Simulation Of the Application of The Area Traffic Control System (ATCS) At the Intersection in Kubu Raya District

Sheva Naufal Zaki, Anastasia Caroline Sutandi, and Joewono Prasetijo

Abstract— Optimizing the handling of transportation issues is challenging for Kubu Raya District due to the area's 70 times larger size than Pontianak City and the APBD funding restricted allocation for road infrastructure upgrades. Traffic congestion, air and noise pollution, traffic accidents, and delays are some of the transportation issues that Kubu Raya Regency faces. To address traffic issues at signalized junctions in Kubu Raya Regency, this study intends to provide the idea of implementing the Area Traffic Control System (ATCS) at signalized intersections at the research location which still use pretimed traffic signals. There are two intersections where the ATCS is applied: Major Alianyang-Adi Sucipto and Major Alianyang-Raya Desa Kapur. Intersection performance is analyzed using the MKJI 1997 and PTV VISSIM Software approaches. Wednesday and Saturday were the busiest days for conducting the survey. With LOS B a delay of 11.80 seconds was observed at Intersection Major Alianyang-Adi Sucipto and LOS F a delay 127.35 seconds was observed at Intersection Major Alianyang-Raya Desa Kapur following the introduction of ATCS, according to the analysis conducted using PTV VISSIM Software.

Keywords— ATCS, Intelligent Transport System, Kubu Raya, Level of Service, MKJI 1997, PTV VISSIM, Signalized Intersection.

1 Introduction

The rapid development of electronics and computer equipment has made it possible to develop several new concepts of transportation infrastructure that were never thought of in the past [1]. The quality and quantity of transportation-related data, the quality of human resources, low levels of discipline, low income, fast urbanization, limited resources, particularly financial ones, and inadequate planning, control, and supervision all contribute to the exacerbation of transportation-related issues. Some of the largest cities in Indonesia, including Jakarta, Surabaya, Medan and Bandung, show this situation [2].

The Intelligent Transport System (ITS) refers to the management of an information system that leverages data processing technology to enhance the flow of people and goods, lower traffic, improve accident prevention, enhance emergency response, and maintain the roads [3]. This system's goals are to enhance traffic flow, prevent or lessen traffic accidents, minimize accident damage, uphold traffic safety, preserve the sustainability of the environment, and minimize car pollution because of traffic jams at intersections and segments. It is anticipated that when travel times becomes longer and traffic jams becomes shorter, car pollution levels would decrease as well [4].

In the Minister of Transportation Regulation No. 96/2015 on Guidelines for the Implementation of Traffic Engineering Management Activities there are procedures for management and traffic engineering including traffic control at intersections, where Intelligent Transport Systems (ITS) are included. at intersections, which includes the Intelligent Transport System (ITS) [5]. Therefore, the author conducted research about simulating the application of the Area Traffic Control System (ATCS) at intersections in Kubu Raya Regency.

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2 Theoritical Framework

2.1 Performance of Signalized Intersection

There is a transportation impact when signalized crossings operate less than ideal. issues with transportation generally brought on by delays, pollution, and flow. Based on this, improving the efficiency of Kubu Raya Regency's intersections is necessary to address the region's transportation issues.

2.2 Traffic Lights Condition

Traffic lights that function as flow separators are very important because the collision of vehicle flows, especially in large enough volumes, endangers vehicles passing through the intersection and can disrupt the intersection traffic system. The condition of traffic lights is dim and error in Kubu Raya Regency and still uses Fixed time traffic signals. Based on this, optimizing traffic light timing is very important to reduce delay time.

2.3 Implementation of Area Traffic Control System (ATCS) in Kubu Raya

Area Traffic Control System (ATCS) is a road traffic intersection control system using traffic lights where the traffic light settings at each intersection are coordinated. ATCS is very suitable to be applied to intersections in Kubu Raya Regency, because the intersection is in a commercial area, health facility area, education area and is an access to the Kapuas II pedestrian bridge and to the Intercountry Bus Terminal. The ATCS implementation effort is expected to improve the function of the

Fig. 1. Site Map

Source: Google Earth Pro (2024)

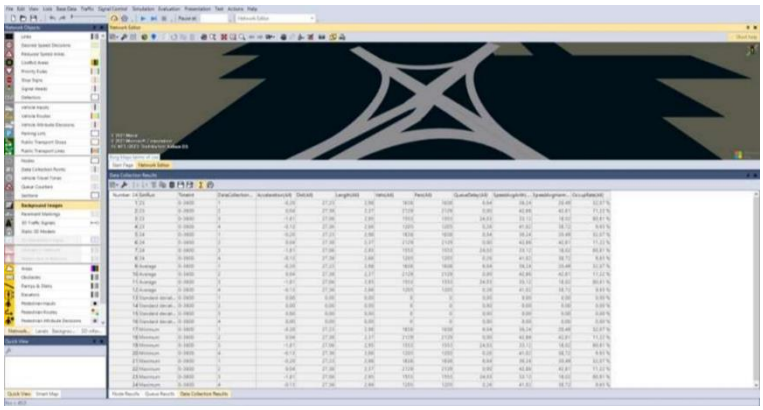

Fig. 2. PTV VISSIM results existing conditions of Major Alianyang-Adi Sucipto Intersection

intersection to help overcome transportation problems such as delays, air pollution, poor level of service, etc.

3 RESEARCH METHODOLOGY

This research falls under the category of a case study with a description method, which is a process for describing or explaining the object of study based on the facts that are observed in the Kubu Raya Regency area to solve problems. A review of the literature on the Area Traffic Control System (ATCS) is also provided as help, both in addition to the literature study and in addition to the concept and suggestion preparation.

3.1 Methods for Collecting Data

Primary data collection is the method employed. Primary data are study findings that are gathered by conducting in-person surveys at the study site. The purpose of data collecting is to gather the information required to meet the goals of the research.

Analyzing and interpreting information gleaned from descriptive, non-numerical, and unstructured data requires the critical process of data processing. Transcription is the first stage of processing qualitative data; it entails transforming written text data sources, observational literature studies, and references into a format that can be examined in more detail. Subsequently, pertinent techniques will be employed to analyze the transcription data. To produce findings that can be analyzed, this procedure necessitates a thorough rewriting of the text.

Analyze primary data with MKJI 1997. To evaluate the effects both before and after ATCS is implemented in Kubu Raya Regency, the implementation of ATCS is simulated using PTV VISSIM software.

3.2 Data Analysis

This study employed quantitative descriptive analysis, a research methodology that characterizes variables considering data in the form of numerical values derived from real-world situations.

The transcription data will be subjected to analysis using MKJI 1997, which is listed on SIG I through SIG V forms. The

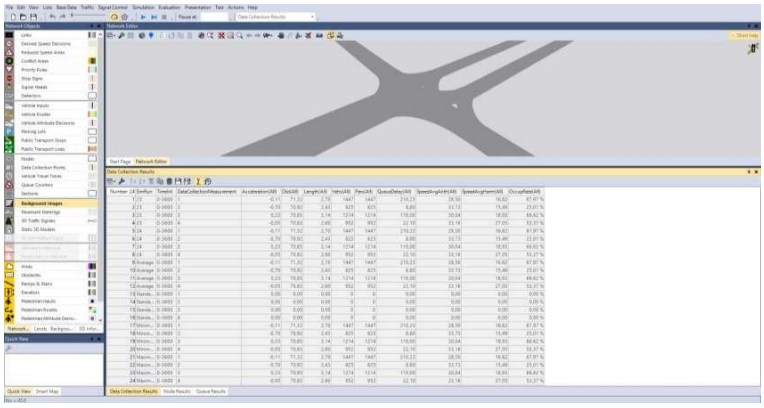

Fig. 3. PTV VISSIM results existing conditions of Major Alianyang-Raya Desa Kapur Intersection

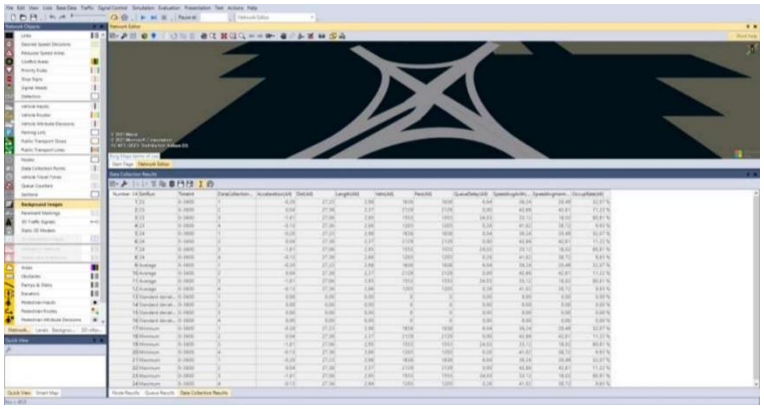

Fig. 4. PTV VISSIM results ATCS Implementation of Major Alianyang-Adi Sucipto Intersection

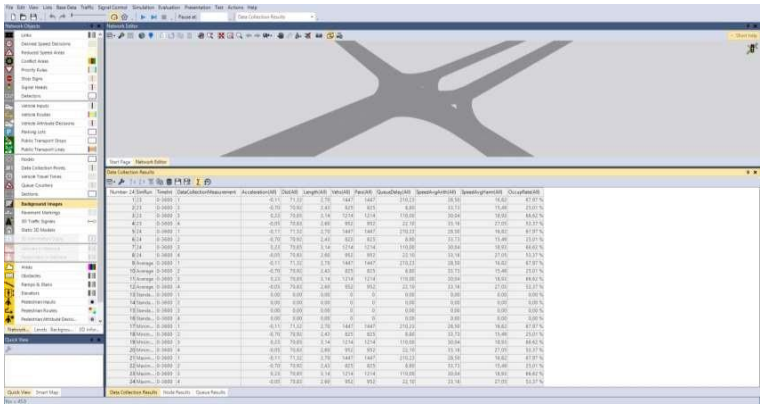

Fig. 5. PTV VISSIM results ATCS Implementation of Major Alianyang-Raya Desa Kapur Intersection

purpose of this analysis is to determine and assess the effectiveness of signalized junctions. Using the PTV VISSIM program, simulation is the next stage.

3.3 Constraints and boundaries

Reviewing the breadth of existing problems and limited time, it is necessary to provide problem boundaries so that it is easy to understand and in accordance with what is expected, with the scope of discussion:

1. Intersections that already have Traffic Signaling Devices (APILL) in the form of Fixed Time Traffic Signal.
2. The concept of applying the Area Traffic Control System (ATCS) is carried out at Intersection Major Alianyang-Adi Sucipto & Intersection Major Alianyang-Raya Desa Kapur.
3. Diversion of Traffic Management towards Kapuas II Bridge for the last 10 years.
4. The simulation that will be designed in the preparation of this paper uses the 1997 Indonesian Road Capacity Manual (MKJI) and PTV VISSIM Software.
5. Primary Data Collection (Existing Conditions) was carried out on 2 days, namely weekdays and weekends at 08.00 - 10.00 WIB, 12.00 - 14.00 WIB, and 16.00 - 18.00 WIB

TABLE 1
SIG-I Form Intersections Major Alianyang-Adi Sucipto

Approach Code	Road Environment Type	Side Barriers	Median	Direct Left Turn	Slope	Distance to parking vehicle	Approach Width (m)			
							Approach	Entry	Direct Left Turn	Exit
	(com/res/ra)	(High/Low)	(Yes/No)	(Yes/No)	(+/- %)	(m)	W_A	W_{Entry}	W_{LTOR}	W_{Exit}
A1	COM	Low	Yes	Yes	0	0	18	6,5	4,5	7,5
A2	COM	Low	No	Yes	0	0	11	5,5	4,5	5,5
A3	COM	Low	No	Yes	0	0	13	7,5	4,5	6,5
A4	COM	Low	No	Yes	0	0	11	5,5	4,5	5,5

TABLE 2
SIG-I Form Intersections Major Alianyang – Raya Desa Kapur

Approach Code	Road Environment Type	Side Barriers	Median	Direct Left Turn	Slope	Distance to parking vehicle	Approach Width (m)			
							Approach	Entry	Direct Left Turn	Exit
	(com/res/ra)	(High/Low)	(Yes/No)	(Yes/No)	(+/- %)	(m)	W_A	W_{Entry}	W_{LTOR}	W_{Exit}
B1	COM	Low	No	Yes	0	0	13	7	2	6,5
B2	COM	Low	No	Yes	0	0	9	4,5	2	4,5
B3	COM	Low	Yes	Yes	0	0	25	6,5	2	7,0
B4	COM	Low	No	Yes	0	0	8	4	2	4,0

TABLE 3
SIG-II Form Intersections Major Alianyang – Adi Sucipto

Approach Code	Directions	Motorized Vehicles Traffic Flow (MV)								
		Tiny automobiles (LV)			Massive automobiles (HV)			Motors (MC)		
		Sheltered emp = 1,0 Defendant's emp = 1,0			Sheltered emp = 1,3 Defendant's emp = 1,3			Sheltered emp = 0,2 Defendant's emp = 0,4		
		Veh/hour	pcu/ hour		Veh/hour	pcu/hour		Veh/hour	pcu/ hour	
			Sheltered	Defendant's		Sheltered	Defendant's		Sheltered	Defendant's
A1	ST	442	442	442	69	90	90	1039	208	416
	RT	73	73	73	10	13	13	302	60	121
	LTOR	44	44	44	11	14	14	586	117	234
	TOTAL	559	559	559	90	117	117	1927	385	771
A2	ST	81	81	81	17	22	22	491	98	196
	RT	22	22	22	3	4	4	141	28	56
	LTOR	131	131	131	52	68	68	2670	534	1068
	TOTAL	234	234	234	72	94	94	3302	660	1321
A3	ST	442	442	442	69	90	90	1039	208	416
	RT	73	73	73	10	13	13	586	117	234
	LTOR	559	559	559	90	117	117	2211	442	884
	TOTAL	559	559	559	90	117	117	2211	442	884
A4	ST	71	71	71	14	18	18	373	75	149
	RT	73	73	73	15	20	20	692	138	277
	LTOR	125	125	125	10	13	13	480	96	192
	TOTAL	269	269	269	39	51	51	1545	309	618

(1)

3.4 Anticipated Results

This research seeks to propose the implementation of ATCS at intersections in Kubu Raya Regency. The results of this study will improve intersection performance and provide guidance for policy makers and urban planners in tackling transportation problems such as delays, air pollution, poor level of service, etc.

4 Discussion

4.1 Calculation Using SIG Form n MKJI 1997 Existing Condition

SIG I in Table 1 and Table 2 presents information on the size of Kubu Raya Regency, this intersection is in a commercial

TABLE 3
SIG-I Form Intersections Major Alianyang-Adi Sucipto

Motorized Vehicles Traffic Flow (MV)				
Approach Code	Directions	Motorized Vehicles Total MV		
		Veh/hour	pcu/hour	
			Sheltered	Defendant's
A1	ST	1550	740	947
	RT	385	146	207
	LTOR	641	176	293
	TOTAL	2576	1061	1447
A2	ST	589	201	300
	RT	166	54	82
	LTOR	2853	733	1267
	TOTAL	3608	988	1648
A3	ST	1550	740	947
	RT	669	203	320
	LTOR	641	176	293
	TOTAL	2860	1118	1560
A4	ST	458	164	238
	RT	780	231	369
	LTOR	615	234	330
	TOTAL	1853	629	938

(2)

TABLE 4
SIG-II Form Intersections Major Alianyang – Raya Desa Kapur

Motorized Vehicles Traffic Flow (MV)										
Approach Code	Directions	Tiny automobiles (LV) Sheltered emp = 1,0 Defendant's emp = 1,0			Massive automobiles (HV) Sheltered emp = 1,3 Defendant's emp = 1,3			Motors (MC) Sheltered emp = 0,2 Defendant's emp = 0,4		
		Veh/hour	pcu/ hour		Veh/hour	pcu/ hour		Veh/hour	pcu/ hour	
			Sheltered	Defendant's		Sheltered	Defendant's		Sheltered	Defendant's
B1	ST	257	257	257	120	156	156	2037	407	815
	RT	241	241	241	13	17	17	1070	214	428
	LTOR	148	148	148	3	4	4	1294	259	518
	TOTAL	646	646	646	136	177	177	4401	880	1761
B2	ST	49	49	49	2	3	3	493	99	197
	RT	211	211	211	3	4	4	484	97	194
	LTOR	19	19	19	0	0	0	146	29	58
	TOTAL	279	279	279	5	7	7	1123	225	449
B3	ST	311	311	311	68	88	88	1084	217	434
	RT	198	198	198	5	7	7	626	125	250
	LTOR	13	13	13	5	7	7	38	8	15
	TOTAL	522	522	522	78	102	102	1748	350	699
B4	ST	104	104	104	11	14	14	584	117	234
	RT	76	76	76	9	12	12	273	55	109
	LTOR	37	37	37	9	12	12	273	55	109
	TOTAL	217	217	217	29	38	38	1216	244	487

area (COM), WA, WEntry, WLTOR, and WExit data. low side obstacles, with and without road medians.

SIG II regarding Kubu Raya Regency traffic flow condition data, with the types of tiny automobiles (LV), Massive automobiles (HV) and Motors (MC), for each right turn (RT), straight (ST), left turn (LT), on each approach are presented in Table 3 and Table 4. Non-motorized vehicles (UM) are ignored because they are not present at Major Alianyang-Adi Sucipto Intersection and Major Alianyang-Raya Desa Kapur Intersection.

Determine the lost time (LTI) at Major Alianyang-Adi Sucipto and Major Alianyang-Raya Desa Kapur intersections as a function of the time between greens per cycle and enter the results at the bottom of column 4 on the SIG Form - IV.

SIG IV shows the distribution of traffic flow data taken from GIS II, at the tinajaun intersection all approaches are protected type (P).

SIG V shows the calculation of the performance of Intersection Major Alianyang-Adi Sucipto and Intersection Major Alianyang-Raya Desa Kapur, namely queue length, number of stopped vehicles and delays.

From the analysis that has been carried out using SIG Form I - SIG Form V on existing conditions, it shows that the

TABLE 4
SIG-II Form Intersections Major Alianyang – Raya Desa Kapur

Motorized Vehicles Traffic Flow (MV)				
Approach Code	Directions	Motorized Vehicles Total MV		
		Veh/hour	pcu/hour	
			Sheltered	Defendant's
B1	ST	2414	820	1228
	RT	1324	472	686
	LTOR	1445	411	670
	TOTAL	5183	1703	2584
B2	ST	544	151	249
	RT	698	312	409
	LTOR	165	48	77
	TOTAL	1407	511	735
B3	ST	1463	616	833
	RT	829	330	455
	LTOR	56	28	35
	TOTAL	2348	974	1323
B4	ST	699	235	352
	RT	358	143	197
	LTOR	405	121	193
	TOTAL	1462	499	742

(2)

TABLE 5
SIG-III Form Lost Time (LTI)

Determination of all red time	Time (seconds)	Total
Phase 1 → Phase 2	2	8
Phase 2 → Phase 3	2	
Phase 3 → Phase 4	2	
Phase 4 → Phase 1	2	
Amber time / Phase	3	12
Total lost time (LTI)= All red total + Amber time (sec / cycle)		20

TABLE 6
SIG-IV Form Intersections Major Alianyang – Adi Sucipto

Approach Code	Green in phase no.	Approach type (P/O)	Turning vehicle ratio			Flow RT pcu/hour		Effective width (m)
			P_{LTOR}	P_{LT}	P_{RT}	Q_{RT}	Q_{RTO}	W_E
A1	1	P			0,15	146	203	6,5
A1 Ltor	1	P	0,25					4,5
A2	2	P			0,05	54	231	5,5
A2 Ltor	2	P	0,79					4,5
A3	3	P			0,23	203	146	7,5
A3 Ltor	3	P	0,22					4,5
A4	4	P			0,42	231	54	5,5
A4 Ltor	4	P	0,33					4,5

performance of the Major Alianyang-Adi Sucipto Intersection and the Major Alianyang-Raya Desa Kapur Intersection has exceeded the specified conditions. Traffic volumes that are too high due to the diversion of traffic management that occurs affect the capacity of the intersection and Kapuas II bridge, thereby increasing the degree of saturation, increasing queue length, and delay.

4.2 Implementation ATCS Using PTV VISSIM

Detectors are installed at each junction to allow the system to account for the time necessary for each arm of the intersection, the delay when utilizing ATCS is less than when using MKJI 1997 calculations. Minimum green time, maximum red time, and length of the region read by the detector are the parameters utilized in the PTV VISSIM program. Based on the analysis conducted using PTV VISSIM Software at Major Alianyang-Adi Sucipto Intersection and Major Alianyang-Raya Desa Kapur Intersection after the implementation of Area Traffic Control System (ATCS), a recapitulation of the comparison of existing conditions and after the implementation of ATCS is obtained as follows figures below.

From the recapitulation of the comparison of existing

TABLE 6
SIG-IV Form Intersections Major Alianyang – Adi Sucipto

Approach Code	Saturated flow pcu/hour green							
	Basic values pcu/hour green	Adjustment Factor						Customized value pcu/hour green
		All types of approaches				Type P only		
		Size of the city	Side barriers	Slope	Parking	Turn Right	Turn Left	
	S_O	F_{CS}	F_{SF}	F_G	F_P	F_{RT}	F_{LT}	S
A1	3900	0,94	0,95	1,00	1,00	1,00	1,00	4019
A1 Ltor	2700	0,94	0,95	1,00	1,00	1,00	1,00	2411
A2	3300	0,94	0,95	1,00	1,00	1,00	1,00	2947
A2 Ltor	2700	0,94	0,95	1,00	1,00	1,00	1,00	2411
A3	4500	0,94	0,95	1,00	1,00	1,00	1,00	4019
A3 Ltor	2700	0,94	0,95	1,00	1,00	1,00	1,00	2411
A4	3300	0,94	0,95	1,00	1,00	1,00	1,00	2947
A4 Ltor	2700	0,94	0,95	1,00	1,00	1,00	1,00	2411
Pre customization cycle time	289							
Customized cycle time	221							

(2)

Approach Code	Traffic Flow pcu/hour	Flow Ratio	Phase Ratio	Green time sec	Capacity pcu/hour	Saturation Degree
	Q	FR	PR	g	C	DS
A1	886	0,220	0,251	67	1218	0,727
A1 Ltor	175	0,073	0,083			
A2	255	0,087	0,098	26	347	0,735
A2 Ltor	733	0,304	0,346			
A3	886	0,220	0,251	67	1218	0,727
A3 Ltor	175	0,073	0,083			
A4	395	0,134	0,152	41	547	0,721
A4 Ltor	234	0,097	0,110			
	IFR=$\sum FR_{CRIT}$	0,879				

(3)

TABLE 7
SIG-IV Form Intersections Major Alianyang – Adi Sucipto

Approach Code	Green in phase no.	Approach type (P/O)	Turning vehicle ratio			Flow RT pcu/hour		Effective width (m)
			P_{LTOR}	P_{LT}	P_{RT}	Q_{RT}	Q_{RTO}	W_E
B1	1	P			0,26	472	330	7,0
B1 Ltor	`	P	0,28					2,0
B2	2	P			0,50	312	143	4,5
B2 Ltor	1	P	0,12					2,0
B3	3	P			0,35	330	472	6,5
B3 Ltor	3	P	0,02					2,0
B4	4	P			0,24	143	312	4,0
B4 Ltor	4	P	0,28					2,0

(1)

conditions and after the implementation of ATCS, the following evaluations can be obtained:

1. At Intersection Major Alianyang-Adi Sucipto shows a significant change in delay, in the existing condition 54.27 seconds changed after the application of the ATCS concept to 11.80 seconds.
2. Intersection Major Alianyang-Adi Sucipto shows a significant change in Level of Service (LOS), in the existing condition LOS E changes after the application of the ATCS concept to LOS B.
3. At Intersection Major Alianyang-Raya Desa Kapur experienced a change in delay time, in the existing condition 153.91 seconds changed after the application of the ATCS concept to 127.35 seconds.
4. At Intersection Major Alianyang-Raya Desa Kapur does not show changes in Level of Service (LOS), in existing conditions LOS F and after the application of the ATCS concept LOS F. This is influenced by the geometric conditions of the intersection and the inadequate capacity of the intersection.

5 CONCLUSIONS

Based on the research that has been done, it can be concluded as follows:

1. Based on the results of the analysis of existing conditions using the MKJI 1997 SIG formular at Intersection Major Alianyang-Adi Sucipto and Intersection Major Alianyang-Raya Desa Kapur has LOS F. Due to the volume of traffic exceeding the capacity of the intersection so that the SIG form states the FR_{CRIT} value> 0.8.

Approach Code	Saturated flow pcu/hour green							
	Basic values pcu/hour green	Adjustment Factor						Customized value pcu/hour green
		All types of approaches				Type P only		
		Size of the city	Side barriers	Slope	Parking	Turn Right	Turn Left	
	So	**Fcs**	**Fsf**	**Fg**	**Fp**	**Frt**	**Flt**	**S**
B1	4200	0,94	0,95	1,00	1,00	1,00	1,00	3751
B1 Ltor	1200	0,94	0,95	1,00	1,00	1,00	1,00	1072
B2	2700	0,94	0,95	1,00	1,00	1,00	1,00	2411
B2 Ltor	1200	0,94	0,95	1,00	1,00	1,00	1,00	1072
B3	3900	0,94	0,95	1,00	1,00	1,00	1,00	3483
B3 Ltor	1200	0,94	0,95	1,00	1,00	1,00	1,00	1072
B4	2400	0,94	0,95	1,00	1,00	1,00	1,00	2143
B4 Ltor	1200	0,94	0,95	1,00	1,00	1,00	1,00	1072
Pre customization cycle time	-1494,117							
Customized cycle time	-1437							

(2)

Approach Code	Traffic Flow pcu/hour	Flow Ratio	Phase Ratio	Green time sec	Capacity pcu/hour	Saturation Degree
	Q	**FR**	**PR**	**g**	**C**	**DS**
B1	1292	0,344	0,337	-510	1331	0,971
B1 Ltor	411	0,383	0,375			
B2	463	0,192	0,188	-284	476	0,973
B2 Ltor	48	0,045	0,044			
B3	946	0,272	0,265	-402	974	0,971
B3 Ltor	28	0,026	0,026			
B4	378	0,176	0,172	-261	389	0,972
B4 Ltor	121	0,113	0,110			
	IFR=∑FRcrit	1,023				

(3)

TABLE 8
SIG-V Form Intersections Major Alianyang – Adi Sucipto

Approach Code	Traffic Flow pcu/hour	Capacity pcu/hour	Degree of Saturation	Green Ratio	Number of queue (pcu)				Queue Length m	Stop Rate stop/pcu	Number of Stop pcu/hour
	Q	**C**	**DS**	**GR**	**NQ1**	**NQ2**	**Total NQ**	**NQMAX**	**QL**	**NS**	**Nsv**
A1	886	1218	0,727	0,303	0,830	74,772	75,602	50	133,333	1,251	1108
A2	255	347	0,735	0,118	0,869	21,302	22,171	17	61,818	1,275	325
A3	886	1218	0,727	0,303	0,830	74,772	75,602	44	117,333	1,251	1108
A4	395	547	0,721	0,186	0,787	33,580	34,367	25	90,909	1,277	504
LTOR (All)	1317										
Flow cor. Qcor									Total		3045
Total flow Qtotal	3739								Average Vehicle Stops (stop/pcu)		0,814

(1)

2. Based on the results of the analysis of existing conditions after the management of traffic diversion to the Kapuas I bridge, PTV VISSIM Software at Intersection Major Alianyang-Adi Sucipto has a LOS E delay time of 54.27 seconds with 54.27 seconds delay time and Intersection Major Alianyang-Raya Desa Kapur has a LOS F with 153.91 seconds delay time.
3. Based on the results of the analysis after the application of the ATCS using PTV VISSIM Software at Intersection Major Alianyang-Adi Sucipto has a LOS B with 11.80 seconds delay time and Intersection Major Alianyang-Raya Desa Kapur has a LOS F with 127.35 seconds delay time.

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Approach Code	Delay			
	Average Traffic Delay sec/pcu	Average Geometric Delay sec/pcu	Average Delay sec/pcu	Total Delay pcu.sec
	DT	**DG**	**DT + DG**	**D x Q**
A1	71,290	4,103	75,394	66798,841
A2	103,191	4,724	107,915	27518,334
A3	71,290	4,103	75,394	66798,841
A4	89,811	2,473	92,284	36420,034
		Total		197536,049
		Delay Average deviation		52,837

(2)

TABLE 9
SIG-V Form Intersections Major Alianyang – Raya Desa Kapur

Approach Code	Traffic Flow pcu/hour	Capacity pcu/hour	Degree of Saturation	Green Ratio	Number of queue (pcu)				Queue Length m	Stop Rate stop/pcu	Number of Stop pcu/hour
	Q	**C**	**DS**	**GR**	**NQ_1**	**NQ_2**	**Total NQ**	**NQ_{MAX}**	**QL**	**NS**	**N_{SV}**
B1	1292	1331	0,971	0,355	10,457	-531,291	-520,834	32	91,429	0,909	1174
B2	463	476	0,973	0,198	7,843	-190,003	-182,160	26	115,556	0,887	411
B3	946	974	0,971	0,280	9,688	-388,788	-379,100	34	104,615	0,904	855
B4	378	389	0,972	0,182	7,216	-155,276	-148,060	26	130,000	0,883	334
LTOR (All)	608										
Flow cor. Qcor									Total		2774
Total flow Qtotal	3687								Average Vehicle Stops (stop/pcu)		0,752

(1)

Approach Code	Delay			
	Average Traffic Delay sec/pcu	Average Geometric Delay sec/pcu	Average Delay sec/pcu	Total Delay pcu.sec
	DT	**DG**	**DT + DG**	**D x Q**
B1	-427,864	3,243	-424,621	-548610,896
B2	-513,328	1,908	-511,420	-236787,645
B3	-475,977	2,700	-473,276	-447719,543
B4	-517,556	3,235	-514,321	-194413,444
		Total		-1427531,528
		Delay Average deviation		-387,180

(2)

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