LEADER
Civil Engineering and Architecture Journal

Civil Engineering and Architecture Journal Vol 2 No. 2 (2024) 3026-622X
DOI 10.37253/leader.v2i1.9548

ANALYSIS OF ROAD GEOMETRIC DESIGN ON THE 2 KM MAJALENGKA – CIKIJING ROAD SECTION (KASTURI STREET CASE STUDY)

Sevan Alif Maulana[1], Jody Martin Ginting[2], Adinda Fajarika[3]
[1]Faculty of Civil Engineering, University of Majalengka, Indonesia
[2]Faculty of Civil Engineering and Planning, Batam International University
[3]Mercu Buana University Jakarta, Indonesia
Email Korespondensi: sevanalifmaulana@gmail.com, andri.irfan@uib.ac.id, adindafajarikaa21@gmail.com

ARTICLE INFO

Keywords:
Highway, Road Geometric Design

ABSTRACT

Road geometric design is part of road engineering, with a focus on the engineering design of the physical form of the road to realize the basic function of the road. Road geometry design products include horizontal alignment, vertical alignment, and road cross sections. The geometric design of the road takes into account traffic safety and comfort in accordance with the function of the road. Estimated traffic flows include motorized vehicles, bicycles, and pedestrians. Road construction in developing countries aims to connect isolated areas and encourage economic growth through better population mobility. Therefore, the government needs to be encouraged. This key element focuses on achieving a balance between regional development and national security for national development. Without sufficient access, it will be difficult for people to conduct activities with different parties. When planning grade curves to improve road safety, attention is paid to the type of curve, the condition of the ground contour to avoid slopes and rivers, and the average speed of road users, all of which affect the minimum circle radius. The minimum circle radius value is a factor that affects the sharpness of the road's horizontal curve at a later stage, if the minimum radius is used then the curve will be very sharp. Therefore, the required turn value needs to be considered and adjusted to the standard so that the horizontal curve of the road is not too steep for the user.

1. Introduction

Road geometric design is part of road engineering, with a focus on the engineering design of the physical form of the road to realize the basic function of the road. Road geometry design products include horizontal alignment, vertical alignment, and road cross sections. The geometric design of the road takes into account traffic safety and comfort in accordance with the function of the road. Estimated traffic flows include motorized vehicles, bicycles, and pedestrians. Horizontal alignment is the projection of the road axis for undivided roads, or the inside lane edge of intermediate roads. Horizontal alignments, often called "traffic lines" or "road lines," consist of straight lines connected by curved lines.

The goal of road geometric design is to increase user comfort and safety while maintaining efficient traffic operations while minimizing construction and maintenance costs (Andito, 2022). Road construction in developing countries aims to connect isolated areas and encourage economic growth through better population mobility. Therefore, the government needs to be encouraged(Suprayoga, 2020).

This key component focuses on achieving balanced inter-regional development and national security for national development. Without sufficient access, it will be difficult for people to conduct activities with different parties. Therefore, appropriate standards must be used when planning roads. Roads are necessary to ensure comfort and user safety as well as efficient movement of traffic (Gaikawad, 2020). The human factor, inadequate vehicle conditions and inadequate road geometry from a safety standpoint are factors that can lead to a high number of accidents(Rosaria, 2022).

When planning grade curves to improve road safety, attention is paid to the type of curve, the condition of the ground contour to avoid slopes and rivers, and the average speed of road users, all of which affect the minimum circle radius. The minimum circle radius value is a factor that affects the sharpness of the road's horizontal curve at a later stage, if the minimum radius is used then the curve will be very sharp. Therefore, the required turn value needs to be considered and adjusted to the standard so that the horizontal curve of the road is not too steep for the user.

Apart from these aspects, vehicles that pass through several vertical bends must be careful, also pay attention to visibility and lighting distance. That is because the topographical conditions in Majalengka Regency have several sharp vertical bends and very steep climbs or descents, so that it poses a risk to every road user. Thus, in planning vertical bends, it is necessary to consider road safety factors and the safety of passing vehicles in accordance with regulations. In addition to horizontal bends, the geometric design must also pay attention to vertical bends as well.(Megarestya, 2022)

In this way, a geometric design analysis will be carried out regarding the suitability of the existing geometric design of the road using data from previous research on the Majalengka - Cikijing road section by adjusting it to the road geometric design guidelines.

2. Literature review

2.1 Highways

It is the main road for the transportation service that connects one area/region to another, especially for the continuity of the distribution of goods and services. The use of the road itself is also regulated by agreed laws. According to RI Law no. 38 of 2004 concerning roads, roads are land transportation infrastructure covering all parts of the road, including supporting buildings and equipment used for traffic, which are located at ground level, above ground level, at groundwater and/or water levels and at water level at water level, except for railroads, highways and cable roads.

Whereas Law Number 22 of 2009 concerning Road Traffic and Transportation which was promulgated after the definition of Law Number 38, roads are all parts of the road, including supporting buildings used for public traffic and their equipment, which are located on the ground surface, above ground, underground and water, and above water, except rails and cables.

The main roads in Majalengka have many problems, one of the problems in Majalengka is potholes. Even though damage patching has been done frequently, the patch doesn't last long or only for a short time. The most severe road damage in Majalengka is on the Talaga-Cikijing road.

The Majalengka – Cikijing road section is a collector road that connects the provincial capital to the district/city capital. there are several problems such as holes and uneven patches and there are several patches that have been damaged again.

2.2 Road Geometric Design

Road geometry is the shape that describes the road, including cross-section, longitudinal section, and other aspects related to the physical form of the road. The geometric design itself includes both horizontal and vertical alignment.

The geometric design of the road takes into account traffic safety and traffic comfort, etc., and adapts to the function of the road. Estimated traffic flow includes motor vehicle, bicycle, and pedestrian traffic. Horizontal alignment is the projection of the road axis for undivided roads, or the inside lane edge of intermediate roads. Horizontal alignments, often called the "traffic" or "road" axes, consist of straight lines connected by curved lines.

3. Research Methods

This research is motivated by the minimal periodic maintenance on this road section, more precisely this research is located on the Talaga – Cikijing road section. This periodic maintenance fee was shifted by Covid-19, but now it has been implemented. With a long workmanship of 150 days (Yulianto, 2023).

In this research, a survey was carried out and looked at the existing facilities on the road section, this is a map of the research location

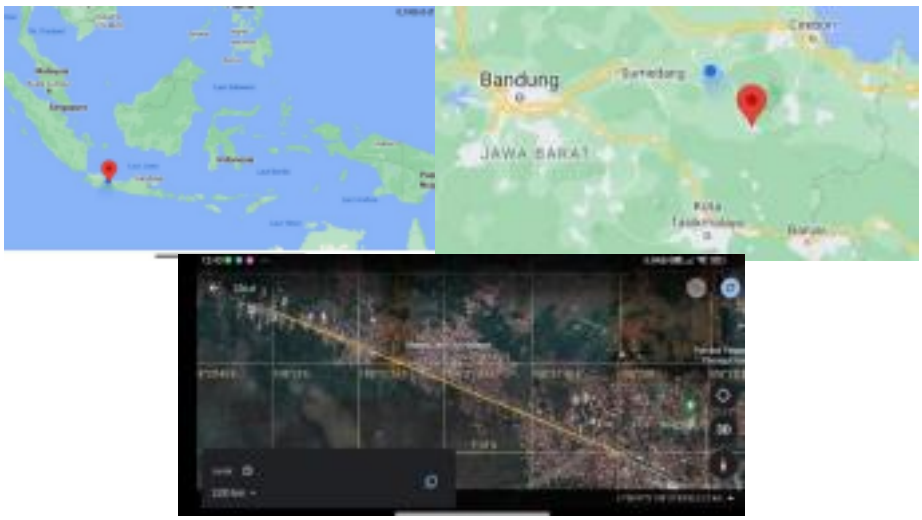

Figure 1. Map of research locations.

4. Discussion

4.1 Road Conditions

The Kasturi road section belongs to the primary collector road type. At present the Kasturi road is not too damaged, although there are some small patches visible on the road. But the patch is a little disturbing to passing road users, the thickness of the patch is too raised or thick because it is patched too often. Therefore, road users are often disturbed. This Kasturi road section has vertical or flat and straight contours, slightly curved without any sharp turns and uphill. However, for now the Kasturi road section has received repairs, with the name of the Kasturi Road Periodic Maintenance Work (Cikijing) project package.(sanjaya, 2023).

4.2 Facilities

The facilities on the Kasturi road are quite good, having 2 mosques along the road, namely the Al-Aatiin Public Mosque and the Jami' Al Hidayah Mosque. In addition there are Minimarkets, Schools, Workshops, Food Stalls, District offices, Police Posts, Police, Health Centers, Pharmacies and Pom Mini. Even though there are no gas stations and the long distance to go to the RSUD, at least there is a health center on the road.

5. Conclusion

The Kasturi road section belongs to the primary collector road type. At present the Kasturi road is not too damaged, although there are some small patches visible on the road. Therefore, road users are often disturbed. This Kasturi road section has vertical or flat and straight contours, slightly curved without any sharp turns and uphill. The facilities on the Kasturi road are quite good, having 2 mosques along the road, namely the Al-Aatiin Public Mosque and the Jami' Al Hidayah Mosque.

6. References

Andito, I. R. (2022). The Design of Horizontal Alignment Using Indonesia Highway Design Standard: A Case of Jalan Babat-Tapen, East Java.*Indonesian Journal of Multidisciplinary Science*, 200.

Gaikawad, P. &. (2020). A Review-Geometric Design of Highway with the Help of Autocad Civil 3D. *International Journal for Research in Applied Science and Engineering Technology*, 8 (5).

Megarestya, A. R. (2022). The Horizontal Curved Geometric Design with Autocad® Civil 3D on Jalan Muara Wahau, East Kalimantan. *Indonesian Journal of Multidisciplinary Science*, 237-250.

Rosaria, L. R. (2022). The Geometric Design of Horizontal Alignment: A Case Of Post-Harvest Infrastructure Corn Drying Center, Tuban, East Java. *Indonesian Journal of Multidisciplinary Science*, 224-236.

sanjaya, Y. (2023, April 2).*LET'S WATCH! The budget for road repairs in Majalengka - Cikijing - Talaga from Ridwan Kamil Reaches IDR 33.2 Billion*. Retrieved from radarmajalengka.com: https://radarmajalengka.disway.id/read/652406/yuk-awasi-anggaran-perbaikan-jalan-di majalengka-cikijing-talagadari-ridwan-kamil-menreach-rp-332-miliar

Suprayoga, G. B. (2020). Coping with strategic ambiguity in planning. *Impact Assessment and Project Appraisa.*

Yulianto, E. (2023, March 30). *The Severely Damaged Cikijing-Majalengka Road Section is Being Repaired, Just Completed after Eid*. Retrieved from Jabar Tribun News: https://jabar.tribunnews.com/2023/03/30/ruas-jalan-cikijing-majalengka-yang-rusak-parah-diperbaiki-baru-selesai-after-lebaran