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EVALUATION OF UNSIGNALIZED INTERSECTION: CASE STUDY INTERSECTION ROUNDABOUT MUNJUL JL KH. ABDUL HALIM-JL PEMUDA-JL SITI ARMILAH MAJALENGKA

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ABSTRACT

An unsignalized intersection is defined as a meeting of two or more roads not equipped with red lights or traffic signs to control traffic. Traffic problems in Majalengka Regency must be fixed or resolved in an orderly manner. The survey method was used. The research was carried out for two days in one week, and the calculations used MKJI and PKJI. Based on the results of calculations and research conducted at the unsignalized intersection at the Parapatan Munjul Roundabout connecting the road from the East and West of Jalan KH. Abdul Halim from the South of Jalan Pemuda and the North of Jalan Siti Armilah, it was concluded that the total traffic volume during peak hours, namely on Monday, December 23, 2024, at 07.00 - 08.00 with a value of 1562.35 / hour, therefore indicating a poor level of service. The results of the LOS service level have poor information from the East and West, and South and North have good information. Of the population in Majlengka Regency of less than 1.36 million, it will increase over time and traffic volume will increase.

1. Introduction

In terms of traffic safety, unsignalized intersections are highly considered by many countries around the world, especially in countries with active populations. These intersections are often critical locations that can cause accidents around the world. Vehicles enter the intersection from various entrances, travel along distinct paths within the intersection zone, and exit the intersection at various points. Complicated vehicle judgments to prevent crashes at the intersection are the outcome of the complex conflict connection between vehicles, necessitating intricate design to ensure traffic safety while enhancing traffic efficiency (Guan, 2020). Organizations such as the World Health Organization (WHO) and the United Nations (UN) have pushed for improvements to traffic infrastructure to reduce the risks associated with road intersections. Traffic jams and accident rates in Indonesia have increased because of the high population density (Reta, 2024). Research shows that good unsignalized intersections can improve traffic flow and reduce the number of accidents. Therefore, good regulation at unsignalized intersections should be an essential part of the road safety agenda worldwide.

At the regional level, unsignalized intersections are also very important, especially in developing areas where the number of vehicles continues to increase. Draw attention to regional concerns about the upkeep of road infrastructure in different areas (Kharisma, 2024). For example, managing increasingly complex traffic flows is extremely difficult in many parts of Southeast Asia. Congestion and accidents

often occur due to the lack of clarity in regulating unsignalized intersections. Traffic congestion is an international public issue that might result in significant expenses (HAN, 2021). Therefore, an approach between the government and the community is needed to create traffic solutions appropriate to local traffic conditions to make it safer and more comfortable for everyone.

Nationally, in transport and road safety policy. Thus, academia and industry have focused a lot of effort on the traffic prediction problem (Yuan, 2021). Unsignalized intersections are a significant problem. According to several studies, most traffic accidents occur at intersections, especially those without precise regulation. The government has tried to solve this problem by conducting surveys and analyses to assess these intersections. The results of this evaluation will likely form the basis for improving policies and more efficient traffic regulation methods throughout the country. Road users' safety can be significantly increased by improving traffic safety via careful planning (Candra, 2024).

At the local level, each area has unique challenges related to unsignalized intersections. People with access to transportation are more productive because they can travel rapidly, affecting time efficiency (Andika, 2022). The flow of cars, people, and other forms of transportation through a specific location or route is referred to as traffic (Fatimah, 2024). Factors such as geography, population density, and driver behavior contribute to traffic dynamics at an intersection. For example, in some small towns, an unsignalized intersection may function well, while in a large city, the same intersection may be a source of congestion and accidents. Therefore, the evaluation of unsignalized intersections must consider the local context so that the solutions implemented are genuinely relevant and effective in improving the safety and comfort of road users.

One of the land transportation routes that facilitates human mobility when driving and transporting commodities across regions is the highway (Pramadita, 2024). Traffic problems in the Majalengka Regency must be fixed or improved in an orderly manner; the Majalengka Regency has a center of activity that runs well. The lack of smooth traffic flow in several locations causes poor service at intersections and on-road sections—the intersection of Jalan Kh. Abdul Halim is a road that leads to the center of activity in the Majalengka Regency. With the increasing economic figures in the Majalengka Regency area, many vehicles are passing through. There is a greater need for transportation due to Asia's expanding social, economic, tourism, educational, and other sectors (Permana, 2024). The presence of traders, eateries, schools, and hotels around the Munjul Roundabout disrupts traffic flow. A city's traffic flow is its lifeblood, sustaining daily life and fostering economic progress (Wang, 2024)

2. Literature Review

2.1 Intersection

Driving carefully is one technique to increase road security, which is necessary for road user safety (Candra, 2024). Because there is no precise regulation for road users, this intersection is often the location of accidents and traffic congestion. They found that drivers make impulsive decisions without adequate guidance, increasing collision risk. Accurately predicting the severity of traffic accidents is crucial for managing and controlling traffic safety. One of the biggest threats is traffic accidents, which have resulted in significant financial losses and human injuries (Yan, 2022). This study shows that understanding driver behavior at unsignalized intersections is critical to improving interventions.

Impact of traffic volume on accidents at unsignalized intersections. However, various variables, like crash type and severity (or distribution thereof), road type, volume level, and volume variations over time, may affect the association between volume and crash numbers (Høye A. K., 2020). The results show that increasing vehicle volume is associated with increasing accident frequency. The researchers

recommend developing an accident prediction model to help authorities plan better infrastructure and traffic management. Geometric road design aims to reduce construction and maintenance costs while maintaining traffic efficiency and making road users more comfortable and safe (Herdiana, 2024). This becomes even more relevant in a rapidly rising population, where many areas are experiencing a surge in vehicles.

Around the world, people are concerned about road safety. Over 1.35 million people worldwide are killed in traffic accidents each year, with 90% of those deaths occurring in developing nations, according to the Global Status Report on Road Safety (Bonela, 2022). Geometric design aspects are also an essential focus in studying unsignalized intersections. Road width, curve angle, and visibility significantly affect intersection safety. They found that well-designed intersections can reduce accidents and improve traffic flow. This study shows the need for collaboration between transportation planners and civil engineers in designing functionally efficient and safe intersections for road users. The research above mainly focus on AV driving conflicts in single-lane cross-intersection settings; more complicated intersection scenarios are nearly impossible to resolve (Hang, 2022)

Finally, the importance of community involvement in the evaluation of unsignalized intersections. They noted that active community participation in data collection and problem identification at intersections can provide valuable insights for improvement. By involving road users, authorities can better understand community needs and expectations, which can support the development of more responsive and adaptive traffic policies. The results of this study confirm that a cross-functional and participatory approach is needed to improve safety and comfort at unsignalized intersections. Because of this, drivers feel more comfortable spotting and passing cars going the other way (Bonela, 2022).

2.2 Unsignalized Intersection

Where two or more roads converge, there is an intersection where cars and people can congregate, make turns, and flee (Xia, 2022). A traffic accident is one of the primary infrequent occurrences that disrupts traffic flow (Ali, 2021). Unsignalized intersections require high caution from road users. The main factors that affect traffic flow at this type of intersection are road priority and traffic signs. However, because of a lack of infrastructure, including insufficient road width, most roads lack traffic signs at crossings (Fatimah, 2024). However, if road users do not obey traffic rules and respect each other, accidents are pretty likely to occur at unsignalized intersections. Unsignalized intersections are often the location of accidents, especially in dense cities.

In addition, the geometric characteristics of unsignalized intersections significantly affect traffic performance. Road width, entry angle, and driver visibility significantly impact driver speed and behavior patterns when entering an intersection. The field's growth as a desirable substitute for crash-based safety assessment is severely hampered by the lack of comprehensive understanding regarding the numerous facets of surrogate safety evaluation (Arun, 2021). The quality of road design and maintenance also reduces the potential for accidents at unsignalized intersections. The study suggests the need for ongoing assessment of the physical condition of intersections to improve safety.

On the contrary, there is a need for a defined machine-interpretable description of traffic laws because these regulations are frequently ambiguous and open to interpretation (Esterle, 2020 November). Traffic regulation enforcement is an integral part of unsignalized intersection management. Demonstrating that using warning signs and road markings can help drivers make better decisions when interacting at intersections. Additionally, technology such as navigation apps can help drivers

become more aware of unsignalized intersections, reducing the number of accidents. However, the need for effective community outreach is a barrier to implementing these policies.

Finally, there is a need for further research in formulating more effective strategies for managing unsignalized intersections. Research integrating technical aspects, driver behavior, and transportation policies is needed to formulate comprehensive recommendations. Governments, researchers, and the public should work together to create a safer environment at unsignalized intersections. In doing so, unsignalized intersections can be better managed, reducing the risk of accidents and improving traffic efficiency.

2.3 Traffic

Traffic is a complex phenomenon involving interactions between various road users, including motor vehicles, pedestrians, and cyclists. In the context of growing urbanization, traffic has become one of the main challenges in city planning. Individuals are impacted by traffic congestion as well. Some significant factors brought on by traffic congestion are lost time, particularly during peak hours, emotional stress, and additional pollutants contributing to global warming (Akhtar, 2021). The increasing population and vehicles in urban areas contribute to increasingly severe congestion, which hurts people's mobility, health, and quality of life. Consequently, a better understanding of traffic patterns and dynamics is essential for formulating effective transportation policies.

By 2030, traffic accidents are expected to rank among the top five causes of death worldwide and constitute a significant cause of injuries-related deaths (Candra, 2024). In addition, environmental factors also affect traffic conditions. Found that weather factors like rain and fog can reduce visibility and increase the risk of accidents. This study emphasizes the importance of considering environmental conditions when designing infrastructure and traffic management systems. With sensor technology and data analysis, real-time information about traffic conditions can be used to optimize vehicle flow and reduce congestion. Getting people across an intersection safely and effectively is one of the primary goals of signal timing settings. An accommodation strategy for various users who allocate the right-of-way is necessary to accomplish this purpose (Qadri, 2020).

Using past police-reported crash data, traffic safety has been evaluated regarding crash frequency and/or severity (Wishart, 2020). Driver behavior is also a crucial aspect of traffic analysis. Shows that driver behavior, including speed, compliance with traffic signs, and reaction to emergencies, significantly affects road safety. By understanding the psychological and social factors that influence drivers, transportation planners can develop more effective education strategies and safety campaigns. For example, training and outreach programs can raise awareness of the importance of road safety.

Finally, technology integration in traffic management is gaining attention. Intelligent transportation systems (ITS) and mobile navigation applications can improve traffic efficiency. The primary goals of ITS, which is currently in use in many nations, are to improve overall traffic safety and maximize the utilization of the current infrastructure (Nguyen, 2021). Revealing that implementing this technology not only helps reduce congestion but also improves the experience of road users. Therefore, continuous research in developing and applying new technologies is needed to create a safer and more sustainable traffic system. With a holistic and data-driven approach, traffic challenges can be addressed effectively. We suggest a study examining several road, environmental, driver, and accident parameters that may

impact the accident severity in terms of fatalities or injuries to make a valuable contribution to the literature (Eboli, 2020).

3. Methodology

The method used is the survey method; the research will be conducted twice a week, on Monday and Saturday, and will take place during peak hours, namely from 07.00 to 08.00 in the morning and 12.00 to 13.00 in the afternoon and in the afternoon from 16.00 to 17.00 in the afternoon. The research location is at the Parapatan Munjul Roundabout, connecting the road from the East and West of Jalan KH—Abdul Halim is from the south of Jalan Pemuda and the north of Jalan Siti Armilah. Over the past few years, there has been an increase in the number of four-wheeled and heavy vehicles on this road (Reta, 2024). Traffic problems in the Majalengka Regency must be addressed immediately because the Majalengka Regency has a well-functioning activity center. The lack of smooth traffic flow in several places causes poor service at intersections or on-road sections. For example, at the Parapatan Roundabout location, the road is a connecting route for several roads because the absence of traffic signs can cause accidents or hinder the smooth flow of traffic.

Figure 1. Research Location

4. Result and Discussion

4.1 Geometric Data

Table 1 Intersection Geometry Data

No.	Approach	Road Type	Effective Width	Road Conditions
1	Jalan KH. Abdul Halim	2/2 UD	8 m	Mayor
2	Jalan KH. Abdul Halim	2/2 UD	8 m	Mayor
3	Jalan Pemuda	2/2 UD	5 m	Minor
4	Jalan Siti Armilah	2/2 UD	5 m	Minor

Source: MKJI 1997

The data was obtained from a survey conducted twice a week, namely on Monday, December 23, 2024, and Saturday, December 28, 2024. Survey data collection was carried out in one day, from 07.00 to 08.00

at noon.,00 to 13.00 in the afternoon, and in the afternoon from 16.00 to 17.00 in the afternoon. Traffic flow surveys were conducted during peak hours of morning, afternoon, and evening. Data were obtained by dividing each arm every ten minutes according to vehicle type.

Table 2 Vehicle Equivalent Value List

No.	Vehicle Type	Class Code	Section	Crossroads
1	Light Vehicles	LV	1	1
2	Heavy Vehicles	HV	1,2	1,3
3	Motorcycle	MC	0,25	0,25

Source: PKJI 2014

To calculate the traffic flow data analysis for the total number of vehicles in 10 minutes, the number of vehicles is multiplied by the type of vehicle shown in Table 2, and then the multiplication results are added together.

4.2 Traffic Volume

Table 3 Results of traffic flow survey data calculations Monday, December 23, 2024

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Monday 23/12/2024	East	07:00 – 07:10	111	18,2	42,5	171,7	1114,75
		07:10 – 07:20	124	19,5	46,75	190,25	
		07:20 – 07:30	112	15,6	46,75	174,35	
		07:30 – 07: 40	114	32,5	42,5	189	
		07:40 – 07:50	119	22,1	47,25	188,35	
		07:50 – 08:00	131	22,1	48	201,1	
		12:00 – 12:10	107	22,1	39,25	171,7	1038,5
		12:10 – 12:20	108	32,5	41,5	190,25	
		12:20 – 12:30	127	18,2	45	174,35	
		12:30 – 12:40	99	19,5	45	189	
		12:40 – 12:50	113	27,3	39,75	188,35	
		12:50 – 13:00	97	16,9	40,5	201,1	
		16:00 – 16:10	133	19,5	41	369	1289,15
		16:10 – 16:20	124	18,2	47,5	189,7	
		16:20 – 16:30	115	22,1	47	184,1	
		16:30 – 16:40	129	27,3	42,5	198,8	
		16:40 – 16:50	110	16,9	45,5	172,4	
		16:50 – 17:00	115	16,9	43,25	175,15	
Monday 23/12/2024	West	07:00 – 07:10	212	19,5	53	284,5	1562,35
		07:10 – 07:20	118	22,1	84,5	224,6	
		07:20 – 07:30	119	22,1	93,75	235,15	
		07:30 – 07: 40	129	33,8	90,25	253,05	
		07:40 – 07:50	142	27,3	101,75	271,05	
		07:50 – 08:00	159	52	83	294	

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Monday 23/12/2024	West	12:00 – 12:10	128	31,2	79,75	238,95	1447,15
		12:10 – 12:20	131	35,1	75,5	241,6	
		12:20 – 12:30	157	28,6	96,25	281,85	
		12:30 – 12:40	129	24,7	90,75	244,45	
		12:40 – 12:50	127	23,4	63	213,4	
		12:50 – 13:00	116	29,9	81	226,9	
		16:00 – 16:10	135	29.9	61,75	226,65	1474,35
		16:10 – 16:20	135	18,2	58,25	211,45	
		16:20 – 16:30	128	23,4	107,75	259,15	
		16:30 – 16:40	142	26	84,5	252,5	
		16:40 – 16:50	215	15,6	79,75	310,35	
		16:50 – 17:00	115	19,5	79,75	214,25	
Monday 23/12/2024	South	07:00 – 07:10	10	2,6	25	37,6	269,75
		07:10 – 07:20	15	1,3	24	40,3	
		07:20 – 07:30	22	-	25,25	47,25	
		07:30 – 07: 40	12	1,3	27,5	40,8	
		07:40 – 07:50	23	1,3	26,25	50,55	
		07:50 – 08:00	32	-	21,25	53,25	
		12:00 – 12:10	30	2,6	12,5	45,1	229,2
		12:10 – 12:20	21	-	17,75	38,75	
		12:20 – 12:30	15	1,3	19,5	35,8	
		12:30 – 12:40	15	-	22,25	37,25	
		12:40 – 12:50	7	1,3	15	23,3	
		12:50 – 13:00	19	-	30	49	
		16:00 – 16:10	22	1,3	25,5	48,8	261,95
		16:10 – 16:20	25	2,6	25	52,6	
		16:20 – 16:30	10	1,3	25,25	36,55	
		16:30 – 16:40	19	-	25,25	44,25	
		16:40 – 16:50	20	2,6	15,5	38,1	

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Monday 23/12/2024	North	07:00 – 07:10	31	1,3	31,75	64,05	387,25
		07:10 – 07:20	22	1,3	39,5	62,8	
		07:20 – 07:30	28	2,6	33,5	64,1	
		07:30 – 07: 40	24	2,6	36	62,6	
		07:40 – 07:50	28	2,6	36,75	67,35	
		07:50 – 08:00	30	2,6	33,75	66,35	
		12:00 – 12:10	24	2,6	31,5	58,1	404
		12:10 – 12:20	41	5,2	33,25	79,45	
		12:20 – 12:30	42	1,3	35,25	78,55	
		12:30 – 12:40	30	2,6	37,5	70,1	
		12:40 – 12:50	28	2,6	30,75	61,35	
		12:50 – 13:00	21	5,2	30,25	56,45	
		16:00 – 16:10	23	1,3	33	57,3	343,75
		16:10 – 16:20	23	-	30	53	
		16:20 – 16:30	31	1,3	30,75	63,05	
		16:30 – 16:40	22	1,3	33	56,3	
		16:40 – 16:50	28	2,6	34,25	64,85	
		16:50 – 17:00	19	-	30,25	49,25	

Source: Survey Data Calculation Results

The survey results on Monday, December 23, 2024, showed that traffic volume increased between 07.00 and 08.00, reaching a value of 1562.35/hour.

Table 4 Results of traffic flow survey data calculations Saturday, December 28, 2024

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Saturday 28/12/2024	East	07:00 – 07:10	126	24,7	36,5	187,2	1072,65
		07:10 – 07:20	124	20,8	34,5	179,3	
		07:20 – 07:30	117	26	31,25	177,25	
		07:30 – 07: 40	104	19,5	35,25	158,75	
		07:40 – 07:50	122	23,4	39,5	184,9	
		07:50 – 08:00	126	19,5	39,75	185,25	
		12:00 – 12:10	116	19,5	36,25	171,75	1031,75
		12:10 – 12:20	136	23,4	32,5	191,9	
		12:20 – 12:30	88	10,4	37,25	135,65	
		12:30 – 12:40	121	18,2	41,5	180,7	
		12:40 – 12:50	124	16,9	42,75	183,65	
		12:50 – 13:00	105	15,6	47,5	168,1	
		16:00 – 16:10	116	24,7	45,5	186,2	967,9
		16:10 – 16:20	109	23,4	40,75	173,15	
		16:20 – 16:30	105	11,7	46	162,7	
		16:30 – 16:40	110	20,8	48,5	179,3	
		16:40 – 16:50	55	19,5	31	105,5	
		16:50 – 17:00	102	14,3	44,75	161,05	

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Saturday 28/12/2024	West	07:00 – 07:10	149	57,2	76	171,7	1477,8
		07:10 – 07:20	110	20,8	58,5	190,25	
		07:20 – 07:30	159	23,4	68	174,35	
		07:30 – 07: 40	159	23,4	74	189	
		07:40 – 07:50	186	28,6	67,25	188,35	
		07:50 – 08:00	137	23,4	57,25	201,1	
		12:00 – 12:10	157	20,8	68,5	171,7	1397,1
		12:10 – 12:20	174	23,4	53,5	190,25	
		12:20 – 12:30	116	14,3	68,75	174,35	
		12:30 – 12:40	157	15,6	67,5	189	
		12:40 – 12:50	144	24,7	71,25	188,35	
		12:50 – 13:00	118	20,8	85	201,1	
		16:00 – 16:10	154	22,1	77	369	1554,7
		16:10 – 16:20	158	31,2	78,5	189,7	
		16:20 – 16:30	162	22,1	107,5	184,1	
		16:30 – 16:40	146	29,9	85,75	198,8	
		16:40 – 16:50	122	29,9	85,25	172,4	
		16:50 – 17:00	137	19,5	87	175,15	
Saturday 28/12/2024	South	07:00 – 07:10	212	19,5	53	284,5	269,25
		07:10 – 07:20	118	22,1	84,5	224,6	
		07:20 – 07:30	119	22,1	93,75	235,15	
		07:30 – 07: 40	129	33,8	90,25	253,05	
		07:40 – 07:50	142	27,3	101,75	271,05	
		07:50 – 08:00	159	52	83	294	
		12:00 – 12:10	22	-	18,5	40,5	253
		12:10 – 12:20	25	-	16,5	41,5	
		12:20 – 12:30	25	1,3	19,5	45,8	
		12:30 – 12:40	24	1,3	20	45,3	
		12:40 – 12:50	18	1,3	20	39,3	
		12:50 – 13:00	9	2,6	29	40,6	
		16:00 – 16:10	23	1,3	22,5	46,8	267,5
		16:10 – 16:20	26	-	25	51	
		16:20 – 16:30	18	1,3	25,25	44,55	
		16:30 – 16:40	16	-	25,5	41,5	
		16:40 – 16:50	14	2,6	24	40,6	
		16:50 – 17:00	18	1,3	23,75	43,05	

Day	Traffic Flow	Time	Vehicle Type/10 minutes			Total Vehicles/ 10 minutes	Total/hour
			LV x 1	HV x 1,2	MC x 0,25		
Saturday 28/12/2024	North	07:00 – 07:10	24	6,5	30,5	61	396,7
		07:10 – 07:20	27	2,6	41,5	71,1	
		07:20 – 07:30	28	9,1	21,25	58,35	
		07:30 – 07: 40	26	13	35,25	74,25	
		07:40 – 07:50	27	14,3	34	75,3	
		07:50 – 08:00	23	5,2	28,5	56,7	
		12:00 – 12:10	29	9,1	25,5	63,6	365,5
		12:10 – 12:20	39	10,4	27	76,4	
		12:20 – 12:30	21	7,8	27,5	56,3	
		12:30 – 12:40	40	13	34,25	87,25	
		12:40 – 12:50	28	6,5	31	65,5	
		12:50 – 13:00	28	11,7	36,75	76,45	
		16:00 – 16:10	31	14,3	34,75	80,05	460,15
		16:10 – 16:20	22	9,1	39,25	70,35	
		16:20 – 16:30	45	10,4	43,25	98,65	
		16:30 – 16:40	27	9,1	36,25	72,35	
		16:40 – 16:50	36	5,2	37	78,2	
		16:50 – 17:00	17	7,8	35,75	60,55	

Source: Survey Data Calculation Results

The survey results on Saturday, December 28, 2024 showed an increase in traffic volume at 16.00 – 17.00 with a value of 1554.7/hour.

The results of a direct survey in the field for 2 days in 1 week that the traffic volume during peak hours from existing data can be concluded that, peak hours at the Parapatan Munjul Majalengka Roundabout intersection are Monday, December 23, 2024 at 07.00 - 08.00 with a total volume value of 1562.35/hour.

4.3 Capacity

Tabel 5 Road Capacity

Arah	Kapasitas Jalan	FLp	FM	FUK	FHS	FBKI	FBKa	FRMI	Kapasitas
Timur	2900	1,39	1,05	1	0,94	1,18	0,5	1,19	2906,8
Barat	2900	1,39	1,05	1	0,94	1,18	0,5	1,19	2906,8
Selatan	2900	1,39	1,05	1	0,94	1,18	0,5	1,19	2906,5
Utara	2900	1,39	1,05	1	0,94	1,18	0,5	1,19	2906,5

Source: MKJI 1997

From the four-way intersection of Bundaran Mujul Majalengka, the essential capacity (C0) is 2/2 UD or 2900. The width of the road to the East and west measures 8 m with a value of 1.39, and the width of the road to the South and north measures 5 m with a value of 1.13. The median factor of the main road is narrow <3 m, so the adjustment is 1.05, obtained by PKJI 2014. The city size adjustment factor shows that the population of Majalengka is 1.36 million people with a value of 1. The intersection does not have a signal on the road from the East and West of Jalan KH. Abdul Halim from the South of Jalan Pemuda and from the North of Jalan Siti Armilah has moderate side obstacles. Therefore, the value is 0.94.

4.4 Level of Service

Table 6 Level of Service

Direction	Traffic Flow	Capacity	DS	LOS
	Smp/Hour	Smp/Hour		
Timur	3442,4	2906,8	1,18	Bad
Barat	4483,85	2906,8	1,54	Bad
Selatan	760,9	2906,5	0,26	Good
Utara	1222,35	2906,5	0,42	Good

Sumber: MKJI 1997

The level of service at an intersection is determined by the traffic saturation level obtained from the flow value divided by the load capacity. From the east 1.18 west 1.54 south 0.26 north 0.42 The service level at the four-way intersection of Munjul Roundabout is unstable due to this DS level.

5. Conclusion

Based on the results of calculations and research conducted at the unsignalized intersection at the Parapatan Munjul Roundabout connecting roads from the East and West of Jalan KH. Abdul Halim from the South of Jalan Pemuda and from the North of Jalan Siti Armilah, it was concluded that the total traffic volume during peak hours, namely on Monday, December 23, 2024 at 07.00 - 08.00 with a value of 1562.35 / hour, therefore indicating a poor level of service. The results of the LOS service level have poor information from the East and West and from the South and North have good information. Of the population in Majlengka Regency of less than 1.36 million, it will definitely increase over time and traffic volume will definitely increase.

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