



KURSUS PENGENALAN PENILAIAN KESAN TRAFIK (8 -10 FEBRUARI 2021)

ANALISIS DATA TRAFIK AWALAN (BANCIAN TRAFIK)

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BAHAGIAN KEJURUTERAAN TRAFIK (BKT) CAWANGAN JALAN

ANALISA DATA TRAFIK AWALAN

1. PENGUMPULAN DATA



2. PEMROSESAN DATA



1. PENGUMPULAN DATA



PENGUMPULAN DATA

1. KAJIAN AWALAN (DESK STUDY)

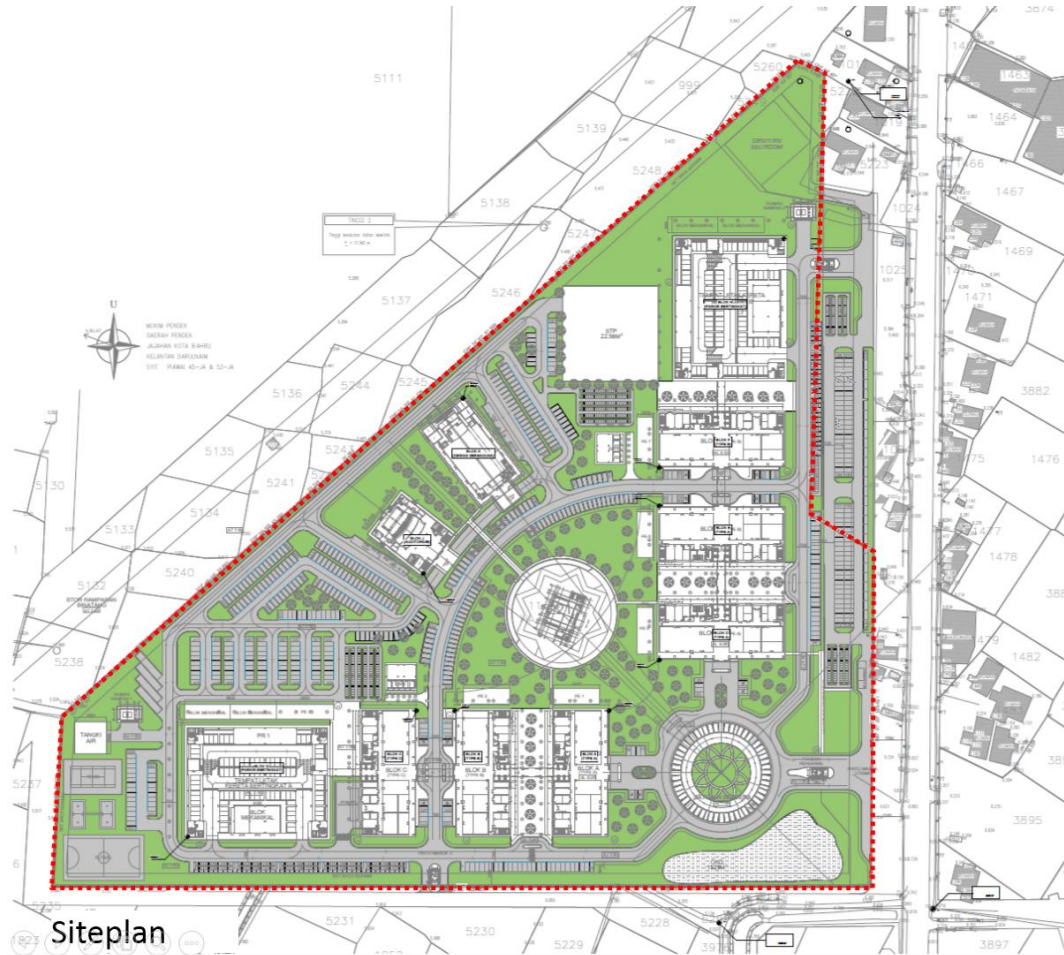
- Mendapatkan brif projek (beserta SOA), lokasi kajian dan pelan susunatur daripada HOPT/HODT
- Menentukan lokasi persimpangan yang terlibat melalui *Google Earth/Maps* sebelum mengadakan lawatan tapak
- Merujuk RTVM sekiranya terdapat stesen bancian BLK yang berhampiran – waktu puncak, *LOS screenline*, *growth rate*
- Semak keperluan/waran TIA



CONTOH LOKASI KAJIAN



CONTOH PELAN SUSUNATUR



Konsep pembangunan terkini

- a. Pintu masuk utama
- b. Pintu masuk 2
- c. Pintu masuk 3
- d. Dataran
- e. Blok A
- f. Blok B
- g. Blok C
- h. Blok D
- i. Blok E
- j. Blok F
- k. Tempat letak kereta 4 tingkat (kakitangan)
- l. Tempat letak kereta 4 tingkat (kakitangan)
- m. Surau (200 pax)
- n. Dewan serbaguna (1000 pax)
- o. Auditorium (100 pax)
- p. Tangki air
- q. Cafeteria (2 nos)
- r. STP
- s. TNB 33KV
- t. Hentian bas / teksi



PENGUMPULAN DATA

2. DATA TRAFIK DI PERSIMPANGAN (BANCIAN TRAFIK)

- Bancian trafik dilaksanakan **setiap 15 minit** bagi **semua arah pergerakan** (termasuk *illegal U-turn*, jika ada) pada **waktu puncak**
- Data diperlukan dalam bentuk
 - *Softcopy (Ms.Excel)*
 - *Hardcopy (raw data)*



BANCIAN TRAFIK



PENGUMPULAN DATA

3. DATA GEOMETRIK (UKURAN DI TAPAK)

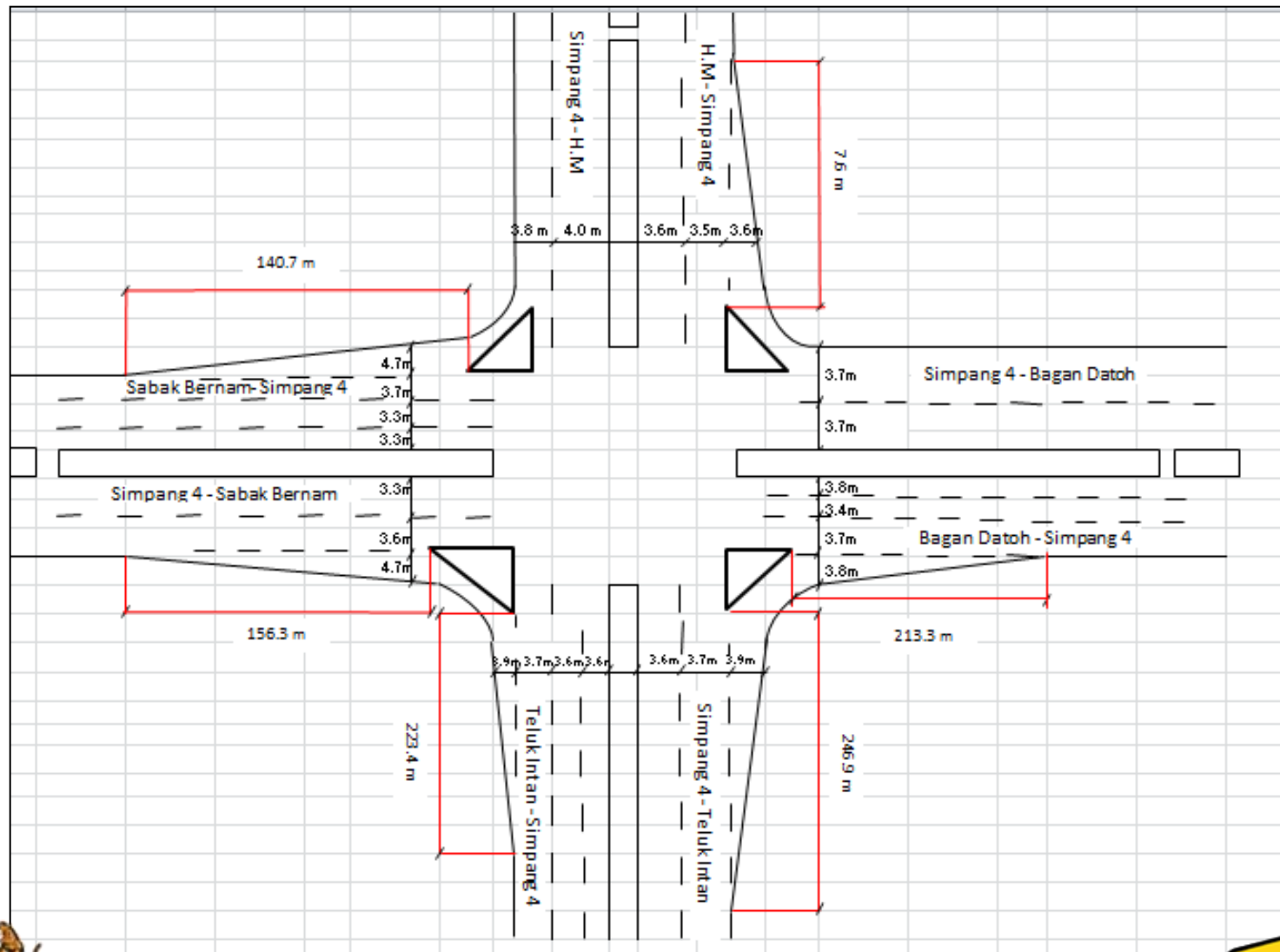
- Data geometrik setiap persimpangan dalam bentuk pelan lakaran
- Menunjukkan ukuran setiap lebar lorong dan panjang *acceleration lane*, *deceleration lane*, *storage lane*, *radius (roundabout)* dan *median* (jika ada)



PENGUKURAN DI TAPAK



CONTOH DATA GEOMETRIK (LAKARAN)





PENGUMPULAN DATA

4. *PHASING TIME*

- *Phasing time* bagi setiap lampu isyarat persimpangan yang terlibat (jika ada)

5. *QUEUE LENGTH*

- Mengambil jarak *queue* terpanjang pada setiap kaki persimpangan beserta gambar



BANCIAN TRAFIK



APAKAH BANCIAN TRAFIK?

- Mengira dan merekod jumlah/isipadu kenderaan
- Mengenalpasti keadaan trafik sebenar di lokasi bancian
- Memberi maklumat lain seperti tahap perkhidmatan jalan (LOS), waktu puncak, komposisi trafik dan lain-lain



OBJEKTIF BANCIAAN TRAFIK (UMUM)

- Mengetahui ciri-ciri trafik serta keberkesanan sistem rangkaian jalanraya semasa
- *Road planning* – rekabentuk jalan yang lebih berkesan berdasarkan keperluan (jumlah lorong, ketebalan turapan jalan)
- Keperluan *upgrading/junction treatment*
- Pembangunan dasar-dasar pengangkutan



OBJEKTIF BANCIAAN TRAFIK (TIA)

- Mengumpul data isipadu trafik sediada di setiap *screen line* dan persimpangan
- Menganalisa keadaan trafik sediada – LOS, waktu puncak, komposisi trafik, *existing traffic pattern/distribution*
- Menganalisa keadaan trafik akan datang di *screen line* dan persimpangan
- Mencadangkan konsep rekabentuk persimpangan yang terlibat (sama ada persimpangan baru atau naiktaraf)



JENIS-JENIS BANCIAAN TRAFIK

- **Traffic Volume Survey** – Traffic count
- **Area-Wide Survey** – Plate number survey, OD survey, roadside interview
- **Speed Survey** – Using speed measuring equipment
- **Queue Length/Junction Delay Survey** - Recording the length of the queue on an approach to a junction and the queueing time
- **Other survey** – pedestrian, cyclist, public transport



TRAFFIC VOLUME SURVEY

- Traffic count falls into **two** main categories; **manual counts** and **automatic counts**.
- There are no distinct differences between the two methods, however economic consideration will determine the selection of an appropriate method of traffic counting
- **AUTOMATIC COUNT** – Pressure/pneumatic tube, inductive loop, video-based count
- **MANUAL COUNT** – Manual observation, vehicle classification



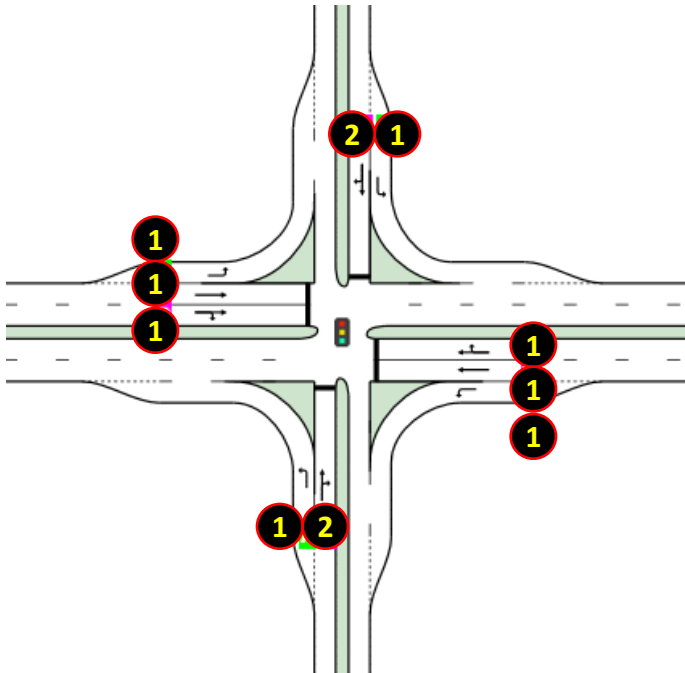
APA YANG DIPERLUKAN (MANUAL TRAFFIC SURVEY)

- Pembanci – bagi setiap arah pergerakan
- Borang banci
- Tally counter

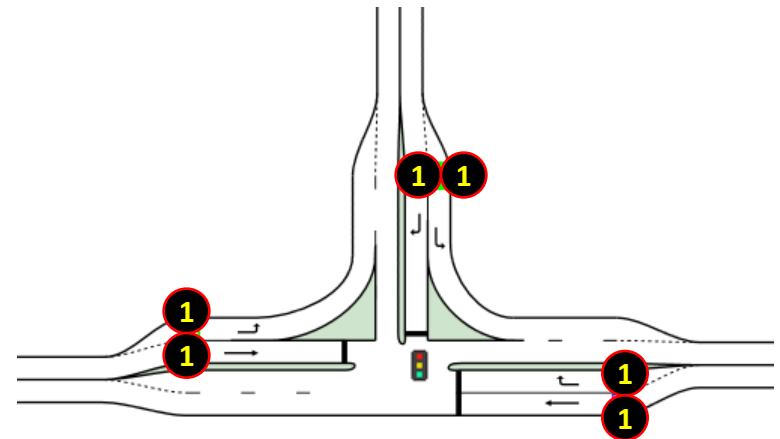


ARAH PERGERAKAN TRAFIK

1 BILANGAN PEMBANGCI



SIMPANG EMPAT TANPA U-TURN
(JUMLAH PEMBANGCI 12 ORANG)



SIMPANG TIGA
(JUMLAH PEMBANGCI 6 ORANG)



KELAS-KELAS KENDERAAN

CLASS	VEHICLE TYPE
Motorcars, Taxis & Small MPV's 1	 Small MPV's :- Proton Isora, Proton Alza, Honda Stream, Toyota Wish, Naza Ria, etc.
Small Vans, Big MPV's & Utilities (Light 2 axles) 2	 Big MPV's :- Toyota Alphard/Velfire, etc.
Lorries & Large Vans (Heavy 2 axles) 3	 Large Vans :- 12 Seater and Above
Lorries with 3 axles (Heavy 3 axles and above) 4	
Buses 5	
Motorcycles & Scooters 6	 Including 3 Wheel Motorcycle

SUMBER: BHGN PERANCANG JALAN, KKR



BORANG BANCI

[Borang (BP) J.K.R. 305-Pin.593]


 Bahagian Perancang Jalan
 KEMENTERIAN KERJA RAYA MALAYSIA
LAPORAN BANCI LALULINTAS KEBANGSAAN
 Ringkasan Harian
 Rekod Kiraan Manual

Borang : KKR – B42
 No Keluaran : 3
 No Pindaan : 1
 Mukasurat : 1 / 1

Negeri : Daerah :

No. Stesen : **15-Minute Peak Hours Traffic Count** Jenis Kajian : ☐

Lokasi Stesen : Ke Arah ☐

Lalulintas dari : ☐

Bilangan Lorong :

Har : Tarikh :

Disediakan oleh :

Jam Permulaan	(1) Motor dan Taksi	(2) Van Kecil dan UTV (Ringan – 2 gandar)	(3) Lori dan Van Besar (Berat – 2 gandar)	(4) Lori dengan 3 Gandar atau trailer (Berat dan melebihi 2 gandar)	(5) Bas	(6) Motosikal	Jumlah
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WAKTU PUNCAK

- Waktu puncak pagi (Contoh: 6.00 pagi – 9.00 pagi)
- Waktu puncak petang (Contoh: 4.00 ptg – 7.00 ptg)
- Pemilihan waktu puncak bergantung kepada lokasi kajian dan jenis guna tanah (*land use*)
- RTVM sebagai panduan (jika terdapat stesen banci berhampiran)



2. PEMROSESAN DATA



PEMROSESAN DATA

- Data trafik yang diperolehi dari bancian trafik perlu diproses sebelum digunakan untuk analisis selanjutnya (menggunakan perisian SIDRA)
- Data perlu ditukarkan kepada unit kenderaan penumpang (*passenger car unit, pcu*) dan *pcu/hr*



PASSENGER CAR UNIT (PCU)

CONVERSION FACTOR

Type of Vehicle	Equivalent Value in pcu			
	Two Lane Highways ⁽¹⁾	Multilane Highways ⁽¹⁾	Expressways ⁽¹⁾	Traffic Signal Design ⁽²⁾
Cars/Small Vans/Utilities	1.00	1.00	1.00	1.00
Lorries (with 2 axles)/Large Vans	1.44	1.58	1.47	1.19
Large lorry, trailers, heavy vehicles with 3 axles and more	1.83	1.76	1.95	2.27
Buses	1.93	1.65	1.66	2.08
Motorcycles	0.96	0.84	0.63	0.22

Table 4.0: PCU Conversion Factors

Source: ATJ 38/2018: Guidelines For Traffic Impact Assessment



CONTOH 1

COMPUTE PCU FOR A TRAFFIC SIGNAL JUNCTION WITH THE FOLLOWING TRAFFIC VOLUME

Passenger cars: 250

Motorcycles: 60

Heavy Lorries: 5

Medium lorries: 20

Buses: 2

Light vans: 10

<i>TYPES OF VEHICLES</i>	<i>TRAFFIC VOLUME</i>	<i>PCU CONVERSION FACTOR</i>	<i>PASSENGER CAR UNIT</i>
<i>PASSENGER CARS</i>			
<i>LIGHT VANS/UTILITIES</i>			
<i>MEDIUM LORRIES</i>			
<i>HEAVY LORRIES</i>			
<i>BUSES</i>			
<i>MOTORCYCLES</i>			



JAWAPAN

A TRAFFIC SIGNAL JUNCTION

Passenger cars: 250

Heavy Lorries: 5

Buses: 2

Motorcycles: 60

Medium lorries: 20

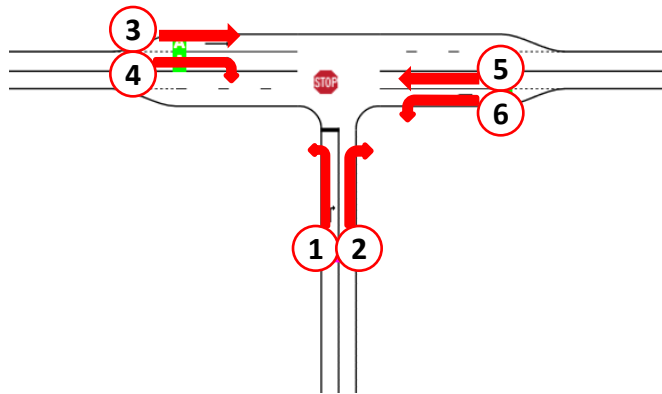
Light vans: 10

<i>TYPES OF VEHICLES</i>	<i>TRAFFIC COUNT</i>	<i>PCU CONVERSION FACTOR</i>	<i>PASSENGER CAR UNIT</i>
<i>PASSENGER CARS</i>	<i>250</i>	<i>1.00</i>	<i>250</i>
<i>LIGHT VANS/UTILITIES</i>	<i>10</i>	<i>1.00</i>	<i>10</i>
<i>MEDIUM LORRIES</i>	<i>20</i>	<i>1.19</i>	<i>24</i>
<i>HEAVY LORRIES</i>	<i>5</i>	<i>2.27</i>	<i>11</i>
<i>BUSES</i>	<i>2</i>	<i>2.08</i>	<i>4</i>
<i>MOTORCYCLES</i>	<i>60</i>	<i>0.22</i>	<i>13</i>

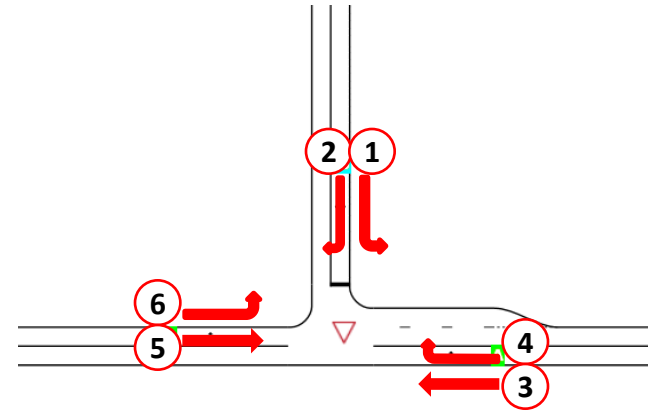


CONTOH 2

**KENALPASTI PCU/HR BAGI KAJIAN YANG MELIBATKAN DUA PERSIMPANGAN
SEPERTI DI BAWAH**



JUNCTION 2



JUNCTION 1



← 3 ARAH PERGERAKAN



LANGKAH 1 – KIRA PCU

JUNCTION 1

ARAH 1										ARAH 2										ARAH 3										ARAH 4										ARAH 5										ARAH 6										
TIME	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR											
6:00	6:15	2	0	0	0	0	3	3	41	3	2	0	0	0	2	5	20	11	3	3	2	1	8	26	167	0	0	0	0	0	3	1	22	10	0	1	0	0	9	13	128	2	0	0	0	0	4	3	18	396										
6:15	6:30	3	0	0	0	0	3	4	94	3	1	0	0	0	2	4	21	16	0	0	0	0	0	16	296	1	0	0	0	0	1	1	36	18	1	0	2	0	9	26	209	2	1	0	0	0	4	4	26	681										
6:30	6:45	7	3	0	0	0	7	12	167	3	1	0	0	0	3	5	24	23	6	2	0	1	19	38	486	5	0	0	0	0	4	6	56	32	1	1	0	0	30	41	351	1	1	0	0	0	11	4	41	1125										
6:45	7:00	13	2	1	0	0	32	23	186	5	0	0	0	0	2	5	30	53	9	7	2	1	46	87	613	9	3	0	0	0	10	14	65	30	3	2	2	2	21	49	421	4	0	0	0	0	13	7	48	1363										
7:00	7:15	33	5	0	0	0	80	56	186	3	2	0	0	0	7	7	40	120	5	5	0	2	91	155	647	10	2	0	0	0	12	15	58	70	3	3	1	0	68	94	490	8	0	0	0	0	11	10	52	1474										
7:15	7:30	54	3	0	1	0	80	77	161	6	0	0	0	0	4	7	45	172	6	5	0	2	82	206	582	13	3	2	0	0	11	21	53	125	8	10	2	0	85	168	502	10	5	1	0	0	15	19	56	1400										
7:30	7:45	14	2	2	2	0	32	30	121	10	0	0	0	0	6	11	50	133	2	2	3	1	83	165	422	12	2	0	0	0	7	16	41	80	0	7	0	2	83	111	448	6	1	0	0	0	20	11	41	1124										
7:45	8:00	19	1	1	0	0	10	23	119	9	1	2	0	0	15	16	47	97	0	5	2	2	45	122	368	6	0	0	0	0	4	7	38	100	1	0	0	1	65	117	463	5	1	1	0	0	17	11	36	1071										
8:00	8:15	22	3	1	0	0	21	31	110	5	5	0	0	0	5	11	38	63	5	9	1	0	42	90	372	3	3	2	0	0	8	10	40	76	8	5	2	1	42	106	463	9	1	1	0	0	15	14	36	1058										
8:15	8:30	26	5	1	0	0	20	37		4	4	2	0	0	7	12		37	1	0	0	1	27	46		6	1	0	0	0	8	9		70	12	15	2	0	45	114		1	0	0	0	16	5													
8:30	8:45	18	2	1	0	0	30	28		2	2	1	1	0	5	9		70	9	5	6	2	34	110		8	0	2	0	0	7	12		78	15	5	2	4	62	125		5	0	0	0	0	7	7												
8:45	9:00	9	1	0	0	0	20	14		2	2	1	0	0	4	6		94	5	6	4	1	36	125		3	2	0	1	0	8	9		62	10	15	5	2	55	117		8	0	0	0	0	12	11												



LANGKAH 2 – KIRA PCU/HR

JUNCTION 1

ARAH 1										ARAH 2										ARAH 3										ARAH 4										ARAH 5										ARAH 6										
TIME	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR											
6:00	6:15	2	0	0	0	0	3	3	41	3	2	0	0	0	2	5	20	11	3	3	2	1	8	26	167	0	0	0	0	0	3	1	22	10	0	1	0	0	0	9	13	128	2	0	0	0	0	4	3	18	396									
6:15	6:30	3	0	0	0	0	3	4	94	3	1	0	0	0	2	4	21	16	0	0	0	0	0	16	296	1	0	0	0	0	1	1	36	18	1	0	2	0	9	26	209	2	1	0	0	0	4	4	26	681										
6:30	6:45	7	3	0	0	0	7	12	167	3	1	0	0	0	3	5	24	23	6	2	0	1	19	38	486	5	0	0	0	0	4	6	56	32	1	1	0	0	30	41	351	1	1	0	0	0	11	4	41	1125										
6:45	7:00	13	2	1	0	0	32	23	186	5	0	0	0	0	2	5	30	53	9	7	2	1	46	87	613	9	3	0	0	0	10	14	65	30	3	2	2	2	21	49	421	4	0	0	0	0	13	7	48	1363										
7:00	7:15	33	5	0	0	0	80	56	186	3	2	0	0	0	7	7	40	120	5	5	0	2	91	155	647	10	2	0	0	0	12	15	58	70	3	3	1	0	68	94	490	8	0	0	0	0	11	10	52	1474										
7:15	7:30	54	3	0	1	0	80	77	161	6	0	0	0	0	4	7	45	172	6	5	0	2	82	206	582	13	3	2	0	0	11	21	53	125	8	10	2	0	85	168	502	10	5	1	0	0	15	19	56	1400										
7:30	7:45	14	2	2	2	0	32	30	121	10	0	0	0	0	6	11	50	133	2	2	3	1	83	165	422	12	2	0	0	0	7	16	41	80	0	7	0	2	83	111	448	6	1	0	0	0	20	11	41	1124										
7:45	8:00	19	1	1	0	0	10	23	119	9	1	2	0	0	15	16	47	97	0	5	2	2	45	122	368	6	0	0	0	0	4	7	38	100	1	0	0	1	65	117	463	5	1	1	0	0	17	11	36	1071										
8:00	8:15	22	3	1	0	0	21	31	110	5	5	0	0	0	5	11	38	63	5	9	1	0	42	90	372	3	3	2	0	0	8	10	40	76	8	5	2	1	42	106	463	9	1	1	0	0	15	14	36	1058										
8:15	8:30	26	5	1	0	0	20	37		4	4	2	0	0	7	12		37	1	0	0	1	27	46		6	1	0	0	0	8	9		70	12	15	2	0	45	114		1	0	0	0	16	5													
8:30	8:45	18	2	1	0	0	30	28		2	2	1	1	0	5	9		70	9	5	6	2	34	110		8	0	2	0	0	7	12		78	15	5	2	4	62	125		5	0	0	0	0	7	7												
8:45	9:00	9	1	0	0	0	20	14		2	2	1	0	0	4	6		94	5	6	4	1	36	125		3	2	0	1	0	8	9		62	10	15	5	2	55	117		8	0	0	0	0	12	11												



BAGAIMANA MENGIRA PCU/HR

ARAH 1										
TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU		PCU/HR
6:00	6:15	2	0	0	0	0	3	3	}	41
6:15	6:30	3	0	0	0	0	3	4		94
6:30	6:45	7	3	0	0	0	7	12		167
6:45	7:00	13	2	1	0	0	32	23		186
7:00	7:15	33	5	0	0	0	80	56		186
7:15	7:30	54	3	0	1	0	80	77		161
7:30	7:45	14	2	2	2	0	32	30		121
7:45	8:00	19	1	1	0	0	10	23		119
8:00	8:15	22	3	1	0	0	21	31		110
8:15	8:30	26	5	1	0	0	20	37		
8:30	8:45	18	2	1	0	0	30	28		
8:45	9:00	9	1	0	0	0	20	14		

JUMLAHKAN PCU BAGI SETIAP JAM



LANGKAH 3 – KIRA TOTAL PCU/HR

JUNCTION 1

ARAH 1										ARAH 2										ARAH 3										ARAH 4										ARAH 5										ARAH 6										TOTAL PCU/HR
TIME	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR												
6:00	6:15	2	0	0	0	0	3	3	41	3	2	0	0	0	2	5	20	11	3	3	2	1	8	26	167	0	0	0	0	0	3	22	10	0	1	0	0	9	13	128	2	0	0	0	0	4	3	18	396											
6:15	6:30	3	0	0	0	0	3	4	94	3	1	0	0	0	2	4	21	16	0	0	0	0	0	16	296	1	0	0	0	0	1	1	36	18	1	0	2	0	9	26	209	2	1	0	0	0	4	4	26	681										
6:30	6:45	7	3	0	0	0	7	12	167	3	1	0	0	0	3	5	24	23	6	2	0	1	19	38	486	5	0	0	0	0	4	6	56	32	1	1	0	0	30	41	351	1	1	0	0	0	11	4	41	1125										
6:45	7:00	13	2	1	0	0	32	23	186	5	0	0	0	0	2	5	30	53	9	7	2	1	46	87	613	9	3	0	0	0	10	14	65	30	3	2	2	2	21	49	421	4	0	0	0	0	13	7	48	1363										
7:00	7:15	33	5	0	0	0	80	56	186	3	2	0	0	0	7	7	40	120	5	5	0	2	91	155	647	10	2	0	0	0	12	15	58	70	3	3	1	0	68	94	490	8	0	0	0	0	11	10	52	1474										
7:15	7:30	54	3	0	1	0	80	77	161	6	0	0	0	0	4	7	45	172	6	5	0	2	82	206	582	13	3	2	0	0	11	21	53	125	8	10	2	0	85	168	502	10	5	1	0	0	15	19	56	1400										
7:30	7:45	14	2	2	2	0	32	30	121	10	0	0	0	0	6	11	50	133	2	2	3	1	83	165	422	12	2	0	0	0	7	16	41	80	0	7	0	2	83	111	448	6	1	0	0	0	20	11	41	1124										
7:45	8:00	19	1	1	0	0	10	23	119	9	1	2	0	0	15	16	47	97	0	5	2	2	45	122	368	6	0	0	0	0	4	7	38	100	1	0	0	1	65	117	463	5	1	1	0	0	17	11	36	1071										
8:00	8:15	22	3	1	0	0	21	31	110	5	5	0	0	0	5	11	38	63	5	9	1	0	42	90	372	3	3	2	0	0	8	10	40	76	8	5	2	1	42	106	463	9	1	1	0	0	15	14	36	1058										
8:15	8:30	26	5	1	0	0	20	37		4	4	2	0	0	7	12		37	1	0	0	1	27	46		6	1	0	0	0	8	9		70	12	15	2	0	45	114		1	0	0	0	16	5													
8:30	8:45	18	2	1	0	0	30	28		2	2	1	1	0	5	9		70	9	5	6	2	34	110		8	0	2	0	0	7	12		78	15	5	2	4	62	125		5	0	0	0	0	7	7												
8:45	9:00	9	1	0	0	0	20	14		2	2	1	0	0	4	6		94	5	6	4	1	36	125		3	2	0	1	0	8	9		62	10	15	5	2	55	117		8	0	0	0	0	12	11												



ULANG LANGKAH 1-3 UNTUK *JUNCTION 2*

JUNCTION 2

ARAH 1										ARAH 2										ARAH 3										ARAH 4										ARAH 5										ARAH 6										TOTAL CU/HR
TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	CU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	CU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	CU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	CU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	CU/HR																			
6:00	6:15	1	0	0	0	0	1	1	7	0	1	0	0	0	6	2	26	14	2	2	1	0	7	22	185	0	0	0	0	0	0	0	6	9	3	3	2	0	3	21	152	1	1	2	0	0	1	5	29	405										
6:15	6:30	0	0	0	1	0	3	3	18	0	2	0	0	0	1	2	38	20	2	0	4	0	7	33	288	0	0	0	0	0	0	0	29	15	8	3	2	1	5	34	225	2	1	0	0	0	0	3	50	649										
6:30	6:45	1	0	0	0	0	0	1	31	3	0	3	0	1	3	9	41	27	0	1	4	0	10	39	444	0	1	0	0	0	2	1	60	24	0	1	1	2	7	33	330	0	0	3	0	0	0	4	74	980										
6:45	7:00	1	0	0	0	0	6	2	34	9	2	0	0	0	4	12	38	73	0	7	1	0	33	91	563	4	0	0	0	0	2	4	80	40	5	4	3	1	23	64	473	10	0	3	1	0	10	18	92	1279										
7:00	7:15	7	0	0	0	0	23	12	37	12	2	0	0	0	4	15	39	110	1	2	0	1	44	125	622	12	0	0	0	0	50	23	93	66	5	9	3	0	26	94	528	23	0	0	0	0	13	26	90	1409										
7:15	7:30	10	0	0	0	0	27	16	33	3	0	1	0	0	3	5	29	160	5	1	2	1	70	188	626	16	2	0	0	0	60	31	73	109	12	1	3	0	47	139	516	13	2	0	2	0	30	26	76	1353										
7:30	7:45	1	0	0	0	0	11	3	20	4	0	2	0	0	1	7	36	143	3	2	0	0	48	159	562	15	2	0	0	0	18	21	46	146	7	7	0	3	36	175	461	18	1	0	0	0	12	22	62	1186										
7:45	8:00	5	0	0	0	0	4	6	23	9	2	0	0	0	7	13	40	132	5	1	0	0	53	150	514	10	3	0	0	0	22	18	35	94	8	4	2	1	27	119	397	13	0	0	0	0	13	16	49	1057										
8:00	8:15	4	1	2	0	0	3	8	21	3	1	0	0	0	4	5	37	106	10	5	0	0	30	129	455	2	0	0	0	0	6	3	19	61	6	2	2	2	18	82	343	8	2	0	0	0	10	12	39	915										
8:15	8:30	1	0	1	0	0	1	2		8	3	0	0	0	4	12		92	10	5	3	0	46	125		0	0	1	1	0	1	4		56	6	13	1	0	18	84		8	1	0	0	0	13	12												
8:30	8:45	3	2	1	0	0	1	6		10	0	0	0	0	2	10		86	3	5	3	2	21	111		4	1	0	2	0	2	10		61	15	12	5	3	17	112		2	3	2	0	0	8	9												
8:45	9:00	3	0	0	0	0	5	4		9	0	0	0	0	3	10		62	10	5	2	2	21	91		2	0	0	0	0	1	2		42	4	6	2	2	18	66		5	0	0		0	5	6												



LANGKAH 4 – KIRA JUMLAH PCU/HR KEDUA-DUA JUNCTION

TIME		TOTAL PCU/HR JUNCTION 1	TOTAL PCU/HR JUNCTION 2	OVERALL PCU/HR JUNCTION 1+2
6:00	6:15	396	405	801
6:15	6:30	681	649	1331
6:30	6:45	1125	980	2105
6:45	7:00	1363	1279	2643
7:00	7:15	1474	1409	2883
7:15	7:30	1400	1353	2753
7:30	7:45	1124	1186	2310
7:45	8:00	1071	1057	2128
8:00	8:15	1058	915	1973
8:15	8:30			
8:30	8:45			
8:45	9:00			



LANGKAH 5 – KENALPASTI *PEAK HOUR*

TIME		TOTAL PCU/HR JUNCTION 1	TOTAL PCU/HR JUNCTION 2	OVERALL PCU/HR JUNCTION 1+2
6:00	6:15	396	405	801
6:15	6:30	681	649	1331
6:30	6:45	1125	980	2105
6:45	7:00	1363	1279	2643
7:00	7:15	1474	1409	2883
7:15	7:30	1400	1353	2753
7:30	7:45	1124	1186	2310
7:45	8:00	1071	1057	2128
8:00	8:15	1058	915	1973
8:15	8:30			
8:30	8:45			
8:45	9:00			

MAXIMUM TRAFFIC VOLUME = 2883 PCU/HR
PEAK HOUR: 7.00 AM – 8.00 AM



LANGKAH 6 – DAPATKAN PCU/HR PADA WAKTU PUNCAK 7.00 AM – 8.00 AM

JUNCTION 1

ARAH 1										ARAH 2										ARAH 3										ARAH 4										ARAH 5										ARAH 6										
TIME	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR						
6:00	6:15	2	0	0	0	0	3	3	41	3	2	0	0	0	2	5	20	11	3	3	2	1	8	26	167	0	0	0	0	0	3	1	22	10	0	1	0	0	9	13	128	2	0	0	0	0	4	3	18	396										
6:15	6:30	3	0	0	0	0	3	4	94	3	1	0	0	0	2	4	21	16	0	0	0	0	0	16	296	1	0	0	0	0	1	1	36	18	1	0	2	0	9	26	209	2	1	0	0	0	4	4	26	681										
6:30	6:45	7	3	0	0	0	7	12	167	3	1	0	0	0	3	5	24	23	6	2	0	1	19	38	486	5	0	0	0	0	4	6	56	32	1	1	0	0	30	41	351	1	1	0	0	0	11	4	41	1125										
6:45	7:00	13	2	1	0	0	32	23	186	5	0	0	0	0	2	5	30	53	9	7	2	1	46	87	613	9	3	0	0	0	10	14	65	30	3	2	2	2	21	49	421	4	0	0	0	0	13	7	48	1363										
7:00	7:15	33	5	0	0	0	80	56	186	3	2	0	0	0	7	7	40	120	5	5	0	2	91	155	647	10	2	0	0	0	12	1	58	70	3	3	1	0	68	94	490	8	0	0	0	0	11	10	52	1474										
7:15	7:30	54	3	0	1	0	80	77	161	6	0	0	0	0	4	7	45	172	6	5	0	2	82	206	582	13	3	2	0	0	11	21	53	125	8	10	2	0	85	168	502	10	5	1	0	0	15	19	56	1400										
7:30	7:45	14	2	2	2	0	32	30	121	10	0	0	0	0	6	11	50	133	2	2	3	1	83	165	422	12	2	0	0	0	7	16	41	80	0	7	0	2	83	111	448	6	1	0	0	0	20	11	41	1124										
7:45	8:00	19	1	1	0	0	10	23	119	9	1	2	0	0	15	16	47	97	0	5	2	2	45	122	368	6	0	0	0	0	4	7	38	100	1	0	0	1	65	117	463	5	1	1	0	0	17	11	36	1071										
8:00	8:15	22	3	1	0	0	21	31	110	5	5	0	0	0	5	11	38	63	5	9	1	0	42	90	372	3	3	2	0	0	8	10	40	76	8	5	2	1	42	106	463	9	1	1	0	0	15	14	36	1058										
8:15	8:30	26	5	1	0	0	20	37		4	4	2	0	0	7	12		37	1	0	0	1	27	46		6	1	0	0	0	8	9		70	12	15	2	0	45	114		1	0	0	0	16	5													
8:30	8:45	18	2	1	0	0	30	28		2	2	1	1	0	5	9		70	9	5	6	2	34	110		8	0	2	0	0	7	12		78	15	5	2	4	62	125		5	0	0	0	0	7	7												
8:45	9:00	9	1	0	0	0	20	14		2	2	1	0	0	4	6		94	5	6	4	1	36	125		3	2	0	1	0	8	9		62	10	15	5	2	55	117		8	0	0	0	0	12	11												



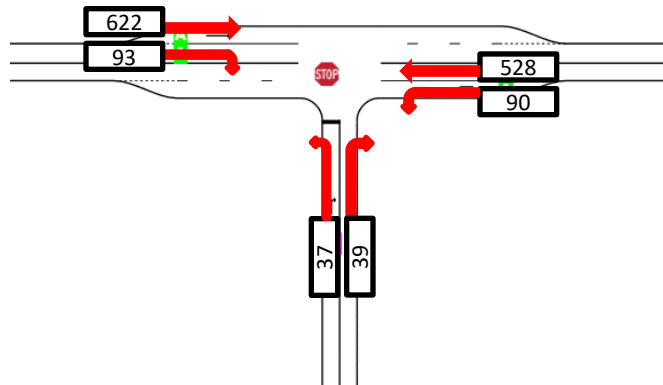
LANGKAH 6 – DAPATKAN PCU/HR PADA WAKTU PUNCAK 7.00 AM – 8.00 AM

JUNCTION 2

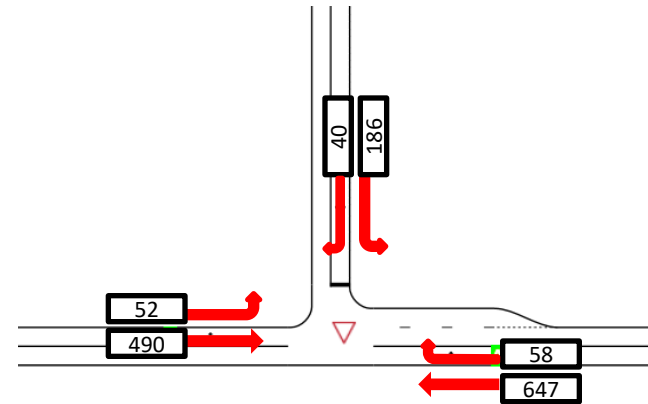
ARAH 1										ARAH 2								ARAH 3								ARAH 4								ARAH 5								ARAH 6								
		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR
6:00	6:15	1	0	0	0	0	1	1	7	0	1	0	0	0	6	2	26	14	2	2	1	0	7	22	185	0	0	0	0	0	0	0	6	9	3	3	2	0	3	21	152	1	1	2	0	0	1	5	29	405
6:15	6:30	0	0	0	1	0	3	3	18	0	2	0	0	0	1	2	38	20	2	0	4	0	7	33	288	0	0	0	0	0	0	0	29	15	8	3	2	1	5	34	225	2	1	0	0	0	0	3	50	649
6:30	6:45	1	0	0	0	0	0	1	31	3	0	3	0	1	3	9	41	27	0	1	4	0	10	39	444	0	1	0	0	0	2	1	60	24	0	1	1	2	7	33	330	0	0	3	0	0	0	4	74	980
6:45	7:00	1	0	0	0	0	6	2	34	9	2	0	0	0	4	12	38	73	0	7	1	0	33	91	563	4	0	0	0	0	2	4	80	40	5	4	3	1	23	64	473	10	0	3	1	0	10	18	92	1279
7:00	7:15	7	0	0	0	0	23	12	37	12	2	0	0	0	4	15	39	110	1	2	0	1	44	125	622	12	0	0	0	0	50	23	93	66	5	9	3	0	26	94	528	23	0	0	0	0	13	26	90	1409
7:15	7:30	10	0	0	0	0	27	16	33	3	0	1	0	0	3	5	29	160	5	1	2	1	70	188	626	16	2	0	0	0	60	31	73	109	12	1	3	0	47	139	516	13	2	0	2	0	30	26	76	1353
7:30	7:45	1	0	0	0	0	11	3	20	4	0	2	0	0	1	7	36	143	3	2	0	0	48	159	562	15	2	0	0	0	18	21	46	146	7	7	0	3	36	175	461	18	1	0	0	0	12	22	62	1186
7:45	8:00	5	0	0	0	0	4	6	23	9	2	0	0	0	7	13	40	132	5	1	0	0	53	150	514	10	3	0	0	0	22	18	35	94	8	4	2	1	27	119	397	13	0	0	0	0	13	16	49	1057
8:00	8:15	4	1	2	0	0	3	8	21	3	1	0	0	0	4	5	37	106	10	5	0	0	30	129	455	2	0	0	0	0	6	3	19	61	6	2	2	2	18	82	343	8	2	0	0	0	10	12	39	915
8:15	8:30	1	0	1	0	0	1	2		8	3	0	0	0	4	12		92	10	5	3	0	46	125		0	0	1	1	0	1	4	56	6	13	1	0	18	84		8	1	0	0	0	13	12			
8:30	8:45	3	2	1	0	0	1	6		10	0	0	0	0	2	10		86	3	5	3	2	21	111		4	1	0	2	0	2	10	61	15	12	5	3	17	112		2	3	2	0	0	8	9			
8:45	9:00	3	0	0	0	0	5	4		9	0	0	0	0	3	10		62	10	5	2	2	21	91		2	0	0	0	0	1	2	42	4	6	2	2	18	66		5	0	0		0	5	6			



DATA *PCU/HR* SEDIA UNTUK ANALISIS SETERUSNYA MENGUNAKAN *SOFTWARE SIDRA*



JUNCTION 2



JUNCTION 1



PERBEZAAN BANCİ TIA/KAJIAN TRAFİK DAN BANCİ LALULINTAS KEBANGSAAN (BLK)

BIL	BANCİ TIA/KAJIAN TRAFİK	BANCİ LALULINTAS KEBANGSAAN
1.	Dilaksanakan mengikut keperluan – bagi projek baru ataupun kajian kesesakan jalan sedia ada	Dilaksanakan setiap tahun (2 kali) – mendapatkan data trafik, komposisi trafik, <i>traffic growth</i> tahunan
2.	Dilakukan pada waktu puncak pagi dan petang (kebiasaannya 3 jam pagi dan 3 jam petang)	Dilaksanakan selama 16 jam dan 24 jam (mengikut lokasi)
3.	Data direkod setiap 15 minit	Data direkod setiap 1 jam
4.	Lokasi kajian lebih spesifik	Lokasi yang sama (stesen banci)
5.	Banci persimpangan dan <i>screenline</i>	Banci <i>screenline</i> sahaja
6.	Kos kerja bancian daripada peruntukan projek/JKR Daerah	Kos kerja bancian daripada KKR





TERIMA KASIH

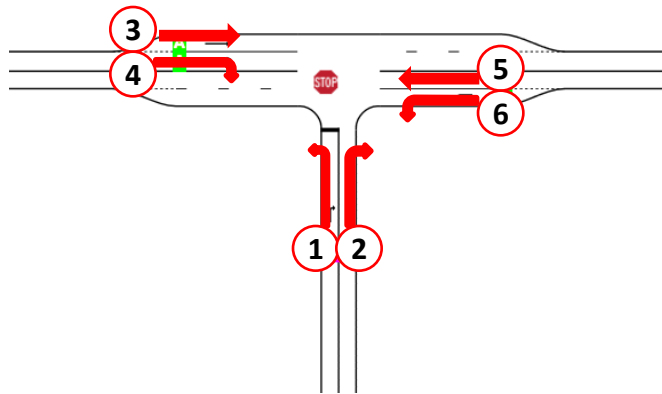


HANDS ON

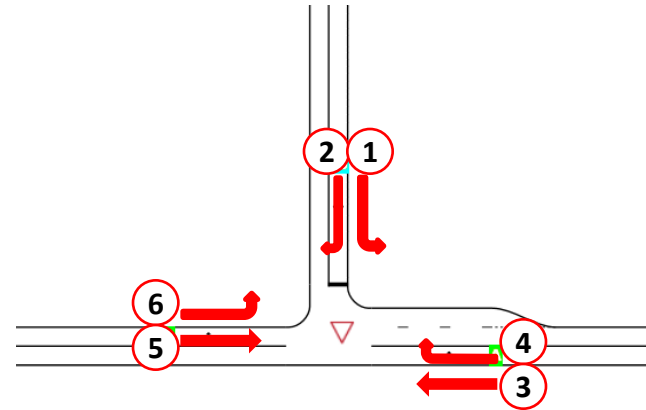


CONTOH 3

**KENALPASTI PCU/HR BAGI KAJIAN YANG MELIBATKAN DUA PERSIMPANGAN
SEPERTI DI BAWAH MENGGUNAKAN DATA BANGCI YANG DIBERIKAN**



JUNCTION 2



JUNCTION 1



← 3 ARAH PERGERAKAN



JUNCTION 1

JUNCTION 1

ARAH 1		1.00	1.00	1.19	2.27	2.08	0.22		
		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
TIME									
6:00	6:15	3	0	0	0	0	3		
6:15	6:30	3	0	0	0	0	3		
6:30	6:45	7	3	0	0	0	7		
6:45	7:00	13	2	1	0	0	32		
7:00	7:15	34	5	0	0	0	80		
7:15	7:30	54	3	0	1	0	80		
7:30	7:45	14	2	2	2	0	32		
7:45	8:00	19	1	1	0	0	10		
8:00	8:15	22	3	1	0	0	21		
8:15	8:30	26	5	1	0	0	20		
8:30	8:45	18	2	1	0	0	30		
8:45	9:00	9	1	0	0	0	20		
Total		220	27	7	3	0	338		

ARAH 2									
		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
TIME									
6:00	6:15	4	2	0	0	0	2		
6:15	6:30	3	1	0	0	0	2		
6:30	6:45	3	1	0	0	0	3		
6:45	7:00	5	0	0	0	0	2		
7:00	7:15	4	2	0	0	0	7		
7:15	7:30	6	0	0	0	0	4		
7:30	7:45	10	0	0	0	0	6		
7:45	8:00	9	1	2	0	0	15		
8:00	8:15	5	5	0	0	0	5		
8:15	8:30	4	4	2	0	0	7		
8:30	8:45	2	2	1	1	0	5		
8:45	9:00	2	2	1	0	0	4		
Total		55	20	6	1	0	62		

JUNCTION 1

ARAH 3

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	12	3	3	2	1	8		
6:15	6:30	16	0	0	0	0	0		
6:30	6:45	23	6	2	0	1	19		
6:45	7:00	53	9	7	2	1	46		
7:00	7:15	120	5	5	0	2	91		
7:15	7:30	172	6	5	0	2	82		
7:30	7:45	133	2	2	3	1	83		
7:45	8:00	97	0	5	2	2	45		
8:00	8:15	63	5	9	1	0	42		
8:15	8:30	37	1	0	0	1	27		
8:30	8:45	70	9	5	6	2	34		
8:45	9:00	94	5	6	4	1	36		
Total		889	51	49	20	14	513		

ARAH 4

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	1	0	0	0	0	3		
6:15	6:30	1	0	0	0	0	1		
6:30	6:45	5	0	0	0	0	4		
6:45	7:00	9	3	0	0	0	10		
7:00	7:15	10	2	0	0	0	12		
7:15	7:30	13	3	2	0	0	11		
7:30	7:45	12	2	0	0	0	7		
7:45	8:00	6	0	0	0	0	4		
8:00	8:15	3	3	2	0	0	8		
8:15	8:30	6	1	0	0	0	8		
8:30	8:45	8	0	2	0	0	7		
8:45	9:00	3	2	0	1	0	8		
Total		76	16	6	1	0	83		

JUNCTION 1

ARAH 5

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	11	0	1	0	0	9		
6:15	6:30	18	1	0	2	0	9		
6:30	6:45	32	1	1	0	0	30		
6:45	7:00	30	3	2	2	2	21		
7:00	7:15	70	3	3	1	0	68		
7:15	7:30	125	8	10	2	0	85		
7:30	7:45	80	0	7	0	2	83		
7:45	8:00	100	1	0	0	1	65		
8:00	8:15	76	8	5	2	1	42		
8:15	8:30	70	12	15	2	0	45		
8:30	8:45	78	15	5	2	4	62		
8:45	9:00	62	10	15	5	2	55		
Total		751	62	64	18	12	574		

ARAH 6

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR
6:00	6:15	3	0	0	0	0	4	3		
6:15	6:30	2	1	0	0	0	4	4		
6:30	6:45	1	1	0	0	0	11	4		
6:45	7:00	4	0	0	0	0	13	7		
7:00	7:15	8	0	0	0	0	11	10		
7:15	7:30	10	5	1	0	0	15	19		
7:30	7:45	6	1	0	0	0	20	11		
7:45	8:00	5	1	1	0	0	17	11		
8:00	8:15	9	1	1	0	0	15	14		
8:15	8:30	1	0	0	0	0	16	5		
8:30	8:45	5	0	0	0	0	7	7		
8:45	9:00	8	0	0	0	0	12	11		
Total		61	10	3	0	0		106		

JUNCTION 2

JUNCTION 2

ARAH 1		1.00	1.00	1.19	2.27	2.08	0.22		
		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
TIME									
6:00	6:15	2	0	0	0	0	1		
6:15	6:30	0	0	0	1	0	3		
6:30	6:45	1	0	0	0	0	0		
6:45	7:00	1	0	0	0	0	6		
7:00	7:15	8	0	0	0	0	23		
7:15	7:30	10	0	0	0	0	27		
7:30	7:45	1	0	0	0	0	11		
7:45	8:00	5	0	0	0	0	4		
8:00	8:15	4	1	2	0	0	3		
8:15	8:30	1	0	1	0	0	1		
8:30	8:45	3	2	1	0	0	1		
8:45	9:00	3	0	0	0	0	5		
Total		37	3	4	1	0	85		

ARAH 2									
		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
TIME									
6:00	6:15	1	1	0	0	0	6		
6:15	6:30	0	2	0	0	0	1		
6:30	6:45	3	0	3	0	1	3		
6:45	7:00	9	2	0	0	0	4		
7:00	7:15	13	2	0	0	0	4		
7:15	7:30	3	0	1	0	0	3		
7:30	7:45	4	0	2	0	0	1		
7:45	8:00	9	2	0	0	0	7		
8:00	8:15	3	1	0	0	0	4		
8:15	8:30	8	3	0	0	0	4		
8:30	8:45	10	0	0	0	0	2		
8:45	9:00	9	0	0	0	0	3		
Total		70	13	6	0	1	42		

JUNCTION 2

ARAH 3

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	15	2	2	1	0	7		
6:15	6:30	20	2	0	4	0	7		
6:30	6:45	27	0	1	4	0	10		
6:45	7:00	73	0	7	1	0	33		
7:00	7:15	111	1	2	0	1	44		
7:15	7:30	160	5	1	2	1	70		
7:30	7:45	143	3	2	0	0	48		
7:45	8:00	132	5	1	0	0	53		
8:00	8:15	106	10	5	0	0	30		
8:15	8:30	92	10	5	3	0	46		
8:30	8:45	86	3	5	3	2	21		
8:45	9:00	62	10	5	2	2	21		
Total		1025	51	36	20	6	390		

ARAH 4

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	1	0	0	0	0	0		
6:15	6:30	0	0	0	0	0	0		
6:30	6:45	0	1	0	0	0	2		
6:45	7:00	4	0	0	0	0	2		
7:00	7:15	13	0	0	0	0	50		
7:15	7:30	16	2	0	0	0	60		
7:30	7:45	15	2	0	0	0	18		
7:45	8:00	10	3	0	0	0	22		
8:00	8:15	2	0	0	0	0	6		
8:15	8:30	0	0	1	1	0	1		
8:30	8:45	4	1	0	2	0	2		
8:45	9:00	2	0	0	0	0	1		
Total		65	9	1	3	0	164		

JUNCTION 2

ARAH 5

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR
6:00	6:15	11	0	1	0	0	9		
6:15	6:30	18	1	0	2	0	9		
6:30	6:45	32	1	1	0	0	30		
6:45	7:00	30	3	2	2	2	21		
7:00	7:15	71	3	3	1	0	68		
7:15	7:30	125	8	10	2	0	85		
7:30	7:45	80	0	7	0	2	83		
7:45	8:00	100	1	0	0	1	65		
8:00	8:15	76	8	5	2	1	42		
8:15	8:30	70	12	15	2	0	45		
8:30	8:45	78	15	5	2	4	62		
8:45	9:00	62	10	15	5	2	55		
Total		751	62	64	18	12	574		

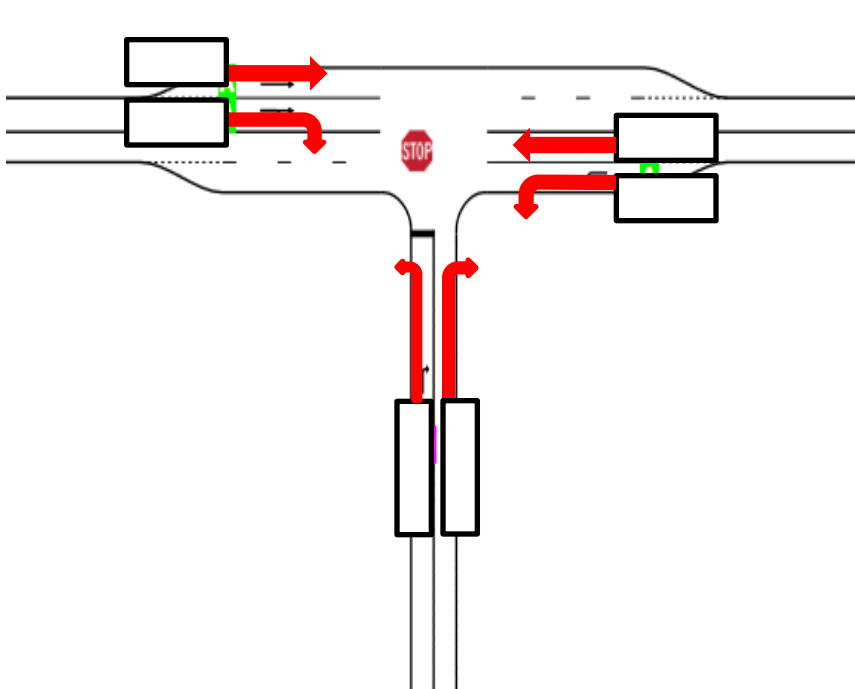
ARAH 6

TIME		CAR	VAN	M/L	H/L	BUS	M/C	PCU	PCU/HR	TOTAL PCU/HR
6:00	6:15	3	0	0	0	0	4	3		
6:15	6:30	2	1	0	0	0	4	4		
6:30	6:45	1	1	0	0	0	11	4		
6:45	7:00	4	0	0	0	0	13	7		
7:00	7:15	9	0	0	0	0	11	10		
7:15	7:30	10	5	1	0	0	15	19		
7:30	7:45	6	1	0	0	0	20	11		
7:45	8:00	5	1	1	0	0	17	11		
8:00	8:15	9	1	1	0	0	15	14		
8:15	8:30	1	0	0	0	0	16	5		
8:30	8:45	5	0	0	0	0	7	7		
8:45	9:00	8	0	0	0	0	12	11		
Total		61	10	3	0	0		108		

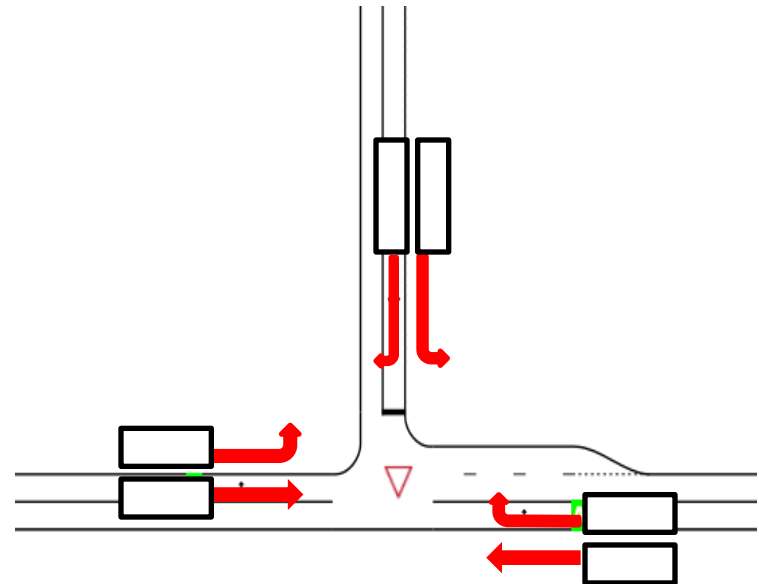
IDENTIFY PEAK HOUR

TIME		TOTAL PCU/HR JUNCTION 1	TOTAL PCU/HR JUNCTION 2	OVERALL PCU/HR JUNCTION 1+2
6:00	6:15			
6:15	6:30			
6:30	6:45			
6:45	7:00			
7:00	7:15			
7:15	7:30			
7:30	7:45			
7:45	8:00			
8:00	8:15			
8:15	8:30			
8:30	8:45			
8:45	9:00			

MASUKKAN *PCU/HR* BAGI SETIAP ARAH



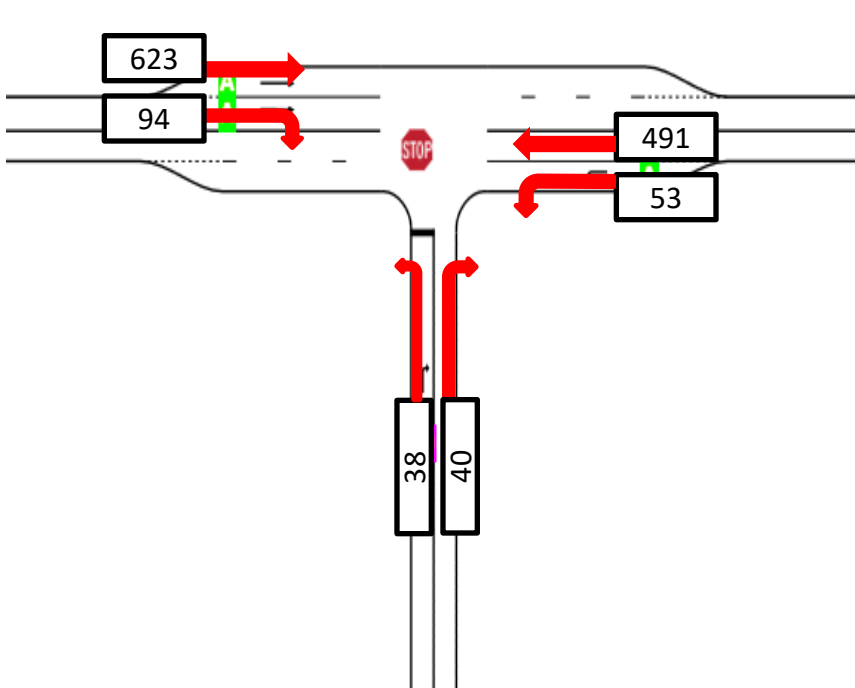
JUNCTION 2



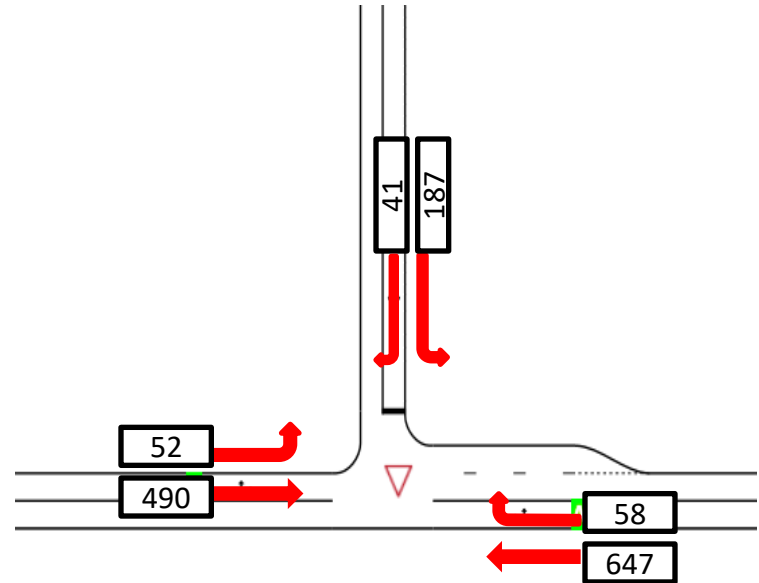
JUNCTION 1



JAWAPAN



JUNCTION 2



JUNCTION 1

