2, 2013.
- [8] S. Tinarbuko, "Semiotika Analisis Tanda Pada Karya Desain Komunikasi Visual," *Nirmana*, vol. 5, no. 1, 2004.
- [9] L. P. Leach, "Critical chain project management improves project performance," *Proj. Manag. J.*, vol. 30, no. 2, pp. 39–51, 1999.
- [10] E. B. SANJAYA, "Persepsi Insinyur Teknik Sipil Mengenai Kelayakan Infrastruktur Propinsi Jawa Barat." UAJY, 2016.
- [11] T. Listyorini *et al.*, "Holographic reflection Penglipuran Village Bali," *nternational J. Eng. &Technology*, vol. Vol 7, No, no. 14 (2018), 2018.
- [12] Y. A. J. Susilo, "Evaluasi Tingkat Pelayanan Jalan Arteri Primer Kota Ambarawa." Program Pasca Sarjana Universitas Diponegoro, 2002.
- [13] P. A. Sandra, *Evaluasi Kondisi Arus Lalu Lintas dan Perkerasan Jalan Nasional di Provinsi di Yogyakarta*. Semarang: Universitas Katolik Soegijapranata, 2010.
- [14] N. J. Smith, *Engineering project management*. Blackwell Science Ames, IA, 2002.
- [15] R. H. Thayer and E. Yourdon, "Software engineering project management," Softw. Eng. Proj. Manag., pp. 72–104, 1997.
- [16] S. Sukirman, "Perkerasan lentur jalan raya," Nova, Bandung, vol. 2, 1999.

- [17] M. Aminsyah, "Pengaruh Kepipihan dan Kelonjongan Agregat Terhadap Perkerasan Lentur Jalan Raya," *J. Rekayasa Sipil*, vol. 6, no. 1, pp. 23–36, 2010.
- [18] P. R. Indonesia, "Peraturan Pemerintah nomor 34 tahun 2006 tentang jalan," *Jakarta Sekr. Negara*, 2006.
- [19] D. P. Umum, "Undang-Undang Republik Indonesia Nomor 38 Tahun 2004 tentang JALAN." Jakarta, 2004.
- [20] Undang-undang Republik Indonesia Nomer 13 tahun 1980 tentang Jalan. .