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# Evaluation of Maintenance and Drainage Damage Factors on the Condition of the Kadipaten - Jatiwangi Road (PT. Gistek Indonesia S.D. Bridge 2 Cisambeng)

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*ABSTRACT*

*Drainage is of course one of the most necessary aspects of the road component, and we should pay more attention to this aspect, and we also need to know that one of the causes of damage to a road is due to damage or non-functioning drainage. So the purpose of this case study is to identify road drainage problems that are on the Kadipaten road to Jatiwangi along 2,951 m from the front of PT Gistex Indonesia to the Cisambeng 2 bridge, which in the sector of the route is the industrial sector, lots of factory building growth right on the side national roads in the district. Majalengka, knowing how crowded and congested the national roads are. From the results of the observation of this case study, it can be concluded that there are still many inactive or disconnected canals, sediment, garbage, and large stones that have accumulated and clogged the drainage. then there is an STA Drainage point right in front of PT. LYG, you can say the worst condition is where the DPT drainage wall has collapsed. A good design needs to be done knowing that the drainage construction has not been done in 1 year.*

## 1. INTRODUCTION

The increase in the establishment of the factory industry on the Duchy road to Jatiwangi, of course, must have road infrastructure that has good preservation. lots of heavy trucks with heavy loads, and the density of motorists during the time of return is a focus on the condition of the road during the rainy season, where several road points are submerged in water due to drainage conditions that are covered with garbage and soil and even drainage walls have collapsed. If you look at the quality of road services, such as pavement conditions, road shoulder conditions, drainage/water channel conditions, supplementary road conditions, markings, signs, complementary road building conditions, and the condition of the surrounding plants/grass, the road is an important indicator for achieve good road service. (Muatan, Rifai, & & Handayani, 2022) Road damage can be caused by several factors, including water, changes in temperature, weather, air temperature, pavement construction materials, unstable subgrade conditions, poor compaction on top of the subgrade, and tonnage or loads of heavy vehicles that exceed capacity and volume. the increasing number of vehicles. (Yudaningrum & Ikhwanudin, 2017)

Meanwhile, the rain factor is also a natural event that is not planned and cannot even be avoided or prevented. Rainwater that should seep into the ground turns into runoff and causes flooding. Determining the right drainage system to cope with runoff discharge of rainwater is a formulation of the problem in planning. (Huda, 2021), So in today's life the road is an important asset in an area so that the strategy or way of maintaining roads is a top priority to be researched, developed and planned. (Kumalawati, Jhon, & Rizal, 2023)

Because of the author will examine the problems with road conditions and provide a comparative picture of good and bad conditions from several drainage points (side channels) along the Kadipaten Road to Jatiwangi (PT. Gistek Indonesia to Bridge 2 Cisambeng).

## 2. LITERATUR REVIEW

### Road Drainage Classification

Drainage is one of the importants or complementary structures for road conditions, where drainage functions as follows: 1. Drain rainwater/water as quickly as possible of the road surface and then flow it through the side channel to the final disposal channel. 2. Prevent the of water originating from the drainage area around the entrance to the pavement area. 3. Prevent damage to the environment around the road due to water flow. There is also a surface drainage system which in principle consists of 1. The transverse slope of the road pavement and road shoulders. 2. Side ditches 3. Culverts. 4. Capture channel.

Regarding the types of drainage formation it self, there are to types of drainage : a. Natural drainage, formed naturally and there are no supporting buildings. b. Artificial drainage, made with a purpose and has a specific purpose and has a special building plan. (Departemen Pekerjaan Umum, (2006))

Based on the construction: a. Open Channels, Channels that drain water with a free surface, be it rainwater, household waste or other dirty water that does not interfere with environmental health. b. Closed canals, while closed canals are for (water that disturbs environmental health) or for canals located in the middle of the city. (SUJARWOKO, 2018)

### Road Damage

When examining Government Regulation Number 34 of 2006, roads are infrastructure land transportation which includes all parts of the road, including auxiliary buildings and equipment intended for traffic, which are at ground level, above ground level, below ground level, and/or water, as well as above water level, except for railroads, lorry roads and cable roads. Apart from that, there are several damage factors that can be divided into two parts, namely, 1. Structural damage, including pavement failure or damage to one or more pavement components, causes the pavement to no longer be able to bear traffic loads. 2. functional damage that disrupts the safety and comfort of road users so that vehicle operating costs increase. According to Sukirman (1999), damage to road pavement construction can be caused by increased traffic, water due to poor drainage, poor materials, climate with high temperatures and rainfall, unstable soil, and poor soil compaction. The damage was caused by various factors including high traffic volume and the burden of passing vehicles. Road damage will affect the safety and comfort of road users which can cause accidents, traffic jams, and others (Munandar, Widodo, & Sulandari, 2014), some factors cause road damage, including increased traffic loads, inadequate drainage systems and asphalt pavement materials, climate, unstable soil conditions, and planning and execution of work that is not in accordance with specifications. Road damage is not caused by one factor alone but can be a combination of several interrelated causes (Utomo, 2001).

### Drainage damage factor

Basically, the main cause of road pavement damage is poor drainage or subgrade conditions, which results in losses for rebuilding, especially road drainage. (Yudaningrum & Ikhwanudin, 2017) Apart from function, of course, there are also factors such as damage to road drainage, 1. Abnormalities or errors in the cross slope. 2. Cracks in masonry or concrete installation channels. 3. Change in cross-section. 3. Hole. 4. Garbage blockage. Problems with the condition of the primary drainage channel are high sediment and less high embankments, accumulation of waste, and cracks (Oktiawan & Amalia, 2012). In addition, Poor road drainage conditions also have the potential to make the road less durable and easily damaged because it cannot drain rainwater properly. Determine the actual Load Equivalence Factor (VDF) on the national road segment so that strong and durable road designs can be analyzed. (Kurniawan, 2023)

### Road drainage treatment and maintenance methods

Maintenance is an activity carried out to improve the performance of the channel function following the design plan where the size of the work is based on the inspection report, in the sense that maintenance is a consequence or mandatory part of a development, as well as drainage which does not escape routine maintenance which must be carried out. take note. This activity is something to prevent more severe damage. Many factors contribute to drainage damage, One of the main causes of channel damage is the cause of lack of maintenance. Some care and maintenance as well as repairs to road drainage, as follows: 1. Maintenance of the canal by digging heaps of earth, weeds, perhaps, and carrying out drainage repairs of soil construction. 2. Control and repair of reinforced concrete construction drainage and no masonry. 3. Checking and repairing the inlet channel for cast concrete installation. 4. Carry out repairs to the control box cover of reinforced and non-reinforced concrete construction. (Saputra & Fatmila, 2023)

## 3. METHOD

In a drainage canal design, several steps must be carried out first, starting from preparing a site survey and examining the area that is the object of research. This implementation method is carried out through good design and correct arrangement, This research methodology is carried out manually by observing and using simple measuring instruments and some documentation.

### The Location


picture 1.1 location map Indonesia kadipaten

The Location of study activities under review the located on the Kadipaten road to Jatiwangi, 3,061 m long, from the Indonesian Gistek Factory to Bridge 2 Cisambeng. With coordinates A = 6°45'17.7"S 108°12'17.1"E ends at coordinates B = 6°44'26.9"S 108°13'34.2"E. Retrieval of STA identification According to the existing damage to the drainage conditions.

## Preparation phase

Prepare materials for data requirements, discussion should lead to literature review, knowing the conditions of the location that will be research material, and preparing measuring instruments and preparation for observation.

a. stationery b. Meter

## Data Collection

Primary Data and Secondary Data.

picture 1.2 Survey the location and condition of the site area

STA 1+964 & 2+160 STA 0+749 & 0+845

System Data on Good Drainage. There are, of course, many classifications or references for assessing good drainage conditions as follows: Fulfilling the proper size of the drainage canal The correct slope of the base of the canal water does not seep or seep into the canal Good maintenance The drainage network functions to channel rainwater so that the housing environment is free from stagnant water; To determine the size of the drainage canals, it is determined based on the volume capacity of the water to be accommodated and the frequency of 5-year rainfall intensity and soil absorption capacity; Channel systems can be open or closed, (Ir.Adiwijaya.Ph.D, 2016)

SyRequirements for open channels: Channels are ½ circle in shape, minimum diameter of 20cm; Minimum channel slope 2%, Minimum channel depth 40cm; Building materials: clay, concrete, bricks, river stone; Closed Channel Requirements: Channels are equipped with control holes at every distance of at least 10 meters and at every turn; Minimum channel slope 2% Minimum channel depth 30cm; Building materials: PVC, clay, concrete, brick, river stone Rainwater drains a designed to be used or used only for residential areas. In general, live loads are people, If two-wheeled vehicles (motorcycles) or 4-wheeled vehicles (cars) pass through, the channel must be covered with a 10-12cm thick reinforced concrete plate. (Supardi & Mokhtar, 2023)

## Analytical method

Measurement of Drainage Diameter, Measurement is carried out using an iron roller meter with a maximum length of 50 meters.

picture 1.3 Measurement of Drainage Diameter and Observation of Drainage conditions

Observation of Drainage conditions. Before taking measurements, the author's initial step is to observe the conditions in the drainage.

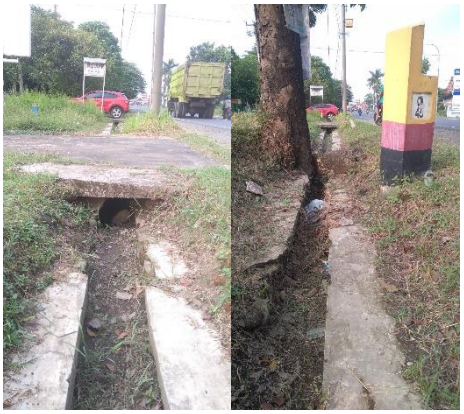
## 4. RESULT AND DISCUSSION

### Road Drainage Condition (Duchy to Jatiwangi)

### Road Drainage Conditions

The results of the Identification of the duchy road drainage from PT. Gistex Indonesia (STA 0 + 000) to PT. LYG Jatiwangi (STA 2 + 951).

The starting point for sampling at STA 0+000 to 0+202 can be seen from the image below, it has dimensions that can be said to be small, and it can be seen that there are trees blocking the canal and there are also thick piles the sediment, although it does not affect the condition of the road, but at the standard of drainage this road needs study.



Gambar 1.4 pada STA 0+000 & STA 0+202

*Sumber : Front Drainage Polres Kasokandel Author's documentation*

The second point at STA 0+391 to 0+500 at the location in front of PT. Gistex Indonesia, the drainage at this point has 2 drainages with different dimensions, where the roadside drainage connects to a larger

dimension and can. The condition of the road drainage is quite good, with a roadside drainage depth of 56 cm, a width of 54 cm, and a large drainage with a width of 1.95 cm, with a depth of 93 cm.

Below are the conditions at STA 0+391 & STA 0+500.

picture 1.6 STA 0+391 & STA 0+500
*Sumber : Front Drainage PT. Gistex Indonesia Author documentation*

At STA 0+749 to 1+360 in front of Toyota to PT. Litex Indonesia, the drainage at this point has an open channel and closed channel types. Where the closed type is in front of the entrance gate of PT. Litex Indonesia, which is used as a way for workers to enter and leave. This STA has conditions, sediment has accumulated, garbage is clogged, and DPT conditions are quite damaged.

picture 1.7 pada titik STA 0+749 & STA 1+360

*Sumber : Front Drainage PT. Letix Indonesia Author documentation*

And at STA 2+812 to 2+951 located in front of the Kasokandel Community Health Center up to PT.LYG, with the most severe drainage conditions there is accumulated sediment, clogged garbage, and landslides in DPT conditions.

picture 1.8 Portrait of the condition of STA 2+812 From the Duchy to Jatiwangi

*Sumber : Front Drainage PT. LYG Author documentation*

Picture 1.9 STA 2 + 951, with a collapsed drainage wall.

*Sumber : Front Drainage PT. LYG Author documentation*

**Results Measure the diameter of the drainage.**

Results Dimensional dimensions of drainage on the condition of the Kadipaten Road to Jatiwangi, The author's assumption for the average drainage dimension at this location is 45 cm wide with a depth of 54 or 55 cm.

Table 1 he results of the size of the Drainage Diameter

| No | Drainage Point | Wide | depth |
|---|---|---|---|
| 1 | 0 + 202 | 23 cm | 15 cm |
| 2 | 0 + 391 | 45 cm | 54 cm |
| 3 | 0 + 500 | 1,95 cm | 93 cm |
| 4 | 0 + 749 | 45 cm | 40 cm |
| 5 | 1 + 360 | 45 cm | 54 cm |
| 6 | 2 + 812 | 20 cm | 15 cm |
| 7 | 2 + 951 | 6 cm | 54 cm |

Then the results from the table above can be summarized by seeing that surveyors at STA 0+202 and STA 2 + 812, which can be said to be the physical condition of the drainage below the predetermined standards.

## 5. CONCLUSION

### Drainage Maintenance Solutions at each STA

From the literature study and analysis carried out by the author, it can draw the following conclusions:

Starting with STA 0 + 202 and 2 + 812, they have the same conditions, with shrinkage in the drainage DPT, and accumulation of soil sediment, stones, and garbage. Maintenance at this STA needs to carry out demolition and a new design, when viewed from the road conditions, the original soil is too low with drainage conditions, which causes water to stagnate in the wrong place. Then the STA points 0+391, 0+749, and 1+360, the conditions at these STA points are relatively good. It's just that it still has sediment. Maintenance at this STA performs maintenance control of garbage blockages and sediment piles. And STA 2 + 951, located in front of PT. LYG, which has quite a cornering road condition. And the soil conditions that have different ground elevations. Where the water continued to stagnate on the low side of the land resulting in the DPT collapsing of the Drainage, and damage to the drainage cover due to public vehicles that kept stopping above the drainage. The solution that must be done, of course, is to improve the drainage development plan at this STA point, it a noted that the construction of drainage at this STA has not been in a year yet, but it is damaged again with the same factor. You also need to know. In general, the point from the small bridge beside PT LYG to the Cisambeng Bridge can A said to have no drainage channels. Planning of ditches or side drainage channels includes 3 (three) process stages as follows:. Hydrological analysis, hydraulic calculations and plans. And if we look based on the type of damage that occurred in the field, corrective actions can be carried out by remedial actions per segment

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