

## BAB 4 ANALISIS DATA DAN PEMBAHASAN

### 4.1 Kemajuan dan Kuantitas Pekerjaan

Pekerjaan Peningkatan Jalan G.Obos Palangka Raya pada minggu pertama Agustus mengalami keterlambatan pekerjaan sebesar 5,002 % seperti terlihat pada tabel 4.1. Hal ini disebabkan oleh keterlambatan material, proses pembebasan lahan dan proses addendum pekerjaan yang sedang berjalan.

Tabel 4.1 Kemajuan Pekerjaan Bulan Agustus Minggu Pertama

No. Item	Uraian Pekerjaan	Sat	Volume	
			Rencana	Realisasi
1.2	Mobilisasi	Ls	1,00	0,80
3.1.(1a)	Galian Biasa	M <sup>3</sup>	1.953,00	1.174,68
3.2.(2a)	Timbunan Pilihan	M <sup>3</sup>	7.200,00	7.000,00
3.5.(2b)	Geotextile	M <sup>2</sup>	3.180,00	3.180,00
4.2.(2b)	Lapis Pondasi Agregat Kelas S	M <sup>3</sup>	334,80	-
5.1.(1)	Lapis Pondasi Agregat Kelas A	M <sup>3</sup>	1.266,98	942,75
5.1.(2)	Lapis Pondasi Agregat Kelas B	M <sup>3</sup>	1.116,00	686,25
6.1.(1a)	Lapis Resap Pengikat	Ltr	6.230,93	-
6.1.(2a)	Lapis Perekat	Ltr	413,42	-
6.3.(3a)	Lataston Lapis Aus ( HRS-WC )	Ton	138,29	-
6.3.(4a)	Lataston Lapis Pondasi ( HRS-Base )	Ton	653,88	-
6.3.(8)	Bahan Anti Pengelupasan	Kg	125,95	-
7.1.(7a)	Beton Mutu Sedang fc' = 20 Mpa	M <sup>3</sup>	97,02	57,08

7.1.(10)	Beton Mutu Rendah $f_c' = 10$ Mpa	M <sup>3</sup>	1,85	1,38
7.3(1)	Baja Tulangan BJ 24 Polos	Kg	9.040,64	5.474,47
7.9(1)	Pasangan Batu	M <sup>3</sup>	2.033,17	1.712,25
	<b>Kemajuan Pekerjaan</b>	<b>%</b>	<b>70,295</b>	<b>65,293</b>

Sumber : Olahan Peneliti, 2016

Berdasarkan kemajuan pekerjaan yang mengalami keterlambatan pada Bulan Agustus Minggu pertama diatas maka dilakukan analisis untuk mengejar keterlambatan dengan cara mempercepat pelaksanaan pekerjaan dan mengatur jadwal pekerjaan ( *Time Schedule*) pada pekerjaan yaitu : Pekerjaan Galian Biasa, Pekerjaan Lapis Pondasi Agregat Kelas B, Pekerjaan Lapis Pondasi Agregat Kelas A, Lapis Resap Pengikat dan Lataston Lapis Pondasi (HRS-Base ) dengan kuantitas pekerjaan sebagai berikut:

Tabel 4.2 Daftar Kuantitas Pekerjaan

No. Item	Pekerjaan	Sat	Volume
3.1.(1a)	Galian Biasa	m <sup>3</sup>	778,32
5.1.(1)	Lapis Pondasi Agregat Kelas A	m <sup>3</sup>	324,23
5.1.(2)	Lapis Pondasi Agregat Kelas B	m <sup>3</sup>	429,75
6.1.(1a)	Lapis Resap Pengikat	Ltr	2.040,00
6.3.(4a)	Lataston Lapis Pondasi (HRS-Base )	Ton	214.08

Sumber : Olahan Peneliti,2016

#### 4.2 Evaluasi Waktu Pelaksanaan

Pekerjaan Peningkatan Jalan G.Obos Palangka Raya pada minggu pertama Agustus mengalami keterlambatan pekerjaan sebesar 5,002 % dimana kemajuan pekerjaan terlaksana dilapangan 65,293 % , sedangkan kemajuan rencana 70,295 % hari kalender. Untuk mengatasi keterlambatan pekerjaan dilakukan dengan

melakukan percepatan dan mengatur ulang jadwal waktu pelaksanaan ( *Time Schedule* ) dengan menghitung waktu pelaksanaan setiap item pekerjaan dan peralatan serta membandingkannya. Dalam penelitian ini menggunakan 2 alternatif. Alternatif 1 dengan penambahan waktu kerja, alternatif 2 penambahan peralatan.

#### 4.2.1 Koefisien Peralatan

Dalam pekerjaan Peningkatan Jalan G.Obos Palangka Raya item pekerjaan yang dipakai adalah Galian Biasa, Timbunan Pilihan, Geotextile Separator Kelas 2, Lapis Pondasi Agregat Kelas S, Lapis Pondasi Agregat Kelas A, Lapis Pondasi Agregat Kelas B, Lapis Resap Pengikat ( Prime Coat ), Lapis Perekat (Tack Coat), Lataston Lapis Aus ( HRS-WC), Dan Lataston Lapis Pondasi ( HRS-Base). Dalam pekerjaan tersebut diatas peralatan yang digunakan adalah Excavator, Motor Grader, Vibrator Roller, AMP, Asphalt Finisher, Asphalt Sprayer, Compressor, Dump Truck 3.5 Ton, Tandem Roller 6-8 Ton, Pneumatic Tired Roller 8-10 Ton.

Tabel 4.3 Daftar Peralatan

No.	Komponen	Satuan	Jumlah
1	AMP	Unit	1.00
2	Asphalt Finisher	Unit	1.00
3	Asphalt Sprayer	Unit	1.00
4	Compressor 4000-6500 L/M	Unit	1.00
5	Dump Truck 3,5 Ton	Unit	7.00
6	Excavator	Unit	1.00
7	Motor Grader	Unit	1.00
8	Tandem Roller 6-8 Ton	Unit	1.00

9	Pneumatic Tired Roller 8-10 Ton	Unit	1.00
10	Wheel Loader	Unit	1.00
11	Vibrator Roller	Unit	1.00

Sumber : Dinas Pekerjaan Umum Prov. Kalimantan Tengah,2016

Tabel 4.4 Koefisien Peralatan

No.	Pekerjaan / Peralatan	Satuan	Koefesien
3.1.(1a)	Galian Biasa		
	1. Excavator	Jam	0,0109
	2. Dump Truck	Jam	0,1453
3.2.(2a)	Timbunan Pilihan		
	1. Wheel Loader	Jam	0,0085
	2. Dump Truck	Jam	0,3205
	3. Motor Grader	Jam	0,0040
	4. Tandem	Jam	0,0161
	5. Water Tanker	Jam	0,0070
4.2.(2b)	Lapis Pondasi Agregat Kelas S		
	1. Wheel Loader	Jam	0,0085
	2. Dump Truck	Jam	0,1672
	3. Motor Grader	Jam	0,0043
	4. Tandem	Jam	0,0054
	5. Water Tanker	Jam	0,0141
5.1.(1)	Lapis Pondasi Agregat Kelas A		
	1. Wheel Loader	Jam	0,0085
	2. Dump Truck	Jam	0,1734
	3. Motor Grader	Jam	0,0043
	4. Tandem	Jam	0,0134
	5. Water Tanker	Jam	0,0141
5.1.(2)	Lapis Pondasi Agregat Kelas B		
	1. Wheel Loader	Jam	0,0085
	2. Dump Truck	Jam	0,1773
	3. Motor Grader	Jam	0,0043
	4. Tandem	Jam	0,0054
	5. Water Tanker	Jam	0,0141
6.1(1a)	Lapis Resap Pengikat		
	1. Asphalt Distributor	Jam	0,0002
	2. Compressor	Jam	0,0002

6.1(2a)	Lapis Perekat 1. Asphalt Distributor 2. Compressor	Jam Jam	0,0002 0,0002
6.3(3a)	Lataston Lapis Aus HRS-WC 1. Whell Loader 2. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	Jam Jam Jam Jam Jam Jam Jam	0,0096 0,0241 0,0241 0,1870 0,0191 0,0157 0,0043
6.3(4a)	Lataston Lapis Pondasi HRS-Base 1. Whell Loader 2. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	Jam Jam Jam Jam Jam Jam Jam	0,0096 0,0241 0,0241 0,1870 0,0041 0,0058 0,0049
7.1.(7a)	Beton Mutu Sedang $f_c' = 20$ Mpa ( K-250 ) 1. Concrete Mixer 2. Water Tanker 3. Pekerja 4. Tukang 5. Mandor	Jam Jam Jam Jam Jam	0,4097 0,0545 2,4408 1,2204 0,4097
7.1.(10)	Beton Mutu Sedang $f_c' = 10$ Mpa ( K-125 ) 1. Concrete Mixer 2. Water Tanker 3. Pekerja 4. Tukang 5. Mandor	Jam Jam Jam Jam Jam	0,4097 0,0382 1,2204 1,2204 0,4097
7.9.(1)	Pasangan Batu 1. Concrete Mixer 2. Water Tanker 3. Pekerja 4. Tukang 5. Mandor	Jam Jam Jam Jam Jam	0,4097 0,0014 4,0971 1,2204 0,4097

Sumber : Dinas Pekerjaan Umum Prov. Kalimantan Tengah, 2016

## 4.2.2 Alternatif 1

Dilakukan penambahan waktu pelaksanaan pekerjaan dengan menggunakan jumlah peralatan yang tersedia, diperoleh perhitungan sebagai berikut :

### 4.2.1.1. Perhitungan Waktu Pelaksanaan

#### a. Pekerjaan Galian Biasa

Pekerjaan Galian Biasa dengan Kuantitas 778,32 M<sup>3</sup>.\*

Pekerjaan Galian Biasa dengan Kuantitas 1.593,32 M<sup>3</sup>.

#### 1. Excavator

Excavator = 0,0109 Jam/ M<sup>3</sup> x 778,32 M<sup>3</sup> = 8,484 Jam

7 Jam/Hari = 1,212 Hari

Excavator = 2,00 Hari\*

Excavator = 0,0109 Jam/ M<sup>3</sup> x 1.593,00 M<sup>3</sup> = 17,364 Jam

7 Jam/Hari = 2,481 Hari

Excavator = 3,00 Hari

#### 2. Dump Truck

Dump Truck = 0,1453 Jam/ M<sup>3</sup> x 778,32 M<sup>3</sup> = 113,090 Jam / 7

7 Jam/Hari = 2,308 Hari

Dump Truck 7 Unit = 3,00 Hari\*

Dump Truck = 0,1453 Jam/ M<sup>3</sup> x 1.593,00 M<sup>3</sup> = 231,463 Jam / 7

7 Jam/Hari = 4,724 Hari

Dump Truck 7 Unit = 5,00 Hari

## b. Pekerjaan Timbunana Pilihan

Pekerjaan Timbunan Pilihan dengan Kuantitas 7.200,00 M<sup>3</sup>.

### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 61,20 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 8,743 \text{ Hari}$$

$$\text{Wheel Loader} = 9,00 \text{ Hari}$$

### 2. Dump Truck

$$\text{Dump Truck} = 0,3205 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 2.307,60 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 47,094 \text{ Hari}$$

$$\text{Dump Truck} = 47,00 \text{ Hari}$$

### 3. Motor Grader

$$\text{Motor Grade} = 0,0040 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 28,800 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 4,114 \text{ Hari}$$

$$\text{Motor Grader} = 5,00 \text{ Hari}$$

### 4. Tandem Roller

$$\text{Tandem Roller} = 0,0161 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 115,92 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 16,56 \text{ Hari}$$

$$\text{Tandem Roller} = 17,00 \text{ Hari}$$

### 5. Water Tanker

$$\text{Water Tanker} = 0,0070 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 50,400 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 7,20 \text{ Hari}$$

$$\text{Water Tanker} = 8,00 \text{ Hari}$$

**c. Pekerjaan Geotekstile Separator Kelas 2**

Pekerjaan Geotekstile dengan Kuantitas 3.180,00 M<sup>2</sup>.

1. Flat Bed Truck

$$\text{Wheel Loader} = 0,0091 \text{ Jam/ M}^2 \times 3.180,00 \text{ M}^2 = 28,938 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 4,134 \text{ Hari}$$

$$\text{Wheel Loader} = 5,00 \text{ Hari}$$

**d. Pekerjaan Lapis Pondasi Agregat Kelas S**

Pekerjaan Lapis Pondasi Agregat Kelas S dengan Kuantitas 334,80 M<sup>3</sup>.

1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 334,80 \text{ M}^3 = 2,8458 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,406 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}$$

2. Dump Truck

$$\text{Dump Truck} = 0,1672 \text{ Jam/ M}^3 \times 334,80 \text{ M}^3 = 55,979 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,142 \text{ Hari}$$

$$\text{Dump Truck} = 2,00 \text{ Hari}$$

3. Motor Grader

$$\text{Motor Grade} = 0,0043 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 1,440 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,206 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

4. Tandem Roller

$$\text{Tandem Roller} = 0,0054 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 1,808 \text{ Jam}$$



$$7 \text{ Jam/Hari} = 0,258 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

#### 5. Water Tanker

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 4,721 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,674 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}$$

#### e. Pekerjaan Lapis Pondasi Agregat Kelas A

Pekerjaan Lapis Pondasi Agregat Kelas A dengan Kuantitas  
324,23 M<sup>3</sup>.\*

Pekerjaan Lapis Pondasi Agregat Kelas A dengan Kuantitas  
1.266,98 M<sup>3</sup>.

##### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 2,756 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,394 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}^*$$

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 10,769 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,538 \text{ Hari}$$

$$\text{Wheel Loader} = 2,00 \text{ Hari}$$

##### 2. Dump Truck

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 56,221 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,147 \text{ Hari}$$

$$\text{Dump Truck} = 2,00 \text{ Hari}^*$$

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 219,694 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 4,484 \text{ Hari}$$

$$\text{Dump Truck} = 5,00 \text{ Hari}$$

### 3. Motor Grader

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 1,394 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,199 \text{ Hari}$$

$$\text{Motor Grader} = 1,00 \text{ Hari}^*$$

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 5,448 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,778 \text{ Hari}$$

$$\text{Motor Grader} = 1,00 \text{ Hari}$$

### 4. Tandem Roller

$$\text{Tandem Roller} = 0,0134 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 4,345 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,621 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}^*$$

$$\text{Tandem Roller} = 0,0134 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 16,978 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 2,425 \text{ Hari}$$

$$\text{Tandem Roller} = 3,00 \text{ Hari}$$

### 5. Water Tanker

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 4,572 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,653 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}^*$$

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 17,864 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 2,552 \text{ Hari}$$

$$\text{Water Tanker} = 3,00 \text{ Hari}$$

#### f. Pekerjaan Lapis Pondasi Agregat Kelas B

Pekerjaan Lapis Pondasi Agregat Kelas B dengan Kuantitas 429,75 M<sup>3</sup>.\*

Pekerjaan Lapis Pondasi Agregat Kelas B dengan Kuantitas 1.116,00 M<sup>3</sup>.

##### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 3,653 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,522 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}^*$$

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 9,486 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,355 \text{ Hari}$$

$$\text{Wheel Loader} = 2,00 \text{ Hari}$$

##### 2. Dump Truck

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 74,519 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,521 \text{ Hari}$$

$$\text{Dump Truck} = 2,00 \text{ Hari}^*$$

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 193,514 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 3,949 \text{ Hari}$$

$$\text{Dump Truck} = 4,00 \text{ Hari}$$

##### 3. Motor Grader

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 1,848 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,264 \text{ Hari}$$

$$\text{Motor Grader} = 1,00 \text{ Hari}^*$$

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 4,799 \text{ Jam}$$

7 Jam/Hari = 0,686 Hari

Motor Grader = 1,00 Hari

4. Tandem Roller

Tandem Roller =  $0,0134 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 5,759 \text{ Jam}$

7 Jam/Hari = 0,823 Hari

Tandem Roller = 1,00 Hari \*

Tandem Roller =  $0,0134 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 14,954 \text{ Jam}$

7 Jam/Hari = 2,136 Hari

Tandem Roller = 3,00 Hari

5. Water Tanker

Water Tanker =  $0,0141 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 6,059 \text{ Jam}$

7 Jam/Hari = 0,866 Hari

Water Tanker = 1,00 Hari \*

Water Tanker =  $0,0141 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 6,059 \text{ Jam}$

7 Jam/Hari = 0,866 Hari

Water Tanker = 1,00 Hari

**g. Pekerjaan Lapis Resap Pengikat**

Pekerjaan Lapis Resap Pengikat dengan Kuantitas 6.230,93 Ltr

1. Asphalt Distributor

Asphalt Distributor =  $0,0002 \text{ Jam/ Ltr} \times 6.230,93 \text{ Ltr} = 1,246 \text{ Jam}$

7 Jam/Hari = 0,178 Hari

Asphalt Distributor = 1,00 Hari

## 2. Compressor

$$\text{Compressor} = 0,0002 \text{ Jam/ Ltr} \times 6.230,93 \text{ Ltr} = 1,246 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,178 \text{ Hari}$$

$$\text{Compressor} = 1,00 \text{ Hari}$$

**h. Pekerjaan Lapis Perekat**

Pekerjaan Lapis Resap Perekat dengan Kuantitas 413,42 Ltr.

## 1. Asphalt Distributor

$$\text{Asphalt Distributor} = 0,0002 \text{ Jam/ Ltr} \times 413,42 \text{ Ltr} = 0,0826 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,0118 \text{ Hari}$$

$$\text{Asphalt Distributor} = 1,00 \text{ Hari}$$

## 2. Compressor

$$\text{Compressor} = 0,0002 \text{ Jam/ Ltr} \times 413,42 \text{ Ltr} = 0,0826 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,012 \text{ Hari}$$

$$\text{Compressor} = 1,00 \text{ Hari}$$

**i. Pekerjaan Lataston Lapis Aus ( HRS – WC )**

Pekerjaan Lataston Lapis Aus ( HRS – WC ) dengan Kuantitas

138,290 Ton

## 1. Wheel Loader

$$\text{Wheel Loader} = 0,0096 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 1,328 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,190 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}$$

## 2. AMP

$$\text{AMP} = 0,0241 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 3,333 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,476 \text{ Hari}$$

$$\text{AMP} = 1,00 \text{ Hari}$$

## 3. Dump Truck

$$\text{Dump Truck} = 0,1870 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 25,860 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,528 \text{ Hari}$$

$$\text{Dump Truck} = 1,00 \text{ Hari}$$

## 4. Asphalt Finisher

$$\text{Asphalt Finisher} = 0,0191 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 2,641 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,377 \text{ Hari}$$

$$\text{Asphalt Finisher} = 1,00 \text{ Hari}$$

## 5. Tandem Roller

$$\text{Tandem Roller} = 0,0157 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 2,171 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,310 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

## 6. Pneumatic Tired Roller

$$\text{Pneumatic Tired Roller} = 0,0043 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 0,595 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,085 \text{ Hari}$$

$$\text{Pneumatic Tired Roller} = 1,00 \text{ Hari}$$

**j. Pekerjaan Lataston Lapis Pondasi ( HRS – Base )**

Pekerjaan Lataston Lapis Pondasi ( HRS – Base ) dengan Kuantitas  
653,880 Ton

1. Wheel Loader

Wheel Loader =  $0,0096 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 6,277 \text{ Jam}$

7 Jam/Hari = 0,897 Hari

Wheel Loader = 1,00 Hari

2. AMP

AMP =  $0,0241 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 15,759 \text{ Jam}$

7 Jam/Hari = 2,251 Hari

AMP = 3,00 Hari

3. Dump Truck

Dump Truck =  $0,1870 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 122,2760 \text{ Jam}$

7 Jam/Hari = 2,295 Hari

Dump Truck = 3,00 Hari

4. Asphalt Finisher

Asphalt Finisher =  $0,0191 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 12,489 \text{ Jam}$

7 Jam/Hari = 1,784 Hari

Asphalt Finisher = 2,00 Hari

5. Tandem Roller

Tandem Roller =  $0,0157 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 10,266 \text{ Jam}$

7 Jam/Hari = 1,467 Hari

Tandem Roller = 2,00 Hari

6. Pneumatic Tired Roller

$$\text{Pneumatic Tired Roller} = 0,0043 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 2,812 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,402 \text{ Hari}$$

$$\text{Pneumatic Tired Roller} = 1,00 \text{ Hari}$$

**k. Pekerjaan Beton Mutu Sedang  $f_c' = 20 \text{ Mpa}$  ( K-250 )**

Pekerjaan Beton Mutu Sedang  $f_c' = 20 \text{ Mpa}$  ( K-250 ) dengan kuantitas  $97,02 \text{ M}^3$

1. Concrete Mixer

$$\text{Concrete Mixer} = 0,4097 \text{ Jam/ M}^3 \times 97,02 \text{ M}^3 = 39,7491 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 5,6784 \text{ Hari}$$

$$\text{Concrete Mixer} = 6,00 \text{ Hari}$$

2. Water Tanker

$$\text{Water Tanker} = 0,0545 \text{ Jam/ M}^3 \times 97,02 \text{ M}^3 = 5,2876 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,755 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}$$

3. Mandor

$$\text{Mandor} = 0,4907 \text{ Jam/ M}^3 \times 97,02 \text{ M}^3 = 39,7491 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 5,6784 \text{ Hari}$$

$$\text{Mandor} = 6,00 \text{ Hari}$$

4. Tukang

$$\text{Tukang} = 1,2204 \text{ Jam/ M}^3 \times 97,02 \text{ M}^3 = 118,4032 \text{ Jam} / 3 \text{ org}$$

$$7 \text{ Jam/Hari} = 5,6382 \text{ Hari}$$

$$\text{Tukang} = 6,00 \text{ Hari}$$



## 5. Pekerja

$$\text{Pekerja} = 4,0971 \text{ Jam/ M}^3 \times 97,02 \text{ M}^3 = 397,5006 \text{ Jam} / 10 \text{ org}$$

$$7 \text{ Jam/Hari} = 5,6786 \text{ Hari}$$

$$\text{Pekerja} = 6,00 \text{ Hari}$$

### 1. Pekerjaan Beton Mutu Rendah $f_c' = 10 \text{ Mpa}$ ( K-125 )

Pekerjaan Beton Mutu Rendah  $f_c' = 10 \text{ Mpa}$  ( K-125 ) dengan kuantitas  $1,85 \text{ M}^3$

#### 1. Concrete Mixer

$$\text{Concrete Mixer} = 0,4097 \text{ Jam/ M}^3 \times 1,85 \text{ M}^3 = 0,7579 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,1083 \text{ Hari}$$

$$\text{Concrete Mixer} = 1,00 \text{ Hari}$$

#### 2. Water Tanker

$$\text{Water Tanker} = 0,0382 \text{ Jam/ M}^3 \times 1,85 \text{ M}^3 = 0,071 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,010 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}$$

#### 3. Mandor

$$\text{Mandor} = 0,4907 \text{ Jam/ M}^3 \times 1,85 \text{ M}^3 = 0,9078 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,1297 \text{ Hari}$$

$$\text{Mandor} = 1,00 \text{ Hari}$$

#### 4. Tukang

$$\text{Tukang} = 1,2204 \text{ Jam/ M}^3 \times 1,85 \text{ M}^3 = 2,2577 \text{ Jam} / 3 \text{ org}$$

$$7 \text{ Jam/Hari} = 0,3225 \text{ Hari}$$

$$\text{Tukang} = 1,00 \text{ Hari}$$

## 5. Pekerja

$$\text{Pekerja} = 1,2204 \text{ Jam/ M}^3 \times 1,85 \text{ M}^3 = 2,2577 \text{ Jam / 3 org}$$

$$7 \text{ Jam/Hari} = 0,1075 \text{ Hari}$$

$$\text{Pekerja} = 1,00 \text{ Hari}$$

### **m. Pekerjaan Pasangan Batu**

Pekerjaan Pasangan Batu dengan kuantitas 2.033,17 M<sup>3</sup>

#### 1. Concrete Mixer

$$\text{Concrete Mixer} = 0,4097 \text{ Jam/ M}^3 \times 2.033,17 \text{ M}^3 = 832,9897 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 118,999 \text{ Hari}$$

$$\text{Concrete Mixer} = 119,00 \text{ Hari}$$

#### 2. Water Tanker

$$\text{Water Tanker} = 0,0014 \text{ Jam/ M}^3 \times 2.033,17 \text{ M}^3 = 2,846 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,407 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}$$

#### 3. Mandor

$$\text{Mandor} = 0,4097 \text{ Jam/ M}^3 \times 2.033,17 \text{ M}^3 = 832,9897 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 118,9985 \text{ Hari}$$

$$\text{Mandor} = 119,00 \text{ Hari}$$

#### 4. Tukang

$$\text{Tukang} = 1,2204 \text{ Jam/ M}^3 \times 2.033,17 \text{ M}^3 = 2481,2807 \text{ Jam / 3 org}$$

$$7 \text{ Jam/Hari} = 118,1562 \text{ Hari}$$

$$\text{Tukang} = 119,00 \text{ Hari}$$

## 5. Pekerja

Pekerja =  $4,0971 \text{ Jam/ M}^3 \times 2.033,17 \text{ M}^3 = 8330,1008 \text{ Jam} / 10 \text{ org}$

7 Jam/Hari = 119,0014 Hari

Pekerja = 119,00 Hari

Tabel 4.5 Waktu Pelaksanaan Alternatif 1

No.	Pekerjaan / Peralatan	Satuan	Waktu
<b>3.1.(1a)</b>	<b>Galian Biasa</b>	<b>Hari</b>	<b>8</b>
	1. Excavator	Hari	5
	2. Dump Truck	Hari	8
<b>3.2.(2a)</b>	<b>Timbunan Pilihan Dari Sumber</b>	<b>Hari</b>	<b>47</b>
	1. Wheel Loader	Hari	9
	2. Dump Truck	Hari	47
	3. Motor Grader	Hari	5
	4. TandemRoller	Hari	17
	5. WaterTanker	Hari	8
<b>3.5.(2b)</b>	<b>Geotekstile Separator Kelas 2</b>	<b>Hari</b>	<b>5</b>
	1. Flat Bed Truck	Hari	5
<b>4.2.(2b)</b>	<b>Lapis Pondasi Agregat Kelas S</b>	<b>Hari</b>	<b>2</b>
	1. Wheel Loader	Hari	1
	2. Dump Truck	Hari	2
	3. Motor Grader	Hari	1
	4. TandemRoller	Hari	1
	5. WaterTanker	Hari	1
<b>5.1.(1)</b>	<b>Lapis Pondasi Agregat Kelas A</b>	<b>Hari</b>	<b>7</b>
	1. Wheel Loader	Hari	3
	2. Dump Truck	Hari	7
	3. Motor Grader	Hari	2
	4. TandemRoller	Hari	4
	5. WaterTanker	Hari	4
<b>5.1.(2)</b>	<b>Lapis Pondasi Agregat Kelas B</b>	<b>Hari</b>	<b>5</b>
	1. Wheel Loader	Hari	3
	2. Dump Truck	Hari	5
	3. Motor Grader	Hari	2
	4. TandemRoller	Hari	4
	5. WaterTanker	Hari	2
<b>6.1.(1a)</b>	<b>Lapis Resap Pengikat</b>	<b>Hari</b>	<b>1</b>
	1. Asphalt Distributor	Hari	1
	2. Compressor	Hari	1

<b>6.1.(2a)</b>	<b>Lapis Perekat</b> 1. Asphalt Distributor 2. Compressor	<b>Hari</b> Hari Hari	<b>1</b> 1 1
<b>6.3.(3a)</b>	<b>Lataston Lapis Aus HRS-WC</b> 1. Wheel Loader 2. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	<b>Hari</b> Hari Hari Hari Hari Hari Hari	<b>1</b> 1 1 1 1 1 1
<b>6.3.(4a)</b>	<b>Lataston Lapis Pondasi HRS-Base</b> 1. Wheel Loader 2. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	<b>Hari</b> Hari Hari Hari Hari Hari Hari	<b>3</b> 1 3 3 3 2 2 1
<b>7.1.(7a)</b>	<b>Beton Mutu Sedang <math>f_c' = 20</math> Mpa ( K-250 )</b> 1. Concrete Mixer 2. Water Tanker 3. Mandor 4. Tukang 5. Pekerja	<b>Hari</b> Hari Hari Hari Hari Hari	<b>6</b> 6 1 6 6 6
<b>7.1.(10)</b>	<b>Beton Mutu Rendah <math>f_c' = 10</math> Mpa ( K-125 )</b> 1. Concrete Mixer 2. Water Tanker 3. Mandor 4. Tukang 5. Pekerja	<b>Hari</b> Hari Hari Hari Hari Hari	<b>1</b> 1 1 1 1 1
<b>7.9.(1)</b>	<b>Pasangan Batu</b> 1. Concrete Mixer 2. Water Tanker 3. Mandor 4. Tukang 5. Pekerja	<b>Hari</b> Hari Hari Hari Hari	<b>119</b> 119 1 119 119 119

Sumber : Olahan Peneliti, 2016

Dari pertambahan waktu pelaksanaan pekerjaan dapat dihitung biaya pelaksanaan pekerjaan

1. Pekerjaan Galian Biasa

Excavator = 8,484 Jam x Rp. 535.286,93 = Rp. 4.451.374,31

Dump Truck = 16, 156 jam x Rp. 299.618,19 = Rp. 4.840.631,49

2. Pekerjaan Lapis Pondasi Agregat Kelas A

Wheel Loader = 2,756 Jam x Rp. 223.700,02 = Rp. 616.517,26

DumpTruck = 8,031 Jam x Rp. 299.618,19 = Rp. 2.406.233,68

Motor Grader = 1,349 Jam x Rp. 572.290,45 = Rp. 772. 019,82

Tandem Roller = 4,345 Jam x Rp. 428.876,70 = Rp. 1.863.469,26

Water Tanker = 4,572 Jam x Rp. 296.567,75 = Rp. 1.355.907,75

3. Pekerjaan Lapis Pondasi Agregat Kelas B

Wheel Loader = 3,653 Jam x Rp. 223.700,02 = Rp. 817.176,17

DumpTruck = 10,646 Jam x Rp. 299.618,19 = Rp. 3.189.735,25

Motor Grader = 1,848 Jam x Rp. 572.290,45 = Rp. 1.057.592,75

Tandem Roller = 5,759 Jam x Rp. 428.876,70 = Rp. 2.469.900,92

Water Tanker = 6,059 Jam x Rp. 296.567,75 = Rp. 1.796.904,00

#### 4.2.3 Alternatif 2

Dilakukan dengan menambah jumlah peralatan yang digunakan kemudian dilakukan perhitungan biaya.

##### 4.2.3.1. Perhitungan Waktu Pelaksanaan Berdasarkan Penambahan

###### Peralatan

###### a. Pekerjaan Galian Biasa

Pekerjaan Galian Biasa dengan Kuantitas 778,32 M<sup>3</sup>.\*

Pekerjaan Galian Biasa dengan Kuantitas 1.593,32 M<sup>3</sup>.

## 1. Excavator

$$\text{Excavator} = 0,0109 \text{ Jam/ M}^3 \times 778,32 \text{ M}^3 = 8,484 \text{ Jam} / 2 \text{ unit}$$

$$7 \text{ Jam/Hari} = 0,606 \text{ Hari}$$

$$\text{Excavator } 2 \text{ unit} = 1,00 \text{ Hari}^*$$

$$\text{Excavator} = 0,0109 \text{ Jam/ M}^3 \times 1.593,00 \text{ M}^3 = 17,364 \text{ Jam}$$

$$7 \text{ Jam/ Hari} = 2,481 \text{ Hari}$$

$$\text{Excavator} = 3,00 \text{ Hari}$$

## 2. Dump Truck

$$\text{Dump Truck} = 0,1453 \text{ Jam/ M}^3 \times 778,32 \text{ M}^3 = 113,090 \text{ Jam} / 7 \text{ unit}$$

$$7 \text{ Jam/ 2 Hari} = 1,154 \text{ Hari}$$

$$\text{Dump Truck } 14 \text{ Unit} = 2,00 \text{ Hari}^*$$

$$\text{Dump Truck} = 0,1453 \text{ Jam/ M}^3 \times 1.593,00 \text{ M}^3 = 231,463 \text{ Jam} / 7$$

$$7 \text{ Jam/Hari} = 4,724 \text{ Hari}$$

$$\text{Dump Truck } 7 \text{ Unit} = 5,00 \text{ Hari}$$

**b. Pekerjaan Timbunan Pilihan**

Pekerjaan Timbunan Pilihan dengan Kuantitas 7.200,00 M<sup>3</sup>.

## 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 61,20 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 8,743 \text{ Hari}$$

$$\text{Wheel Loader} = 9,00 \text{ Hari}$$

## 2. Dump Truck

$$\text{Dump Truck} = 0,3205 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 2.307,60 \text{ Jam} / 7 \text{ unit}$$

$$7 \text{ Jam/Hari} = 47,094 \text{ Hari}$$

$$\text{Dump Truck} = 47,00 \text{ Hari}$$

3. Motor Grader

$$\text{Motor Grade} = 0,0040 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 28,800 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 4,114 \text{ Hari}$$

$$\text{Motor Grader} = 5,00 \text{ Hari}$$

4. Tandem Roller

$$\text{Tandem Roller} = 0,0161 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 115,92 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 16,56 \text{ Hari}$$

$$\text{Tandem Roller} = 17,00 \text{ Hari}$$

5. Water Tanker

$$\text{Water Tanker} = 0,0070 \text{ Jam/ M}^3 \times 7.200,00 \text{ M}^3 = 50,400 \text{ Jam}$$

$$8 \text{ Jam/Hari} = 7,20 \text{ Hari}$$

$$\text{Water Tanker} = 8,00 \text{ Hari}$$

**c. Pekerjaan Geotekstile Separator Kelas 2**

Pekerjaan Geotekstile dengan Kuantitas 3.180,00 M<sup>2</sup>.

1. Flat Bed Truck

$$\text{Wheel Loader} = 0,0091 \text{ Jam/ M}^2 \times 3.180,00 \text{ M}^2 = 28,938 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 4,134 \text{ Hari}$$

$$\text{Wheel Loader} = 5,00 \text{ Hari}$$

#### d. Pekerjaan Lapis Pondasi Agregat Kelas S

Pekerjaan Lapis Pondasi Agregat Kelas S dengan Kuantitas 334,80 M<sup>3</sup>.

##### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 334,80 \text{ M}^3 = 2,8458 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,406 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}$$

##### 2. Dump Truck

$$\text{Dump Truck} = 0,1672 \text{ Jam/ M}^3 \times 334,80 \text{ M}^3 = 55,979 \text{ Jam} / 7 \text{ unit}$$

$$7 \text{ Jam/Hari} = 1,142 \text{ Hari}$$

$$\text{Dump Truck} = 2,00 \text{ Hari}$$

##### 3. Motor Grader

$$\text{Motor Grade} = 0,0043 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 1,440 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,206 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

##### 4. Tandem Roller

$$\text{Tandem Roller} = 0,0054 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 1,808 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,258 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

##### 5. Water Tanker

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 334,800 \text{ M}^3 = 4,721 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,674 \text{ Hari}$$

$$\text{Water Tanker} = 1,00 \text{ Hari}$$



### e. Pekerjaan Lapis Pondasi Agregat Kelas A

Pekerjaan Lapis Pondasi Agregat Kelas A dengan Kuantitas 324,23 M<sup>3</sup>.\*

Pekerjaan Lapis Pondasi Agregat Kelas A dengan Kuantitas 1.266,98 M<sup>3</sup>.

#### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 2,756 \text{ Jam}$$

$$7 \text{ Jam/ 2 Hari} = 0,197 \text{ Hari}$$

$$\text{Wheel Loader 2 unit} = 1,00 \text{ Hari}^*$$

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 10,769 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,538 \text{ Hari}$$

$$\text{Wheel Loader} = 2,00 \text{ Hari}$$

#### 2. Dump Truck

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 56,221 \text{ Jam / 7 unit}$$

$$7 \text{ Jam/ 2 Hari} = 0,574 \text{ Hari}$$

$$\text{Dump Truck 14 unit} = 1,00 \text{ Hari}^*$$

$$\text{Dump Truck} = 0,1734 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 219,694 \text{ Jam / 7 unit}$$

$$7 \text{ Jam/Hari} = 4,484 \text{ Hari}$$

$$\text{Dump Truck} = 5,00 \text{ Hari}$$

#### 3. Motor Grader

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 1,394 \text{ Jam}$$

$$7 \text{ Jam/ 2 Hari} = 0,0995 \text{ Hari}$$

$$\text{Motor Grader 2 unit} = 1,00 \text{ Hari}^*$$

$$\text{Motor Grader} = 0,0043 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 5,448 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,778 \text{ Hari}$$

$$\text{Motor Grader} = 1,00 \text{ Hari}$$

#### 4. Tandem Roller

$$\text{Tandem Roller} = 0,0134 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 4,345 \text{ Jam}$$

$$7 \text{ Jam/ 2 Hari} = 0,3105 \text{ Hari}$$

$$\text{Tandem Roller 2 unit} = 1,00 \text{ Hari}^*$$

$$\text{Tandem Roller} = 0,0134 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 16,978 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 2,425 \text{ Hari}$$

$$\text{Tandem Roller} = 3,00 \text{ Hari}$$

#### 5. Water Tanker

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 324,23 \text{ M}^3 = 4,572 \text{ Jam}$$

$$7 \text{ Jam/ 2 Hari} = 0,3265 \text{ Hari}$$

$$\text{Water Tanker 2 unit} = 1,00 \text{ Hari}^*$$

$$\text{Water Tanker} = 0,0141 \text{ Jam/ M}^3 \times 1.266,98 \text{ M}^3 = 17,864 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 2,552 \text{ Hari}$$

$$\text{Water Tanker} = 3,00 \text{ Hari}$$

### f. Pekerjaan Lapis Pondasi Agregat Kelas B

Pekerjaan Lapis Pondasi Agregat Kelas B dengan Kuantitas 429,75 M<sup>3</sup>.\*

Pekerjaan Lapis Pondasi Agregat Kelas B dengan Kuantitas 1.116,00 M<sup>3</sup>.

#### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0085 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 3,653 \text{ Jam}$$

$$7 \text{ Jam/ Hari} = 0,261 \text{ Hari}$$

Wheel Loader 2 unit = 1,00 Hari\*

Wheel Loader =  $0,0085 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 9,486 \text{ Jam}$

$7 \text{ Jam/2Hari} = 0,6775 \text{ Hari}$

Wheel Loader = 1,00 Hari

## 2. Dump Truck

Dump Truck =  $0,1734 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 74,519 \text{ Jam} / 7 \text{ unit}$

$7 \text{ Jam/ Hari} = 0,7604 \text{ Hari}$

Dump Truck 14 unit = 1,00 Hari\*

Dump Truck =  $0,1734 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 193,514 \text{ Jam} / 7 \text{ unit}$

$7 \text{ Jam/2 Hari} = 1,574 \text{ Hari}$

Dump Truck = 2,00 Hari

## 3. Motor Grader

Motor Grader =  $0,0043 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 1,848 \text{ Jam}$

$7 \text{ Jam/ 2 Hari} = 0,132 \text{ Hari}$

Motor Grader 2 unit = 1,00 Hari\*

Motor Grader =  $0,0043 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 4,799 \text{ Jam}$

$7 \text{ Jam/Hari} = 0,686 \text{ Hari}$

Motor Grader = 1,00 Hari

## 4. Tandem Roller

Tandem Roller =  $0,0134 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 5,759 \text{ Jam}$

$7 \text{ Jam/2 Hari} = 0,4114 \text{ Hari}$

Tandem Roller 2 unit = 1,00 Hari \*

Tandem Roller =  $0,0134 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 14,954 \text{ Jam}$

7 Jam/Hari = 2,136 Hari

Tandem Roller = 3,00 Hari

5. Water Tanker

Water Tanker =  $0,0141 \text{ Jam/ M}^3 \times 429,75 \text{ M}^3 = 6,059 \text{ Jam}$

7 Jam/Hari = 0,433 Hari

Water Tanker 2 unit = 1,00 Hari \*

Water Tanker =  $0,0141 \text{ Jam/ M}^3 \times 1.116,00 \text{ M}^3 = 6,059 \text{ Jam}$

7 Jam/Hari = 0,866 Hari

Water Tanker = 1,00 Hari

**g. Pekerjaan Lapis Resap Pengikat**

Pekerjaan Lapis Resap Pengikat dengan Kuantitas 6.230,93 Ltr.

1. Asphalt Distributor

Asphalt Distributor =  $0,0002 \text{ Jam/ Ltr} \times 6.230,93 \text{ Ltr} = 1,246 \text{ Jam}$

7 Jam/Hari = 0,178 Hari

Asphalt Distributor = 1,00 Hari

2. Compressor

Compressor =  $0,0002 \text{ Jam/ Ltr} \times 6.230,93 \text{ Ltr} = 1,246 \text{ Jam}$

7 Jam/Hari = 0,178 Hari

Compressor = 1,00 Hari

**3. Pekerjaan Lapis Perekat**

Pekerjaan Lapis Resap Perekat dengan Kuantitas 413,42 Ltr.

1. Asphalt Distributor

Asphalt Distributor =  $0,0002 \text{ Jam/ Ltr} \times 413,42 \text{ Ltr} = 0,0826 \text{ Jam}$

$$7 \text{ Jam/Hari} = 0,0118 \text{ Hari}$$

$$\text{Asphalt Distributor} = 1,00 \text{ Hari}$$

## 2. Compressor

$$\text{Compressor} = 0,0002 \text{ Jam/ Ltr} \times 413,42 \text{ Ltr} = 0,0826 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,012 \text{ Hari}$$

$$\text{Compressor} = 1,00 \text{ Hari}$$

## 4. Pekerjaan Lataston Lapis Aus ( HRS – WC )

Pekerjaan Lataston Lapis Aus ( HRS – WC ) dengan kuantitas  
138,290 Ton

### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0096 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 1,328 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,190 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}$$

### 2. AMP

$$\text{AMP} = 0,0241 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 3,333 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,476 \text{ Hari}$$

$$\text{AMP} = 1,00 \text{ Hari}$$

### 3. Dump Truck

$$\text{Dump Truck} = 0,1870 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 25,860 \text{ Jam} / 7 \text{ unit}$$

$$7 \text{ Jam/Hari} = 0,528 \text{ Hari}$$

$$\text{Dump Truck} = 1,00 \text{ Hari}$$

### 4. Asphalt Finisher

$$\text{Asphalt Finisher} = 0,0191 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 2,641 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,377 \text{ Hari}$$

$$\text{Asphalt Finisher} = 1,00 \text{ Hari}$$

#### 5. Tandem Roller

$$\text{Tandem Roller} = 0,0157 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 2,171 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,310 \text{ Hari}$$

$$\text{Tandem Roller} = 1,00 \text{ Hari}$$

#### 6. Pneumatic Tired Roller

$$\text{Pneumatic Tired Roller} = 0,0043 \text{ Jam/ Ton} \times 138,290 \text{ Ton} = 0,595 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,085 \text{ Hari}$$

$$\text{Pneumatic Tired Roller} = 1,00 \text{ Hari}$$

### 5. Pekerjaan Lataston Lapis Pondasi ( HRS – Base )

Pekerjaan Lataston Lapis Pondasi ( HRS – Base ) dengan kuantitas 653,880 ton

#### 1. Wheel Loader

$$\text{Wheel Loader} = 0,0096 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 6,277 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,897 \text{ Hari}$$

$$\text{Wheel Loader} = 1,00 \text{ Hari}$$

#### 2. AMP

$$\text{AMP} = 0,0241 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 15,759 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 2,251 \text{ Hari}$$

$$\text{AMP} = 3,00 \text{ Hari}$$

#### 3. Dump Truck

$$\text{Dump Truck} = 0,1870 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 122,2760 \text{ Jam} / 7 \text{ unit}$$

$$7 \text{ Jam/Hari} = 2,295 \text{ Hari}$$

$$\text{Dump Truck} = 3,00 \text{ Hari}$$

#### 4. Asphalt Finisher

$$\text{Asphalt Finisher} = 0,0191 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 12,489 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,784 \text{ Hari}$$

$$\text{Asphalt Finisher} = 2,00 \text{ Hari}$$

#### 5. Tandem Roller

$$\text{Tandem Roller} = 0,0157 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 10,266 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 1,467 \text{ Hari}$$

$$\text{Tandem Roller} = 2,00 \text{ Hari}$$

#### 6. Pneumatic Tired Roller

$$\text{Pneumatic Tired Roller} = 0,0043 \text{ Jam/ Ton} \times 653,880 \text{ Ton} = 2,812 \text{ Jam}$$

$$7 \text{ Jam/Hari} = 0,402 \text{ Hari}$$

$$\text{Pneumatic Tired Roller} = 1,00 \text{ Hari}$$

Tabel 4.6 Waktu Pelaksanaan Alternatif 2

No.	Pekerjaan / Peralatan	Satuan	Waktu
<b>3.1.(1a)</b>	<b>Galian Biasa</b>	<b>Hari</b>	<b>2</b>
	1. Excavator	Hari	1
	2. Dump Truck	Hari	2
<b>3.2.(2a)</b>	<b>Timbunan Pilihan Dari Sumber</b>	<b>Hari</b>	<b>47</b>
	1. Wheel Loader	Hari	9
	2. Dump Truck	Hari	47
	3. Motor Grader	Hari	5
	4. Tandem Roller	Hari	17
	5. Water Tanker	Hari	8
<b>3.5.(2b)</b>	<b>Geotekstil Separator Kelas 2</b>	<b>Hari</b>	<b>5</b>
	1. Flat Bed Truck	Hari	5
<b>4.2.(2b)</b>	<b>Lapis Pondasi Agregat Kelas S</b>	<b>Hari</b>	<b>2</b>
	1. Wheel Loader	Hari	1
	2. Dump Truck	Hari	2
	3. Motor Grader	Hari	1

	4. TandemRoller 5. WaterTanker	Hari Hari	1 1
<b>5.1.(1)</b>	<b>Lapis Pondasi Agregat Kelas A</b> 1. Wheel Loader 2. Dump Truck 3. Motor Grader 4. TandemRoller 5. WaterTanker	<b>Hari</b> Hari Hari Hari Hari	<b>1</b> 1 1 1 1
<b>5.1.(2)</b>	<b>Lapis Pondasi Agregat Kelas B</b> 1. Wheel Loader 2. Dump Truck 3. Motor Grader 4. TandemRoller 5. WaterTanker	<b>Hari</b> Hari Hari Hari Hari	<b>1</b> 1 1 1 1
<b>6.1.(1a)</b>	<b>Lapis Resap Pengikat</b> 1. Asphalt Distributor 2. Compressor	<b>Hari</b> Hari Hari	<b>1</b> 1 1
<b>6.1.(2a)</b>	<b>Lapis Perekat</b> 1. Asphalt Distributor 2. Compressor	<b>Hari</b> Hari Hari	<b>1</b> 1 1
<b>6.3.(3a)</b>	<b>Lataston Lapis Aus HRS-WC</b> 1. Wheel Loader 2. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	<b>Hari</b> Hari Hari Hari Hari Hari Hari	1 1 1 1 1 1 1
<b>6.3.(4a)</b>	<b>Lataston Lapis Pondasi HRS-Base</b> 3. Wheel Loader 4. AMP 3. Genset 4. Dump Truck 5. Asphalt Finisher 6. Tandem Roller 7. Pneumatic Tired Roller	<b>Hari</b> Hari Hari Hari Hari Hari Hari	<b>3</b> 1 3 3 3 2 2 1
<b>7.1.(7a)</b>	<b>Beton Mutu Sedang <math>f_c' = 20</math> Mpa ( K-250 )</b> 1. Concrete Mixer 2. Water Tanker 3. Mandor 4. Tukang 5. Pekerja	<b>Hari</b> Hari Hari Hari Hari	<b>6</b> 6 1 6 6 6



<b>7.1.(10)</b>	<b>Beton Mutu Rendah <math>f_c' = 10</math> Mpa ( K-125 )</b>	<b>Hari</b>	<b>1</b>
	1. Concrete Mixer	Hari	1
	2. Water Tanker	Hari	1
	3. Mandor	Hari	1
	4. Tukang	Hari	1
	5. Pekerja	Hari	1
<b>7.9.(1)</b>	<b>Pasangan Batu</b>	<b>Hari</b>	<b>119</b>
	1. Concrete Mixer	Hari	119
	2. Water Tanker	Hari	1
	3. Mandor	Hari	119
	4. Tukang	Hari	119
	5. Pekerja	Hari	119

Sumber : Olahan Peneliti, 2016

Dari pertambahan waktu pelaksanaan pekerjaan dapat dihitung biaya pelaksanaan pekerjaan

Penambahan Jam kerja

1. Pekerjaan Galian Biasa

Excavator = 8,484 Jam x Rp. 535.286,93 = Rp. 4.451.374,31

Dump Truck = 16, 156 jam x Rp. 299.618,19 = Rp. 4.840.631,49

2. Pekerjaan Lapis Pondasi Agregat Kelas A

Wheel Loader = 2,756 Jam x Rp. 223.700,02 = Rp. 616.517,26

Dump Truck = 8,031 Jam x Rp. 299.618,19 = Rp. 2.406.233,68

Motor Grader = 1,349 Jam x Rp. 572.290,45 = Rp. 772. 019,82

Tandem Roller = 4,345 Jam x Rp. 428.876,70 = Rp. 1.863.469,26

Water Tanker = 4,572 Jam x Rp. 296.567,75 = Rp. 1.355.907,75

3. Pekerjaan Lapis Pondasi Agregat Kelas B

Wheel Loader = 3,653 Jam x Rp. 223.700,02 = Rp. 817.176,17

Dump Truck = 10,646 Jam x Rp. 299.618,19 = Rp. 3.189.735,25

Motor Grader = 1,848 Jam x Rp. 572.290,45 = Rp. 1.057.592,75

Tandem Roller = 5,759 Jam x Rp. 428.876,70 = Rp. 2.469.900,92

Water Tanker = 6,059 Jam x Rp. 296.567,75 = Rp. 1.796.904,00

Tabel 4.7 Perbandingan Waktu ( hari )

Pekerjaan	Peralatan	Alternatif 1		Alternatif 2	
		Satuan	Waktu	Satuan	Waktu
Galian Biasa		<b>Hari</b>	<b>3</b>	<b>Hari</b>	<b>2</b>
	Excavator	Hari	2	Hari	1
	Dump Truck	Hari	3	Hari	2
Lapis Pondasi Agregat A		<b>Hari</b>	<b>2</b>	<b>Hari</b>	<b>1</b>
	Wheel Loader	Hari	1	Hari	1
	Dump Truck	Hari	2	Hari	1
	Motor Grader	Hari	1	Hari	1
	Tandem Roller	Hari	1	Hari	1
	Water Tanker	Hari	1	Hari	1
Lapis Pondasi Agregat B		<b>Hari</b>	<b>2</b>	<b>Hari</b>	<b>1</b>
	Wheel Loader	Hari	1	Hari	1
	Dump Truck	Hari	2	Hari	1
	Motor Grader	Hari	1	Hari	1
	Tandem Roller	Hari	1	Hari	1
	Water Tanker	Hari	1	Hari	1

Tabel 4.8 Perbandingan Waktu ( jam ) dan Biaya Pelaksanaan

Pekerjaan	Peralatan	Alternatif 1		Alternatif 2	
		Waktu Pelaksanaan ( jam )	Biaya Pelaksanaan ( Rp)	Waktu Pelaksanaan ( jam )	Biaya Pelaksanaan ( Rp)
Galian Biasa	Excavator	8,484	4.451.374,31	4,242	8,951.744,62
	Dump Truck	16, 156	4.840.631,49	8,078	9.681.262,98
Lapis Pondasi Agregat A	Wheel Loader	2,756	616.517,26	1,378	1.233.034,52
	Dump Truck	8,031	2.406.233,68	4,0155	4.812.467,36
	Motor Grader	1,349	772.019,82	0,6745	1.544.039,64
	Tandem Roller	4,345	1.863.469,26	2,173	3.726.938,52
	Water Tanker	4,572	1.355.907,75	2,286	2.711.815,5
	Lapis Pondasi Agregat B	Wheel Loader	2,756	616.517,26	1,378
	Dump Truck	8,031	2.406.233,68	4,0155	4.812.467,36
	Motor Grader	1,349	772.019,82	0,6745	1.544.039,64
	Tandem Roller	4,345	1.863.469,26	2,173	3.726.938,52
	Water Tanker	4,572	1.355.907,75	2,286	2.711.815,5
			<b>23.320.001,34</b>		<b>49.777.677,96</b>

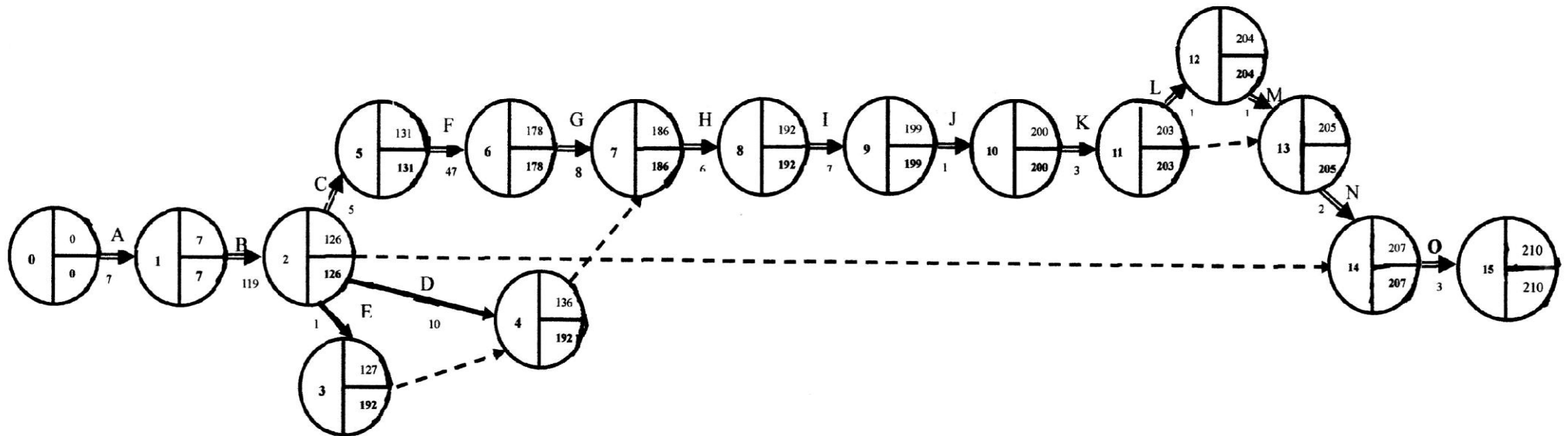
Dengan penambahan peralatan maka waktu pelaksanaan berkurang dan biaya akan bertambah. Dari kedua alternatif tersebut maka dipilih alternatif yang ke 1, karena dari segi biaya alternatif 1 lebih murah dan dari segi waktu masih dapat dilaksanakan sesuai kontrak.

### 4.3 Aktivitas Pekerjaan

Tabel 4.9 Aktivitas Pekerjaan

Aktivitas	Pekerjaan	Aktivitas yang mendahului	Waktu ( hari )
A	Mobilisasi	-	7
B	Pasangan Batu	A	119
C	Geotextile	B	5
D	Beton Mutu Sedang $f_c' = 20 \text{ Mpa}$ ( K-250 )	B	6
E	Beton Mutu Rendah $f_c' = 10 \text{ Mpa}$ ( K-125 )	B	1
F	Timbunana Pilihan	C	47
G	Galian Biasa	F	8
H	Lapis Pondasi Agregat Kelas B	G,D	6
I	Lapis Pondasi Agregat Kelas A	H	7
J	Lapis Resap Pengikat	I	1
K	Lataston Lapis Pondasi ( HRS-Base )	J	3
L	Lapis Perekat	K	1
M	Lataston Lapis Aus ( HRS-WC )	L	1
N	Lapis Pondasi Agregat Kelas S	J,L	2
O	Demobilisasi	N,A	3

#### 4.4 Diagram Network Planning



Gambar 4.1 Diagram Network Planning  
Sumber : Olahan Peneliti, 2016





