Aged Reduction Prediction of the Road Plan Due to Overload On the Pancer Road, Pesanggaran District, Banyuwangi

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Abstract. Jalan Pancer is grade 3 roads with the heaviest axle loads of 8 tons, the age of the road plan is 5 years. But Jalan Pancer has been passed by heavy vehicles with the heaviest axle loads of more than 8 tons which caused premature damage to the road. Therefore this study aims to determine the predicted reduction in the life of the road plan caused by overloading from the vehicles. The research method used is to conduct a traffic survey to get Average Daily Traffic value and identify the heavy vehicles. The data obtained were analyzed to obtain the value of Vehicle Damage Factor (VDF) for each type of vehicle and the value of Cumulative Equivalent Standard Axle-CESA for the life of the road plan. The comparison results among VDF value of the survey and VDF value of the plan conclude that road damage factor great. Because of the overload conditions the age of the plan is only 1 year 9.7 months, there is a decrease in the life of the road by 3 years 2.3 months in the second year, so it can be concluded that Jalan Pancer suffered early damage before the planned age (5 years).

Keywords: overload, reduced road life plan, road life plan, VDF, Pancer Road, CESA, road damage, Banyuwangi.

1. Introduction

1.1. Background
One of the common problems of road pavement in Indonesia so far is the early damage to pavement. One of the main factors causing road damage is one of them caused by overload. Based on previous observations, that the road pavement in the southern Banyuwangi area often suffered early damage or road damage before the service life period ended. Through the vehicle weight data obtained from the weighbridge, it shows that vehicles passing through roads in the area of southern Banyuwangi exceed the required burden of the Heaviest Axis Load.

One of the roads experiencing these problems is Jalan Pancer, Pesanggaran, Banyuwangi. Pancer Road is a road with class 3 road classification, with the heaviest axle load of 8 tons, with a cross section width is 4 meters. The Pancer Road pavement structure is Hotmix/ACWC, the age of the road plan is 5 years. Jalan Pancer is the main access for the Overlapping Gold Mining Project by PT. Bumi Suksesindo (BSI), also the Pier Development Project on Pancer Beach by PT. Aura Sinar Baru and access to the main attractions of Pulau Merah Beach. This triggers heavy vehicles that pass the permit limit required to cross the Jalan Pancer, including tourism buses, material transport trucks and heavy equipment transport trucks.
Jalan Pancer was damaged early, the last road improvement project was carried out in year of 2014 with the age of the road plan is 5 years, but in 2016 (only 2 years old) the condition of the road was damaged such as cracks to large holes. Often the occurrence of this overload makes the road damaged earlier, so it is not in accordance with the age of the planned road plan. Then we should be able to take preventive actions on the pavement planning or improvement efforts and the planned age if this overload indication is known. Therefore, research is needed to evaluate the overload on age existing roads in the Pancer Road section using the Vehicle Damage Factor (VDF) calculation formula and the cumulative equivalent standard or Commulative Equivalent Standard Axle (CESA). So that it can be seen decreasing the life of the road plan.

From Figure 1 below we can see the condition of Jalan Pancer, Pesanggaran subdistrict, Banyuwangi Regency, which is being passed by trucks carrying material to the Pier Development Project on Pancer Beach. This road has a length of ± 2 km and a width of 4 meters of cross section of the road.

![Figure 1. Pancer Road Conditions](image)

1.2. Research Objectives
To find out the aged reduction prediction of the road plan that occurs, which is caused by an overload on the Pancer Road, Pesanggaran, Banyuwangi.

2. Theoretical Basis
2.1. Road Pavement Construction.
Pavement is a layer that is located between the basic soil layers and vehicle wheels which functions to provide services to transportation facilities and during the service period is expected to not occur significant damage so that the pavement is in accordance with the expected quality, then knowledge of the nature, procurement and processing of Road pavement making materials are needed [1].

Based on the binding material, road pavement construction can be distinguished including:

- a) Flexible pavement construction, which is pavement using asphalt as a binding material. The layers of pavement are carrying and spreading the burden of traffic to the subgrade.

- b) Rigid pavement construction, which is pavement using cement as a binder. Boneless concrete plates are placed on the subgrade without a foundation layer. Traffic loads are mostly borne by concrete slabs.

- c) Composite pavement construction (composite pavement), i.e. rigid pavement combined with flexible pavement can be either flexible pavement above rigid pavement or rigid pavement over flexible pavement.
2.2. Road classification
The operation of roads must provide roads that provide a sense of security and safety [2]. Operation of the Road will immediately repair the damaged road without seeing who has the biggest impact [3]. The implementation of regional roads can overcome the problems of regional roads by making arrangements, infrastructure, construction and supervision of infrastructure, through various activities such as: [4]
1. Inventory of road service levels and problems
2. Compilation of plans and their implementation programs and determination of the level of road services
3. Planning and optimizing utilization of road sections
4. Geometric improvement of roads and intersections
5. Determination of road class for each section
6. Feasibility test of road functions

Road classification according to road function is divided into 3 types, namely: [5]
a) Arterial Roads, Roads that serve major transportation with characteristics of long distance travel, high average speeds and the number of access roads are efficiently restricted.
b) Collector Roads, Roads that serve transporter / divider transport with characteristics of medium distance travel, average speed is medium and the number of entry roads are limited,
c) Local Roads, Roads that serve local transportation with the characteristics of short distance travel, low average speed and the number of access roads unlimited. The Age of The Road Plan

The planned life is the number of years since the road was opened for vehicle traffic until a repair is needed which is structural (until a pavement layer overlay is needed). During the life of the plan, the road maintenance must be carried out such as nonstructural coating which functions as a wear out layer.[1]

2.3. Vehicle Classification
The vehicle classifications are physically distinguished based on dimensions, weight and performance. Vehicle dimensions affect the width of the traffic lane, the width of the hardened road shoulder, the length and width of the parking space[7].

2.4. Vehicle Damage Factor (VDF)
Road damage or better known as Vehicle Damage Factor (VDF), is one of the parameters that can determine pavement thickness significantly and if the weight of the vehicle (especially truck type vehicles) especially with overload load, the VDF value will significantly increase.

The burden of pavement construction has special characteristics in the sense that it has different principles from the burden on other constructions outside of road construction. Understanding the special characteristics of the road pavement construction burden is very important in further understanding, especially relating to pavement construction design, pavement construction capacity, and the process of construction damage concerned.

2.5. Traffic Volume
Traffic volume is the number of vehicles that pass a certain point or line on a cross section of the road. Traffic volume enumeration data is information needed for the planning, design, management and road operation phases.[1]

Traffic volume shows the number of vehicles that crossed one observation point in a unit of time (days, hours, minutes). In relation to determining the number and width of lanes, the unit of traffic volume commonly used is average daily traffic, planning hour volume and capacity.[1]

Traffic volume data can be obtained from routine posts around the location. Vehicle load data retrieval is done by calculating from the axis of the vehicle. The calculation of daily traffic volume is adjusted to the conditions in which departures and departures, for example: school, work, shopping, and evening / evening recreation differ from one another so that they get actual conditions in the field and
all problems that arise can be summarized well [7]. To search for Average Daily Traffic: can be calculated using the following **Equation 1 and Equation 2**:

\[
LHR = (1 + i)^n \times P
\]

\[
ADT_{smp} = (ADT) \times \text{Factor equivalent}
\]

Which is:
- \(ADT\) = average daily traffic (vehicles/day)
- \(ADT_{smp}\) = average daily traffic equivalents in a passenger car unit (passenger car unit/day)
- \(i\) = Traffic growth factor
- \(n\) = year to \(n\)
- \(P\) = The amount of traffic volume at the beginning of the planned life

2.6. Traffic Loads

The dimensions, weight of the vehicle, and the loaded load will cause compressive force on the vehicle axis. The compressive force is applied to the pavement surface and will contribute to the road surface [8]. Based on this value, the Standard Load configuration is derived for the following axis configurations at **Figure 2** below: [9]

![Figure 2. Standard Axis Load Configuration](image)

We can follow the distribution of axis load from various types of vehicles on the empty weight, weight with maximum load and maximum total weight in each type of vehicle where asphalt pavement loads are compressed [10].

The axle load of each vehicle is affected by the location of the vehicle points that vary according to the load of the vehicle, according to the **Equation 3**. below:

\[
E_{\text{empty truck}} = E_{\text{front axis}} + E_{\text{rear axis}}
\]

2.7. Cumulative Equivalent Numbers

The number of equivalent trajectories over the life of the design can be determined through the cumulative equivalent axle standard (CESA) load axis. To determine the cumulative equivalent standard load axis over the design life, we use **Equation 4**:

\[
CESA = LHR \times 365 \times E \times C \times N
\]
Which is:
CESA: Load cumulative equivalent standard axis
N: Number of each type of vehicle
365: Number of days in a year
E: Axis load equivalent
C: Vehicle distribution coefficient
N: Design life relationship factors that are adjusted to traffic development

To find the distribution coefficient (C), it can be seen from Table 1 according to the criteria of Jalan Pancer, Pesanggaran subdistrict, Banyuwangi. [12]

| Number of Paths (n) | Number of Vehicle | Coefficient (C) |
|---------------------|-------------------|-----------------|
|                     | Light Vehicles (*) | Heavy vehicle (**) |
|                     | (<5ton)           | (>5ton)         |
| 1 way               | 1.00              | 1.00            |
| 2 way               | 0.60              | 0.70            |
| 3 lane              | 0.40              | 0.50            |
| 4 lane              | -                 | 0.45            |
| 5 lane              | -                 | 0.25            |
| 6 lane              | -                 | 0.20            |

*) Total weight <5 tons, for example: passenger cars, pick ups, delivery cars
**) Total weight ≥ 5 tons, for example: bus, truck, tractor, semi trailer, trailer.

2.8. Traffic Growth Factors
Traffic growth factor is the number of vehicles that use the road from year to year which is influenced by regional development, increased public welfare and increased ability to buy vehicles. Traffic growth factors are expressed in percent/year. Traffic growth factors can be obtained from the analysis of traffic data, population development, income per capita, regional master plan and others. To calculate traffic growth over the life of a road plan you can use Equation 5:

\[ F = P (1 + i)^n \]  

Wich is:
F = Traffic Volume year to n
i = Traffic growth factor
n = year to n
P = The amount of traffic volume at the beginning of the planned life

2.9. Overload
Overload is a condition where a vehicle is loading goods with an amount that exceeds the allowable amount (the heaviest axle load standard)[14]. Overload will cause the Cumulative Equivalent Single Axle Load plan to be reached before the year of the age road plan according to the design. Generally, every road construction has been designed accordingly with applicable design criteria [15]. But so far the overload is still rarely considered in any road design. Because overloading can shorten the service life of the road, this VDF (Vehicle Damage Factor) needs to be included in the pavement design process.
3. Methodology

3.1. Data Collection

There are two kinds of data that needed, among others are primary data and secondary data.

3.1.1. Primary Data

Primary Data is data obtained from direct observation in the field. To get the value of reducing the age of the road plan on Pancer Road, several surveys are needed to get the required data, including:

a. Preliminary survey: preliminary survey to find out the general condition of pancer roads, road classifications, road facilities, and road dimensions. Based on preliminary surveys, the classification data of the pancer road is classified as class III road with a cross section width of 4 meters and has the heaviest source load of a maximum of 8 tons. The pancer road is the main access to the tourism and industrial areas, the type of area is a residential area with several shops on the side of the road. This road was repaired in 2014 along 1 km. The pancer road type is 2/2 UD (consisting of 2 lanes, 2 directions, undivided). The dimensions of the road drainage are on the right lane are 0.8 m and 1 m on the left lane, the average right shoulder of the lane is 1.8 m, and 2 m for the left lane. Given the width of the road that is not too broad, it will disturb and cause inconvenience for motorists. In addition, this road is often traversed by material transport vehicles, carrying project equipment and other large vehicles.

b. Average daily traffic volume survey: to get traffic volume data on the pancer road. The following Table 2 is the average traffic volume data survey results on the pancer road:

| No | Vehicle Type | ADT (Vehicle/day) |
|----|--------------|-------------------|
|    |              | Mon   | Tues  | Wed   | Thurs | Fri   | Sat   | Sun   | ADT  |
| 1  | Light Vehicle| 129   | 132   | 139   | 131   | 114   | 153   | 169   | 138  | 48,54|
| 2  | 2 axis truck | 242   | 223   | 260   | 234   | 15    | 6     | 7     | 141  | 49,55|
| 3  | 3 axis truck | 4     | 2     | 6     | 1     | 3     | 2     | 0     | 3    | 0,90 |
| 4  | Large Bus    | 0     | 0     | 6     | 2     | 0     | 4     | 8     | 3    | 1,00 |
|    | Total        | 375   | 357   | 411   | 368   | 132   | 165   | 184   | 285  | 100  |

3.1.2. Secondary Data. Secondary data is compiled data obtained from related agencies or bodies. Secondary data obtained are ADT data plan, road class data, Aged plan data plan load data vehicle axis data, vehicle type data.

3.2. Techniques of Survey Methods

There are mainly 2 methods by which we can collect data through the survey method.

3.2.1. Preliminary survey. By conducting direct observations in the field, by measuring the dimensions of the road, recording road facilities, and the condition of existing roads.

3.2.2. Average Daily Traffic Survey. Conducting of Average Daily Traffic surveys according to conditions where departing and returning schedules, for example: school, work, shopping, and evening/evening recreation differ from one another so that they get actual conditions in the field and all problems that arise can be summarized well, the survey was conducted for 7 days with a 24 hour a day using manual counters tool. The Average Daily Traffic Survey was conducted in the 3rd (three) year from the beginning of the construction of the Pancer road.[7]
3.2.3. Vehicle Load Surveys. Axis load is influenced by the axle configuration and vehicle load. For example, two of the same vehicles have different axial loads due to differences in load, thus also different in their equivalent numbers. This survey was conducted for 7 days with a 24 hour a day.[1] In carrying out a vehicle load survey on Jalan Pancer, the type of vehicle for 2-way trucks heading to the Pier Development Project on Pancer Beach obtained vehicle load data from the Project's weighbridge (PT. Aura Sinar Baru). In the type of light vehicle data obtained from the website www.mday.info.com, while Trucks 3 the weight transfer data is obtained from the website www.indotrucker.com and in the type of large Bus vehicles obtained from PT. Abiyan Trans Banyuwangi.

3.3. Data Processing
After primary data and secondary data are obtained, the next step is:
3.3.1. Analyze data using 2 scenarios: Scenario 1 is to find out the value of CESA at the end of the life of the road plan, using ADT data and vehicle weight based on planning data. This scenario is considered a normal condition and is used as a basis for analysis. Scenario 2 is to find out the actual CESA value over the life of the plan, using ADT data from the survey results and vehicle axle loads obtained from the survey results manually.

3.3.2. Results and Discussion. After processing the data, it can be seen the effect of overload on the life of the plan and can be known the equivalent value of the VDF (Vehicle Damage Factor) used for planning with VDF survey results which the greater the VDF value, the greater the road damage factor and can find out decrease in road service life from the beginning of construction by interpolation.

4. Results and Discussion

4.1. Comparison of Annual Daily Traffic (ADT) and Traffic Growth
Comparison of planning ADT data with survey ADT data and the magnitude of traffic growth factors can be seen in Table 3 below.

| No | Vehicle Classification | ADT First year (veh/day) | ADT Survey 3rd year (veh/day) | traffic growth |
|----|------------------------|---------------------------|-------------------------------|---------------|
| 1  | Light Vehicle          | 72                        | 138                           | 0.2426        |
| 2  | 2 Axis Truck           | 16                        | 141                           | 1.0655        |
| 3  | 3 Axis Truck           | 0                         | 3                             | -             |
| 4  | Large Bus              | 0                         | 3                             | -             |

4.2. Evaluation of Vehicle Loads
Based on the results of the survey of vehicle weight, it was concluded that the weight of the vehicle survey results were much greater than the weight of the planned vehicle based on the standard vehicle axle load, which means that the Pancer Road had overloaded. Vehicle weight data can be seen at Table 4.
Table 4. Vehicle Weight Data on the Pancer Road Section

| No | Vehicle Classification | Vehicle weight (ton) | Design Data | Survey Data |
|----|------------------------|----------------------|-------------|-------------|
| 1  | Light Vehicle          | 2                    | 5.1         |             |
| 2  | 2 Axis Truck           | 18.2                 | 19.68       |             |
| 3  | 3 Axis Truck           | 25                   | 37.72       |             |
| 4  | Large Bus              | 9                    | 13.09       |             |

4.3. The comparison of Equivalent Numbers or VDF (Vehicle Damage Factor)

VDF (Vehicle Damage Factor) is one of the parameters that can determine the thickness of the pavement that quite significant and if the vehicle will be heavier (especially overloaded vehicle), the VDF value will significantly increase. According to the type of vehicle Equivalent Number Calculation of vehicles or VDF in scenario 1 which is obtained distribution of Axis Load from Various Types of Vehicles based on Manual Perkerasan Jalan No. 01/MN/BM/83. In the second scenario VDF calculation is calculated by adding up the equivalent number of each axis of each vehicle survey results.

VDF calculation for scenario 2 in light vehicle type with axle configuration (1,1), vehicle weight 5.1 tons with front axle load distribution (As 1) 2.55 tons single axle single wheel and (As 2) 2.55 tons single axis single wheel.

\[
\text{VDF} = \text{DF}_{sb\ depan} + \text{DF}_{sb\ belakang} \\
= 1 \left(2.55^{8,16}\right)^4 + 1 \left(2.55^{8,16}\right)^4 \\
= 0.0095 + 0.0095 \\
= 0.0191
\]

VDF calculation for scenario 2 on type 2 axle truck with axle configuration (1,2), vehicle weight 19.68 tons with front axle load distribution (As 1) 6.6912 tons single axle single wheel and (As 2) 12.9888 tons of rear axle double wheels.

\[
\text{VDF} = \text{DF}_{sb\ depan} + \text{DF}_{sb\ belakang} \\
= 1 \left(6.6912^{8,16}\right)^4 + 1 \left(12.9888^{8,16}\right)^4 \\
= 0.4521 + 6.4197 \\
= 6.8718
\]

VDF calculation for scenario 2 on 3-axis truck type with axle configuration (1,22), vehicle weight 37.72 tons with front axle load distribution (As 1) 9,4300 tons single-axis single wheel and (As 2) 28,2900 tons of rear axle double wheels.

\[
\text{VDF} = \text{DF}_{sb\ depan} + \text{DF}_{sb\ belakang} \\
= 1 \left(9.4300^{8,16}\right)^4 + 1 \left(28.2900^{8,16}\right)^4 \\
= 1.7836 + 12.4242 \\
= 14.2078
\]

VDF calculation for scenario 2 on large bus type with axis configuration (1,2), vehicle weight 13.09 tons with front axle load distribution (As 1) 4.4506 tons single axis single wheel and (As 2) 8.6394 tons rear axle double wheel.

\[
\text{VDF} = \text{DF}_{sb\ depan} + \text{DF}_{sb\ belakang} \\
= 1 \left(4.4506^{8,16}\right)^4 + 1 \left(8.6394^{8,16}\right)^4 \\
= 0.0885 + 1.2565 \\
= 1.3450
\]

Recapitulation of VDF values for scenario 2 on vehicles crossing Pancer Street, Pesanggaran subdistrict, Banyuwangi, can be seen in Table 5.
Table 5. Recapitulation of the VDF value in Scenario 2

| No | Vehicle Classification | Vehicle Weight (Survey Data) | Load per axis | Angka Ekivalen (VDF) |
|----|-------------------------|-------------------------------|---------------|---------------------|
|    |                         |                               | Front Axis    | Rear Axis           | E Front Axis | E Rear Axis | Amount E |
| 1  | Light Vehicle           | 5,1                           | 2,550         | 2,550               | 0,010       | 0,010       | 0,0191   |
| 2  | 2 Axis Truck            | 19,68                         | 6,691         | 12,989              | 0,452       | 6,420       | 6,8718   |
| 3  | 3 Axis Truck            | 37,79                         | 9,448         | 28,343              | 1,797       | 12,517      | 14,3135  |
| 4  | Large Bus               | 13,09                         | 4,451         | 8,639               | 0,088       | 1,257       | 1,3450   |

The results of the calculation of VDF scenario 2 are compared with the scenario VDF 1. Comparison of the VDF values is the quotient between the VDF values from the survey results with the planned VDF values. This comparison is intended to see the extent of differences in the destruction factors of each type of vehicle, while the results of the comparison can be seen in Table 6 below.

Table 6. Comparison of VDF (Vehicle Damage Factor) Values

| No | Vehicle Classification | Scenario 1 | Scenario 2 | Difference |
|----|-------------------------|------------|------------|------------|
|    |                         | VDF        | VDF        |            |
| 1  | Light Vehicle           | 0,0005     | 0,0191     | 3.815%     |
| 2  | 2 Axis Truck            | 5,0264     | 6,8718     | 137%       |
| 3  | 3 Axis Truck            | 2,7416     | 14,2078    | 518%       |
| 4  | Large Bus               | 0,3006     | 1,3450     | 447%       |

Based on Table 6, there is a comparison of VDF values for each type of vehicle that is > 100% due to the scenario 2 VDF value (survey) not in accordance with the VDF value of scenario 1 (planning), it can be concluded that all types of vehicles are overloaded so that the road damage factor is greater and causes the Pancer Road to experience damage early or before the planned life.

4.4. Cumulative Equivalent Numbers

The pavement design age can be analyzed based on the cumulative Equivalent Standard Axle (CESA) of each scenario. CESA analysis is the analysis of traffic by substituting the LHR value, the vehicle equivalent factor or the coefficient of damage required with ESAL (Equivalent Single Axle Load) units. CESA values are calculated annually from the first year to the end of the planned life. The age of the pavement plan can be analyzed based on the results of the CESA analysis in each scenario. If it is assumed that the value of CESA at the end of the life of scenario 1 plan is the end of the service life period, then the value of CESA at the end of the life of scenario 1 will be achieved in what year in scenario 2.

4.4.1. Comparison of CESA values in scenario 1 and scenario 2. The data used in the scenario 1 uses a growth factor of 8.2% per year according to planning data from the Banyuwangi District Transportation Department with a 5-year road planning life and the function of the road is a primary artery with 2 2-way lanes. Based on these data a vehicle distribution coefficient (C) can be obtained by 0.5 while for finding the value of design age factors that have been adjusted for traffic growth (N). In the calculation of the next year, it is only different at n / age of the plan according to what year is calculated. The following Table 7 shows the differences in the value of CESA in scenario 1 and scenario 2 from the
year of 2015 – 2019. CESA values in both scenario 1 and scenario 2 show the value of CESA experienced a significant increase considering the increasing number of LHR and the weight of the vehicle at scenario 2 that was overloaded.

Table 7. CESA Values in Scenario 1 and Scenario 2

| No | Year | CESA Values |
|----|------|-------------|
|    |      | Scenario 1  | Scenario 2  |
| 1  | 2015 | 15,285.69   | 63,877.19   |
| 2  | 2016 | 74,516.12   | 806,462.32  |
| 3  | 2017 | 188,944.93  | 6,093,369.97|
| 4  | 2018 | 378,738.42  | 36,432,677.00|
| 5  | 2019 | 667,589.80  | 199,101,861.50|

4.4.2. Remaining Life (RL). The CESA value at the end of the design life of scenario 1 is 667,589.80 SAL, while the value of CESA scenario 2 is 199,101,861.50 SAL which is 298.24 times greater than the value of the CESA plan or scenario 1.

\[
\text{Remaining Life (RL) scenario 1} = 100 \times 1 - \frac{\text{CESA 2018}}{\text{CESA 2019}} = 100 \times 1 - \frac{15,285.69}{667,589.80} = 43.27\% \\
\text{Remaining Life (RL) scenario 2} = 100 \times 1 - \frac{\text{CESA 2018}}{\text{CESA 2019}} = 100 \times 1 - \frac{378,738.42}{6,093,369.97} = 81.70\%
\]

From the results of the calculation of remaining life of the plan, it is known that in scenario 1 and scenario 2 the remaining pavement life for the next 5 years is 43.27% and 81.70% which means the pavement service for 5 years is reduced, this happens because the burden that passes through pavement increases every year.

4.4.3. CESA Values Recapitulation

Figure 3. CESA Value Recapitulation
The chart (Figure 3) gives information that from the year of 2016 the results of the CESA value of scenario 2 already exceeded the CESA value of 2019 in scenario 1 (value of planned life). If it is assumed that the value of CESA at the end of the life of scenario plan 1 is the end of service life, then by interpolation we get a reduction in road life (in scenario 2) 3 years and 2.3 months from the planned life, meaning that the pavement age will end at 1 year 9.7 months from when the road was opened.

5. Conclusions
Based on the calculation of the value of VDF, obtained differences in each type of vehicle > 100%. This means that all types of vehicles are overloaded. The results of the average value of scenario 2 VDF is greater than scenario 1, then it can be stated that the road damage factor is greater. Based on CESA analysis, the pavement is planned with a planned age of 5 years and receives a burden of 667,589.80 SAL. If calculated with overload conditions, the planned life is only up to 1 year 9.7 months or there is a decrease in the life of the road plan by 3 years 2.3 months with a load of 806,462.32 SAL in the second year. So it can be concluded that Jalan Pancer suffered early damage before the planned age ended. Therefore, road pavement reconstruction is needed in accordance with the actual load that occurs in the field.

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