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ANALYSIS OF URBAN TRAFFIC FLOW PERFORMANCE ON RAJAWALI STREET SURABAYA OLD TOWN

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ABSTRACT

The Surabaya Old Town Tourism Area, particularly along Rajawali street, has experienced increased traffic activity due to the high number of tourist visits, especially on weekends. This situation has led to roadside frictions that impact road performance. This study aims to analyze the roadside frictions and traffic volume along the road segment. A quantitative approach was applied, based on the Indonesian Highway Capacity Manual (MKJI) 1997. Primary data were collected through field surveys conducted over seven consecutive days during peak hours (4:00 PM–8:00 PM) and analyzed to identify traffic characteristics at the study location. The results of the study showed that side obstacles were in the moderate to high category, with the highest traffic volume of 2,881 smp/hour on Saturday.

Keywords: MKJI 1997, Road Section, Side Obstacles, Surabaya Old Town, Traffic Volume.

1. INTRODUCTION

Transportation can be categorized as a derived demand. Both in urban and rural areas. Transportation remains the backbone of the economy.(Abadiyah et al., 2023). Law Number 38 of 2004 states that highways are used to improve public welfare and have an important function in political, military, social, cultural, economic and security aspects as a means of transportation.(Hapsari et al., 2024)

Traffic is a process with random variations that occur, including parameters of volume, density, etc.(Universitas, 2021). Many types of vehicles pass through the highway every day due to conditions where the need for transportation continues to increase. The result is congestion on existing roads..(Pongkorung et al., 2024)

Surabaya is the center of activity in East Java, every development project there is often assessed based on its benefits and advantages for the community. In addition to the benefits that may be felt by the community, the result is a lot of traffic jams.(Pembangunan et al., 2023)

The problem formulation in this study includes the Side Barrier Value and Traffic Volume on the road section in the old city tourist area of Surabaya. This research only discusses the Side Barrier Value and Traffic Volume Value during 7 peak hours (04.00 pm-08.00 pm) on the Rajawali road section in the Old City Tourism Area of Surabaya.

2. LITERATURE REVIEW

Definition of road

Roads are a vital part of land transportation infrastructure that support the movement of people and goods. The availability and quality of transport services greatly influence regional accessibility and mobility. Thus, road reliability and

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operational condition are key to achieving effective transport system management.(Della, R.H., Agustien.M., TJendani.H.T., 2024)

Road performance reflects a road's ability to handle traffic based on service standards. Motorcycles, being the most common mode of transport, significantly contribute to congestion. Their growing numbers make them a major part of traffic and a key source of road-related issues.(Sipil et al., 2024)

Transportation System

Transportation system according to Nasution (1996) is the process of moving individuals and goods from one place to another. The main elements of the transportation system include: Infrastructure, Facilities (Vehicles), Management and Regulation, Users. The transportation system functions to support human mobility, economic growth, distribution of goods, and accelerate regional development.(Nur et al., 2021)

According to Miro (2012),(Giulietti & Assumpção, 2019) land transportation can be classified into:

1. Physical Geography, including road transportation, special pipeline and cable transportation, deepwater transportation, and rail transportation.
2. Administrative Geography, namely intra-city transportation, rural transportation, inter-city transportation within provinces (AKDP), inter-city transportation between provinces (AKAP), and cross-border transportation between countries (international).

Indonesian Road Capacity Manual 1997 Method (MKJI 1997)

Indonesian Road Capacity Manual (MKJI 1997) Is a manual book, which is used to calculate road traffic performance but cannot be used to view or analyze the network. The manual is a guideline for planning, designing, analyzing road facility operations, traffic situations and conditions in Indonesia.

Road traffic performance analysis can be done using the MKJI book, which was carried out as a project by the Directorate General of Highways, taking place from 1990 to 1997, where field data collection was carried out in the period from 1991 to 1995.(Kusnandar, 2009)

Side Obstacles

According to the Indonesian Road Capacity Manual (1997), side obstacles are activities on the side of the road to traffic performance, for example: Pedestrians doing activities on the road, Public transportation or other vehicles that stop, Motorized vehicles entering and exiting the road, Slow moving vehicle flow. The Side Obstacle Class (SCF) value is determined based on the following **Table 2.1** :

Table 2.1. The Side Obstacle Class (SCF)

Side Obstacle Class (SCF)	Code	Number of Event/200 m/hour	Regional Conditions
Very Low	VL	<100	Residential Area; little activity
Low	L	100-299	Residential Area; there are many activities
Medium	M	300-499	Industrial Area

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High	H	500-899	Commercial Area
Very High	VH	>900	Commercial area; very dense

Source : MKJI 1997

The following is the formula used to determine the Side Resistance Value :

$$\boldsymbol{SCF = (PED\ x\ 0,5) + (PSV\ x\ 1,0) + (EEV\ x\ 0,7) + (SMV\ x\ 0,4)} \ldots\ldots \mathbf{2.1}$$

Description:

SCF = Side Obstacle Value (Number/hour)

PED = Pedestrians (Number/hour)

PSV = Stopped/Parked Vehicles (Number/hour)

EEV = Exit+Entry Vehicles (Number/hour)

SMV = Slow Vehicles (Number/hour)

Traffic Volume

Volume is the number of vehicles passing a point per unit time at a particular location, usually expressed in vehicles per day, pcu per hour, and vehicles per minute. Traffic volume is calculated based on the following **Formula 2.2** :

$$\boldsymbol{Qsmp = Q_{LV} + (E_{HV}.Q_{HV}) + (E_{MC}.Q_{MC})} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{2.2}$$

Description:

Qsmp = Vehicle Volume (smp/hour)

QLV = Light Vehicle Volume (smp/hour)

QHV = Heavy Vehicle Volume (smp/hour)

QMC = Motorcycle Volume (smp/hour)

The type of vehicle is determined according to its respective Equivalent Value, the following is a table to determine the Passenger Car Unit Value (SMP) :

Table 2.2. Passenger Car Unit (SMP) according to vehicle type

No.	Vehicle Type	Code	SMP	
			Section	Intersection
1.	Sedan/Jeep, Oplet, Microbus, PickUp	LV	1	1
2.	Bus Standart, Truck gandeng, Truck berat	HV	1,2	1,5
3.	Sepeda Motor	MC	0,25	0,4
4.	Becak, Sepeda, dll	UM	0,8	1

Source : MKJI 1997

3. RESEARCH METHODOLOGY

This study uses a quantitative approach with survey data obtained directly from the research location and then analyzed based on the 1997 MKJI guidelines

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Flowchart

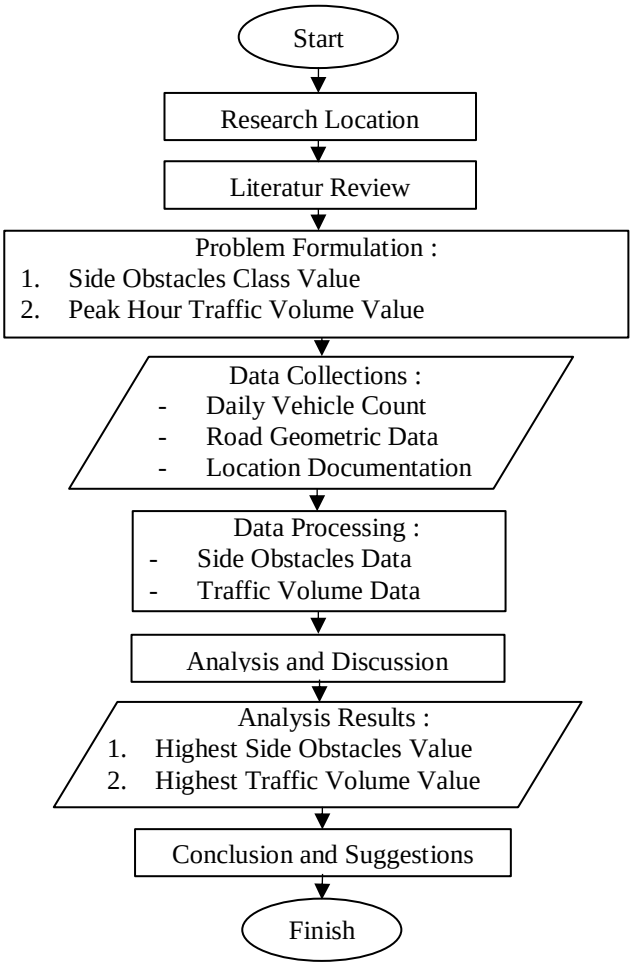

Figure 3.1. Flowchart

Survey Time and Location

Figure 3.2. Research Location

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Figure 3.2 Description :

The image marked in red represents the survey location with the following provisions:

- Place Name : Old Town Surabaya Tourist Area
- Location : Rajawali Street, Krembangan District, Surabaya City.
- Road Type : Local Urban Area
- Road Type : 4/1 UD
- Traffic Flow : One-Way
- Road Length : ± 0.8 kilometers (based on speedometer)
- Road Width : ± 14.3 meters (based on meter roll)

The survey was conducted for 7 days, starting from Thursday to Wednesday, at 16.00–20.00 WIB (peak hours).

Data Collection

The Data collected during the survey were: Data on the Number of Vehicles, Type of Vehicle (LV, HV, MC), Data on the Frequency of Side Obstacles: Pedestrians (PED), Stopped Vehicles (PSV), In and Out Vehicles (EEV), Slow Vehicles (SMV).

Data Analysis Using the 1997 MKJI Method

The Side Obstacle Value is calculated using the 1997 MKJI guidelines with the following steps:

1. Identification of Side Obstacle Elements
   Calculate the number of incidents that fall into the side obstacle category, such as pedestrians, parked vehicles, vehicles entering and exiting access roads, and other activities on the side of the road.
2. Calculating the Frequency of Side Obstacles
   Conduct direct observations in the field for a certain period of time to record the intensity of side obstacle events, then calculate according to **Formula 2.1**.
3. Determination of Side Obstacle Class
   Classify the level of side obstacles in Table 2.1 into the categories Very Low (VL), Low (L), Medium (M), High (T), or Very High (VH) based on the frequency value obtained.

Traffic Volume is calculated based on the number of vehicles passing through a road section at a certain time, with the following steps :

1. Conversion of Passenger Car Unit Value (SMP)
   Using the passenger car equivalence factor (EMP) based on the type of vehicle according to Table 2.2 2.
2. Calculation of Vehicle Traffic Volume (Qsmp)
   The calculation is carried out according to Formula 2.2 and produces traffic volume in passenger car units per hour (pcu/hour).

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4. ANALYSIS AND DISCUSSION

Side Obstacle Value

Side Obstacles Values are summed per hour, because there is no vehicle entry and exit data (EEV), Researchers only group it into pedestrian data (PED), stopped vehicle data (PSV), and slow vehicle data (SMV). In this calculation, the Vehicle Entry and Exit Value (EEV) is not used because the Traffic Flow Type is 1 Way. Here is the Table:

Table 4.1. Side Obstacles Number Survey Data

Number of events per hour				
Day to	**Period**	**Pedestrians (PED)**	**Vehicle Stops (PSV)**	**Vehicle Slows Down (SMV)**
1 (Thursday)	16.00 - 17.00	296	65	74
	17.00 - 18.00	318	60	126
	18.00 - 19.00	485	36	96
	19.00 - 20.00	655	28	48
2 (Friday)	16.00 - 17.00	334	88	47
	17.00 - 18.00	389	102	30
	18.00 - 19.00	662	98	49
	19.00 - 20.00	703	74	28
3 (Saturday)	16.00 - 17.00	768	113	73
	17.00 - 18.00	1319	166	68
	18.00 - 19.00	1388	92	43
	19.00 - 20.00	1400	79	28
4 (Sunday)	16.00 - 17.00	2406	92	91
	17.00 - 18.00	2193	36	63
	18.00 - 19.00	1170	85	41
	19.00 - 20.00	3886	71	17
5 (Monday)	16.00 - 17.00	347	28	26
	17.00 - 18.00	387	23	10
	18.00 - 19.00	480	12	14
	19.00 - 20.00	856	9	11
6 (Tuesday)	16.00 - 17.00	444	50	61
	17.00 - 18.00	280	25	28
	18.00 - 19.00	61	14	5
	19.00 - 20.00	267	12	5
7 (Wednesday)	16.00 - 17.00	270	83	39
	17.00 - 18.00	517	57	20
	18.00 - 19.00	809	25	20
	19.00 - 20.00	979	20	13

Source: Researcher Survey Results, 2025

The PED, PSV and SMV values in **Table 4.1** are multiplied by their Weight Factors, following **Formula 2.1**, then Classified based on **Table 2.1**. The results are shown in **Table 4.2.** Here:

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Table 4.2. Results of Calculation and Determination of Side Obstacle Class

Side Obstacle Value (SCF)								
Day	**Period**	**PED**	**PSV**	**SMV**	**Amount**	**Max Value**	**Code**	**Results**
		0,5	**1**	**0,4**				
1 (Thursday)	16.00 - 17.00	148	65	29,6	242,6	374,7	M	Medium
	17.00 - 18.00	159	60	50,4	269,4			
	18.00 - 19.00	242,5	36	38,4	316,9			
	19.00 - 20.00	327,5	28	19,2	374,7			
2 (Friday)	16.00 - 17.00	167	88	18,8	273,8	448,6	M	Medium
	17.00 - 18.00	194,5	102	12	308,5			
	18.00 - 19.00	331	98	19,6	448,6			
	19.00 - 20.00	351,5	74	11,2	436,7			
3 (Saturday)	16.00 - 17.00	384	113	29,2	526,2	852,7	H	High
	17.00 - 18.00	659,5	166	27,2	852,7			
	18.00 - 19.00	694	92	17,2	803,2			
	19.00 - 20.00	700	79	11,2	790,2			
4 (Sunday)	16.00 - 17.00	1203	92	36,4	1331,4	2020,8	VH	Very High
	17.00 - 18.00	1096,5	36	25,2	1157,7			
	18.00 - 19.00	585	85	16,4	686,4			
	19.00 - 20.00	1943	71	6,8	2020,8			
5 (Monday)	16.00 - 17.00	173,5	28	10,4	211,9	441,4	M	Medium
	17.00 - 18.00	193,5	23	4	220,5			
	18.00 - 19.00	240	12	5,6	257,6			
	19.00 - 20.00	428	9	4,4	441,4			
6 (Tuesday)	16.00 - 17.00	222	50	24,4	296,4	296,4	L	Low
	17.00 - 18.00	140	25	11,2	176,2			
	18.00 - 19.00	30,5	14	2	46,5			
	19.00 - 20.00	133,5	12	2	147,5			
7 (Wednesday)	16.00 - 17.00	135	83	15,6	233,6	514,7	H	High
	17.00 - 18.00	258,5	57	8	323,5			
	18.00 - 19.00	404,5	25	8	437,5			
	19.00 - 20.00	489,5	20	5,2	514,7			

Source: Researcher's Processed Results, 2025

From **Table 4.2** , the part marked in **grey** is the largest value for each day, the following is the calculation:

1. **Day 1 (Thursday)** Highest Value on Period **16.00 – 17.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (655 x 0,5) + (28 x 1) + (48 x 0,4)
     = (327,5) + (28) + (19,2) = **374,7 events/hour**
   - Side Obstacle Value (SCF) : **Medium**
2. **Day 2 (Friday)** Highest Value on Period **18.00 – 19.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (662 x 0,5) + (98 x 1) + (49 x 0,4)
     = (331) + (98) + (19,6) = **448,6 events/hour**
   - Side Obstacle Value (SCF) : **Medium**

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3. **Day 3 (Saturday)** Highest Value on Period **17.00 – 18.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (1319 x 0,5) + (166 x 1) + (68 x 0,4)
     = (659,5) + (166) + (27,2) = **852,7 events/hour**
   - Side Obstacle Value (SCF) : **High**
4. **Day 4 (Sunday)** Highest Value on Period **19.00 – 20.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (3886 x 0,5) + (71 x 1) + (17 x 0,4)
     = (1943) + (71) + (6,8) = **2020,8 events/hour**
   - Side Obstacle Value (SCF) : **Very High**
5. **Day 5 (Monday)** Highest Value on Period **19.00 – 20.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (856 x 0,5) + (9 x 1) + (11 x 0,4)
     = (428) + (9) + (4,4) = **441,4 events/hour**
   - Side Obstacle Value (SCF) : **Medium**
6. **Day 6 (Tuesday)** Highest Value on Period **16.00 – 17.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (444 x 0,5) + (50 x 1) + (61 x 0,4)
     = (222) + (50) + (24,4) = **296,4 events/hour**
   - Side Obstacle Value (SCF) : **Low**
7. **Day 7 (Wednesday)** Highest Value on Period **19.00 – 20.00** :
   - Amount x Weight Factor
     = (PED x 0,5) + (PSV x 1) + (SMV x 0,4)
     = (979 x 0,5) + (20 x 1) + (13 x 0,4)
     = (489,5) + (20) + (5,2) = **514,7 events/hour**
   - Side Obstacle Value (SCF) : **High**
8. Recapitulation of Highest Side Obstacle Value (SCF) per day :

Table 5.1. Recapitulation of Highest Side Obstacle Values per day

Value SCF			
A Day	**Highest Value**	**Result Per Day**	**Code**
Day 1 (Thursday)	374,70	Medium	M
Day 2 (Friday)	448,60	Medium	M
Day 3 (Saturday)	852,70	High	H
Day 4 (Sunday)	2020,80	Very High	VH
Day 5 (Monday)	441,40	Medium	M
Day 6 (Tuesday)	296,40	Low	L
Day 7 (Wednesday)	514,70	High	H

Source: Researcher's Processed Results, 2025

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The following is **Figure 4.1** regarding the graph of the highest side obstacles values for each day :

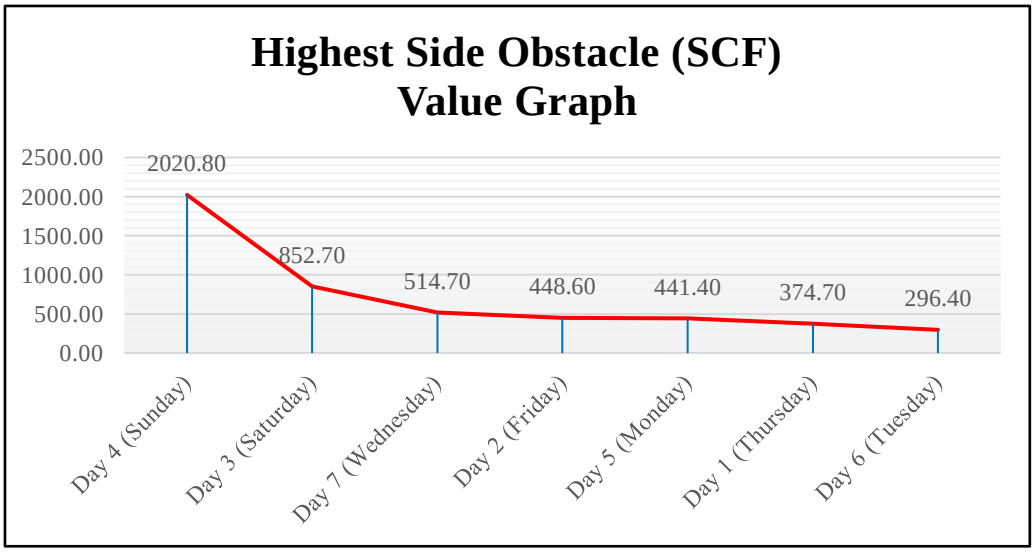

Figure 4.1. Highest Value Side Obstacle Graph

Traffic Volume

To analyze the Traffic Volume Value (Qsmp) must know the Passenger Car Equivalent Value (EMP) of Vehicle Types Starting from HV, LV, and MC, the calculation described only on the 1st day (Thursday) is calculated according to **Formula 2.2**. While for the 2nd day to the 7th day only the table of results of the calculation is shown :

9. Day 1 (Thursday) :

Table 4.3. Data on Number of Vehicle Types

Day 1 (Thursday)									
Vehicle Period/ 15 min	HV	LV	MC	EMP 1,2 HV	EMP 1 LV	EMP 0,25 MC	Amount / 15 min	Amount / Hours	Max Value / Hours
16.00-16.15	40	241	962	48,0	241,0	240,5	529,5		
16.15-16.30	44	287	1043	52,8	287,0	260,8	600,6	**2242,5**	
16.30-16.45	39	214	1323	46,8	214,0	330,8	591,6		
16.45-17.00	32	225	1030	38,4	225,0	257,5	520,9		
17.00-17.15	12	191	1215	14,4	191,0	303,8	509,2		
17.15-17.30	28	199	1123	33,6	199,0	280,8	513,4	**2091,5**	
17.30-17.45	19	221	1246	22,8	221,0	311,5	555,3		
17.45-18.00	32	203	1089	38,4	203,0	272,3	513,7		
18.00-18.15	27	185	1348	32,4	185,0	337,0	554,4		
18.15-18.30	15	211	1462	18,0	211,0	365,5	594,5	**2288,8**	
18.30-18.45	23	228	1273	27,6	228,0	318,3	573,9		
18.45-19.00	19	267	1105	22,8	267,0	276,3	566,1		
19.00-19.15	22	264	1269	26,4	264,0	317,3	607,7		
19.15-19.30	12	305	1121	14,4	305,0	280,3	599,7	**2290,3**	
19.30-19.45	8	264	990	9,6	264,0	247,5	521,1		
19.45-20.00	7	301	1010	8,4	301,0	252,5	561,9		

Source: Researcher's Processed Results, 2025

Following **Formula 2.2**, the calculation is as follows. The calculation is only for peak hours or the highest hours, namely 19.00-20.00:

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10. Period 19.00 – 20.00 : (Highest Traffic Volume (Qsmp))
    - At Period 19.00 – 19.15
      = (HV x 1,2) + (LV) + (MC x 0,25)
      = (22 x 1,2) + (264) + (1269 x 0,25)
      = (26,40) + (264,00) + (317,25)
      = **607,65 Qsmp/15 min**
    - At Period 19.15 – 19.30
      = (HV x 1,2) + (LV) + (MC x 0,25)
      = (12 x 1,2) + (305) + (1121 x 0,25)
      = (14,40) + (305,00) + (280,25)
      = **599,65 Qsmp/15 min**
    - At Period 19.30 – 19.45
      = (HV x 1,2) + (LV) + (MC x 0,25)
      = (8 x 1,2) + (264) + (990 x 0,25)
      = (9,60) + (264,00) + (247,50)
      = **521,10 Qsmp/15 min**
    - At Period 19.45 – 20.00
      = (HV x 1,2) + (LV) + (MC x 0,25)
      = (7 x 1,2) + (301) + (1010 x 0,25)
      = (8,40) + (301,00) + (177,60)
      = **561,90 Qsmp/15 min**
    - Total Traffic Volume (Qsmp/hours) :
      = 607,65 + 599,65 + 521,10 + 561,90
      = 2290,30 Qsmp/hours.

From **Table 4.4**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (19.00-20.00), which was **2290,30 smp/hours**.

11. Day 2 (Friday) :

Table 4.5. Data on Number of Vehicle Types

Day 2 (Friday)									
Vehicle Period/ 15 min	**HV**	**LV**	**MC**	**EMP**			**Amount / 15 min**	**Amount / Hours**	**Max Value / Hours**
				1,2	1	0,25			
				HV	**LV**	**MC**			
16.00-16.15	23	160	1021	27,6	160,0	255,3	442,9	**1935,8**	**2575,0**
16.15-16.30	21	177	1117	25,2	177,0	279,3	481,5		
16.30-16.45	23	162	1114	27,6	162,0	278,5	468,1		
16.45-17.00	28	209	1203	33,6	209,0	300,8	543,4		
17.00-17.15	28	237	1220	33,6	237,0	305,0	575,6	**2575,0**	
17.15-17.30	9	247	1550	10,8	247,0	387,5	645,3		
17.30-17.45	20	255	1646	24,0	255,0	411,5	690,5		
17.45-18.00	19	319	1287	22,8	319,0	321,8	663,6		
18.00-18.15	30	357	1392	36,0	357,0	348,0	741,0	**2504,7**	
18.15-18.30	14	346	1024	16,8	346,0	256,0	618,8		
18.30-18.45	16	310	1211	19,2	310,0	302,8	632,0		
18.45-19.00	17	243	998	20,4	243,0	249,5	512,9		
19.00-19.15	24	271	1246	28,8	271,0	311,5	611,3	**2148,4**	
19.15-19.30	11	215	1108	13,2	215,0	277,0	505,2		
19.30-19.45	10	214	1204	12,0	214,0	301,0	527,0		
19.45-20.00	13	237	1009	15,6	237,0	252,3	504,9		

Source: Researcher's Processed Results, 2025

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From **Table 4.5**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **2575,0 smp/hours**.

12. Day 3 (Saturday) :

Table 4.6. Data on Number of Vehicle Types

Day 3 (Saturday)									
Vehicle Period/ 15 min	**HV**	**LV**	**MC**	**EMP**			**Amount / 15 min**	**Amount / Hours**	**Max Value / Hours**
				1,2	1	0,25			
				HV	**LV**	**MC**			
16.00-16.15	16	218	1291	19,2	218,0	322,8	560,0		
16.15-16.30	27	218	1273	32,4	218,0	318,3	568,7	**2267,4**	
16.30-16.45	45	218	1127	54,0	218,0	281,8	553,8		
16.45-17.00	40	245	1168	48,0	245,0	292,0	585,0		
17.00-17.15	94	375	1346	112,8	375,0	336,5	824,3		
17.15-17.30	37	307	1442	44,4	307,0	360,5	711,9	**2881,0**	
17.30-17.45	23	194	1226	27,6	194,0	306,5	528,1		
17.45-18.00	26	314	1886	31,2	314,0	471,5	816,7		**2881,0**
18.00-18.15	27	372	1152	32,4	372,0	288,0	692,4		
18.15-18.30	7	261	1033	8,4	261,0	258,3	527,7	**2298,7**	
18.30-18.45	5	259	985	6,0	259,0	246,3	511,3		
18.45-19.00	7	334	900	8,4	334,0	225,0	567,4		
19.00-19.15	29	381	1363	34,8	381,0	340,8	756,6		
19.15-19.30	7	270	1333	8,4	270,0	333,3	611,7	**2417,7**	
19.30-19.45	6	205	1290	7,2	205,0	322,5	534,7		
19.45-20.00	9	253	1004	10,8	253,0	251,0	514,8		

Source: Researcher's Processed Results, 2025

From **Table 4.6**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **2881,0 smp/hours**.

13. Day 4 (Sunday) :

Table 4.7. Data on Number of Vehicle Types

Day 4 (Sunday)									
Vehicle Period/ 15 min	**HV**	**LV**	**MC**	**EMP**			**Amount / 15 min**	**Amount / Hours**	**Max Value / Hours**
				1,2	1	0,25			
				HV	**LV**	**MC**			
16.00-16.15	29	242	988	34,8	242,0	247,0	523,8		
16.15-16.30	35	261	1016	42,0	261,0	254,0	557,0	**2127,0**	
16.30-16.45	23	240	1044	27,6	240,0	261,0	528,6		
16.45-17.00	13	224	1112	15,6	224,0	278,0	517,6		
17.00-17.15	15	246	1352	18,0	246,0	338,0	602,0		
17.15-17.30	39	297	1126	46,8	297,0	281,5	625,3	**2397,5**	
17.30-17.45	10	290	1036	12,0	290,0	259,0	561,0		
17.45-18.00	7	319	1127	8,4	319,0	281,8	609,2		**2397,5**
18.00-18.15	13	267	1119	15,6	267,0	279,8	562,4		
18.15-18.30	19	268	1012	22,8	268,0	253,0	543,8	**2057,0**	
18.30-18.45	15	216	984	18,0	216,0	246,0	480,0		
18.45-19.00	4	214	1008	4,8	214,0	252,0	470,8		
19.00-19.15	2	242	897	2,4	242,0	224,3	468,7		
19.15-19.30	14	224	903	16,8	224,0	225,8	466,6	**1806,9**	
19.30-19.45	1	183	981	1,2	183,0	245,3	429,5		
19.45-20.00	0	166	1105	0,0	166,0	276,3	442,3		

Source: Researcher's Processed Results, 2025

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From **Table 4.7**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **2397,5 smp/hours**.

14. Day 5 (Monday) :

Table 4.8. Data on Number of Vehicle Types

Day-5 (Monday)									
Vehicle Period/ 15 min	HV	LV	MC	EMP 1,2 HV	EMP 1 LV	EMP 0,25 MC	Amount / 15 min	Amount / Hours	Max Value / Hours
16.00-16.15	15	123	979	18,0	123,0	244,8	385,8		
16.15-16.30	9	203	1090	10,8	203,0	272,5	486,3	**1675,8**	
16.30-16.45	9	159	927	10,8	159,0	231,8	401,6		
16.45-17.00	16	131	1008	19,2	131,0	252,0	402,2		
17.00-17.15	8	153	1239	9,6	153,0	309,8	472,4		
17.15-17.30	6	190	1454	7,2	190,0	363,5	560,7	**1967,0**	
17.30-17.45	9	217	949	10,8	217,0	237,3	465,1		
17.45-18.00	12	213	966	14,4	213,0	241,5	468,9		**1967,0**
18.00-18.15	5	212	1060	6,0	212,0	265,0	483,0		
18.15-18.30	6	224	1106	7,2	224,0	276,5	507,7	**1935,7**	
18.30-18.45	2	193	955	2,4	193,0	238,8	434,2		
18.45-19.00	8	241	1041	9,6	241,0	260,3	510,9		
19.00-19.15	7	178	1127	8,4	178,0	281,8	468,2		
19.15-19.30	6	212	1201	7,2	212,0	300,3	519,5	**1904,8**	
19.30-19.45	4	211	1031	4,8	211,0	257,8	473,6		
19.45-20.00	2	194	989	2,4	194,0	247,3	443,7		

Source: Researcher's Processed Results, 2025

From **Table 4.8**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **1967,0 smp/hours**.

15. Day 6 (Tuesday) :

Tabel 4.9. Data on Number of Vehicle Types

Day 6 (Tuesday)									
Vehicle Period/ 15 min	HV	LV	MC	EMP 1,2 HV	EMP 1 LV	EMP 0,25 MC	Amount / 15 min	Amount / Hours	Max Value / Hours
16.00-16.15	15	226	1234	18,0	226,0	308,5	552,5		
16.15-16.30	34	229	1199	40,8	229,0	299,8	569,6	**2525,0**	
16.30-16.45	15	252	1491	18,0	252,0	372,8	642,8		
16.45-17.00	76	251	1672	91,2	251,0	418,0	760,2		
17.00-17.15	13	265	1923	15,6	265,0	480,8	761,4		
17.15-17.30	9	220	1704	10,8	220,0	426,0	656,8	**2704,5**	
17.30-17.45	12	257	1763	14,4	257,0	440,8	712,2		
17.45-18.00	12	232	1311	14,4	232,0	327,8	574,2		**2704,5**
18.00-18.15	11	160	546	13,2	160,0	136,5	309,7		
18.15-18.30	5	165	859	6,0	165,0	214,8	385,8	**1537,8**	
18.30-18.45	1	188	792	1,2	188,0	198,0	387,2		
18.45-19.00	2	200	1011	2,4	200,0	252,8	455,2		
19.00-19.15	1	183	705	1,2	183,0	176,3	360,5		
19.15-19.30	13	191	984	15,6	191,0	246,0	452,6	**1828,2**	
19.30-19.45	7	212	1020	8,4	212,0	255,0	475,4		
19.45-20.00	5	224	1239	6,0	224,0	309,8	539,8		

Source: Researcher's Processed Results, 2025

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From **Table 4.9**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **2704,5 smp/hours**.

16. Day 7 (Wednesday) :

Tabel 4.10. Data on Number of Vehicle Types

Day 7 (Wednesday)									
Vehicle Period/ 15 min	HV	LV	MC	EMP 1,2 HV	EMP 1 LV	EMP 0,25 MC	Amount / 15 min	Amount / Hours	Max Value / Hours
16.00-16.15	29	315	1034	34,8	315,0	258,5	608,3	**2060,8**	**2472,9**
16.15-16.30	17	175	902	20,4	175,0	225,5	420,9		
16.30-16.45	13	232	1202	15,6	232,0	300,5	548,1		
16.45-17.00	6	229	989	7,2	229,0	247,3	483,5		
17.00-17.15	6	263	1215	7,2	263,0	303,8	574,0	**2185,3**	
17.15-17.30	7	207	1715	8,4	207,0	428,8	644,2		
17.30-17.45	7	197	1009	8,4	197,0	252,3	457,7		
17.45-18.00	9	245	1015	10,8	245,0	253,8	509,6		
18.00-18.15	12	251	1100	14,4	251,0	275,0	540,4	**2334,4**	
18.15-18.30	9	292	1201	10,8	292,0	300,3	603,1		
18.30-18.45	24	271	1289	28,8	271,0	322,3	622,1		
18.45-19.00	13	247	1225	15,6	247,0	306,3	568,9		
19.00-19.15	21	191	1685	25,2	191,0	421,3	637,5	**2472,9**	
19.15-19.30	9	210	1863	10,8	210,0	465,8	686,6		
19.30-19.45	16	273	1230	19,2	273,0	307,5	599,7		
19.45-20.00	6	269	1092	7,2	269,0	273,0	549,2		

Source: Researcher's Processed Results, 2025

From **Table 4.10**, part marked in **grey**, the highest traffic volume (Qsmp/hour) was obtained at peak hours (17.00-18.00), which was **2472,9 smp/hours**.

The following is **Figure 4.1** regarding the graph of the highest side obstacles values for each day :

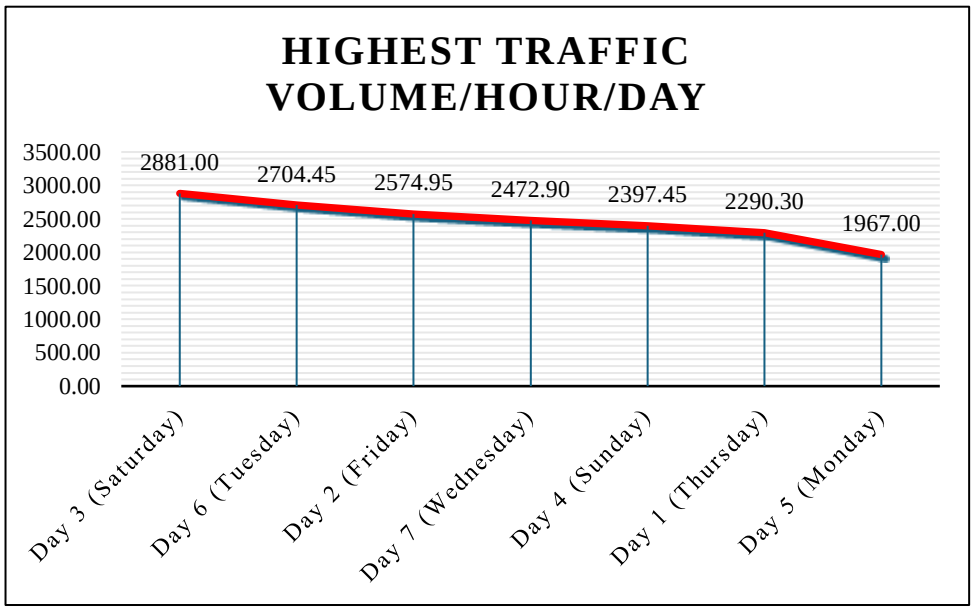

Figure 4.2. Highest Traffic Volume Graph per day during peak hours

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5. CONCLUSION AND SUGGESTIONS

Conclusion

Based on the Analysis and Research Results on Traffic Performance on the Rajawali Road Section in the Old City Tourism Area of Surabaya, which was carried out using the MKJI-1997 Method approach, several Conclusions were obtained from the Side Obstacle Class Values and Traffic Volume, namely:

1. Side Traffic Congestion (SCF)
   The **highest** number of side traffic congestion incidents occurred on **Sunday**, with **2020,8** incidents per hour (very high category), followed by Saturday (852,7 incidents per hour), and Monday (441,4 incidents per hour). The day with the **lowest** side traffic congestion was **Tuesday**, with **296,4** incidents per hour (low category). This indicates that increased tourism and commercial activity, particularly in the middle to late weekends, significantly impacts the frequency of roadside disruptions.
2. Traffic Volume (Qsmp)
   The **highest** traffic volume was recorded on **Saturday** at **2881** Qsmp/hour, followed by Tuesday (2,704.45 pcu/hour), and Friday (2,574.95 pcu/hour). The **lowest** volume occurred on **Monday** at **1967** Qsmp/hour. This demonstrates a consistent surge in traffic volume on holidays and weekends.

Suggestions

Given the limitations identified in this study, several suggestions are offered for future research. It is recommended to broaden the research coverage to include other roads within the Old Town Surabaya Tourism Area such as Kembang Jepun Street or KH. Mas Mansyur Street to enable comparison with the traffic characteristics of Rajawali Street. Conducting traffic surveys at various times, including in the morning, afternoon, or during national holidays, is suggested to provide a more comprehensive view of traffic conditions. Special attention should also be given to weekend periods, as substantial increases in traffic volume and side friction were found on Saturdays and Sundays. Furthermore, future studies could explore the broader social and economic impacts of tourism-related traffic. Finally, implementing technical infrastructure solutions such as improved parking layouts, wider sidewalks, or simulated one-way traffic systems using transport modeling software can be considered to enhance long-term traffic management and infrastructure planning

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