

Quality Analysis of Street Lighting Protocol of Pematang Siantar City

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ABSTRACT

Public Street Lighting (PJU) is part of the utilities needed by the community. Public road lighting is needed to improve traffic safety, environmental safety and public comfort when driving, especially at night. This study aims to determine the light intensity and level of public street lighting (PJU) in Pematang Siantar City, especially Jalan Sutomo. The condition of Jalan Sutomo, Pematang Siantar City is a one-way street. In calculating the luminance intensity (lux) of public street lighting, a digital lux meter is used. The type and power of the lamp used for PJU on Jl. Sutomo Pematang Siantar City is a 60 W LED lamp. The height of the PJU pole on Jl. Sutomo in Pematang Siantar City is 9 meters in average with an arm length of 2 meters. The distance between a row of PJU poles is approximately 50 meters, with a road width of approximately 10 meters. The laying of the PJU on Jalan Sutomo, Pematang Siantar City, is by facing each other on each side of the road using a 1 arm lamp post.

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1. INTRODUCTION

Electricity is a form of energy that is needed and useful, where electrical energy has an important function in all aspects of life to meet a need that uses electrical energy. Lighting is needed by all people, especially at night, both for lighting in homes, public places, and public roads. Public street lighting is one of the local government programs in providing social services to the community. It is hoped that with the existence of public street lighting to be able to avoid accidents and crime, especially at night. Public street lighting is a public lighting installation and is usually installed on roads, bridges or certain places such as parks and other public places so as to provide a sense of security and comfort to the public when traveling at night. Good public street lighting installations must use existing standards and regulations so that public street lighting installations can work properly according to their functions and have a long service life. However, in reality it often happens that the installation of street lights is not in accordance with applicable standards, such as the distance between different poles, the height of the PJU poles that are not in accordance with the standards and the types of lamps that are not suitable which result in less than optimal lighting.

On the other hand, maintenance of public street lighting that has been operating is also rarely carried out, which raises problems in public street lighting, including broken lighting, security that no longer functions. The way to overcome this problem is that in the implementation of the construction of public street lighting, good planning is needed, so that the installation of public street lighting lamps has high efficiency,

has sufficient lighting strength. The intensity of public street lighting must also be in accordance with the provisions so that public street lighting can operate properly. A good street lighting lamp is a complete unit consisting of a light source (lamp), optical elements (reflectors), spreaders, electrical elements, a support structure consisting of vertical support arms and a lamp post foundation. Where public street lighting is usually installed on the right and left sides of the road or in the middle (road median) which is used to illuminate the road or the environment around the road as needed. The process of data analysis and retrieval is carried out on Jl. Sutomo , Pematang Siantar.

A. Definition of Street Lighting

Definition of Street Lighting The definition of street lighting according to SNI-04-6262-2000 is a lamp used for street lighting at night so that pedestrians, cyclists and motorists can see more clearly the road to be traversed at night, so as to improve traffic safety and safety of road users.

Street lighting is usually installed on the left/right side of the road or in the middle (in the median section of the road) which is used to illuminate the road and the surrounding environment.

The main objectives of street lighting based on SNI 04-6262-2000 are:

1. To enable users of cars, motorcycles, bicycles and animal-drawn vehicles to walk safely;
2. To enable pedestrians to see the light, adapt, recognize pedestrians and provide safety sensitivity;
3. To improve the appearance of the surrounding atmosphere at night.

Street lamp lighting has various geometric shapes of placement according to the shape and condition of the road. According to Sangkertadi (2006) Broadly speaking, the layout of public street lighting is grouped into 3 (three) parts, namely: straight/ordinary roads, bend roads and intersection areas.

- a. Straight Street The laying of street lighting on a straight road is divided into several geometries depending on traffic density factors, road width factors and purely aesthetic factors. The layout of the PJU on the straight road, among others, is as shown in the following figure.

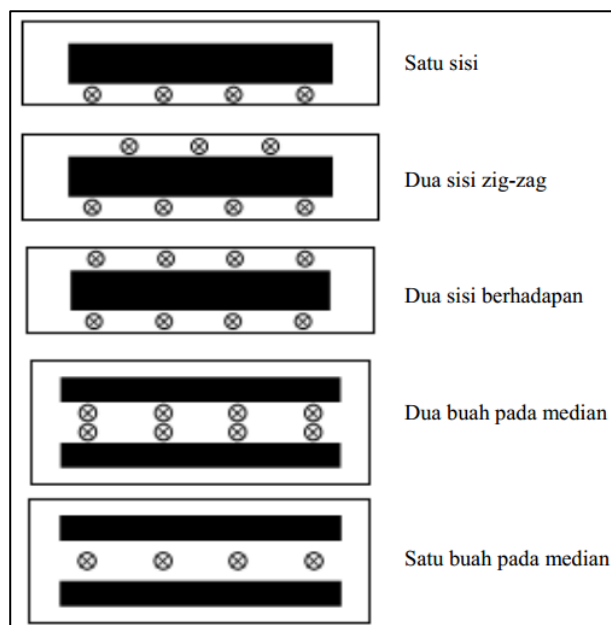


Figure 1. PJU layout on a straight road

- b. Bend in the road

Apart from being based on traffic density factors, road width factors and aesthetic factors , lighting placement also always pays attention to the main safety factor. If the road width is less than 1.5 times the height of the luminaire, the

luminaire may be placed on the outside of the bend in a single-sided mount. Careful laying is required to avoid confusion of the situation. At the corner of the road, the laying of lights is carried out on two sides of the bend. The distance between the light points is getting closer to the top of the bend to provide better guidance to the driver. However, if it is not possible to put it on two sides of the road, it is enough on the outer side of the road. The layout of the PJU on the cornering road, among others, is as shown in the following figure.

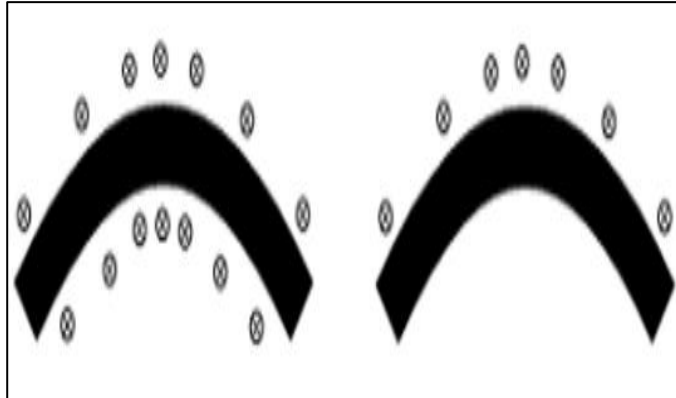


Figure 2. PJU layout on cornering roads

c. Crossroads

Laying lights at intersections, roundabouts, road narrowing is done in such a way that the area can be clearly seen from a distance. In laying lighting at crossroads, it is usually required to meet rules such as: Providing road surface lighting at intersections with higher luminance, and using different colors of light. The layout of the PJU at the crossroads, among others, is as shown in the following figure.

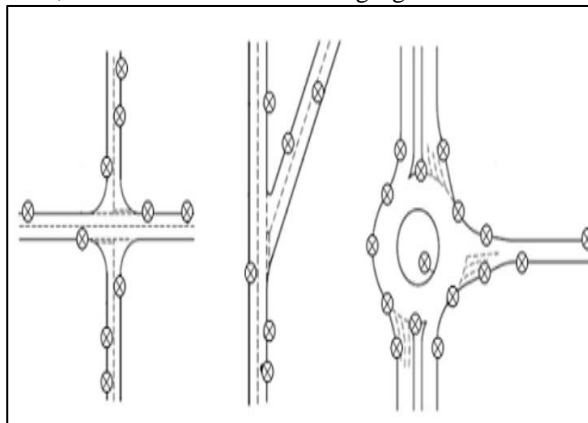


Figure 3. Arrangement of PJU locations at crossroads

B. Lighting Quality According to SNI Standard

The quality of lighting on a road can be measured using the illumination method. This data collection uses the illumination method because it can be measured directly on the road surface using a lux meter. Normal lighting quality according to SNI 7391 : 2008 is as shown in the following table.

Table 1. Normal lighting quality according to SNI 7391:2008

Klasifikasi Jalan	Kuat Pencahayaan (Illuminasi)	Luminasi	Batasan Silau	
	E rata rata (<i>lux</i>)	L rata rata (cd/m^2)	Silau	Batas ambang silau
Trotoar	1-4	0,10	4	20
Jalan Lokal :				
Primer	2-5	0,40	4	20
Sekunder	2-5	0,40	4	20
Jalan Kolektor :				
Primer	3-7	0,40	4-5	20
Sekunder	3-7	0,40	4-5	20
Jalan Arteri :				
Primer	11-20	0,40	5-6	10-20
Sekunder	11-20	0,40	5-6	10-20
Jalan arteri dengan akses kontrol, jalan bebas hambatan	15-20	0,40	5-6	10-20
Jalan layang simpang susun, terowongan	20-25	0,40	6	10

2. RESEARCH METHOD

Based on the study to be investigated, namely the analysis of the quality of street lamp lighting on Jalan Sutomo, Pematang Siantar City, namely examining the intensity carried out using a *Digital Lux measuring instrument. meters. The flowchart* of this research is as shown in the following figure.

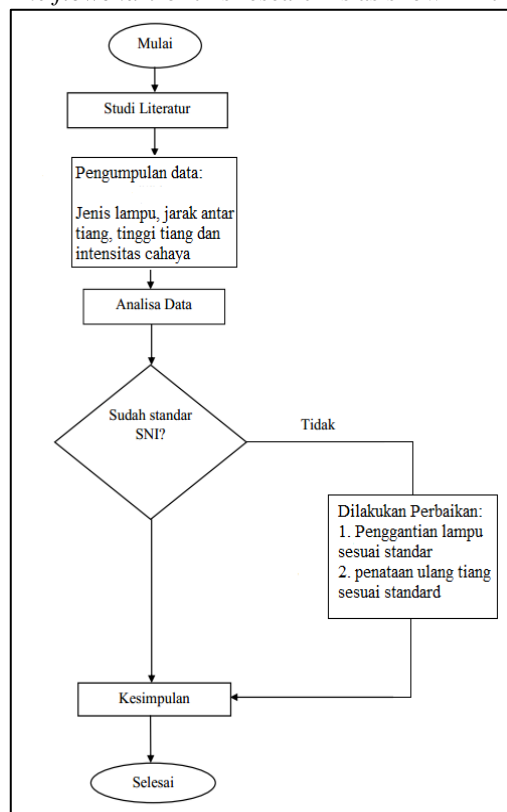


Figure 4. Research *flowchart* .

3. RESULTS AND DISCUSSIONS

A. PJU's Existing Condition

The lighting of the street lamps on Jalan Sutomo, Pematang Siantar City, is using a lamp with one arm. The width of the road is about 7 meters in one direction where the street lights are placed opposite each other on both sides. The type of lamp used is the type of LED lamp. The type of lamp is as shown in the picture below.



Figure 5. LED type lamp

The types of poles used in street lamp lighting are as shown in the figure below.

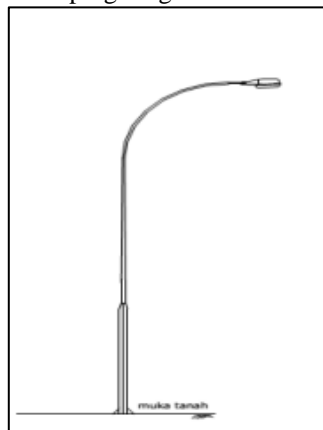


Figure 6. Single arm PJU pole

Meanwhile, the existing conditions on Jalan Sutomo Pematang Siantar City are as shown in the image below.



Figure 7. PJU on Jl. Sutomo

From the field it was also found that there are many trees around the street lamps where the shady trees are very influential in reducing lighting to the road. As shown in the following image.



Figure 8. Condition of PJU covered by trees

In this case, PJU maintenance is needed so that the lighting from the lamps can work optimally. So that road users, especially at night, can be safer.

B. The results of measuring the quality of street lights on Jl. Sutomo, Pematang Siantar

From the results of the research found in the field, namely on the left Stuomo road, as shown in the table below.

Table 2. Results of measuring the intensity of street lights on Jl. Sutomo left lane

Pole to-	Light intensity (lux)	Lamp Type	Information
1	340	LED	In accordance
2	350	LED	In accordance
3	290	LED	It is not in accordance with
4	0	LED	off
5	330	LED	It is not in accordance with
6	280	LED	It is not in accordance with
7	270	LED	It is not in accordance with
8	300	LED	It is not in accordance with
9	0	LED	off
10	340	LED	In accordance

From the research results found in the field, namely on the right lane Stuomo road as shown in the table below.

Table 3. Results of measuring the intensity of street lights on Jl. Sutomo right lane

Pole to-	Light intensity (lux)	Lamp Type	Information
1	280	LED	It is not in accordance with
2	310	LED	Not Suitable
3	340	LED	In accordance
4	350	LED	In accordance
5	260	LED	It is not in accordance with
6	0	LED	off
7	340	LED	In accordance
8	300	LED	It is not in accordance with
9	290	LED	It is not in accordance with
10	0	LED	off

The level of light intensity of public street lighting using a lux meter measuring instrument so that the lighting level is obtained in units of lux (illuminance). Based on the standard SNI 04-6262-2000 that the average illumination or lighting levels on arterial roads is around 340-460 lux. From the research, it was found that there were many lights that were not up to standard, namely because there were lights that were muffled by the trees around and there were also many lights on each panel on the led that had gone out. So to achieve the standard required maintenance.

4. CONCLUSION

This study discusses the analysis of the lighting quality of the Pematang Siantar city protocol street lights. The results of this study can be concluded as follows:

1. The type of PJU pole used is a single arm pole.
2. The type of lamp used in PJU y is an LED lamp.
3. From the results of the study, it was found that there were still many lamps that were not up to standard.
4. It is hoped that maintenance, especially on PJU, such as replacing the lights that have gone out and trimming the leaves around the lights, so that maximum lighting is produced.

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