CERUCUK

Volume 5 No. 1 2021 (1-16)

PLANNING EVALUATION OF RIGID PAVEMENT'S THICKNESS ON INTERSECTION OF A ROAD SEGMENT OF SIKUI KM. 34 NATIONAL ROAD STA. 0+000 S/D 0+300EAST BARITO DISTRICT

Agung Rubian Dwi Putra and Yasruddin

Department of Civil Engineering, Faculty of Engineering, University of Lambung Mangkurat
E-mail:agungrubian@gmail.com

ABSTRACT

East Barito is one district that has a variety of natural resources such as agriculture and mining, Sikui KM of National Highway 34 is one of the roads that used to be accessed by one party mobilization of existing mines in Central Kalimantan. But on the other hand, the national road Sikui KM 34 is also used for connecting roads between provinces or cities. Based on the above actual national roads not intended for large-laden vehicles.

Path planning is aimed to obtain a rigid pavement thickness based on the Pavement Design Manual Nomor 02/M/BM/2017 which controlled by "Pedoman Perencanaan Perkerasan Jalan Beton Semen Pd T-14-2003" and calculating the budget plan on the intersection of a road segment of Sikui KM 34 national road, East Barito disctrict.

On the planning of rigid pavement's thickness by using "Manual Desain Perkerasan Jalan Nomor 02/M/BM/2017" it is found that the concrete plate layer = 28,5 cm; LMC base layer = 10 cm; drainage layer = 15 cm and by using "Pedoman Perencanaan Perkerasan Jalan Beton Semen Pd T-14-2003" also found that the concrete plate layer = 21 cm; base layer = 15 cm. After that, on the existing condition obtained concrete plate layer = 30 cm; K-125 concrete layer = 10 cm. Then, it is found that the efficient pavement's thickness which taken by using "Pedoman Perencanaan Perkerasan Jalan Beton Semen Pd T-14-2003" is more efficient rather than the existing condition. Moreover, this thesis also discusses the budget plan on the intersection of a road segment of Sikui Km. 34, East Barito district.

Keywords: Manual Desain Perkerasan Jalan 02/M/BM/2017, Pedoman Perencanaan Perkerasan Jalan Beton Semen Pd T-14-2003, Budget Planning

1. PRELIMINARY

East Barito is one of the districts in the province of Central Kalimantan. East Barito itself has an area of 3,834 km². East Barito is one district that has a variety of natural resources such as agriculture and mining. There are several mining companies in East Barito. In the mining companies, mobilization is the most important because it can facilitate the process of distribution of mining and mining activity itself. Mobilization process itself has access in the form of roads, where the road used as land transportation infrastructure plays a very important in the transport sector, especially for the continuation of the distribution of goods and services,

Sikui KM 34 National road is one of the roads that used to be accessed by one party mobilization mining in East Barito. But on the other hand, the national road of Sikui KM 34 is also used for connecting roads between provinces or cities. Based on the above actual national roads not intended for large-laden vehicles. Thus it was made was the alternative of making the national road intersection in Sikui KM 34 for access to mining.

In this thesis, the author would like to evaluate planning of rigid pavement (Rigid Pavement) at the intersection of a parcel of national roads Sikui KM 34 with Manual Design of Pavement Number. 02/M/BM/2017 of the Ministry of Public Works and in advance, planning refers to Manual Design Pavement roads No. 02/M/BM/2013 of the Ministry of Public Works and Public Housing Directorate General of Highways.

2. LITERATURE REVIEW

Type Pavement

Pavement can be divided into four (4) sections, namely:

1. Flexible Pavement
2. Rigid Pavement
3. Composite Pavement
4. Pavement Paving Block

Pavement Structure

Pavement structure consists of several layers, namely:

1. Surface Course
2. Base Course
3. Subbase Course
4. Sub Grade

classification of Roads

Road classification is divided into:

1. Classification is based on the function of the road
2. The classification is based on the authority of coaching
3. Classification based on load axle load

Pavement Thickness calculation with Pavement Design Manual No.02/M/BM/2017

Based on the procedure outlined in the Rigid Pavement Thickness Design Guidelines Pavement Design Manual No. 02/M/BM/2017 Ministry of Public Works General Directorate of Highways in 2017.

Pavement Thickness calculation with Planning Guidelines Pd Cement Concrete Pavement T-14-2003

The steps of the calculation, determine ratings subgrade CBR, the estimated distribution of commercial vehicles and the type/load axis, select the connection type, select the type and thickness of subbase, specify CBR effective, select a safety factor of the load, the selection of road shoulders, select the tensile strength and of concrete age of 28 days, and estimate the concrete slab thickness. Then specify repitisi analysis permits continued to fatigue and erosion. If the erosion damage and fatigue damage is less than 100%, set a bold plan.

Budget plan

Planning for the calculation of the draft budget of pavement thickness calculation results, among others:

1. Base Unit Price (HSD) Labor.
2. Base Unit Price (HSD) equipment.
3. Base Unit Price (HSD) materials.
4. Base Unit Price (HSD) Works.
5. Calculation of Volume of Work.

3. RESEARCH METHODS

The research method presented in the flow chart below:

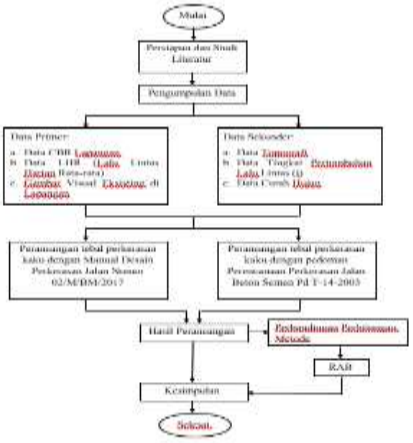


Figure 3.1 Flowchart Top Design

4. RESULTS AND DISCUSSION

The following analysis of the data needed for planning, namely:

1. Data analysis annual average daily traffic (LHR)

Table 4.1 Data LHR

jenis kendaraan	jumlah	lalu lintas harian Rata - Rata (50%)	LHR Tahun (365 hari)
5B	28	14	5110
6A	339	170	61868
6B	534	267	97455
7A	25	13	4563
7B	1	1	183
7C	26	13	4745
Total		477	173923

Source: Data survey in 2018 by the Central Kalimantan provincial Highways

2. CBR Data Analysis

- Normal methods

Table 4.2 Data CBR Field

NO	STA	CBR LAPANGAN
1	0-00	2.60
2	0-50	1.90
3	0-100	3.30
4	0-150	2.00
5	sisi aspal (kr)	4.00
6	sisi aspal (kn)	2.20
7	0-00	2.90
8	0-50	2.50
9	0-100	2.90
10	0-150	3.00
Total		27.30

Source: Calculation Results

Table 4.2 can be calculated from the CBR average value and standard deviation of the data obtained as follows:

CBR average $= \frac{Jumlah\ CBR\ titik}{Jumlah\ data}$

$= \frac{27.3}{10}$

= 2.73%

standard deviation $= \sqrt{\frac{\sum_{i=0}^{n}(x_1-\bar{x})^2}{n-1}}$

standard deviation $= \sqrt{\frac{(4{,}5-3{,}1)^2+(3{,}3-3{,}1)^2+(3{,}2-3{,}1)^2+(2{,}8-3{,}1)^2+(3{,}3-3{,}1)^2+(3{,}6-3{,}1)^2+(3{,}3-3{,}1)^2+(2{,}6-3{,}1)^2+(2{,}0-3{,}1)^2+(2{,}9-3{,}1)^2+(3{,}3-3{,}1)^2+(2{,}2-3{,}1)^2}{12-1}}$

standard deviation = 0.636 %

F value:

f = 1.645 (95% probability), for highway or freeway.

f = 1.282 (probability 90%), for the collector and arterial roads.

f = 0.842 (80% probability), for local roads and small streets.

Value n CBR <6% = 10, the number of data meet the requirements for using the formula in determining the characteristics of the CBR.

CBR The calculation of the following characteristics:

CBR CBR characteristics = average - standard deviation fx

CBR characteristics = 2.73 to 1.282 x 0.636

CBR characteristics = 1.91%

- percentile method

CBR sorted values of equal to or greater and at the percentage as shown in Table 4.3 below:

Table 4.3 Percentage Data subgrade CBR

NO	CBR %	JUMLAH SAMA DAN LEBIH BESAR	PERSENTASE
1	1.90 %	10	10 / 10 x 100%= 100,00%
2	2.00 %	9	9 / 10 x 100%= 90%
3	2.20 %	8	8 / 10 x 100%= 80%
4	2.50 %	7	7 / 10 x 100%= 70%
5	2.60 %	6	6 / 10 x 100%= 60%
6	2.90 %	4	4 / 10 x 100%= 40%
7	2.90 %	4	4 / 10 x 100%= 40%
8	3.00 %	3	3 / 10 x 100%= 30%
9	3.30 %	2	2 / 10 x 100%= 20%
10	4.00 %	1	1 / 10 x 100%= 10%

Source: Calculation Results

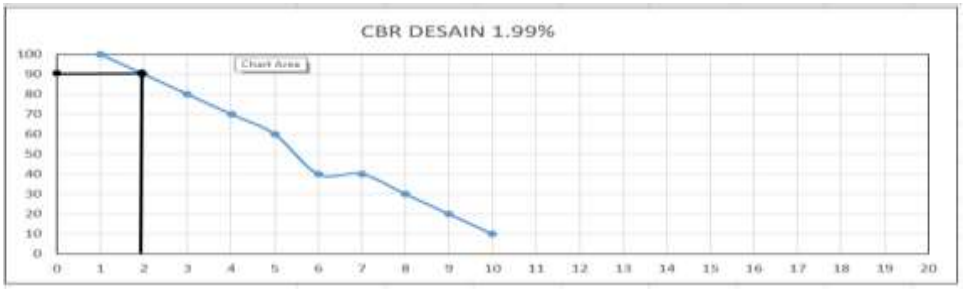


Figure 4.1 Relationship Graph subgrade CBR value with Graphic Method

Table 4.3 shows the CBR of the subgrade uniform segment with 10 data CBR (n = 10). Data compiled data from lowest to highest. Then do the calculations using Microsoft Excel by using the function = PERCENTILE (array, k) with "array" refers to a collection of data and the "k" is a percentile (the tithe). After calculating the results obtained for 1.99% CBR characteristics as shown in Figure 4.1. So to use CBR planning characteristics of 1.91%.

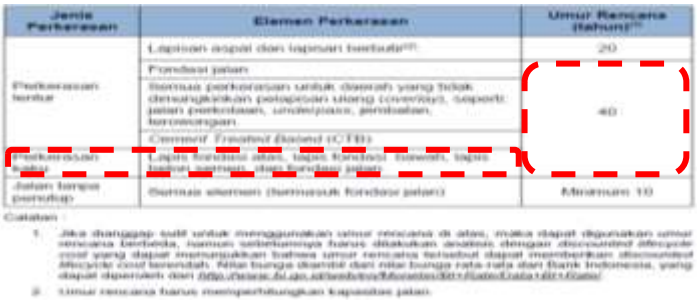
I. Designing With Pavement Design Manual No. 02 / M / BM / 2017

Be discovered planning parameter data as follows:

1. Age Plan

In this plan the design life of 40 years is used by with Table 4.4:

table 4.4 New Age Pavement Plan (UR)



Source: Pavement Design Manual No.02/M/BM/2017

2. Traffic Growth Factor

Traffic growth factor for Kalimantan for arterial and urban roads by 5.14%.

3. CBR Soil Basics

Subgrade CBR gained 1.91%, obtained from the analysis results with normal methods.

4. Rigid Pavement Thickness Design

For roads with heavy traffic can be determined based on a calculation reps commercial vehicle axis. Traffic load calculation based on the number of heavy vehicles axis groups as follows:

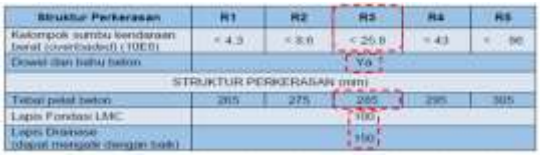
Table 4.5 Load Traffic Based on the Number of Groups Axis Vehicle Weight

Jenis Kendaraan	Jml. Kel. Sumbu (bh)	LHR 2018 (bh)	Kel. Sumbu 2018 (bh)	Jml. Kel. Sumbu 2018 - 2058 (bh)
1	2	3	4 = 2 x 3	5 = 4 x 365 x 0,5 x 1 x R
5B	2	28	56	412924.21
6A	2	339	678	4999332.36
6B	2	534	1068	7875054.51
7A	2	25	50	368682.33
7B	4	1	4	29494.59
7C	3	26	78	575144.4305
Kumulatif Kel. Sumbu Kend. Berat 2018 - 2058				13685487.99

Source: Calculation Results

The cumulative results of the axis of heavy vehicles in Table 4.5 above, for the determination of rigid pavement thickness in Table 4.6 below included in category R3 pavement structure.

Table 4.6 Rigid Pavement for Road with Heavy Traffic Load



Source: Pavement Design Manual No.02/M/BM/2017

II. Calculation of Pavement Thickness Using Pd T-14-2003 Guideline

From the preceding discussion, it can be seen:

1. Subgrade CBR : 1.91%
2. quality concrete : Attempted K-300, K-350, K-400, K-450
3. Under foundation material : CBK
4. The coefficient of friction between the plates concrete foundation (μ) : 1,8 (cement stabilization)
5. Roadside : Yes
6. Trellis (dowel) : Yes

Cement concrete pavement is planned for 2 lanes 2-way street for arterial roads. Planning includes Concrete Pavement Reinforcement Continued With (BBDT).

a. Traffic Analysis

Step calculation of the number of axes can be seen from Table 4.7 below:

Table 4.7 Calculation of Total Axis By Type and His burden

Jenis Kendaraan	Konvigurasi Beban sumbu				Jumlah Kendaraan	Jumlah Sumbu Per Kendaraan	Jumlah Sumbu	STRT		STRG		STdRG	
	RD	RB	RGD	RGB				BS	JS	BS	JS	BS	JS
1	2				3	4	5=3x4	6	7	8	9	10	11
Bus Besar (SB)	3	5			28	2	56	3	28	5	28		
Truk 2 Sumbu /gol 6A	2	4			339	2	678	2	339	4	339		
Truk 2 Sumbu /gol 6B	5	8			534	2	1068	5	534	8	534		
Truk 3 sumbu / Gol 7A	6	14			25	2	50	6	25			14	25
Truk 3 Sumbu / gol 7B	6	14			1	2	2	6	1			14	1
Truk 5 Sumbu Trailler	6	14	5	5	26	4	104	6	26			14	26
										5	26		
										5	26		
							1958		953		953		52

Source: Calculation Results

Vehicle traffic growth factor (R) can be determined using the following formula:

$$R = \frac{(1+\mathrm{i})^{40} - 1}{i}$$

$$R = \frac{(1+5{,}4\%)^{40} - 1}{5{,}4\%}$$

$$R = 125{,}01$$

Total Axis Commercial Vehicles (JSKN) during the design life of 40 years

$$JSKN = JSKNH \times 365 \times R$$

$$= 1958 \times 365 \times 125{,}01$$

$$= 8{,}9 \times 10^7$$

$$JSKN\ rencana = JSKNH \times C$$

$$= 8{,}9 \times 10^7 \times 0{,}5$$

$$= 4{,}4 \times 10^7$$

b. Calculation of Axis happened Repitisi

Table 4.8 Calculation of Repitisi Wick

STRT	8.00	52.00	0.05	0.49	44668543.33	
	5.00	554.00	0.58	0.49	44668543.33	
	3.00	28.00	0.03	0.49	44668543.33	
	2.00	319.00	0.34	0.49	44668543.33	
Total		953.00	1.00			
STRG	8.00	554.00	0.58	0.49	44668543.33	
	5.00	80.00	0.08	0.49	44668543.33	
	4.00	319.00	0.34	0.49	44668543.33	
Total		953.00				
STdRD	14.00	52.00	1.00	0.03	44668543.33	
Total		52.00				
						44668543.33

Source: Calculation Results

c. Calculation of Thick Plates

Based on the subgrade CBR obtained from previous calculations, so using Figure 4.2 can be determined the magnitude of the effective value of land CBR. In the planning of the national road Sikui KM 34, has a subgrade CBR value of 1.91%.

Source: Planning Pd Cement Concrete Pavement T-14-2003

Figure 4.2 Basic Land CBR Effective and Thick Base Down

Based on Figure 4.3 above, for subgrade have used CBR 1.91% CBK 150 mm thick foundation.

Table 4.9 Load Safety Factor

No.	Penggunaan	Nilai Fkr
1	Jalan bebas hambatan utama (*major freeway*) dan jalan berlajur banyak, yang aliran lalu lintasnya tidak terhambat serta volume kendaraan niaga yang tinggi. Bila menggunakan data lalu-lintas dari hasil survai beban (*weight-in-motion*) dan adanya kemungkinan route alternatif, maka nilai faktor keamanan beban dapat dikurangi menjadi 1,15.	1,2
2	Jalan bebas hambatan (*freeway*) dan jalan arteri dengan volume kendaraan niaga menengah.	1,1
3	Jalan dengan volume kendaraan niaga rendah.	1,0

Source: Planning Pd Cement Concrete Pavement T-14-2003

Based on Table 4.9 it is known that the magnitude of the load safety factor for arterial roads was 1.1.

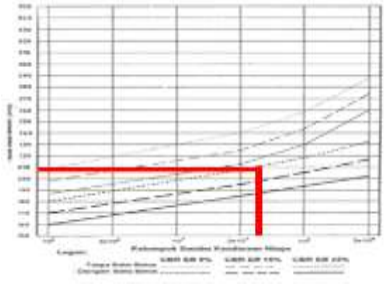
By using the empirical formula, then the flexural tensile strength of concrete with the quality of K-350 is:

$$f_{cf} = K \times \sqrt{fc'}$$

$$f_{cf} = 0{,}75 \times \sqrt{350 \times 0{,}083}$$

$$f_{cf} = 4{,}04\,Mpa$$

The value of the minimum thickness of the concrete slab that will be used in this planning can be seen in Figure 4.3.



Source: Planning Pd Cement Concrete Pavement T-14-2003

Figure 4.3 Chart planning FCF = 4.25 MPa, Traffic Outside the City, with Trellis, FKB = 1.1

From the graph above, it can be deduced that the minimum thickness is 210 mm concrete slab with JSKN plan of 4,4x107.

Determination of fatigue and erosion analysis can be determined by nomogram repitisi permit load (Fatigue Factor) and nomogram repitisi load permits (Erosion Factor),

Thick Plates for 210 mm K-350

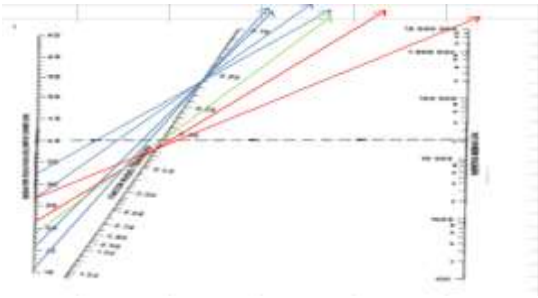


Figure 4.4 Analysis of Fatigue and Load Permission Based voltage ratio with or without reinforcement

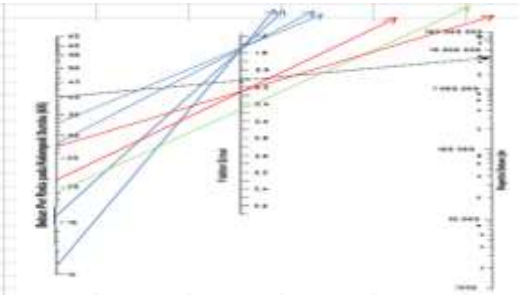


Figure 4.5 Analysis of Erosion and Total Expenses Permission Based Repitisi with Shoulder Concrete

Table 4.10 Analysis of Fatigue and Erosion plate 210 mm thick with concrete quality K-350

Jenis Sumbu	Beban Sumbu ton (kN)	Beban Rencana Per Roda (kN)	Repetisi yang Terjadi	Faktor Tegangan dan	Analisa Fatik		Analisa Erosi	
					Repetisi Ijin	Persen Rusak (%)	Repetisi Ijin	Persen Rusak (%)
1	2	3	4	5	6	7 = 4 x "100" / 6	8	9 = 4 x "100" / 8
STRT	6 (60)	33.00	1186320.86	TE = 0.85	TT	0	TT	0
	5 (50)	27.50	12182602.73	FE = 1.74	TT	0	TT	0
	3 (30)	16.50	638788.16	FRT = 0.21	TT	0	TT	0
	2 (20)	11.00	7733899.48		TT	0	TT	0
STRG	8 (80)	22.00	12182602.73	TE = 1.38	TT	0	TT	0
	5 (50)	27.50	1825109.02	FE = 2.34	TT	0	TT	0
	4 (40)	22.00	7733899.48	FRT = 0.34	TT	0	TT	0
STdRG	14 (140)	19.25	1186320.86	TE = 1.20	TT	0	TT	0
				FE = 2.48				
				FRT = 0.30				
Total (%)					0.00		0	

Source: Calculation Results

For the results of the analysis of K-300, K-350, K-400, K-450, with a slab thickness of 150 mm, 200 mm, 210 mm, 250 mm, 300 mm and 350 mm can be seen in Table 10 below:

Table 4.11 Calculation Results of Fatigue Analysis and Erosion

Tebal Pelat (mm)	Mutu Beton	Analisa Fatik (%)	Ceb	Analisa Erosi (%)	Ceb
150	K-300	562879.59	> 100%	1633.85	> 100%
	K-350	372388.40	> 100%	1633.85	> 100%
	K-400	48919.84	> 100%	1633.85	> 100%
	K-450	23378.51	< 100%	1633.85	> 100%
200	K-300	684.42	> 100%	18.25	< 100%
	K-350	91.26	< 100%	18.25	< 100%
	K-400	0	< 100%	18.25	< 100%
	K-450	0	< 100%	0	< 100%
210	K-300	182.51	> 100%	0	< 100%
	K-350	0	< 100%	0	< 100%
	K-400	0	< 100%	0	< 100%
	K-450	0	< 100%	0	< 100%
250	K-300	0	< 100%	0	< 100%
	K-350	0	< 100%	0	< 100%
	K-400	0	< 100%	0	< 100%
	K-450	0	< 100%	0	< 100%
300	K-300	0	< 100%	0	< 100%
	K-350	0	< 100%	0	< 100%
	K-400	0	< 100%	0	< 100%
	K-450	0	< 100%	0	< 100%
350	K-300	0	< 100%	0	< 100%
	K-350	0	< 100%	0	< 100%
	K-400	0	< 100%	0	< 100%
	K-450	0	< 100%	0	< 100%

Source: Calculation Results

From the calculation of the fatigue and erosion analysis methods, Pd T-14-2003 then obtained fatigue and erosion value closest to 100% is at 210 mm slab thickness, concrete quality K-350 with a value of fatigue 0% and 0% erosion. But by using the Design Manual No. 02 / M / BM / 2017 obtained slab thickness 285 mm. Therefore, the wear plate 210 mm thick with concrete quality K-350. Images of the cross-section can be seen in the following figure:

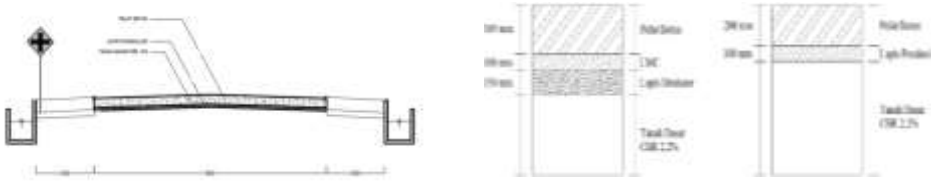


Figure 4.6 Sectional Crossing, Rigid Pavement Thickness with Pavement Design Manual 2017 with the Rigid Pavement Thickness Pd-T-14-2003

d. Continued Pavement Reinforcement calculations with

a) thick Plates = 210 mm

b) The width of the foundation = 2 x 4 m

c) long Plates = 5 m

d) The coefficient of friction between the concrete slab with subbase = 1.8

e) Tensile strength steel license = 240 MPa

f) Concrete content weight = 2400 kg / m3

g) gravitation = 9.81 m / sec

Transverse Reinforcement

$$As\ perlu = \frac{\mu.\,L.\,M.\,g.\,h}{2.fs}$$

$$As\ perlu = \frac{1{,}8 \times 4 \times 2.400 \times 9{,}81 \times 0{,}210}{2 \times 240}$$

$As\ perlu =$ 211.90 mm2 / m '

As obtained minimum of manual ISO-2002

$As_{min} = 0{,}1\% \times 210 \times 1.000$

$As_{min} =$ 210 mm^2/m' > As_{perlu} = 148,33 mm^2/m'

Total Reinforcement

$$\frac{1}{4}\pi.\emptyset^2.n = As_{min}$$

$$\frac{1}{4}\pi.12^2.n = 210\ mm^2$$

n = 1,86 $buah$ → $digunakan\ n = 2\ buah$

The distance between reinforcement

$$S = \frac{{}^{1}/_{4}.\pi.\emptyset^2.1.000}{As_{perlu}}$$

$$S = \frac{{}^{1}/_{4}.\pi.12^2.1.000}{210} = 762{,}49\ mm$$

Maka dipakai tulangan $\emptyset 12 - 500\ mm$

Longitudinal reinforcement

$$As\ perlu = \frac{\mu.L.M.g.h}{2.fs}$$

$$As\ perlu = \frac{1{,}8 \times 5 \times 2.400 \times 9{,}81 \times 0{,}210}{2 \times 240}$$

$$As\ perlu = \ 92{,}70\ mm^2/m$$

As obtained minimum of manual ISO-2002

$$As_{min} = 0{,}1\% \times 210 \times 1.000$$

$$As_{min} = \ 210\ mm^2/m\ >\ As\ perlu = 92{,}70\ mm^2/m$$

Total Reinforcement

$$\frac{1}{4}\pi.\emptyset^2.n = As_{min}$$

$$\frac{1}{4}\pi.12^2.n = 210\ mm^2$$

$$n\ \ =\ \ 1{,}86\ buah\ \rightarrow digunakan\ n = 2\ buah$$

The distance between reinforcement

$$S = \frac{{}^{1}/_{4}.\pi.\emptyset^2.1.000}{As_{perlu}}$$

$$S = \frac{{}^{1}/_{4}.\pi.12^2.1.000}{210} = 1.219{,}98\ mm$$

Then we used reinforcement $\emptyset 12 - 500$ mm

e. Planning Dowel

Table 2.13 Based on size and distance of the spokes (dowel) to the thickness of the plate with the CBR of 1.91 is required 200 mm diameter spokes (dowel) Ø33 mm, with the length (L) of 450 mm and the distance (s) between the dowel 300 mm. Sketches connection with the transverse shrinkage and expansion in the picture Dowelfollowing:

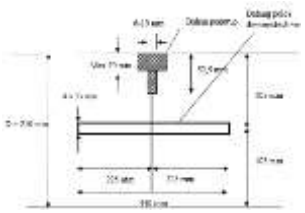


Figure 4.7 Picture Connection Losses Transverse with Dowel

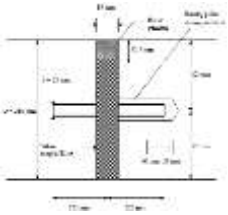


Figure 4.8 Picture Connection Expansion with Dowel

f. Planning Tie Bar

For planning Tie Bar took a diameter D16 tie bar with a length of 1000 mm and a maximum distance of 750 mm. Tie Bars sketch slab thickness of 210 mm can be seen in the following figure:

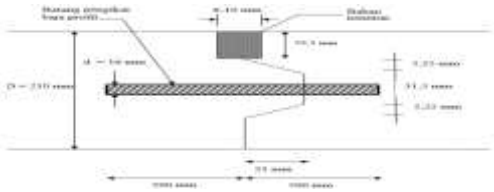


Figure 4.9 Connection with Tie Bar to 210 mm Thick Plates

III. Calculation of Budget Plan (RAB)

Calculation of the Budget Plan of the results of the calculation method of Pd T-14-2003, among others:

1. Base Unit Price (HSD) Labor.
2. Base Unit Price (HSD) Equipment.
3. Base Unit Price (HSD) Materials.
4. Base Unit Price (HSD) Works.
5. Calculation of Volume of Work.

1. Price and Quantities Lits

No	Uraian Pekerjaan	Volume	Satuan	Harga Satuan Rp	Jumlah Harga Rp
I	Divisi 1				
1	Galian	1228	M^3	Rp 50,586	Rp 62,119,608
II	Divisi 5				
1	Pekerasan Beton Semen	515.76	M^3	Rp 3,880,198	Rp 2,001,251,126
2	Lapisan Pondasi Bawah Beton Kurus	368.4	M^3	Rp 1,695,996	Rp 624,864,863
III	Divisi 7				
1	Baja Tulangan	9643.4	KG	Rp 27,628	Rp 266,426,652
2	Pekerjaan Pembesian Dowel dan Tie Bar	3891.0	KG	Rp 40,319	Rp 156,881,526
				Total Pekerjaan	Rp 3,131,483,776
				Dibulatkan	Rp 3,131,483,000

2. Summary of Price Work

REKAPITULASI
PERKIRAAN HARGA PEKERJAAN

Proyek/Bagpro :
No. Paket Kontrak :
Nama Paket :
Prop/Kab/ Kodya :

No. Divisi	Uraian	Jumlah HargaPekerjaan
1	Umum	Rp
2	Drainase	
3	Pekerjaan Tanah	Rp 62.119.608
4	Pelebaran Perkerasan dan Bahu Jalan	
7	Perkerasan Non Aspal	Rp 2.628.019.980
8	Perkerasan Aspal	
7	Struktur	Rp 423.308.178
8	Pengembalian Kondisi dan Pekerjaan Minor	
9	Pekerjaan Harian	
10	Pekerjaan Pemeliharaan Rutin	
(A) Jumlah Harga Pekerjaan (Termasuk Biaya Umum dan Keuntungan)		Rp 3.111.483.776,59
Dibulatkan		Rp 3.111.483.000
Terbilang : *Tiga Milyar Seratus Sebelas Juta Empat Ratus Delapan Puluh Tiga Ribu Rupiah*		

CONCLUSION

National Road Sikui KM 34 (STA 0+000 s/d STA 0+300) have a cumulative total 13,685,487.99 piece axis group in 2018.

Normal methods and Percentile method used to determine the value of CBR in the field. The results are used is the smallest result, the normal method, ie 1.91%.

Thick pavement using Road Pavement Design Manual No.02/M/BM/2017 to get the result that, Plates Concrete = 28.5 cm; Base LMC = 10 cm; Lapis Drainage = 15 cm and for thick pavement using Cement Concrete Pavement Planning Pd T-14-2003 getting results that, Plates Concrete = 21 cm; With Quality Concrete = K - 350; Base = 15 cm. As for the planned pavement thickness companies namely Plates Concrete = 30 cm; Concrete Layer K-125 = 10 cm.

The work of the Unit Price Analysis 2019 (AHSP) is used to calculate the budget plan and get results with a total cost of Rp. 3.111.483 billion.

SUGGESTION

On the road pavement planning, required accuracy in analyzing the data that will be used primarily in the calculation of daily traffic average as a cumulative burden of the standard used. We should pay attention to the correct data collection techniques and proper justification to minimize errors in planning so that the obtained results pavement effective planning and efficient.

In the planning of this road pavement LHR, the author uses survey data obtained based on data from a survey in 2018 by the Highways Central Kalimantan province of the mine in question which has an average daily amount is small. So it is advisable to use the data LHR from nearby mining companies as data LHR planning assumptions.

REFERENCES

Departemen Bina Marga. 2017. *Manual Kapasitas Jalan Indonesia 2017*. Jakarta.

Departemen Pekerjaan Umum. 2008. *Cara Uji CBR dengan Dynamic Cone Penetrometer (DCP), Pd T-02-2006*. Bandung.

Departemen Pemukiman dan Prasarana Wilayah. 2003. *Perencanaan Perkerasan Jalan Beton Semen, Pd T-14-2003*. Jakarta.

Departemen Pemukiman dan Prasarana Wilayah. 2004. *Survey Pencacahan Lalu Lintas dengan cara Manual, Pd T-19-2004-B.* Jakarta.

Haryanto, Iman., Utomo, Heru Budi. 2012. *Pengembangan Pembelajaran Berbasis Riset dan Education for Sustainable Development untuk Matakuliah Perkerasan Jalan Raya dengan Memanfaatkan Hasil Riset Terapan Ecomaterial.* Pusat Pengembangan Pendidikan Universitas Gajah Mada. Yogyakarta.

Kementerian Pekerjaan Umum Direktorat Jendral Bina Marga. 2017. *Manual Desain Perkerasan Jalan 02/M/BM/2017*. Jakarta.

Kementerian Pekerjaan Umum dan Perumahan Rakyat. 2018. *Spesifikasi Umum 2018 untuk Pekerjaan Kontruksi Jalan dan Jembatan.* Jakarta.

Saodang, Hamirhan. 2005. *Perancangan Perkerasan Jalan Raya*. Nova. Bandung.

Shirley L, Hendarsin. 2000. *Perencanaan Teknik Jalan Raya*. Politeknik Negeri Bandung Jurusan Teknik Sipil. Bandung.

Rifani, Ahmad. 2018. *Evaluasi Perencanaan Tebal Perkerasan Kaku, Bangunan Pelengkap dan Perlengkapan Jalan pada Peningkatan Jalan Trikora – Kong Ex (STA 0-000 – STA 1-100).* Banjarmasin.