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Analysis of Road Sight Distance and Support Facility: A Case of Jalan Babakan Anyar – Majalengka

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ABSTRACT
Road infrastructure is very important for the development of the economy and human mobility throughout the world. However, behind the importance of this extensive road network, a primary challenge continues to grow, namely the construction of safe and efficient road geometry. Due to the high population density in Indonesia, traffic jams and accident rates have increased. Serious accidents can occur if the road geometry is not suitable. This research has the main objective of carrying out planning regarding visibility distances and the condition of road facilities, such as existing lighting and traffic signs, to develop practical recommendations that can be implemented to increase traffic efficiency and safety at the Babakan Anyar - Kadipaten Highway location. The primary data collection method involves using official documents and reports following the guidelines in the Procedure for Geometric Planning of Inter-City Roads through the Director General of Highways in 1997. On the Babakan Anyar - Kadipaten Highway, which is included in the provincial road category and is a type of road arterie with flat terrain conditions, it has been decided to set a design speed of 100 km/hour for this research. Based on the 100 km/h design speed used in this research, the minimum stopping visibility required is 175 meters. However, because the planned value measured is 181.92 meters, the stopping visibility distance (Jh) is 181.92. Likewise, the minimum required visibility distance is 670 meters, but the value obtained is 751.89 meters, so a visibility distance (Jd) of 751.89 meters is used. In addition, lighting facilities are needed to increase visibility and reduce the risk of accidents by ensuring drivers can see the road, traffic signs, and obstacles.

Keywords: Road geometry, infrastructure, safety, road facilities

INTRODUCTION

Road infrastructure is very important for the development of the economy and human mobility throughout the world. Among many urban infrastructure systems, transportation infrastructure plays a vital role in a city's functioning (Badhrudeen, Derrible, Verma, Kermanshah, & Furno, 2022). However, behind the importance of this extensive road network, a primary challenge continues to grow, namely the construction of safe and efficient road geometry. Road geometric planning is the initial step in road construction that connects roads or access roads (Joice, Rifai, & Taufik, 2022).

Traffic safety has always been a big issue in China (Chu, Wu, Atombo, Zhang, & Özkan, 2019). Road geometry is designed considering traffic safety and comfort issues adapted to the road's function (Rizki, Rifai, & Djamal, 2022). Geometric design aims to optimize efficiency and safety, thereby reducing costs and environmental damage (Jima & Sipos, 2022). Appropriate visibility design is one of the critical geometric aspects for maintaining road safety. A key factor influencing driving behavior is the driver's cognitive processes in complex environments, such as low visibility (Deng, Wu, Cao, & Lyu, 2019). Overall, road geometry influences road user efficiency and comfort and significantly impacts safety.

In Indonesia, traffic jams and accident rates have increased due to high population density. Serious accidents can occur if the road geometry is not suitable. To provide required road services, geometric shapes must be designed efficiently (Assalam, Rifai, & Taufik, 2022). Besides that, many accidents in Indonesia occur due to extreme weather, resulting in poor driving visibility. The number of traffic accidents on rainy days is much higher than on sunny days (Zou, Zhang, & Cheng, 2021).

In the case of Jalan Raya Bababakan Anyar - Kadipaten, the volume of heavy vehicles and four-wheeled vehicles on this road has increased over the past few years. This increase in vehicle volume makes accidents more susceptible. Road collisions have social, personal, and economic impacts on Society (Bassani, Rossetti, & Catani, 2020). The most vulnerable triggers for traffic accidents are bicycles, motorbikes, and pedestrians (Athiappan, et al., 2022). Therefore, appropriate road geometry is needed to reduce the number of accidents.

This research's main objective is to carry out planning regarding visibility distances and the condition of road facilities, such as existing lighting and traffic signs, to develop practical recommendations that can be implemented to increase traffic efficiency and safety at the Babakan Anyar—Kadipaten Highway location.

Literature review

Road Geometry

Road design is an integral part of transportation engineering (Arifin & Rifai, 2022). When constructing roads to ensure road users' safety, security, and comfort, a road design engineer must be aware of certain aspects of geometric road design (Rizqi, Rifai, & Bhakti, 2022). Highway operation is directly affected by horizontal and vertical lines (Gunawan, Rifai, & Irianto, 2022). The vertical geometry aspect considers the elevation of the road from one point to another, including the correct slope, to ensure adequate drainage and user comfort. Road geometry, such as curves and slopes, dramatically influences road transportation's safety, stability, and efficiency (He, Mattas, Dona, Albano, & Ciuffo, 2021). Meanwhile, horizontal geometry regulates road width and curve design to support safe operational speeds and reduce the risk of accidents.

Road geometry is essential not only for traffic efficiency but also for the safety of road users. The main goal of geometric design is to create a safe, efficient, and economical path to maintain aesthetics and environmental quality (Zulfa, Rifai, & Taufik, 2022). Good design considers various factors such as operational speed, the types of vehicles using the road, and the characteristics of the topography where the road is built. This ensures the driver can operate the car safely and without significant obstacles, both in normal conditions and emergencies.

Apart from that, road geometry also plays an essential role in maintaining road infrastructure. Proper design can reduce road maintenance costs and extend the service life of the road. Thus, road geometry is not only about the physical design of the road but also about efficient resource management for sustainable and economically responsible road infrastructure. Design criteria in geometric planning include cross-section elements, visibility, vehicle stability, driver comfort, traffic characteristics, and economic factors (Nurjannah & Rifai, 2022).

Visibility

Sight distance is an essential factor in the geometric design of roads (Andrade-Cataño, De Santos-Berbel, & Castro, 2020). Visibility is the maximum distance drivers can see and identify objects or obstacles on the road in front of them. Every driver is different from other drivers in terms of how they drive and their ability to take risks while driving (Gürbüz & Buyruk, 2019). This is an essential factor in driving safety because it affects the driver's ability to respond appropriately to situations on the road. This visibility is also determined by several factors, such as the height of the driver's eyes above the road surface, certain objects above the road, and the height of objects in the lateral position of obstacles in the driver's line of sight (Adiputra, Rifai, & Bhakti, 2022). Visibility is identified into two types: stopping visibility (Jh) and overtaking visibility (Jd).

Stopping sight distance *is* the minimum distance required for a driver to see an object on the road, decide to stop, and then stop the vehicle safely before reaching the object. Sight stopping distance can be determined as the sum of two distances, namely: 1) reaction distance (the distance the vehicle travels from the moment the driver sees the object until the driver applies the brakes) and 2) brake distance (the distance the vehicle travels from the moment the brakes are applied until the vehicle arrives at a stop) (Abdulhafedh, 2020). The reaction distance is typically about 2.5 seconds and, together with the braking distance, is affected by vehicle speed, road surface conditions, and the efficiency of the brake system. Thus, perception of speed and distance are two critical aspects for drivers to avoid accidents successfully (Ding, Jiao, Zhu, & Liu, 2019). Driving above the speed limit is one of the most critical issues in safety studies, increasing the risk of collisions (Zolali, Mirbaha, Layegh, & Behnood, 2021).

Table 1 Minimum Jh

VR, km/Hr	120	100	80	60	50	40	30	20
Jh minimum (m)	250	175	120	75	55	40	27	16

Source: TCPGJAK 1997

Decision *sight distance* is the minimum distance required by a driver to see an object or situation that requires decision-making, such as a bend or traffic sign, and then decide on the appropriate action, such as reducing speed or making a lane change. This allows the driver to respond quickly and precisely to the road conditions ahead. Insufficient visibility can affect the efficiency of executing basic maneuvers (González-Gómez & Castro, 2019).

Good planning of ready visibility helps minimize the risk of accidents and improves road safety.

Table 2 Jd Minimum

VR, km/Hr	120	100	80	60	50	40	30	20
So minimum (m)	800	670	550	350	250	200	150	100

Source: TCPGJAK 1997

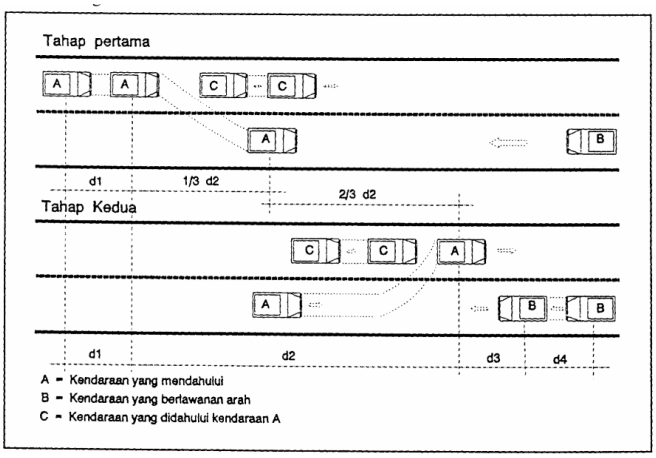


Figure 1. Leading Viewing Distance (Jd)
Source: TCPGJAK 1997

Road Support Facilities

Road supporting facilities are additional elements designed to optimize road transportation's comfort, safety and efficiency. The benefits associated with developing road and transportation infrastructure can increase community satisfaction (Kanwal, Rasheed, Pitafi, Pitafi, & Ren, 2020; Megat Johari, Megat Johari, Savolainen, & Gates, 2023). One crucial facility is street lighting, which helps drivers and pedestrians see clearly at night or in bad weather. Streetlights installed along highways, city roads, and residential areas are important for reducing the risk of accidents and increasing safety. Road lighting is essential for drivers to see better at night or in low light (Sumantri, Rifai, & Ferial, 2022). Good lighting at intersections, zebra crossings, and dangerous areas such as sharp turns or steep descents provides better visibility and helps drivers identify potential dangers early (Angtony, Rifai, & Indrastuti, 2023) (Dwiatmoko, Isradi, Prasetijo, Rohani, & Rifai, 2023).

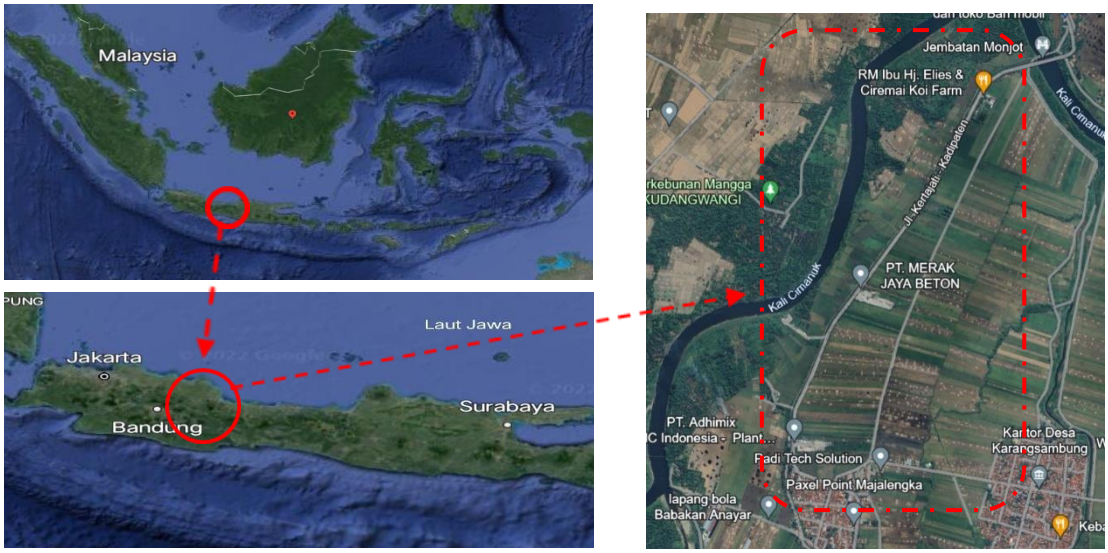
Apart from road lighting, traffic signs also play a crucial role in driving safety and comfort. Traffic signs are divided into several categories based on their function and purpose: warning signs are marked yellow, prohibitions are red, orders are blue, and instructions are green. One strategy to reduce accidents at exit signs is installing speed warning signs (Megat Johari, Megat Johari, Savolainen, & Gates, 2023). These signs are designed to minimize confusion, direct driver behavior, and ensure traffic rules are followed, reducing accidents and increasing traffic efficiency (Jenny, Rifai, & Handayani, 2023) (Melvin, Rifai, & Savitri, 2006) (Resinta & Rifa'i, 2023).

As the number of vehicles on the road increases exponentially, systems to help drivers avoid accidents are becoming increasingly important (Rifai & Hastuti, 2023) (Isradi, Prasetijo, Prasetyo, Hartatik, & Rifai, 2023) (Wincent, Rifai, & Isradi, 2022) Street lighting and traffic signs together create a safer and more orderly road environment. Roadway geometric elements are expected to be selected, measured, and placed in a way that meets design criteria such as visibility, vehicle stability, driver comfort, drainage, economy, and aesthetics (Chakole & Wadhai, 2022). By utilizing these two facilities effectively, highways become safer and more comfortable for all users, both motorists and pedestrians (Sumantri, Rifai, & Ferial, 2022).

This research aims to fill that gap by assessing the sight distance and road support facilities along the Babakan Anyar - Kadipaten Highway. By examining the specific conditions of this road segment, the study can develop practical recommendations tailored to improving traffic efficiency and safety at this location. Analyzing both stopping sight distance (Jh) and decision sight distance (Jd) will offer valuable insights into the adequacy of the current road geometry (Victory, Rifai, & Handayani, 2022) (Immanuel, Rifai, & Prasetijo, 2022).. Additionally, evaluating existing lighting and traffic signs will illuminate potential road support infrastructure deficiencies. This granular, location-specific analysis level needs to be improved in the broader literature on road geometry and safety. Therefore, this research seeks to contribute new knowledge by conducting an in-depth case study of the Babakan Anyar - Kadipaten Highway. The findings can guide infrastructure improvements and road design decisions to enhance overall traffic safety and efficiency along this critical road segment in Indonesia.

RESEARCH METHODS

The primary data collection method involves using official documents and reports per the guidelines stated in the Procedures for Geometric Planning of Inter-City Roads through the Directorate General of Highways in 1997. The research was conducted from March to June 2024. Academic publications, including textbooks and journals, are also an essential source of secondary data. By combining primary and secondary data, researchers can conduct a more thorough analysis and produce more precise and valuable recommendations. Building research and connecting it to existing knowledge is the basis of all academic research activities, regardless of educational field (Snyder, 2019). Systematic reviews typically synthesize findings from original research in a field of study, assess the level of consensus or lack of it about the state of the art in the field, and identify challenges and future directions (Chen & Song, 2019).



RESULTS AND DISCUSSION

Plan Speed (Vr)

Before determining the visibility distance, it is necessary to know the design speed used in this research. The design speed refers to the speed chosen as a basis for the geometric design of the road, which allows the vehicle to operate smoothly in various weather situations, light road conditions, and minimal interference from beside the road. The following are the standard speed plans.

Table 3 Plan Speed (Vr)

Function	Planned Speed, VR'Km/h		
	Flat	Hill	Mountains
Arteries	70 - 120	60 - 80	40 - 70
Collector	60 - 90	50 - 60	30 - 50
Local	40 - 70	30 - 50	20 - 30

Source: TCPGJA 1997

The Babakan Anyar—Kadipaten Highway, which is an arterial road with flat terrain and is included in the provincial road category, has been decided to set a design speed of 100 km/hour for this research. This decision is based on road characteristics that allow vehicles to travel at that speed safely and efficiently.

Stopping Visibility (Jh)

$$\text{Jh} = \left[\frac{VR}{3.6}\right] T + \left[\frac{VR}{3,6}\right]^2 x \frac{1}{2 . g . f}$$

$$\text{Jh} = \left[\frac{VR}{3.6}\right] T + \frac{\left(\frac{VR}{3,6}\right)^2}{2 . g . f}$$

$$\text{Jh} = \frac{100}{3.6} T + \frac{\left(\frac{VR}{3,6}\right)^2}{2 . g . f}$$

$$\text{Jh} = \frac{100}{3.6} x\ 2,5 + \frac{\left(\frac{100}{3,6}\right)^2}{2 . 9,8 . 0,35}$$

$$\text{Jh} = 181,92\ m$$

Where :
VR = 100 Km/h
g = Gravitational Acceleration = 9.8 m/s ^{2}
F = Coef. Friction = 0.35 - 0.55
T = Provisional Response Time 2.5 seconds

Based on table 1. The minimum Jh used for VR = 100 km/h is 175 meters, because 181.92 > 175 therefore the stopping distance (Jh) is chosen, namely 181.92 m.

Leading Visibility (Jd)

$$\text{T1} = 2,12 + 0,026\ x\ VR$$
$$\text{T1} = 2,12 + 0,026\ x\ 100$$
$$\text{T1} = 4,72\ second$$

$$\text{T2} = 6,56 + 0,048\ x\ VR$$
$$\text{T2} = 6,56 + 0,048\ x\ 100$$
$$\text{T2} = 11,36\ second$$

$$\text{a} = 2,052 + 0,0036 \text{ x VR}$$

$$\text{a} = 2,052 + 0,0036 \text{ x } 100$$

$$\text{a} = 2,412 \text{ km/jam/detik}$$

m = 10 – 15 km/hour

$$\text{d1} = 0,278 . T1\ (VR - m + (a\ x\ T1)/2$$

$$\text{d1} = 0,278\ x\ 4,72\ (100 - 10 + (\frac{2,412\ x\ 4,72}{2})$$

$$\text{d1} = 0,278\ x\ 4,72\ (100 - 10 + (\frac{2,412\ x\ 4,72}{2})$$

$$\text{d1} = 125,56\ m$$

$$d2 = 0{,}278 \ x \ VR \ x \ T2$$

$$d2 = 0{,}278 \ x \ 100 \ x \ 11{,}36$$

$$d2 = 315{,}80 \ m$$

$$d3 = 30 - 100 \ m, = 100 \ m$$

$$d4 = \frac{2}{3} \ x \ d2$$

$$d4 = \frac{2}{3} \ x \ 315{,}80$$

$$d4 = 210{,}53 \ m$$

Where :

d1 = length of travel during the reaction (meters),

d2 = length of travel during overtaking until returning to the initial track (meters),

d3 = distance between the overtaking vehicle and the vehicle in the opposite direction after completing the approach (meters),

d4 = length of vehicle route from the opposite direction, whose value is proportional to 213 x d2 (meters).

So, Jd is calculated:

$$Jd = d1 + d2 + d3 + d4$$

$$Jd = 125{,}56 + 315{,}80 + 100 + 210{,}53$$

$$Jd = 751{,}89 \ m$$

Based on Table 2, the minimum Jd used for VR = 100 km/h is 670 meters because 751.89 > 670, so the overtaking field distance (Jd) is chosen, namely 751.89 m.

Road Support Facilities

Based on research and referring to the Minister of Transportation Regulation (Permenhub) No. 13 of 2014 concerning traffic signs, the need for signs in planning the Babakan Anyar – Kadipaten Highway is essential. Required signs include warning signs for left and right turns, which help drivers anticipate changes in road direction. Additionally, warning signs for bridges or narrowings on bridges are also needed to provide drivers with initial information about road width changes that can affect vehicle speed. Additional signs stating specific distances are also essential to give the drivers further details regarding the distance to obstacles or changes in road conditions ahead.

Besides traffic signs, lighting facilities are also crucial in planning the Babakan Anyar – Kadipaten Highway. Adequate lighting is essential to improve visibility at night and in bad weather conditions. With good lighting, drivers can clearly see the road, traffic signs, and obstacles ahead, which helps reduce the risk of accidents. While previous studies have examined road geometry and its impact on traffic safety, limited research focuses explicitly on the Babakan Anyar - Kadipaten Highway in Indonesia. Most past studies have examined road geometry issues more broadly without deeply analyzing a specific road case.

CONCLUSION

Based on the 100 km/h design speed used in this research, the minimum stopping visibility required is 175 meters. However, because the planned value measured is 181.92 meters, the stopping visibility distance (Jh) is 181.92. Likewise, the minimum required visibility distance is 670 meters, but the value obtained is 751.89 meters, so a visibility distance (Jd) of 751.89 meters is used.

This research also identifies the need for traffic signs to be placed according to the standards of Minister of Transportation Regulation No. 13 of 2014. The signs required include signs warning of left and right bends, warnings of bridges or narrowings on bridges, and additional signs stating the distance. In addition, lighting facilities are needed to increase visibility and reduce the risk of accidents by ensuring drivers can see the road, traffic signs, and obstacles. Implementing this facility will significantly improve road users' safety and comfort.

By implementing stopping and overtaking sight distances greater than the minimum required, as well as by installing appropriate traffic signs and adequate lighting facilities, the Babakan Anyar—Kadipaten Highway can provide a safer and more efficient driving environment. These steps will support achieving a higher level of safety for all road users, reduce the risk of accidents, and increase comfort and efficiency in travel.

BIBLIOGRAPHY

Abdulhafedh, A. (2020). Highway stopping sight distance, decision sight distance, and passing sight distance based on AASHTO models. *Open Access Library Journal*, 1-24.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. . *Journal of business research*, 333-339.

Angtony, D., Rifai, A. I., & Indrastuti, I. (2023). The Satisfaction Analysis of Airport Services. *IJEBD (International Journal of Entrepreneurship and Business Development), 6*(2), 318-326.

Dwiatmoko, H., Isradi, M., Prasetijo, J., Rohani, M. M., & Rifai, A. I. (2023). Accident Prevention and Traffic Safety for Sekolah Alam Robbani Bekasi-(KidSafe) . *Communautaire: Journal of Community Service, 2*(1), 56-63.

Jenny, J., Rifai, A. I., & Handayani, S. (2023). Comparative Study of The Sustainability Transport Systems. *IJEBD (International Journal of Entrepreneurship and Business Development), 6*(2), 254-264.

Melvin, M., Rifai, A. I., & Savitri, A. (2006). Analysis Performance for Evaluation of Schedule Irregularities on Bore Pile Foundation with FTA. . *IJEBD International Journal of Entrepreneurship and Business Development, 2023*(6 (1)), 122-129.

Resinta, T., & Rifa'i, A. I. (2023). The Traffic Jam Phenomenon at Traditional Village: A Case of User Perception in Batam, Indonesia. *LEADER: Civil Engineering and Architecture Journal, 1*(1), 36-43.

Rifai, A. I., & Hastuti, M. T. (2023). Analysing urban public transport users' satisfaction: A case study of Tanjung Priok port route by JakLingko. *AIP Conference Proceedings (Vol. 2599, No. 1). AIP Publishing.*

Isradi, M., Prasetijo, J., Prasetyo, Y. D., Hartatik, N., & Rifai, A. I. (2023). PREDICTION OF SERVICE LIFE BASE ON RELATIONSHIP BETWEEN PSI AND IRI FOR FLEXIBLE PAVEMENT. *Proceedings on Engineering, 5*(2), 267-274.

Wincent, W., Rifai, A. I., & Isradi, M. (2022). The Road Performance Analysis in Jalan Ahmad Yani Batam Using IHCM 1997. *Indonesian Journal of Multidisciplinary Science, 1*(1), 103-116.

Victory, J., Rifai, A. I., & Handayani, S. (2022). The Satisfaction Analysis of Local Public Transportation (Carry) Services at Batam, Indonesia. *Indonesian Journal of Multidisciplinary Science, 1*(1), 69-80.

Immanuel, Y., Rifai, A. I., & Prasetijo, J. (2022). The Road Performance Analysis of the Tuah Madani Roundabout, Batam-Indonesia. *Indonesian Journal of Multidisciplinary Science, 1*(1), 27-36.

Adiputra, D. S., Rifai, A. I., & Bhakti, S. K. (2022). Design of Road Geometric with AutoCAD® 2D: A Case Wirosari-Ungaran Semarang. *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 729-738.

Andrade-Cataño, F., De Santos-Berbel, C., & Castro, M. (2020). Reliability-based safety evaluation of headlight sight distance applied to road sag curve standards. *IEEE Access*, 43606-43617.

Arifin, A., & Rifai, A. I. (2022). Geometric Design of Upper Cisokan Hydroelectric Power Plant Access Road with AutoCAD® Civil 3D (STA 3+ 000-STA. 4+ 800). *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 851-858.

Assalam, M. F., Rifai, A. I., & Taufik, M. (2022). The Effectiveness Analysis of Frontage Road on Jalan Margonda Raya, Depok. *Indonesian Journal of Multidisciplinary Science*, 383-396.

Athiappan, K., Karthik, C., Rajalaskshmi, M., Subrata, C., Dastjerdi, H. R., Liu, Y., & Gheisari, M. (2022). Identifying Influencing Factors of Road Accidents in Emerging Road Accident Blackspots. *Advances in Civil Engineering, 2022*.

Badhrudeen, M., Derrible, S., Verma, T., Kermanshah, A., & Furno, A. (2022). A Geometric Classification of World Urban Road Networks. *Urban Science, 6*, 11.

Bassani, M., Rossetti, L., & Catani, L. (2020). Spatial analysis of road crashes involving vulnerable road users in support of road safety management strategies. *Transportation research procedia*, 394-401.

Chakole, H., & Wadhai, P. J. (2022). A Review on The comparison of geometric design using Civil 3D software and manual method. *International Journal for Modern Trends in Science and Technology*, 117.

Chen, C., & Song, M. (2019). Visualizing a field of research: A methodology of systematic scientometric reviews. *PloS one*, e0223994.

Chu, W., Wu, C., Atombo, C., Zhang, H., & Özkan, T. (2019). Traffic climate, driver behaviour, and accidents involvement in China. *Accident Analysis & Prevention*, 119-126.

Deng, C., Wu, C., Cao, S., & Lyu, N. (2019). Modeling the effect of limited sight distance through fog on car-following performance using QN-ACTR cognitive architecture. *Transportation research part F: traffic psychology and behaviour*, 643-654.

Ding, N., Jiao, N., Zhu, S., & Liu, B. (2019). Structural equations modeling of real-time crash risk variation in car-following incorporating visual perceptual, vehicular, and roadway factors. *Accident Analysis & Prevention*, 133.

González-Gómez, K., & Castro, M. (2019). Evaluating pedestrians' safety on Urban intersections: A visibility analysis. *Sustainability*, 6630.

Gunawan, R. Y., Rifai, A. I., & Irianto, M. A. (2022). AutoCAD® 2D for Geometric Design of Terbanggi Besar–Pematang Panggang Highway (Sta. 28+ 650–Sta. 53+ 650). *Citizen: Jurnal Ilmiah Multidisiplin Indonesia,*, 757-765.

Gürbüz, H., & Buyruk, S. (2019). Improvement of safe stopping distance and accident risk coefficient based on active driver sight field on real road conditions. *IET Intelligent Transport Systems*, 1843-1850.

He, Y., Mattas, K., Dona, R., Albano, G., & Ciuffo, B. (2021). Introducing the effects of road geometry into microscopic traffic models for automated vehicles. *IEEE transactions on intelligent transportation systems*, 13604-13613.

Jima, D., & Sipos, T. (2022). The Impact of Road Geometric Formation on Traffic Crash and Its Severity Level. *Sustainability, 14*(14), 8475.

Joice, E. O., Rifai, A. I., & Taufik, M. (2022). The Link Road Design of Jalan Plupuh Tanon And Jalan Gabugan Section 1, Sragen Indonesia. *Indonesian Journal of Multidisciplinary Science*, 211-223.

Kanwal, S., Rasheed, M. I., Pitafi, A. H., Pitafi, A., & Ren, M. (2020). Road and transport infrastructure development and community support for tourism: The role of perceived benefits, and community satisfaction. *Tourism Management*, 77.

Megat Johari, M. U., Megat Johari, N., Savolainen, P. T., & Gates, T. J. (2023). Safety evaluation of freeway exit ramps with advisory speed reductions. *Transportation research record*, 503-512.

Nurjannah, S. N., & Rifai, A. I. (2022). Geometric Design for Relocation of National Road Sei Duri-Mempawah Section, West Kalimantan using AutoCAD® 2D. *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 692-702.

Rizki, R., Rifai, A. I., & Djamal, E. Z. (2022). Geometric Redesign of Jalan Cisauk–Jaha, Banten with Manual Method (Sta. 0+ 000-Sta. 0+ 350). *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 859-864.

Rizqi, M., Rifai, A. I., & Bhakti, S. K. (2022). Design of Road Geometric with AutoCAD® Civil 3D: A Case Jalan Kertawangunan–Kadugede, Kuningan-Indonesia. *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 879-887.

Sumantri, V. N., Rifai, A. I., & Ferial, F. (2022). Impact of inter-urban street lighting on users perception of road safety behavior: A Case of Jalan Majalengka-Rajagaluh. *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 703-711.

Zolali, M., Mirbaha, B., Layegh, M., & Behnood, H. R. (2021). A behavioral model of drivers' mean speed influenced by weather conditions, road geometry, and driver characteristics using a driving simulator study. *Advances in civil engineering*, 5542905.

Zou, Y., Zhang, Y., & Cheng, K. (2021). Exploring the impact of climate and extreme weather on fatal traffic accidents. *Sustainability, 13*, 310.

Zulfa, N., Rifai, A. I., & Taufik, M. (2022). Road geometric design used AutoCAD® Civil 3D: a case study jalan campaka-wanaraja garut, Indonesia. *Citizen: Jurnal Ilmiah Multidisiplin Indonesia*, 843-850.