PENANG SMART MOBILITY MICRO-SIMULATION MODEL DEVELOPMENT

FINAL REPORT APPENDIX

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ASEAN AUSTRALIA SMART CITIES TRUST FUND
Asian Development Bank

Australian Government
Department of Foreign Affairs and Trade

ADB

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Authored by	**Lo Yu-Cheih and Prasanna Venkatesan**
Checked by	**Xu Yiheng**
Approved by	**Richard Sprosen**
Cover image	**Alexey Pelikh (Adobe Stock)**

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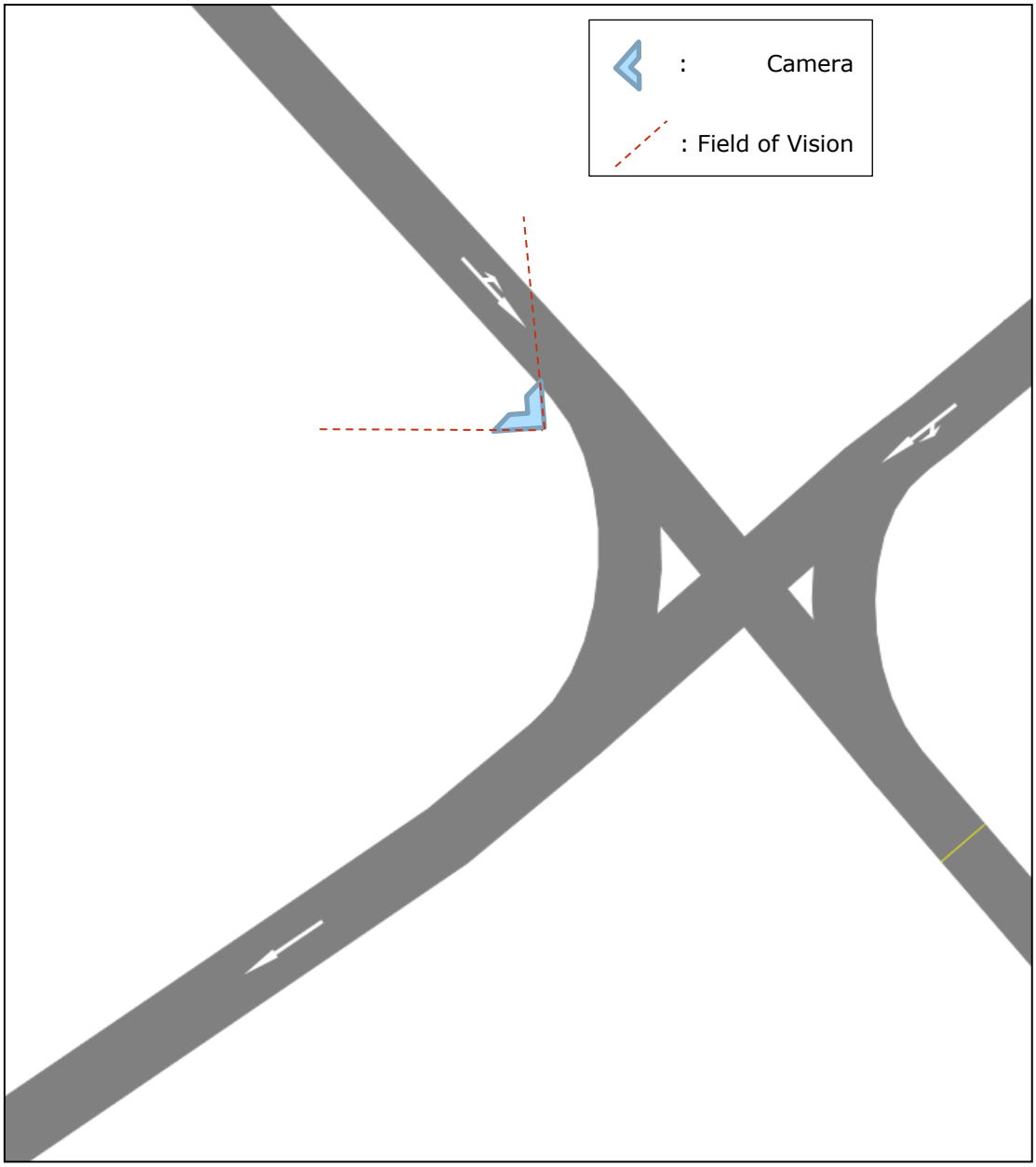


1.1 Junction 1: Pengkalan Weld / Lebuh Downing

Junction 1 is a unsignalized T-junction, and the layout is shown in the figure below, followed by the photos taken during site survey. Short queues were observed on approaches of the junction.

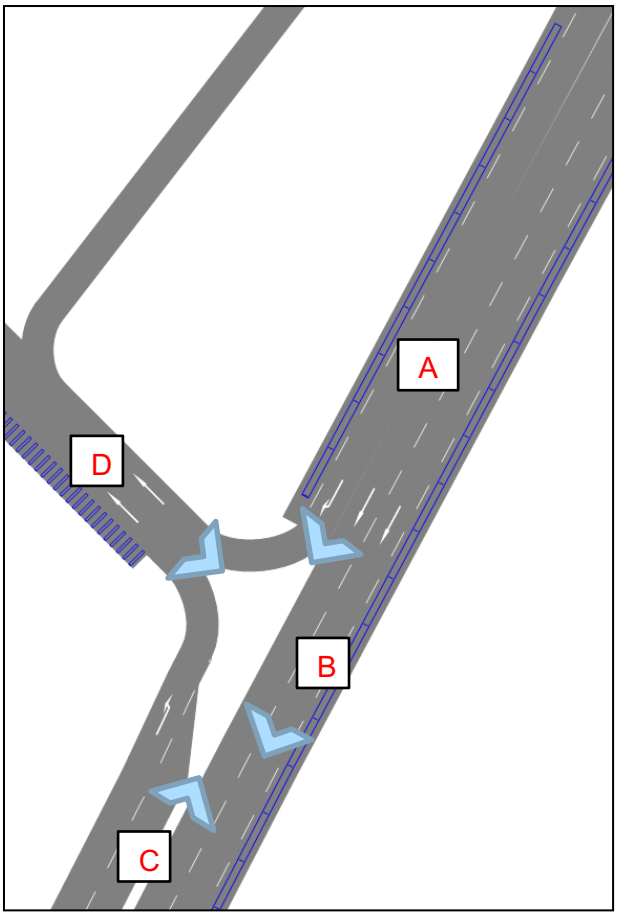


Figure 1-1 Junction 1 Layout

Figure 1-2 Junction 1 Traffic Condition

1.2 Junction 2: Pengkalan Weld / Gat Lebuh Gereja

Junction 2 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

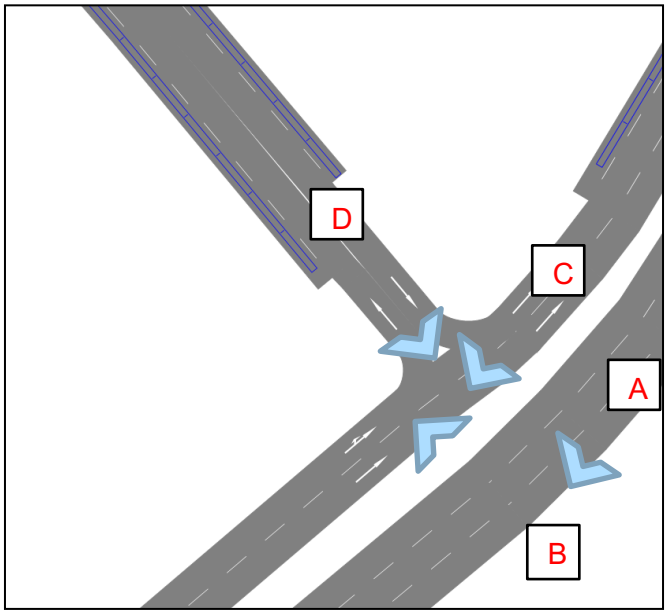


Figure 1-3 Junction 2 Layout

Figure 1-4 Junction 2 Traffic Condition

1.3 Junction 3: Pengkalan Weld / Gat Lebuh China

Junction 3 is a unsignalized Double T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

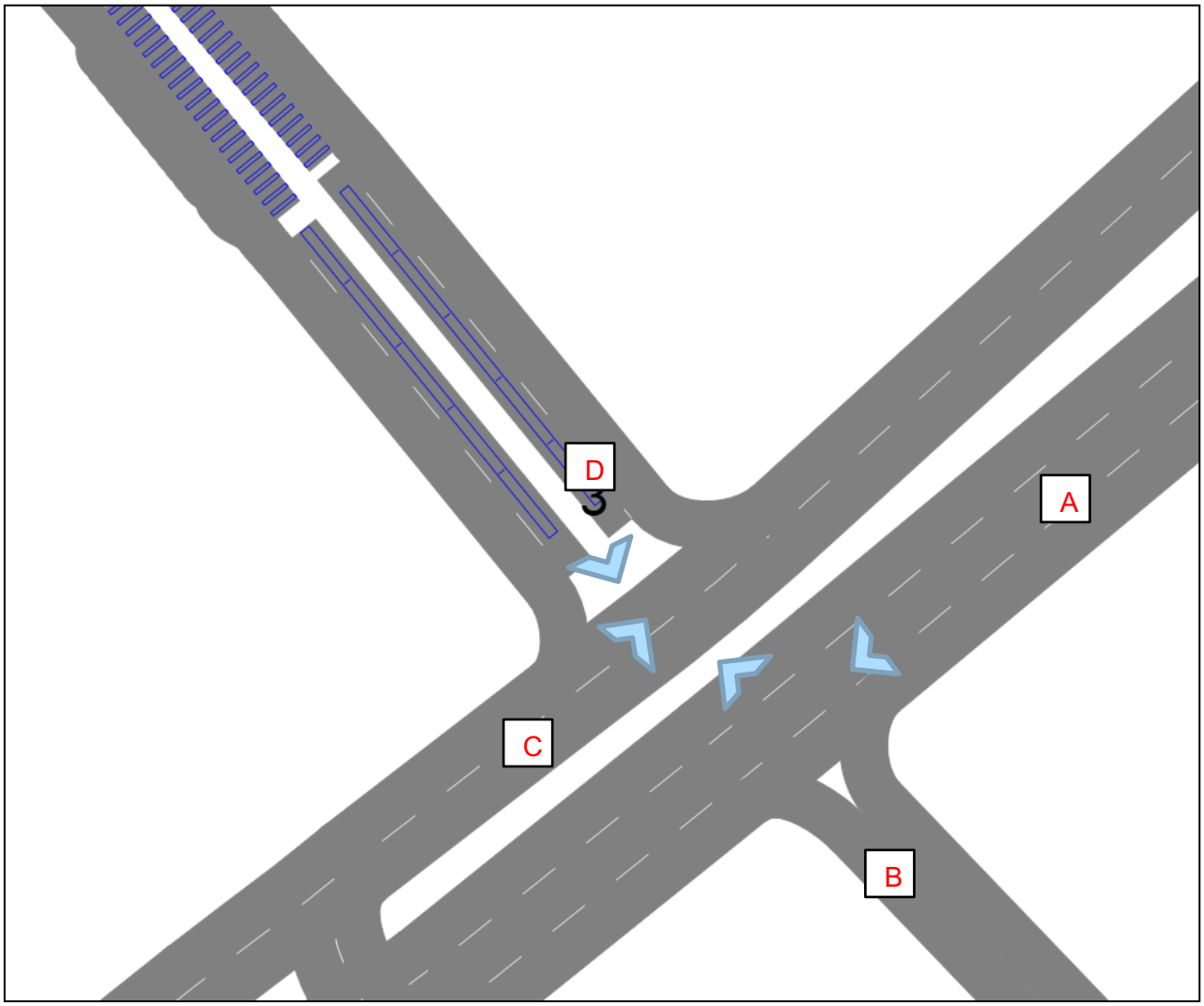


Figure 1-5 Junction 3 Layout

Figure 1-6 Junction 3 Traffic Condition

1.4 Junction 4: Pengkalan Weld / Gat Lebuh Pasar

Junction 4 is a signalized cross junction and the layout is shown in the figure below, followed by the site photos. Medium queues were observed at east approach of the junction and short queues were observed at the other approaches of the junction.

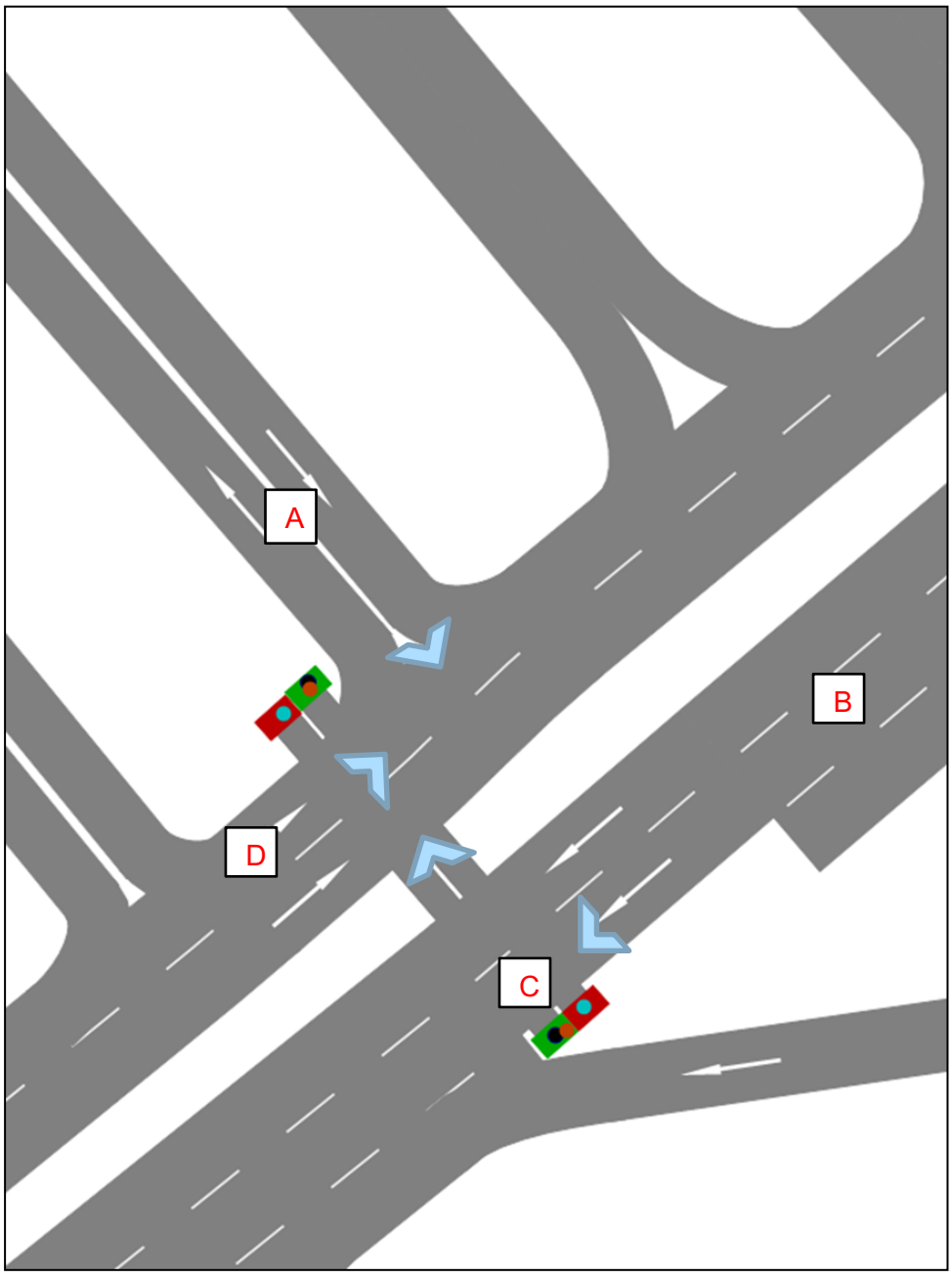


Figure 1-7 Junction 4 Layout

Figure 1-8 Junction 4 Traffic Condition

1.5 Junction 5: Pengkalan Weld / Gat Lebuh Chulia

Junction 5 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on the approaches of the junction.

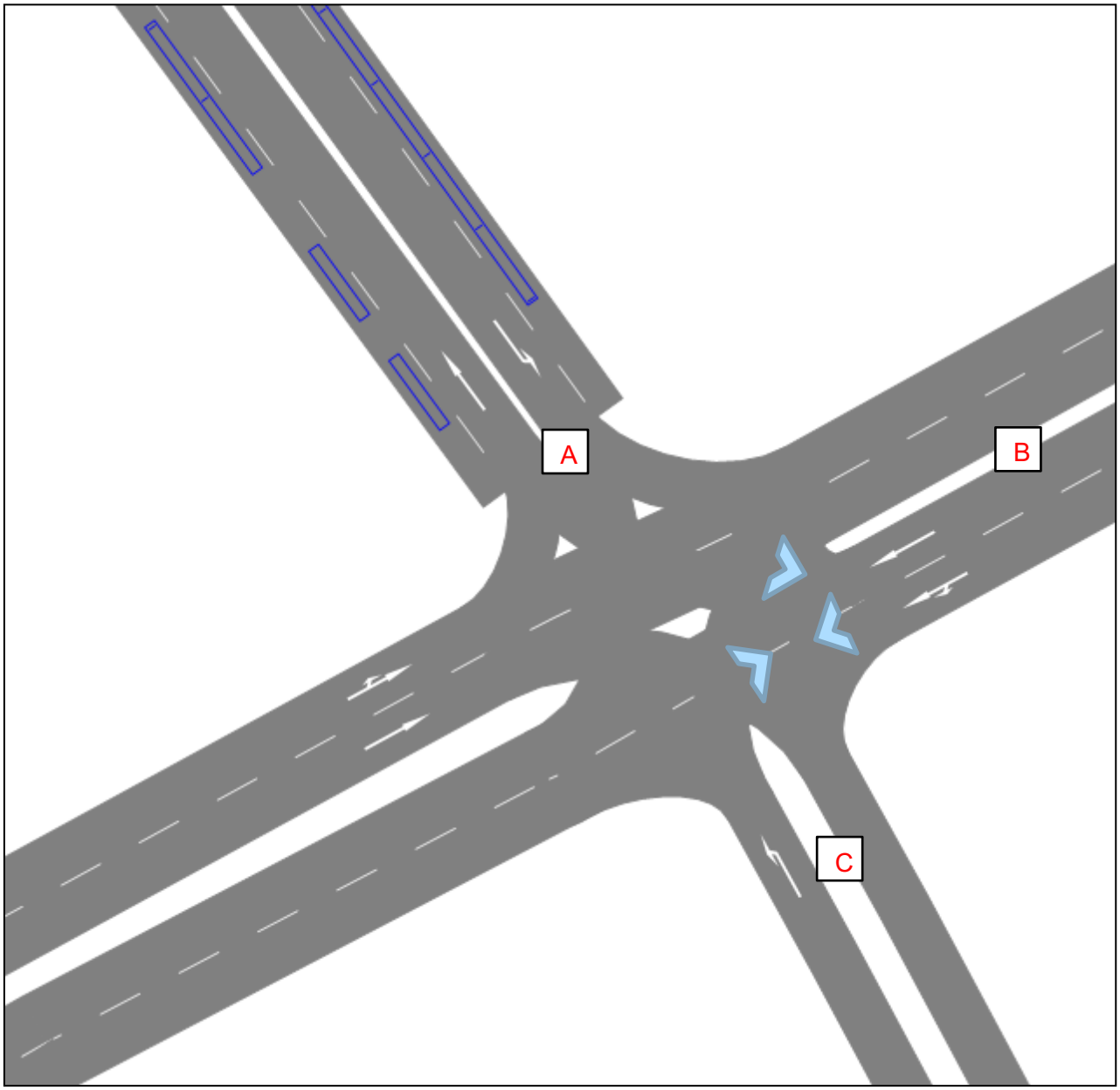


Figure 1-9 Junction 5 Layout

Figure 1-10 Junction 5 Traffic Condition

1.6 Junction 6: Pengkalan Weld / Gat Lebuh Armenian

Junction 6 is a unsignalized Double-T junction and the layout is shown in the figure below, followed by the site photos. Long queues were observed at east approach of the junction during the morning and evening peak.

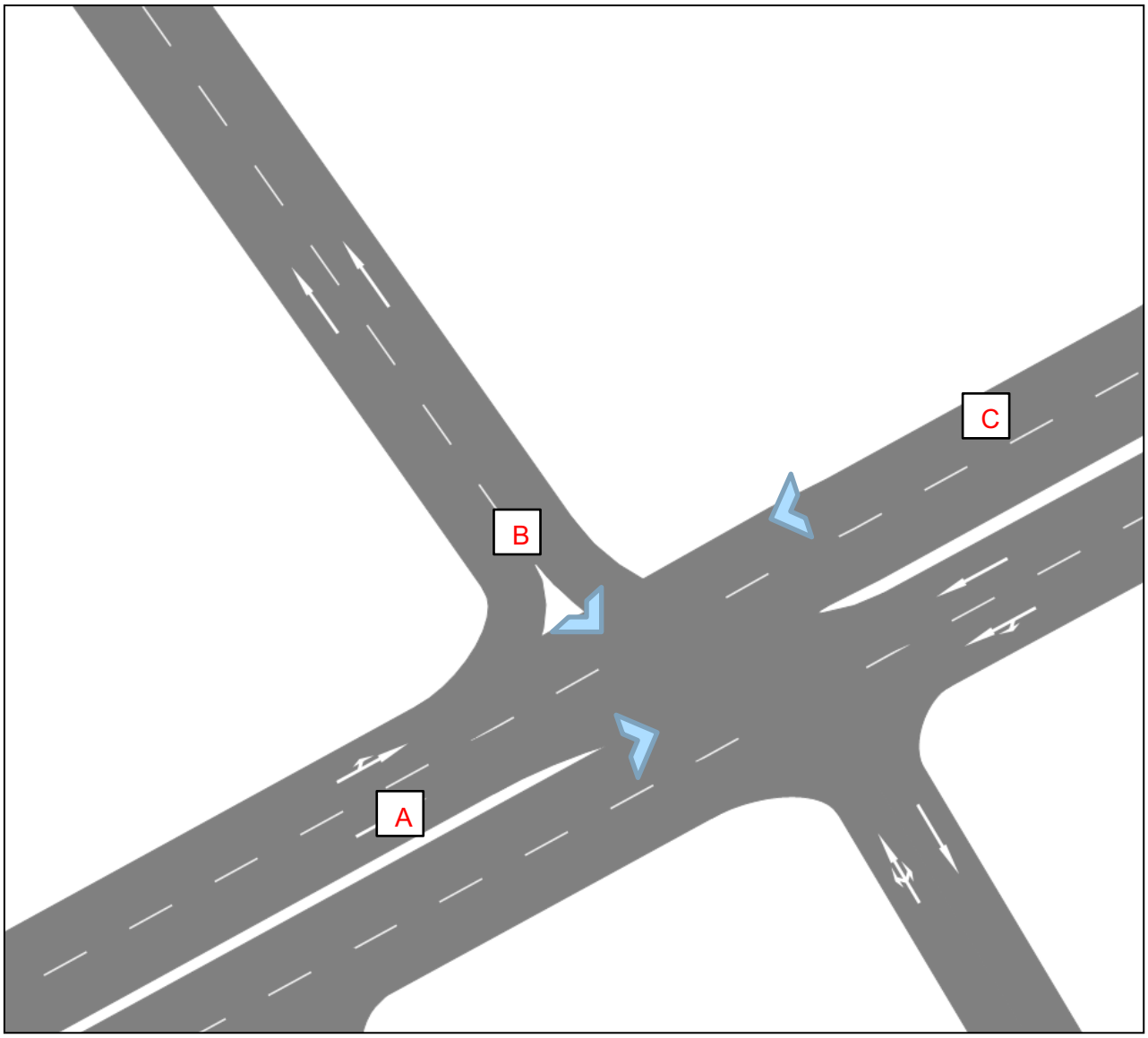


Figure 1-11 Junction 6 Layout

Figure 1-12 Junction 6 Traffic Condition

1.7 Junction 7: Pengkalan Weld / Gat Lebuh Acheh

Junction 7 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium queues were observed on all approaches of the junction.

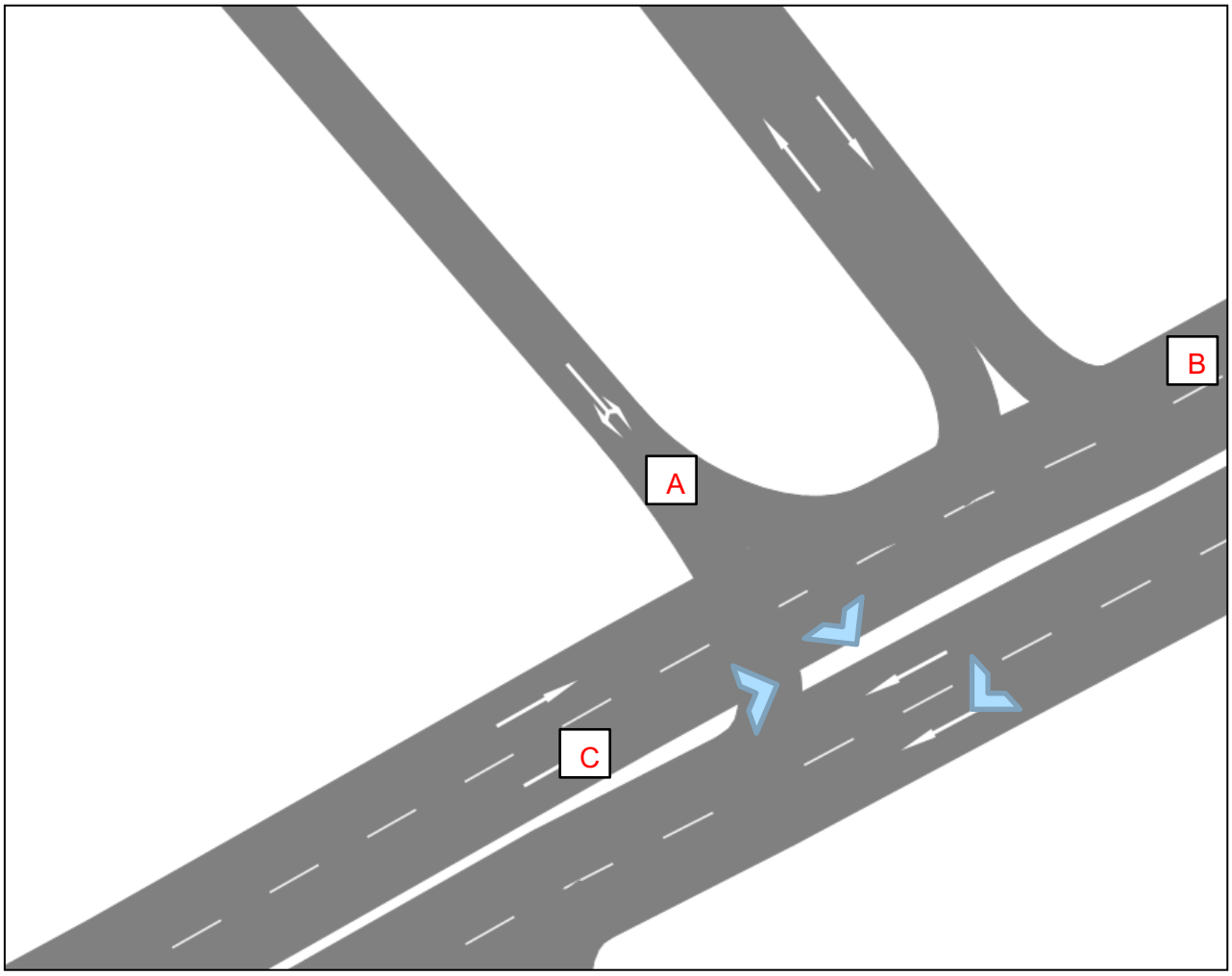


Figure 1-13 Junction 7 Layout

Figure 1-14 Junction 7 Traffic Condition

1.8 Junction 8: Pengkalan Weld / Raya Merdeka Highway

Junction 8 is a signalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

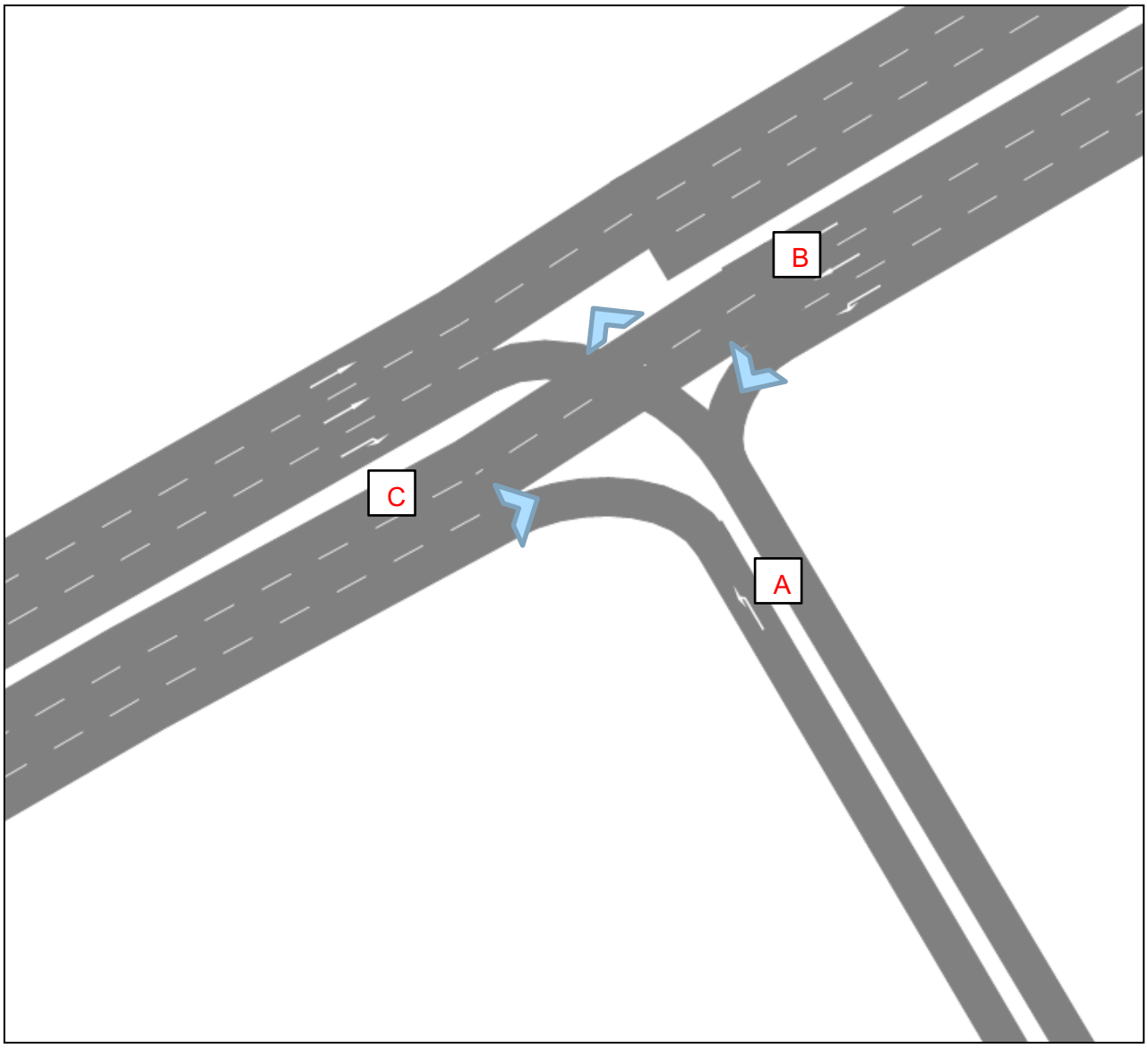


Figure 1-15 Junction 8 Layout

Figure 1-16 Junction 8 Traffic Condition

1.9 Junction 9: Pengkalan Weld / Gat Lebuh Melayu

Junction 9 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed at the North approach and medium queues were observed at the West and East approaches of the junction.

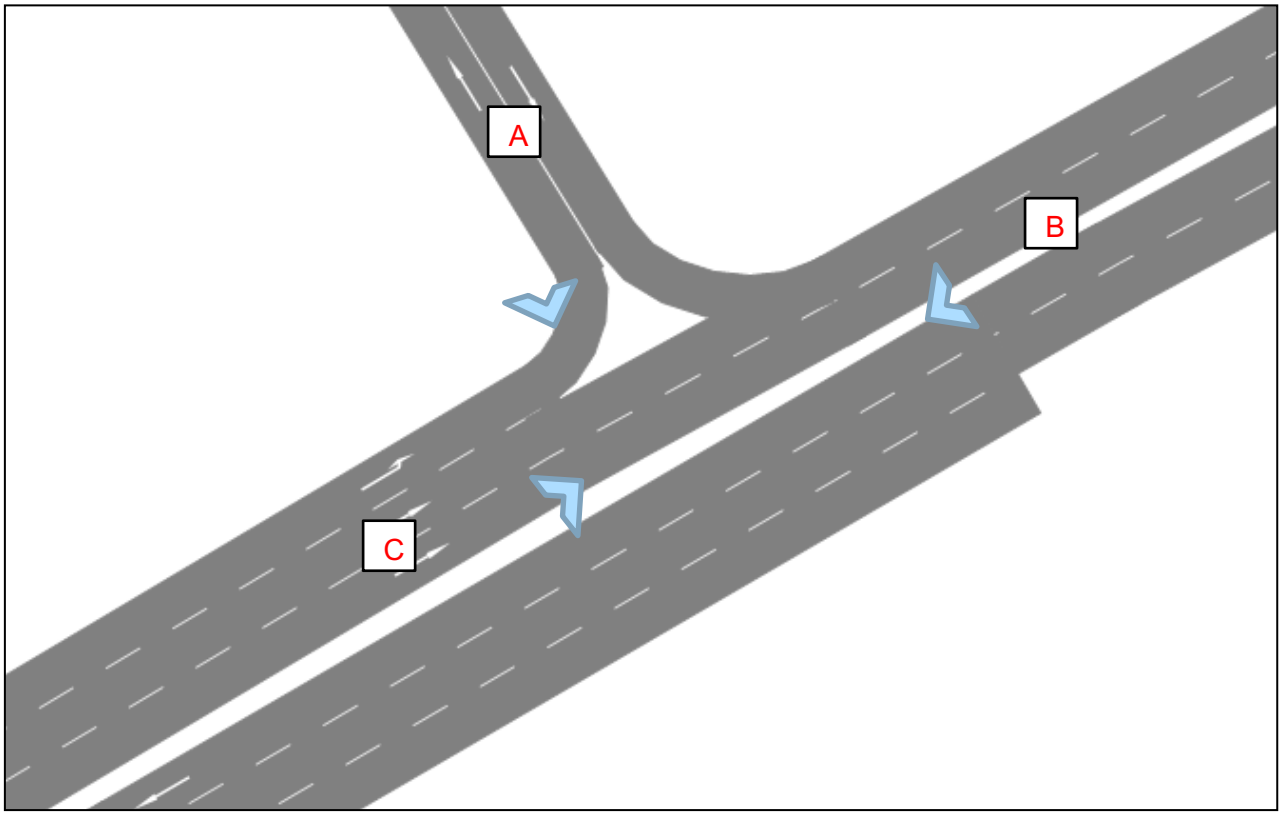


Figure 1-17 Junction 9 Layout

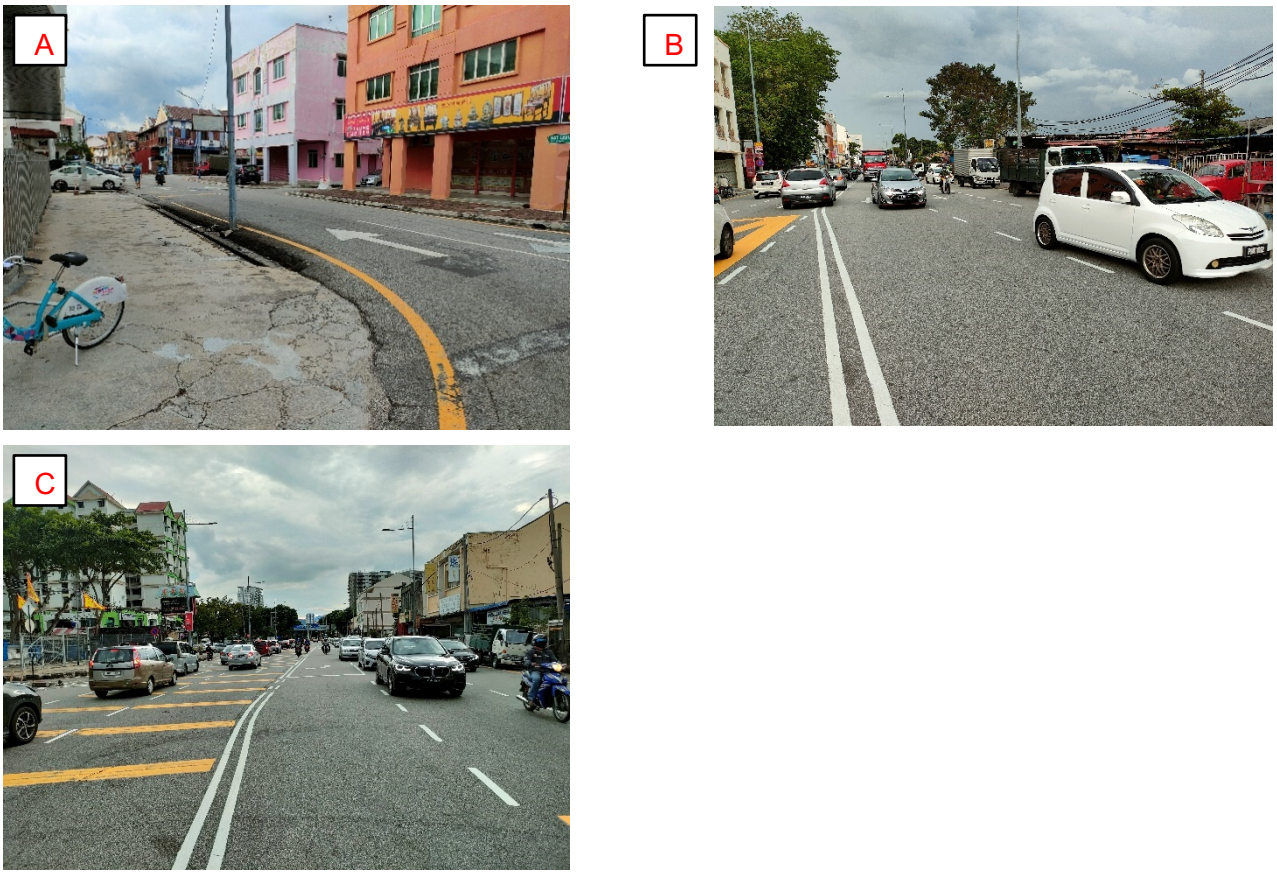


Figure 1-18 Junction 9 Traffic Condition

1.10 Junction 10: Lebuh Victoria / Gat Lebuh Melayu

Junction 10 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction during the morning and evening peak.

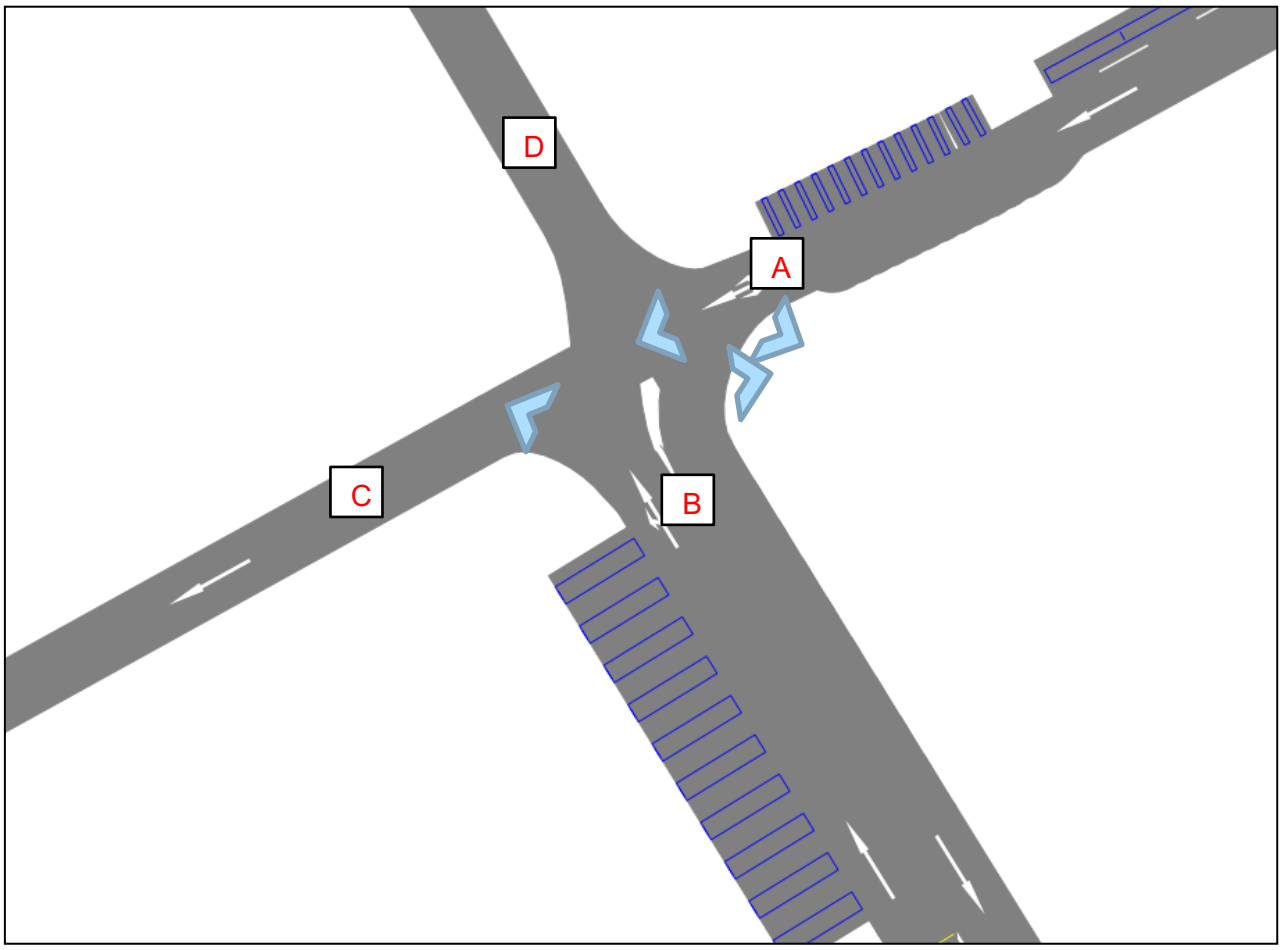


Figure 1-19 Junction 10 Layout

Figure 1-20 Junction 10 Traffic Condition

1.11 Junction 11: Lebuh Victoria / Gat Lebuh Acheh

Junction 11 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

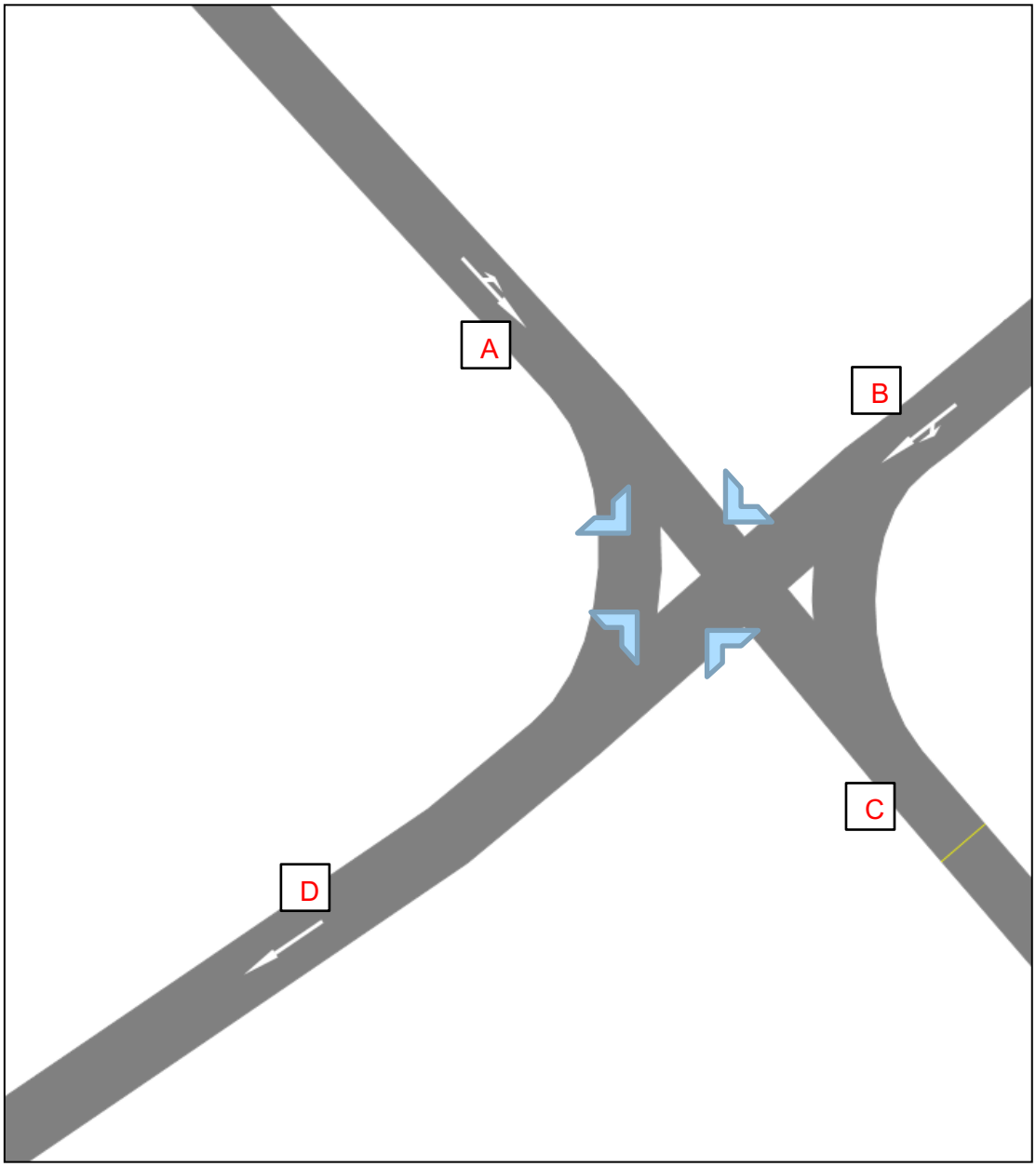


Figure 1-21 Junction 11 Layout

Figure 1-22 Junction 11 Traffic Condition

1.12 Junction 12: Lebuh Victoria / Gat Lebuh Armenian

Junction 12 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

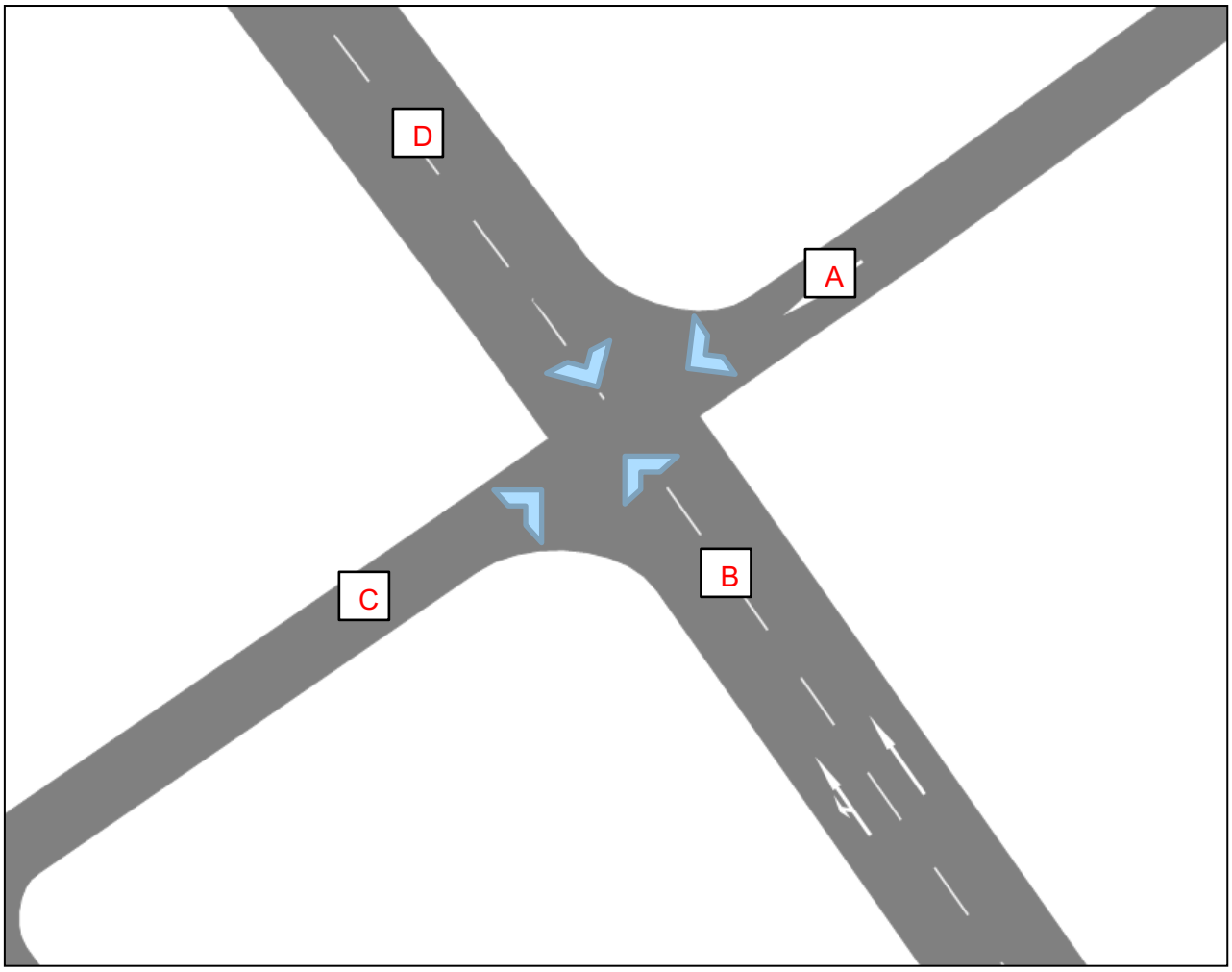


Figure 1-23 Junction 12 Layout

Figure 1-24 Junction 12 Traffic Condition

1.13 Junction 13: Lebuh Victoria / Gat Lebuh Chulia

Junction 13 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

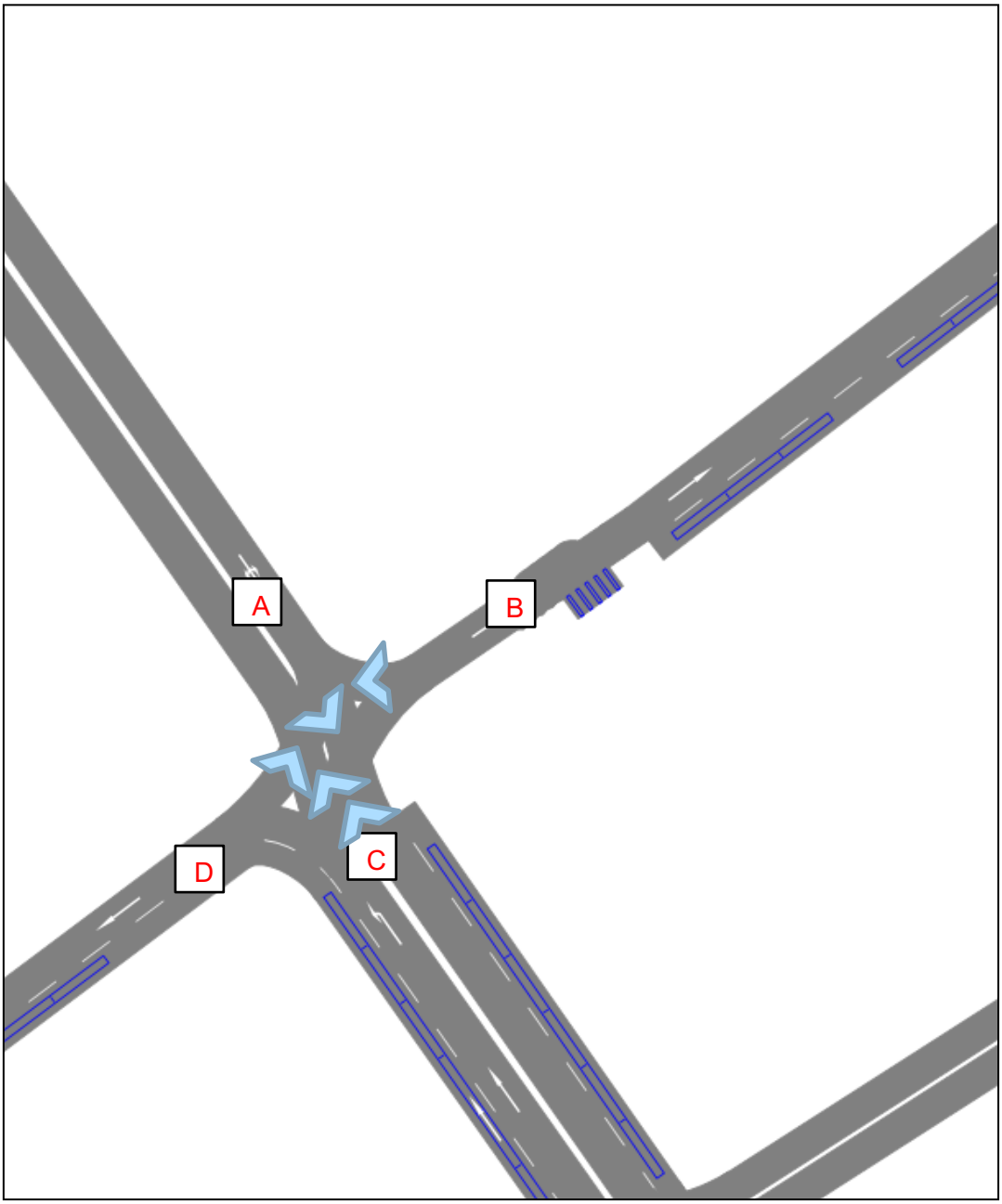


Figure 1-25 Junction 13 Layout

Figure 1-26 Junction 13 Traffic Condition

1.14 Junction 14: Lebuh Victoria / Gat Lebuh Pasar

Junction 14 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

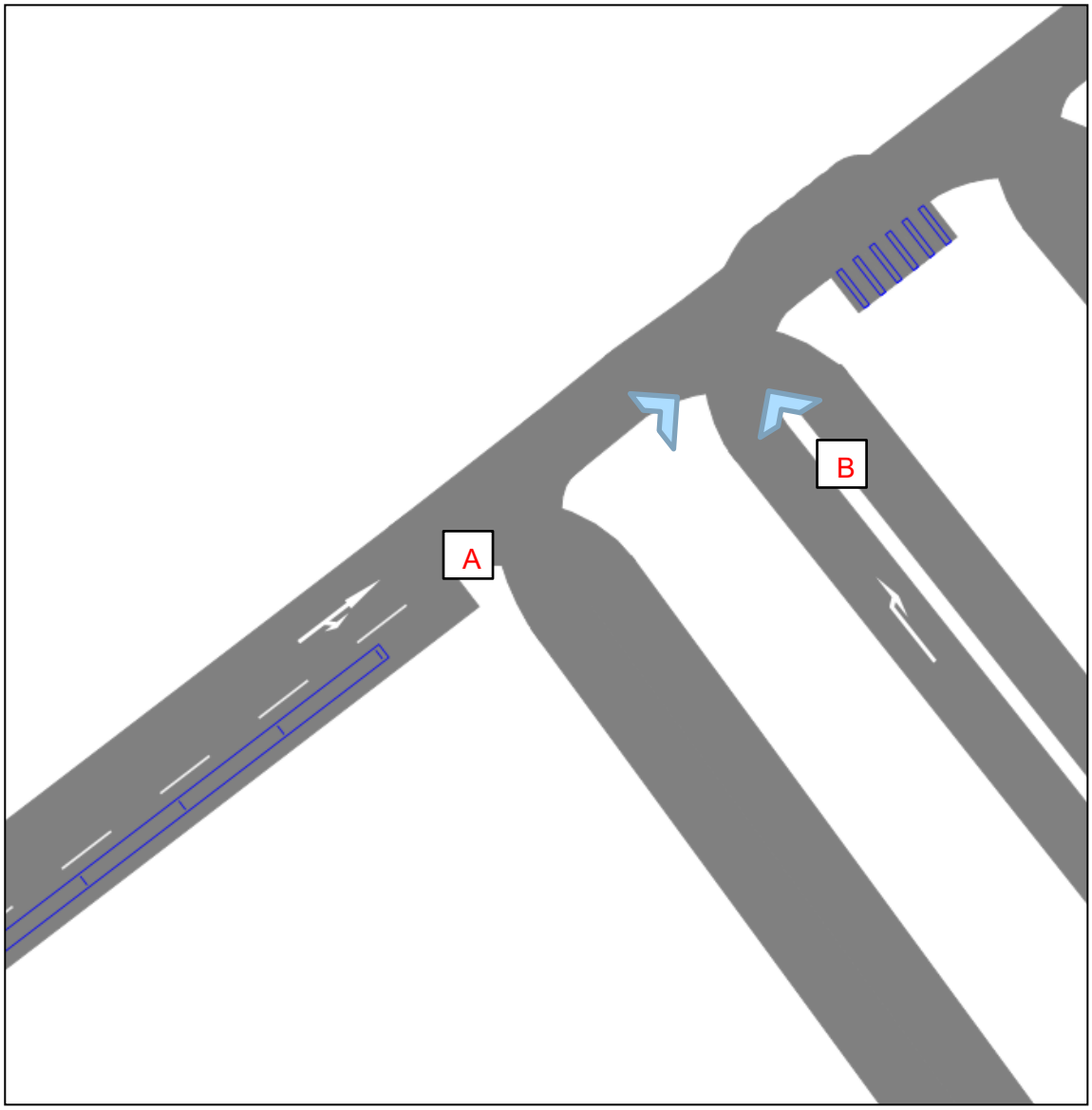


Figure 1-27 Junction 14 Layout

A

B

Figure 1-28 Junction 14 traffic Condition

1.15 Junction 15: Lebuh Victoria / Gat Lebuh China

Junction 15 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

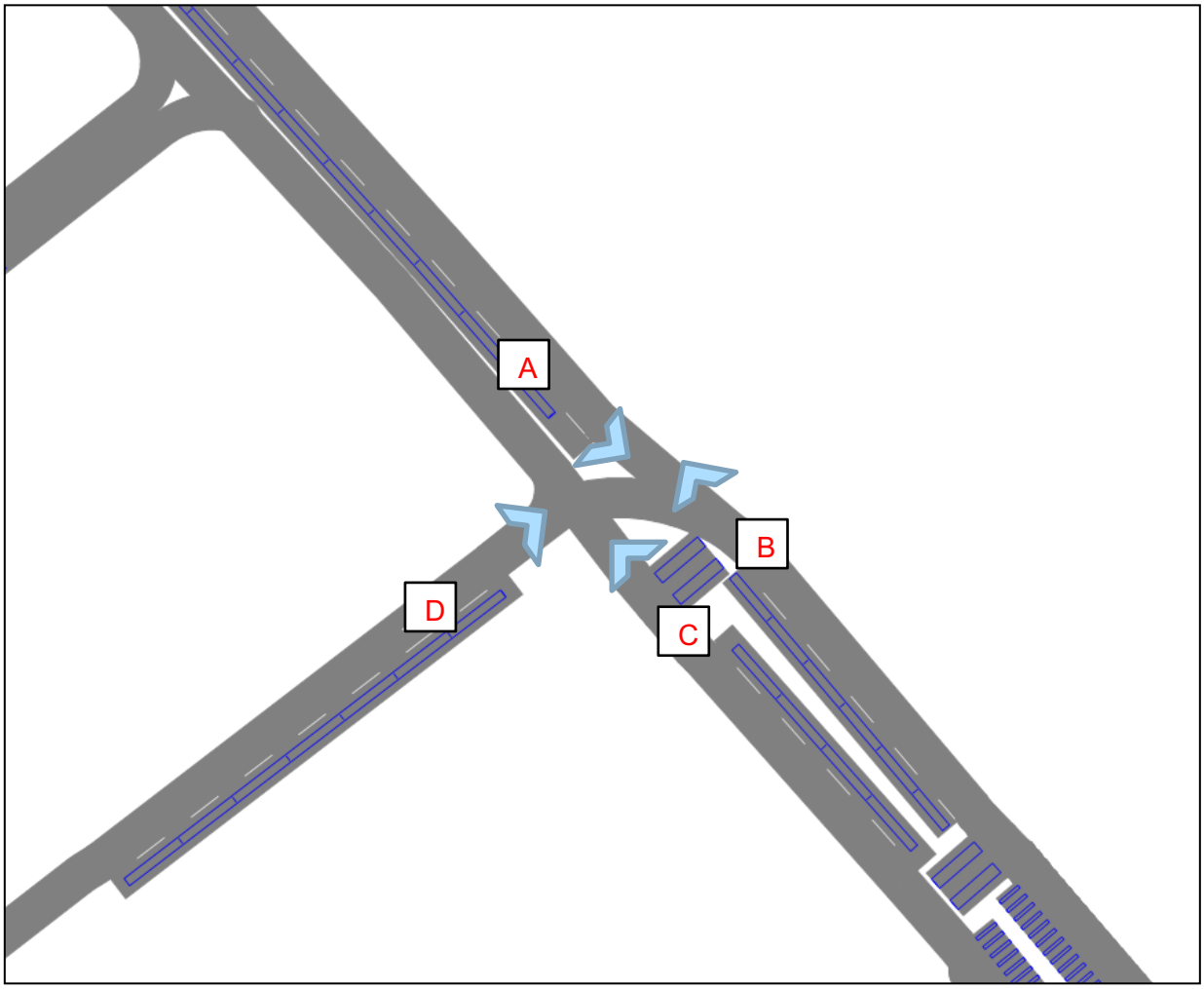


Figure 1-29 Junction 15 Layout

Figure 1-30 Junction 15 Traffic Condition

1.16 Junction 16: Beach Street / Pesara King Edward

Junction 16 is a unsignalized roundabout junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

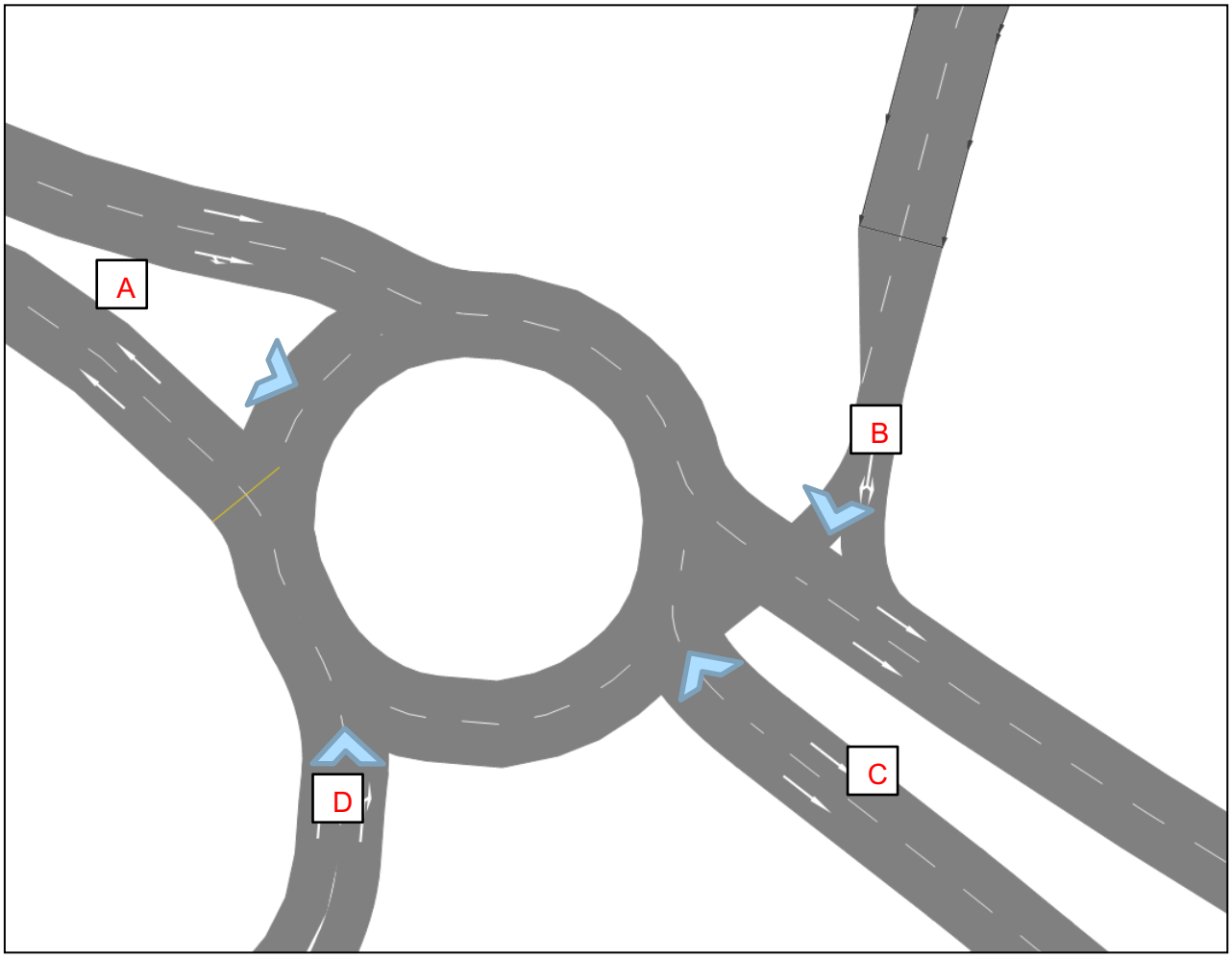


Figure 1-31 Junction 16 Layout

Figure 1-32 Junction 16 Traffic Condition

1.17 Junction 17: Beach Street / Lebuh Downing

Junction 17 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

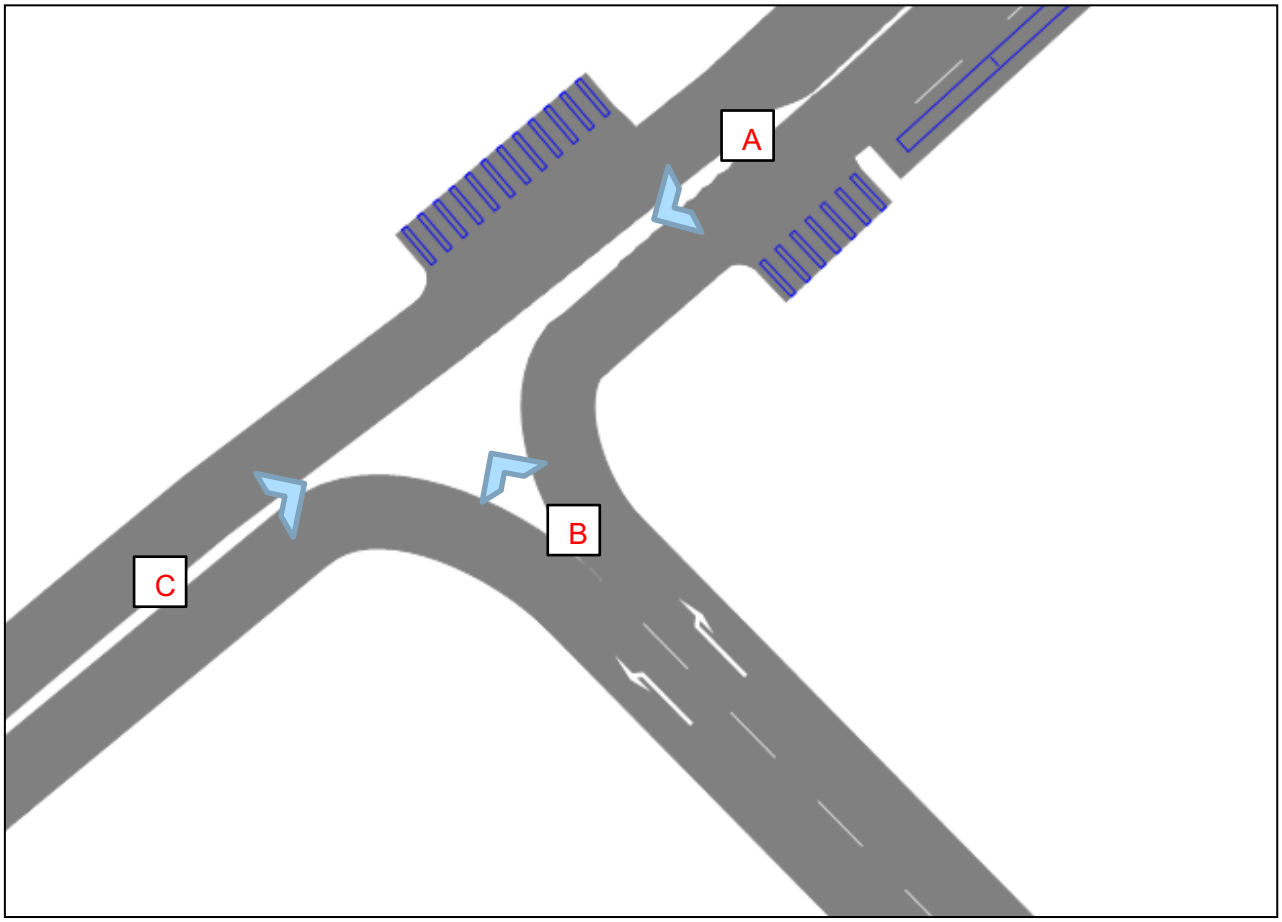


Figure 1-33 Junction 17 Layout

Figure 1-34 Junction 17 Traffic Condition

1.18 Junction 18: Beach Street / Lebuh Union

Junction 18 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

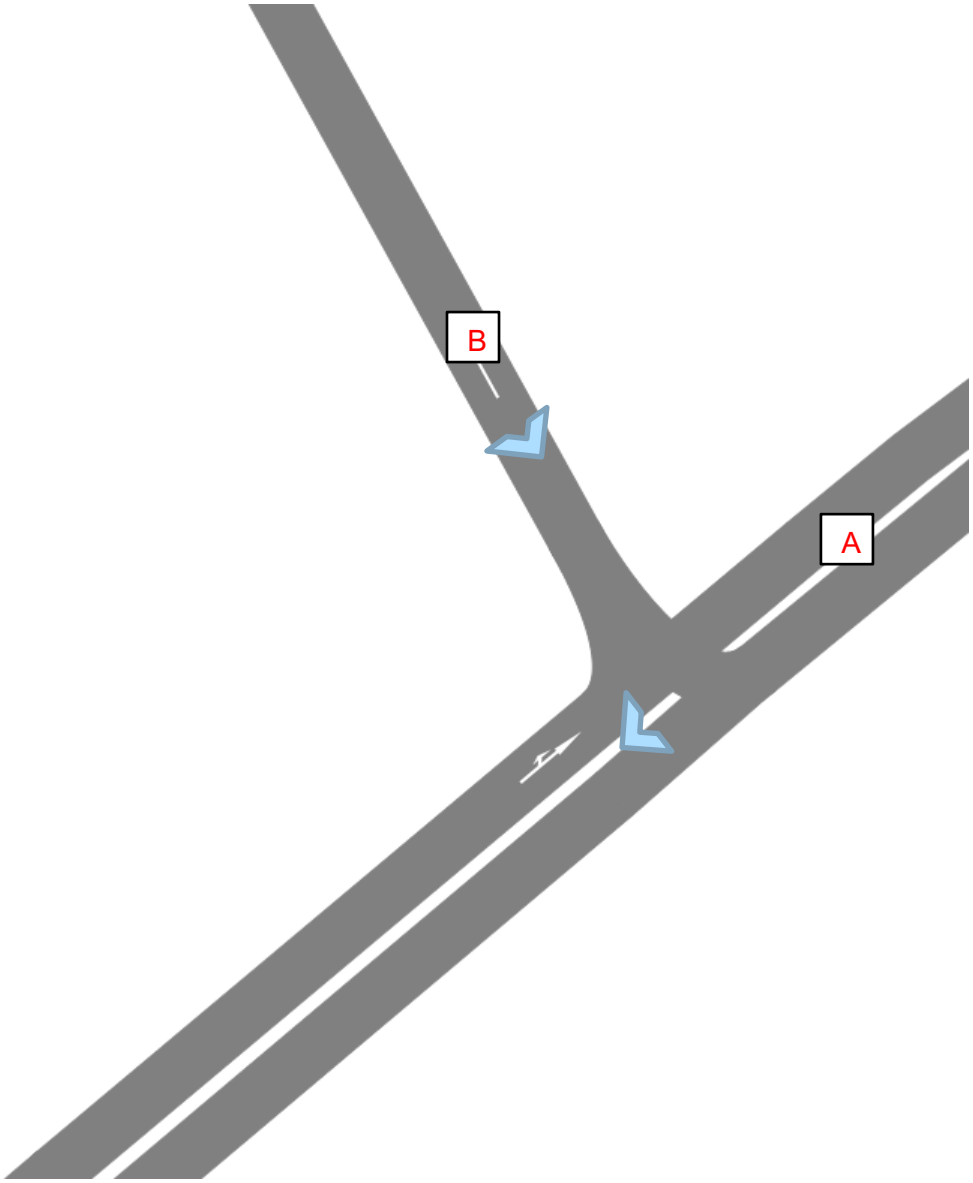


Figure 1-35 Junction 18 Layout

A

B

Figure 1-36 Junction 18 Traffic Condition

1.19 Junction 19: Beach Street / Bishop Street

Junction 19 is a signalized double T-signalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

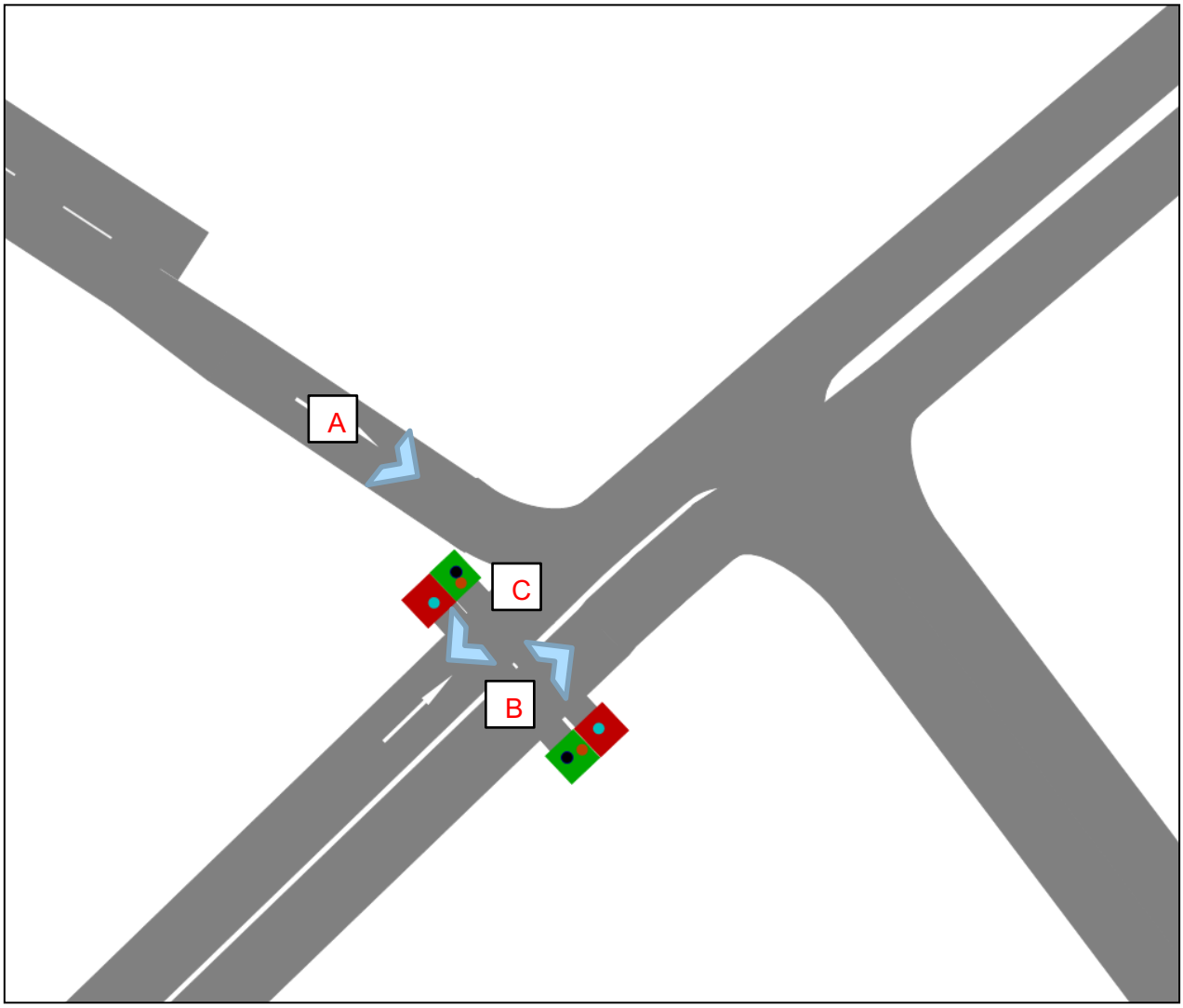


Figure 1-37 Junction 19 Layout

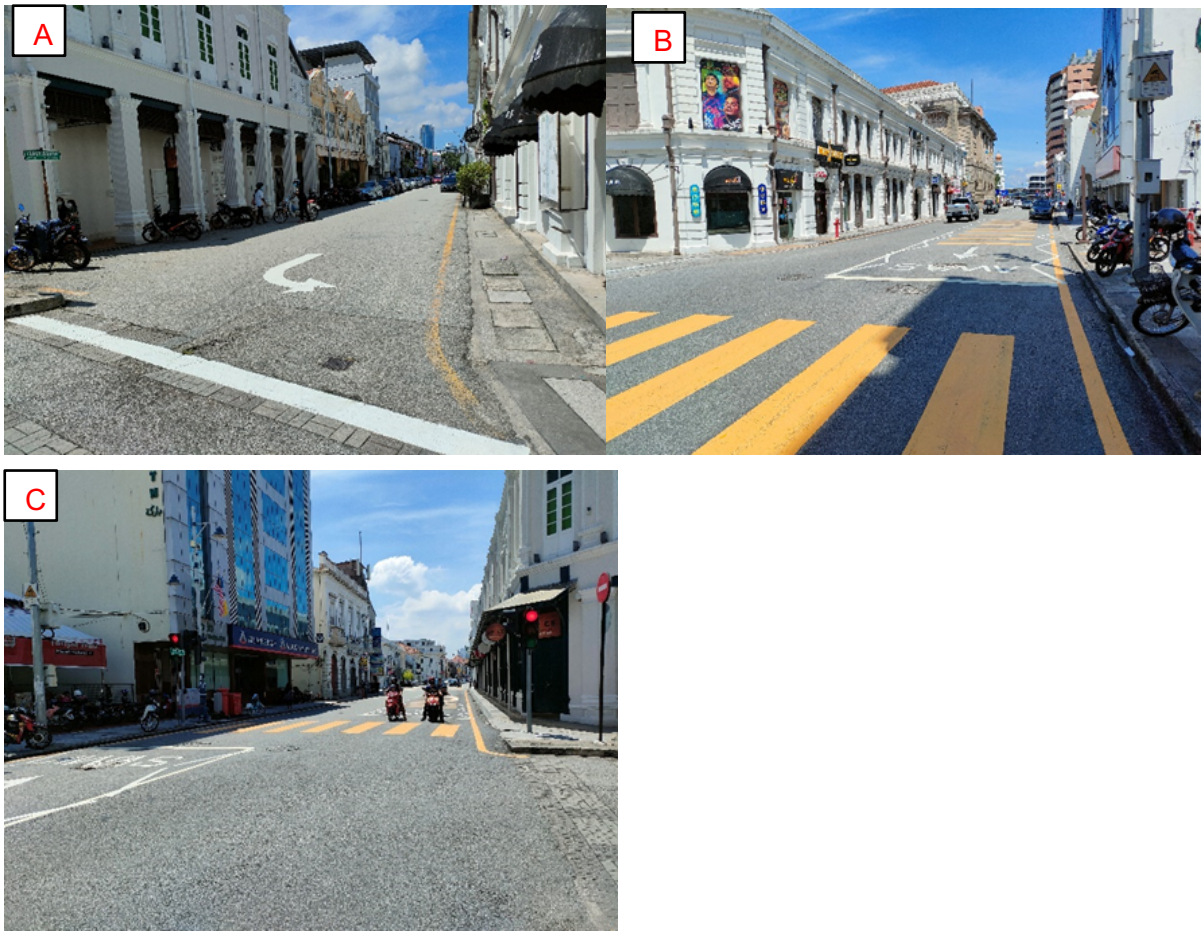


Figure 1-38 Junction 19 Traffic Condition

1.20 Junction 20: Beach Street / Gat Lebuh Gereja

Junction 20 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Junction 20 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

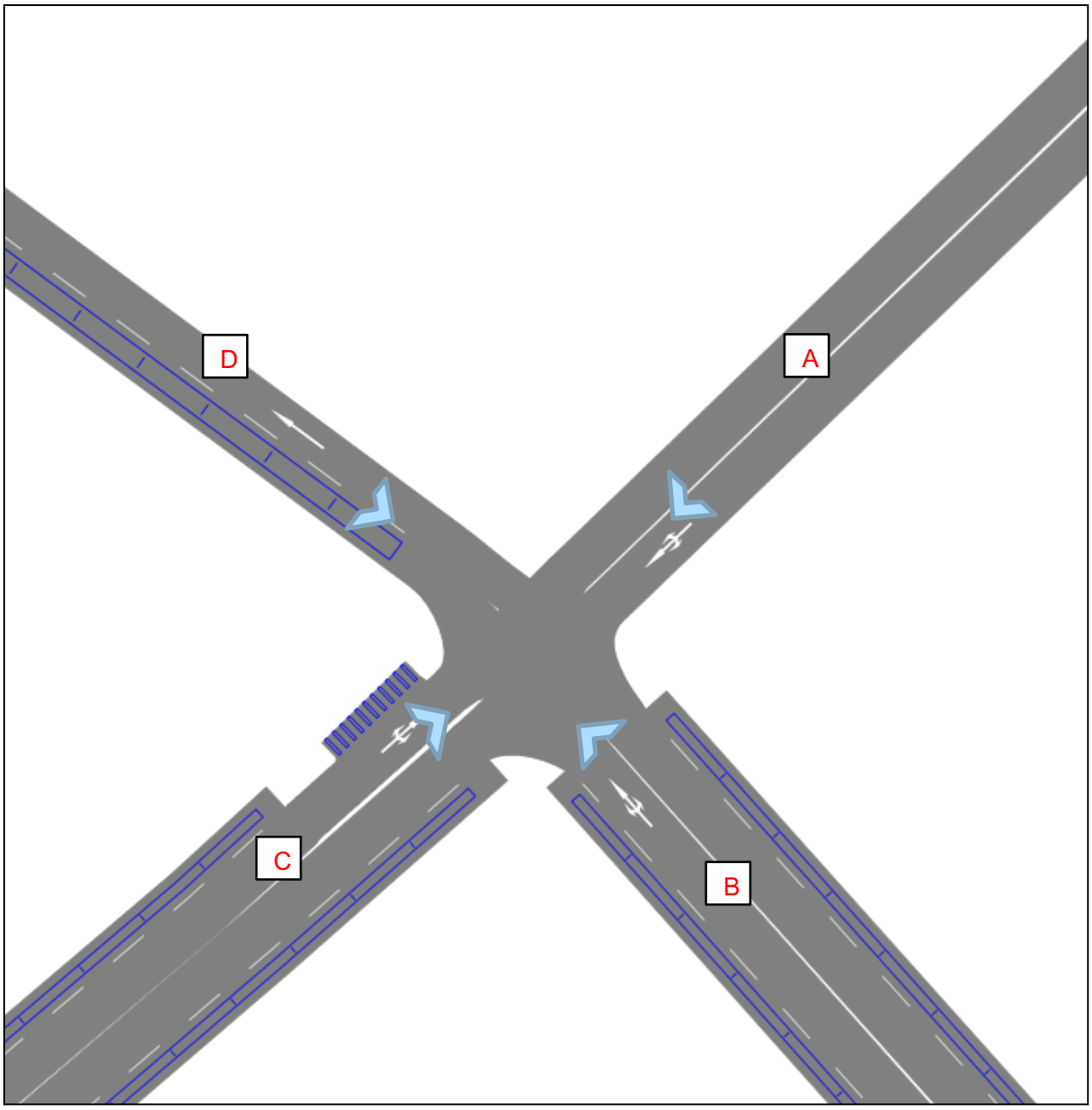


Figure 1-39 Junction 20 Layout

Figure 1-40 Junction 20 Traffic Condition

1.21 Junction 21: Beach Street / Gat Lebuh China

Junction 21 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

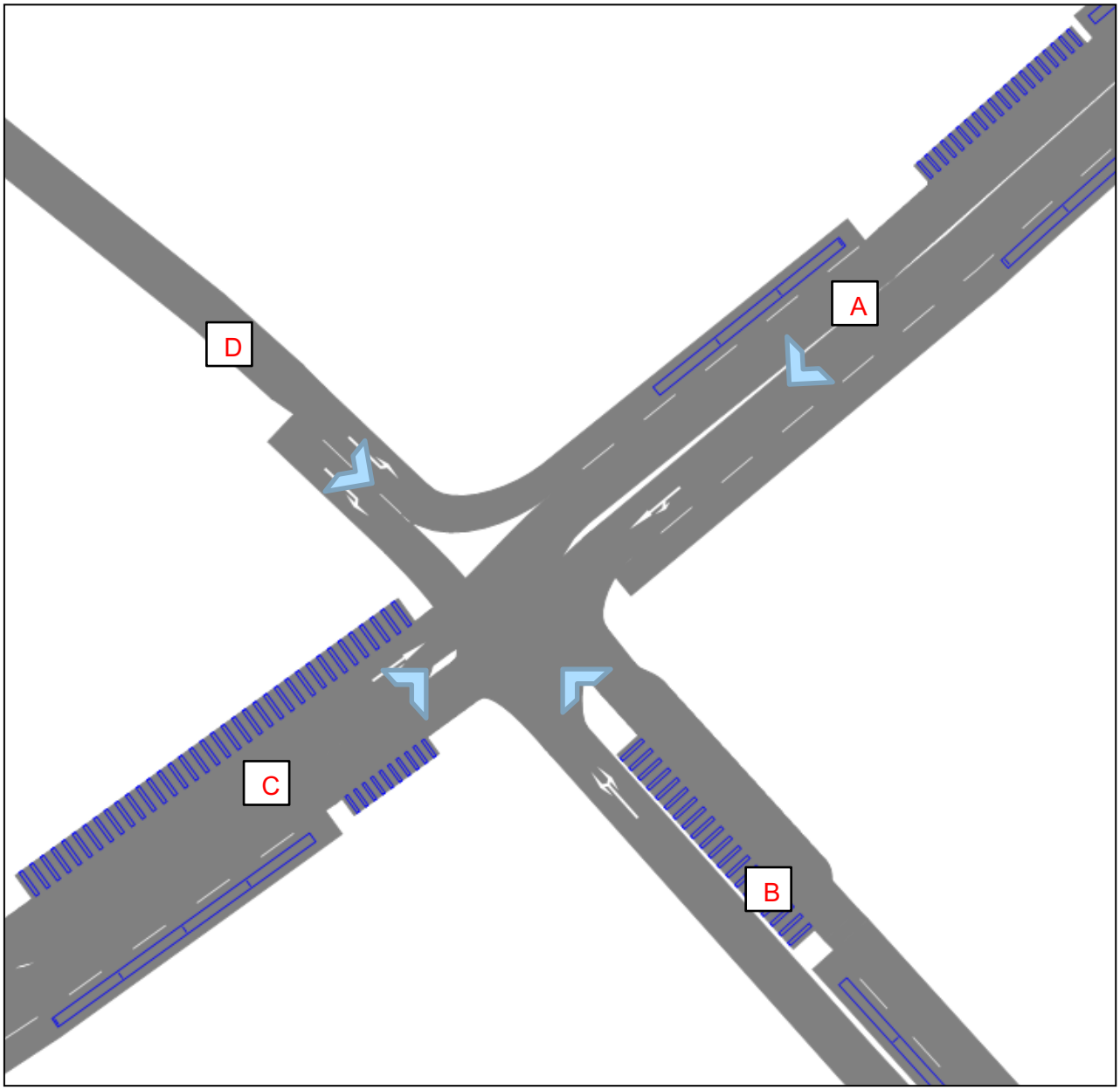


Figure 1-41 Junction 21 Layout

Figure 1-42 Junction 21 Traffic Condition

1.22 Junction 22: Beach Street / Lebuh Pasar

Junction 22 is a signalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

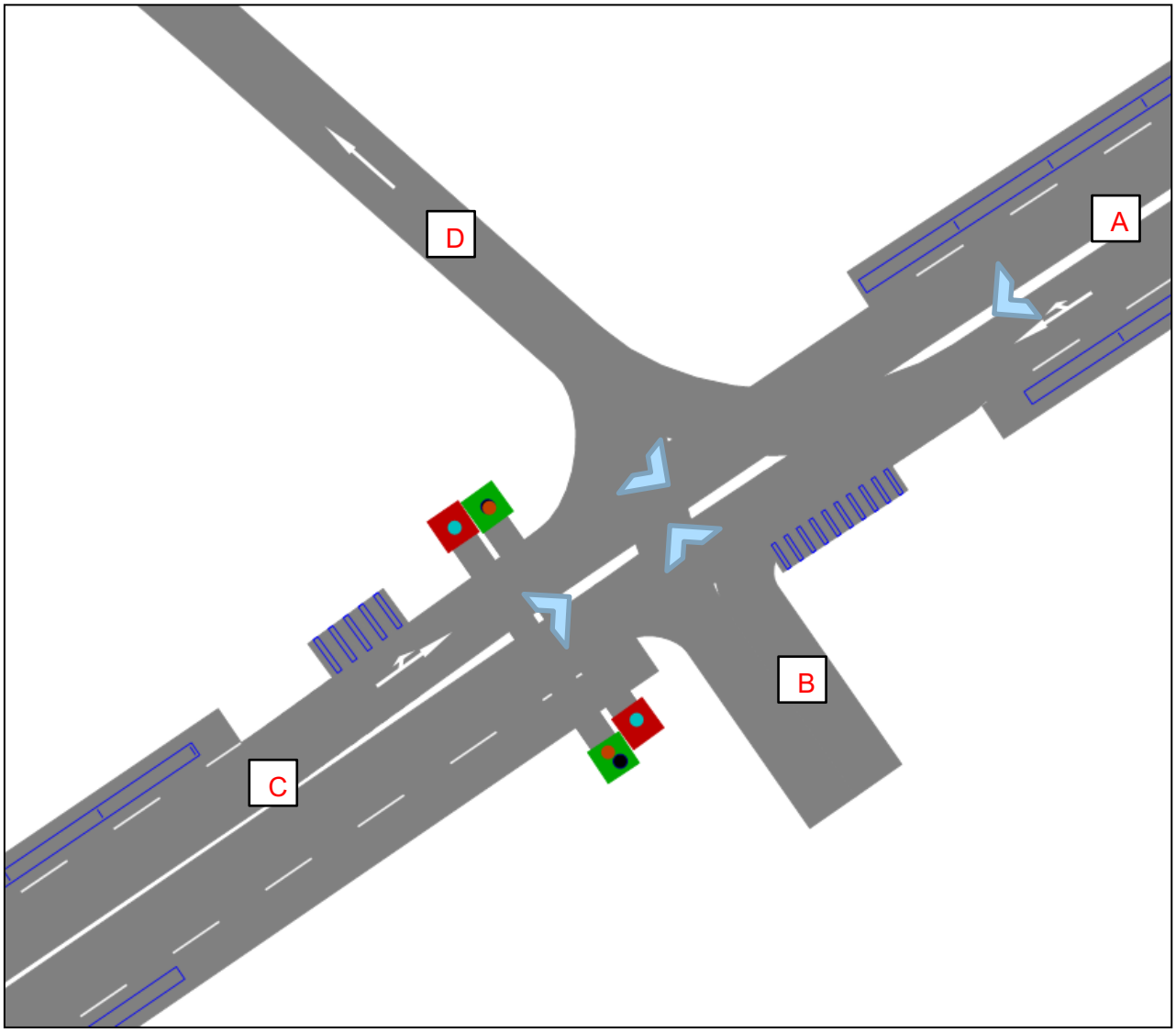


Figure 1-43 Junction 22 Layout

Figure 1-44 Junction 22 Traffic Condition

1.23 Junction 23: Beach Street / Gat Lebuh Chulia

Junction 23 is a signalized cross junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

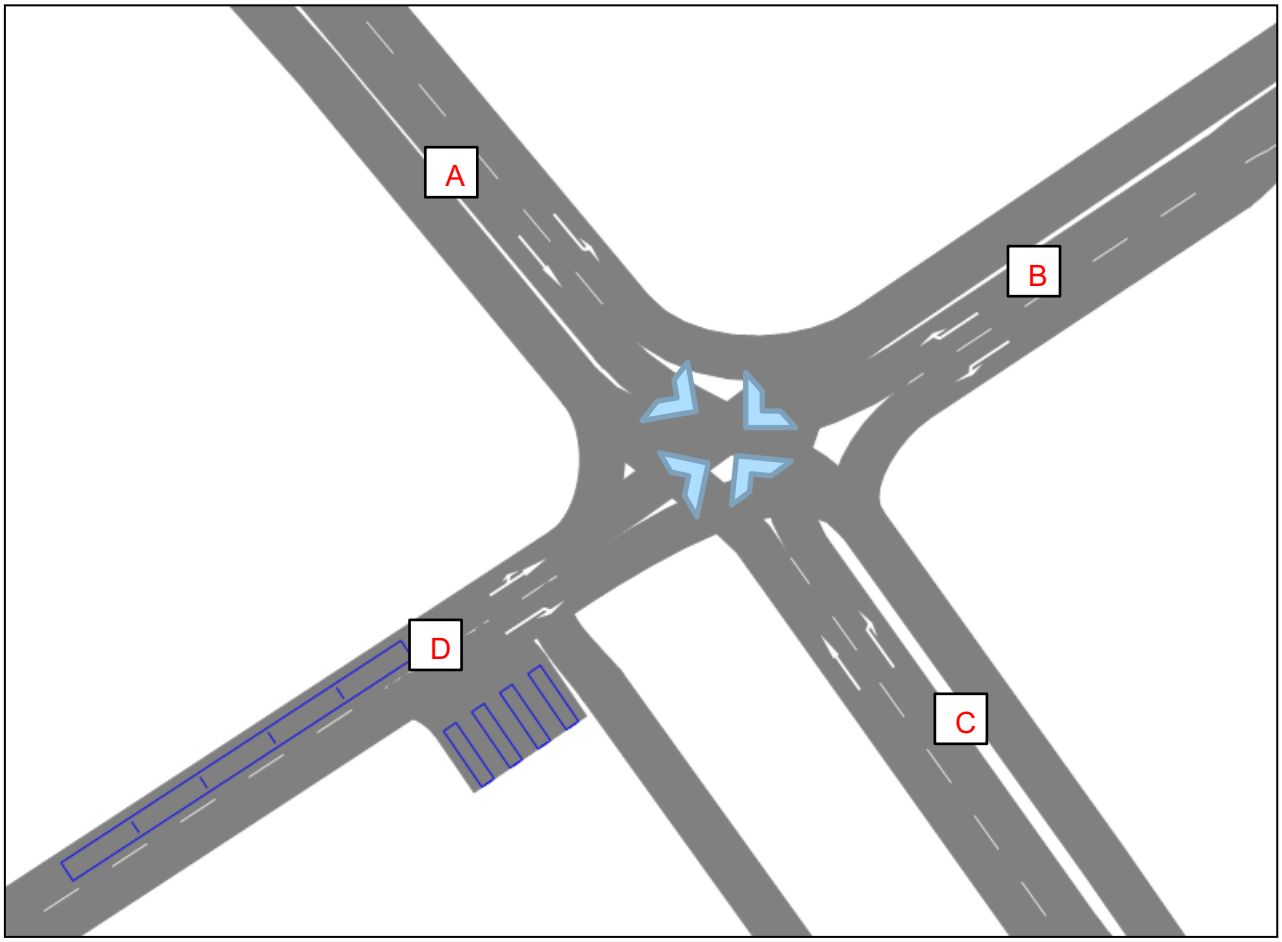


Figure 1-45 Junction 23 Layout

Figure 1-46 Junction 23 Traffic Condition

1.24 Junction 24: Beach Street / Lebuh Ah Quee

Junction 24 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

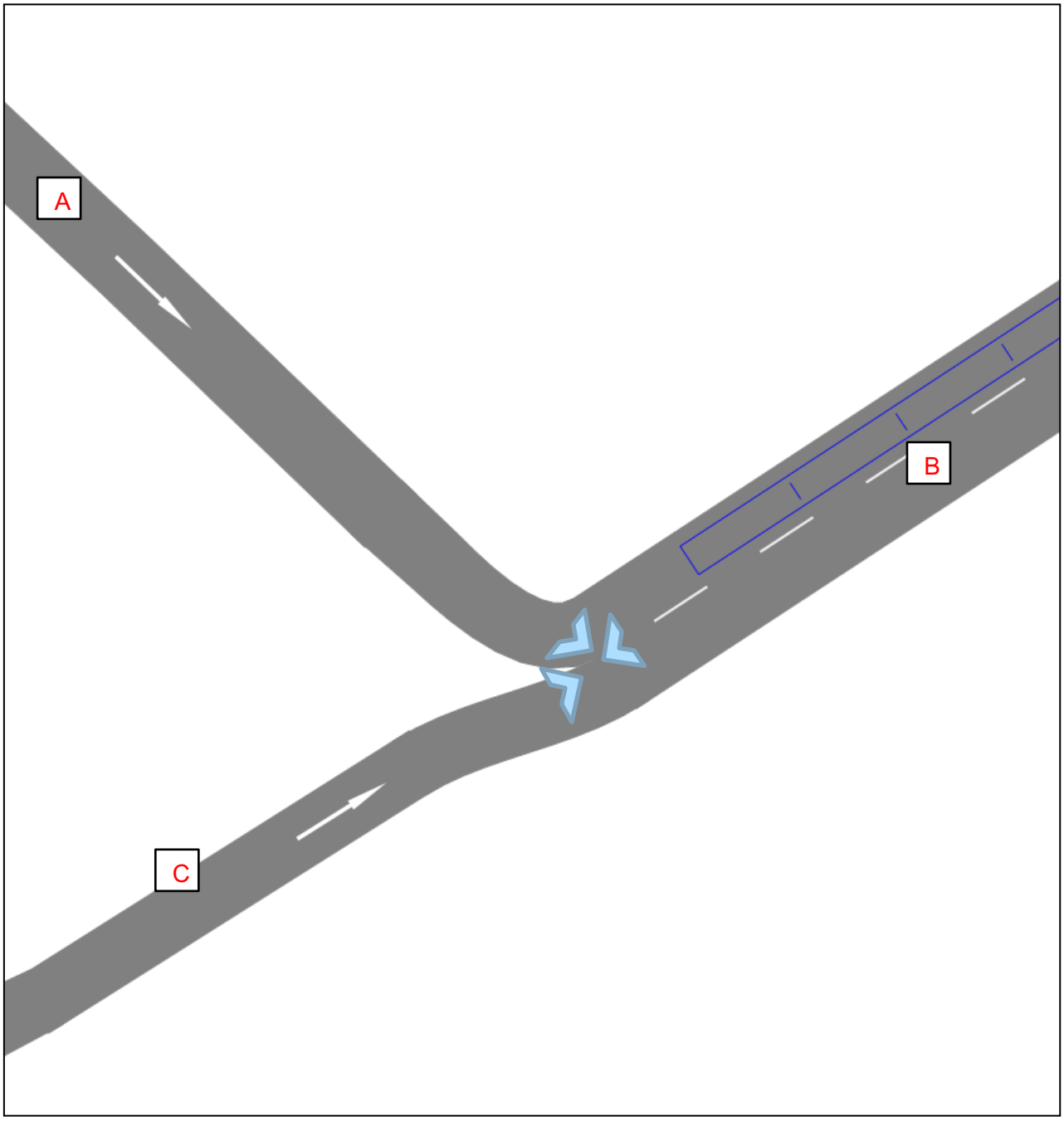


Figure 1-47 Junction 24 Layout

Figure 1-48 Junction 24 Traffic Condition

1.25 Junction 25: Beach Street / Gat Lebuh Armenian

Junction 25 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

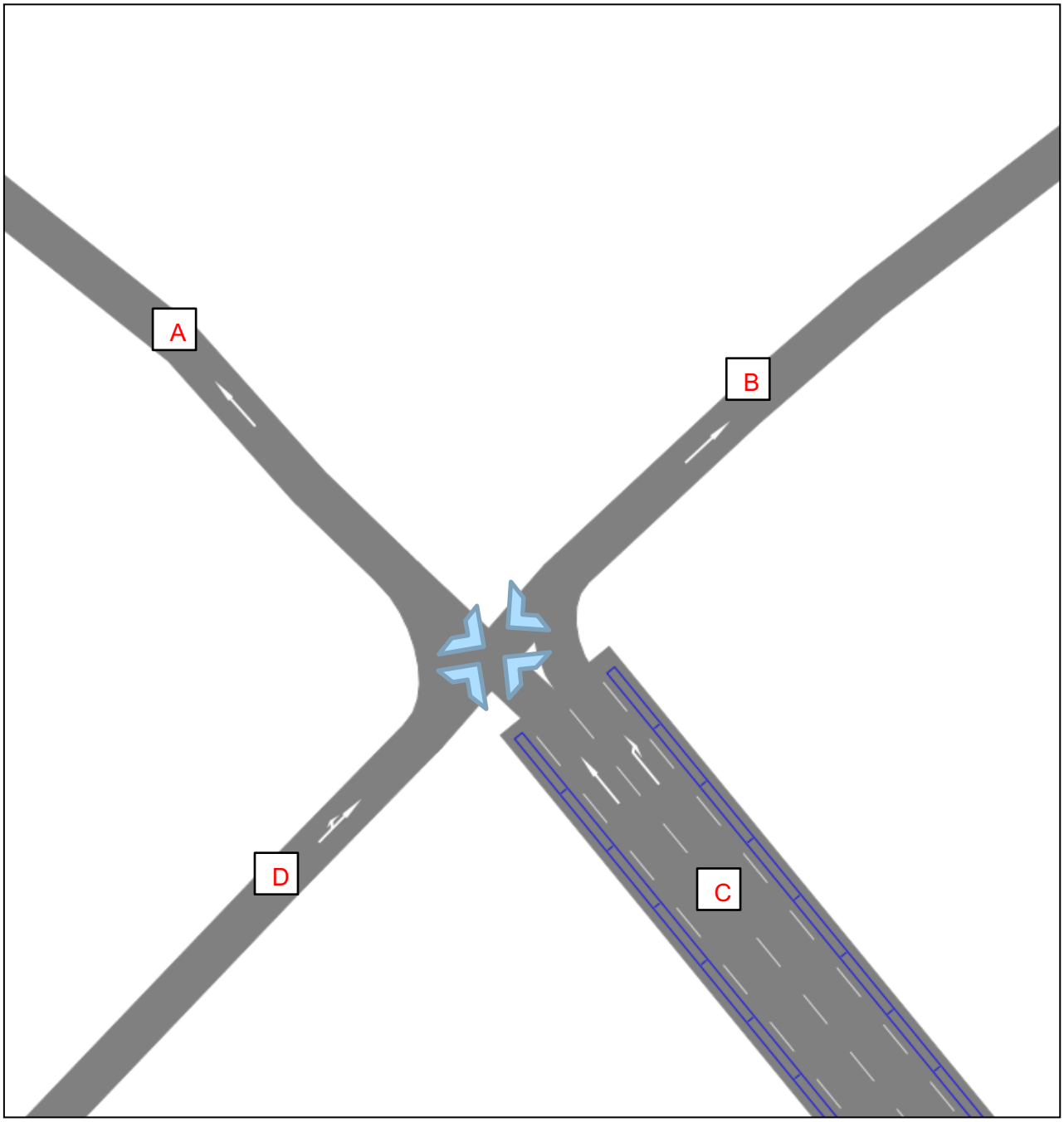


Figure 1-49 Junction 25 Layout

Figure 1-50 Junction 25 Traffic Condition

1.26 Junction 26: Beach Street / Gat Lebuh Acheh

Junction 26 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

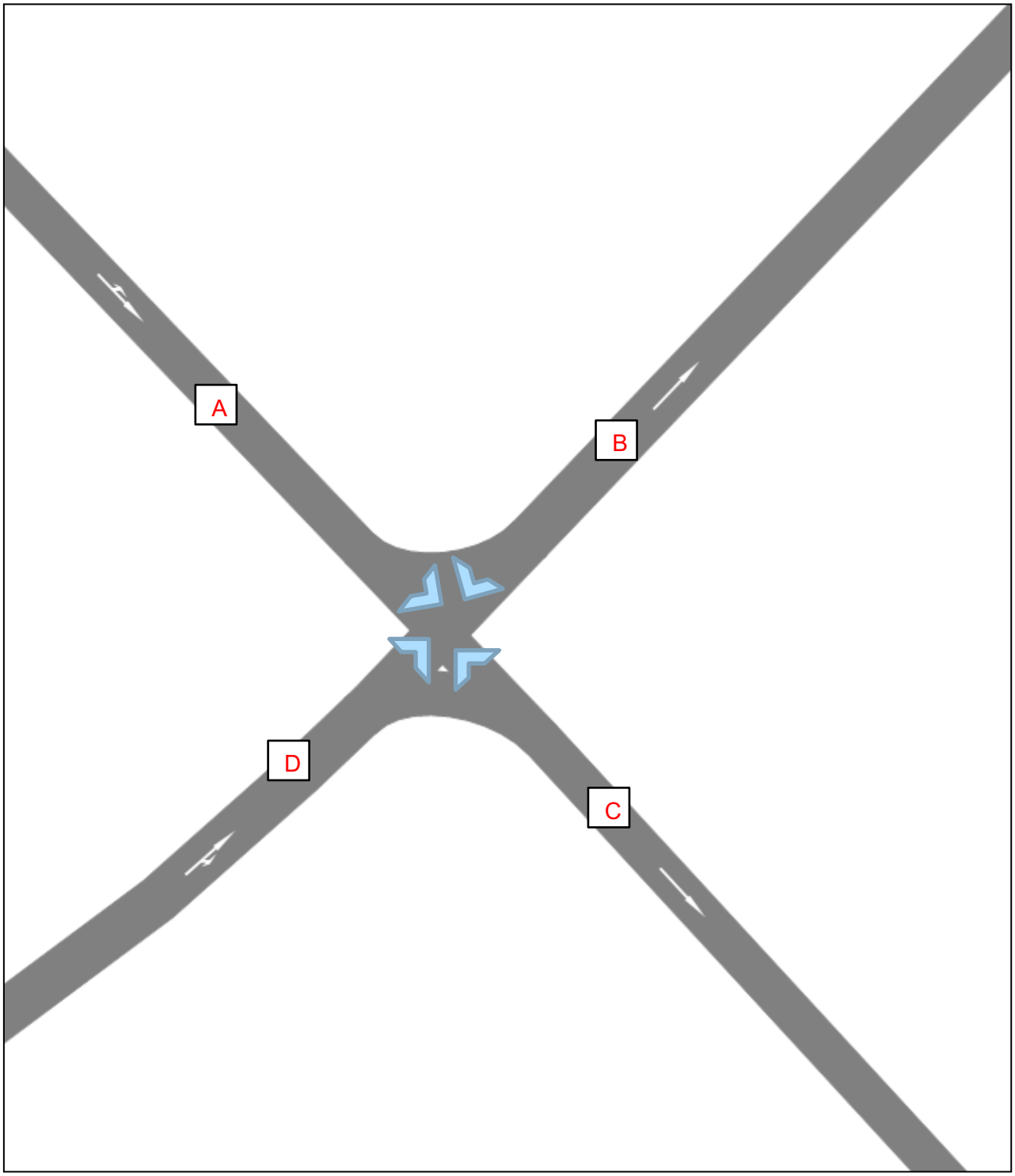


Figure 1-51 Junction 26 Layout

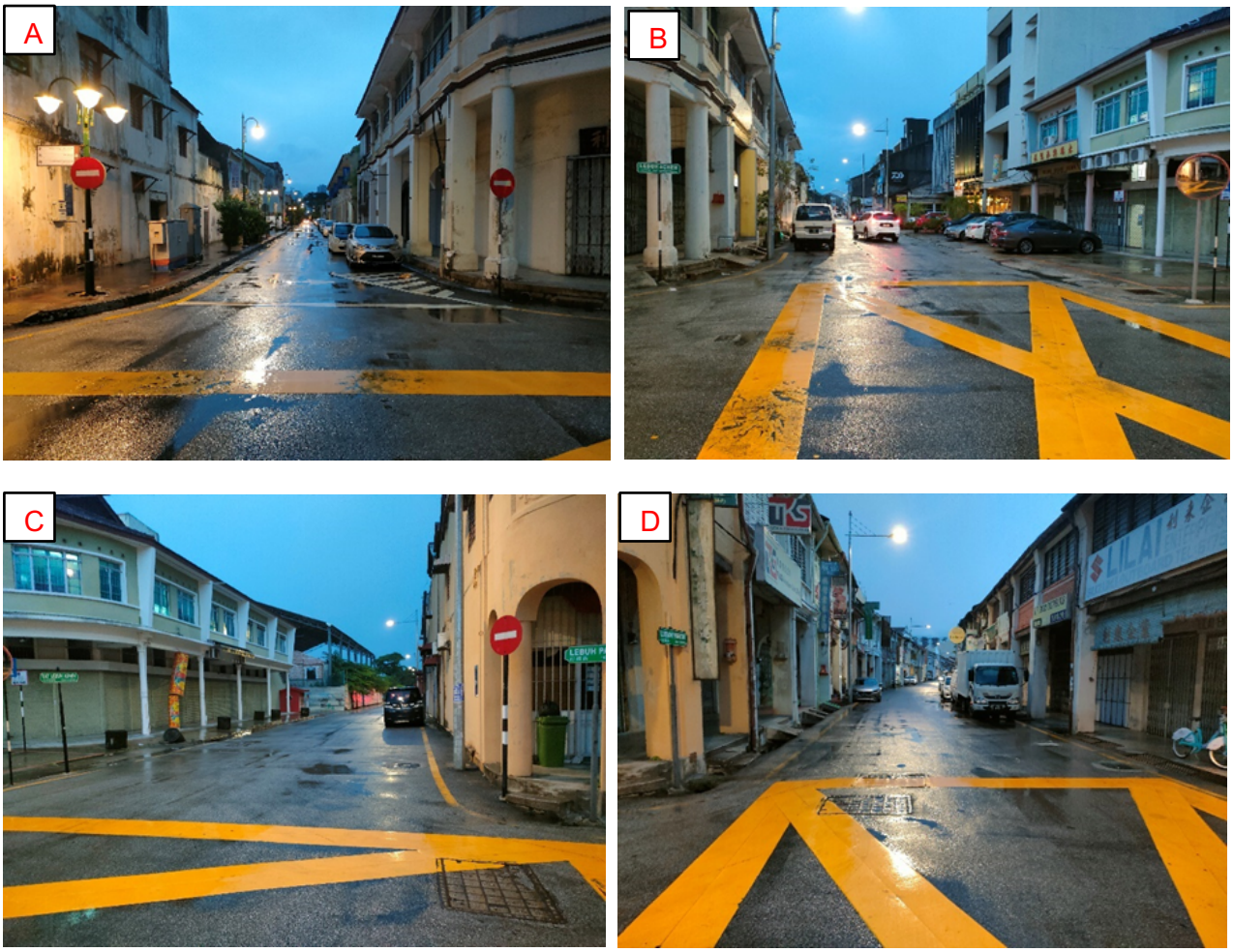


Figure 1-52 Junction 26 Traffic Condition

1.27 Junction 27: Beach Street / Get Lebuh Melayu

Junction 27 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

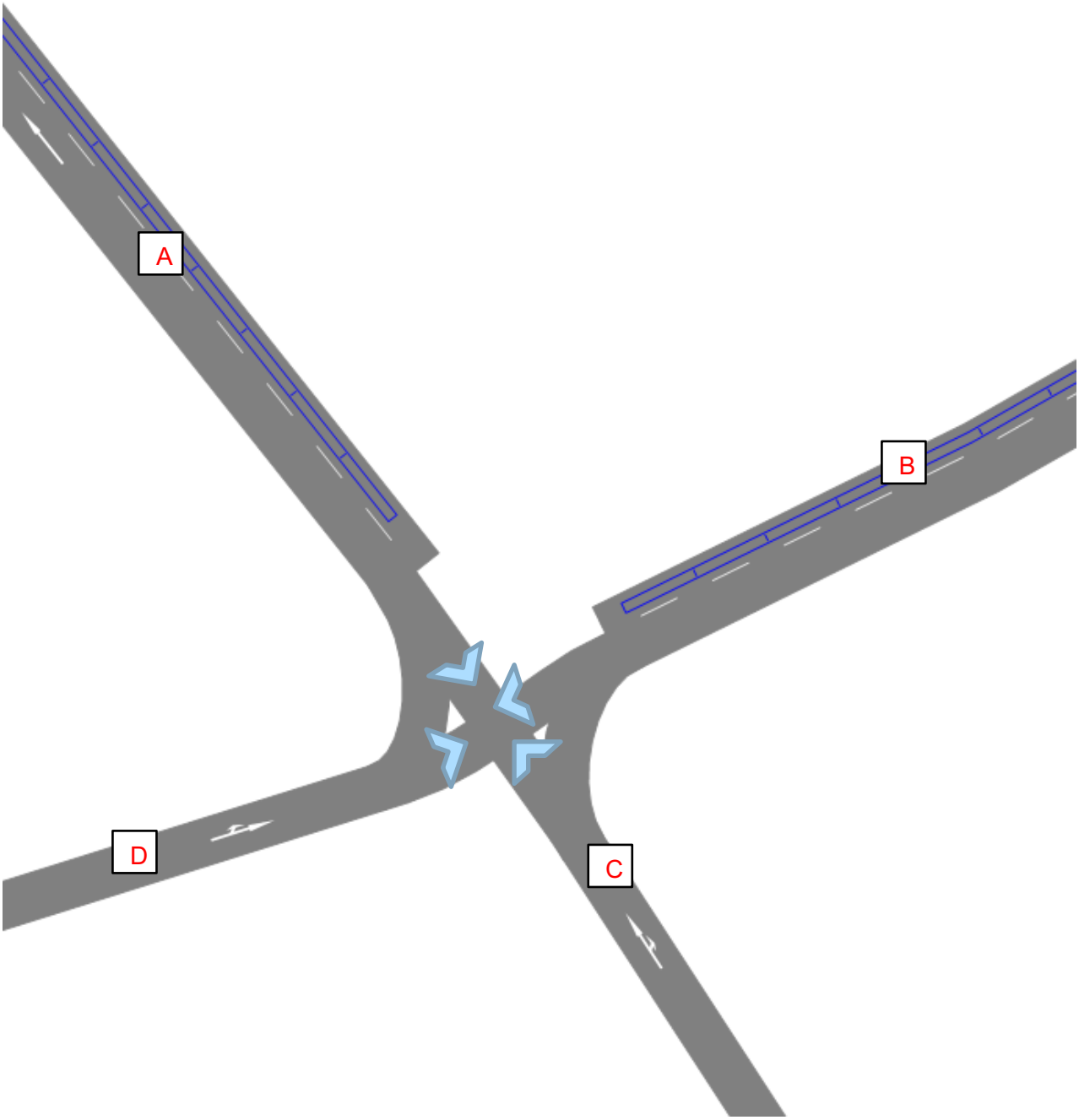


Figure 1-53 Junction 27 Layout

Figure 1-54 Junction 27 Traffic Condition

1.28 Junction 28: Get Lebuh Melayu / Lorong Toh Aka

Junction 28 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

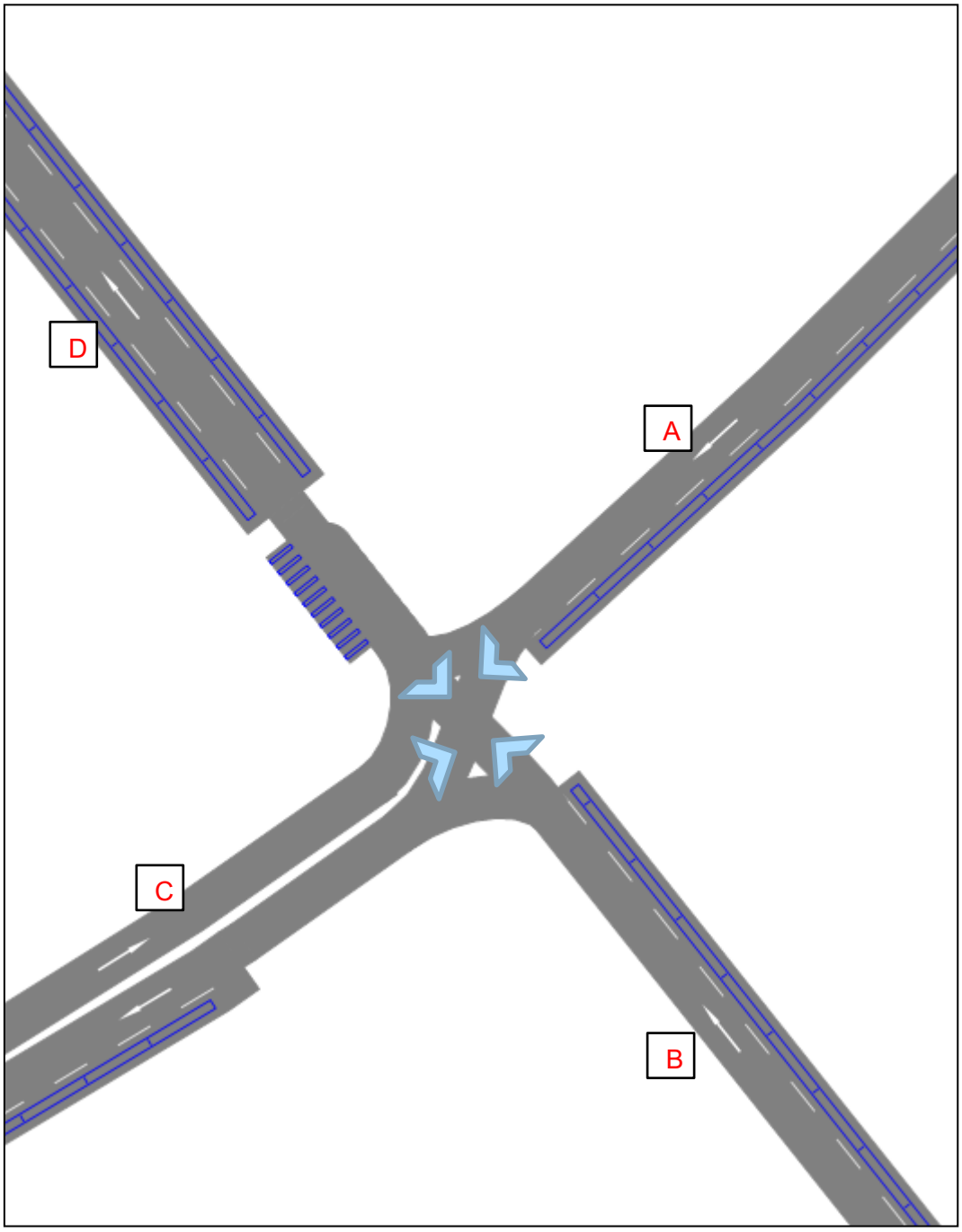


Figure 1-55 Junction 28 Layout

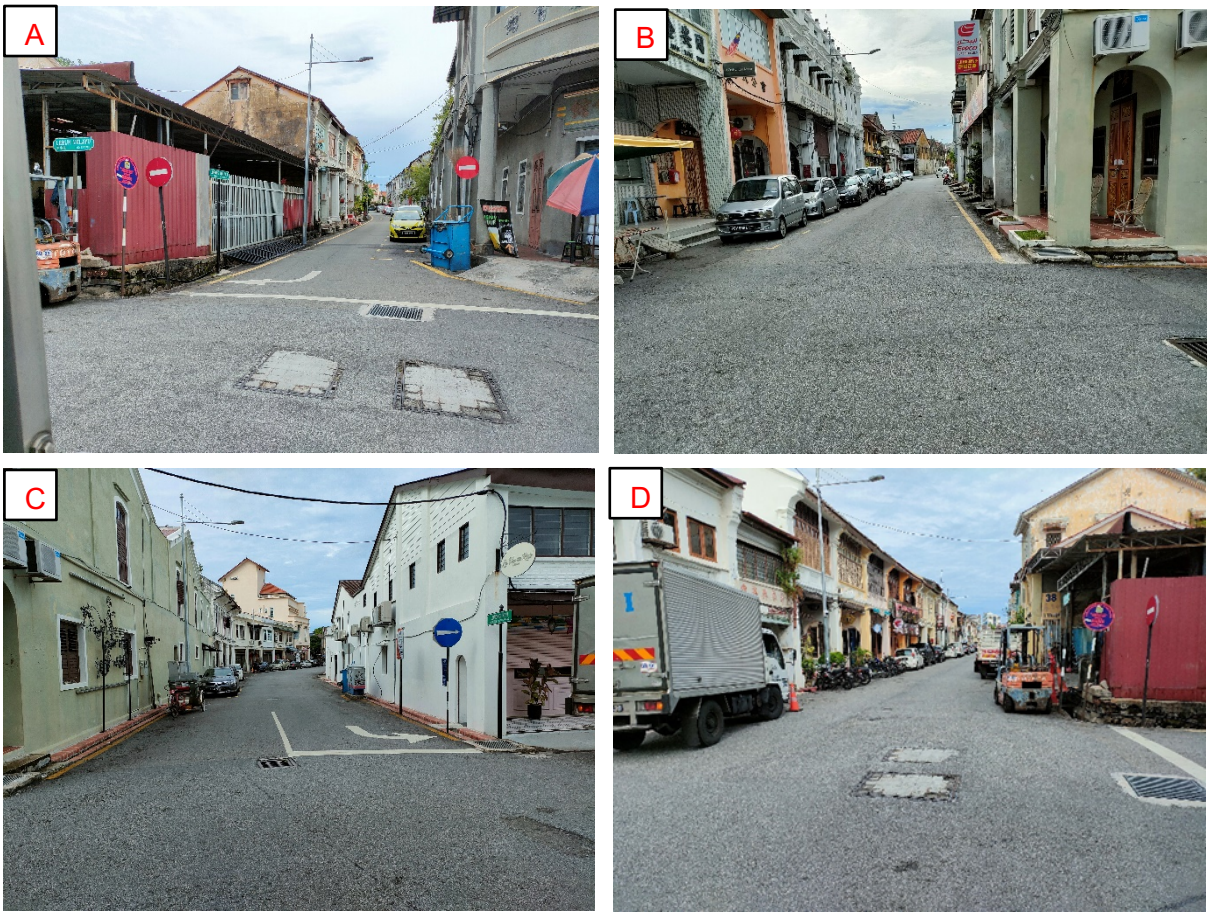


Figure 1-56 Junction 28 Traffic Condition

1.29 Junction 29: Lorong Toh Aka / Lorong Carnavon

Junction 10 is a signalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction during the morning and evening peak.

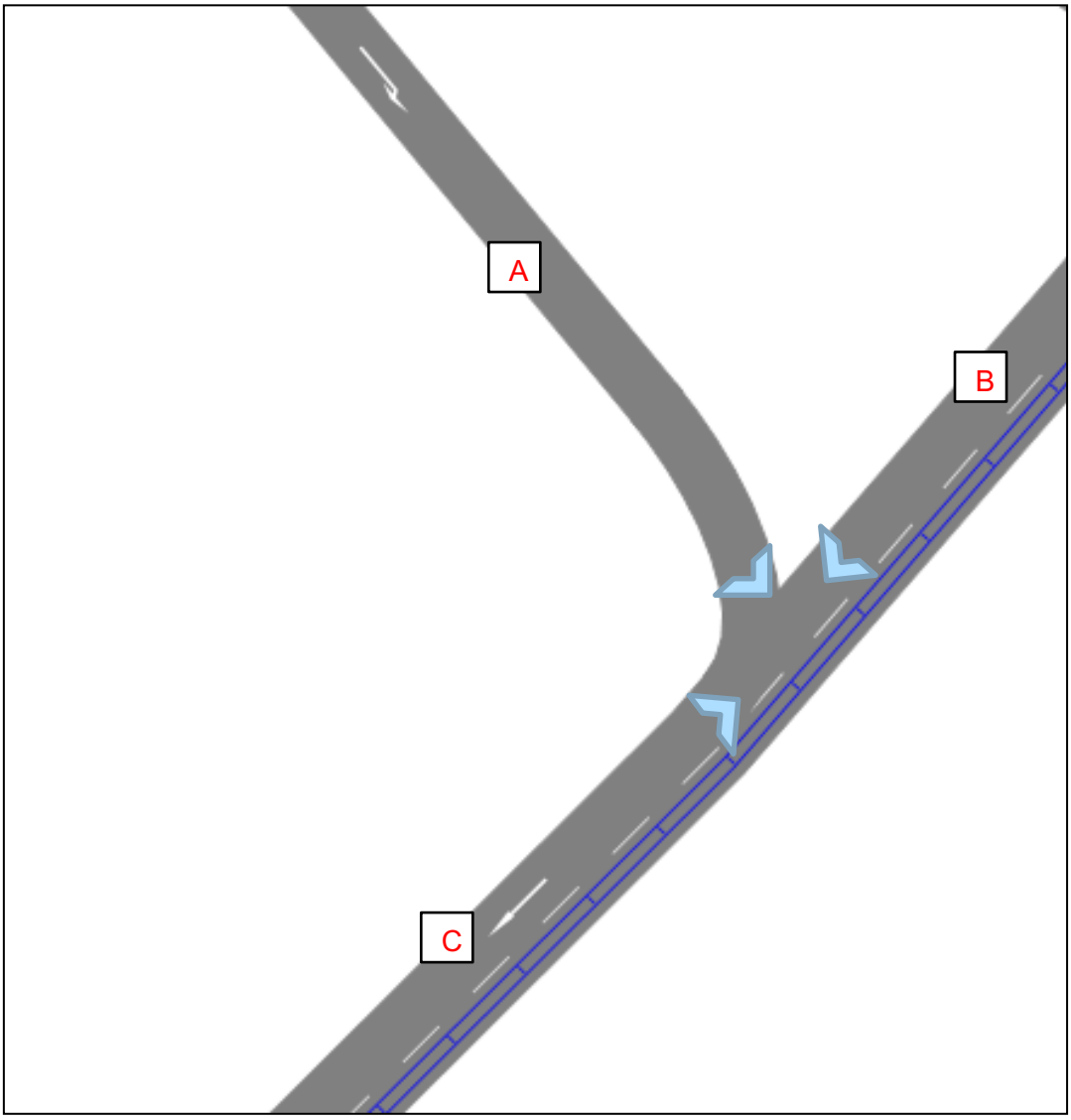


Figure 1-57 Junction 29 Layout

Figure 1-58 Junction 29 Traffic Condition

1.30 Junction 30: Gat Lebuh Acheh / Lebuh Carnavon

Junction 30 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

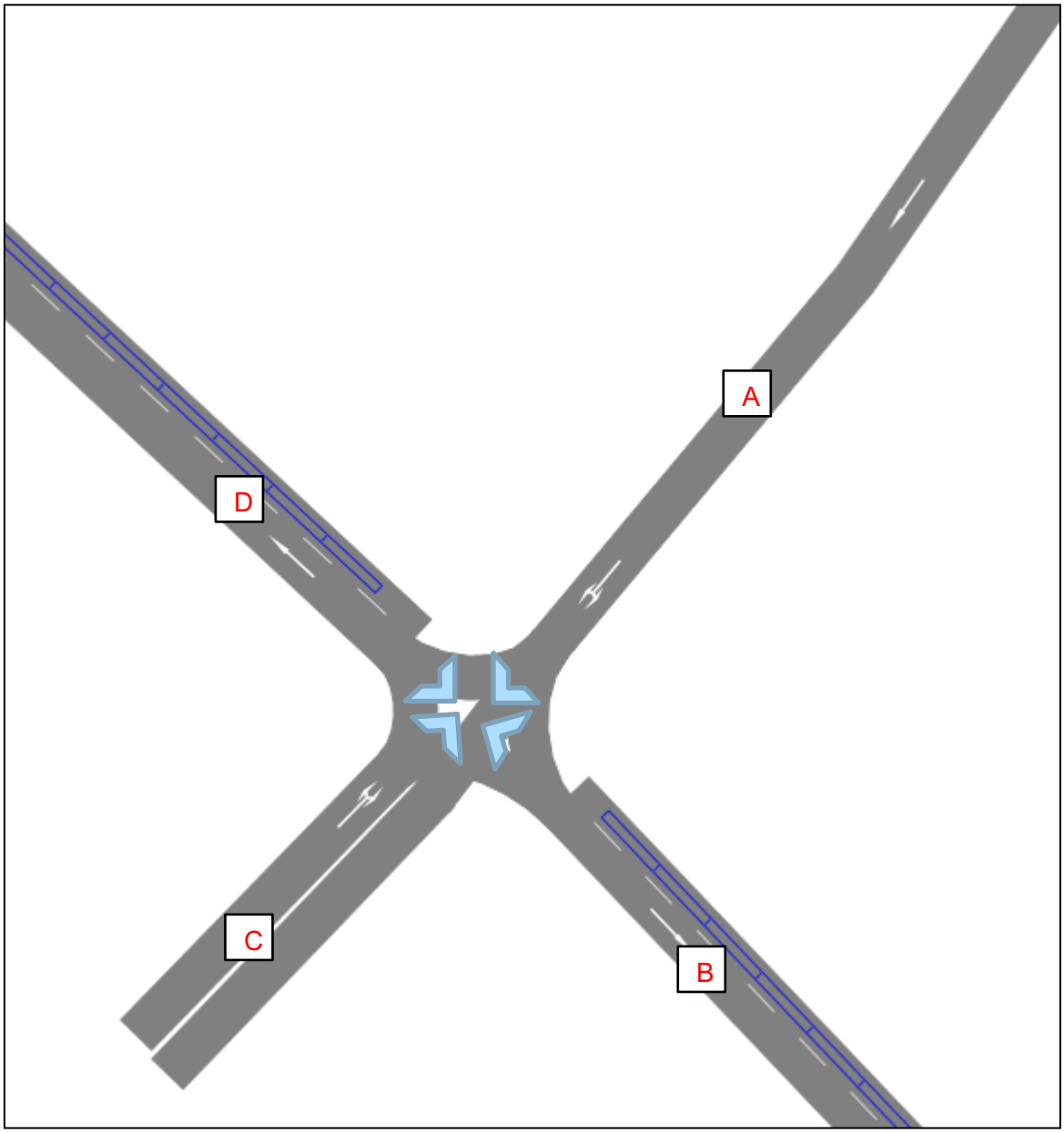


Figure 1-59 Junction 30 Layout

Figure 1-60 Junction 30 Traffic Condition

1.31 Junction 31: Gat Lebuh Armenian / Lorong Carnavon

Junction 31 is a unsignalized double T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

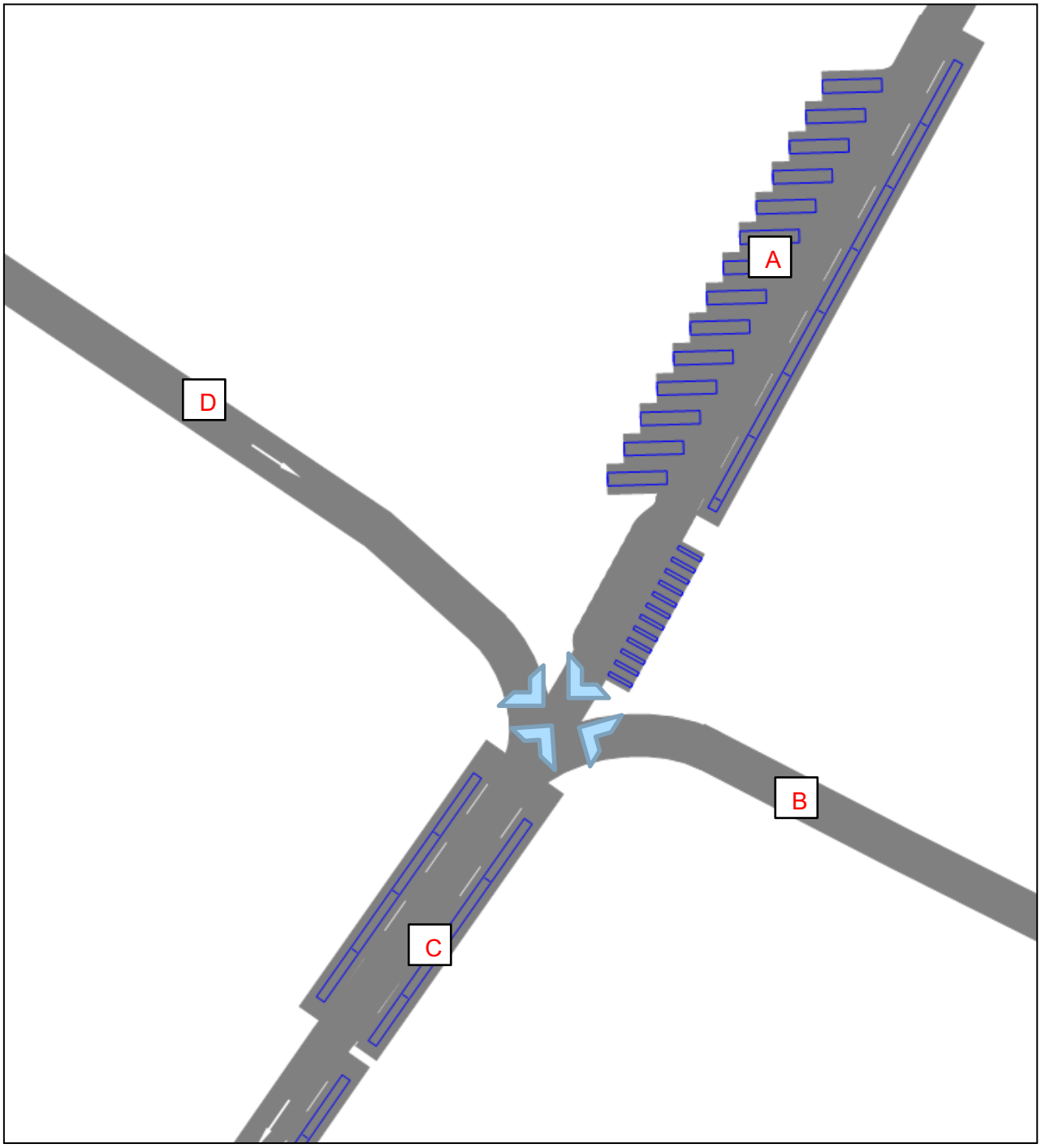


Figure 1-61 Junction 31 Layout

Figure 1-62 Junction 31 Traffic Condition

1.32 Junction 32: Jalan Masjid Kapitan Keling / Jalan Masjid Kapitan Keling

Junction 32 is a unsignalized Y-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

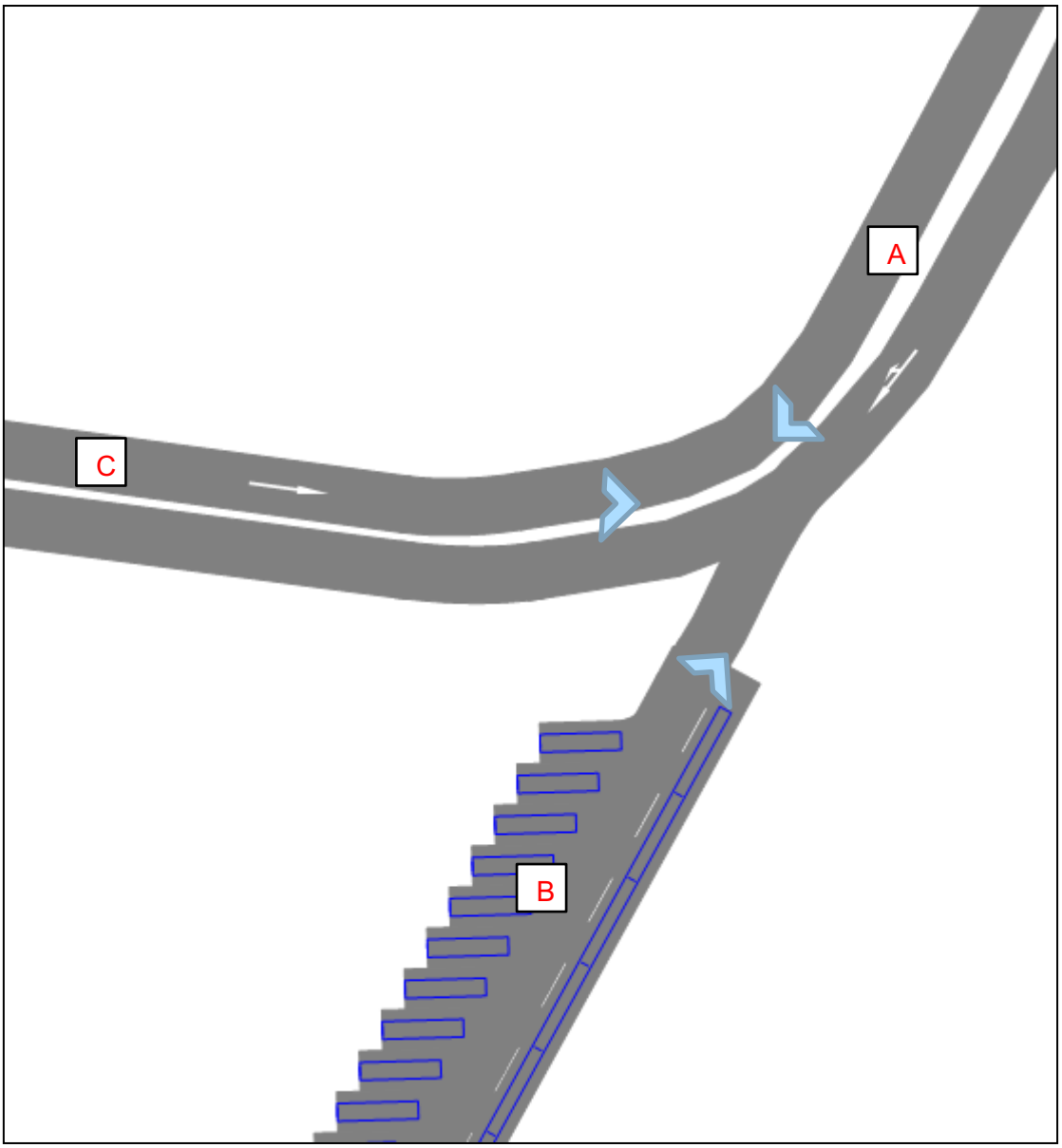


Figure 1-63 Junction 32 Layout

Figure 1-64 Junction 32 Traffic Condition

1.33 Junction 33: Jalan Masjid Kapitan keeling/ Lebuh Ah Quee

Junction 33 is a unsignalized double T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

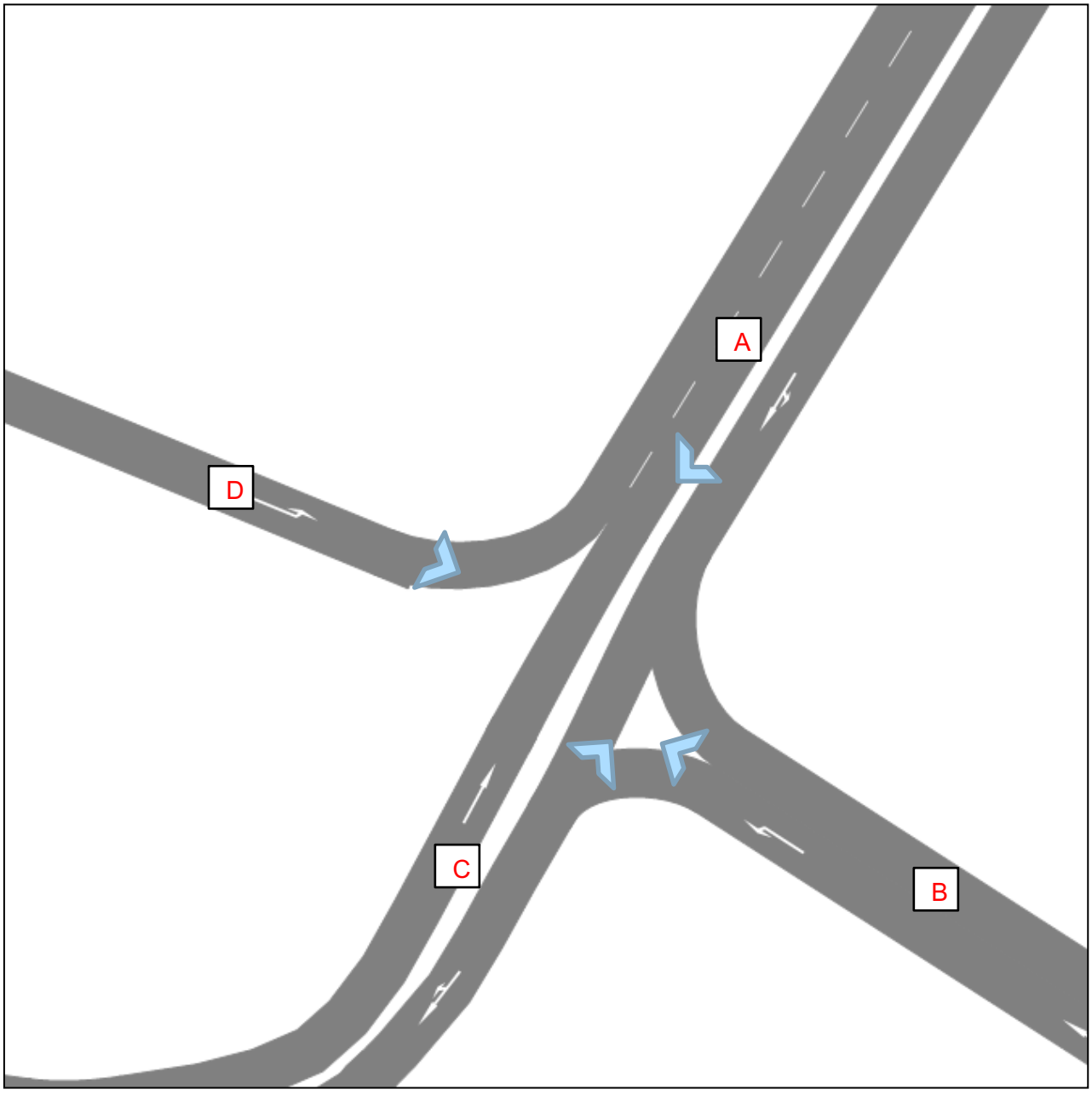


Figure 1-65 Junction 33 Layout

Figure 1-66 Junction 33 Traffic Condition

1.34 Junction 34: Jalan Masjid Kapitan Keling / Chulia Street

Junction 34 is a signalized cross junction, and the layout is shown in the figure below, followed by the site photos. Long queues were observed on approaches of the junction.

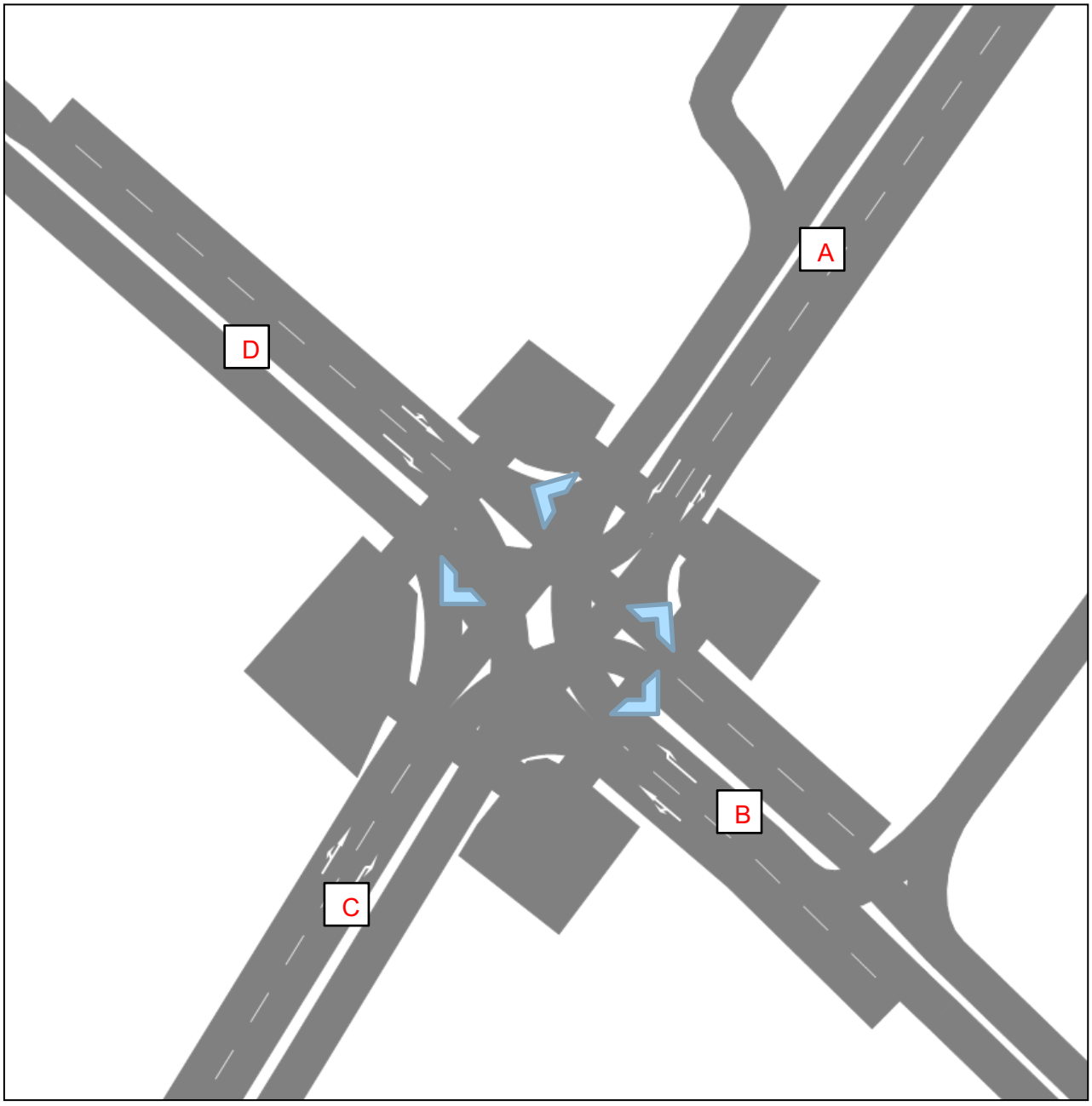


Figure 1-67 Junction 34 Layout

Figure 1-68 Junction 34 Traffic Condition

1.35 Junction 35: Lebuh King / Chulia Street

Junction 35 is a unsignalized Cross-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

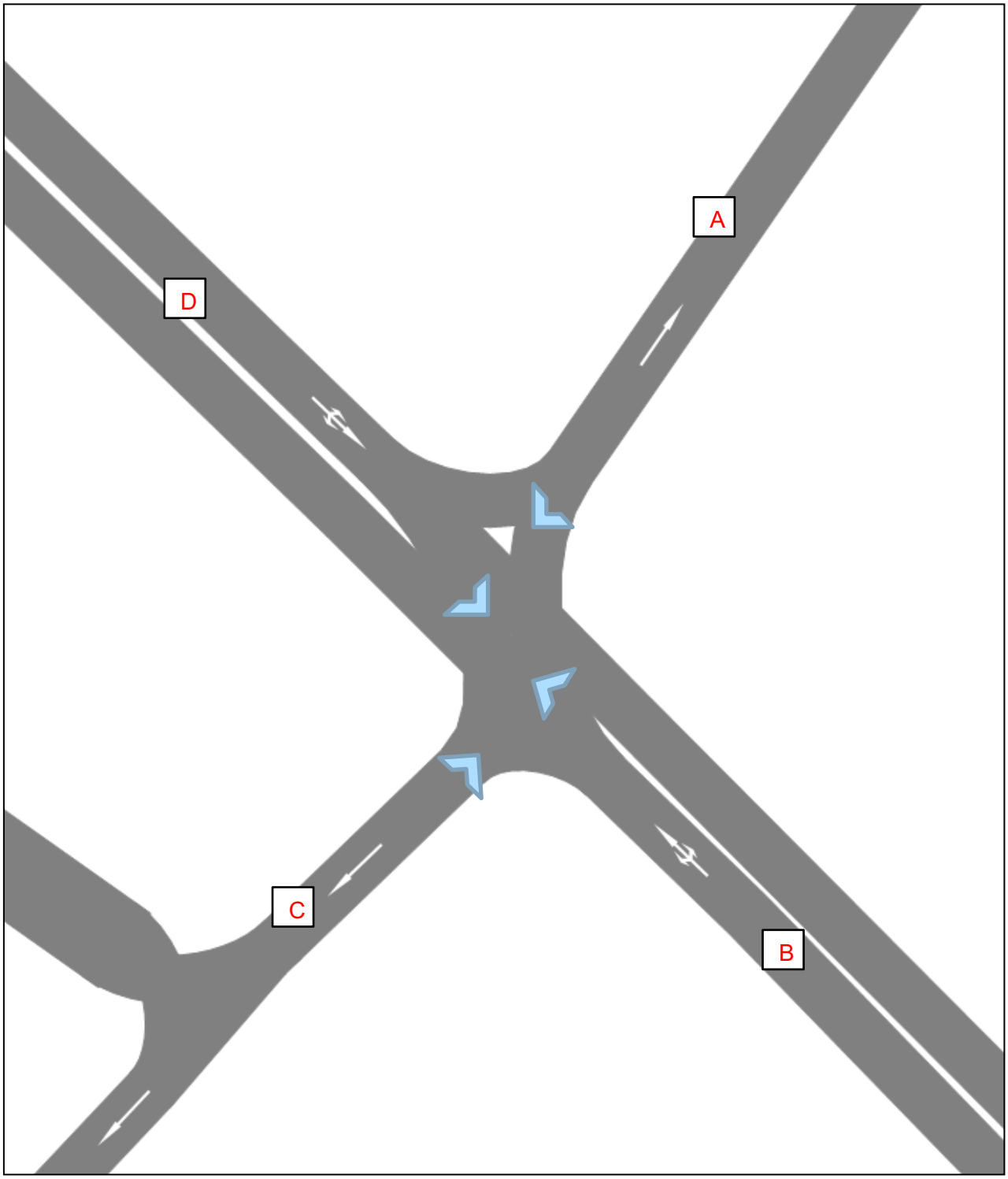


Figure 1-69 Junction 35 Layout

Figure 1-70 Junction 35 Traffic Condition

1.36 Junction 36: Penang Street / Chulia Street

Junction 36 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short-length queues were observed on approaches of the junction.

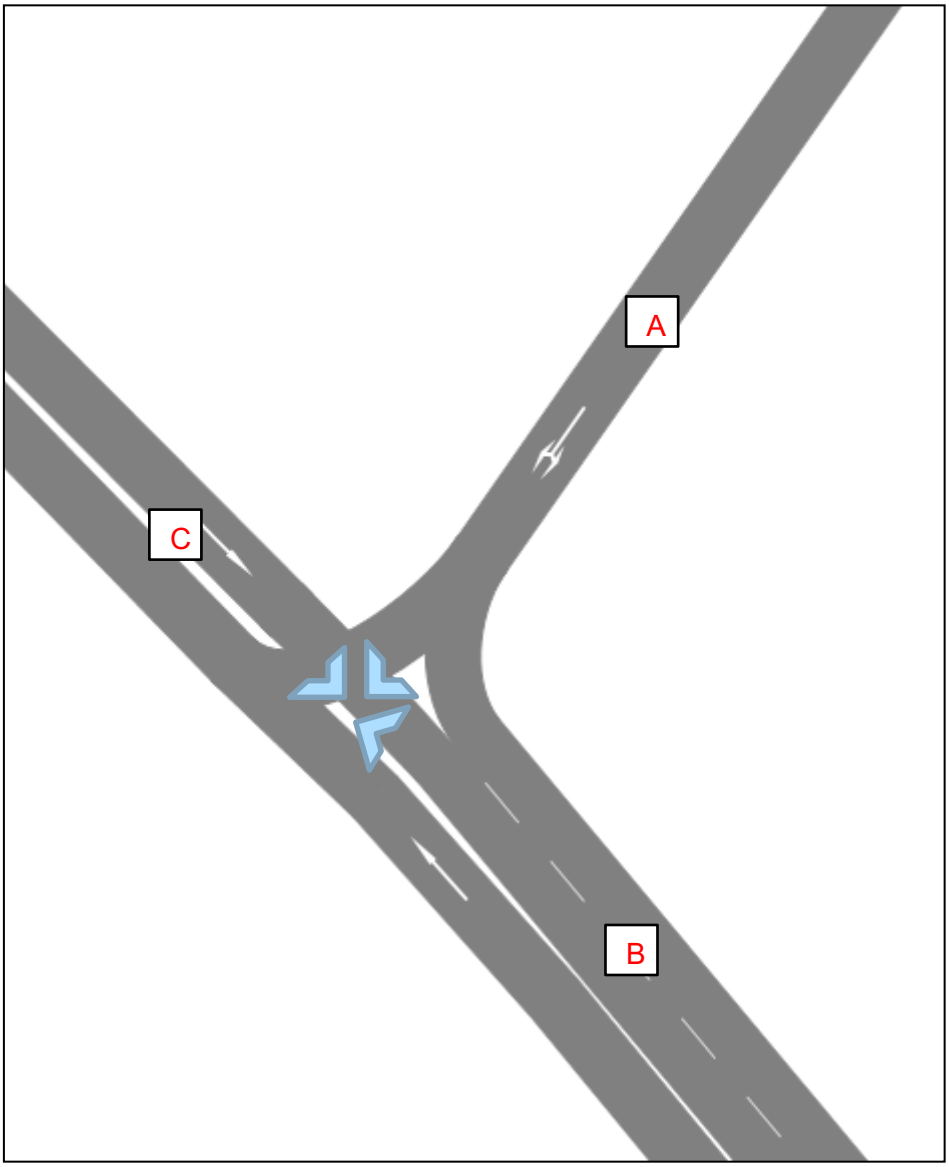


Figure 1-71 Junction 36 Layout

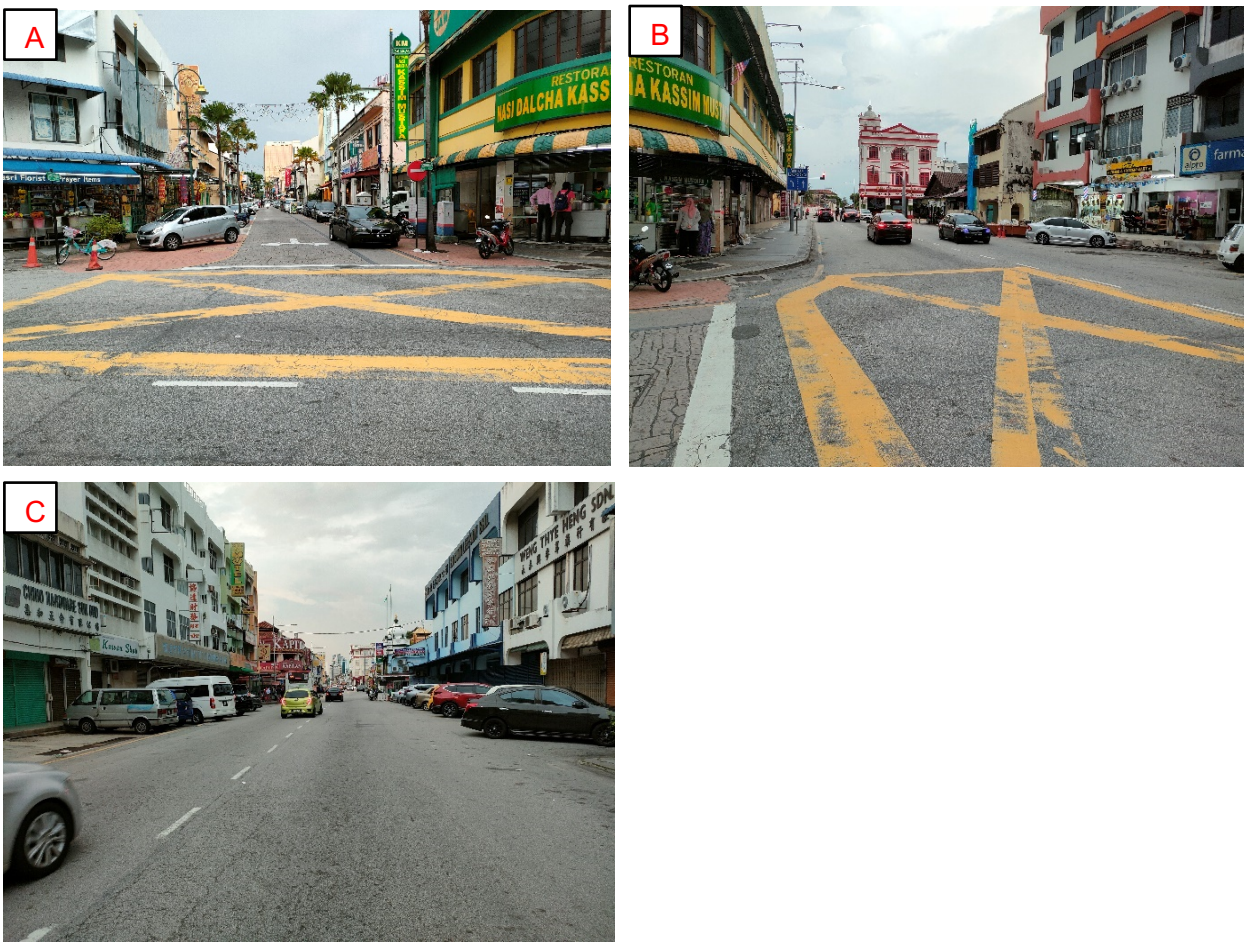


Figure 1-72 Junction 36 Traffic Condition

1.37 Junction 37: Penang Street / Lebuh Pasar

Junction 37 is a unsignalized Cross-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

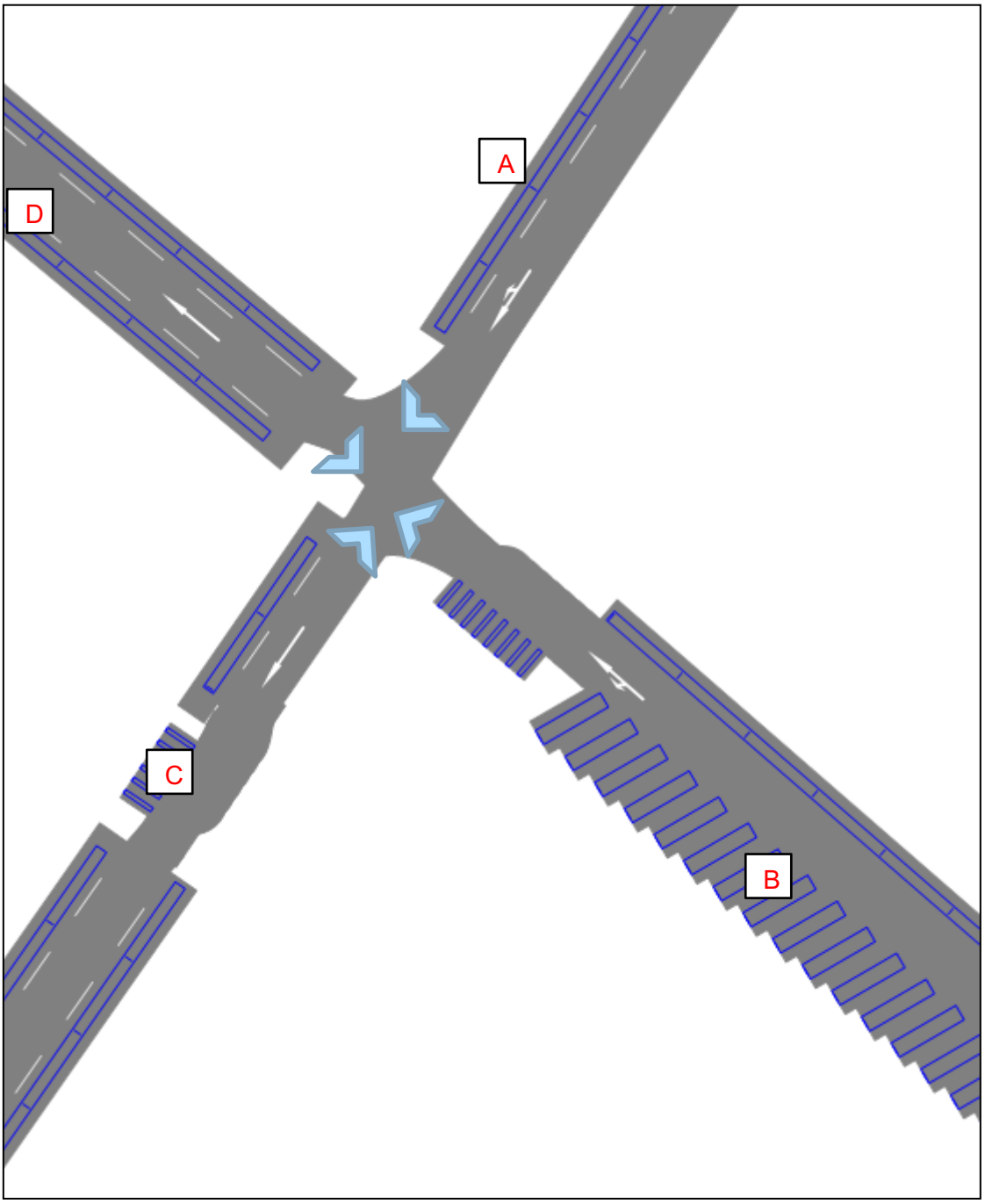


Figure 1-73 Junction 37 Layout

Figure 1-74 Junction 37 Traffic Condition

1.38 Junction 38: Lebuh King / Lebuh Pasar

Junction 38 is a unsignalized Cross junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

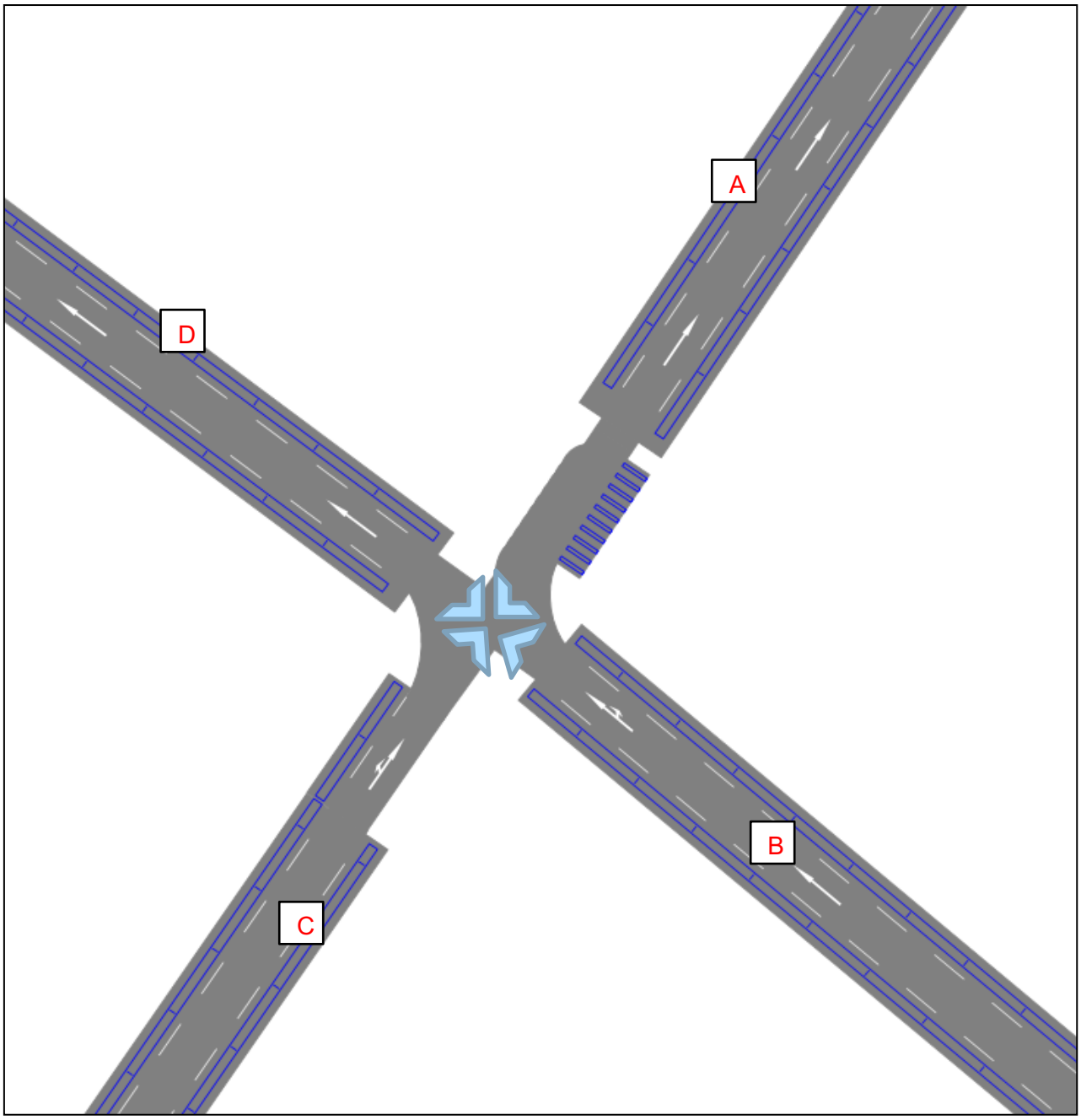


Figure 1-75 Junction 38 Layout

Figure 1-76 Junction 38 Traffic Condition

1.39 Junction 39: Lebuh Pasir / Queen Street

Junction 38 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

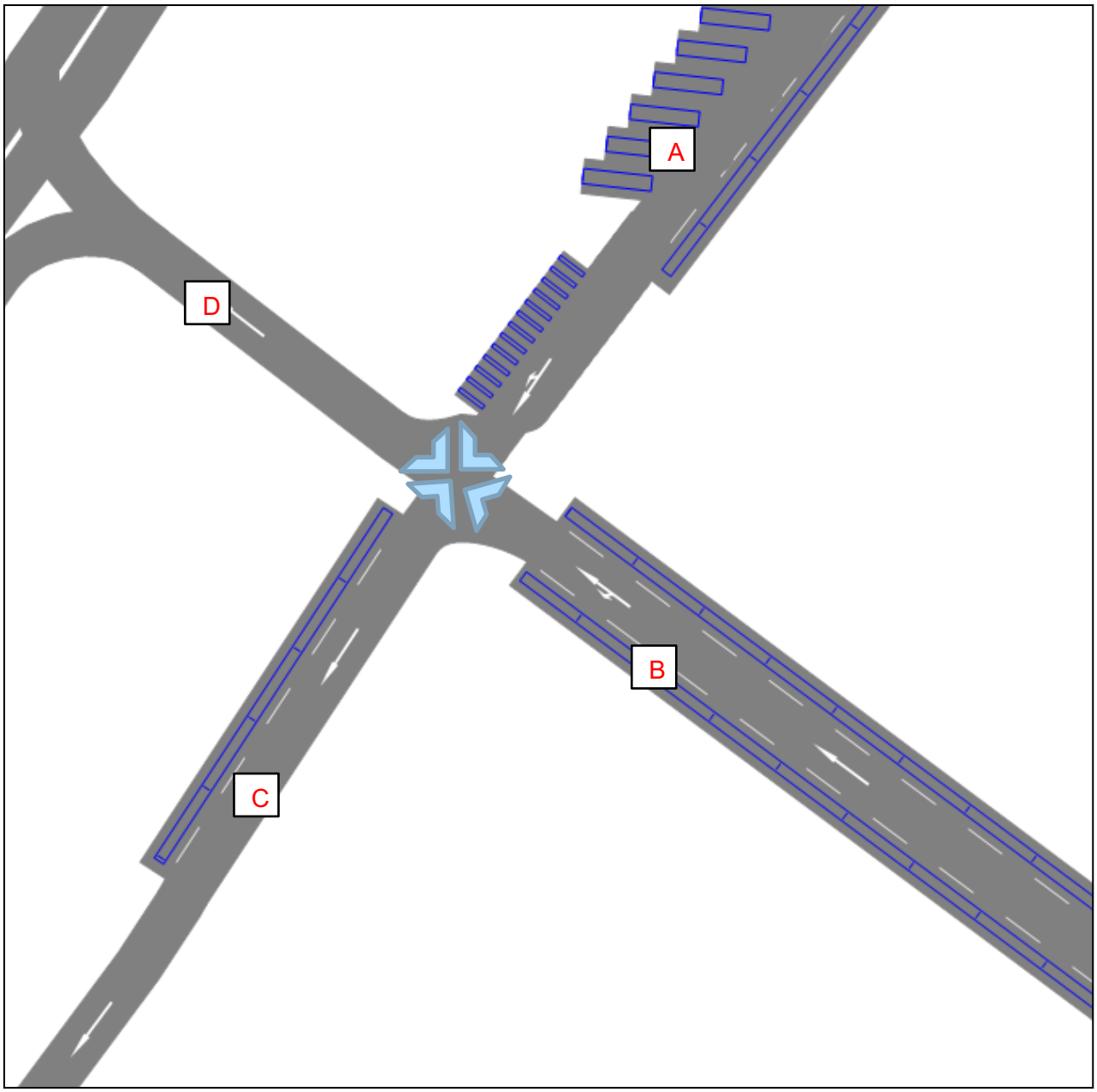


Figure 1-77 Junction 39 Layout

Figure 1-78 Junction 39 Traffic Condition

1.40 Junction 40: Lebuh Pasir / Jalan Masjid Kapitan Keling

Junction 10 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

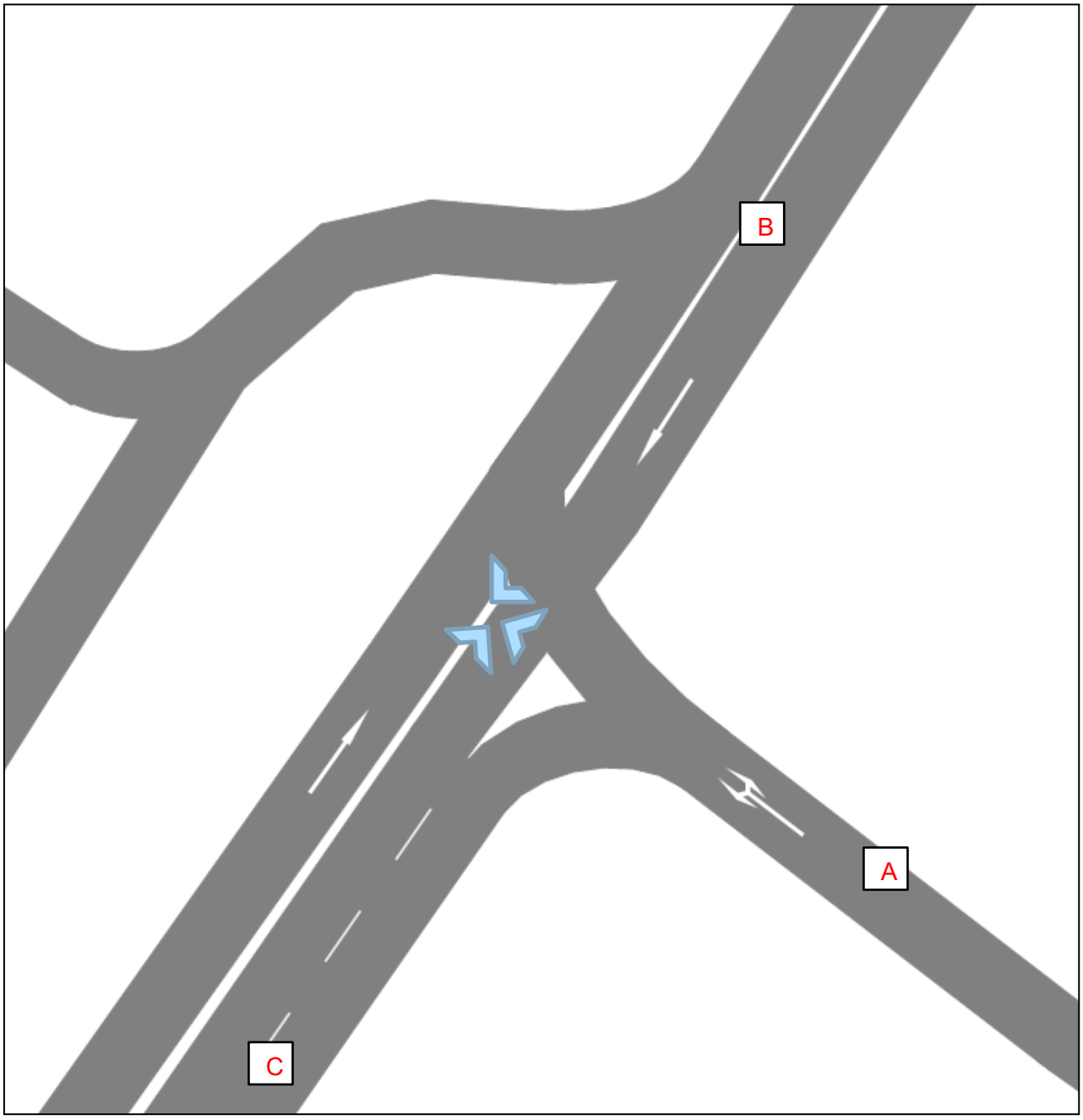


Figure 1-79 Junction 40 Layout

Figure 1-80 Junction 40 Traffic Condition

1.41 Junction 41: Lorong Stewart / Jalan Masjid Kapitan Keling

Junction 41 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Medium length queues were observed on approaches of the junction.

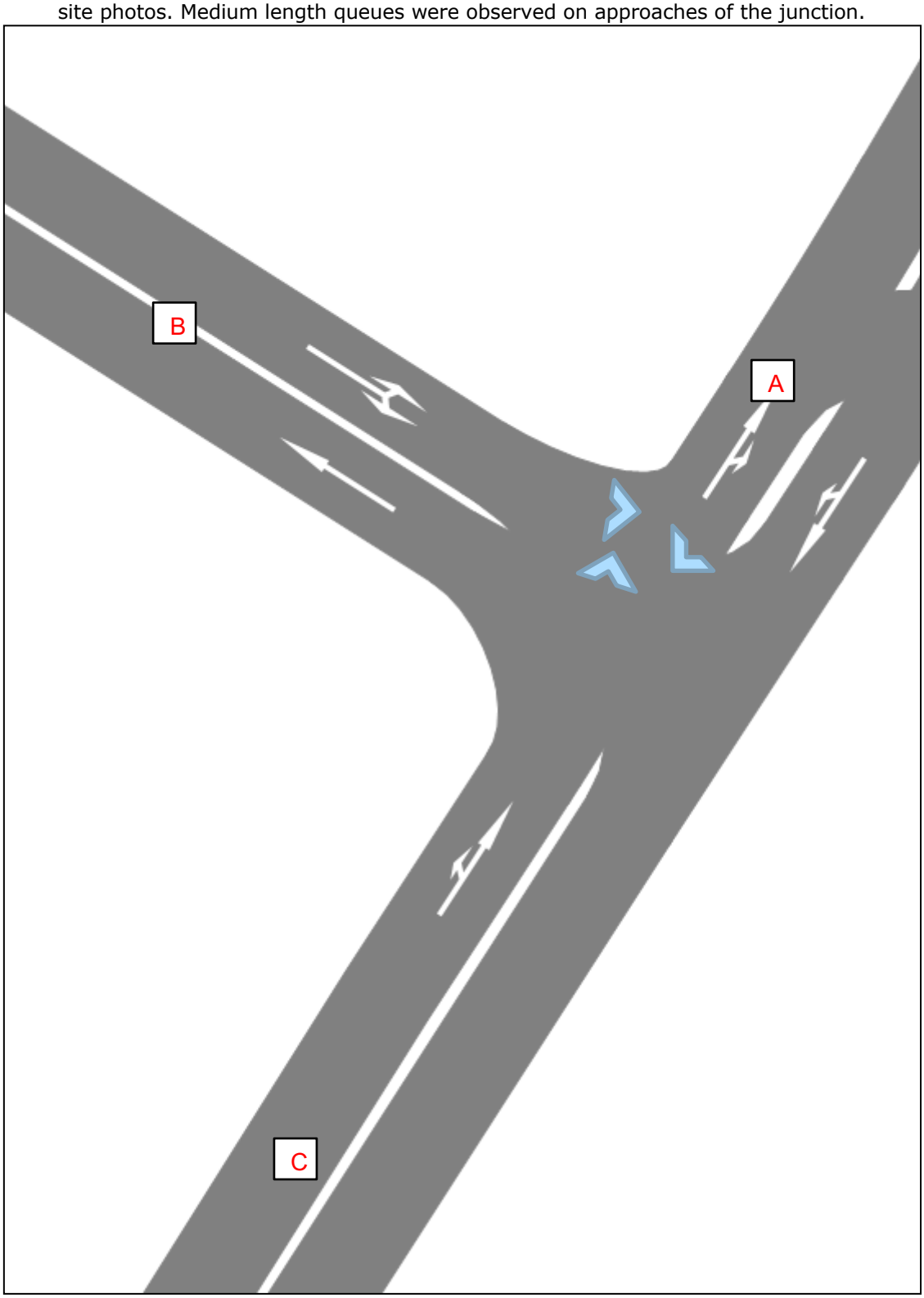


Figure 1-81 Junction 41 Layout

Figure 1-82 Junction 41 Traffic Diagram

1.42 Junction 42: Lebuh China / Jalan Masjid Kapitan Keling

Junction 42 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

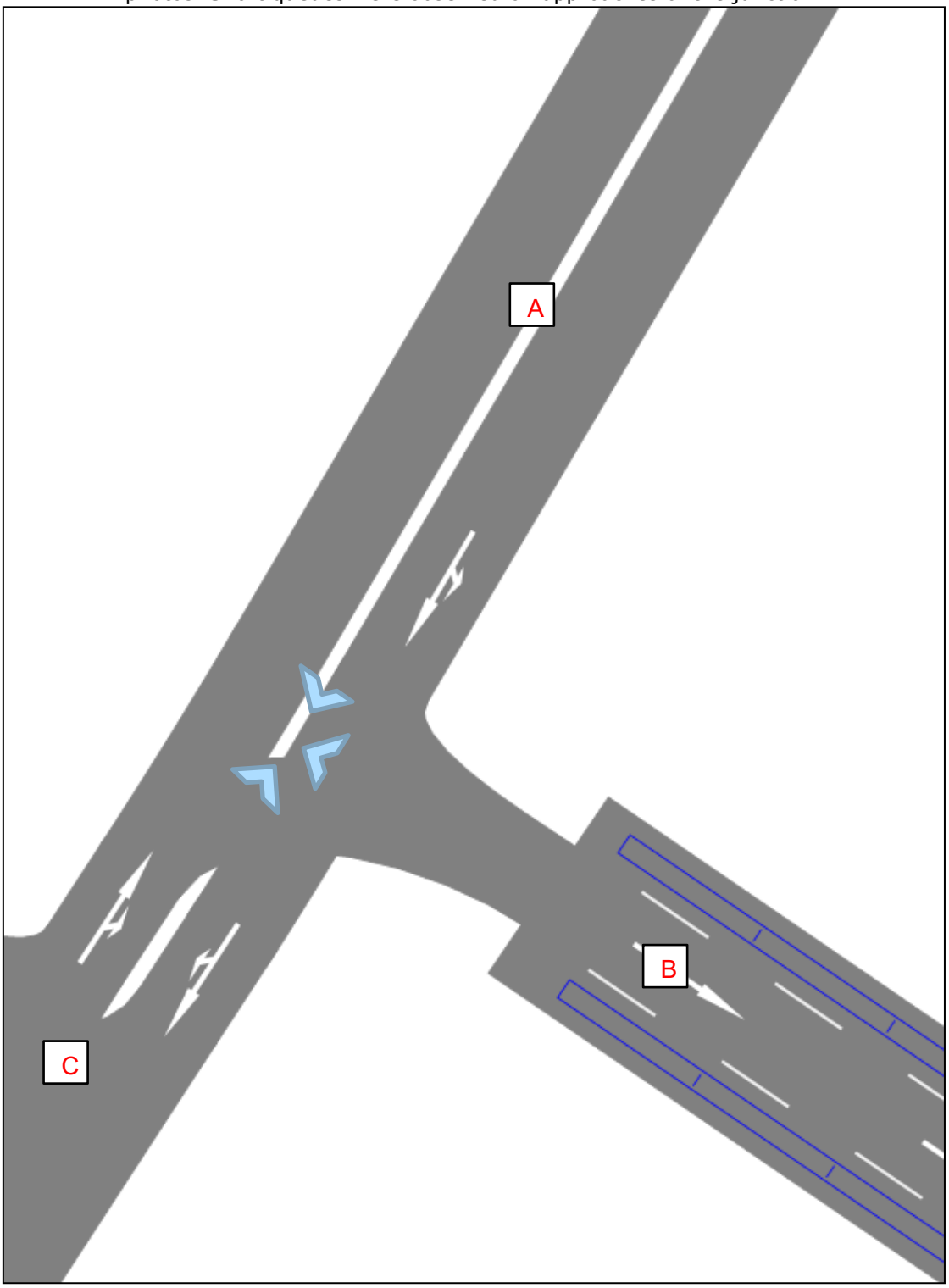


Figure 1-83 Junction 42 Layout

Figure 1-84 Junction 42 Traffic Condition

1.43 Junction 43: Lebuh China / Queen Street

Junction 43 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

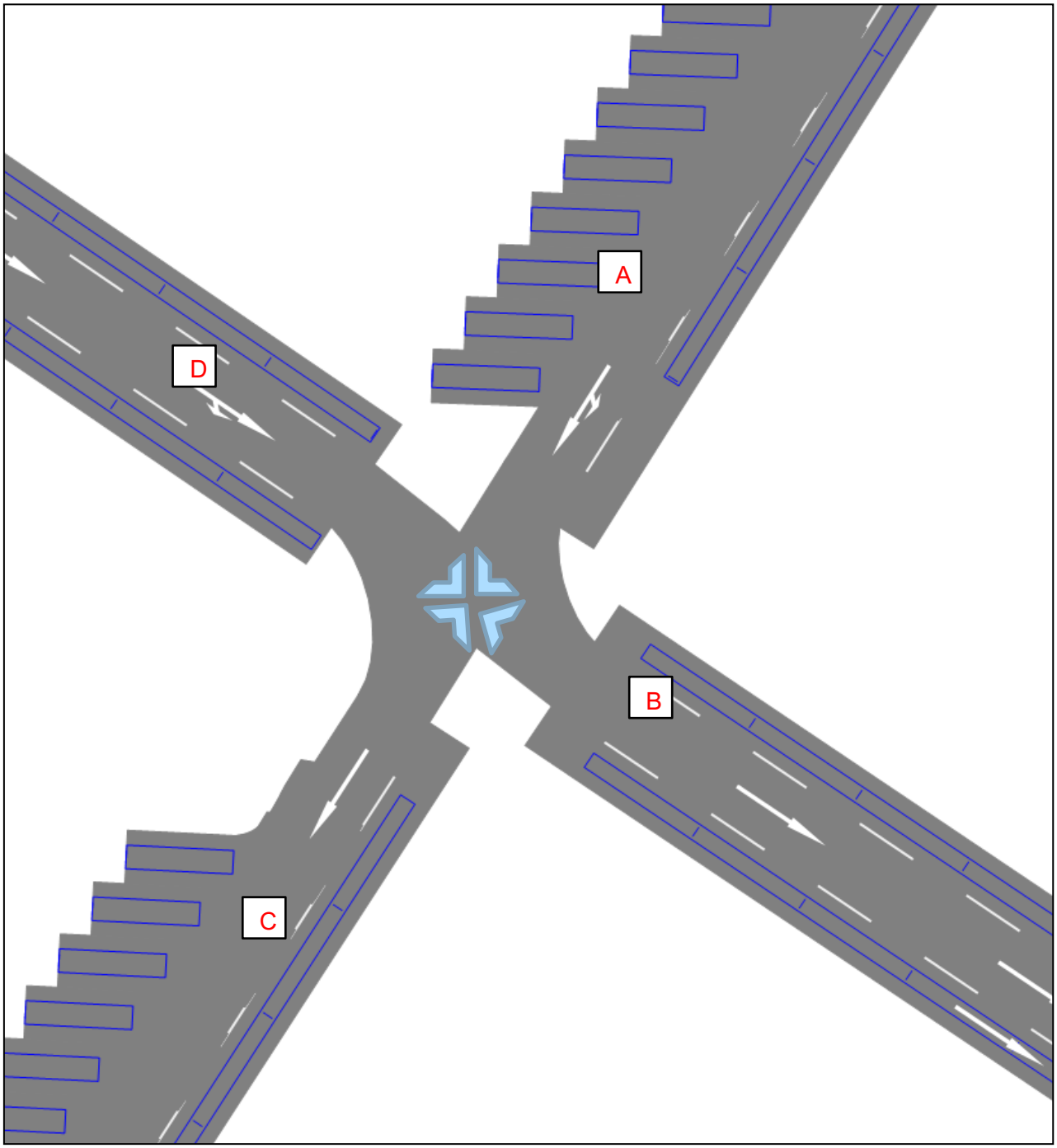


Figure 1-85 Junction 43 Layout

Figure 1-86 Junction 43 Traffic Diagram

1.44 Junction 44: Lebuh China / Lebuh King

Junction 44 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

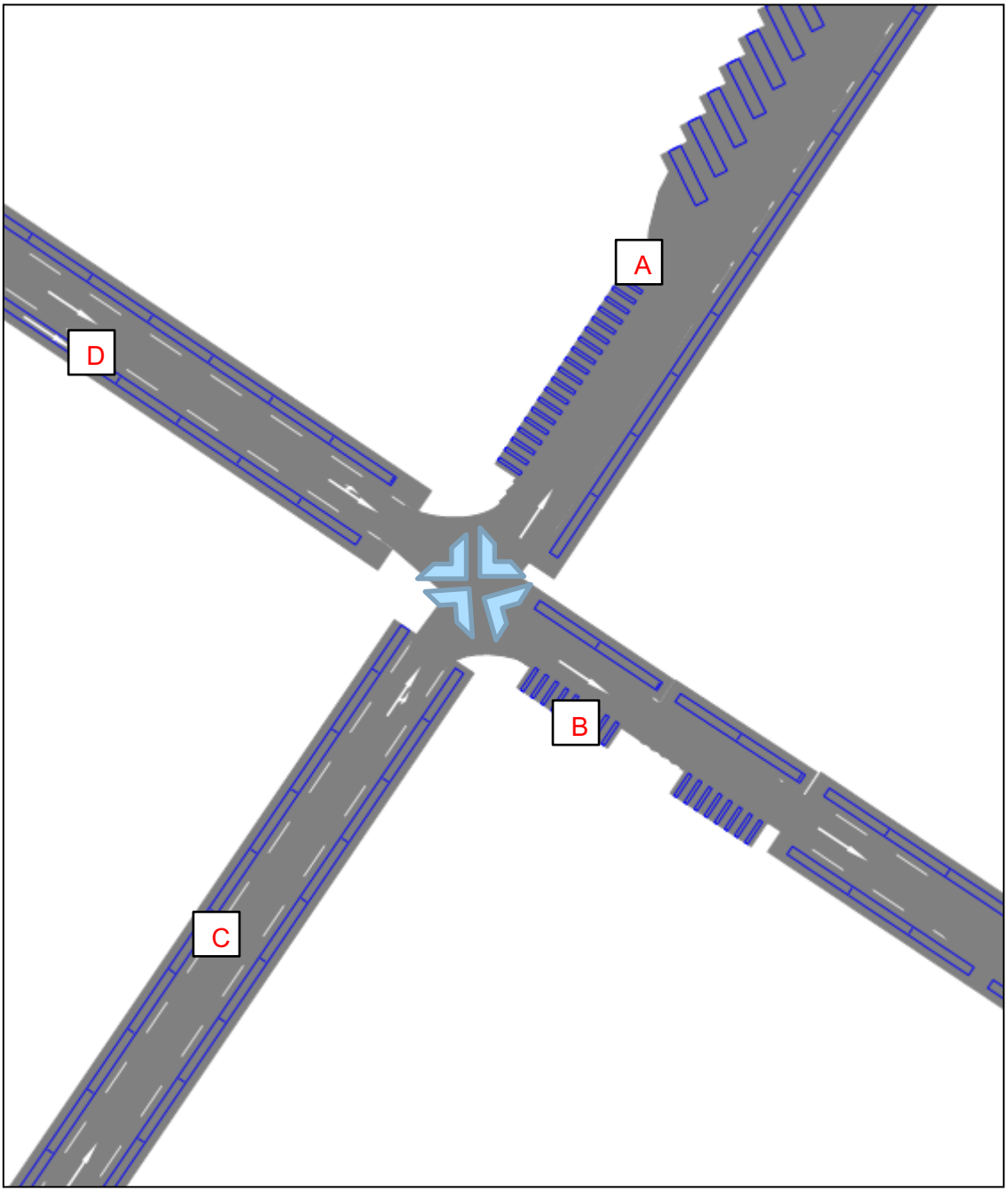


Figure 1-87 Junction 44 Layout

Figure 1-88 Junction 44 Traffic Condition

1.45 Junction 45: Lebuh China / Penang Street

Junction 45 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

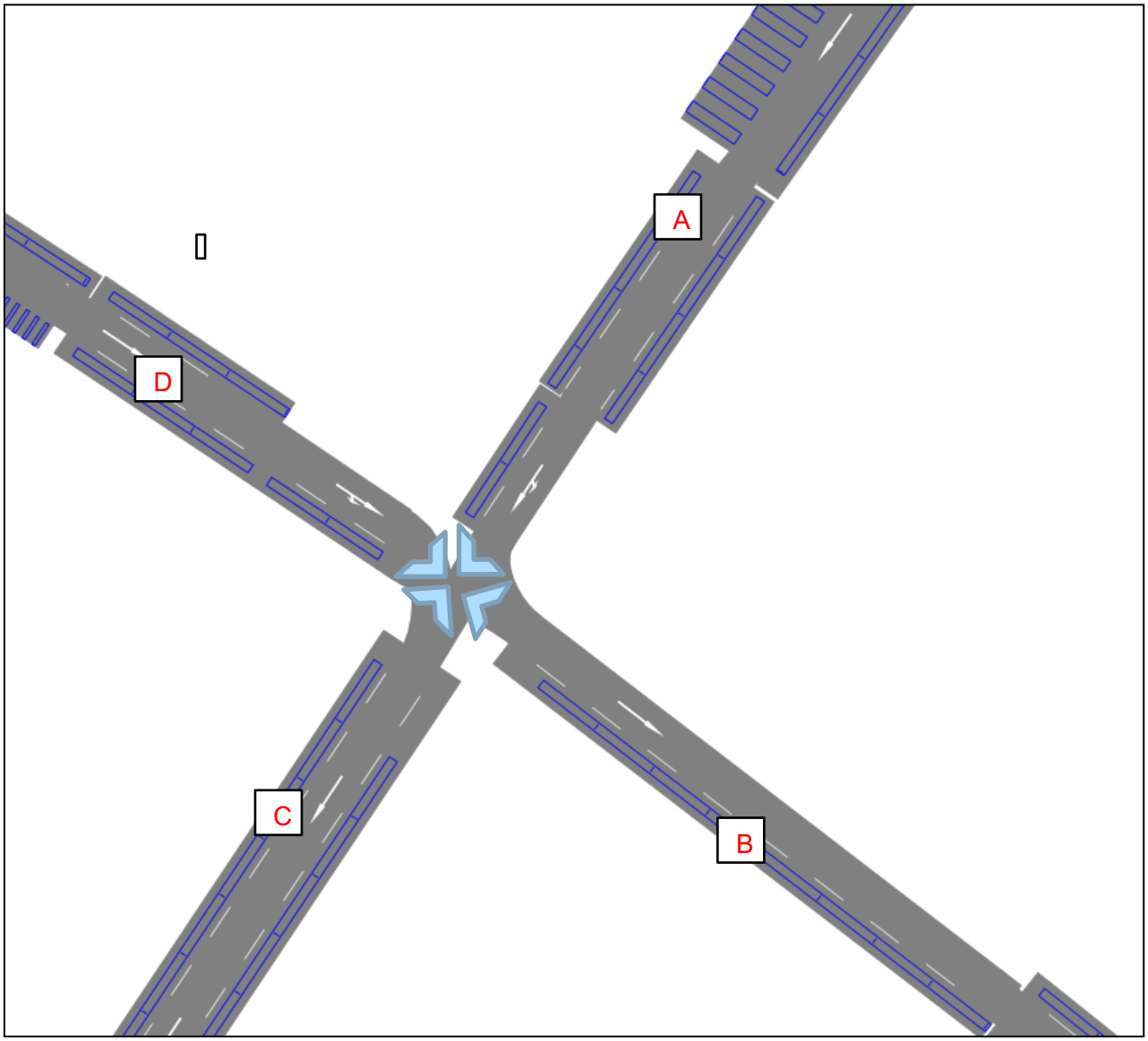


Figure 1-89 Junction 45 Layout

Figure 1-90 Junction 45 Traffic Diagram

1.46 Junction 46: Church Street / Penang Street

Junction 46 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

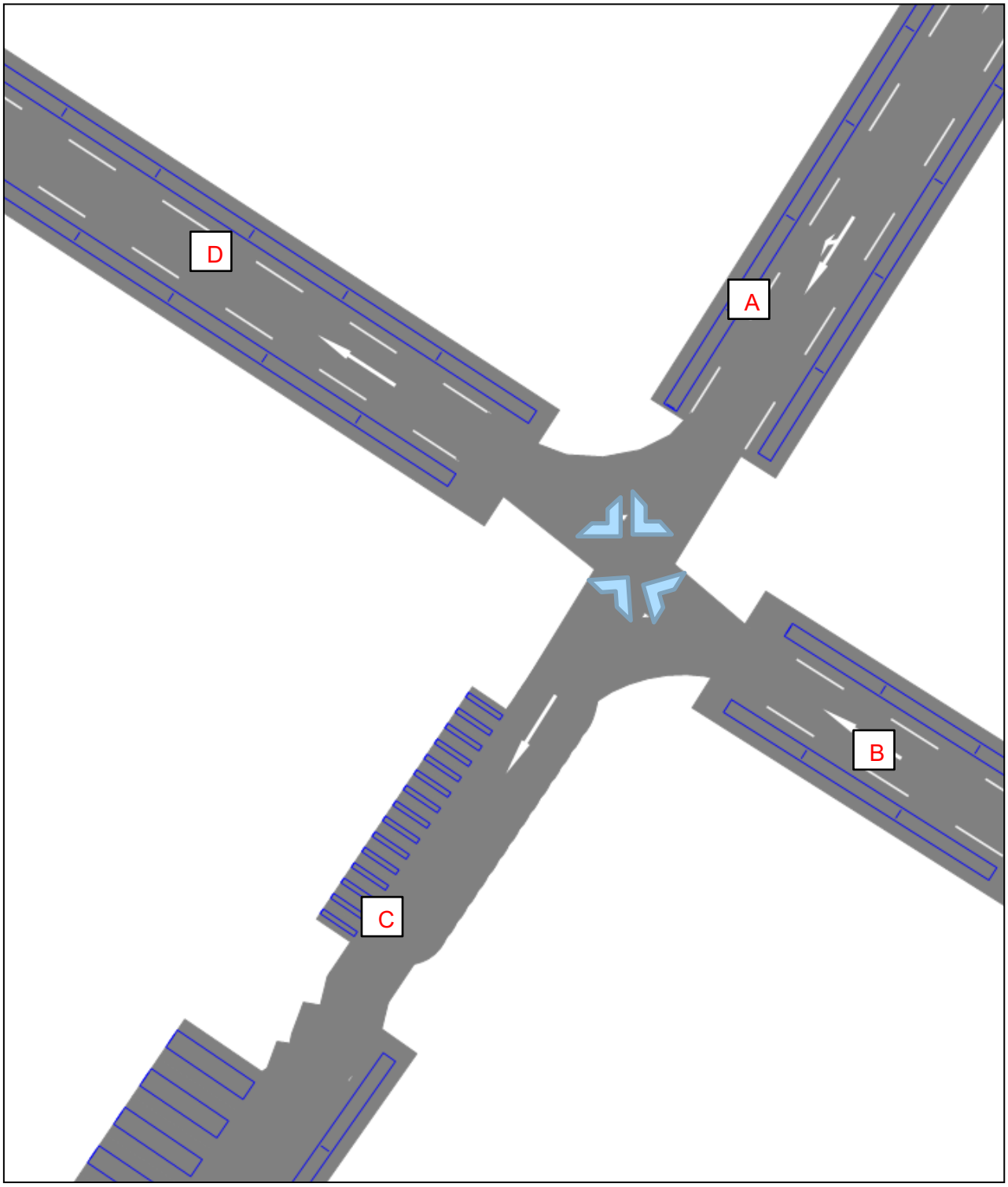


Figure 1-91 Junction 46 Layout

Figure 1-92 Junction 46 Traffic Diagram

1.47 Junction 47: Church Street / Lebuh King

Junction 47 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

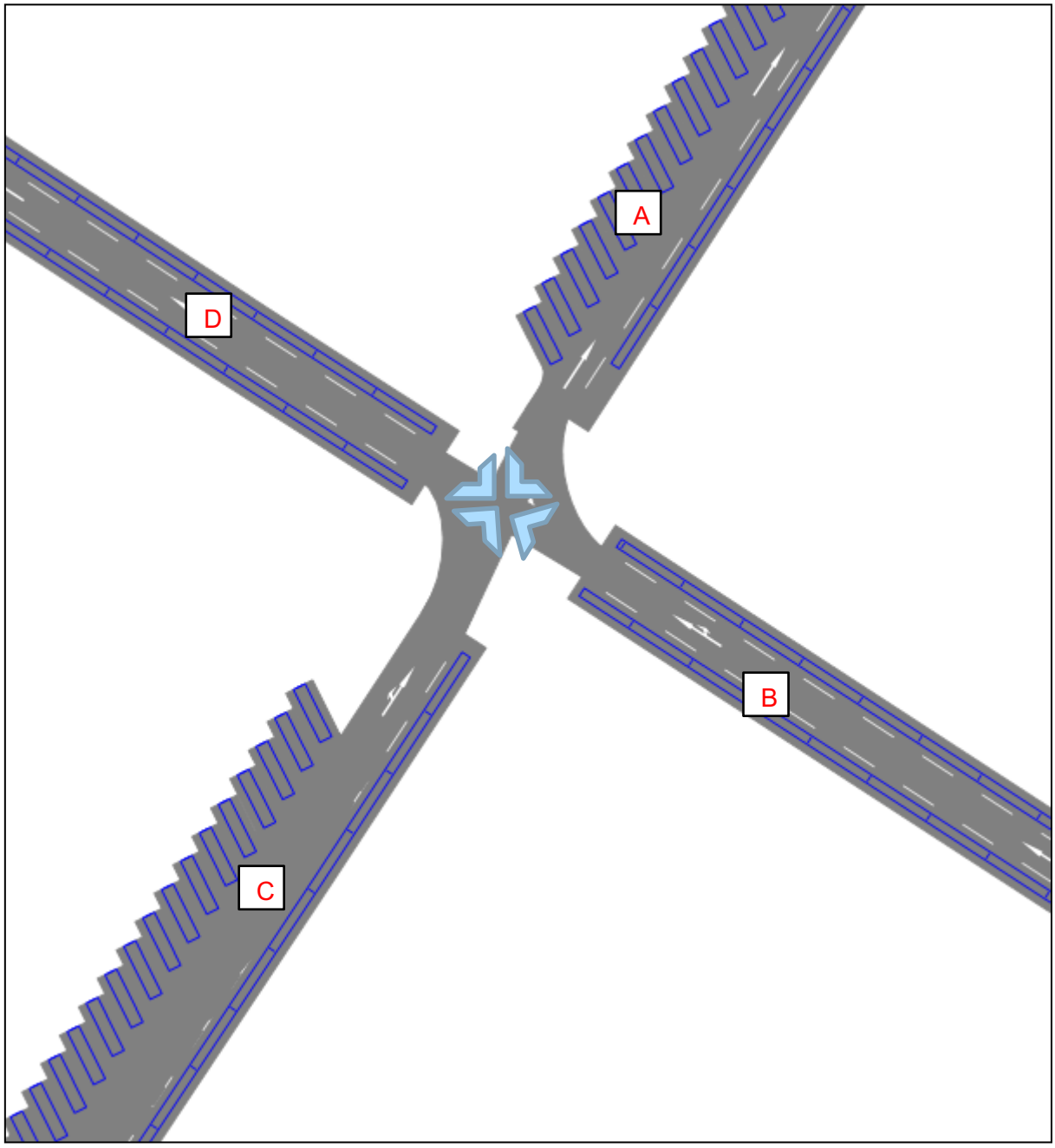


Figure 1-93 Junction 47 Layout

Figure 1-94 Junction 47 Traffic Condition

1.48 Junction 48: Church Street / Queen Street

Junction 48 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

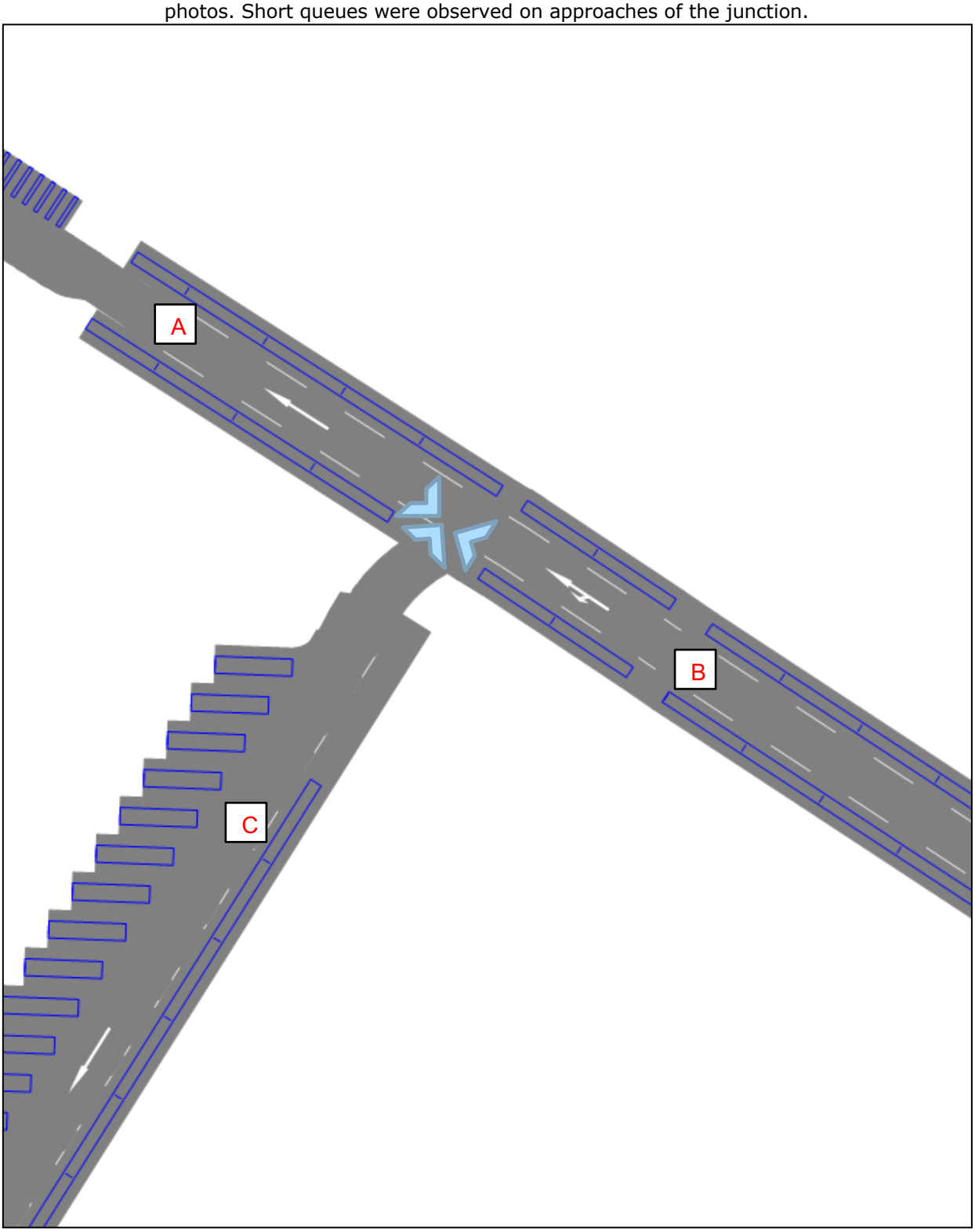


Figure 1-95 Junction 48 Layout

Figure 1-96 Junction 48 Traffic Condition

1.49 Junction 49: Church Street / Jalan Lebuh Kapitan Keling

Junction 49 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Medium-length queues were observed on approaches of the junction.

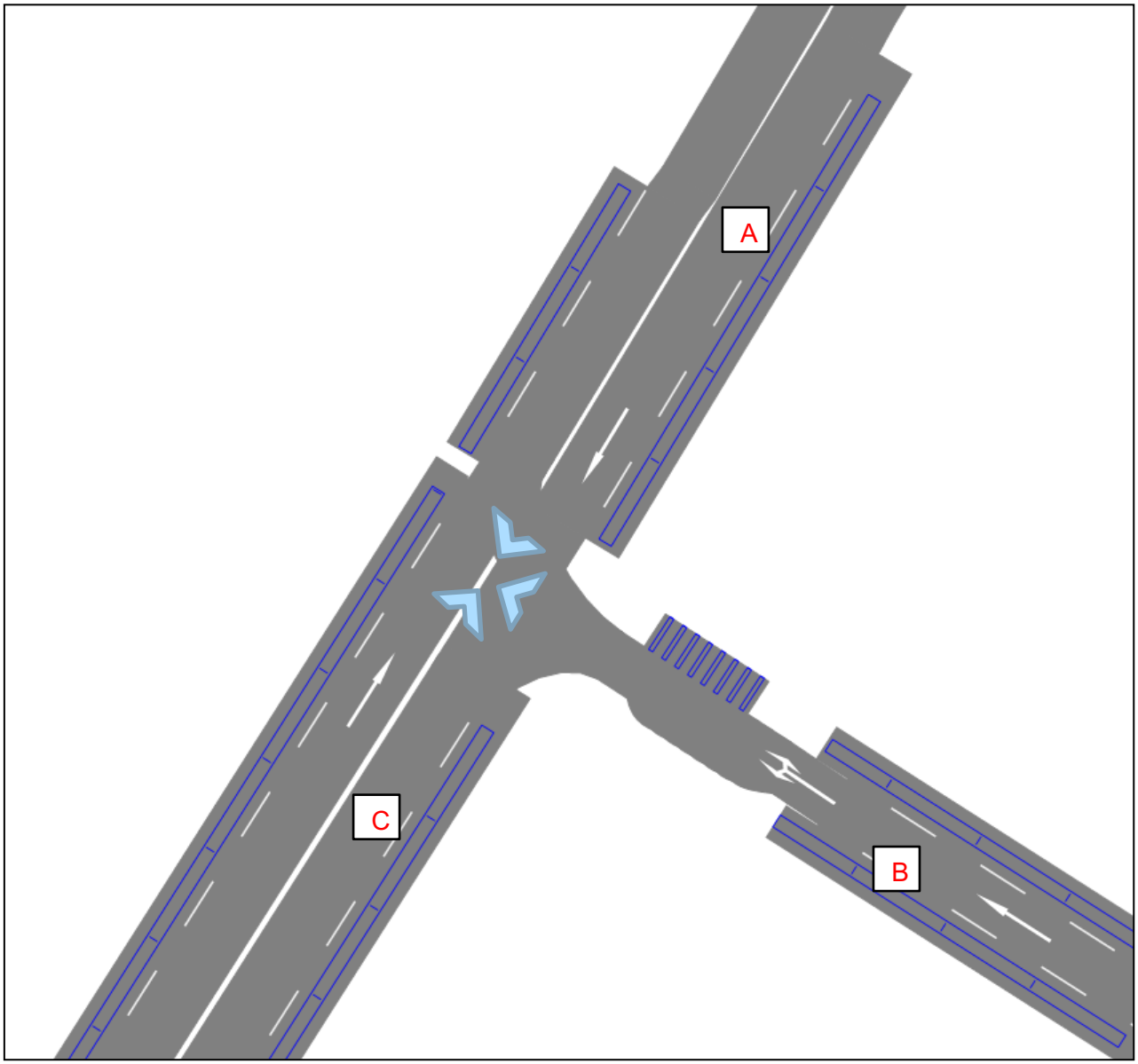


Figure 1-97 Junction 49 Layout

Figure 1-98 Junction 49 Traffic Condition

1.50 Junction 50: Lorong Argus / Jalan Lebuh Kapitan Keling

Junction 50 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction during the morning and evening

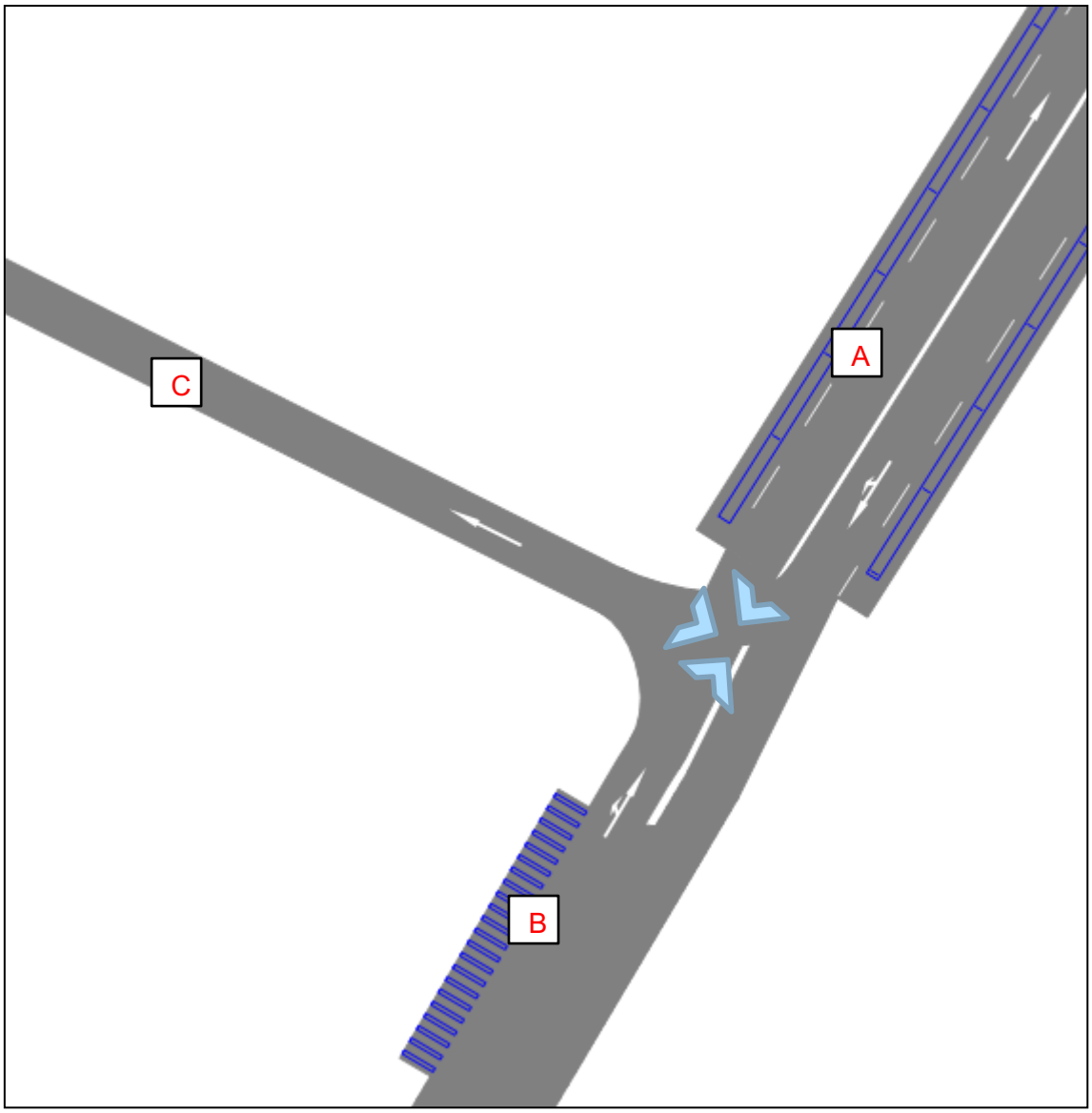


Figure 1-99 Junction 50 Layout

Figure 1-100 Junction 50 Traffic Condition

1.51 Junction 51: Lebuh Bishop / Jalan Lebuh Kapitan Keling

Junction 51 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

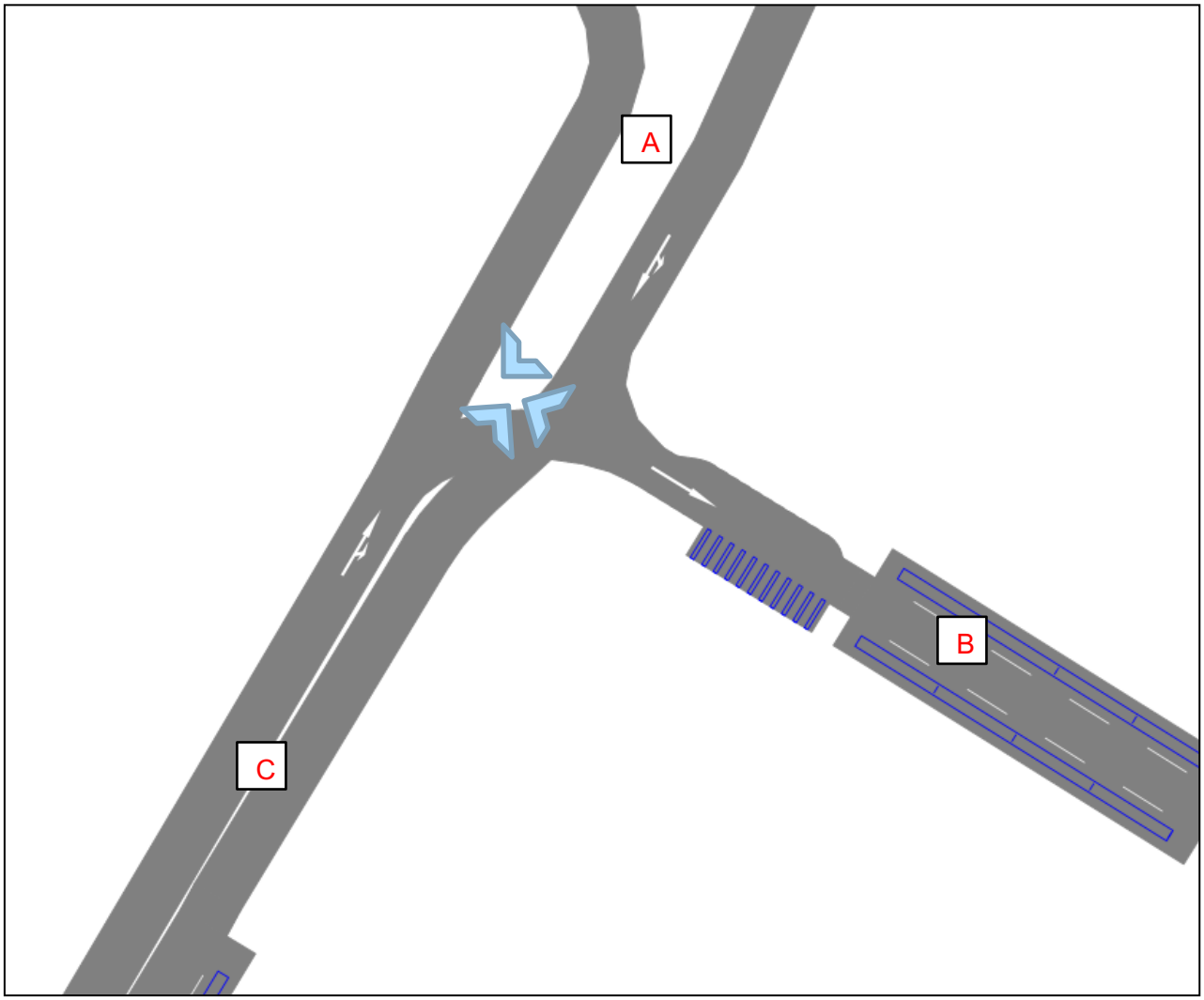


Figure 1-101 Junction 51 Layout

Figure 1-102 Junction 51 Traffic Condition

1.52 Junction 52: Lebuh Bishop / Lebuh King

Junction 52 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

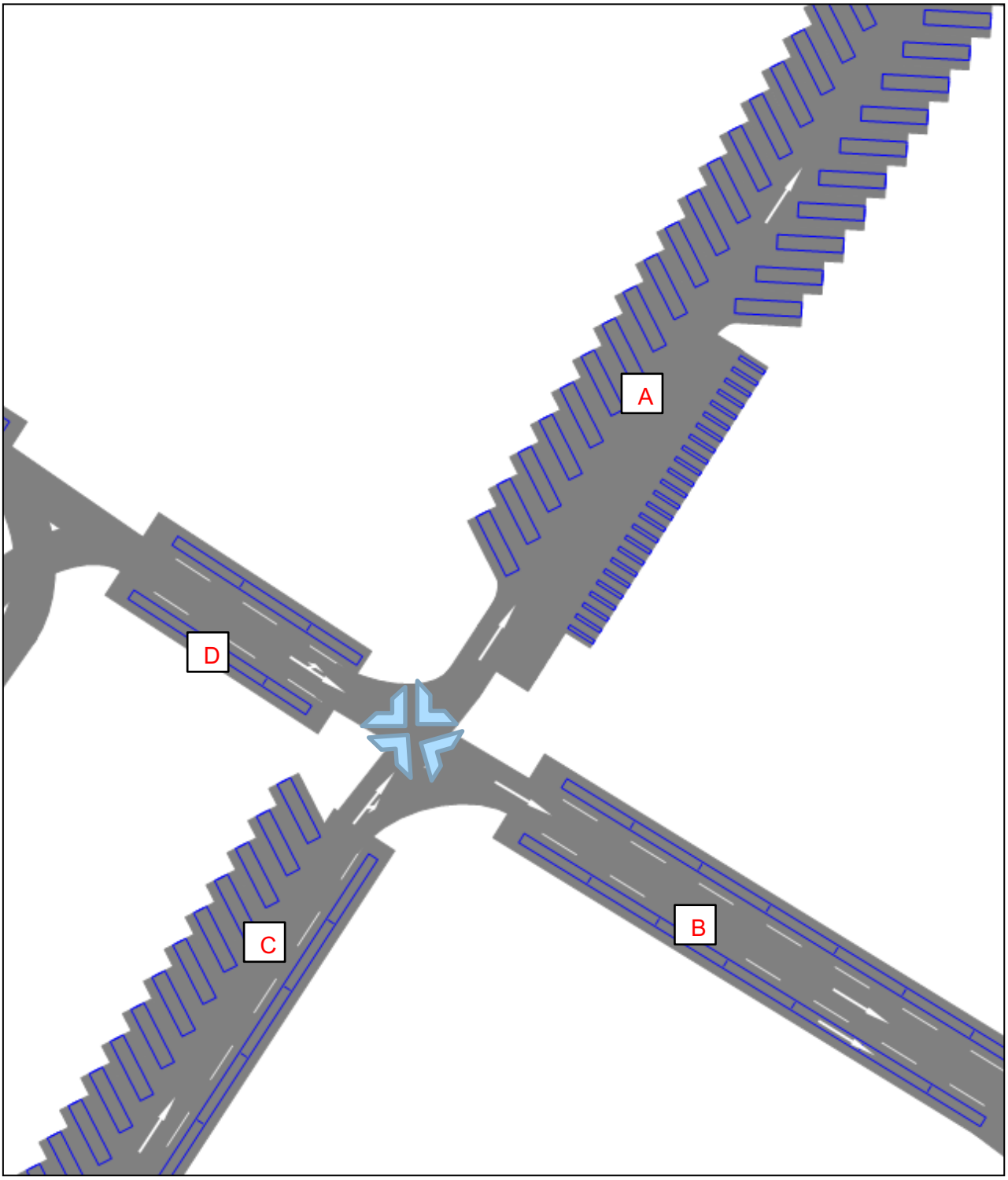


Figure 1-103 Junction 52 Layout

Figure 1-104 Junction 52 Traffic Condition

1.53 Junction 53: Lebuh Bishop / Penang Street

Junction 53 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

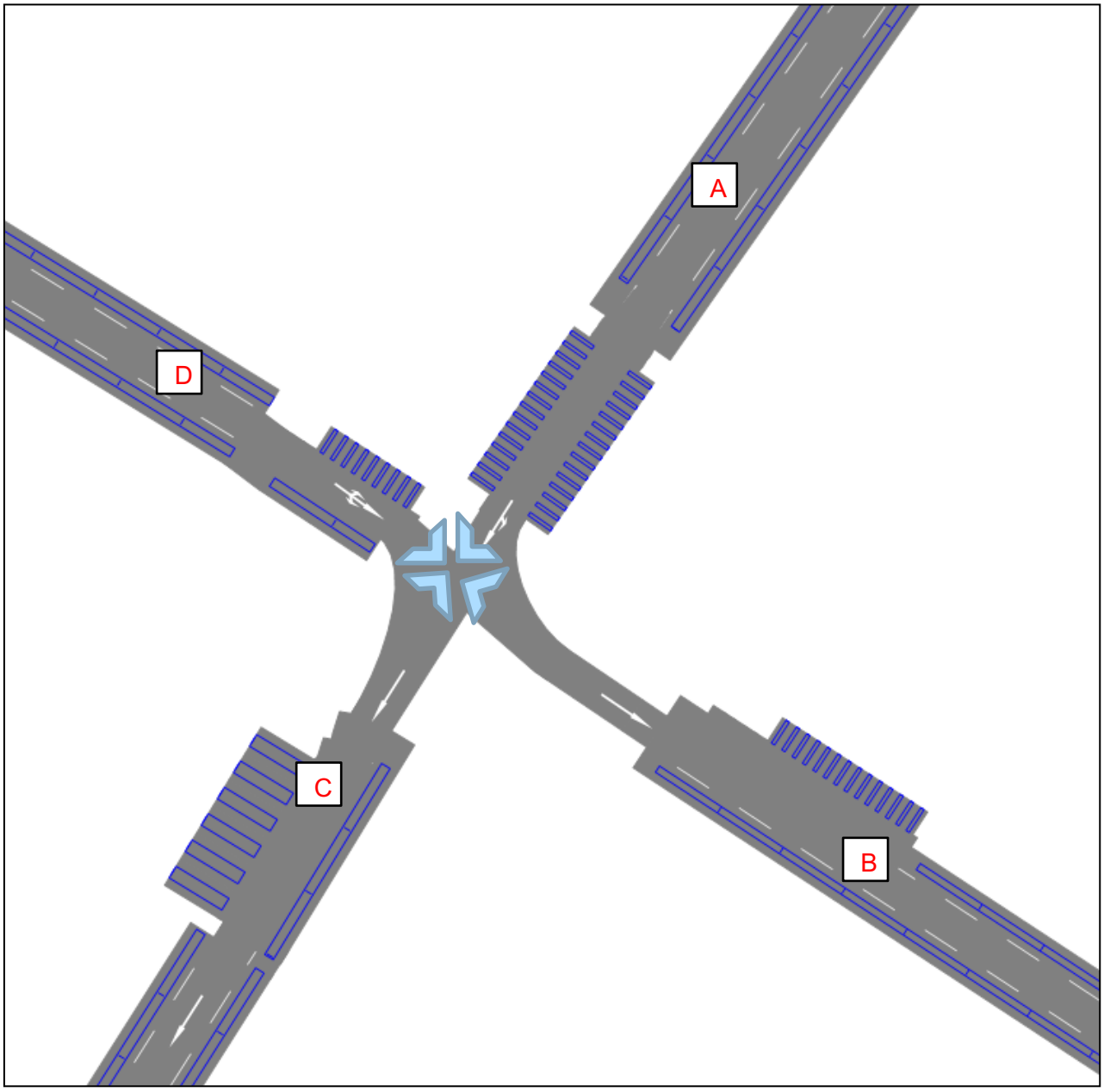


Figure 1-105 Junction 53 Layout

Figure 1-106 Junction 53 Traffic Condition

1.54 Junction 54: Lebuh Union / Penang Street

Junction 54 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

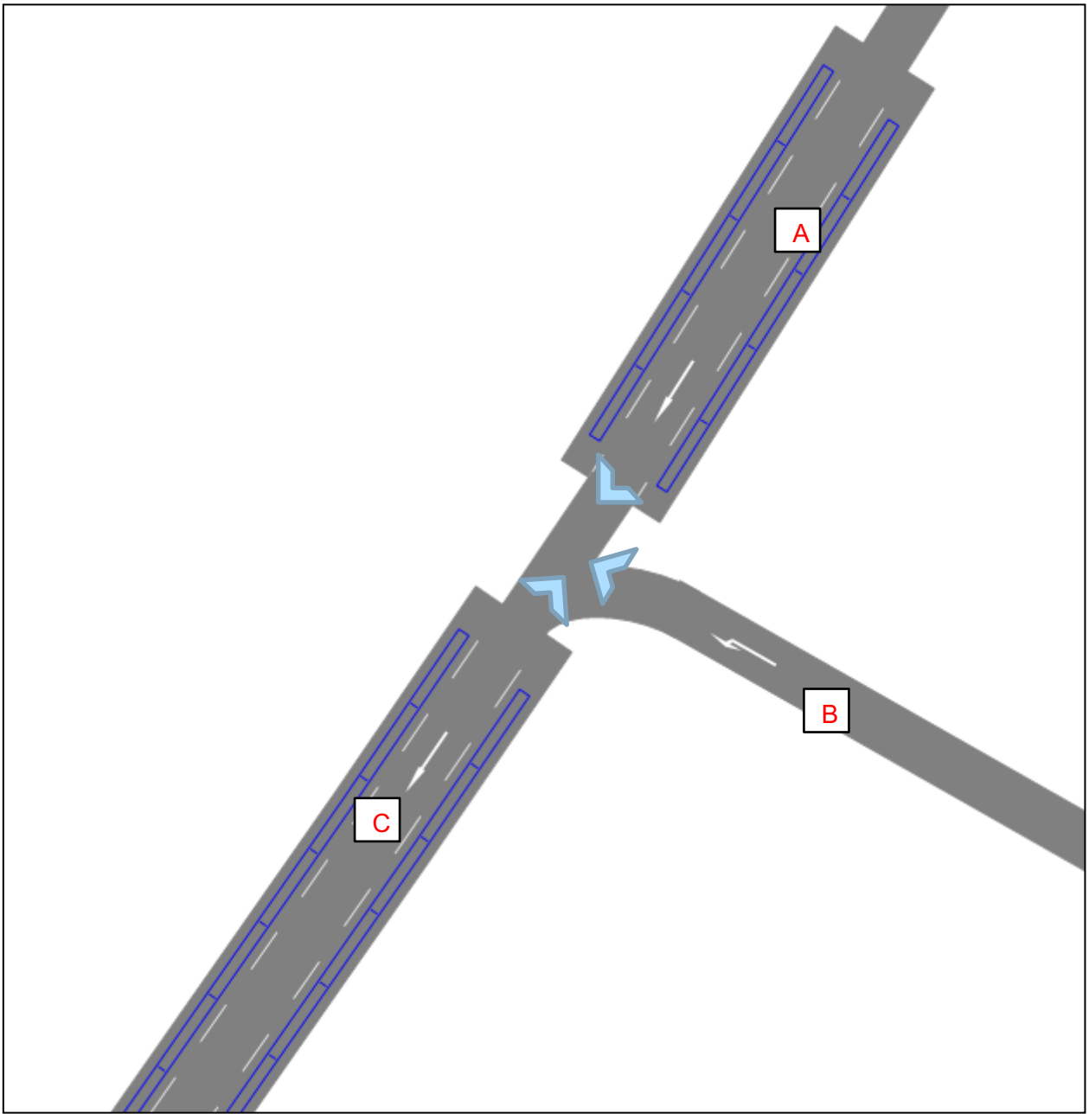


Figure 1-107 Junction 54 Layout

Figure 1-108 Junction 54 Traffic Condition

1.55 Junction 55 Lebuh Light / Penang Street

Junction 55 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

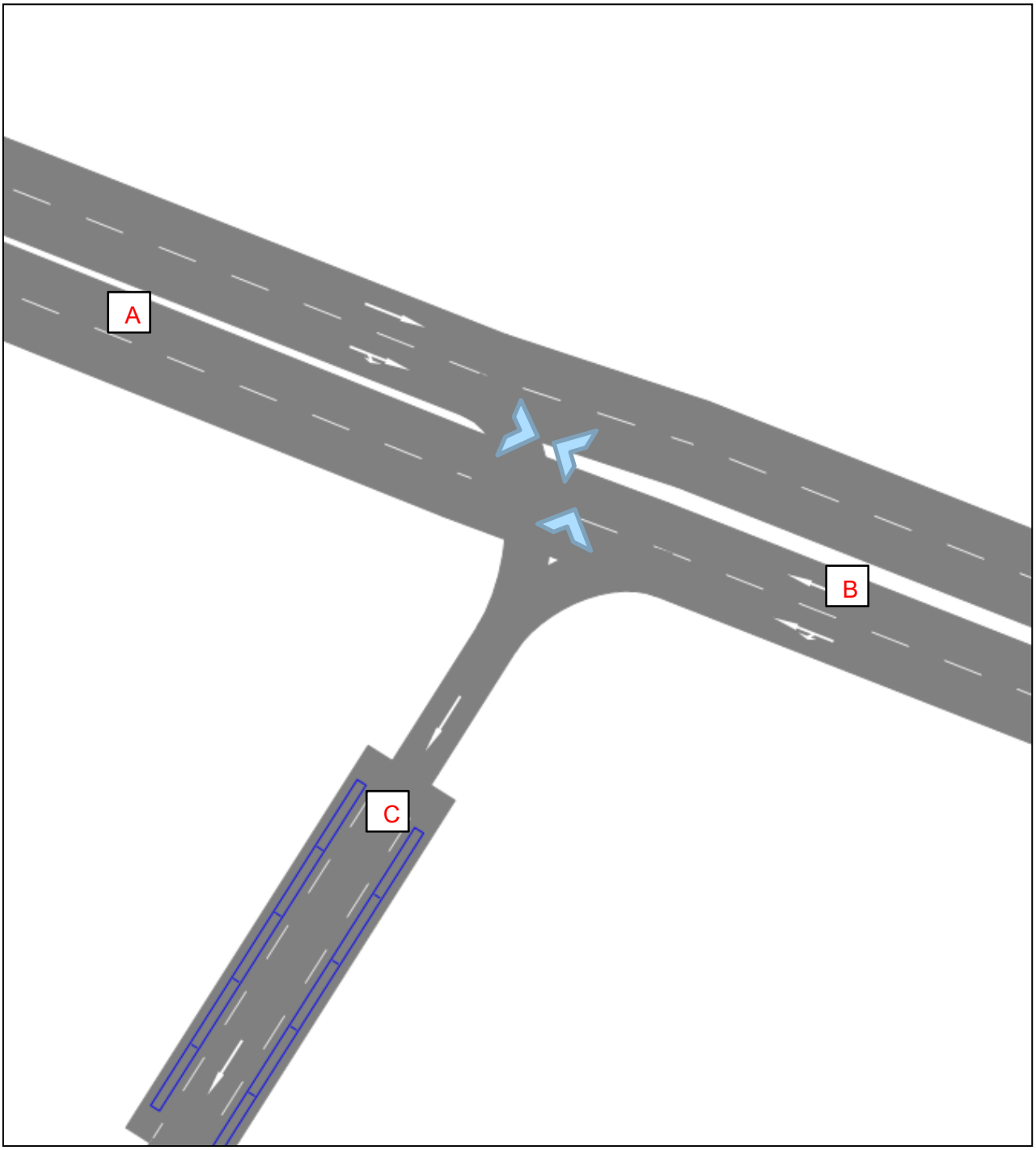


Figure 1-109 Junction 55 Layout

Figure 1-110 Junction 55 Traffic Condition

1.56 Junction 56 Lebuh Light / Lebuh King

Junction 56 is a signalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

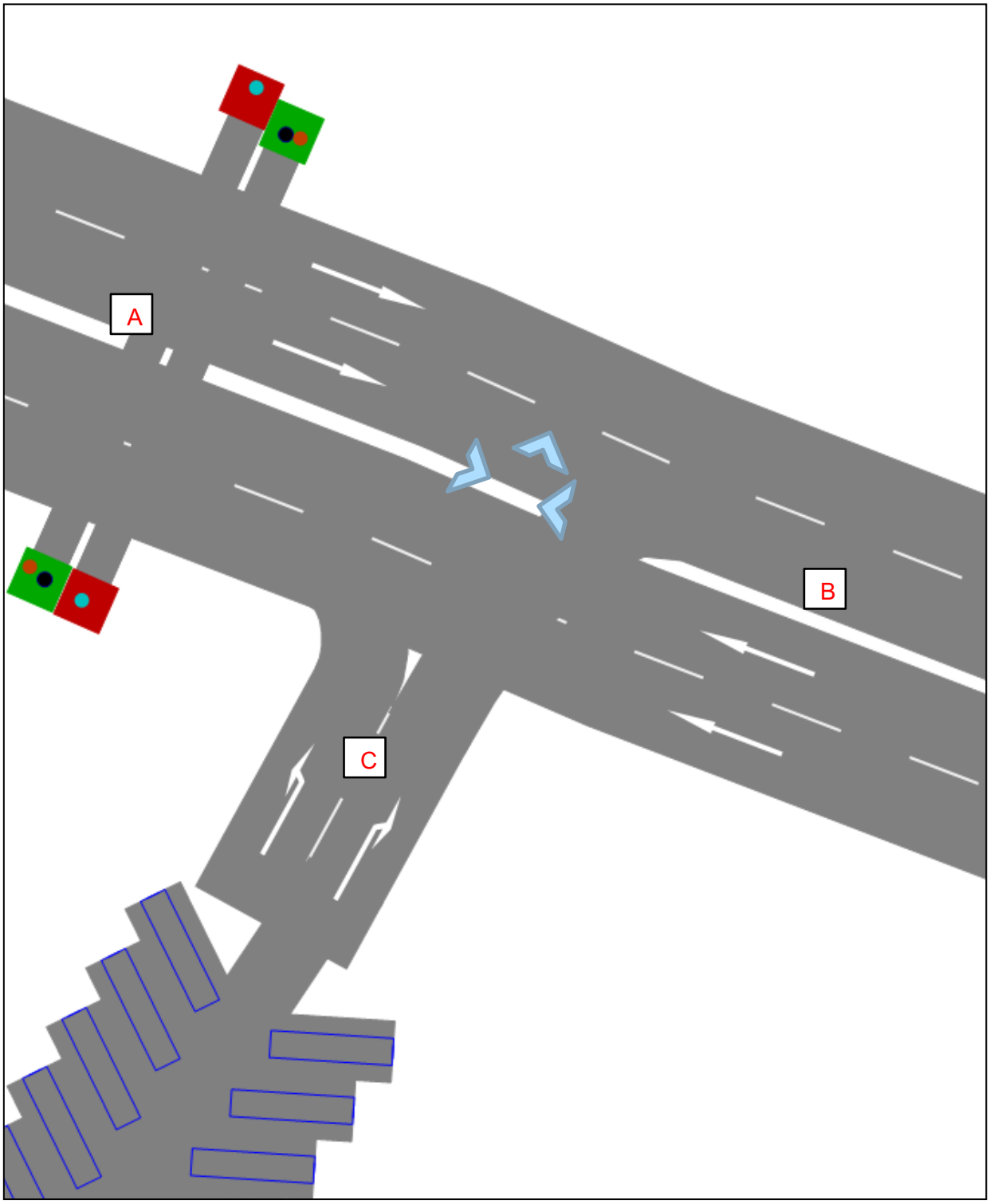


Figure 1-111 Junction 56 Layout

Figure 1-112 Junction 56 Traffic Condition

1.57 Junction 57 Lebuh Light / Jalan Padang Kota Lama

Junction 57 is a signalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

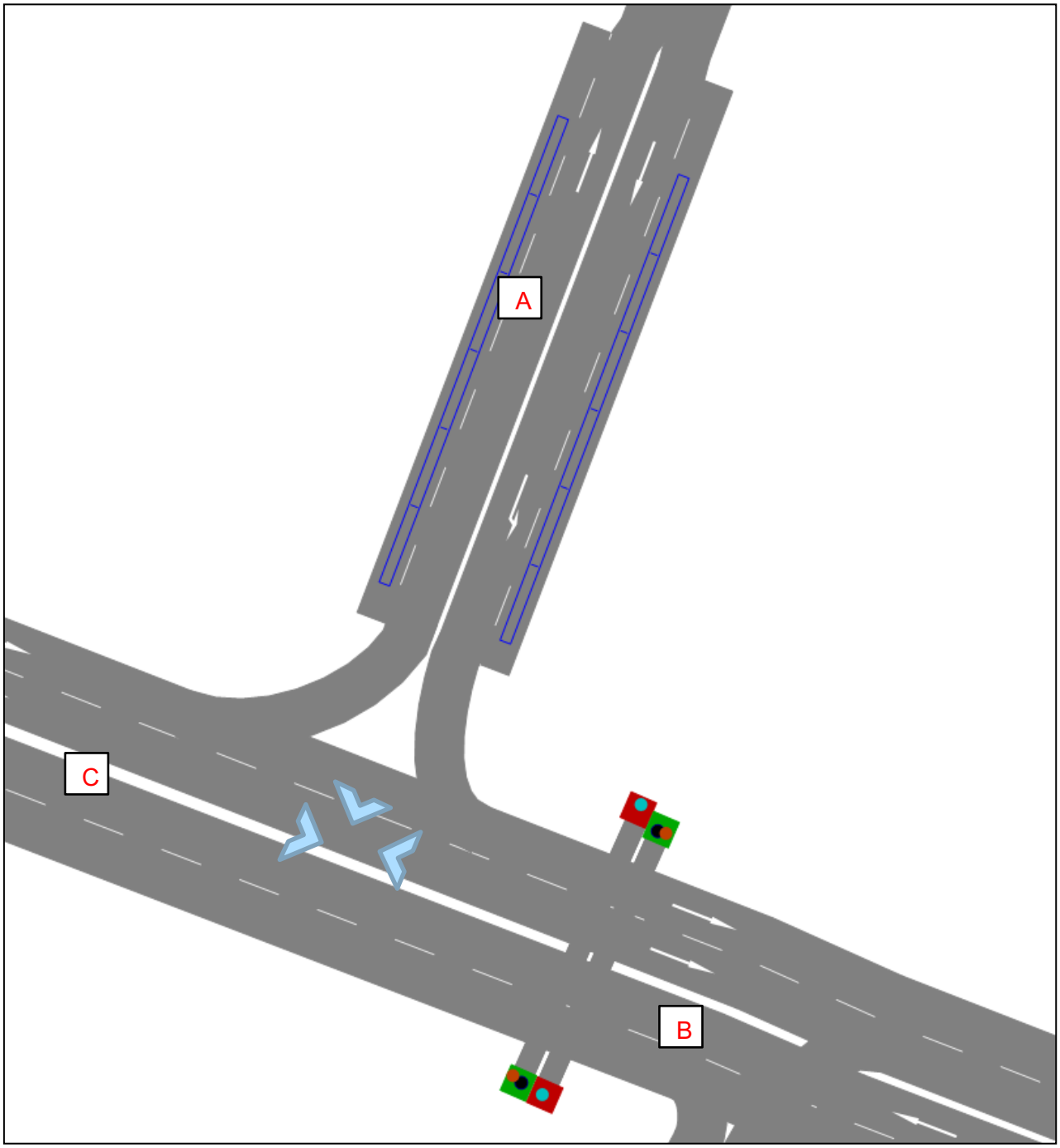


Figure 1-113 Junction 57 Layout

Figure 1-114 Junction 57 Traffic Condition

1.58 Junction 58 Lebuh Light / Jalan Masjid Kapitan Keling

Junction 58 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

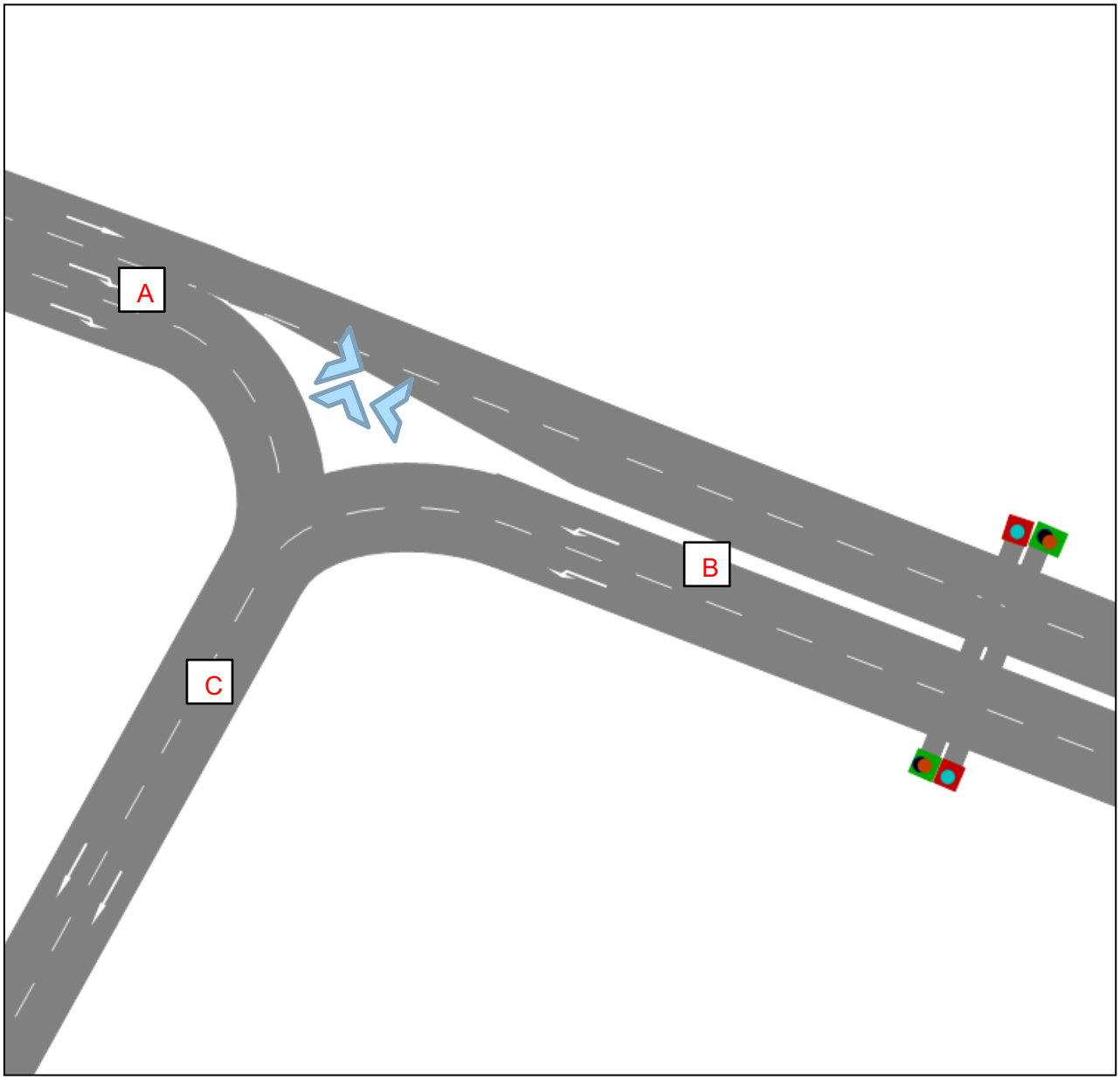


Figure 1-115 Junction 58 layout

Figure 1-116 Junction 58 Traffic Condition

1.59 Junction 59 Lebuh Farquhar / Jalan Masjid Kapitan Keling

Junction 58 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

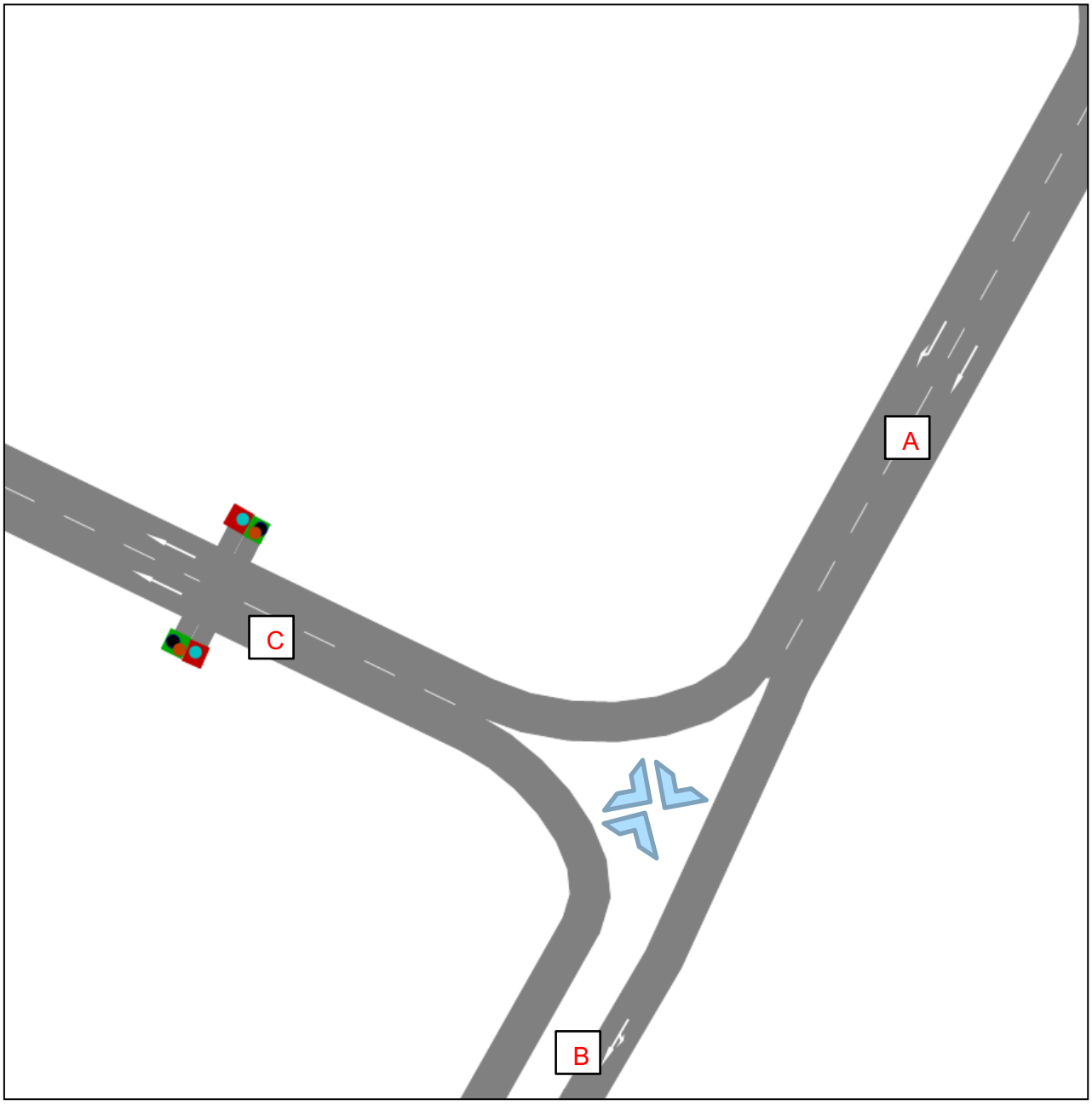


Figure 1-117 Junction 59 Layout

Figure 1-118 Junction 59 Traffic Condition

1.60 Junction 60 Lebuh Light / Jalan Tun Syed Sheh Barakbah

Junction 60 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

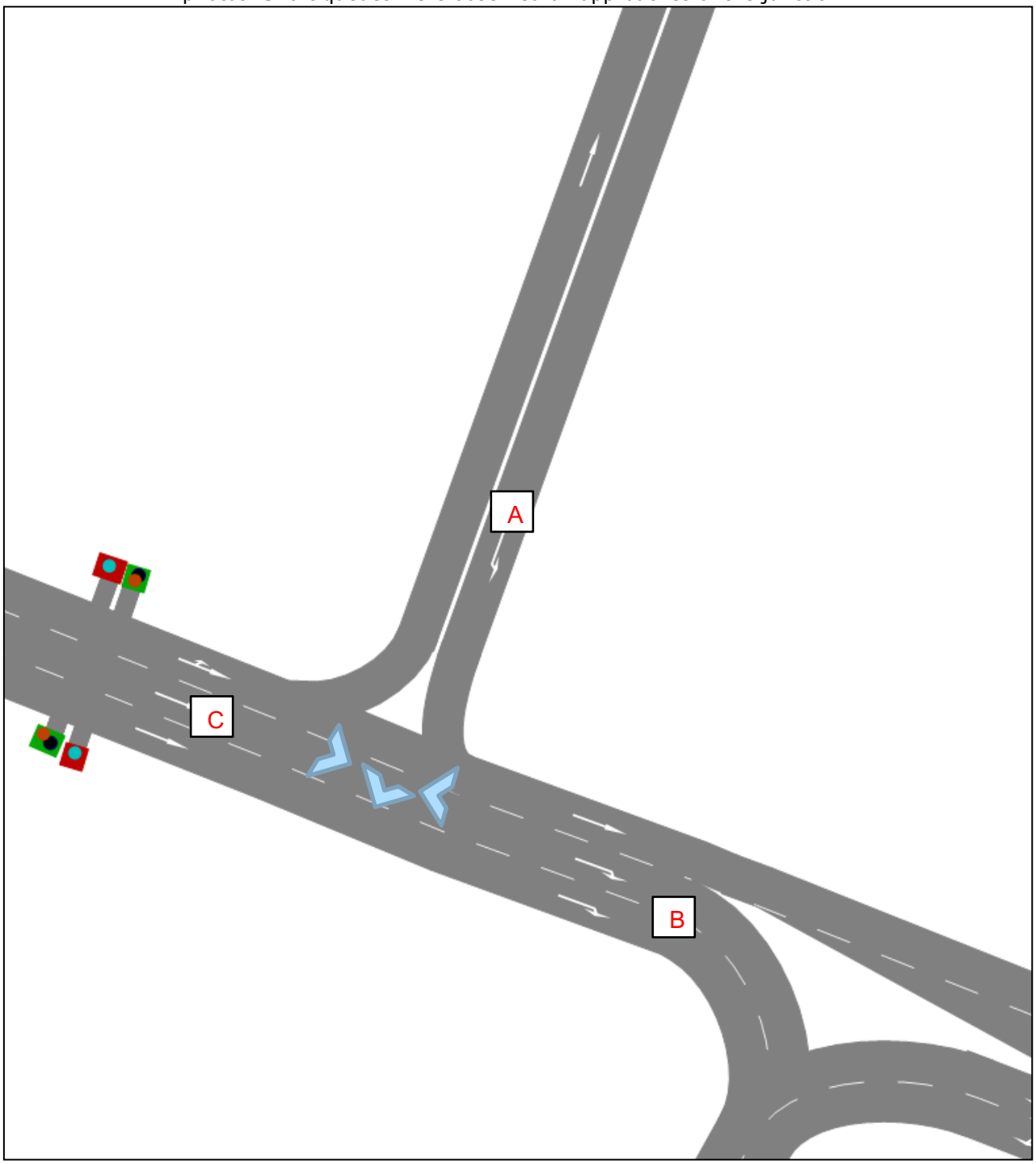


Figure 1-119 Junction 60 Layout

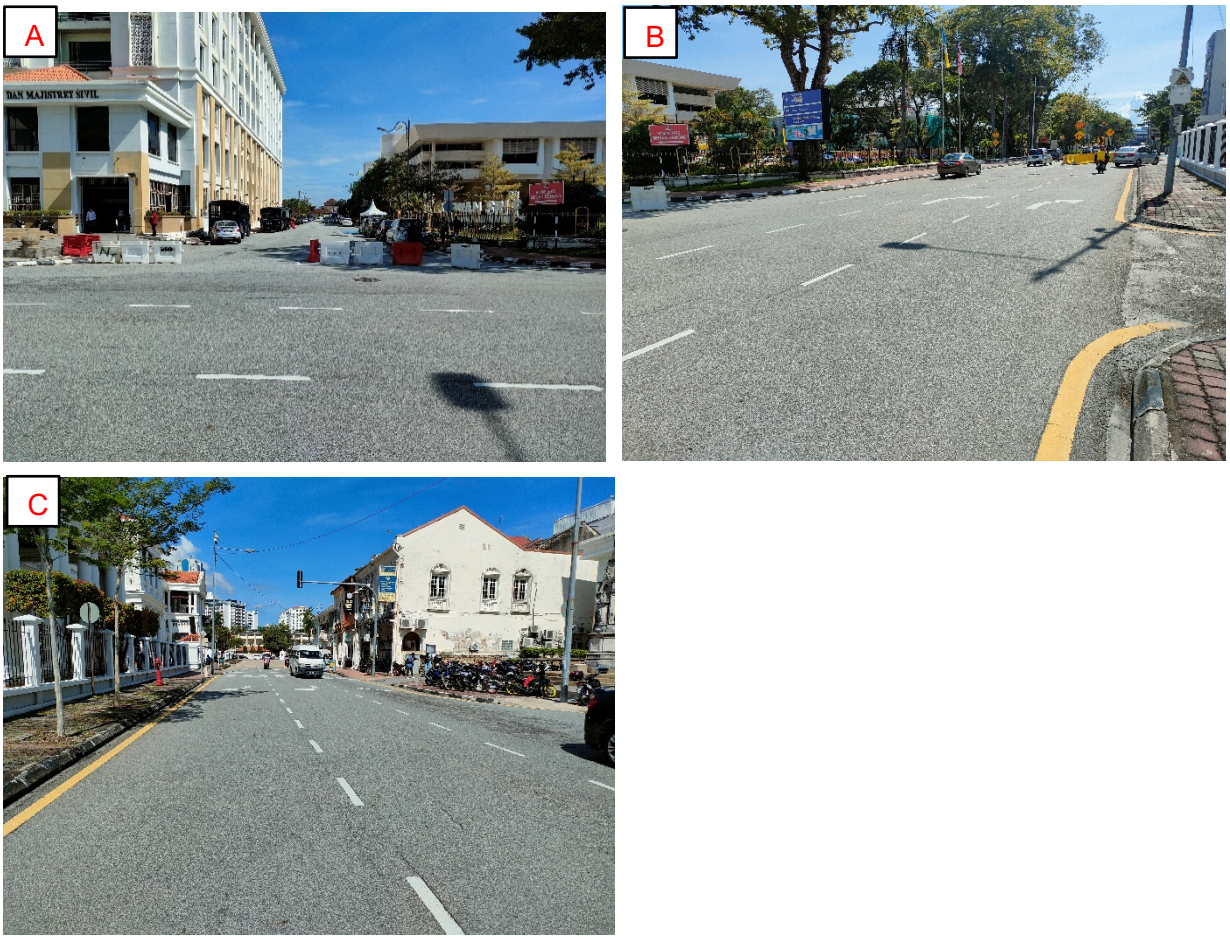


Figure 1-120 Junction 60 Traffic Condition

1.61 Junction 61 Lebuh Farquhar / Access

Junction 61 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

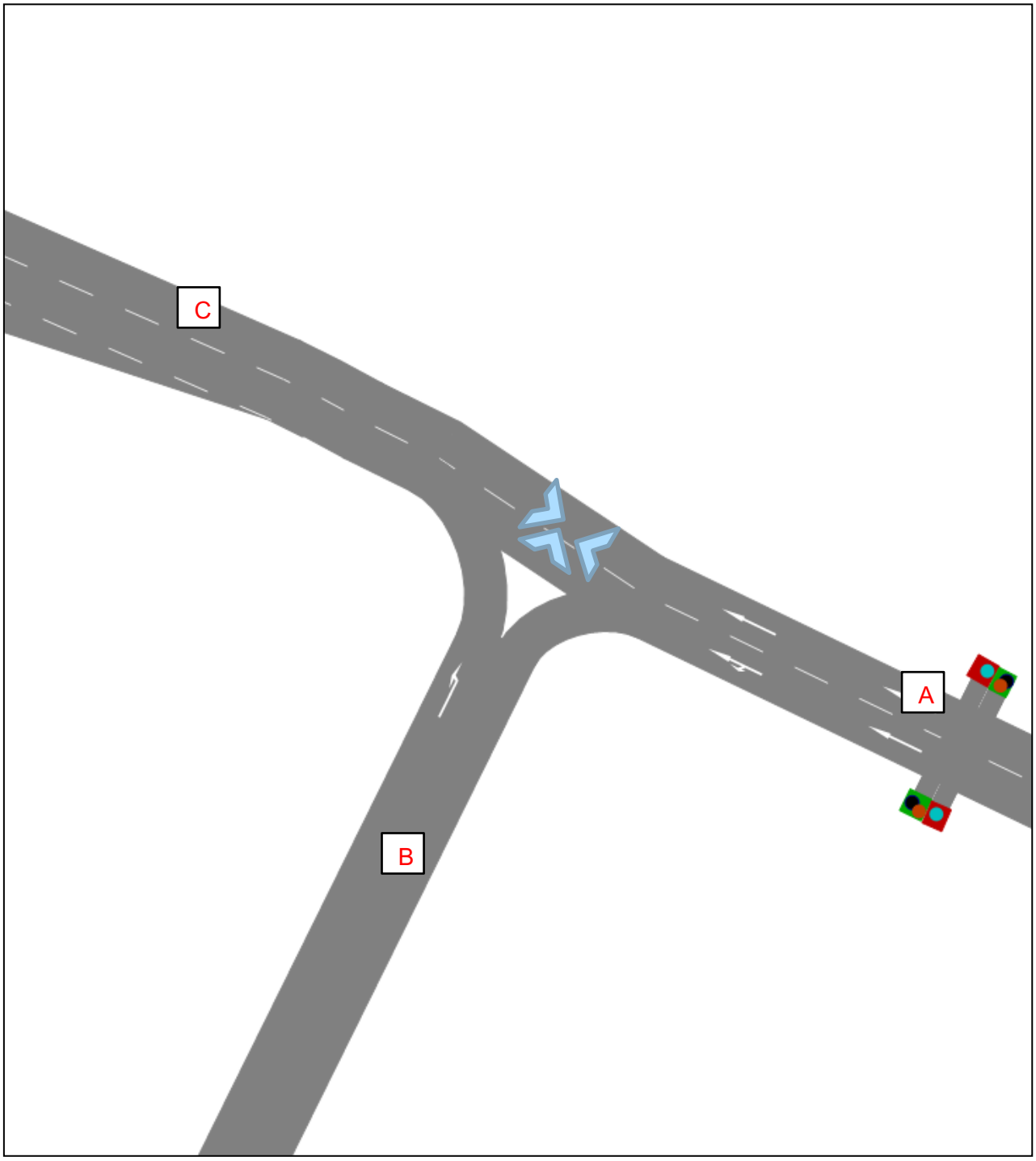


Figure 1-121 Junction 61 Layout

Figure 1-122 Junction 61 Traffic Condition

1.62 Junction 62 Lebuh Light / Jalan Green Hall

Junction 62 is a unsignalized T junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

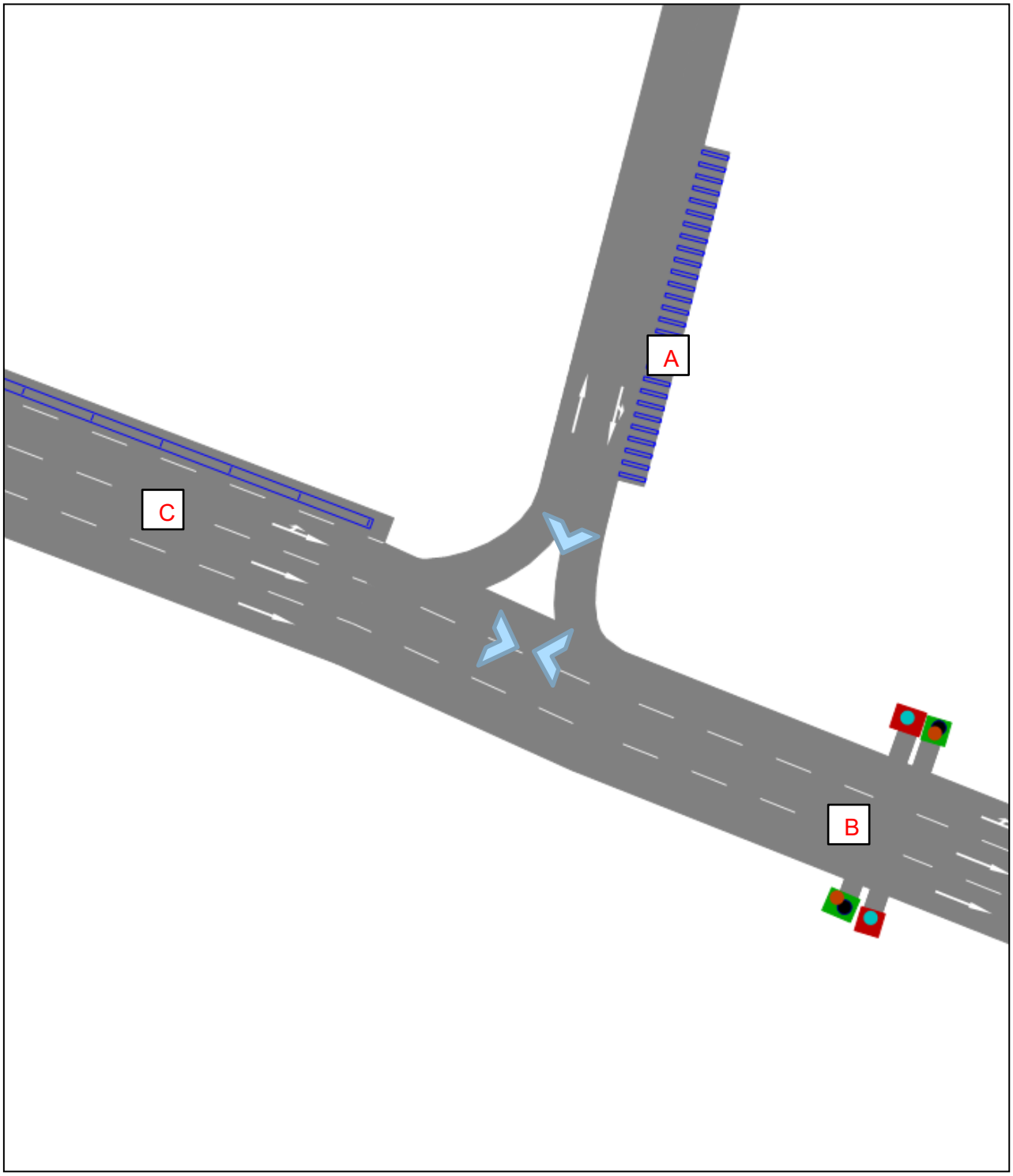


Figure 1-123 Junction 62 Layout

Figure 1-124 Junction 62 Traffic Condition

1.63 Junction 63 Lebuh Farquhar / Lebuh Light

Junction 63 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

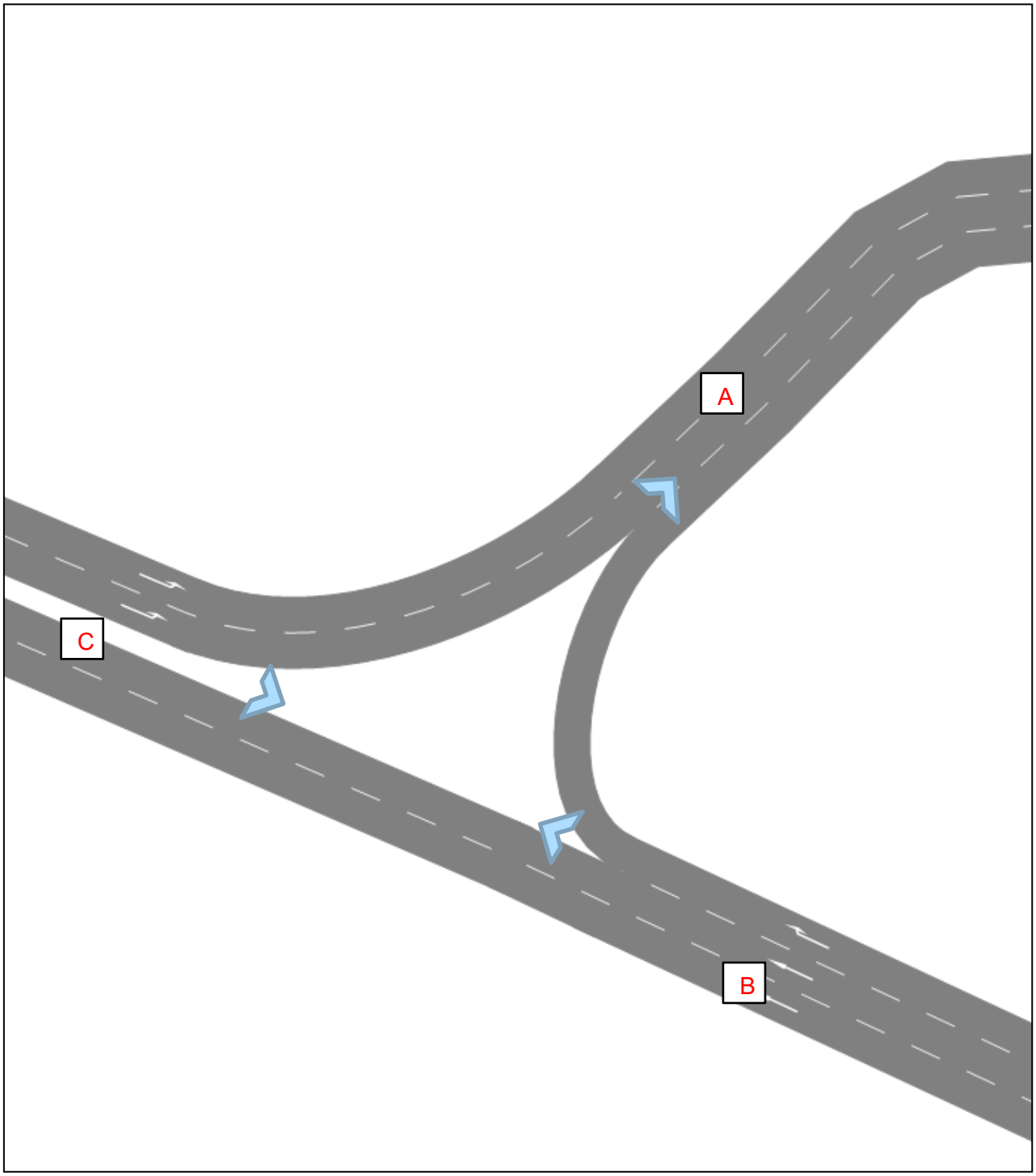


Figure 1-125 Junction 63 Layout

Figure 1-126 Junction 63 Traffic Condition

1.64 Junction 64 Jln Sultan Ahmad Shah / Lorong Love

Junction 64 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

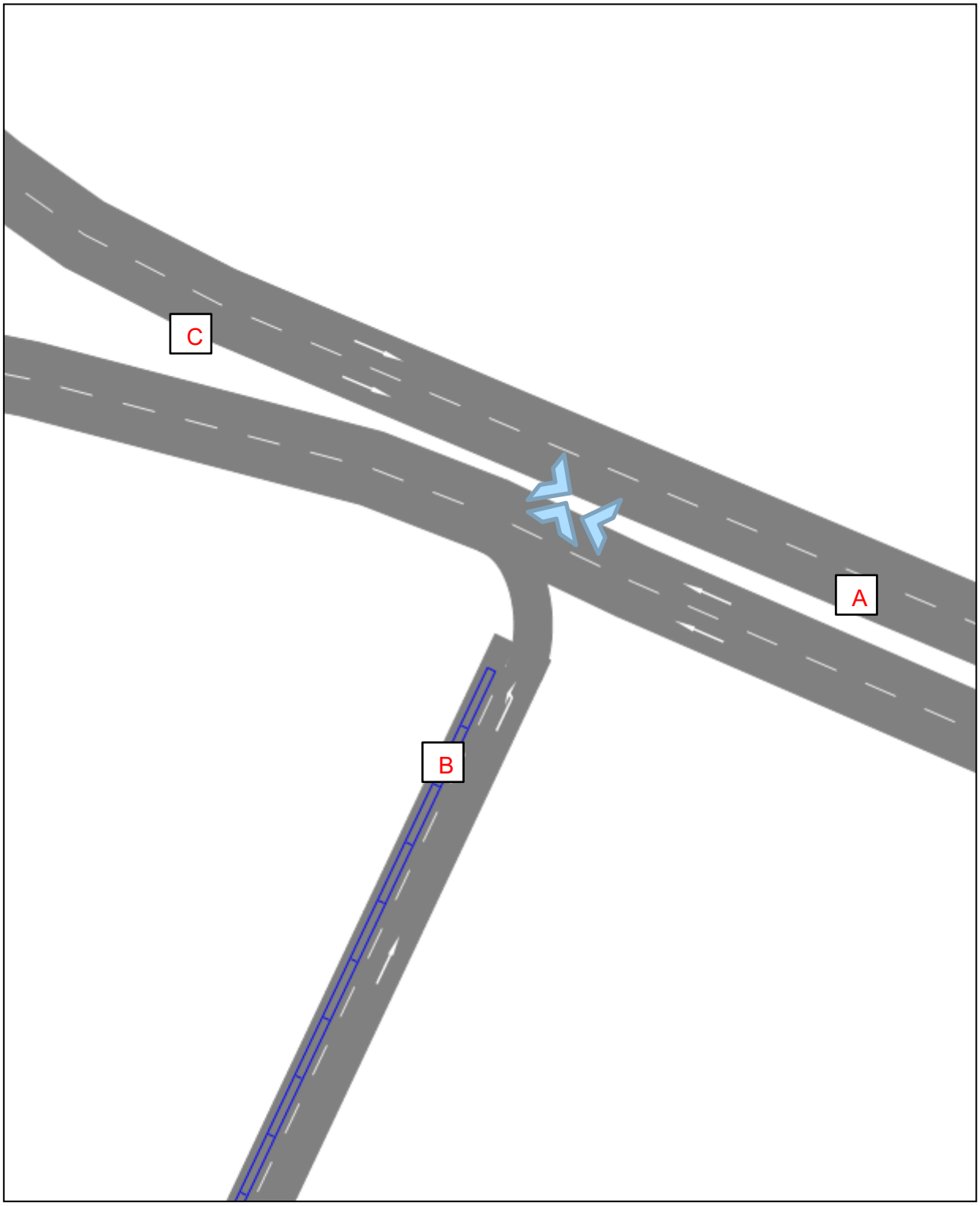


Figure 1-127 Junction 64 Layout

Figure 1-128 Junction 64 Traffic Condition

1.65 Junction 65 Lorong Argus / Lorong Love

Junction 65 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction

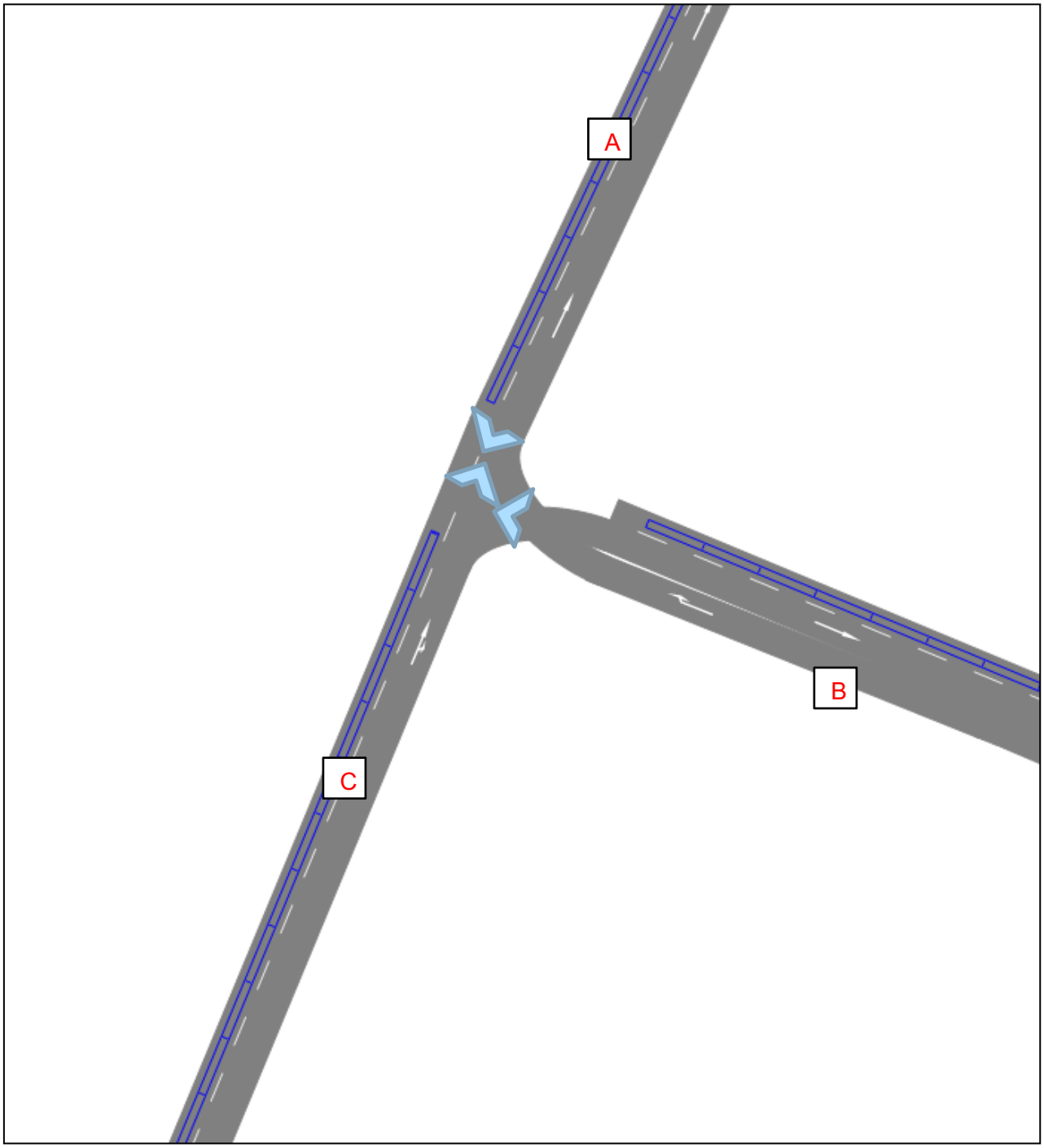


Figure 1-129 Junction 65 Layout

Figure 1-130 Junction 65 Traffic Condition

1.66 Junction 66 Lorong Stewart / Lorong love

Junction 66 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

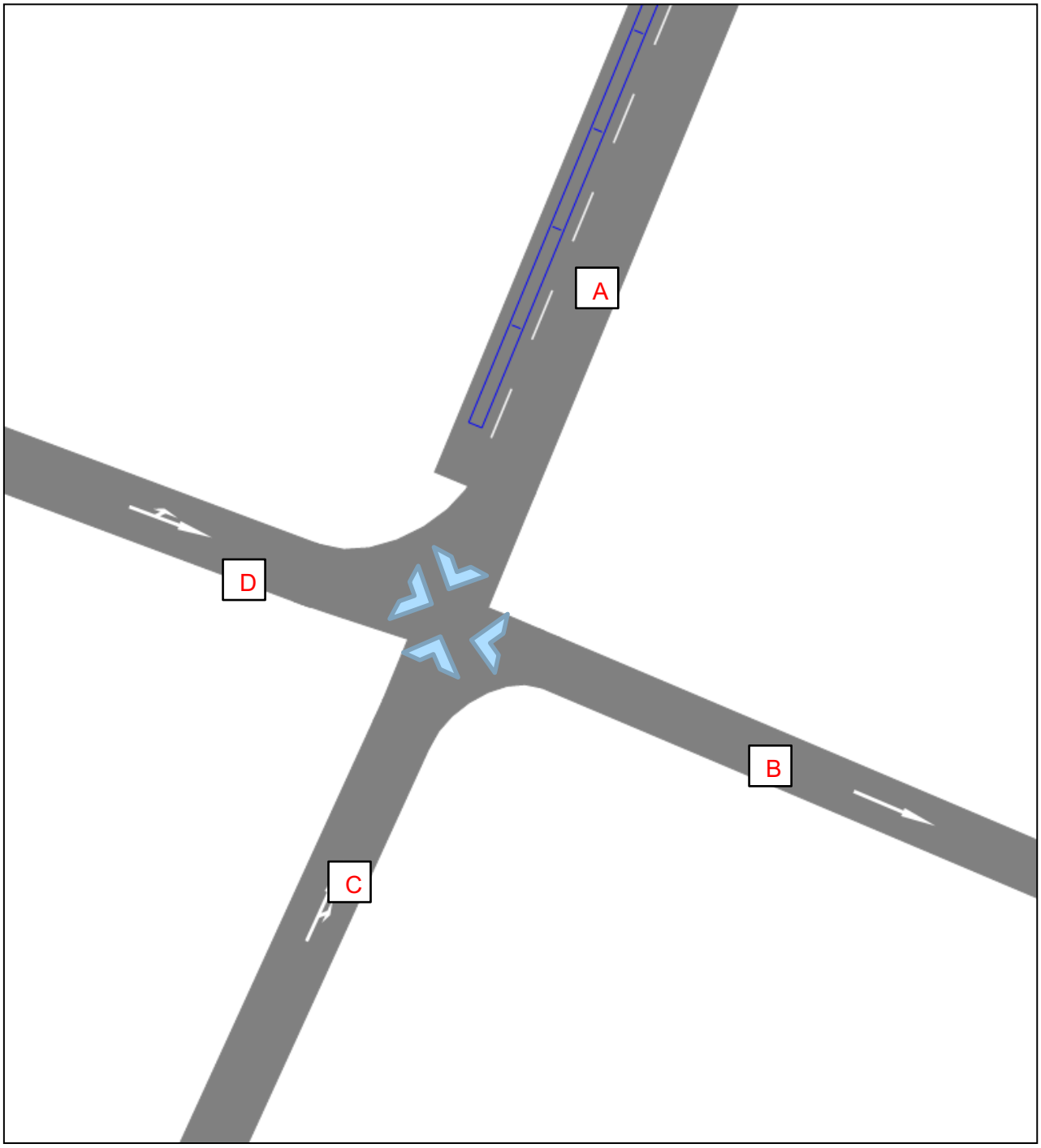


Figure 1-131 Junction 66 Layout

Figure 1-132 Junction 66 Traffic Condition

1.67 Junction 67 Lorong Stewart / Lorong Chulia

Junction 60 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

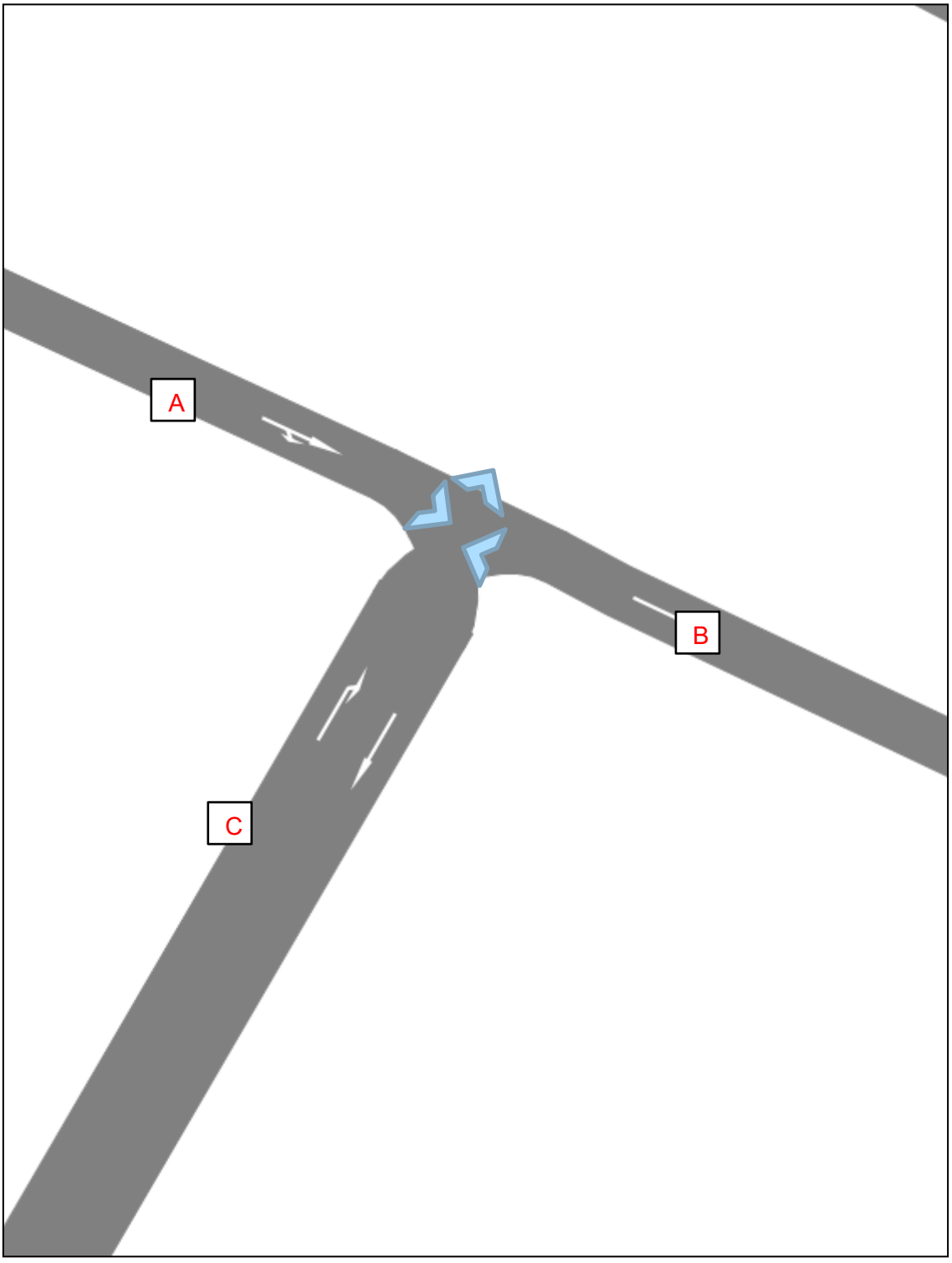


Figure 1-133 Junction 67 Layout

Figure 1-134 Junction 67 Traffic Condition

1.68 Junction 68 Lebuh Carnavon / Chulia Street

Junction 68 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

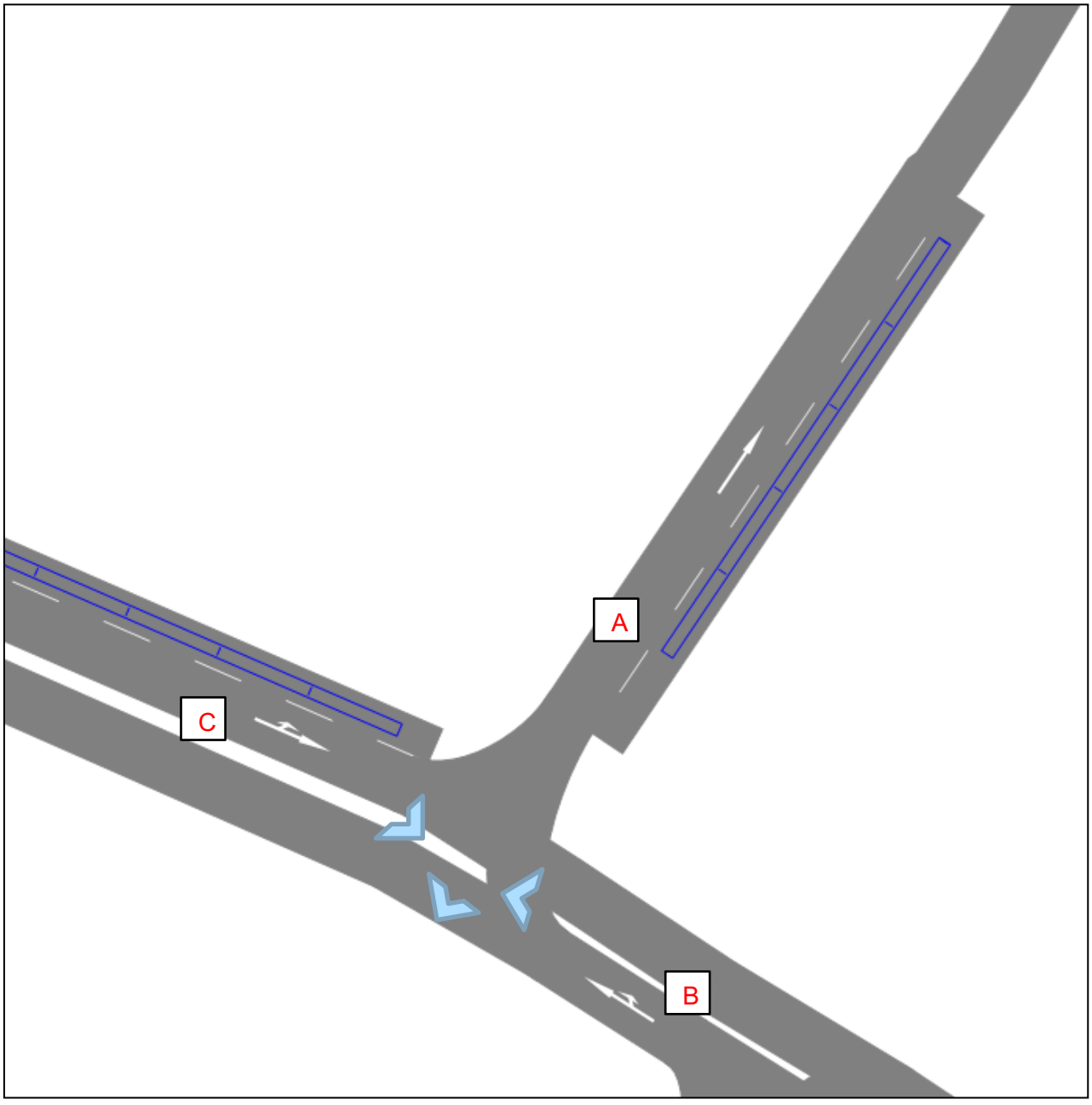


Figure 1-135 Junction 68 Layout

Figure 1-136 Junction 68 Traffic Condition

1.69 Junction 69 Lebuh Carnavon / Chulia Street

Junction 69 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

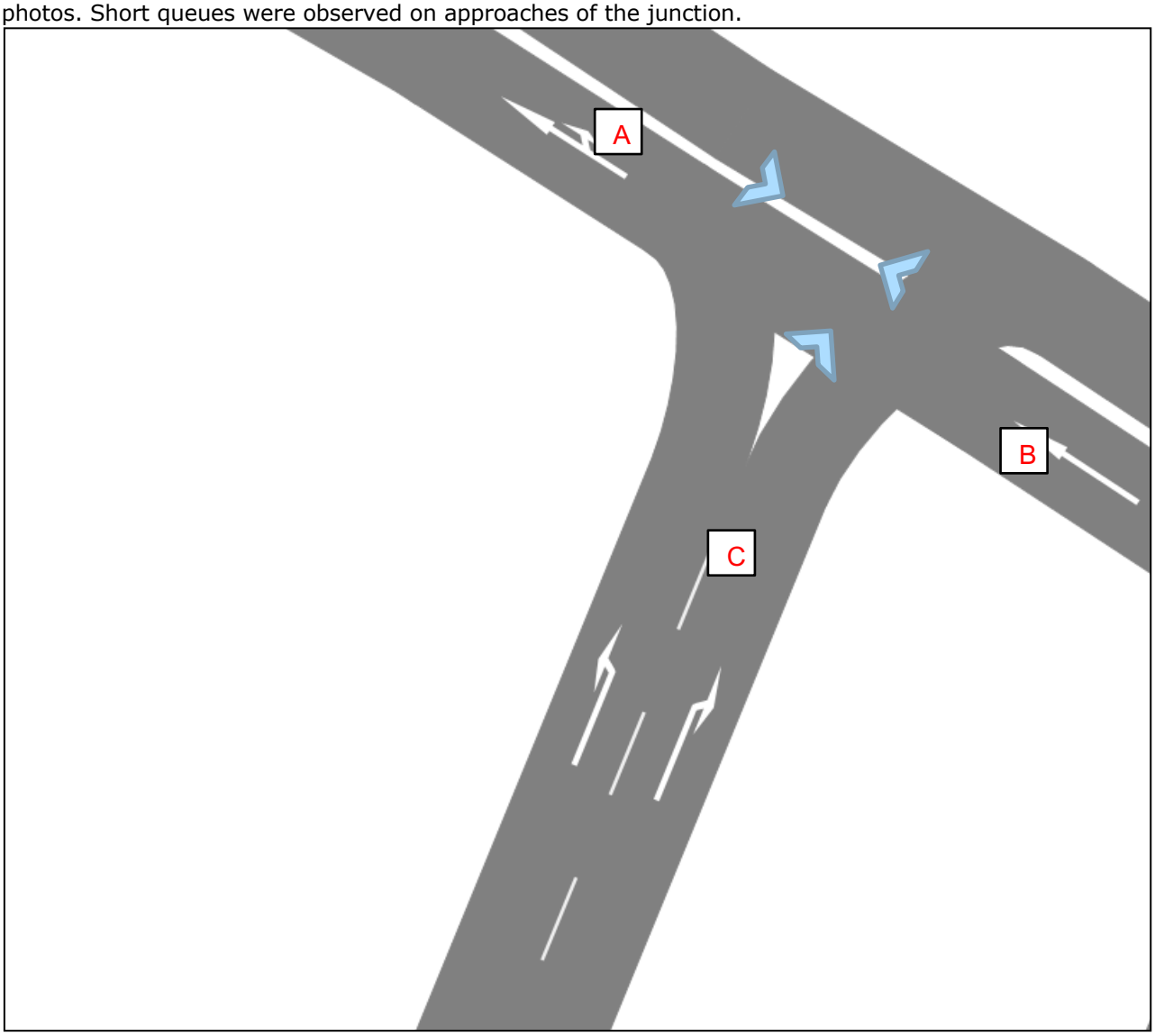


Figure 1-137 Junction 69 Layout

Figure 1-138 Junction 69 Traffic Condition

1.70 Junction 70 Lorong Chulia / Chulia Street

Junction 70 is a unsignalized T junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

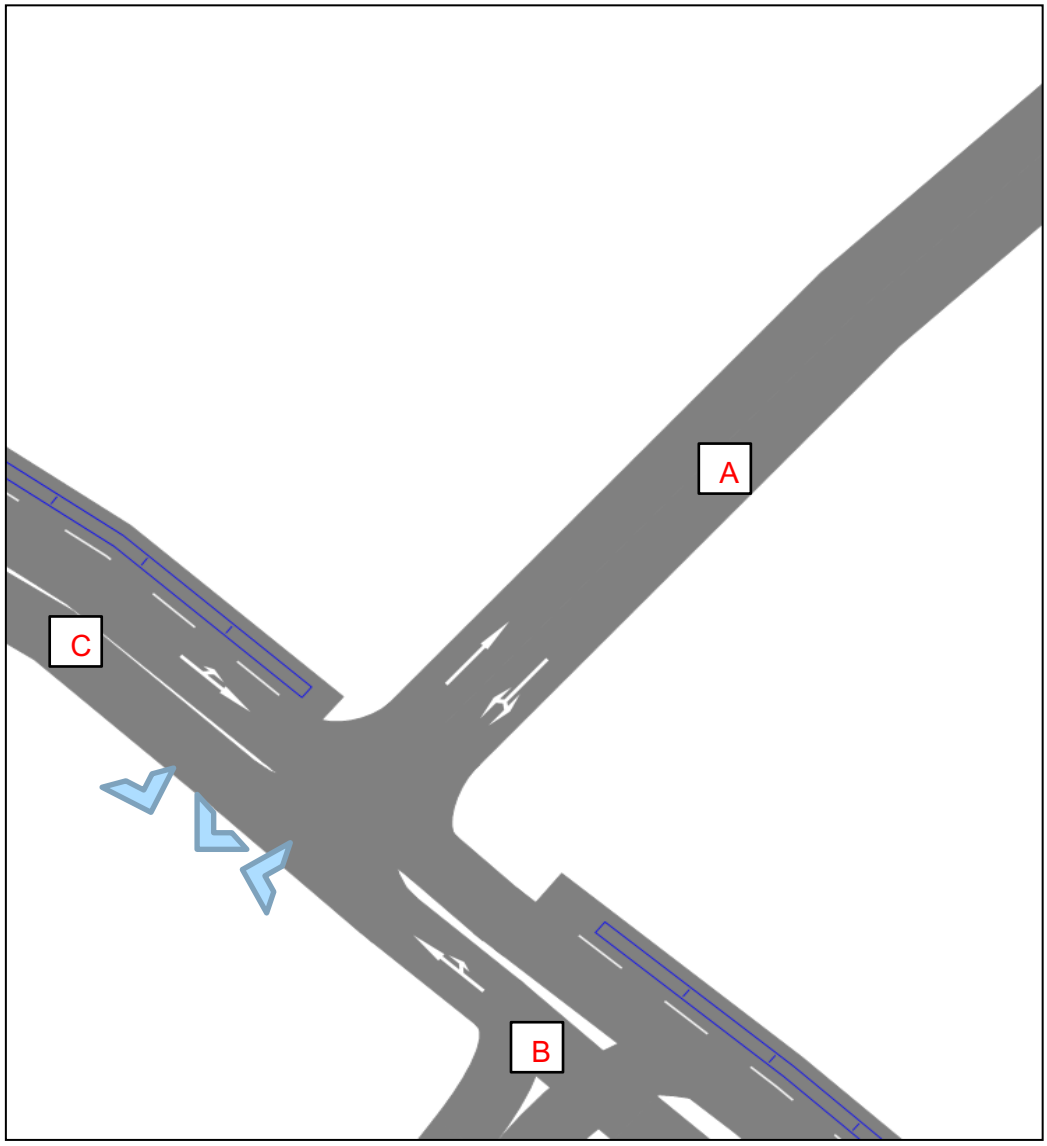


Figure 1-139 Junction 70 Layout

Figure 1-140 Junction 70 Traffic Diagram

1.71 Junction 71 Jalan Campbell / Lebuh Carnavon

Junction 71 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

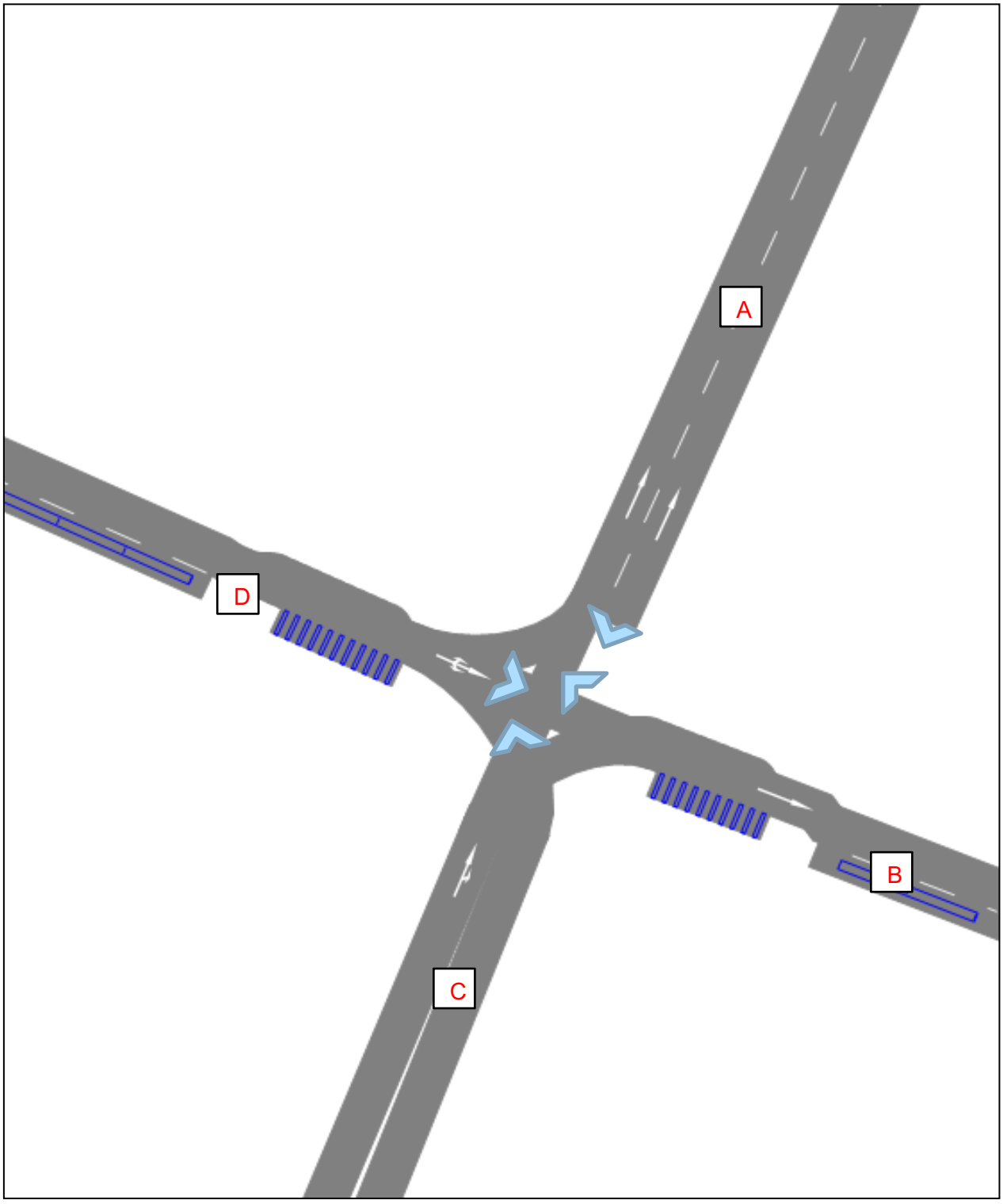


Figure 1-141 Junction 71 Layout

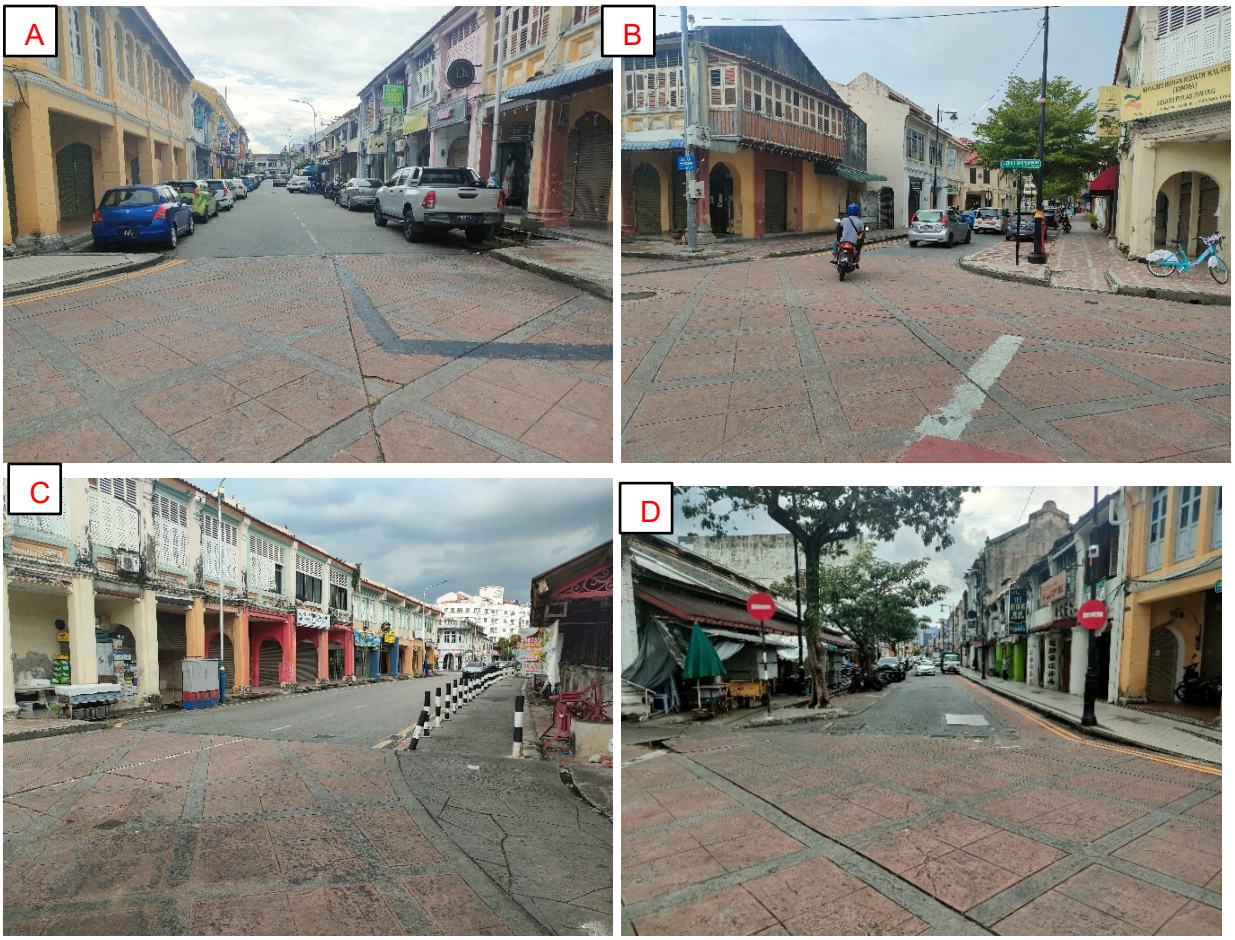


Figure 1-142 Junction 71 Traffic Condition

1.72 Junction 72 Lebuh Carnavon / Jalan Kampung Kolam

Junction 72 is a unsignalized cross junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

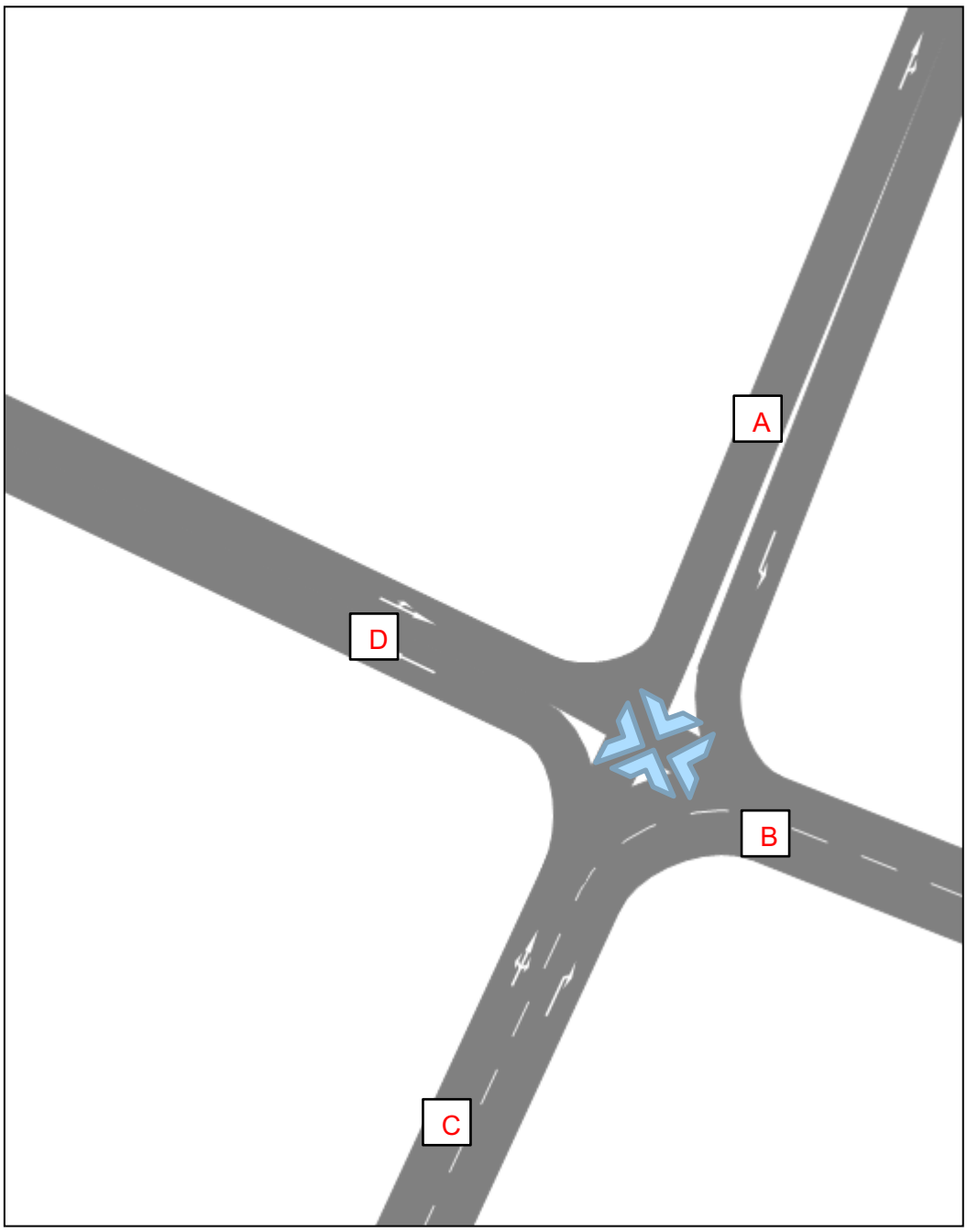


Figure 1-143 Junction 72 Layout

Figure 1-144 Junction 72 Traffic Condition

1.73 Junction 73 Lebuh Carnavon / Jalan Kampung Kolam

Junction 73 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

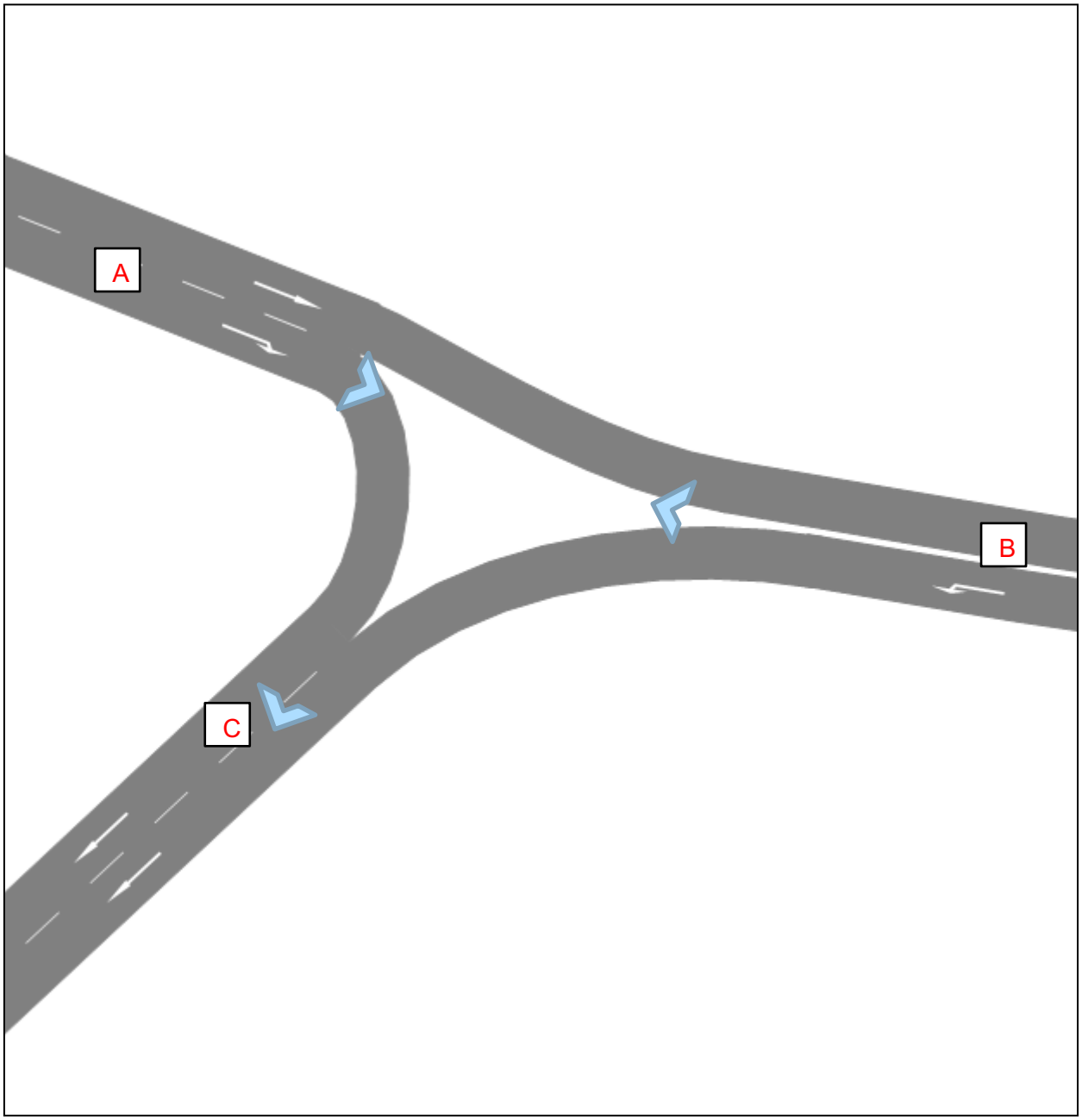


Figure 1-145 Junction 73 Layout

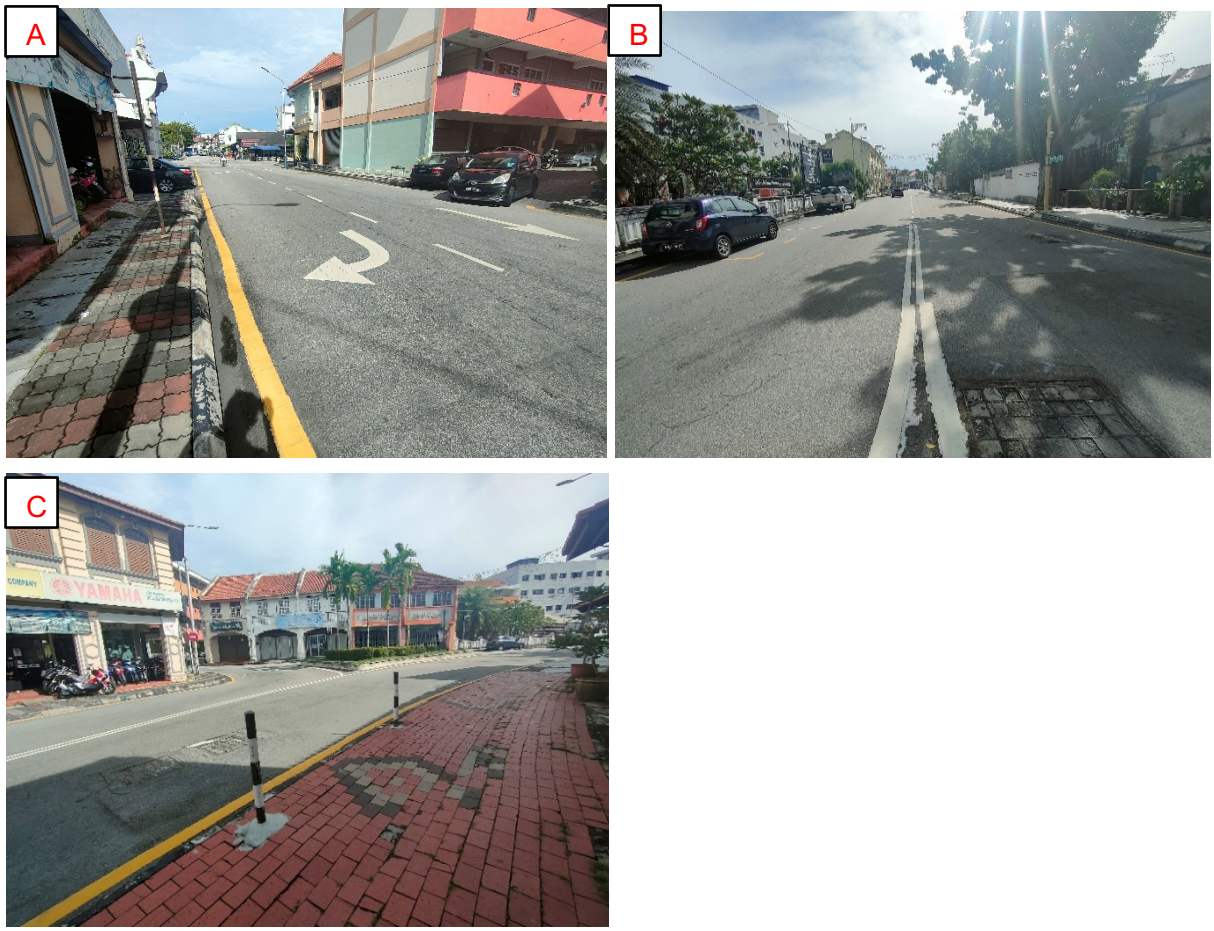


Figure 1-146 Junction 73 Traffic Condition

1.74 Junction 74 Lebuh Carnavon / Lebuh Acheh

Junction 74 is a unsignalized T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

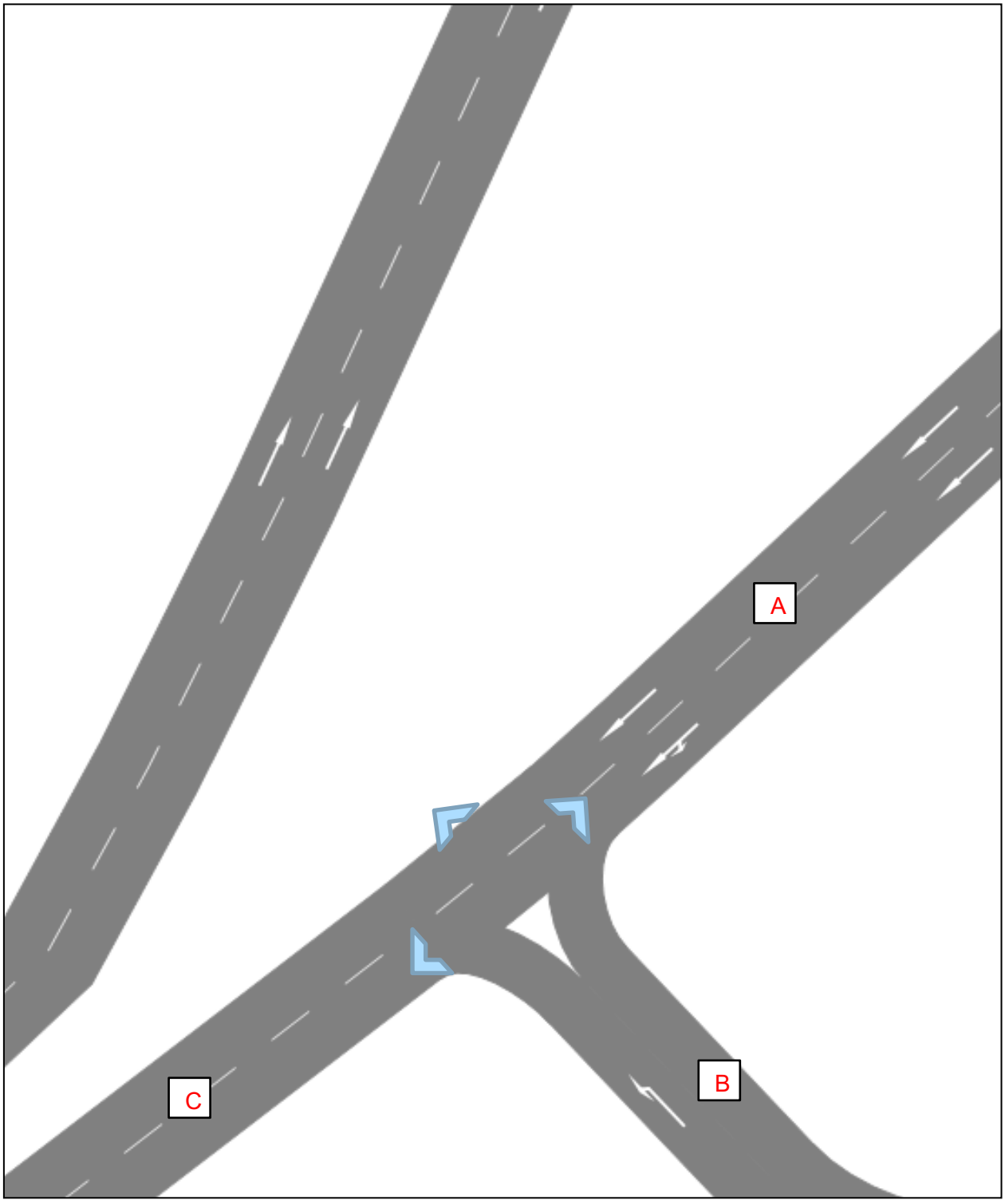


Figure 1-147 Junction 74 Layout

Figure 1-148 Junction 74 Traffic Condition

1.75 Junction 75 Lebuh Carnavon / Lorong Carnavon

Junction 75 is a unsignalized double T-junction and the layout is shown in the figure below, followed by the site photos. Short queues were observed on approaches of the junction.

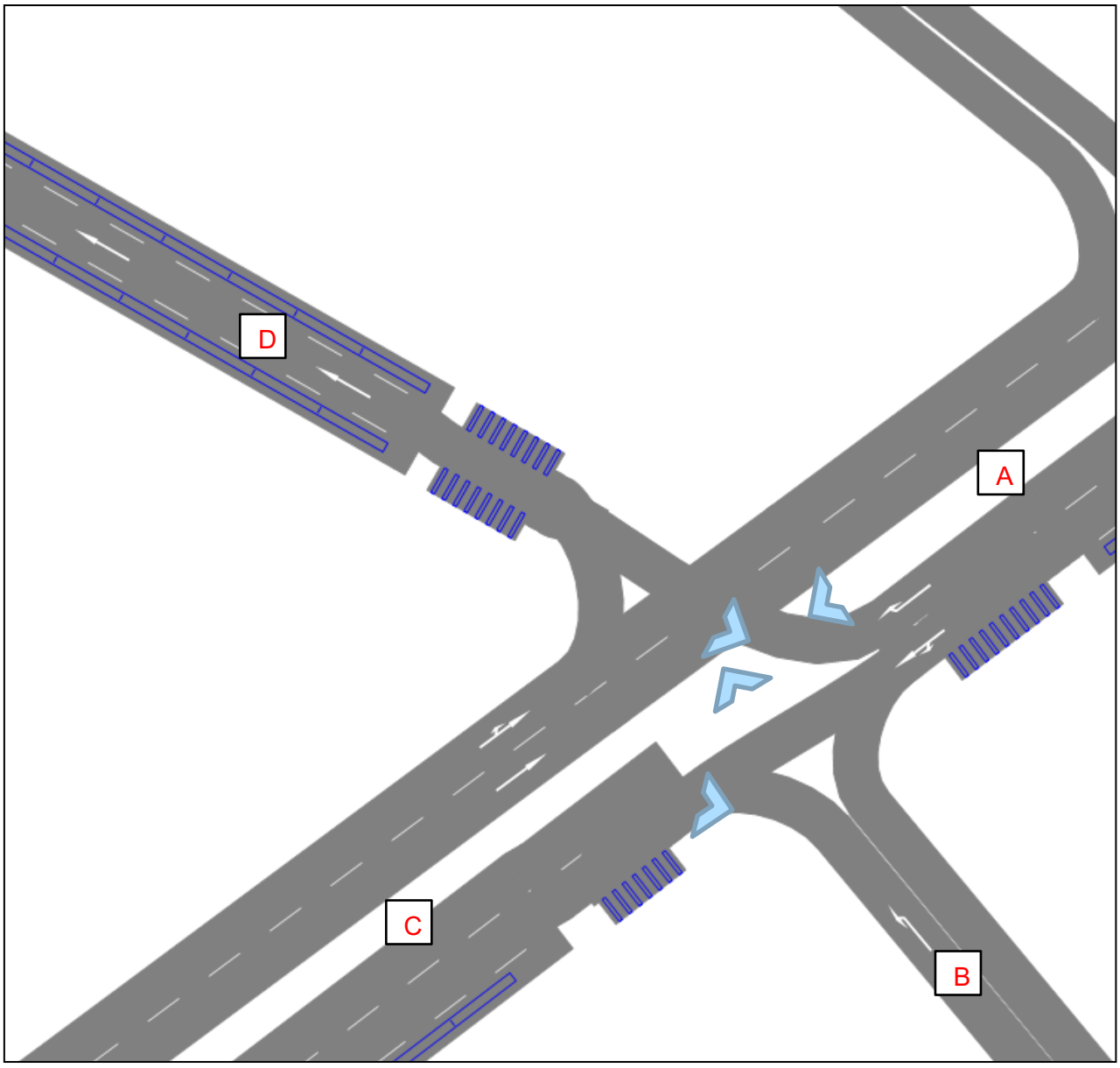


Figure 1-149 Junction 75 Layout

Figure 1-150 Junction 75 Traffic Condition

2. STAGE 1 LEVEL OF SERVICE, DELAY AND QUEUE LENGTHS

Table 2-1 Base Scenario AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	0	299	0	A	17	J17-S-Left	2	470	1	A
	J1-E-Through	0	1070	0	A		J17-S-Right	2	1104	1	A
	J1-W-Left	34	1448	11	B		J17-W-Through	0	439	0	A
	Total		2817	6	A		Total		2013	1	A
2	J2-N-Left	0	78	3	A	18	J18-E-Right	2	206	4	A
	J2-W-Left	0	103	1	A		J18-E-Through	1	263	2	A
	J2-W-Through	0	1514	0	A		J18-W-Left	0	251	2	A
	Total		1695	0	A		J18-W-Through	0	438	2	A
3	J3-N-Left	0	45	5	A		Total		1158	2	A
	J3-W-Left	0	233	9	A	19	J19-E-Through	5	246	10	B
	J3-W-Through	0	1571	7	A		J19-N-Left	2	324	4	A
	Total		1849	7	A		J19-W-Through	7	481	12	B
4	J4-E-Through	4	912	11	B		Total		1051	9	A
	J4-N-Left	0	0	0	A	20	J20-E-Left	0	64	1	A
	J4-S-Left	0	40	0	A		J20-E-Right	1	56	5	A
	J4-W-Left	8	0	0	A		J20-E-Through	1	126	2	A
	J4-W-Through	8	1604	5	A		J20-S-Left	0	0	0	A
	Total		2556	7	A		J20-S-Right	0	28	7	A
5	J5-E-Left	0	53	0	A		J20-S-Through	0	74	4	A
	J5-E-Through	0	899	0	A		J20-W-Left	0	253	2	A
	J5-N-Left	0	88	4	A		J20-W-Right	0	14	2	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J5-S-Left	0	14	1	A		J20-W-Through	0	452	2	A
	J5-W-Left	1	525	2	A		Total		1067	2	A
	J5-W-Through	1	1543	2	A		J21-E-Left	0	0	0	A
	Total		3122	1	A		J21-E-Through	0	126	0	A
13	J13-N-Left	2	65	8	A		J21-N-left	0	213	1	A
	J13-N-Right	2	164	12	B		J21-N-Right	0	79	5	A
	J13-N-Through	2	124	9	A		J21-N-Through	0	18	3	A
	J13-S-Left	0	42	0	A	21	J21-S-Left	0	149	1	A
	J13-S-Right	1	175	2	A		J21-S-Right	0	205	3	A
	J13-S-Through	0	309	0	A		J21-S-U-Turn	0	0	0	A
	Total		879	4	A		J21-W-Right	0	10	2	A
14	J14-S-Right	0	0	0	A		J21-W-Through	0	311	2	A
	J14-W-Right	1	0	0	A		Total		1111	2	A
	Total		224	2	A		J22-E-Right	0	2	10	B
15	J15-N-Through	0	27	0	A		J22-E-Through	0	417	8	A
	J15-S-Through	0	233	1	A	22	J22-W-Left	6	204	6	A
	J15-W-Left	0	203	1	A		J22-W-Through	6	264	6	A
	J15-W-Right	0	19	1	A		Total		887	7	A
	Total		482	1	A		J23-E-Left	15	174	58	E
16	J16-E-Left1	0	36	1	A		J23-E-Right	15	61	61	E
	J16-E-Left2	0	12	5	A	23	J23-N-Left	14	148	57	E
	J16-E-Right	0	121	5	A		J23-N-Through	14	139	56	E
	J16-N-Through	1	457	4	A		J23-S-Right	19	63	49	D

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-N-U-Turn	1	0	0	A		J23-S-Through	19	246	58	E
	J16-W-Left	0	965	1	A		J23-W-Left	31	122	80	E
	J16-W-Right1	0	227	2	A		J23-W-Right	31	44	105	F
	J16-W-Right2	0	352	2	A		J23-W-Through	31	200	84	F
	Total		2559	2	A		Total		1197	66	E

Table 2-2 Base Scenario PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	1	240	0	A	17	J17-S-Left	0	186	1	A
	J1-E-Through	1	2234	0	A		J17-S-Right	0	782	1	A
	J1-W-Left	3	804	4	A		J17-W-Through	0	612	0	A
	Total		3278	1	A		Total		1580	0	A
2	J2-N-Left	0	61	1	A	18	J18-E-Right	0	3	1	A
	J2-W-Left	0	72	0	A		J18-E-Through	0	183	0	A
	J2-W-Through	0	822	0	A		J18-W-Left	0	160	2	A
	Total		955	0	A		J18-W-Through	0	613	2	A
3	J3-N-Left	0	49	4	A		Total		959	2	A
	J3-W-Left	0	152	1	A	19	J19-E-Through	6	248	10	B
	J3-W-Through	0	845	5	A		J19-N-Left	1	329	4	A
	Total		1046	4	A		J19-W-Through	5	474	10	B
4	J4-E-Through	5	1956	6	A		Total		1051	8	A
	J4-N-Left	0	1	0	A	20	J20-E-Left	0	61	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J4-S-Left	0	20	0	A		J20-E-Right	0	20	4	A
	J4-W-Left	3	0	0	A		J20-E-Through	0	167	1	A
	J4-W-Through	3	920	5	A		J20-S-Left	0	32	1	A
	Total		2897	6	A		J20-S-Right	0	0	0	A
5	J5-E-Left	0	112	1	A		J20-S-Through	0	39	4	A
	J5-E-Through	0	1864	1	A		J20-W-Left	0	181	2	A
	J5-N-Left	0	149	1	A		J20-W-Right	0	0	0	A
	J5-S-Left	0	14	3	A		J20-W-Through	0	470	2	A
	J5-W-Left	0	345	1	A		Total		970	2	A
	J5-W-Through	0	714	0	A	21	J21-E-Left	0	0	0	A
	Total		3198	1	A		J21-E-Through	0	199	0	A
13	J13-N-Left	4	43	12	B		J21-N-left	0	186	1	A
	J13-N-Right	4	404	12	B		J21-N-Right	0	130	5	A
	J13-N-Through	4	187	19	C		J21-N-Through	0	32	3	A
	J13-S-Left	0	69	-1	A		J21-S-Left	0	148	1	A
	J13-S-Right	0	57	2	A		J21-S-Right	0	144	4	A
	J13-S-Through	0	219	0	A		J21-S-U-Turn	0	0	0	A
	Total		979	9	A		J21-W-Right	0	1	4	A
14	J14-S-Right	0	0	0	A		J21-W-Through	0	330	1	A
	J14-W-Right	0	1	0	A		Total		1170	2	A
	Total		153	1	A	22	J22-E-Right	1	12	3	A
15	J15-N-Through	0	32	0	A		J22-E-Through	1	547	9	A
	J15-S-Through	0	152	1	A		J22-W-Left	4	256	5	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J15-W-Left	0	134	2	A		J22-W-Through	4	144	6	A
	J15-W-Right	0	18	0	A		Total		959	7	A
	Total		336	1	A	23	J23-E-Left	32	270	60	E
16	J16-E-Left1	3	215	3	A		J23-E-Right	32	144	60	E
	J16-E-Left2	4	85	13	B		J23-N-Left	25	199	61	E
	J16-E-Right	4	122	15	C		J23-N-Through	25	257	61	E
	J16-N-Through	9	645	9	A		J23-S-Right	13	29	70	E
	J16-N-U-Turn	9	109	9	A		J23-S-Through	13	193	57	E
	J16-W-Left	1	675	2	A		J23-W-Left	22	122	71	E
	J16-W-Right1	1	260	2	A		J23-W-Right	22	101	72	E
	J16-W-Right2	1	456	2	A		J23-W-Through	22	127	71	E
	Total		3227	6	A		Total		1442	63	E

Table 2-3 Scenario 1 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	0	300	0	A	17	J17-S-Left	3	465	3	A
	J1-E-Through	0	1067	0	A		J17-S-Right	3	1085	1	A
	J1-W-Left	45	1434	9	A		J17-W-Through	0	437	0	A
	Total		2801	4	A		Total		1987	1	A
2	J2-N-Left	0	78	7	A	18	J18-E-Right	0	204	8	A
	J2-W-Left	0	106	2	A		J18-E-Through	0	262	3	A
	J2-W-Through	0	1500	1	A		J18-W-Left	45	249	4	A
	Total		1748	1	A		J18-W-Through	0	438	4	A
3	J3-N-Left	0	47	6	A		Total		1153	4	A
	J3-W-Left	1	231	10	B	19	J19-E-Through	0	247	12	B
	J3-W-Through	0	1559	7	A		J19-N-Left	0	324	8	A
	Total		1837	8	A		J19-W-Through	0	482	18	C
4	J4-E-Through	7	910	10	A		Total		1053	13	B
	J4-N-Left	0	0	0	A	20	J20-E-Left	1	64	4	A
	J4-S-Left	2	40	4	A		J20-E-Right	0	57	6	A
	J4-W-Left	47	0	0	A		J20-E-Through	7	126	2	A
	J4-W-Through	47	1580	20	C		J20-S-Left	0	0	0	A
	Total		2648	15	C		J20-S-Right	2	30	8	A
5	J5-E-Left	0	53	3	A		J20-S-Through	47	74	13	B
	J5-E-Through	0	899	0	A		J20-W-Left	47	247	1	A
	J5-N-Left	1	88	10	B		J20-W-Right	0	14	1	A
	J5-S-Left	0	14	3	A		J20-W-Through	0	452	1	A
	J5-W-Left	4	525	2	A		Total		1078	3	A
	J5-W-Through	4	1545	2	A	21	J21-E-Left	1	0	0	A
	Total		3238	3	A		J21-E-Through	0	126	0	A
13	J13-N-Left	2	65	4	A		J21-N-left	4	212	2	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Right	2	164	6	A		J21-N-Right	4	79	5	A
	J13-N-Through	2	125	3	A		J21-N-Through	2	18	5	A
	J13-S-Left	0	42	0	A		J21-S-Left	2	149	2	A
	J13-S-Right	0	175	1	A		J21-S-Right	2	205	5	A
	J13-S-Through	0	308	0	A		J21-S-U-Turn	0	0	0	A
	Total		879	2	A		J21-W-Right	0	10	3	A
14	J14-S-Right	0	0	0	A		J21-W-Through	0	307	1	A
	J14-W-Right	1	0	0	A		Total		1106	2	A
	Total		224	1	A	22	J22-E-Right	0	3	15	B
15	J15-N-Through	0	28	1	A		J22-E-Through	1	412	9	A
	J15-S-Through	0	231	0	A		J22-W-Left	0	202	8	A
	J15-W-Left	0	205	1	A		J22-W-Through	0	260	6	A
	J15-W-Right	0	19	0	A		Total		307	1	A
	Total		483	1	A	23	J23-E-Left	0	174	55	E
16	J16-E-Left1	0	28	1	A		J23-E-Right	0	61	66	E
	J16-E-Left2	1	20	6	A		J23-N-Left	0	148	56	E
	J16-E-Right	1	121	5	A		J23-N-Through	1	140	59	E
	J16-N-Through	2	439	4	A		J23-S-Right	1	63	46	D
	J16-N-U-Turn	2	0	0	A		J23-S-Through	2	245	56	E
	J16-W-Left	0	947	1	A		J23-W-Left	2	122	76	E
	J16-W-Right1	0	311	1	A		J23-W-Right	0	44	110	F
	J16-W-Right2	0	263	1	A		J23-W-Through	0	199	80	E
	Total		2539	2	A		Total		1196	64	E

Table 2-4 Scenario 1 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	42	235	0	A	17	J17-S-Left	1	296	2	A
	J1-E-Through	42	2231	0	A		J17-S-Right	1	779	1	A
	J1-W-Left	7	918	4	A		J17-W-Through	0	612	0	A
	Total		3384	1	A		Total		1687	1	A
2	J2-N-Left	0	61	3	A	18	J18-E-Right	42	85	6	A
	J2-W-Left	0	130	2	A		J18-E-Through	42	211	2	A
	J2-W-Through	0	936	0	A		J18-W-Left	7	80	4	A
	Total		1191	1	A		J18-W-Through	0	613	3	A
3	J3-N-Left	1	133	5	A		Total		989	3	A
	J3-W-Left	0	108	6	A	19	J19-E-Through	0	248	12	B
	J3-W-Through	0	933	6	A		J19-N-Left	0	329	8	A
	Total		1174	6	A		J19-W-Through	1	362	13	B
4	J4-E-Through	164	1828	19	C		Total		939	11	B
	J4-N-Left	0	1	0	A	20	J20-E-Left	0	61	2	A
	J4-S-Left	1	20	3	A		J20-E-Right	0	20	3	A
	J4-W-Left	11	0	0	A		J20-E-Through	164	167	1	A
	J4-W-Through	11	954	10	A		J20-S-Left	0	85	3	A
	Total		2920	15	B		J20-S-Right	1	0	0	A
5	J5-E-Left	0	102	3	A		J20-S-Through	11	44	7	A
	J5-E-Through	0	1746	1	A		J20-W-Left	11	176	1	A
	J5-N-Left	1	190	3	A		J20-W-Right	0	0	0	A
	J5-S-Left	0	14	7	A		J20-W-Through	0	358	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J5-W-Left	0	342	1	A		Total		923	1	A
	J5-W-Through	0	717	0	A		J21-E-Left	1	0	0	A
	Total		3225	1	A		J21-E-Through	0	253	0	A
	J13-N-Left	5	36	5	A		J21-N-left	0	160	2	A
	J13-N-Right	5	403	7	A		J21-N-Right	0	130	5	A
	J13-N-Through	5	228	6	A		J21-N-Through	5	58	4	A
13	J13-S-Left	0	69	-1	A	21	J21-S-Left	5	98	2	A
	J13-S-Right	0	57	1	A		J21-S-Right	5	124	6	A
	J13-S-Through	0	216	0	A		J21-S-U-Turn	0	19	7	A
	Total		1009	4	A		J21-W-Right	0	36	4	A
	J14-S-Right	0	0	0	A		J21-W-Through	0	260	1	A
14	J14-W-Right	0	1	0	A		Total		1138	2	A
	Total		147	1	A		J22-E-Right	0	15	2	A
	J15-N-Through	0	113	0	A		J22-E-Through	0	548	10	A
	J15-S-Through	0	108	1	A	22	J22-W-Left	0	254	7	A
15	J15-W-Left	0	127	1	A		J22-W-Through	0	109	8	A
	J15-W-Right	0	19	0	A		Total		260	1	A
	Total		367	1	A		J23-E-Left	0	269	61	E
	J16-E-Left1	7	211	7	A		J23-E-Right	0	145	57	E
	J16-E-Left2	7	91	19	C		J23-N-Left	7	165	61	E
16	J16-E-Right	7	122	23	C	23	J23-N-Through	7	291	54	D
	J16-N-Through	13	396	15	C		J23-S-Right	7	26	66	E
	J16-N-U-Turn	13	109	11	B		J23-S-Through	13	193	56	E

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-W-Left	1	678	1	A		J23-W-Left	13	122	70	E
	J16-W-Right1	1	410	2	A		J23-W-Right	1	101	70	E
	J16-W-Right2	1	305	8	A		J23-W-Through	1	127	68	E
	Total		3229	8	A		Total		1439	61	E

Table 2-5 Scenario 2 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	0	164	0	A	16	J16-N-Through	2	423	6	A
	J1-E-Through	0	1391	0	A		J16-N-U-Turn	2	0	0	A
	J1-W-Left	12	1182	5	A		J16-W-Left	1	940	1	A
	Total		2737	2	A		J16-W-Right1	1	289	2	A
2	J2-N-Left	0	32	2	A		J16-W-Right2	1	459	2	A
	J2-W-Left	0	467	1	A		Total		2716	3	A
	J2-W-Through	0	1208	0	A	17	J17-S-Left	1	1178	1	A
	Total		1707	1	A		J17-S-Right	0	9	8	A
3	J3-N-Left	0	100	4	A		J17-W-Through	0	510	0	A
	J3-W-Left	0	223	5	A		Total		1697	1	A
	J3-W-Through	0	1575	6	A	18	J18-W-Left	0	483	1	A
	Total		1898	6	A		J18-W-Through	0	519	2	A
4	J4-E-Through	5	1227	2	A		Total		1002	1	A
	J4-S-Left	0	40	0	A	19	J19-N-Left	0	322	2	A
	J4-W-Through	8	1607	5	A		J19-W-Through	6	832	8	A
	Total		2874	3	A		Total		1154	6	A
5	J5-E-Left	0	49	0	A	20	J20-S-Right	1	381	2	A
	J5-E-Through	0	1218	0	A		J20-S-Through	1	82	3	A
	J5-N-Left	0	99	5	A		J20-W-Left	0	282	1	A
	J5-S-Left	0	14	3	A		J20-W-Right	0	34	0	A
	J5-W-Left	6	678	3	A		J20-W-Through	0	447	0	A
	J5-W-Through	6	1530	3	A		Total		1246	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		3588	2	A		J21-N-left	0	233	0	A
	J13-N-Left	1	7	8	A		J21-N-Through	0	20	1	A
	J13-N-Right	1	83	8	A		J21-S-Right	0	189	2	A
	J13-N-Through	1	99	5	A	21	J21-S-U-Turn	0	9	1	A
13	J13-S-Left	0	3	-1	A		J21-W-Right	0	0	0	A
	J13-S-Right	0	170	1	A		J21-W-Through	0	207	1	A
	J13-S-Through	0	507	0	A		Total		807	1	A
	Total		869	1	A		J22-W-Left	4	192	8	A
14	J14-S-Right	0	133	1	A	22	J22-W-Through	4	289	8	A
	Total		133	1	A		Total		481	8	A
	J15-N-Through	0	30	0	A		J23-N-Left	11	147	46	D
	J15-S-Through	0	223	0	A		J23-N-Through	11	133	41	D
15	J15-W-Left	0	62	1	A		J23-S-Right	23	222	38	D
	J15-W-Right	0	70	0	A		J23-S-Through	23	287	39	D
	Total		385	0	A	23	J23-W-Left	17	128	49	D
	J16-E-Left1	0	33	0	A		J23-W-Right	17	56	35	C
16	J16-E-Left2	0	16	5	A		J23-W-Through	17	249	45	D
	J16-E-Right	0	119	5	A		Total		1222	42	D

Table 2-6 Scenario 2 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	2	80	0	A	16	J16-N-Through	37	570	24	C
	J1-E-Through	2	2804	0	A		J16-N-U-Turn	37	109	21	C
	J1-W-Left	4	1076	2	A		J16-W-Left	2	703	2	A
	Total		3960	1	A		J16-W-Right1	2	326	2	A
2	J2-N-Left	0	72	2	A		J16-W-Right2	2	769	3	A
	J2-W-Left	0	83	0	A		Total		3670	13	B
	J2-W-Through	0	1015	0	A	17	J17-S-Left	1	1072	1	A
	Total		1170	0	A		J17-S-Right	0	7	4	A
3	J3-N-Left	0	188	2	A		J17-W-Through	0	735	0	A
	J3-W-Left	0	107	2	A		Total		1814	1	A
	J3-W-Through	0	909	4	A	18	J18-W-Left	0	197	1	A
	Total		1204	4	A		J18-W-Through	0	743	1	A
4	J4-E-Through	6	2527	2	A		Total		940	1	A
	J4-S-Left	0	20	0	A	19	J19-N-Left	0	329	1	A
	J4-W-Through	3	940	4	A		J19-W-Through	4	581	6	A
	Total		3487	3	A		Total		910	4	A
5	J5-E-Left	0	115	1	A	20	J20-S-Right	0	16	1	A
	J5-E-Through	0	2432	1	A		J20-S-Through	0	66	2	A
	J5-N-Left	0	124	1	A		J20-W-Left	0	199	1	A
	J5-S-Left	0	14	6	A		J20-W-Right	0	72	0	A
	J5-W-Left	0	391	1	A		J20-W-Through	0	553	0	A
	J5-W-Through	0	716	1	A		Total		924	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		3792	1	A		J21-N-left	0	201	0	A
	J13-N-Left	2	9	1	A		J21-N-Through	0	76	2	A
	J13-N-Right	2	175	8	A		J21-S-Right	0	147	2	A
	J13-N-Through	2	148	5	A	21	J21-S-U-Turn	0	3	3	A
13	J13-S-Left	0	53	-1	A		J21-W-Right	0	14	0	A
	J13-S-Right	0	41	1	A		J21-W-Through	1	350	1	A
	J13-S-Through	0	297	-1	A		Total		937	1	A
	Total		723	3	A		J22-W-Left	3	265	7	A
	J14-S-Right	0	129	1	A	22	J22-W-Through	3	233	7	A
14	Total		129	1	A		Total		500	7	A
	J15-N-Through	0	94	0	A		J23-N-Left	18	206	42	D
	J15-S-Through	0	107	0	A		J23-N-Through	18	249	41	D
15	J15-W-Left	0	32	0	A		J23-S-Right	10	66	33	C
	J15-W-Right	0	94	1	A		J23-S-Through	10	230	32	C
	Total		327	0	A	23	J23-W-Left	17	114	45	D
	J16-E-Left1	16	289	17	C		J23-W-Right	17	82	50	D
16	J16-E-Left2	16	50	54	F		J23-W-Through	17	225	48	D
	J16-E-Right	16	123	44	E		Total		1172	42	D

Table 2-7 Scenario 3 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	0	299	0	A	17	J17-S-Left	1	497	1	A
	J1-E-Through	0	1072	0	A		J17-S-Right	1	1097	1	A
	J1-W-Left	44	1476	7	A		J17-W-Through	0	442	0	A
	Total		2847	3	A		Total		2036	1	A
2	J2-N-Left	0	79	2	A	18	J18-E-Right	2	205	4	A
	J2-W-Left	0	134	0	A		J18-E-Through	1	291	2	A
	J2-W-Through	0	1542	0	A		J18-W-Left	0	251	2	A
	Total		1755	1	A		J18-W-Through	0	443	2	A
3	J3-N-Left	0	70	3	A		Total		1190	2	A
	J3-W-Left	0	223	7	A	19	J19-E-Through	5	248	10	B
	J3-W-Through	0	1605	6	A		J19-N-Left	1	324	5	A
	Total		1898	6	A		J19-W-Through	7	453	13	B
4	J4-E-Through	0	40	0	A		Total		1025	10	A
	J4-N-Left	12	1629	6	A	20	J20-E-Left	0	64	2	A
	J4-S-Left	0	0	0	A		J20-E-Right	0	57	4	A
	J4-W-Left	4	916	3	A		J20-E-Through	0	127	1	A
	J4-W-Through	12	0	0	A		J20-S-Left	0	25	2	A
	Total		2585	5	A		J20-S-Right	0	32	5	A
5	J5-E-Left	0	99	5	A		J20-S-Through	0	75	5	A
	J5-E-Through	0	14	2	A		J20-W-Left	0	247	1	A
	J5-N-Left	1	53	3	A		J20-W-Right	0	14	1	A
	J5-S-Left	0	903	1	A		J20-W-Through	0	423	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J5-W-Left	3	517	2	A		Total		1064	2	A
	J5-W-Through	3	1553	2	A		J21-E-Left	0	0	0	A
	Total		3139	2	A		J21-E-Through	0	152	0	A
	J13-N-Left	2	61	4	A		J21-N-left	0	212	1	A
	J13-N-Right	2	164	6	A		J21-N-Right	0	79	4	A
	J13-N-Through	2	135	4	A		J21-N-Through	0	18	3	A
13	J13-S-Left	0	42	0	A	21	J21-S-Left	0	134	1	A
	J13-S-Right	0	175	1	A		J21-S-Right	0	182	3	A
	J13-S-Through	0	298	0	A		J21-S-U-Turn	0	0	0	A
	Total		875	2	A		J21-W-Right	0	10	2	A
	J14-S-Right	0	0	0	A		J21-W-Through	0	301	1	A
14	J14-W-Right	1	0	0	A		Total		1088	1	A
	Total		220	1	A		J22-E-Right	0	13	2	A
	J15-N-Through	0	28	0	A		J22-E-Through	0	413	9	A
	J15-S-Through	0	223	0	A	22	J22-W-Left	6	194	5	A
15	J15-W-Left	0	178	1	A		J22-W-Through	6	256	6	A
	J15-W-Right	0	42	1	A		Total		876	7	A
	Total		471	1	A		J23-E-Left	14	174	58	E
	J16-E-Left1	0	24	1	A		J23-E-Right	14	61	56	E
	J16-E-Left2	0	24	5	A		J23-N-Left	15	141	55	E
16	J16-E-Right	0	121	5	A	23	J23-N-Through	15	147	58	E
	J16-N-Through	1	443	4	A		J23-S-Right	19	53	52	D
	J16-N-U-Turn	1	0	0	A		J23-S-Through	19	245	56	E

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-W-Left	0	956	1	A		J23-W-Left	31	122	77	E
	J16-W-Right1	0	338	2	A		J23-W-Right	31	44	95	F
	J16-W-Right2	0	238	2	A		J23-W-Through	31	199	82	F
	Total		2548	2	A		Total		1186	64	E

Table 2-8 Scenario 3 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	1	240	0	A	17	J17-S-Left	0	183	1	A
	J1-E-Through	1	2235	0	A		J17-S-Right	0	780	1	A
	J1-W-Left	4	801	3	A		J17-W-Through	0	612	0	A
	Total		3276	1	A		Total		1575	0	A
2	J2-N-Left	0	61	1	A	18	J18-E-Right	0	3	0	A
	J2-W-Left	0	69	0	A		J18-E-Through	0	180	0	A
	J2-W-Through	0	819	0	A		J18-W-Left	0	160	2	A
	Total		949	0	A		J18-W-Through	0	613	2	A
3	J3-N-Left	0	49	2	A		Total		956	1	A
	J3-W-Left	0	156	1	A	19	J19-E-Through	6	248	10	A
	J3-W-Through	0	839	4	A		J19-N-Left	1	329	4	A
	Total		1044	4	A		J19-W-Through	5	476	10	B
4	J4-E-Through	0	20	0	A		Total		1053	8	A
	J4-N-Left	3	918	5	A	20	J20-E-Left	0	61	1	A
	J4-S-Left	0	1	0	A		J20-E-Right	0	20	7	A
	J4-W-Left	5	1955	2	A		J20-E-Through	0	167	1	A
	J4-W-Through	3	0	0	A		J20-S-Left	0	29	0	A
	Total		2894	3	A		J20-S-Right	0	0	0	A
5	J5-E-Left	0	146	2	A		J20-S-Through	0	39	6	A
	J5-E-Through	0	14	2	A		J20-W-Left	0	181	1	A
	J5-N-Left	5	111	5	A		J20-W-Right	0	0	0	A
	J5-S-Left	5	1863	2	A		J20-W-Through	0	472	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J5-W-Left	0	344	1	A		Total		969	1	A
	J5-W-Through	0	715	1	A		J21-E-Left	0	0	0	A
	Total		3193	2	A		J21-E-Through	0	196	0	A
	J13-N-Left	4	43	5	A		J21-N-left	0	186	1	A
	J13-N-Right	4	403	6	A		J21-N-Right	0	130	6	A
	J13-N-Through	4	184	5	A		J21-N-Through	0	32	3	A
13	J13-S-Left	0	69	-1	A	21	J21-S-Left	0	152	1	A
	J13-S-Right	0	57	2	A		J21-S-Right	0	144	4	A
	J13-S-Through	0	218	0	A		J21-S-U-Turn	0	0	0	A
	Total		974	4	A		J21-W-Right	0	1	5	A
	J14-S-Right	0	0	0	A		J21-W-Through	0	333	1	A
14	J14-W-Right	0	1	0	A		Total		1174	2	A
	Total		153	1	A		J22-E-Right	1	12	3	A
	J15-N-Through	0	32	0	A		J22-E-Through	0	547	9	A
	J15-S-Through	0	156	0	A	22	J22-W-Left	4	255	5	A
15	J15-W-Left	0	134	1	A		J22-W-Through	4	147	6	A
	J15-W-Right	0	18	0	A		Total		961	7	A
	Total		340	1	A		J23-E-Left	29	270	59	E
	J16-E-Left1	6	214	3	A		J23-E-Right	29	144	61	E
	J16-E-Left2	6	86	19	C		J23-N-Left	25	202	59	E
16	J16-E-Right	6	122	16	C	23	J23-N-Through	25	254	56	E
	J16-N-Through	5	681	8	A		J23-S-Right	12	28	69	E
	J16-N-U-Turn	5	109	8	A		J23-S-Through	12	193	57	E

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-W-Left	1	673	2	A		J23-W-Left	22	122	70	E
	J16-W-Right1	1	238	2	A		J23-W-Right	22	101	69	E
	J16-W-Right2	1	479	2	A		J23-W-Through	22	127	69	E
	Total		3224	5	A		Total		1441	61	E

Table 2-9 Scenario 4 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	0	299	0	A	17	J17-S-Left	3	468	2	A
	J1-E-Through	0	1493	0	A		J17-S-Right	3	1389	1	A
	J1-W-Left	83	1738	12	B		J17-W-Through	0	441	0	A
	Total		3530	6	A		Total		2298	1	A
2	J2-N-Left	1	79	15	C	18	J18-E-Right	2	207	5	A
	J2-W-Left	0	118	1	A		J18-E-Through	1	261	3	A
	J2-W-Through	0	1822	2	A		J18-W-Left	0	251	2	A
	Total		2019	3	A		J18-W-Through	0	441	2	A
3	J3-N-Left	0	48	4	A		Total		1160	3	A
	J3-W-Left	0	234	7	A	19	J19-E-Through	6	250	11	B
	J3-W-Through	0	1891	5	A		J19-N-Left	1	324	5	A
	Total		2173	5	A		J19-W-Through	7	484	12	B
4	J4-E-Through	4	1132	2	A		Total		1058	10	A
	J4-N-Left	0	0	0	A	20	J20-E-Left	0	64	1	A
	J4-S-Left	0	40	0	A		J20-E-Right	0	58	5	A
	J4-W-Left	12	0	0	A		J20-E-Through	0	128	1	A
	J4-W-Through	12	1919	5	A		J20-S-Left	0	9	0	A
	Total		3091	4	A		J20-S-Right	0	31	5	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
5	J5-E-Left	0	54	0	A		J20-S-Through	0	76	5	A
	J5-E-Through	0	1118	0	A		J20-W-Left	0	251	1	A
	J5-N-Left	8	257	11	B		J20-W-Right	0	14	1	A
	J5-S-Left	0	14	4	A		J20-W-Through	0	452	1	A
	J5-W-Left	5	522	2	A		Total		1083	2	A
	J5-W-Through	5	1691	2	A	21	J21-E-Left	0	0	0	A
	Total		3656	2	A		J21-E-Through	0	137	0	A
13	J13-N-Left	4	61	4	A		J21-N-left	0	212	1	A
	J13-N-Right	4	164	7	A		J21-N-Right	0	79	5	A
	J13-N-Through	4	290	5	A		J21-N-Through	0	18	2	A
	J13-S-Left	1	43	-1	A		J21-S-Left	0	138	1	A
	J13-S-Right	1	175	2	A		J21-S-Right	0	205	3	A
	J13-S-Through	1	306	0	A		J21-S-U-Turn	0	0	0	A
	Total		1039	3	A		J21-W-Right	0	10	2	A
14	J14-S-Right	0	0	0	A		J21-W-Through	0	308	1	A
	J14-W-Right	0	0	0	A		Total		1107	1	A
	Total		222	1	A	22	J22-E-Right	1	4	5	A
15	J15-N-Through	0	28	0	A		J22-E-Through	0	413	9	A
	J15-S-Through	0	234	0	A		J22-W-Left	6	205	5	A
	J15-W-Left	0	195	2	A		J22-W-Through	6	264	6	A
	J15-W-Right	0	20	1	A		Total		886	7	A
	Total		477	1	A	23	J23-E-Left	15	173	59	E
16	J16-E-Left1	1	43	2	A		J23-E-Right	15	61	58	E
	J16-E-Left2	1	6	24	C		J23-N-Left	31	148	56	E
	J16-E-Right	1	121	9	A		J23-N-Through	31	307	54	D
	J16-N-Through	5	519	8	A		J23-S-Right	18	63	44	D
	J16-N-U-Turn	5	0	0	A		J23-S-Through	18	243	56	E

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-W-Left	0	942	1	A		J23-W-Left	29	124	73	E
	J16-W-Right1	0	436	2	A		J23-W-Right	29	44	85	F
	J16-W-Right2	0	439	2	A		J23-W-Through	29	199	76	E
	Total		2958	4	A		Total		1362	61	E

Table 2-10 Scenario 4 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-E-Right	1	240	0	A	17	J17-S-Left	3	181	1	A
	J1-E-Through	1	2606	0	A		J17-S-Right	3	1101	2	A
	J1-W-Left	9	1123	3	A		J17-W-Through	0	611	0	A
	Total		3969	1	A		Total		1893	1	A
2	J2-N-Left	0	62	2	A	18	J18-E-Right	0	3	5	A
	J2-W-Left	0	40	0	A		J18-E-Through	0	177	0	A
	J2-W-Through	0	1141	0	A		J18-W-Left	0	160	2	A
	Total		1243	0	A		J18-W-Through	0	612	2	A
3	J3-N-Left	0	51	4	A		Total		952	2	A
	J3-W-Left	0	177	1	A	19	J19-E-Through	7	253	10	A
	J3-W-Through	0	1130	3	A		J19-N-Left	2	329	4	A
	Total		1358	3	A		J19-W-Through	6	481	11	B
4	J4-E-Through	6	2426	2	A		Total		1063	9	A
	J4-N-Left	0	1	3	A	20	J20-E-Left	0	62	0	A
	J4-S-Left	0	20	0	A		J20-E-Right	0	22	2	A
	J4-W-Left	5	0	0	A		J20-E-Through	0	169	0	A
	J4-W-Through	5	1228	4	A		J20-S-Left	0	1	0	A
	Total		3675	3	A		J20-S-Right	0	0	0	A
5	J5-E-Left	0	111	1	A		J20-S-Through	0	39	4	A
	J5-E-Through	0	2335	1	A		J20-W-Left	0	181	1	A
	J5-N-Left	2	305	2	A		J20-W-Right	0	0	0	A
	J5-S-Left	0	14	6	A		J20-W-Through	0	477	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J5-W-Left	0	334	1	A		Total		951	1	A
	J5-W-Through	0	869	0	A		J21-E-Left	0	0	0	A
	Total		3968	1	A		J21-E-Through	0	170	0	A
	J13-N-Left	10	43	6	A		J21-N-left	0	186	1	A
	J13-N-Right	10	407	8	A		J21-N-Right	0	130	5	A
	J13-N-Through	10	343	6	A		J21-N-Through	0	32	3	A
13	J13-S-Left	0	68	-1	A	21	J21-S-Left	0	174	1	A
	J13-S-Right	0	40	2	A		J21-S-Right	0	144	3	A
	J13-S-Through	0	225	0	A		J21-S-U-Turn	0	0	0	A
	Total		1126	5	A		J21-W-Right	0	1	0	A
	J14-S-Right	0	0	0	A		J21-W-Through	0	338	1	A
14	J14-W-Right	0	1	0	A		Total		1175	1	A
	Total		153	1	A		J22-E-Right	1	6	7	A
	J15-N-Through	0	33	0	A		J22-E-Through	1	547	10	A
	J15-S-Through	0	177	0	A	22	J22-W-Left	4	265	5	A
15	J15-W-Left	0	134	1	A		J22-W-Through	4	151	5	A
	J15-W-Right	0	18	1	A		Total		969	8	A
	Total		362	1	A		J23-E-Left	31	271	60	E
	J16-E-Left1	37	200	47	E		J23-E-Right	31	146	58	E
	J16-E-Left2	36	96	82	F		J23-N-Left	46	207	66	E
16	J16-E-Right	36	120	86	F	23	J23-N-Through	46	415	61	E
	J16-N-Through	31	569	20	C		J23-S-Right	13	36	49	D
	J16-N-U-Turn	31	107	22	C		J23-S-Through	13	193	61	E

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J16-W-Left	4	672	2	A		J23-W-Left	21	122	64	E
	J16-W-Right1	4	391	3	A		J23-W-Right	21	102	71	E
	J16-W-Right2	4	643	3	A		J23-W-Through	21	127	69	E
	Total		3598	17	C		Total		1619	62	E

Table 2-11 Overall LOS for Scenarios

Junction	LOS									
	AM Peak					PM Peak				
	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	C	A	A	A	A	B	A	A	A
5	A	A	A	A	A	A	A	A	A	A
13	A	A	A	A	A	A	A	A	A	A
14	A	A	A	A	A	A	A	A	A	A
15	A	A	A	A	A	A	A	B	A	A
16	A	A	A	A	A	A	A	A	A	C
17	A	A	A	A	A	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	A
19	A	B	A	A	A	A	B	A	A	A
20	A	A	A	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A
22	A	A	A	A	A	A	A	A	A	A
23	E	E	D	E	E	E	E	D	E	E

3. STAGE 1 NETWORK PERFORMANCE

Table 3-1 AM Peak Network Performance

Scenario	Delay (sec)	Avg Speed (kmph)
Base	31	29
Scenario 1	46	22
Scenario 2	24	32
Scenario 3	33	29
Scenario 4	38	27

Table 3-2 PM Peak Network Performance

Scenario	Delay (sec)	Avg Speed (kmph)
Base	30	30
Scenario 1	74	19
Scenario 2	28	32
Scenario 3	32	30
Scenario 4	40	28

4. STAGE 2 LEVEL OF SERVICE, DELAY, QUEUE LENGTHS

Table 4-1 Base Scenario AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	2	1484	1	A	36	J36-N-Through	4	299	6	A
	J1-E-Through	0	1094	0	A		J36-E-Left	1	74	4	A
	J1-E-Right	0	362	0	A		J36-E-Right	1	99	4	A
	Total		2940	1	A		J36-S-Through	0	499	1	A
2	J2-W-Left	0	134	0	A		Total		971	3	A
	J2-W-Through	0	1543	0	A	37	J37-E-Through	0	105	0	A
	J2-N-Left	0	96	2	A		J37-E-Right	0	36	1	A
	Total		1773	0	A		J37-S-Left	0	69	1	A
3	J3-W-Left	0	327	0	A		J37-S-Through	0	132	1	A
	J3-W-Through	0	1677	0	A		Total		342	1	A
	J3-N-Left	0	0	0	A	38	J38-W-Left	0	53	3	A
	Total		2004	0	A		J38-W-Through	0	166	2	A
4	J4-W-Left	9	32	9	A		J38-S-Through	0	87	0	A
	J4-W-Through	9	1752	6	A		J38-S-Right	0	80	0	A
	J4-N-Left	0	0	0	A		Total		386	1	A
	J4-E-Through	2	915	1	A	39	J39-E-Through	0	84	1	A
	Total		2699	4	A		J39-E-Right	0	46	1	A
5	J5-W-Left	0	407	1	A		J39-S-Left	0	40	1	A
	J5-W-Through	0	1654	1	A		J39-S-Through	0	100	0	A
	J5-N-Left	1	134	10	B		Total		270	1	A
	J5-E-Through	0	856	0	A	40	J40-W-Through	0	390	0	A
	J5-S-Left	0	28	1	A		J40-E-Through	0	279	0	A
	Total		3079	1	A		J40-S-Left	0	46	0	A
6	J6-W-Left	3	164	2	A		J40-S-Right	0	100	2	A
	J6-W-Through	3	2260	4	A		Total		815	1	A
	J6-W-Right	3	0	0	A	41	J41-W-Left	3	0	0	A
	J6-E-Left	0	0	0	A		J41-W-Through	3	621	4	A
	J6-E-Through	0	873	3	A		J41-N-Left	0	165	4	A
	J6-E-Right	0	46	31	D		J41-N-Right	0	4	4	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	275	0	A
	J6-S-Through	3	164	2	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1065	3	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		3507	4	A		J42-W-Through	1	492	0	A
	J7-W-Through	3	2288	2	A		J42-W-Right	2	294	1	A
	J7-N-Left	7	137	13	B	42	J42-E-Left	0	24	1	A
7	J7-N-Right	8	155	33	D		J42-E-Through	0	275	0	A
	J7-E-Through	0	872	0	A		Total		1085	0	A
	Total		3452	4	A		J43-N-Through	0	293	0	A
	J8-W-Through	1	2449	2	A		J43-N-Right	0	24	0	A
	J8-W-Right	5	3	5	A	43	J43-E-Through	0	0	0	A
	J8-E-Left	0	43	0	A		J43-E-Right	0	106	1	A
8	J8-E-Through	0	1012	0	A		Total		423	0	A
	J8-S-Left	0	19	1	A		J44-W-Through	0	120	0	A
	J8-S-Right	0	160	3	A		J44-W-Right	0	124	1	A
	Total		3686	2	A	44	J44-N-Left	0	232	2	A
	J9-W-Left	0	340	1	A		J44-N-Through	0	232	2	A
	J9-W-Through	0	2265	0	A		Total		708	1	A
9	J9-N-Left	8	68	90	F		J45-N-Through	0	353	1	A
	J9-E-Through	0	1055	0	A		J45-N-Right	0	0	0	A
	Total		3728	2	A	45	J45-E-Left	0	353	1	A
	J10-E-Left	0	68	0	A		J45-E-Through	0	0	0	A
	J10-E-Through	0	115	0	A		Total		706	2	A
	J10-E-Right	0	105	0	A		J46-E-Through	0	244	0	A
10	J10-S-Left	0	32	2	A		J46-E-Right	0	258	1	A
	J10-S-Through	0	307	2	A	46	J46-S-Left	0	64	2	A
	Total		627	1	A		J46-S-Through	0	187	3	A
	J11-N-Through	0	213	1	A		Total		753	1	A
	J11-N-Right	0	140	0	A		J47-W-Left	0	87	1	A
11	J11-E-Left	0	80	0	A		J47-W-Through	0	89	1	A
	J11-E-Through	0	160	0	A	47	J47-S-Through	0	374	0	A
	Total		593	1	A		J47-S-Right	0	69	0	A
	J12-E-Through	0	181	0	A		Total		619	0	A
	J12-E-Right	0	20	0	A		J48-S-Left	0	108	0	A
12	J12-S-Left	0	65	1	A	48	Total		108	0	A
	J12-S-Through	0	144	1	A		J49-W-Through	0	486	0	A
	Total		410	0	A	49	J49-E-Through	0	299	1	A
13	J13-N-Left	2	64	2	A		J49-S-Left	1	73	2	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	2	183	5	A		J49-S-Right	1	276	4	A
	J13-N-Right	2	205	6	A		Total		1134	1	A
	J13-S-Left	1	0	0	A	50	J50-W-Left	0	5	0	A
	J13-S-Through	1	318	0	A		J50-W-Through	0	487	0	A
	J13-S-Right	1	101	2	A		J50-E-Right	0	72	1	A
	Total		871	3	A		Total		564	0	A
14	J14-W-Through	0	136	1	A	51	J51-W-Through	0	582	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	1	179	3	A
	J14-S-Right	0	32	1	A		J51-E-Left	0	267	0	A
	Total		168	1	A		J51-E-Through	0	300	0	A
15	J15-W-Left	0	186	2	A		Total		1328	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	148	0	A
	J15-N-Through	0	0	0	A		J52-W-Right	0	9	3	A
	J15-S-Through	0	326	0	A		J52-N-Left	0	145	2	A
	Total		512	1	A		J52-N-Through	0	285	2	A
16	J16-W	1	845	2	A		Total		587	1	A
	J16-N	3	287	5	A	53	J53-E-Left	1	214	2	A
	J16-E	15	70	9	A		J53-E-Through	1	335	2	A
	Total		1202	7	A		J53-N-Through	0	125	0	A
17	J17-W-Through	0	438	0	A		J53-N-Right	0	168	0	A
	J17-S-Left	0	546	1	A		Total		842	1	A
	J17-S-Right	0	1125	1	A	54	J54-E-Through	0	176	1	A
	Total		2109	1	A		J54-S-Left	0	376	1	A
18	J18-W-Left	0	236	1	A		Total		552	1	A
	J18-W-Through	0	438	3	A	55	J55-N-Through	2	896	1	A
	J18-E-Through	2	304	2	A		J55-N-Right	2	156	14	B
	J18-E-Right	2	241	5	A		J55-S-Left	0	21	1	A
	Total		1219	3	A		J55-S-Through	0	1037	0	A
19	J19-W-Through	5	512	10	A		Total		2110	2	A
	J19-N-Left	3	335	6	A	56	J56-W-Left	1	142	9	A
	J19-E-Through	6	277	9	A		J56-W-Right	1	148	7	A
	Total		1124	9	A		J56-N-Through	6	906	2	A
20	J20-W-Left	0	296	2	A		J56-S-Through	3	1035	4	A
	J20-W-Through	0	477	1	A		Total		2231	4	A
	J20-W-Right	0	68	1	A	57	J57-N-Left	0	87	6	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-E-Left	1	29	4	A		J57-N-Through	0	900	8	A
	J20-E-Through	1	180	2	A		J57-E-Left	0	6	13	B
	J20-E-Right	1	68	11	B		Total		993	5	A
	J20-S-Left	1	0	0	A	58	J58-N-Through	1	987	2	A
	J20-S-Through	2	93	14	B		J58-N-Right	4	620	7	A
	J20-S-Right	1	40	11	B		J58-S-Left	0	1168	4	A
	Total		1251	3	A		Total		2775	4	A
21	J21-W-Through	0	344	1	A	59	J59-W-Left	0	579	0	A
	J21-W-Right	0	0	0	A		J59-E-Right	1	1219	2	A
	J21-N-Left	0	316	1	A		Total		1798	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	0	292	2	A
	J21-N-Right	1	197	4	A		J60-N-Through	0	1550	3	A
	J21-E-Left	0	0	0	A		J60-E-Left	0	57	7	A
	J21-E-Through	0	179	0	A		Total		1899	3	A
	J21-S-Left	1	232	3	A	61	J61-S-Through	0	1631	1	A
	J21-S-Right	1	186	5	A		Total		1631	2	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	13	297	1	A
	Total		1454	2	A		J62-N-Through	13	1760	2	A
22	J22-W-Left	5	128	8	A		J62-E-Left	0	88	8	A
	J22-W-Through	5	288	7	A		Total		2145	2	A
	J22-E-Through	5	457	9	A	63	J63-N-Left	0	1549	1	A
	Total		873	8	A		J63-S-Through	0	1139	0	A
23	J23-W-Left	29	167	39	D		J63-S-Right	0	526	1	A
	J23-W-Through	29	227	35	C		Total		3214	1	A
	J23-W-Right	29	28	42	D	64	J64-W-Left	0	256	0	A
	J23-N-Left	17	179	51	D		J64-N-Through	0	1554	0	A
	J23-N-Through	17	190	57	E		J64-S-Through	0	1137	0	A
	J23-E-Left	26	241	60	E		Total		2947	0	A
	J23-E-Right	26	74	65	E	65	J65-W-Through	0	179	0	A
	J23-S-Through	21	258	63	E		J65-W-Right	0	0	0	A
	J23-S-Right	21	57	62	E		J65-S-Right	0	77	1	A
	Total		1421	53	D		Total		256	0	A
25	J25-W-Left	0	125	0	A	66	J66-W-Through	0	137	0	A
	J25-W-Through	0	293	0	A		J66-W-Right	0	153	0	A
	J25-S-Through	0	140	2	A		J66-N-Left	0	42	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-S-Right	0	46	2	A		J66-N-Through	0	85	1	A
	Total		604	1	A		Total		417	1	A
26	J26-W-Through	0	366	0	A	67	J67-W-Right	0	39	1	A
	J26-W-Right	0	216	0	A		J67-N-Through	0	131	0	A
	J26-N-Left	0	53	2	A		J67-N-Right	0	59	0	A
	J26-N-Through	0	139	4	A		Total		229	0	A
	Total		774	1	A	68	J68-N-Left	0	104	1	A
27	J27-W-Left	0	86	0	A		J68-N-Through	0	222	0	A
	J27-W-Through	0	376	0	A		J68-S-Through	1	613	0	A
	J27-S-Through	0	186	3	A		J68-S-Right	1	189	1	A
	J27-S-Right	0	277	3	A		Total		1128	1	A
	Total		925	1	A	69	J69-W-Left	1	365	3	A
28	J28-W-Left	0	45	1	A		J69-W-Right	1	119	1	A
	J28-E-Through	0	16	1	A		J69-S-Through	1	437	2	A
	J28-E-Right	0	47	1	A		Total		921	2	A
	J28-S-Left	0	86	0	A	70	J70-N-Left	0	101	2	A
	J28-S-Through	0	185	0	A		J70-N-Through	0	0	0	A
	Total		379	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	195	0	A		J70-E-Right	0	53	3	A
	J30-E-Right	0	178	1	A		J70-S-Through	0	357	1	A
	Total		373	1	A		J70-S-Right	0	0	0	A
31	J31-N-Right	0	94	2	A		Total		511	1	A
	J31-E-Through	0	94	1	A	71	J71-W-Through	1	384	2	A
	J31-S-Left	0	187	1	A		J71-W-Right	0	114	1	A
	Total		375	1	A		J71-N-Left	0	101	0	A
32	J32-N-Left	0	607	0	A		J71-N-Through	0	49	0	A
	J32-E-Through	0	94	0	A		J71-N-Right	0	89	0	A
	J32-E-Right	0	367	0	A		Total		737	2	A
	Total		1068	0	A	72	J72-W-Left	0	63	1	A
33	J33-N-Left	0	80	0	A		J72-W-Through	0	421	1	A
	Total		80	2	A		J72-W-Right	0	727	1	A
34	J34-W-Left	23	0	0	A		J72-N-Left	0	79	2	A
	J34-W-Through	23	317	37	D		J72-N-Through	0	91	6	A
	J34-W-Right	23	360	39	D		Total		1381	1	A
	J34-N-Left	14	60	48	D	74	J74-E-Left	0	94	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-N-Through	14	141	54	D		J74-E-Through	0	566	0	A
	J34-N-Right	14	102	45	D		J74-S-Left	0	174	2	A
	J34-E-Left	13	6	74	E		Total		834	0	A
	J34-E-Through	13	177	49	D		J75-W-Left	0	0	0	A
	J34-E-Right	13	142	41	D		J75-W-Through	0	1165	0	A
	J34-S-Left	22	78	41	D		J75-E-Left	0	59	0	A
	J34-S-Through	22	170	44	D	75	J75-E-Through	0	486	0	A
	J34-S-Right	22	82	41	D		J75-E-Right	1	195	5	A
	Total		1635	43	D		J75-S-Left	0	0	0	A
35	J35-N-Left	0	0	0	A		Total		1905	1	A
	J35-N-Through	0	299	2	A						
	J35-N-Right	1	59	3	A						
	J35-S-Left	1	0	0	A						
	J35-S-Through	1	352	1	A						
	J35-S-Right	1	184	1	A						
	Total		894	2	A						

Table 4-2 Base Scenario PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	1	939	1	A	36	J36-N-Through	13	389	18	C
	J1-E-Through	18	2621	1	A		J36-E-Left	1	116	3	A
	J1-E-Right	18	380	0	A		J36-E-Right	1	133	6	A
	Total		3940	1	A		J36-S-Through	0	616	1	A
2	J2-W-Left	0	47	0	A		Total		1254	7	A
	J2-W-Through	0	965	0	A	37	J37-E-Through	1	134	0	A
	J2-N-Left	0	70	2	A		J37-E-Right	1	65	1	A
	Total		1082	0	A		J37-S-Left	2	115	1	A
3	J3-W-Left	0	203	10	A		J37-S-Through	2	210	1	A
	J3-W-Through	0	996	2	A		Total		524	1	A
	J3-N-Left	0	16	1	A	38	J38-W-Left	1	49	7	A
	Total		1215	4	A		J38-W-Through	1	148	3	A
4	J4-W-Left	4	37	8	A		J38-S-Through	4	160	2	A
	J4-W-Through	4	1104	4	A		J38-S-Right	4	101	0	A
	J4-N-Left	0	0	0	A		Total		458	2	A
	J4-E-Through	5	2283	1	A	39	J39-E-Through	25	98	50	F
	Total		3424	2	A		J39-E-Right	25	34	9	A
5	J5-W-Left	0	324	0	A		J39-S-Left	12	60	22	C
	J5-W-Through	0	867	0	A		J39-S-Through	12	136	6	A
	J5-N-Left	0	234	3	A		Total		328	23	C
	J5-E-Through	1	2159	1	A	40	J40-W-Through	9	286	2	A
	J5-S-Left	0	57	6	A		J40-E-Through	15	486	21	C
	Total		3641	1	A		J40-S-Left	2	55	2	A
6	J6-W-Left	0	178	1	A		J40-S-Right	4	109	6	A
	J6-W-Through	0	1272	3	A		Total		936	12	B
	J6-W-Right	0	0	0	A	41	J41-W-Left	17	0	0	A
	J6-E-Left	12	0	0	A		J41-W-Through	14	544	8	A
	J6-E-Through	12	2342	6	A		J41-N-Left	16	199	24	C
	J6-E-Right	12	136	9	A		J41-N-Right	16	82	29	D
	J6-S-Left	0	0	0	A		J41-E-Through	0	416	2	A
	J6-S-Through	0	178	1	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1241	10	B
	Total		4106	5	A	42	J42-W-Through	5	492	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	3	1292	3	A		J42-W-Right	6	248	2	A
	J7-N-Left	17	159	24	C		J42-E-Left	12	3	0	A
	J7-N-Right	18	247	41	E		J42-E-Through	14	417	7	A
	J7-E-Through	0	2340	1	A		Total		1160	3	A
	Total		4038	5	A	43	J43-N-Through	4	231	0	A
8	J8-W-Through	0	1299	0	A		J43-N-Right	5	14	12	B
	J8-W-Right	0	8	16	C		J43-E-Through	14	0	0	A
	J8-E-Left	0	143	1	A		J43-E-Right	15	135	8	A
	J8-E-Through	0	2451	0	A		Total		380	3	A
	J8-S-Left	0	9	1	A	44	J44-W-Through	0	154	0	A
	J8-S-Right	2	102	17	C		J44-W-Right	0	95	0	A
	Total		4012	1	A		J44-N-Left	0	165	1	A
9	J9-W-Left	0	194	1	A		J44-N-Through	0	165	1	A
	J9-W-Through	0	1205	0	A		Total		579	1	A
	J9-N-Left	2	159	12	B	45	J45-N-Through	0	259	1	A
	J9-E-Through	0	2594	0	A		J45-N-Right	0	1	0	A
	Total		4152	1	A		J45-E-Left	0	259	1	A
10	J10-E-Left	0	159	0	A		J45-E-Through	0	1	0	A
	J10-E-Through	0	201	0	A		Total		520	1	A
	J10-E-Right	0	193	0	A	46	J46-E-Through	0	213	0	A
	J10-S-Left	0	23	2	A		J46-E-Right	0	221	1	A
	J10-S-Through	0	170	4	A		J46-S-Left	0	63	2	A
	Total		746	1	A		J46-S-Through	0	277	2	A
11	J11-N-Through	1	209	5	A		Total		774	1	A
	J11-N-Right	0	205	1	A	47	J47-W-Left	0	110	1	A
	J11-E-Left	0	199	1	A		J47-W-Through	0	109	1	A
	J11-E-Through	0	353	0	A		J47-S-Through	0	457	0	A
	Total		966	2	A		J47-S-Right	0	39	0	A
12	J12-E-Through	0	405	0	A		Total		715	0	A
	J12-E-Right	0	43	1	A	48	J48-S-Left	0	161	0	A
	J12-S-Left	0	152	2	A		Total		161	0	A
	J12-S-Through	0	162	2	A	49	J49-W-Through	0	489	0	A
	Total		762	1	A		J49-E-Through	6	433	3	A
13	J13-N-Left	6	96	6	A		J49-S-Left	2	90	5	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	6	195	6	A		J49-S-Right	2	304	6	A
	J13-N-Right	6	439	7	A		Total		1316	3	A
	J13-S-Left	0	12	0	A		J50-W-Left	0	3	0	A
	J13-S-Through	0	284	0	A	50	J50-W-Through	0	489	0	A
	J13-S-Right	0	31	1	A		J50-E-Right	5	81	2	A
	Total		1057	5	A		Total		573	1	A
	J14-W-Through	0	114	1	A		J51-W-Through	0	674	1	A
	J14-W-Right	0	0	0	A		J51-W-Right	0	119	3	A
14	J14-S-Right	0	37	2	A	51	J51-E-Left	3	107	0	A
	Total		151	1	A		J51-E-Through	3	446	0	A
	J15-W-Left	0	214	1	A		Total		1346	1	A
	J15-W-Right	0	0	0	A		J52-W-Through	0	126	0	A
15	J15-N-Through	0	16	1	A		J52-W-Right	0	21	2	A
	J15-S-Through	0	203	1	A	52	J52-N-Left	0	209	0	A
	Total		433	1	A		J52-N-Through	0	206	0	A
	J16-W	1	808	2	A		Total		562	0	A
	J16-N	17	612	12	B		J53-E-Left	0	143	1	A
16	J16-E	154	882	13	B		J53-E-Through	0	333	1	A
	Total		2302	12	B	53	J53-N-Through	0	124	0	A
	J17-W-Through	0	640	0	A		J53-N-Right	0	101	0	A
	J17-S-Left	0	283	0	A		Total		701	1	A
17	J17-S-Right	0	950	1	A		J54-E-Through	0	118	1	A
	Total		1873	0	A	54	J54-S-Left	0	360	1	A
	J18-W-Left	0	158	1	A		Total		478	1	A
	J18-W-Through	0	640	2	A		J55-N-Through	2	1614	2	A
18	J18-E-Through	0	221	1	A		J55-N-Right	2	113	13	B
	J18-E-Right	0	62	4	A	55	J55-S-Left	0	6	0	A
	Total		1081	2	A		J55-S-Through	0	1080	0	A
	J19-W-Through	6	536	9	A		Total		2813	2	A
	J19-N-Left	1	262	3	A		J56-W-Left	2	203	12	B
19	J19-E-Through	6	286	9	A		J56-W-Right	2	132	10	B
	Total		1084	8	A	56	J56-N-Through	9	1600	2	A
	J20-W-Left	0	182	2	A		J56-S-Through	3	1075	5	A
20	J20-W-Through	0	517	1	A		Total		3010	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-W-Right	0	41	2	A	57	J57-N-Left	0	47	5	A
	J20-E-Left	0	30	2	A		J57-N-Through	0	1524	8	A
	J20-E-Through	0	199	1	A		J57-E-Left	0	76	20	C
	J20-E-Right	0	57	5	A		Total		1647	6	A
	J20-S-Left	0	0	0	A	58	J58-N-Through	2	1571	3	A
	J20-S-Through	0	21	6	A		J58-N-Right	8	783	8	A
	J20-S-Right	0	25	6	A		J58-S-Left	1	1234	4	A
	Total		1072	2	A		Total		3588	5	A
21	J21-W-Through	0	370	1	A	59	J59-W-Left	0	674	1	A
	J21-W-Right	0	16	1	A		J59-E-Right	3	1441	2	A
	J21-N-Left	0	216	0	A		Total		2115	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	8	458	4	A
	J21-N-Right	0	106	4	A		J60-N-Through	8	2167	4	A
	J21-E-Left	0	0	0	A		J60-E-Left	11	190	35	E
	J21-E-Through	0	198	1	A		Total		2815	6	A
	J21-S-Left	1	327	3	A	61	J61-S-Through	0	1998	2	A
	J21-S-Right	1	156	6	A		Total		1998	5	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	136	118	12	B
	Total		1389	2	A		J62-N-Through	136	2351	5	A
22	J22-W-Left	22	173	4	A		J62-E-Left	4	280	18	C
	J22-W-Through	22	252	6	A		Total		2749	7	A
	J22-E-Through	10	583	14	B	63	J63-N-Left	36	1927	31	D
	Total		1008	10	A		J63-S-Through	0	1676	0	A
23	J23-W-Left	36	200	31	C		J63-S-Right	0	582	1	A
	J23-W-Through	36	223	39	D		Total		4185	14	B
	J23-W-Right	36	92	45	D	64	J64-W-Left	0	216	0	A
	J23-N-Left	19	225	50	D		J64-N-Through	56	1950	26	D
	J23-N-Through	19	275	56	E		J64-S-Through	0	1676	0	A
	J23-E-Left	60	372	66	E		Total		3842	13	B
	J23-E-Right	60	166	75	E	65	J65-W-Through	0	134	0	A
	J23-S-Through	18	250	65	E		J65-W-Right	0	0	0	A
	J23-S-Right	18	29	80	F		J65-S-Right	0	84	1	A
	Total		1832	55	E		Total		218	0	A
25	J25-W-Left	4	151	3	A	66	J66-W-Through	0	94	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-W-Through	4	306	5	A		J66-W-Right	0	174	0	A
	J25-S-Through	1	163	2	A		J66-N-Left	0	41	1	A
	J25-S-Right	1	76	13	B		J66-N-Through	0	165	1	A
	Total		696	5	A		Total		474	1	A
26	J26-W-Through	0	358	0	A	67	J67-W-Right	0	75	2	A
	J26-W-Right	0	178	1	A		J67-N-Through	0	242	0	A
	J26-N-Left	0	101	1	A		J67-N-Right	0	119	0	A
	J26-N-Through	0	236	3	A		Total		436	1	A
	Total		873	1	A	68	J68-N-Left	0	103	1	A
27	J27-W-Left	0	57	0	A		J68-N-Through	0	303	1	A
	J27-W-Through	0	327	0	A		J68-S-Through	1	925	0	A
	J27-S-Through	0	187	2	A		J68-S-Right	1	168	1	A
	J27-S-Right	0	226	2	A		Total		1499	1	A
	Total		797	1	A	69	J69-W-Left	1	362	5	A
28	J28-W-Left	0	32	1	A		J69-W-Right	1	49	2	A
	J28-E-Through	0	42	1	A		J69-S-Through	3	731	3	A
	J28-E-Right	0	91	1	A		Total		1142	3	A
	J28-S-Left	0	66	0	A	70	J70-N-Left	0	99	3	A
	J28-S-Through	0	176	0	A		J70-N-Through	0	0	0	A
	Total		407	0	A		J70-E-Left	1	0	0	A
30	J30-E-Left	0	339	0	A		J70-E-Right	1	77	9	A
	J30-E-Right	0	277	1	A		J70-S-Through	0	551	1	A
	Total		616	1	A		J70-S-Right	0	4	1	A
31	J31-N-Right	0	119	2	A		Total		731	2	A
	J31-E-Through	0	169	1	A	71	J71-W-Through	1	251	5	A
	J31-S-Left	0	332	1	A		J71-W-Right	1	93	3	A
	Total		620	1	A		J71-N-Left	0	161	0	A
32	J32-N-Left	6	573	6	A		J71-N-Through	0	50	0	A
	J32-E-Through	0	169	0	A		J71-N-Right	0	219	0	A
	J32-E-Right	0	600	0	A		Total		774	2	A
	Total		1342	3	A	72	J72-W-Left	0	73	1	A
33	J33-N-Left	0	86	1	A		J72-W-Through	0	293	0	A
	Total		86	5	A		J72-W-Right	0	682	1	A
34	J34-W-Left	39	0	0	A		J72-N-Left	0	51	3	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-W-Through	39	322	40	D		J72-N-Through	1	155	6	A
	J34-W-Right	39	299	76	E		Total		1254	2	A
	J34-N-Left	19	32	52	D	74	J74-E-Left	0	121	0	A
	J34-N-Through	19	231	85	F		J74-E-Through	0	934	0	A
	J34-N-Right	19	102	54	D		J74-S-Left	1	270	5	A
	J34-E-Left	70	36	136	F		Total		1325	1	A
	J34-E-Through	70	294	117	F	75	J75-W-Left	0	1	0	A
	J34-E-Right	70	211	120	F		J75-W-Through	0	926	0	A
	J34-S-Left	87	151	79	E		J75-E-Left	0	125	0	A
	J34-S-Through	87	275	78	E		J75-E-Through	0	763	0	A
	J34-S-Right	87	96	88	F		J75-E-Right	2	314	5	A
	Total		2049	100	F		J75-S-Left	0	0	0	A
35	J35-N-Left	9	0	0	A		Total		2129	1	A
	J35-N-Through	9	390	6	A						
	J35-N-Right	10	48	6	A						
	J35-S-Left	1	0	0	A						
	J35-S-Through	1	550	1	A						
	J35-S-Right	1	132	1	A						
	Total		1120	3	A						

Table 4-3 Scenario 1 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	2	1484	1	A	36	J36-N-Through	4	287	6	A
	J1-E-Through	0	1092	0	A		J36-E-Left	0	74	3	A
	J1-E-Right	0	361	0	A		J36-E-Right	0	99	3	A
	Total		2937	1	A		J36-S-Through	0	489	0	A
2	J2-W-Left	0	134	0	A		Total		949	3	A
	J2-W-Through	0	1544	0	A	37	J37-E-Through	0	105	0	A
	J2-N-Left	0	96	2	A		J37-E-Right	0	36	0	A
	Total		1774	0	A		J37-S-Left	0	69	1	A
3	J3-W-Left	0	330	0	A		J37-S-Through	0	132	1	A
	J3-W-Through	0	1678	0	A		Total		342	1	A
	J3-N-Left	0	0	0	A	38	J38-W-Left	0	51	2	A
	Total		2008	0	A		J38-W-Through	0	167	2	A
4	J4-W-Left	11	32	11	B		J38-S-Through	0	87	0	A
	J4-W-Through	11	1754	6	A		J38-S-Right	0	80	0	A
	J4-N-Left	0	0	0	A		Total		385	1	A
	J4-E-Through	2	916	1	A	39	J39-E-Through	0	84	1	A
	Total		2702	5	A		J39-E-Right	0	46	0	A
5	J5-W-Left	0	407	1	A		J39-S-Left	0	40	1	A
	J5-W-Through	0	1655	1	A		J39-S-Through	0	98	0	A
	J5-N-Left	1	136	10	B		Total		268	1	A
	J5-E-Through	0	857	0	A	40	J40-W-Through	0	373	0	A
	J5-S-Left	0	28	1	A		J40-E-Through	0	275	0	A
	Total		3083	1	A		J40-S-Left	0	46	0	A
6	J6-W-Left	6	164	2	A		J40-S-Right	0	98	2	A
	J6-W-Through	6	2260	5	A		Total		792	0	A
	J6-W-Right	6	0	0	A	41	J41-W-Left	1	0	0	A
	J6-E-Left	0	0	0	A		J41-W-Through	1	610	3	A
	J6-E-Through	0	874	2	A		J41-N-Left	0	159	3	A
	J6-E-Right	0	46	27	D		J41-N-Right	0	4	4	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	271	0	A
	J6-S-Through	6	164	2	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1044	2	A
	Total		3508	4	A	42	J42-W-Through	1	479	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	0	2288	1	A		J42-W-Right	1	290	1	A
	J7-N-Left	6	138	4	A		J42-E-Left	0	24	0	A
	J7-N-Right	6	153	33	D		J42-E-Through	0	271	0	A
	J7-E-Through	0	874	0	A		Total		1064	0	A
	Total		3453	2	A	43	J43-N-Through	0	290	0	A
8	J8-W-Through	0	2450	2	A		J43-N-Right	0	24	0	A
	J8-W-Right	3	3	7	A		J43-E-Through	0	0	0	A
	J8-E-Left	0	43	0	A		J43-E-Right	0	106	1	A
	J8-E-Through	0	1011	0	A		Total		420	0	A
	J8-S-Left	0	19	1	A	44	J44-W-Through	0	123	0	A
	J8-S-Right	0	160	3	A		J44-W-Right	0	123	0	A
	Total		3686	1	A		J44-N-Left	0	231	0	A
9	J9-W-Left	1	339	1	A		J44-N-Through	0	231	0	A
	J9-W-Through	1	2268	0	A		Total		708	0	A
	J9-N-Left	6	70	65	F	45	J45-N-Through	0	350	0	A
	J9-E-Through	0	1054	0	A		J45-N-Right	0	0	0	A
	Total		3731	2	A		J45-E-Left	0	350	0	A
10	J10-E-Left	0	70	0	A		J45-E-Through	0	0	0	A
	J10-E-Through	0	115	0	A		Total		700	1	A
	J10-E-Right	0	108	0	A	46	J46-E-Through	0	244	0	A
	J10-S-Left	0	32	1	A		J46-E-Right	0	258	1	A
	J10-S-Through	1	307	2	A		J46-S-Left	0	64	2	A
	Total		632	1	A		J46-S-Through	0	187	3	A
11	J11-N-Through	0	213	0	A		Total		753	1	A
	J11-N-Right	0	137	0	A	47	J47-W-Left	0	90	2	A
	J11-E-Left	0	81	0	A		J47-W-Through	0	90	1	A
	J11-E-Through	0	166	0	A		J47-S-Through	0	374	0	A
	Total		597	0	A		J47-S-Right	0	69	0	A
12	J12-E-Through	0	187	0	A		Total		623	0	A
	J12-E-Right	0	20	0	A	48	J48-S-Left	0	108	0	A
	J12-S-Left	0	65	1	A		Total		108	0	A
	J12-S-Through	0	144	1	A	49	J49-W-Through	0	474	0	A
	Total		416	1	A		J49-E-Through	0	294	1	A
13	J13-N-Left	4	64	5	A		J49-S-Left	1	73	2	A
	J13-N-Through	4	176	7	A		J49-S-Right	1	280	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Right	4	208	9	A		Total		1121	2	A
	J13-S-Left	0	0	0	A	50	J50-W-Left	0	5	1	A
	J13-S-Through	0	318	0	A		J50-W-Through	0	474	0	A
	J13-S-Right	0	101	1	A		J50-E-Right	0	72	2	A
	Total		867	4	A		Total		551	0	A
14	J14-W-Through	0	131	1	A	51	J51-W-Through	0	577	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	1	174	4	A
	J14-S-Right	0	32	2	A		J51-E-Left	0	267	0	A
	Total		163	1	A		J51-E-Through	0	296	0	A
15	J15-W-Left	0	181	2	A		Total		1314	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	149	0	A
	J15-N-Through	0	0	0	A		J52-W-Right	0	9	1	A
	J15-S-Through	0	329	1	A		J52-N-Left	0	140	1	A
	Total		510	1	A		J52-N-Through	0	281	1	A
16	J16-W	1	843	2	A		Total		579	1	A
	J16-N	3	283	5	A	53	J53-E-Left	1	214	1	A
	J16-E	14	70	10	A		J53-E-Through	1	336	2	A
	Total		1196	7	A		J53-N-Through	0	119	0	A
17	J17-W-Through	0	436	0	A		J53-N-Right	0	168	0	A
	J17-S-Left	0	545	1	A		Total		837	1	A
	J17-S-Right	0	1126	1	A	54	J54-E-Through	0	176	1	A
	Total		2107	1	A		J54-S-Left	0	376	1	A
18	J18-W-Left	0	236	1	A		Total		552	1	A
	J18-W-Through	0	436	3	A	55	J55-N-Through	2	894	1	A
	J18-E-Through	2	304	3	A		J55-N-Right	2	156	13	B
	J18-E-Right	2	241	5	A		J55-S-Left	0	21	1	A
	Total		1217	3	A		J55-S-Through	0	1037	0	A
19	J19-W-Through	8	511	13	B		Total		2108	2	A
	J19-N-Left	2	330	5	A	56	J56-W-Left	1	138	8	A
	J19-E-Through	6	277	10	A		J56-W-Right	1	147	6	A
	Total		1118	10	B		J56-N-Through	5	906	2	A
20	J20-W-Left	0	289	2	A		J56-S-Through	3	1034	4	A
	J20-W-Through	0	476	1	A		Total		2225	4	A
	J20-W-Right	0	68	1	A	57	J57-N-Left	0	87	6	A
	J20-E-Left	1	29	7	A		J57-N-Through	0	900	8	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-E-Through	1	180	4	A		J57-E-Left	0	6	11	B
	J20-E-Right	2	68	10	B		Total		993	5	A
	J20-S-Left	2	0	0	A	58	J58-N-Through	0	987	2	A
	J20-S-Through	2	93	14	B		J58-N-Right	3	620	7	A
	J20-S-Right	1	40	11	B		J58-S-Left	0	1163	4	A
	Total		1243	4	A		Total		2770	4	A
21	J21-W-Through	0	342	1	A	59	J59-W-Left	0	577	0	A
	J21-W-Right	0	0	0	A		J59-E-Right	0	1220	2	A
	J21-N-Left	0	311	1	A		Total		1797	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	0	292	2	A
	J21-N-Right	1	197	4	A		J60-N-Through	0	1550	3	A
	J21-E-Left	0	0	0	A		J60-E-Left	0	57	8	A
	J21-E-Through	0	179	1	A		Total		1899	3	A
	J21-S-Left	1	229	3	A	61	J61-S-Through	0	1627	1	A
	J21-S-Right	1	186	5	A		Total		1627	2	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	13	293	1	A
	Total		1444	2	A		J62-N-Through	13	1761	2	A
22	J22-W-Left	4	128	7	A		J62-E-Left	0	88	8	A
	J22-W-Through	4	286	7	A		Total		2142	2	A
	J22-E-Through	2	458	5	A	63	J63-N-Left	0	1549	1	A
	Total		872	6	A		J63-S-Through	0	1139	0	A
23	J23-W-Left	29	163	52	D		J63-S-Right	0	522	1	A
	J23-W-Through	29	215	43	D		Total		3210	1	A
	J23-W-Right	29	29	36	D	64	J64-W-Left	0	255	0	A
	J23-N-Left	17	176	52	D		J64-N-Through	0	1554	0	A
	J23-N-Through	17	181	56	E		J64-S-Through	0	1137	0	A
	J23-E-Left	26	245	72	E		Total		2946	0	A
	J23-E-Right	26	70	60	E	65	J65-W-Through	0	178	0	A
	J23-S-Through	23	256	61	E		J65-W-Right	0	0	0	A
	J23-S-Right	23	57	56	E		J65-S-Right	0	77	1	A
	Total		1392	56	E		Total		255	0	A
25	J25-W-Left	0	116	0	A	66	J66-W-Through	0	136	0	A
	J25-W-Through	0	284	0	A		J66-W-Right	0	150	0	A
	J25-S-Through	0	139	1	A		J66-N-Left	0	42	1	A
	J25-S-Right	0	46	1	A		J66-N-Through	0	85	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		585	0	A		Total		413	1	A
26	J26-W-Through	0	356	0	A	67	J67-W-Right	0	36	1	A
	J26-W-Right	0	216	0	A		J67-N-Through	0	128	0	A
	J26-N-Left	0	44	1	A		J67-N-Right	0	59	0	A
	J26-N-Through	0	135	2	A		Total		223	0	A
	Total		751	1	A	68	J68-N-Left	0	103	1	A
27	J27-W-Left	0	86	0	A		J68-N-Through	0	213	0	A
	J27-W-Through	0	376	0	A		J68-S-Through	1	612	0	A
	J27-S-Through	0	186	3	A		J68-S-Right	1	187	1	A
	J27-S-Right	0	277	3	A		Total		1115	1	A
	Total		925	1	A	69	J69-W-Left	1	363	3	A
28	J28-W-Left	0	45	1	A		J69-W-Right	1	115	1	A
	J28-E-Through	0	16	0	A		J69-S-Through	0	437	2	A
	J28-E-Right	0	47	1	A		Total		915	2	A
	J28-S-Left	0	86	0	A	70	J70-N-Left	0	99	2	A
	J28-S-Through	0	185	0	A		J70-N-Through	0	0	0	A
	Total		379	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	182	0	A		J70-E-Right	0	53	3	A
	J30-E-Right	0	179	1	A		J70-S-Through	0	357	1	A
	Total		361	1	A		J70-S-Right	0	0	0	A
31	J31-N-Right	0	84	1	A		Total		509	1	A
	J31-E-Through	0	91	1	A	71	J71-W-Through	1	384	2	A
	J31-S-Left	0	187	1	A		J71-W-Right	0	114	2	A
	Total		362	1	A		J71-N-Left	0	96	0	A
32	J32-N-Left	0	593	0	A		J71-N-Through	0	50	0	A
	J32-E-Through	0	91	0	A		J71-N-Right	0	85	0	A
	J32-E-Right	0	362	0	A		Total		729	1	A
	Total		1046	0	A	72	J72-W-Left	0	63	1	A
33	J33-N-Left	0	83	1	A		J72-W-Through	0	420	1	A
	Total		83	2	A		J72-W-Right	0	705	1	A
34	J34-W-Left	24	0	0	A		J72-N-Left	0	79	3	A
	J34-W-Through	24	313	38	D		J72-N-Through	1	91	10	A
	J34-W-Right	24	356	40	D		Total		1358	2	A
	J34-N-Left	13	60	46	D	74	J74-E-Left	0	84	1	A
	J34-N-Through	13	133	44	D		J74-E-Through	0	555	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-N-Right	13	100	42	D		J74-S-Left	0	174	0	A
	J34-E-Left	14	6	52	D		Total		813	0	A
	J34-E-Through	14	173	51	D		J75-W-Left	0	0	0	A
	J34-E-Right	14	142	41	D		J75-W-Through	0	1143	0	A
	J34-S-Left	24	78	44	D		J75-E-Left	0	59	0	A
	J34-S-Through	24	170	50	D	75	J75-E-Through	0	475	0	A
	J34-S-Right	24	77	41	D		J75-E-Right	2	195	8	A
	Total		1608	43	D		J75-S-Left	0	0	0	A
35	J35-N-Left	1	0	0	A		Total		1872	1	A
	J35-N-Through	1	289	2	A						
	J35-N-Right	1	59	2	A						
	J35-S-Left	1	0	0	A						
	J35-S-Through	0	343	1	A						
	J35-S-Right	0	180	1	A						
	Total		871	2	A						

Table 4-4 Scenario 1 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	1	942	1	A	36	J36-N-Through	12	398	16	C
	J1-E-Through	30	2634	1	A		J36-E-Left	2	123	8	A
	J1-E-Right	30	378	0	A		J36-E-Right	2	137	9	A
	Total		3954	1	A		J36-S-Through	0	616	0	A
2	J2-W-Left	0	50	0	A		Total		1274	7	A
	J2-W-Through	0	968	0	A	37	J37-E-Through	0	141	0	A
	J2-N-Left	0	74	1	A		J37-E-Right	0	67	1	A
	Total		1092	0	A		J37-S-Left	0	119	1	A
3	J3-W-Left	0	203	9	A		J37-S-Through	0	225	1	A
	J3-W-Through	0	1002	3	A		Total		552	1	A
	J3-N-Left	0	16	2	A	38	J38-W-Left	1	50	5	A
	Total		1221	4	A		J38-W-Through	1	169	2	A
4	J4-W-Left	4	37	5	A		J38-S-Through	2	172	3	A
	J4-W-Through	4	1111	4	A		J38-S-Right	2	113	0	A
	J4-N-Left	0	1	0	A		Total		504	2	A
	J4-E-Through	5	2295	1	A	39	J39-E-Through	13	118	25	D
	Total		3444	2	A		J39-E-Right	13	41	8	A
5	J5-W-Left	0	325	1	A		J39-S-Left	6	66	24	C
	J5-W-Through	0	869	0	A		J39-S-Through	6	145	2	A
	J5-N-Left	0	240	3	A		Total		370	14	B
	J5-E-Through	0	2166	1	A	40	J40-W-Through	0	401	0	A
	J5-S-Left	0	57	4	A		J40-E-Through	10	556	18	C
	Total		3657	1	A		J40-S-Left	0	65	7	A
6	J6-W-Left	1	178	1	A		J40-S-Right	0	121	7	A
	J6-W-Through	1	1274	6	A		Total		1143	10	B
	J6-W-Right	1	0	0	A	41	J41-W-Left	2	0	0	A
	J6-E-Left	12	0	0	A		J41-W-Through	2	572	3	A
	J6-E-Through	12	2364	6	A		J41-N-Left	3	240	7	A
	J6-E-Right	12	137	9	A		J41-N-Right	2	91	12	B
	J6-S-Left	0	0	0	A		J41-E-Through	0	472	2	A
	J6-S-Through	1	178	1	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1375	4	A
	Total		4131	6	A	42	J42-W-Through	1	547	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	0	1292	0	A		J42-W-Right	2	265	1	A
	J7-N-Left	10	160	3	A		J42-E-Left	1	5	2	A
	J7-N-Right	10	250	35	D		J42-E-Through	2	475	3	A
	J7-E-Through	0	2359	1	A		Total		1292	1	A
	Total		4061	3	A	43	J43-N-Through	0	252	0	A
8	J8-W-Through	0	1299	0	A		J43-N-Right	0	18	1	A
	J8-W-Right	0	8	29	D		J43-E-Through	1	0	0	A
	J8-E-Left	0	143	1	A		J43-E-Right	1	160	4	A
	J8-E-Through	0	2486	0	A		Total		430	1	A
	J8-S-Left	0	9	1	A	44	J44-W-Through	0	177	0	A
	J8-S-Right	2	102	20	C		J44-W-Right	0	104	0	A
	Total		4047	1	A		J44-N-Left	0	191	0	A
9	J9-W-Left	0	194	0	A		J44-N-Through	0	191	0	A
	J9-W-Through	0	1205	0	A		Total		663	0	A
	J9-N-Left	1	149	10	A	45	J45-N-Through	0	294	0	A
	J9-E-Through	0	2629	0	A		J45-N-Right	0	1	0	A
	Total		4177	1	A		J45-E-Left	0	294	0	A
10	J10-E-Left	0	149	0	A		J45-E-Through	0	1	0	A
	J10-E-Through	0	203	0	A		Total		590	1	A
	J10-E-Right	0	199	0	A	46	J46-E-Through	0	212	0	A
	J10-S-Left	0	23	1	A		J46-E-Right	0	220	1	A
	J10-S-Through	1	170	4	A		J46-S-Left	0	65	2	A
	Total		744	1	A		J46-S-Through	0	278	2	A
11	J11-N-Through	0	209	0	A		Total		775	1	A
	J11-N-Right	0	196	0	A	47	J47-W-Left	0	119	2	A
	J11-E-Left	0	203	0	A		J47-W-Through	0	115	1	A
	J11-E-Through	0	362	0	A		J47-S-Through	0	458	0	A
	Total		970	0	A		J47-S-Right	0	38	0	A
12	J12-E-Through	0	416	0	A		Total		730	1	A
	J12-E-Right	0	43	1	A	48	J48-S-Left	0	167	0	A
	J12-S-Left	0	152	2	A		Total		167	0	A
	J12-S-Through	0	162	1	A	49	J49-W-Through	0	543	0	A
	Total		773	1	A		J49-E-Through	0	475	1	A
13	J13-N-Left	10	100	8	A		J49-S-Left	1	97	3	A
	J13-N-Through	10	197	8	A		J49-S-Right	2	311	5	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Right	10	452	9	A		Total		1426	2	A
	J13-S-Left	0	12	0	A	50	J50-W-Left	0	4	1	A
	J13-S-Through	0	284	0	A		J50-W-Through	0	543	0	A
	J13-S-Right	0	31	0	A		J50-E-Right	1	90	4	A
	Total		1076	6	A		Total		637	1	A
14	J14-W-Through	0	115	1	A	51	J51-W-Through	0	729	2	A
	J14-W-Right	0	1	0	A		J51-W-Right	0	122	3	A
	J14-S-Right	0	37	1	A		J51-E-Left	0	116	0	A
	Total		153	1	A		J51-E-Through	0	475	0	A
15	J15-W-Left	0	215	2	A		Total		1442	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	132	0	A
	J15-N-Through	0	16	1	A		J52-W-Right	0	20	1	A
	J15-S-Through	0	203	1	A		J52-N-Left	0	207	1	A
	Total		434	1	A		J52-N-Through	0	198	0	A
16	J16-W	1	811	2	A		Total		557	0	A
	J16-N	15	624	11	B	53	J53-E-Left	0	143	1	A
	J16-E	133	901	10	B		J53-E-Through	0	334	1	A
	Total		2336	11	B		J53-N-Through	0	118	0	A
17	J17-W-Through	0	647	0	A		J53-N-Right	0	100	0	A
	J17-S-Left	0	282	0	A		Total		695	1	A
	J17-S-Right	0	952	1	A	54	J54-E-Through	0	120	1	A
	Total		1881	0	A		J54-S-Left	0	360	1	A
18	J18-W-Left	0	167	1	A		Total		480	1	A
	J18-W-Through	0	648	2	A	55	J55-N-Through	2	1599	2	A
	J18-E-Through	0	218	1	A		J55-N-Right	2	115	12	B
	J18-E-Right	0	63	4	A		J55-S-Left	0	6	1	A
	Total		1096	2	A		J55-S-Through	0	1077	0	A
19	J19-W-Through	6	564	10	A		Total		2797	2	A
	J19-N-Left	1	255	3	A	56	J56-W-Left	2	203	12	B
	J19-E-Through	6	284	11	B		J56-W-Right	2	136	11	B
	Total		1103	8	A		J56-N-Through	9	1584	2	A
20	J20-W-Left	0	178	2	A		J56-S-Through	2	1073	5	A
	J20-W-Through	0	540	0	A		Total		2996	4	A
	J20-W-Right	0	44	1	A	57	J57-N-Left	0	48	6	A
	J20-E-Left	0	30	1	A		J57-N-Through	0	1510	7	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-E-Through	0	195	2	A		J57-E-Left	0	75	20	C
	J20-E-Right	1	59	5	A		Total		1633	6	A
	J20-S-Left	0	0	0	A	58	J58-N-Through	1	1564	3	A
	J20-S-Through	0	21	7	A		J58-N-Right	6	779	7	A
	J20-S-Right	0	28	6	A		J58-S-Left	0	1263	4	A
	Total		1095	2	A		Total		3606	5	A
21	J21-W-Through	0	364	1	A	59	J59-W-Left	0	727	1	A
	J21-W-Right	0	16	1	A		J59-E-Right	1	1448	2	A
	J21-N-Left	0	245	1	A		Total		2175	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	5	463	3	A
	J21-N-Right	1	114	5	A		J60-N-Through	5	2154	4	A
	J21-E-Left	0	0	0	A		J60-E-Left	11	190	35	D
	J21-E-Through	0	194	1	A		Total		2807	6	A
	J21-S-Left	1	328	3	A	61	J61-S-Through	0	2049	2	A
	J21-S-Right	1	156	6	A		Total		2049	5	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	139	117	13	B
	Total		1417	2	A		J62-N-Through	139	2339	6	A
22	J22-W-Left	6	175	5	A		J62-E-Left	4	282	18	C
	J22-W-Through	6	238	6	A		Total		2738	7	A
	J22-E-Through	2	579	7	A	63	J63-N-Left	36	1900	32	D
	Total		992	6	A		J63-S-Through	0	1706	0	A
23	J23-W-Left	27	197	48	D		J63-S-Right	0	598	1	A
	J23-W-Through	27	211	46	D		Total		4204	15	B
	J23-W-Right	27	92	60	E	64	J64-W-Left	0	227	0	A
	J23-N-Left	20	225	45	D		J64-N-Through	57	1924	27	D
	J23-N-Through	20	292	56	E		J64-S-Through	0	1703	0	A
	J23-E-Left	44	375	79	E		Total		3854	13	B
	J23-E-Right	44	168	81	F	65	J65-W-Through	0	135	0	A
	J23-S-Through	19	251	57	E		J65-W-Right	0	0	0	A
	J23-S-Right	19	29	69	E		J65-S-Right	0	93	1	A
	Total		1840	60	E		Total		228	0	A
25	J25-W-Left	0	151	0	A	66	J66-W-Through	0	96	0	A
	J25-W-Through	0	289	0	A		J66-W-Right	0	182	0	A
	J25-S-Through	0	166	1	A		J66-N-Left	0	41	2	A
	J25-S-Right	0	76	1	A		J66-N-Through	0	165	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		682	0	A		Total		484	1	A
26	J26-W-Through	0	339	0	A	67	J67-W-Right	0	91	2	A
	J26-W-Right	0	178	0	A		J67-N-Through	0	247	0	A
	J26-N-Left	0	101	2	A		J67-N-Right	0	119	0	A
	J26-N-Through	0	228	2	A		Total		457	1	A
	Total		846	1	A	68	J68-N-Left	0	101	1	A
27	J27-W-Left	0	57	0	A		J68-N-Through	0	293	1	A
	J27-W-Through	0	312	0	A		J68-S-Through	1	942	0	A
	J27-S-Through	0	186	1	A		J68-S-Right	1	181	1	A
	J27-S-Right	0	222	2	A		Total		1517	0	A
	Total		777	1	A	69	J69-W-Left	2	370	6	A
28	J28-W-Left	0	32	1	A		J69-W-Right	2	87	2	A
	J28-E-Through	0	42	1	A		J69-S-Through	3	753	3	A
	J28-E-Right	0	95	1	A		Total		1210	3	A
	J28-S-Left	0	66	0	A	70	J70-N-Left	1	137	2	A
	J28-S-Through	0	176	0	A		J70-N-Through	1	0	0	A
	Total		411	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	332	0	A		J70-E-Right	0	77	6	A
	J30-E-Right	0	279	1	A		J70-S-Through	0	577	1	A
	Total		611	1	A		J70-S-Right	0	5	9	A
31	J31-N-Right	0	121	2	A		Total		796	2	A
	J31-E-Through	0	158	1	A	71	J71-W-Through	1	279	4	A
	J31-S-Left	0	333	1	A		J71-W-Right	1	97	3	A
	Total		612	1	A		J71-N-Left	0	180	0	A
32	J32-N-Left	1	525	3	A		J71-N-Through	0	59	0	A
	J32-E-Through	0	158	0	A		J71-N-Right	0	187	0	A
	J32-E-Right	0	644	0	A		Total		802	2	A
	Total		1327	1	A	72	J72-W-Left	0	72	1	A
33	J33-N-Left	0	100	0	A		J72-W-Through	0	327	1	A
	Total		100	4	A		J72-W-Right	0	637	1	A
34	J34-W-Left	29	0	0	A		J72-N-Left	1	50	6	A
	J34-W-Through	29	266	39	D		J72-N-Through	2	157	11	B
	J34-W-Right	29	349	60	E		Total		1243	3	A
	J34-N-Left	16	35	38	D	74	J74-E-Left	0	122	0	A
	J34-N-Through	16	236	61	E		J74-E-Through	0	967	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-N-Right	16	102	42	D		J74-S-Left	0	272	0	A
	J34-E-Left	61	39	102	F		Total		1361	0	A
	J34-E-Through	61	334	111	F		J75-W-Left	0	1	1	A
	J34-E-Right	61	237	99	F		J75-W-Through	0	915	0	A
	J34-S-Left	80	154	72	E		J75-E-Left	0	129	1	A
	J34-S-Through	80	279	69	E	75	J75-E-Through	0	782	0	A
	J34-S-Right	80	100	90	F		J75-E-Right	2	327	7	A
	Total		2131	82	F		J75-S-Left	0	0	0	A
35	J35-N-Left	1	0	0	A		Total		2154	1	A
	J35-N-Through	1	408	4	A						
	J35-N-Right	1	53	5	A						
	J35-S-Left	3	0	0	A						
	J35-S-Through	3	554	7	A						
	J35-S-Right	3	131	1	A						
	Total		1146	5	A						

Table 4-5 Scenario 2 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	2	1483	1	A	36	J36-N-Through	4	296	7	A
	J1-E-Through	0	1092	0	A		J36-E-Left	0	74	2	A
	J1-E-Right	0	363	0	A		J36-E-Right	0	99	3	A
	Total		2938	1	A		J36-S-Through	0	488	0	A
2	J2-W-Left	0	134	0	A		Total		957	3	A
	J2-W-Through	0	1549	0	A	37	J37-E-Through	0	105	0	A
	J2-N-Left	0	86	2	A		J37-E-Right	0	36	1	A
	Total		1769	0	A		J37-S-Left	0	69	1	A
3	J3-W-Left	0	329	0	A		J37-S-Through	0	131	1	A
	J3-W-Through	0	1683	0	A		Total		341	1	A
	J3-N-Left	0	0	0	A	38	J38-W-Left	0	51	2	A
	Total		2012	0	A		J38-W-Through	0	173	2	A
4	J4-W-Left	10	32	8	A		J38-S-Through	0	87	0	A
	J4-W-Through	10	1753	6	A		J38-S-Right	0	80	0	A
	J4-N-Left	0	0	0	A		Total		391	1	A
	J4-E-Through	2	914	1	A	39	J39-E-Through	0	84	1	A
	Total		2699	4	A		J39-E-Right	0	46	0	A
5	J5-W-Left	0	407	1	A		J39-S-Left	0	40	0	A
	J5-W-Through	0	1656	1	A		J39-S-Through	0	98	0	A
	J5-N-Left	1	135	9	A		Total		268	1	A
	J5-E-Through	0	855	0	A	40	J40-W-Through	0	498	1	A
	J5-S-Left	0	28	2	A		J40-E-Through	0	265	0	A
	Total		3081	1	A		J40-S-Left	0	46	0	A
6	J6-W-Left	5	164	2	A		J40-S-Right	0	98	2	A
	J6-W-Through	5	2260	5	A		Total		907	1	A
	J6-W-Right	5	0	0	A	41	J41-W-Left	4	0	0	A
	J6-E-Left	0	0	0	A		J41-W-Through	4	740	5	A
	J6-E-Through	0	873	2	A		J41-N-Left	0	130	5	A
	J6-E-Right	0	46	29	D		J41-N-Right	0	4	1	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	261	0	A
	J6-S-Through	5	164	2	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1135	4	A
	Total		3507	4	A	42	J42-W-Through	2	600	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	0	2288	1	A		J42-W-Right	2	270	1	A
	J7-N-Left	6	137	4	A		J42-E-Left	0	24	0	A
	J7-N-Right	6	155	31	D		J42-E-Through	0	261	0	A
	J7-E-Through	0	873	0	A		Total		1155	0	A
	Total		3453	2	A	43	J43-N-Through	0	269	0	A
8	J8-W-Through	0	2450	2	A		J43-N-Right	0	24	1	A
	J8-W-Right	2	3	2	A		J43-E-Through	0	0	0	A
	J8-E-Left	0	43	0	A		J43-E-Right	0	106	1	A
	J8-E-Through	0	1010	0	A		Total		399	0	A
	J8-S-Left	0	19	1	A	44	J44-W-Through	0	122	0	A
	J8-S-Right	0	160	3	A		J44-W-Right	0	130	0	A
	Total		3685	1	A		J44-N-Left	0	208	2	A
9	J9-W-Left	1	339	1	A		J44-N-Through	0	208	2	A
	J9-W-Through	1	2268	0	A		Total		668	1	A
	J9-N-Left	7	70	83	F	45	J45-N-Through	0	336	1	A
	J9-E-Through	0	1053	0	A		J45-N-Right	0	0	0	A
	Total		3730	2	A		J45-E-Left	0	336	1	A
10	J10-E-Left	0	70	0	A		J45-E-Through	0	0	0	A
	J10-E-Through	0	116	0	A		Total		672	1	A
	J10-E-Right	0	109	0	A	46	J46-E-Through	0	244	0	A
	J10-S-Left	0	32	2	A		J46-E-Right	0	258	1	A
	J10-S-Through	1	307	2	A		J46-S-Left	0	64	3	A
	Total		634	1	A		J46-S-Through	0	187	3	A
11	J11-N-Through	0	213	0	A		Total		753	1	A
	J11-N-Right	0	137	0	A	47	J47-W-Left	0	90	1	A
	J11-E-Left	0	80	0	A		J47-W-Through	0	89	1	A
	J11-E-Through	0	167	0	A		J47-S-Through	0	374	0	A
	Total		597	0	A		J47-S-Right	0	69	0	A
12	J12-E-Through	0	188	0	A		Total		622	0	A
	J12-E-Right	0	20	0	A	48	J48-S-Left	0	108	0	A
	J12-S-Left	0	64	1	A		Total		108	0	A
	J12-S-Through	0	144	1	A	49	J49-W-Through	0	594	0	A
	Total		416	0	A		J49-E-Through	0	284	1	A
13	J13-N-Left	2	70	3	A		J49-S-Left	1	73	2	A
	J13-N-Through	2	177	3	A		J49-S-Right	1	278	5	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Right	2	209	4	A		Total		1229	2	A
	J13-S-Left	0	0	0	A	50	J50-W-Left	0	5	0	A
	J13-S-Through	0	318	0	A		J50-W-Through	0	595	0	A
	J13-S-Right	0	101	3	A		J50-E-Right	0	72	0	A
	Total		875	2	A		Total		672	0	A
14	J14-W-Through	0	131	1	A	51	J51-W-Through	0	689	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	1	178	3	A
	J14-S-Right	0	32	1	A		J51-E-Left	0	267	0	A
	Total		163	1	A		J51-E-Through	0	285	0	A
15	J15-W-Left	0	182	2	A		Total		1419	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	148	0	A
	J15-N-Through	0	0	0	A		J52-W-Right	0	9	3	A
	J15-S-Through	0	328	0	A		J52-N-Left	0	146	2	A
	Total		510	1	A		J52-N-Through	0	284	1	A
16	J16-W	1	843	2	A		Total		587	1	A
	J16-N	3	285	5	A	53	J53-E-Left	1	214	1	A
	J16-E	17	70	13	B		J53-E-Through	1	335	2	A
	Total		1198	7	A		J53-N-Through	0	124	0	A
17	J17-W-Through	0	436	0	A		J53-N-Right	0	168	0	A
	J17-S-Left	1	548	2	A		Total		841	1	A
	J17-S-Right	1	1126	1	A	54	J54-E-Through	0	176	1	A
	Total		2110	1	A		J54-S-Left	0	376	1	A
18	J18-W-Left	0	236	1	A		Total		552	1	A
	J18-W-Through	0	436	2	A	55	J55-N-Through	1	895	1	A
	J18-E-Through	2	305	2	A		J55-N-Right	1	156	13	B
	J18-E-Right	2	242	4	A		J55-S-Left	0	21	1	A
	Total		1219	2	A		J55-S-Through	0	1034	0	A
19	J19-W-Through	6	512	11	B		Total		2106	2	A
	J19-N-Left	3	334	6	A	56	J56-W-Left	1	142	7	A
	J19-E-Through	6	277	9	A		J56-W-Right	1	149	6	A
	Total		1123	9	A		J56-N-Through	5	906	1	A
20	J20-W-Left	0	289	2	A		J56-S-Through	3	1033	4	A
	J20-W-Through	0	477	1	A		Total		2230	3	A
	J20-W-Right	0	58	1	A	57	J57-N-Left	0	87	6	A
	J20-E-Left	1	29	3	A		J57-N-Through	0	900	9	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-E-Through	1	180	3	A		J57-E-Left	0	6	7	A
	J20-E-Right	1	68	12	B		Total		993	5	A
	J20-S-Left	1	0	0	A	58	J58-N-Through	0	987	2	A
	J20-S-Through	2	93	15	C		J58-N-Right	4	605	7	A
	J20-S-Right	1	40	8	A		J58-S-Left	1	1169	4	A
	Total		1234	3	A		Total		2761	4	A
21	J21-W-Through	0	345	1	A	59	J59-W-Left	0	687	1	A
	J21-W-Right	0	0	0	A		J59-E-Right	0	1218	2	A
	J21-N-Left	1	299	1	A		Total		1905	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	0	292	1	A
	J21-N-Right	1	199	4	A		J60-N-Through	0	1535	3	A
	J21-E-Left	0	0	0	A		J60-E-Left	1	57	10	B
	J21-E-Through	0	179	0	A		Total		1884	3	A
	J21-S-Left	1	229	3	A	61	J61-S-Through	0	1738	2	A
	J21-S-Right	1	186	4	A		Total		1738	2	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	13	293	1	A
	Total		1437	2	A		J62-N-Through	13	1745	2	A
22	J22-W-Left	5	127	7	A		J62-E-Left	0	88	8	A
	J22-W-Through	5	289	7	A		Total		2126	2	A
	J22-E-Through	2	458	5	A	63	J63-N-Left	0	1534	1	A
	Total		874	6	A		J63-S-Through	0	1249	0	A
23	J23-W-Left	28	163	56	E		J63-S-Right	0	523	1	A
	J23-W-Through	28	215	43	D		Total		3306	1	A
	J23-W-Right	28	32	52	D	64	J64-W-Left	0	119	0	A
	J23-N-Left	17	179	51	D		J64-N-Through	0	1539	0	A
	J23-N-Through	17	186	57	E		J64-S-Through	0	1245	0	A
	J23-E-Left	26	245	71	E		Total		2903	0	A
	J23-E-Right	26	69	62	E	65	J65-W-Through	0	42	0	A
	J23-S-Through	22	256	58	E		J65-W-Right	0	0	0	A
	J23-S-Right	22	56	53	D		J65-S-Right	0	77	0	A
	Total		1401	57	E		Total		119	0	A
25	J25-W-Left	0	116	0	A	66	J66-W-Through	0	0	0	A
	J25-W-Through	0	284	0	A		J66-W-Right	0	3	0	A
	J25-S-Through	0	140	1	A		J66-N-Left	0	42	0	A
	J25-S-Right	0	46	0	A		J66-N-Through	0	85	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		586	0	A		Total		130	0	A
26	J26-W-Through	0	356	0	A	67	J67-W-Right	0	44	1	A
	J26-W-Right	0	216	0	A		J67-N-Through	0	91	0	A
	J26-N-Left	0	44	2	A		J67-N-Right	0	28	0	A
	J26-N-Through	0	135	2	A		Total		163	0	A
	Total		751	1	A	68	J68-N-Left	0	2	0	A
27	J27-W-Left	0	86	0	A		J68-N-Through	0	221	0	A
	J27-W-Through	0	376	0	A		J68-S-Through	0	583	0	A
	J27-S-Through	0	186	3	A		J68-S-Right	0	1	0	A
	J27-S-Right	0	277	3	A		Total		807	0	A
	Total		925	1	A	69	J69-W-Left	0	211	2	A
28	J28-W-Left	0	45	1	A		J69-W-Right	0	118	2	A
	J28-E-Through	0	16	1	A		J69-S-Through	0	373	1	A
	J28-E-Right	0	47	1	A		Total		702	1	A
	J28-S-Left	0	86	0	A	70	J70-N-Left	0	108	2	A
	J28-S-Through	0	185	0	A		J70-N-Through	0	0	0	A
	Total		379	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	182	0	A		J70-E-Right	0	22	3	A
	J30-E-Right	0	179	1	A		J70-S-Through	0	344	1	A
	Total		361	1	A		J70-S-Right	0	0	0	A
31	J31-N-Right	0	84	1	A		Total		474	1	A
	J31-E-Through	0	91	1	A	71	J71-W-Through	0	237	2	A
	J31-S-Left	0	187	1	A		J71-W-Right	0	119	1	A
	Total		362	1	A		J71-N-Left	0	93	0	A
32	J32-N-Left	0	720	1	A		J71-N-Through	0	50	0	A
	J32-E-Through	0	91	0	A		J71-N-Right	0	88	0	A
	J32-E-Right	0	367	0	A		Total		587	1	A
	Total		1178	0	A	72	J72-W-Left	0	63	1	A
33	J33-N-Left	0	89	2	A		J72-W-Through	0	277	1	A
	Total		89	3	A		J72-W-Right	0	828	1	A
34	J34-W-Left	30	0	0	A		J72-N-Left	0	79	2	A
	J34-W-Through	30	436	41	D		J72-N-Through	1	91	10	A
	J34-W-Right	30	363	41	D		Total		1338	2	A
	J34-N-Left	13	66	46	D	74	J74-E-Left	0	84	0	A
	J34-N-Through	13	140	44	D		J74-E-Through	0	560	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-N-Right	13	105	41	D		J74-S-Left	0	174	0	A
	J34-E-Left	13	6	36	D		Total		818	0	A
	J34-E-Through	13	177	50	D		J75-W-Left	0	0	0	A
	J34-E-Right	13	128	38	D		J75-W-Through	0	1125	0	A
	J34-S-Left	25	78	47	D		J75-E-Left	0	59	1	A
	J34-S-Through	25	171	53	D	75	J75-E-Through	0	480	0	A
	J34-S-Right	25	77	41	D		J75-E-Right	1	195	7	A
	Total		1747	44	D		J75-S-Left	0	0	0	A
35	J35-N-Left	0	0	0	A		Total		1859	1	A
	J35-N-Through	0	297	2	A						
	J35-N-Right	1	59	2	A						
	J35-S-Left	0	0	0	A						
	J35-S-Through	0	342	1	A						
	J35-S-Right	0	180	1	A						
	Total		878	1	A						

Table 4-6 Scenario 2 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	1	940	1	A	36	J36-N-Through	9	404	12	B
	J1-E-Through	33	2610	1	A		J36-E-Left	3	124	12	B
	J1-E-Right	33	379	0	A		J36-E-Right	3	128	14	B
	Total		3929	1	A		J36-S-Through	0	615	0	A
2	J2-W-Left	0	46	0	A		Total		1271	6	A
	J2-W-Through	0	969	0	A	37	J37-E-Through	0	141	0	A
	J2-N-Left	0	71	1	A		J37-E-Right	0	65	1	A
	Total		1086	0	A		J37-S-Left	0	112	1	A
3	J3-W-Left	0	202	9	A		J37-S-Through	0	226	1	A
	J3-W-Through	0	999	2	A		Total		544	1	A
	J3-N-Left	0	16	2	A	38	J38-W-Left	0	51	4	A
	Total		1217	4	A		J38-W-Through	0	163	3	A
4	J4-W-Left	4	35	7	A		J38-S-Through	0	174	1	A
	J4-W-Through	4	1102	4	A		J38-S-Right	0	117	0	A
	J4-N-Left	0	0	0	A		Total		505	1	A
	J4-E-Through	4	2278	1	A	39	J39-E-Through	1	128	7	A
	Total		3415	2	A		J39-E-Right	1	47	3	A
5	J5-W-Left	0	322	0	A		J39-S-Left	1	72	4	A
	J5-W-Through	0	867	0	A		J39-S-Through	1	153	1	A
	J5-N-Left	0	233	3	A		Total		400	4	A
	J5-E-Through	0	2151	1	A	40	J40-W-Through	0	399	0	A
	J5-S-Left	0	57	5	A		J40-E-Through	0	560	1	A
	Total		3630	1	A		J40-S-Left	0	69	1	A
6	J6-W-Left	1	178	1	A		J40-S-Right	1	128	6	A
	J6-W-Through	1	1272	5	A		Total		1156	1	A
	J6-W-Right	1	0	0	A	41	J41-W-Left	3	0	0	A
	J6-E-Left	22	0	0	A		J41-W-Through	2	708	3	A
	J6-E-Through	22	2329	7	A		J41-N-Left	2	177	7	A
	J6-E-Right	22	133	12	B		J41-N-Right	1	92	8	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	468	0	A
	J6-S-Through	1	178	1	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1445	3	A
	Total		4090	6	A	42	J42-W-Through	1	622	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	1	1290	1	A		J42-W-Right	2	263	1	A
	J7-N-Left	13	160	4	A		J42-E-Left	0	5	0	A
	J7-N-Right	13	251	43	E		J42-E-Through	0	468	1	A
	J7-E-Through	0	2324	1	A		Total		1358	1	A
	Total		4025	4	A	43	J43-N-Through	0	250	0	A
8	J8-W-Through	0	1298	0	A		J43-N-Right	0	18	1	A
	J8-W-Right	0	8	37	E		J43-E-Through	0	0	0	A
	J8-E-Left	0	142	1	A		J43-E-Right	0	161	0	A
	J8-E-Through	0	2445	0	A		Total		429	0	A
	J8-S-Left	0	9	14	B	44	J44-W-Through	0	170	0	A
	J8-S-Right	2	102	21	C		J44-W-Right	0	109	0	A
	Total		4004	1	A		J44-N-Left	0	182	2	A
9	J9-W-Left	0	194	1	A		J44-N-Through	0	182	2	A
	J9-W-Through	0	1204	0	A		Total		643	1	A
	J9-N-Left	2	148	11	B	45	J45-N-Through	0	287	1	A
	J9-E-Through	0	2587	0	A		J45-N-Right	0	1	0	A
	Total		4133	1	A		J45-E-Left	0	287	1	A
10	J10-E-Left	0	148	0	A		J45-E-Through	0	1	0	A
	J10-E-Through	0	204	0	A		Total		576	1	A
	J10-E-Right	0	199	0	A	46	J46-E-Through	0	210	0	A
	J10-S-Left	0	23	2	A		J46-E-Right	0	220	1	A
	J10-S-Through	0	170	3	A		J46-S-Left	0	64	3	A
	Total		744	1	A		J46-S-Through	1	271	2	A
11	J11-N-Through	0	209	0	A		Total		765	1	A
	J11-N-Right	0	197	0	A	47	J47-W-Left	0	123	2	A
	J11-E-Left	0	204	0	A		J47-W-Through	0	112	1	A
	J11-E-Through	0	361	0	A		J47-S-Through	0	451	0	A
	Total		971	0	A		J47-S-Right	0	39	0	A
12	J12-E-Through	0	420	0	A		Total		725	0	A
	J12-E-Right	0	43	1	A	48	J48-S-Left	0	162	0	A
	J12-S-Left	0	150	3	A		Total		162	0	A
	J12-S-Through	0	160	2	A	49	J49-W-Through	0	611	0	A
	Total		773	1	A		J49-E-Through	1	467	3	A
13	J13-N-Left	4	104	4	A		J49-S-Left	2	96	4	A
	J13-N-Through	4	194	4	A		J49-S-Right	2	312	6	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Right	4	453	5	A		Total		1486	3	A
	J13-S-Left	0	12	0	A	50	J50-W-Left	0	4	0	A
	J13-S-Through	0	281	0	A		J50-W-Through	0	614	0	A
	J13-S-Right	0	31	3	A		J50-E-Right	1	90	2	A
	Total		1075	3	A		Total		708	0	A
14	J14-W-Through	0	116	1	A	51	J51-W-Through	1	787	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	2	134	6	A
	J14-S-Right	0	35	1	A		J51-E-Left	0	117	0	A
	Total		151	1	A		J51-E-Through	0	468	0	A
15	J15-W-Left	0	214	2	A		Total		1506	2	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	128	0	A
	J15-N-Through	0	16	1	A		J52-W-Right	0	22	1	A
	J15-S-Through	0	201	1	A		J52-N-Left	0	212	1	A
	Total		431	1	A		J52-N-Through	0	207	1	A
16	J16-W	1	810	2	A		Total		569	1	A
	J16-N	13	605	10	A	53	J53-E-Left	0	140	1	A
	J16-E	171	864	13	B		J53-E-Through	0	329	1	A
	Total		2279	11	B		J53-N-Through	0	126	0	A
17	J17-W-Through	0	648	0	A		J53-N-Right	0	101	0	A
	J17-S-Left	0	282	1	A		Total		696	1	A
	J17-S-Right	0	949	1	A	54	J54-E-Through	0	113	1	A
	Total		1879	0	A		J54-S-Left	0	359	1	A
18	J18-W-Left	0	167	1	A		Total		472	1	A
	J18-W-Through	0	648	2	A	55	J55-N-Through	3	1609	2	A
	J18-E-Through	0	220	1	A		J55-N-Right	3	110	14	B
	J18-E-Right	0	62	4	A		J55-S-Left	0	5	0	A
	Total		1097	2	A		J55-S-Through	0	1077	0	A
19	J19-W-Through	6	561	9	A		Total		2801	2	A
	J19-N-Left	1	263	3	A	56	J56-W-Left	2	202	12	B
	J19-E-Through	5	272	10	B		J56-W-Right	2	135	9	A
	Total		1096	8	A		J56-N-Through	8	1591	2	A
20	J20-W-Left	0	178	2	A		J56-S-Through	3	1072	5	A
	J20-W-Through	0	539	1	A		Total		3000	4	A
	J20-W-Right	0	42	1	A	57	J57-N-Left	0	54	6	A
	J20-E-Left	0	30	2	A		J57-N-Through	0	1517	7	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-E-Through	0	188	2	A		J57-E-Left	0	75	16	C
	J20-E-Right	1	54	6	A		Total		1646	6	A
	J20-S-Left	0	0	0	A	58	J58-N-Through	2	1574	3	A
	J20-S-Through	0	20	8	A		J58-N-Right	7	783	8	A
	J20-S-Right	0	25	6	A		J58-S-Left	0	1259	4	A
	Total		1076	2	A		Total		3616	5	A
21	J21-W-Through	0	370	0	A	59	J59-W-Left	0	785	1	A
	J21-W-Right	0	16	1	A		J59-E-Right	0	1451	2	A
	J21-N-Left	0	235	1	A		Total		2236	2	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	8	468	4	A
	J21-N-Right	1	111	6	A		J60-N-Through	8	2167	4	A
	J21-E-Left	0	0	0	A		J60-E-Left	10	190	33	D
	J21-E-Through	0	187	0	A		Total		2825	6	A
	J21-S-Left	1	324	3	A	61	J61-S-Through	0	2113	2	A
	J21-S-Right	1	156	6	A		Total		2113	5	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	139	123	12	B
	Total		1399	2	A		J62-N-Through	139	2363	6	A
22	J22-W-Left	4	179	5	A		J62-E-Left	4	281	17	C
	J22-W-Through	4	244	7	A		Total		2767	7	A
	J22-E-Through	2	575	6	A	63	J63-N-Left	36	1924	32	D
	Total		998	5	A		J63-S-Through	0	1763	0	A
23	J23-W-Left	27	198	51	D		J63-S-Right	0	604	1	A
	J23-W-Through	27	214	48	D		Total		4291	15	B
	J23-W-Right	27	98	54	D	64	J64-W-Left	0	134	0	A
	J23-N-Left	20	234	55	E		J64-N-Through	58	1941	26	D
	J23-N-Through	20	288	58	E		J64-S-Through	0	1761	0	A
	J23-E-Left	34	372	68	E		Total		3836	13	B
	J23-E-Right	34	169	70	E	65	J65-W-Through	0	41	0	A
	J23-S-Through	21	248	62	E		J65-W-Right	0	0	0	A
	J23-S-Right	21	29	72	E		J65-S-Right	0	94	0	A
	Total		1850	59	E		Total		135	0	A
25	J25-W-Left	0	151	0	A	66	J66-W-Through	0	0	0	A
	J25-W-Through	0	287	0	A		J66-W-Right	0	3	3	A
	J25-S-Through	0	163	1	A		J66-N-Left	0	41	0	A
	J25-S-Right	0	76	0	A		J66-N-Through	0	165	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	Total		677	0	A		Total		209	0	A
26	J26-W-Through	0	337	0	A	67	J67-W-Right	0	80	1	A
	J26-W-Right	0	178	0	A		J67-N-Through	0	195	0	A
	J26-N-Left	0	101	2	A		J67-N-Right	0	76	0	A
	J26-N-Through	0	229	2	A		Total		351	0	A
	Total		845	1	A	68	J68-N-Left	0	1	0	A
27	J27-W-Left	0	57	0	A		J68-N-Through	0	299	0	A
	J27-W-Through	0	311	0	A		J68-S-Through	0	909	0	A
	J27-S-Through	0	186	1	A		J68-S-Right	1	2	4	A
	J27-S-Right	0	223	2	A		Total		1211	0	A
	Total		777	1	A	69	J69-W-Left	1	271	4	A
28	J28-W-Left	0	32	1	A		J69-W-Right	0	57	2	A
	J28-E-Through	0	42	2	A		J69-S-Through	3	641	2	A
	J28-E-Right	0	97	1	A		Total		969	2	A
	J28-S-Left	0	66	0	A	70	J70-N-Left	0	111	1	A
	J28-S-Through	0	175	0	A		J70-N-Through	0	0	0	A
	Total		412	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	332	0	A		J70-E-Right	0	35	7	A
	J30-E-Right	0	281	1	A		J70-S-Through	0	545	1	A
	Total		613	1	A		J70-S-Right	0	6	4	A
31	J31-N-Right	0	121	3	A		Total		697	1	A
	J31-E-Through	0	164	1	A	71	J71-W-Through	1	187	4	A
	J31-S-Left	0	331	1	A		J71-W-Right	0	82	2	A
	Total		616	1	A		J71-N-Left	0	142	0	A
32	J32-N-Left	1	650	2	A		J71-N-Through	0	54	0	A
	J32-E-Through	0	165	0	A		J71-N-Right	0	229	0	A
	J32-E-Right	0	660	0	A		Total		694	2	A
	Total		1475	1	A	72	J72-W-Left	0	72	0	A
33	J33-N-Left	0	83	2	A		J72-W-Through	0	221	1	A
	Total		83	4	A		J72-W-Right	0	719	1	A
34	J34-W-Left	30	0	0	A		J72-N-Left	1	48	4	A
	J34-W-Through	30	391	42	D		J72-N-Through	2	159	14	B
	J34-W-Right	30	332	53	D		Total		1219	5	A
	J34-N-Left	15	37	41	D	74	J74-E-Left	0	122	0	A
	J34-N-Through	15	232	51	D		J74-E-Through	0	985	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-N-Right	15	108	45	D		J74-S-Left	0	271	0	A
	J34-E-Left	35	41	74	E		Total		1378	0	A
	J34-E-Through	35	351	67	E		J75-W-Left	0	1	1	A
	J34-E-Right	35	236	75	E		J75-W-Through	0	890	0	A
	J34-S-Left	67	153	59	E		J75-E-Left	0	128	1	A
	J34-S-Through	67	248	61	E	75	J75-E-Through	0	791	0	A
	J34-S-Right	67	124	77	E		J75-E-Right	2	336	6	A
	Total		2253	66	E		J75-S-Left	0	0	0	A
35	J35-N-Left	1	0	0	A		Total		2146	1	A
	J35-N-Through	1	413	3	A						
	J35-N-Right	2	51	4	A						
	J35-S-Left	2	0	0	A						
	J35-S-Through	1	546	3	A						
	J35-S-Right	1	133	1	A						
	Total		1143	3	A						

Table 4-7 Scenario 3 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	2	1486	1	A	36	J36-N-Through	3	287	6	A
	J1-E-Through	0	1092	0	A		J36-E-Left	0	74	2	A
	J1-E-Right	0	361	0	A		J36-E-Right	0	99	4	A
	Total		2939	1	A		J36-S-Through	0	488	0	A
2	J2-W-Left	0	134	1	A		Total		948	3	A
	J2-W-Through	0	1545	0	A	37	J37-E-Through	0	105	0	A
	J2-N-Left	0	96	3	A		J37-E-Right	0	36	1	A
	Total		1775	0	A		J37-S-Left	0	69	1	A
3	J3-W-Left	0	327	0	A		J37-S-Through	0	132	1	A
	J3-W-Through	0	1679	0	A		Total		342	1	A
	J3-N-Left	0	0	0	A	38	J38-W-Left	0	51	2	A
	Total		2006	0	A		J38-W-Through	0	167	2	A
4	J4-W-Left	11	32	9	A		J38-S-Through	0	86	0	A
	J4-W-Through	11	1752	6	A		J38-S-Right	0	80	0	A
	J4-N-Left	0	0	0	A		Total		384	1	A
	J4-E-Through	2	915	1	A	39	J39-E-Through	0	84	1	A
	Total		2699	4	A		J39-E-Right	0	46	0	A
5	J5-W-Left	0	407	1	A		J39-S-Left	0	39	1	A
	J5-W-Through	0	1657	1	A		J39-S-Through	0	98	0	A
	J5-N-Left	1	134	12	B		Total		267	1	A
	J5-E-Through	0	856	0	A	40	J40-W-Through	0	379	0	A
	J5-S-Left	0	28	1	A		J40-E-Through	0	279	0	A
	Total		3082	1	A		J40-S-Left	0	46	0	A
6	J6-W-Left	5	164	2	A		J40-S-Right	0	98	2	A
	J6-W-Through	5	2260	5	A		Total		802	0	A
	J6-W-Right	5	0	0	A	41	J41-W-Left	1	0	0	A
	J6-E-Left	0	0	0	A		J41-W-Through	1	616	3	A
	J6-E-Through	0	873	2	A		J41-N-Left	0	159	4	A
	J6-E-Right	0	46	30	D		J41-N-Right	0	4	4	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	275	0	A
	J6-S-Through	5	164	2	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1054	2	A
	Total		3507	4	A	42	J42-W-Through	1	485	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	1	2288	1	A		J42-W-Right	2	290	1	A
	J7-N-Left	6	137	4	A		J42-E-Left	0	24	0	A
	J7-N-Right	7	155	35	D		J42-E-Through	0	275	0	A
	J7-E-Through	0	870	0	A		Total		1074	0	A
	Total		3450	2	A	43	J43-N-Through	0	290	0	A
8	J8-W-Through	0	2449	2	A		J43-N-Right	0	24	0	A
	J8-W-Right	2	3	9	A		J43-E-Through	0	0	0	A
	J8-E-Left	0	43	1	A		J43-E-Right	0	106	0	A
	J8-E-Through	0	1011	0	A		Total		420	0	A
	J8-S-Left	0	19	1	A	44	J44-W-Through	0	123	0	A
	J8-S-Right	0	160	3	A		J44-W-Right	0	123	1	A
	Total		3685	1	A		J44-N-Left	0	231	0	A
9	J9-W-Left	0	340	1	A		J44-N-Through	0	231	0	A
	J9-W-Through	0	2265	0	A		Total		708	0	A
	J9-N-Left	6	69	66	F	45	J45-N-Through	0	351	1	A
	J9-E-Through	0	1054	0	A		J45-N-Right	0	0	0	A
	Total		3728	2	A		J45-E-Left	0	351	1	A
10	J10-E-Left	0	70	0	A		J45-E-Through	0	0	0	A
	J10-E-Through	0	116	0	A		Total		702	1	A
	J10-E-Right	0	107	0	A	46	J46-E-Through	0	244	0	A
	J10-S-Left	0	32	2	A		J46-E-Right	0	258	1	A
	J10-S-Through	0	307	2	A		J46-S-Left	0	64	2	A
	Total		632	1	A		J46-S-Through	0	187	3	A
11	J11-N-Through	0	214	0	A		Total		753	1	A
	J11-N-Right	0	137	0	A	47	J47-W-Left	0	90	1	A
	J11-E-Left	0	79	0	A		J47-W-Through	0	90	1	A
	J11-E-Through	0	161	0	A		J47-S-Through	0	373	0	A
	Total		591	0	A		J47-S-Right	0	69	0	A
12	J12-E-Through	0	182	0	A		Total		622	0	A
	J12-E-Right	0	20	0	A	48	J48-S-Left	0	107	0	A
	J12-S-Left	0	65	1	A		Total		107	0	A
	J12-S-Through	0	143	1	A	49	J49-W-Through	0	479	0	A
	Total		410	0	A		J49-E-Through	0	299	1	A
13	J13-N-Left	3	63	4	A		J49-S-Left	1	73	2	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	3	174	6	A		J49-S-Right	1	278	4	A
	J13-N-Right	3	208	7	A		Total		1129	1	A
	J13-S-Left	0	0	0	A	50	J50-W-Left	0	5	0	A
	J13-S-Through	0	318	0	A		J50-W-Through	0	480	0	A
	J13-S-Right	0	101	1	A		J50-E-Right	0	72	1	A
	Total		864	3	A		Total		557	0	A
14	J14-W-Through	0	131	1	A	51	J51-W-Through	0	576	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	1	179	3	A
	J14-S-Right	0	32	1	A		J51-E-Left	0	267	0	A
	Total		163	1	A		J51-E-Through	0	300	0	A
15	J15-W-Left	0	182	2	A		Total		1322	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	149	0	A
	J15-N-Through	0	0	0	A		J52-W-Right	0	9	2	A
	J15-S-Through	0	326	0	A		J52-N-Left	0	145	1	A
	Total		508	1	A		J52-N-Through	0	286	1	A
16	J16-W	1	844	2	A		Total		589	1	A
	J16-N	3	283	5	A	53	J53-E-Left	1	214	1	A
	J16-E	20	70	17	C		J53-E-Through	1	335	2	A
	Total		1197	8	A		J53-N-Through	0	125	0	A
17	J17-W-Through	0	436	0	A		J53-N-Right	0	168	0	A
	J17-S-Left	0	547	1	A		Total		842	1	A
	J17-S-Right	0	1127	1	A	54	J54-E-Through	0	176	1	A
	Total		2110	1	A		J54-S-Left	0	376	1	A
18	J18-W-Left	0	236	1	A		Total		552	1	A
	J18-W-Through	0	436	3	A	55	J55-N-Through	2	897	1	A
	J18-E-Through	2	304	2	A		J55-N-Right	2	156	14	B
	J18-E-Right	2	243	5	A		J55-S-Left	0	22	1	A
	Total		1219	3	A		J55-S-Through	0	1037	0	A
19	J19-W-Through	6	511	11	B		Total		2112	2	A
	J19-N-Left	3	335	6	A	56	J56-W-Left	1	142	9	A
	J19-E-Through	6	277	10	A		J56-W-Right	1	148	6	A
	Total		1123	9	A		J56-N-Through	5	907	1	A
20	J20-W-Left	0	290	2	A		J56-S-Through	3	1033	4	A
	J20-W-Through	0	476	1	A		Total		2230	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-W-Right	0	68	1	A	57	J57-N-Left	0	87	6	A
	J20-E-Left	2	29	4	A		J57-N-Through	0	901	9	A
	J20-E-Through	2	180	7	A		J57-E-Left	0	6	16	C
	J20-E-Right	3	68	11	B		Total		994	5	A
	J20-S-Left	2	0	0	A	58	J58-N-Through	0	988	2	A
	J20-S-Through	2	93	16	C		J58-N-Right	3	620	6	A
	J20-S-Right	2	40	13	B		J58-S-Left	0	1168	4	A
	Total		1244	4	A		Total		2776	4	A
21	J21-W-Through	0	342	1	A	59	J59-W-Left	0	576	0	A
	J21-W-Right	0	0	0	A		J59-E-Right	1	1218	2	A
	J21-N-Left	1	310	1	A		Total		1794	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	0	292	2	A
	J21-N-Right	1	198	5	A		J60-N-Through	0	1551	3	A
	J21-E-Left	0	0	0	A		J60-E-Left	1	57	10	A
	J21-E-Through	0	179	0	A		Total		1900	3	A
	J21-S-Left	1	227	3	A	61	J61-S-Through	0	1626	1	A
	J21-S-Right	1	186	5	A		Total		1626	2	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	15	293	2	A
	Total		1442	2	A		J62-N-Through	15	1761	2	A
22	J22-W-Left	5	128	7	A		J62-E-Left	0	88	8	A
	J22-W-Through	5	286	7	A		Total		2142	2	A
	J22-E-Through	2	455	5	A	63	J63-N-Left	0	1549	1	A
	Total		869	6	A		J63-S-Through	0	1139	0	A
23	J23-W-Left	30	163	55	D		J63-S-Right	0	523	1	A
	J23-W-Through	30	215	43	D		Total		3211	1	A
	J23-W-Right	30	29	41	D	64	J64-W-Left	0	255	0	A
	J23-N-Left	17	176	52	D		J64-N-Through	0	1554	0	A
	J23-N-Through	17	181	56	E		J64-S-Through	0	1135	0	A
	J23-E-Left	26	243	73	E		Total		2944	0	A
	J23-E-Right	26	69	59	E	65	J65-W-Through	0	178	0	A
	J23-S-Through	23	256	60	E		J65-W-Right	0	0	0	A
	J23-S-Right	23	57	55	E		J65-S-Right	0	77	1	A
	Total		1389	57	E		Total		255	0	A
25	J25-W-Left	0	116	0	A	66	J66-W-Through	0	136	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-W-Through	0	284	0	A		J66-W-Right	0	150	0	A
	J25-S-Through	0	140	1	A		J66-N-Left	0	42	1	A
	J25-S-Right	0	46	1	A		J66-N-Through	0	85	1	A
	Total		586	0	A		Total		413	1	A
26	J26-W-Through	0	356	0	A	67	J67-W-Right	0	36	1	A
	J26-W-Right	0	216	0	A		J67-N-Through	0	128	0	A
	J26-N-Left	0	44	1	A		J67-N-Right	0	59	0	A
	J26-N-Through	0	136	2	A		Total		223	0	A
	Total		752	0	A	68	J68-N-Left	0	103	1	A
27	J27-W-Left	0	86	0	A		J68-N-Through	0	213	0	A
	J27-W-Through	0	376	0	A		J68-S-Through	1	613	0	A
	J27-S-Through	0	186	3	A		J68-S-Right	1	187	1	A
	J27-S-Right	0	277	3	A		Total		1116	1	A
	Total		925	1	A	69	J69-W-Left	1	363	4	A
28	J28-W-Left	0	45	1	A		J69-W-Right	1	115	1	A
	J28-E-Through	0	16	1	A		J69-S-Through	1	437	2	A
	J28-E-Right	0	47	1	A		Total		915	2	A
	J28-S-Left	0	86	0	A	70	J70-N-Left	0	99	2	A
	J28-S-Through	0	185	0	A		J70-N-Through	0	0	0	A
	Total		379	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	182	0	A		J70-E-Right	0	53	3	A
	J30-E-Right	0	179	1	A		J70-S-Through	0	357	1	A
	Total		361	1	A		J70-S-Right	0	0	0	A
31	J31-N-Right	0	84	2	A		Total		509	1	A
	J31-E-Through	0	91	1	A	71	J71-W-Through	1	384	2	A
	J31-S-Left	0	187	1	A		J71-W-Right	0	114	1	A
	Total		362	1	A		J71-N-Left	0	96	0	A
32	J32-N-Left	0	601	0	A		J71-N-Through	0	50	0	A
	J32-E-Through	0	91	0	A		J71-N-Right	0	85	0	A
	J32-E-Right	0	367	0	A		Total		729	1	A
	Total		1059	0	A	72	J72-W-Left	0	63	1	A
33	J33-N-Left	0	83	1	A		J72-W-Through	0	420	1	A
	Total		83	2	A		J72-W-Right	0	711	1	A
34	J34-W-Left	23	0	0	A		J72-N-Left	1	79	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-W-Through	23	319	38	D		J72-N-Through	1	91	12	B
	J34-W-Right	23	356	39	D		Total		1364	2	A
	J34-N-Left	13	60	46	D	74	J74-E-Left	0	84	0	A
	J34-N-Through	13	133	43	D		J74-E-Through	0	560	0	A
	J34-N-Right	13	100	41	D		J74-S-Left	0	174	0	A
	J34-E-Left	14	6	52	D		Total		818	0	A
	J34-E-Through	14	177	50	D	75	J75-W-Left	0	0	0	A
	J34-E-Right	14	142	42	D		J75-W-Through	0	1149	0	A
	J34-S-Left	26	78	45	D		J75-E-Left	0	59	1	A
	J34-S-Through	26	170	54	D		J75-E-Through	0	480	0	A
	J34-S-Right	26	77	43	D		J75-E-Right	1	195	7	A
	Total		1618	43	D		J75-S-Left	0	0	0	A
35	J35-N-Left	1	0	0	A		Total		1883	1	A
	J35-N-Through	1	289	3	A						
	J35-N-Right	1	59	3	A						
	J35-S-Left	1	0	0	A						
	J35-S-Through	0	343	1	A						
	J35-S-Right	0	180	1	A						
	Total		871	2	A						

Table 4-8 Scenario 3 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	1	938	1	A	36	J36-N-Through	16	394	21	C
	J1-E-Through	32	2610	1	A		J36-E-Left	3	122	13	B
	J1-E-Right	32	380	0	A		J36-E-Right	3	134	12	B
	Total		3928	1	A		J36-S-Through	0	625	1	A
2	J2-W-Left	0	47	0	A		Total		1275	9	A
	J2-W-Through	0	964	0	A	37	J37-E-Through	0	138	0	A
	J2-N-Left	0	73	1	A		J37-E-Right	0	67	1	A
	Total		1084	0	A		J37-S-Left	0	119	1	A
3	J3-W-Left	0	203	10	A		J37-S-Through	0	228	1	A
	J3-W-Through	0	995	2	A		Total		552	1	A
	J3-N-Left	0	16	1	A	38	J38-W-Left	0	50	4	A
	Total		1214	4	A		J38-W-Through	0	155	3	A
4	J4-W-Left	3	37	5	A		J38-S-Through	0	177	0	A
	J4-W-Through	3	1103	4	A		J38-S-Right	0	117	0	A
	J4-N-Left	0	1	1	A		Total		499	1	A
	J4-E-Through	5	2274	1	A	39	J39-E-Through	14	114	17	C
	Total		3415	2	A		J39-E-Right	14	40	6	A
5	J5-W-Left	0	325	0	A		J39-S-Left	3	70	11	B
	J5-W-Through	0	870	0	A		J39-S-Through	3	146	2	A
	J5-N-Left	1	233	4	A		Total		370	9	A
	J5-E-Through	1	2144	1	A	40	J40-W-Through	0	330	0	A
	J5-S-Left	0	57	3	A		J40-E-Through	3	572	5	A
	Total		3629	1	A		J40-S-Left	0	66	1	A
6	J6-W-Left	3	178	3	A		J40-S-Right	0	120	4	A
	J6-W-Through	3	1273	7	A		Total		1088	3	A
	J6-W-Right	3	0	0	A	41	J41-W-Left	3	0	0	A
	J6-E-Left	18	0	0	A		J41-W-Through	2	631	4	A
	J6-E-Through	18	2345	7	A		J41-N-Left	2	212	8	A
	J6-E-Right	18	138	12	B		J41-N-Right	2	94	9	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	480	1	A
	J6-S-Through	3	178	3	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1417	4	A
	Total		4112	7	A	42	J42-W-Through	2	567	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	1	1292	1	A		J42-W-Right	3	276	1	A
	J7-N-Left	13	159	10	A		J42-E-Left	1	4	0	A
	J7-N-Right	14	251	44	E		J42-E-Through	1	480	1	A
	J7-E-Through	0	2341	1	A		Total		1327	1	A
	Total		4043	4	A	43	J43-N-Through	0	263	0	A
8	J8-W-Through	0	1299	0	A		J43-N-Right	0	17	1	A
	J8-W-Right	0	8	44	E		J43-E-Through	3	0	0	A
	J8-E-Left	0	140	1	A		J43-E-Right	3	155	5	A
	J8-E-Through	0	2485	0	A		Total		435	2	A
	J8-S-Left	0	9	3	A	44	J44-W-Through	0	169	0	A
	J8-S-Right	2	102	16	C		J44-W-Right	0	102	0	A
	Total		4043	1	A		J44-N-Left	0	189	0	A
9	J9-W-Left	0	194	1	A		J44-N-Through	0	189	0	A
	J9-W-Through	0	1205	0	A		Total		649	0	A
	J9-N-Left	2	149	13	B	45	J45-N-Through	0	289	0	A
	J9-E-Through	0	2625	0	A		J45-N-Right	0	1	0	A
	Total		4173	1	A		J45-E-Left	0	289	0	A
10	J10-E-Left	0	149	0	A		J45-E-Through	0	1	0	A
	J10-E-Through	0	204	0	A		Total		580	1	A
	J10-E-Right	0	198	0	A	46	J46-E-Through	0	212	0	A
	J10-S-Left	0	23	1	A		J46-E-Right	0	220	1	A
	J10-S-Through	0	170	3	A		J46-S-Left	0	63	2	A
	Total		744	1	A		J46-S-Through	0	277	2	A
11	J11-N-Through	0	208	1	A		Total		772	1	A
	J11-N-Right	0	196	0	A	47	J47-W-Left	0	123	2	A
	J11-E-Left	0	203	0	A		J47-W-Through	0	116	2	A
	J11-E-Through	0	363	0	A		J47-S-Through	0	458	0	A
	Total		970	0	A		J47-S-Right	0	38	0	A
12	J12-E-Through	0	416	0	A		Total		735	1	A
	J12-E-Right	0	43	1	A	48	J48-S-Left	0	167	0	A
	J12-S-Left	0	152	2	A		Total		167	0	A
	J12-S-Through	0	163	2	A	49	J49-W-Through	0	561	0	A
	Total		774	1	A		J49-E-Through	0	478	1	A
13	J13-N-Left	9	100	6	A		J49-S-Left	1	99	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	9	191	7	A		J49-S-Right	2	311	5	A
	J13-N-Right	9	452	9	A		Total		1449	2	A
	J13-S-Left	0	12	1	A	50	J50-W-Left	0	4	0	A
	J13-S-Through	0	285	0	A		J50-W-Through	0	562	0	A
	J13-S-Right	0	31	0	A		J50-E-Right	0	91	2	A
	Total		1071	5	A		Total		657	0	A
14	J14-W-Through	0	116	1	A	51	J51-W-Through	0	734	2	A
	J14-W-Right	0	1	0	A		J51-W-Right	1	134	5	A
	J14-S-Right	0	37	1	A		J51-E-Left	0	113	0	A
	Total		154	1	A		J51-E-Through	0	479	0	A
15	J15-W-Left	0	216	2	A		Total		1460	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	132	0	A
	J15-N-Through	0	16	1	A		J52-W-Right	0	21	2	A
	J15-S-Through	0	203	1	A		J52-N-Left	0	209	1	A
	Total		435	1	A		J52-N-Through	0	208	0	A
16	J16-W	1	811	2	A		Total		570	0	A
	J16-N	12	596	10	A	53	J53-E-Left	0	140	1	A
	J16-E	125	915	10	A		J53-E-Through	0	332	1	A
	Total		2322	10	A		J53-N-Through	0	128	0	A
17	J17-W-Through	0	647	0	A		J53-N-Right	0	100	0	A
	J17-S-Left	0	283	1	A		Total		700	1	A
	J17-S-Right	0	948	1	A	54	J54-E-Through	0	114	1	A
	Total		1878	0	A		J54-S-Left	0	360	1	A
18	J18-W-Left	0	168	1	A		Total		474	1	A
	J18-W-Through	0	647	2	A	55	J55-N-Through	2	1571	2	A
	J18-E-Through	0	220	1	A		J55-N-Right	2	109	13	B
	J18-E-Right	0	63	4	A		J55-S-Left	0	6	0	A
	Total		1098	2	A		J55-S-Through	0	1081	0	A
19	J19-W-Through	5	559	8	A		Total		2767	2	A
	J19-N-Left	1	265	3	A	56	J56-W-Left	3	203	12	B
	J19-E-Through	5	284	10	A		J56-W-Right	3	138	10	A
	Total		1108	7	A		J56-N-Through	8	1559	2	A
20	J20-W-Left	0	178	2	A		J56-S-Through	3	1077	4	A
	J20-W-Through	0	537	1	A		Total		2977	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-W-Right	0	45	1	A	57	J57-N-Left	0	44	5	A
	J20-E-Left	0	28	2	A		J57-N-Through	0	1487	8	A
	J20-E-Through	0	200	2	A		J57-E-Left	0	76	15	C
	J20-E-Right	1	56	6	A		Total		1607	6	A
	J20-S-Left	0	0	0	A	58	J58-N-Through	2	1535	3	A
	J20-S-Through	0	21	11	B		J58-N-Right	6	764	7	A
	J20-S-Right	0	25	5	A		J58-S-Left	0	1267	5	A
	Total		1090	2	A		Total		3566	4	A
21	J21-W-Through	0	368	1	A	59	J59-W-Left	0	733	1	A
	J21-W-Right	0	16	1	A		J59-E-Right	0	1433	2	A
	J21-N-Left	0	238	1	A		Total		2166	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	7	461	4	A
	J21-N-Right	0	114	4	A		J60-N-Through	7	2114	4	A
	J21-E-Left	0	0	0	A		J60-E-Left	10	189	33	D
	J21-E-Through	0	199	1	A		Total		2764	6	A
	J21-S-Left	1	328	3	A	61	J61-S-Through	0	2041	2	A
	J21-S-Right	1	156	6	A		Total		2041	4	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	142	124	13	B
	Total		1419	2	A		J62-N-Through	142	2300	6	A
22	J22-W-Left	5	178	6	A		J62-E-Left	4	282	18	C
	J22-W-Through	5	242	7	A		Total		2706	7	A
	J22-E-Through	2	583	7	A	63	J63-N-Left	38	1857	35	E
	Total		1003	6	A		J63-S-Through	0	1695	0	A
23	J23-W-Left	28	202	49	D		J63-S-Right	0	605	1	A
	J23-W-Through	28	213	42	D		Total		4157	16	C
	J23-W-Right	28	92	54	D	64	J64-W-Left	0	229	0	A
	J23-N-Left	22	231	65	E		J64-N-Through	63	1880	29	D
	J23-N-Through	22	285	60	E		J64-S-Through	0	1690	0	A
	J23-E-Left	41	376	77	E		Total		3799	15	B
	J23-E-Right	41	172	70	E	65	J65-W-Through	0	135	0	A
	J23-S-Through	20	251	60	E		J65-W-Right	0	0	0	A
	J23-S-Right	20	29	65	E		J65-S-Right	0	95	1	A
	Total		1851	61	E		Total		230	0	A
25	J25-W-Left	0	151	0	A	66	J66-W-Through	0	96	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-W-Through	0	289	0	A		J66-W-Right	0	172	0	A
	J25-S-Through	0	166	1	A		J66-N-Left	0	41	1	A
	J25-S-Right	0	76	1	A		J66-N-Through	0	165	1	A
	Total		682	1	A		Total		474	1	A
26	J26-W-Through	0	339	0	A	67	J67-W-Right	0	71	1	A
	J26-W-Right	0	178	0	A		J67-N-Through	0	237	0	A
	J26-N-Left	0	101	2	A		J67-N-Right	0	119	0	A
	J26-N-Through	0	227	2	A		Total		427	1	A
	Total		845	1	A	68	J68-N-Left	0	100	1	A
27	J27-W-Left	0	57	0	A		J68-N-Through	0	294	1	A
	J27-W-Through	0	312	0	A		J68-S-Through	1	956	0	A
	J27-S-Through	0	186	2	A		J68-S-Right	1	171	1	A
	J27-S-Right	0	222	3	A		Total		1521	1	A
	Total		777	1	A	69	J69-W-Left	3	360	7	A
28	J28-W-Left	0	32	1	A		J69-W-Right	2	49	2	A
	J28-E-Through	0	42	1	A		J69-S-Through	3	767	2	A
	J28-E-Right	0	96	1	A		Total		1176	3	A
	J28-S-Left	0	66	0	A	70	J70-N-Left	0	98	2	A
	J28-S-Through	0	175	0	A		J70-N-Through	0	0	0	A
	Total		411	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	329	0	A		J70-E-Right	1	77	8	A
	J30-E-Right	0	282	1	A		J70-S-Through	0	593	1	A
	Total		611	1	A		J70-S-Right	0	1	3	A
31	J31-N-Right	0	119	2	A		Total		769	2	A
	J31-E-Through	0	161	1	A	71	J71-W-Through	1	252	5	A
	J31-S-Left	0	334	1	A		J71-W-Right	1	93	2	A
	Total		614	1	A		J71-N-Left	0	158	0	A
32	J32-N-Left	3	590	5	A		J71-N-Through	0	48	0	A
	J32-E-Through	0	162	0	A		J71-N-Right	0	220	0	A
	J32-E-Right	0	651	0	A		Total		771	2	A
	Total		1403	2	A	72	J72-W-Left	0	72	1	A
33	J33-N-Left	0	93	1	A		J72-W-Through	0	294	1	A
	Total		93	5	A		J72-W-Right	0	670	1	A
34	J34-W-Left	34	0	0	A		J72-N-Left	1	51	6	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-W-Through	34	346	41	D		J72-N-Through	2	156	11	B
	J34-W-Right	34	317	64	E		Total		1243	4	A
	J34-N-Left	16	32	41	D	74	J74-E-Left	0	121	0	A
	J34-N-Through	16	222	61	E		J74-E-Through	0	975	0	A
	J34-N-Right	16	102	45	D		J74-S-Left	0	275	0	A
	J34-E-Left	43	38	95	F		Total		1371	0	A
	J34-E-Through	43	346	76	E	75	J75-W-Left	0	1	1	A
	J34-E-Right	43	252	86	F		J75-W-Through	0	915	0	A
	J34-S-Left	81	154	86	F		J75-E-Left	0	130	1	A
	J34-S-Through	81	278	78	E		J75-E-Through	0	786	0	A
	J34-S-Right	81	105	80	E		J75-E-Right	3	332	8	A
	Total		2192	78	E		J75-S-Left	0	0	0	A
35	J35-N-Left	6	0	0	A		Total		2164	1	A
	J35-N-Through	6	394	9	A						
	J35-N-Right	8	48	7	A						
	J35-S-Left	5	0	0	A						
	J35-S-Through	4	563	10	B						
	J35-S-Right	4	133	1	A						
	Total		1138	8	A						

Table 4-9 Scenario 4 AM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	3	1481	1	A	36	J36-N-Through	4	287	7	A
	J1-E-Through	0	1092	0	A		J36-E-Left	1	74	3	A
	J1-E-Right	0	361	0	A		J36-E-Right	1	99	6	A
	Total		2934	1	A		J36-S-Through	0	490	0	A
2	J2-W-Left	0	134	0	A		Total		950	3	A
	J2-W-Through	0	1540	0	A	37	J37-E-Through	0	105	1	A
	J2-N-Left	0	97	2	A		J37-E-Right	0	35	1	A
	Total		1771	0	A		J37-S-Left	0	69	1	A
3	J3-W-Left	0	326	0	A		J37-S-Through	0	132	0	A
	J3-W-Through	0	1674	0	A		Total		341	1	A
	J3-N-Left	0	0	0	A	38	J38-W-Left	0	51	2	A
	Total		2000	0	A		J38-W-Through	0	167	2	A
4	J4-W-Left	6	32	3	A		J38-S-Through	0	86	0	A
	J4-W-Through	6	1751	4	A		J38-S-Right	0	80	0	A
	J4-N-Left	0	0	0	A		Total		384	1	A
	J4-E-Through	3	916	1	A	39	J39-E-Through	0	84	1	A
	Total		2699	3	A		J39-E-Right	0	46	0	A
5	J5-W-Left	4	405	3	A		J39-S-Left	0	39	1	A
	J5-W-Through	4	1648	3	A		J39-S-Through	0	98	0	A
	J5-N-Left	0	134	5	A		Total		267	1	A
	J5-E-Through	1	855	2	A	40	J40-W-Through	0	379	0	A
	J5-S-Left	0	28	1	A		J40-E-Through	0	280	0	A
	Total		3070	3	A		J40-S-Left	0	46	0	A
6	J6-W-Left	8	164	3	A		J40-S-Right	0	98	2	A
	J6-W-Through	8	2253	6	A		Total		803	1	A
	J6-W-Right	8	0	0	A	41	J41-W-Left	1	0	0	A
	J6-E-Left	5	0	0	A		J41-W-Through	1	616	3	A
	J6-E-Through	5	855	7	A		J41-N-Left	0	159	4	A
	J6-E-Right	5	43	45	D		J41-N-Right	0	4	5	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	276	0	A
	J6-S-Through	8	164	3	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1055	2	A
	Total		3479	7	A	42	J42-W-Through	1	485	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	2	2286	1	A		J42-W-Right	2	290	1	A
	J7-N-Left	13	136	10	A		J42-E-Left	0	24	0	A
	J7-N-Right	13	155	65	E		J42-E-Through	0	276	1	A
	J7-E-Through	1	855	1	A		Total		1075	0	A
	Total		3432	5	A	43	J43-N-Through	0	290	0	A
8	J8-W-Through	0	2450	2	A		J43-N-Right	0	24	0	A
	J8-W-Right	3	3	6	A		J43-E-Through	0	0	0	A
	J8-E-Left	0	43	0	A		J43-E-Right	0	106	0	A
	J8-E-Through	0	1000	0	A		Total		420	0	A
	J8-S-Left	0	19	1	A	44	J44-W-Through	0	123	0	A
	J8-S-Right	1	160	4	A		J44-W-Right	0	123	0	A
	Total		3675	1	A		J44-N-Left	0	230	0	A
9	J9-W-Left	0	339	1	A		J44-N-Through	0	230	0	A
	J9-W-Through	0	2268	0	A		Total		706	0	A
	J9-N-Left	9	66	99	F	45	J45-N-Through	0	351	0	A
	J9-E-Through	0	1043	0	A		J45-N-Right	0	0	0	A
	Total		3716	2	A		J45-E-Left	0	351	0	A
10	J10-E-Left	0	70	0	A		J45-E-Through	0	0	0	A
	J10-E-Through	0	116	0	A		Total		702	1	A
	J10-E-Right	0	107	0	A	46	J46-E-Through	0	244	0	A
	J10-S-Left	0	32	1	A		J46-E-Right	0	258	1	A
	J10-S-Through	0	307	2	A		J46-S-Left	0	64	2	A
	Total		632	1	A		J46-S-Through	0	187	3	A
11	J11-N-Through	0	213	0	A		Total		753	1	A
	J11-N-Right	0	137	0	A	47	J47-W-Left	0	90	1	A
	J11-E-Left	0	80	0	A		J47-W-Through	0	90	1	A
	J11-E-Through	0	163	0	A		J47-S-Through	0	374	0	A
	Total		593	0	A		J47-S-Right	0	69	0	A
12	J12-E-Through	0	184	0	A		Total		623	0	A
	J12-E-Right	0	20	0	A	48	J48-S-Left	0	107	0	A
	J12-S-Left	0	64	1	A		Total		107	0	A
	J12-S-Through	0	143	0	A	49	J49-W-Through	0	478	0	A
	Total		411	0	A		J49-E-Through	0	299	1	A
13	J13-N-Left	3	64	3	A		J49-S-Left	1	73	1	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	3	174	5	A		J49-S-Right	1	278	4	A
	J13-N-Right	3	208	7	A		Total		1128	1	A
	J13-S-Left	0	0	0	A	50	J50-W-Left	0	5	0	A
	J13-S-Through	0	318	0	A		J50-W-Through	0	480	0	A
	J13-S-Right	0	99	2	A		J50-E-Right	0	72	2	A
	Total		863	3	A		Total		557	0	A
14	J14-W-Through	0	130	1	A	51	J51-W-Through	0	577	2	A
	J14-W-Right	0	0	0	A		J51-W-Right	1	179	3	A
	J14-S-Right	0	32	1	A		J51-E-Left	0	267	0	A
	Total		162	1	A		J51-E-Through	0	300	0	A
15	J15-W-Left	0	181	2	A		Total		1323	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	149	0	A
	J15-N-Through	0	0	0	A		J52-W-Right	0	9	4	A
	J15-S-Through	0	325	0	A		J52-N-Left	0	145	2	A
	Total		506	1	A		J52-N-Through	0	286	1	A
16	J16-W	1	841	2	A		Total		589	1	A
	J16-N	3	283	5	A	53	J53-E-Left	1	214	2	A
	J16-E	18	70	12	B		J53-E-Through	1	335	2	A
	Total		1194	7	A		J53-N-Through	0	125	0	A
17	J17-W-Through	0	435	0	A		J53-N-Right	0	168	0	A
	J17-S-Left	1	546	2	A		Total		842	1	A
	J17-S-Right	1	1125	1	A	54	J54-E-Through	0	176	1	A
	Total		2106	1	A		J54-S-Left	0	376	2	A
18	J18-W-Left	0	236	1	A		Total		552	1	A
	J18-W-Through	0	435	3	A	55	J55-N-Through	2	895	1	A
	J18-E-Through	3	305	3	A		J55-N-Right	2	156	14	B
	J18-E-Right	3	241	6	A		J55-S-Left	0	21	1	A
	Total		1217	3	A		J55-S-Through	0	1036	0	A
19	J19-W-Through	7	510	11	B		Total		2108	2	A
	J19-N-Left	3	334	7	A	56	J56-W-Left	1	142	8	A
	J19-E-Through	7	277	11	B		J56-W-Right	1	147	5	A
	Total		1121	10	A		J56-N-Through	5	906	2	A
20	J20-W-Left	0	289	2	A		J56-S-Through	2	1032	4	A
	J20-W-Through	0	476	1	A		Total		2227	3	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-W-Right	0	69	1	A	57	J57-N-Left	0	87	7	A
	J20-E-Left	1	29	3	A		J57-N-Through	0	900	8	A
	J20-E-Through	1	180	3	A		J57-E-Left	0	6	11	B
	J20-E-Right	1	68	9	A		Total		993	5	A
	J20-S-Left	1	0	0	A	58	J58-N-Through	0	987	2	A
	J20-S-Through	1	93	12	B		J58-N-Right	3	620	7	A
	J20-S-Right	1	40	8	A		J58-S-Left	0	1167	4	A
	Total		1244	3	A		Total		2774	4	A
21	J21-W-Through	0	342	1	A	59	J59-W-Left	0	574	1	A
	J21-W-Right	0	0	0	A		J59-E-Right	1	1218	2	A
	J21-N-Left	0	310	1	A		Total		1792	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	0	291	2	A
	J21-N-Right	1	197	4	A		J60-N-Through	0	1550	3	A
	J21-E-Left	0	0	0	A		J60-E-Left	0	57	9	A
	J21-E-Through	0	179	0	A		Total		1898	3	A
	J21-S-Left	1	226	3	A	61	J61-S-Through	0	1624	1	A
	J21-S-Right	1	186	4	A		Total		1624	2	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	14	293	2	A
	Total		1440	2	A		J62-N-Through	14	1760	2	A
22	J22-W-Left	5	128	7	A		J62-E-Left	0	88	8	A
	J22-W-Through	5	286	7	A		Total		2141	2	A
	J22-E-Through	2	455	5	A	63	J63-N-Left	0	1549	1	A
	Total		869	6	A		J63-S-Through	0	1138	0	A
23	J23-W-Left	29	163	53	D		J63-S-Right	0	522	1	A
	J23-W-Through	29	215	42	D		Total		3209	1	A
	J23-W-Right	29	29	36	D	64	J64-W-Left	0	255	0	A
	J23-N-Left	18	176	52	D		J64-N-Through	0	1554	0	A
	J23-N-Through	18	181	59	E		J64-S-Through	0	1133	0	A
	J23-E-Left	25	243	71	E		Total		2942	0	A
	J23-E-Right	25	70	61	E	65	J65-W-Through	0	178	0	A
	J23-S-Through	22	257	58	E		J65-W-Right	0	0	0	A
	J23-S-Right	22	57	49	D		J65-S-Right	0	77	1	A
	Total		1391	56	E		Total		255	0	A
25	J25-W-Left	0	116	0	A	66	J66-W-Through	0	136	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-W-Through	0	284	0	A		J66-W-Right	0	150	0	A
	J25-S-Through	0	140	1	A		J66-N-Left	0	42	1	A
	J25-S-Right	0	46	1	A		J66-N-Through	0	85	1	A
	Total		586	0	A		Total		413	1	A
26	J26-W-Through	0	356	0	A	67	J67-W-Right	0	36	1	A
	J26-W-Right	0	216	0	A		J67-N-Through	0	128	0	A
	J26-N-Left	0	44	2	A		J67-N-Right	0	59	0	A
	J26-N-Through	0	136	2	A		Total		223	0	A
	Total		752	1	A	68	J68-N-Left	0	103	1	A
27	J27-W-Left	0	86	0	A		J68-N-Through	0	213	0	A
	J27-W-Through	0	376	0	A		J68-S-Through	1	614	0	A
	J27-S-Through	0	186	2	A		J68-S-Right	1	187	1	A
	J27-S-Right	0	277	3	A		Total		1117	1	A
	Total		925	1	A	69	J69-W-Left	1	363	4	A
28	J28-W-Left	0	45	1	A		J69-W-Right	1	115	1	A
	J28-E-Through	0	16	0	A		J69-S-Through	1	438	2	A
	J28-E-Right	0	47	1	A		Total		916	2	A
	J28-S-Left	0	86	0	A	70	J70-N-Left	0	99	2	A
	J28-S-Through	0	185	0	A		J70-N-Through	0	0	0	A
	Total		379	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	182	0	A		J70-E-Right	0	53	2	A
	J30-E-Right	0	179	1	A		J70-S-Through	0	358	1	A
	Total		361	1	A		J70-S-Right	0	0	0	A
31	J31-N-Right	0	84	2	A		Total		510	1	A
	J31-E-Through	0	91	1	A	71	J71-W-Through	1	384	2	A
	J31-S-Left	0	187	1	A		J71-W-Right	0	114	1	A
	Total		362	1	A		J71-N-Left	0	96	0	A
32	J32-N-Left	0	601	0	A		J71-N-Through	0	50	0	A
	J32-E-Through	0	91	0	A		J71-N-Right	0	85	0	A
	J32-E-Right	0	367	0	A		Total		729	1	A
	Total		1059	0	A	72	J72-W-Left	0	63	1	A
33	J33-N-Left	0	83	1	A		J72-W-Through	0	420	1	A
	Total		83	2	A		J72-W-Right	0	711	1	A
34	J34-W-Left	23	0	0	A		J72-N-Left	1	79	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-W-Through	23	319	38	D		J72-N-Through	1	91	13	B
	J34-W-Right	23	356	39	D		Total		1364	2	A
	J34-N-Left	13	60	46	D	74	J74-E-Left	0	84	0	A
	J34-N-Through	13	133	47	D		J74-E-Through	0	560	0	A
	J34-N-Right	13	100	42	D		J74-S-Left	0	174	0	A
	J34-E-Left	14	6	66	E		Total		818	0	A
	J34-E-Through	14	177	52	D	75	J75-W-Left	0	0	0	A
	J34-E-Right	14	142	42	D		J75-W-Through	0	1149	0	A
	J34-S-Left	23	78	38	D		J75-E-Left	0	59	1	A
	J34-S-Through	23	171	51	D		J75-E-Through	0	480	0	A
	J34-S-Right	23	77	40	D		J75-E-Right	1	195	7	A
	Total		1619	43	D		J75-S-Left	0	0	0	A
35	J35-N-Left	0	0	0	A		Total		1883	1	A
	J35-N-Through	0	289	2	A						
	J35-N-Right	1	59	2	A						
	J35-S-Left	1	0	0	A						
	J35-S-Through	0	344	1	A						
	J35-S-Right	0	180	1	A						
	Total		872	2	A						

Table 4-10 Scenario 4 PM Peak

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
1	J1-W-Left	0	937	0	A	36	J36-N-Through	15	401	18	C
	J1-E-Through	31	2585	1	A		J36-E-Left	2	122	6	A
	J1-E-Right	31	374	0	A		J36-E-Right	2	134	8	A
	Total		3896	0	A		J36-S-Through	0	624	0	A
2	J2-W-Left	0	47	0	A		Total		1281	7	A
	J2-W-Through	0	963	0	A	37	J37-E-Through	0	138	0	A
	J2-N-Left	0	74	1	A		J37-E-Right	0	67	1	A
	Total		1084	0	A		J37-S-Left	0	119	1	A
3	J3-W-Left	0	202	10	A		J37-S-Through	0	228	1	A
	J3-W-Through	0	994	3	A		Total		552	1	A
	J3-N-Left	0	16	1	A	38	J38-W-Left	0	50	4	A
	Total		1212	4	A		J38-W-Through	0	158	2	A
4	J4-W-Left	3	37	6	A		J38-S-Through	0	178	1	A
	J4-W-Through	3	1099	3	A		J38-S-Right	0	117	0	A
	J4-N-Left	0	1	0	A		Total		503	2	A
	J4-E-Through	4	2252	1	A	39	J39-E-Through	7	125	14	B
	Total		3389	2	A		J39-E-Right	7	44	12	B
5	J5-W-Left	2	321	3	A		J39-S-Left	2	74	11	B
	J5-W-Through	2	861	2	A		J39-S-Through	2	154	1	A
	J5-N-Left	0	233	3	A		Total		397	8	A
	J5-E-Through	3	2119	2	A	40	J40-W-Through	0	333	0	A
	J5-S-Left	0	57	4	A		J40-E-Through	0	568	0	A
	Total		3591	2	A		J40-S-Left	0	70	0	A
6	J6-W-Left	2	177	1	A		J40-S-Right	0	128	4	A
	J6-W-Through	2	1270	7	A		Total		1099	1	A
	J6-W-Right	2	0	0	A	41	J41-W-Left	2	0	0	A
	J6-E-Left	43	0	0	A		J41-W-Through	1	640	3	A
	J6-E-Through	43	2271	12	B		J41-N-Left	1	211	7	A
	J6-E-Right	43	131	22	B		J41-N-Right	1	93	8	A
	J6-S-Left	0	0	0	A		J41-E-Through	0	475	0	A
	J6-S-Through	2	177	1	A		J41-E-Right	0	0	0	A
	J6-S-Right	0	0	0	A		Total		1419	3	A
	Total		4026	10	B	42	J42-W-Through	2	575	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
7	J7-W-Through	1	1289	1	A		J42-W-Right	2	276	1	A
	J7-N-Left	21	159	6	A		J42-E-Left	0	4	0	A
	J7-N-Right	21	251	71	E		J42-E-Through	0	475	1	A
	J7-E-Through	2	2266	2	A		Total		1330	1	A
	Total		3965	6	A	43	J43-N-Through	0	263	0	A
8	J8-W-Through	0	1299	0	A		J43-N-Right	0	17	0	A
	J8-W-Right	0	8	25	C		J43-E-Through	0	0	0	A
	J8-E-Left	0	138	1	A		J43-E-Right	0	166	0	A
	J8-E-Through	0	2425	0	A		Total		446	0	A
	J8-S-Left	0	9	5	A	44	J44-W-Through	0	170	0	A
	J8-S-Right	1	102	15	B		J44-W-Right	0	104	0	A
	Total		3981	1	A		J44-N-Left	0	189	0	A
9	J9-W-Left	0	194	0	A		J44-N-Through	0	189	0	A
	J9-W-Through	0	1205	0	A		Total		652	0	A
	J9-N-Left	2	148	12	B	45	J45-N-Through	0	291	1	A
	J9-E-Through	0	2563	0	A		J45-N-Right	0	1	0	A
	Total		4110	1	A		J45-E-Left	0	291	1	A
10	J10-E-Left	0	148	0	A		J45-E-Through	0	1	0	A
	J10-E-Through	0	204	0	A		Total		584	1	A
	J10-E-Right	0	197	0	A	46	J46-E-Through	0	211	0	A
	J10-S-Left	0	23	1	A		J46-E-Right	0	220	1	A
	J10-S-Through	1	170	4	A		J46-S-Left	0	63	3	A
	Total		742	1	A		J46-S-Through	0	278	2	A
11	J11-N-Through	0	208	1	A		Total		772	1	A
	J11-N-Right	0	196	0	A	47	J47-W-Left	0	122	1	A
	J11-E-Left	0	202	0	A		J47-W-Through	0	116	1	A
	J11-E-Through	0	360	0	A		J47-S-Through	0	458	0	A
	Total		966	0	A		J47-S-Right	0	38	0	A
12	J12-E-Through	0	416	0	A		Total		734	0	A
	J12-E-Right	0	43	1	A	48	J48-S-Left	0	167	0	A
	J12-S-Left	0	149	2	A		Total		167	0	A
	J12-S-Through	0	159	1	A	49	J49-W-Through	0	566	0	A
	Total		767	1	A		J49-E-Through	1	472	2	A
13	J13-N-Left	7	99	7	A		J49-S-Left	2	99	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J13-N-Through	7	192	7	A		J49-S-Right	2	312	6	A
	J13-N-Right	7	453	8	A		Total		1449	2	A
	J13-S-Left	0	12	0	A	50	J50-W-Left	0	4	0	A
	J13-S-Through	0	282	0	A		J50-W-Through	0	568	0	A
	J13-S-Right	0	31	1	A		J50-E-Right	0	92	2	A
	Total		1069	5	A		Total		664	0	A
14	J14-W-Through	0	115	0	A	51	J51-W-Through	0	742	2	A
	J14-W-Right	0	1	0	A		J51-W-Right	1	134	4	A
	J14-S-Right	0	37	1	A		J51-E-Left	0	114	0	A
	Total		153	1	A		J51-E-Through	0	473	0	A
15	J15-W-Left	0	215	2	A		Total		1463	1	A
	J15-W-Right	0	0	0	A	52	J52-W-Through	0	132	0	A
	J15-N-Through	0	16	1	A		J52-W-Right	0	21	2	A
	J15-S-Through	0	201	1	A		J52-N-Left	0	209	1	A
	Total		432	1	A		J52-N-Through	0	208	1	A
16	J16-W	2	811	2	A		Total		570	1	A
	J16-N	16	603	13	B	53	J53-E-Left	0	139	1	A
	J16-E	161	861	13	B		J53-E-Through	0	332	1	A
	Total		2275	12	B		J53-N-Through	0	128	0	A
17	J17-W-Through	0	649	0	A		J53-N-Right	0	100	0	A
	J17-S-Left	0	280	0	A		Total		699	1	A
	J17-S-Right	0	947	0	A	54	J54-E-Through	0	114	1	A
	Total		1876	0	A		J54-S-Left	0	360	1	A
18	J18-W-Left	0	168	1	A		Total		474	1	A
	J18-W-Through	0	649	2	A	55	J55-N-Through	2	1581	2	A
	J18-E-Through	0	218	2	A		J55-N-Right	2	111	12	B
	J18-E-Right	0	62	5	A		J55-S-Left	0	6	1	A
	Total		1097	2	A		J55-S-Through	0	1073	0	A
19	J19-W-Through	5	559	9	A		Total		2771	2	A
	J19-N-Left	1	263	4	A	56	J56-W-Left	3	203	12	B
	J19-E-Through	6	283	10	B		J56-W-Right	3	138	12	B
	Total		1105	8	A		J56-N-Through	8	1564	2	A
20	J20-W-Left	0	178	2	A		J56-S-Through	3	1066	5	A
	J20-W-Through	0	537	1	A		Total		2971	4	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J20-W-Right	0	45	1	A	57	J57-N-Left	0	45	7	A
	J20-E-Left	0	30	1	A		J57-N-Through	0	1489	8	A
	J20-E-Through	0	197	1	A		J57-E-Left	0	75	18	C
	J20-E-Right	0	56	6	A		Total		1609	6	A
	J20-S-Left	0	0	0	A	58	J58-N-Through	2	1534	3	A
	J20-S-Through	0	21	10	A		J58-N-Right	7	772	8	A
	J20-S-Right	0	25	5	A		J58-S-Left	0	1259	4	A
	Total		1089	1	A		Total		3565	5	A
21	J21-W-Through	0	368	0	A	59	J59-W-Left	0	740	1	A
	J21-W-Right	0	16	1	A		J59-E-Right	0	1436	2	A
	J21-N-Left	0	238	1	A		Total		2176	1	A
	J21-N-Through	0	0	0	A	60	J60-N-Left	7	464	3	A
	J21-N-Right	1	114	6	A		J60-N-Through	7	2116	4	A
	J21-E-Left	0	0	0	A		J60-E-Left	10	190	35	D
	J21-E-Through	0	196	1	A		Total		2770	6	A
	J21-S-Left	1	328	3	A	61	J61-S-Through	0	2053	2	A
	J21-S-Right	1	156	6	A		Total		2053	4	A
	J21-S-U-turn	1	0	0	A	62	J62-N-Left	145	123	14	B
	Total		1416	2	A		J62-N-Through	145	2305	6	A
22	J22-W-Left	4	178	5	A		J62-E-Left	4	282	20	C
	J22-W-Through	4	242	6	A		Total		2710	8	A
	J22-E-Through	3	580	6	A	63	J63-N-Left	38	1860	35	D
	Total		1000	6	A		J63-S-Through	0	1702	0	A
23	J23-W-Left	29	202	51	D		J63-S-Right	0	606	1	A
	J23-W-Through	29	213	42	D		Total		4168	16	C
	J23-W-Right	29	92	52	D	64	J64-W-Left	0	225	0	A
	J23-N-Left	21	231	57	E		J64-N-Through	62	1889	29	D
	J23-N-Through	21	286	58	E		J64-S-Through	0	1699	0	A
	J23-E-Left	37	375	74	E		Total		3813	14	B
	J23-E-Right	37	172	71	E	65	J65-W-Through	0	134	0	A
	J23-S-Through	20	250	58	E		J65-W-Right	0	0	0	A
	J23-S-Right	20	29	57	E		J65-S-Right	0	94	1	A
	Total		1850	59	E		Total		228	0	A
25	J25-W-Left	0	151	0	A	66	J66-W-Through	0	94	0	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J25-W-Through	0	289	0	A		J66-W-Right	0	172	0	A
	J25-S-Through	0	163	1	A		J66-N-Left	0	41	2	A
	J25-S-Right	0	76	1	A		J66-N-Through	0	165	1	A
	Total		679	1	A		Total		472	1	A
26	J26-W-Through	0	339	0	A	67	J67-W-Right	0	71	1	A
	J26-W-Right	0	178	0	A		J67-N-Through	0	237	0	A
	J26-N-Left	0	101	2	A		J67-N-Right	0	119	0	A
	J26-N-Through	0	227	2	A		Total		427	1	A
	Total		845	1	A	68	J68-N-Left	0	100	1	A
27	J27-W-Left	0	57	0	A		J68-N-Through	0	294	1	A
	J27-W-Through	0	312	0	A		J68-S-Through	1	952	0	A
	J27-S-Through	0	186	2	A		J68-S-Right	1	169	1	A
	J27-S-Right	0	222	3	A		Total		1515	0	A
	Total		777	1	A	69	J69-W-Left	2	360	5	A
28	J28-W-Left	0	32	1	A		J69-W-Right	1	49	2	A
	J28-E-Through	0	42	2	A		J69-S-Through	3	762	3	A
	J28-E-Right	0	98	1	A		Total		1171	3	A
	J28-S-Left	0	66	0	A	70	J70-N-Left	0	98	2	A
	J28-S-Through	0	175	0	A		J70-N-Through	0	0	0	A
	Total		413	0	A		J70-E-Left	0	0	0	A
30	J30-E-Left	0	330	0	A		J70-E-Right	0	77	6	A
	J30-E-Right	0	277	1	A		J70-S-Through	0	589	1	A
	Total		607	1	A		J70-S-Right	0	1	2	A
31	J31-N-Right	0	119	2	A		Total		765	2	A
	J31-E-Through	0	159	1	A	71	J71-W-Through	1	252	4	A
	J31-S-Left	0	331	1	A		J71-W-Right	1	93	2	A
	Total		609	1	A		J71-N-Left	0	158	0	A
32	J32-N-Left	0	590	0	A		J71-N-Through	0	48	0	A
	J32-E-Through	0	160	0	A		J71-N-Right	0	220	0	A
	J32-E-Right	0	651	0	A		Total		771	2	A
	Total		1401	0	A	72	J72-W-Left	0	72	1	A
33	J33-N-Left	0	93	1	A		J72-W-Through	0	294	1	A
	Total		93	3	A		J72-W-Right	0	670	1	A
34	J34-W-Left	27	0	0	A		J72-N-Left	1	51	6	A

Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS	Junction	Movement	Avg Modelled Queue (m)	Volume	Delay	LOS
	J34-W-Through	27	345	37	D		J72-N-Through	2	156	11	B
	J34-W-Right	27	327	58	E		Total		1243	4	A
	J34-N-Left	18	32	46	D	74	J74-E-Left	0	121	0	A
	J34-N-Through	18	235	64	E		J74-E-Through	0	977	0	A
	J34-N-Right	18	102	45	D		J74-S-Left	0	270	0	A
	J34-E-Left	35	38	75	E		Total		1368	0	A
	J34-E-Through	35	347	71	E	75	J75-W-Left	0	1	1	A
	J34-E-Right	35	243	72	E		J75-W-Through	0	915	0	A
	J34-S-Left	76	151	76	E		J75-E-Left	0	132	1	A
	J34-S-Through	76	276	80	E		J75-E-Through	0	784	0	A
	J34-S-Right	76	110	83	F		J75-E-Right	2	329	7	A
	Total		2206	73	E		J75-S-Left	0	0	0	A
35	J35-N-Left	3	0	0	A		Total		2161	1	A
	J35-N-Through	3	411	6	A						
	J35-N-Right	4	51	4	A						
	J35-S-Left	4	0	0	A						
	J35-S-Through	2	558	6	A						
	J35-S-Right	2	133	1	A						
	Total		1153	5	A						

5. STAGE 2 NETWORK PERFORMANCE

Table 5-1 AM Peak Network Performance

Scenario	Delay (sec)	Avg Speed (kmph)
Base	41	30
Scenario 1	39	31
Scenario 2	41	30
Scenario 3	40	30
Scenario 4	41	30

Table 5-2 PM Peak Network Performance

Scenario	Delay (sec)	Avg Speed (kmph)
Base	99	21
Scenario 1	85	23
Scenario 2	85	23
Scenario 3	86	23
Scenario 4	89	22

6. PROPOSED TRAFFIC IMPACT ASSESSMENT METHODOLOGY

6.1 Overview

Any development will introduce impacts on the surrounding transport network. A traffic impact assessment documents the impacts a development proposal is likely to have on both the road and junction network and transport infrastructure and recommends measures to avoid, manage and mitigate these impacts.

The preparation of a traffic impact assessment and proposed mitigation strategies should consider national transport policies' objectives for encouraging mode shift to more sustainable forms of transportation including active transport and public transport.

There are mainly four stages involved in the Traffic Impact Assessment, namely data collection, analysis of existing traffic conditions, forecasting future traffic demand and evaluation of future traffic conditions.

6.2 Objectives

- Determine the transportation requirements of a new development/redevelopment, and propose adequate and appropriate design features, facilities, and infrastructural improvements to meet future transport demand.
- Enhance the development's overall active and mass transport connectivity, accessibility and convenience with the wider transport network with a focus on promoting walking, cycling and mass transport; and
- Identify the development's impacts on the surrounding transport network and recommend necessary measures to mitigate its negative impacts.

6.3 Traffic Impact Assessment (TIA) Approach

The new process and analysis requirements for the TIA have been added to ensure that analyses are comprehensive, and up to date and take into consideration current behaviour trends that may impact the study area or to report on additional information that is useful for future reference.

There are five (5) main stages involved in the TIA process, namely Data Collection, Analysis of Existing Traffic Conditions, Forecasting of Future Traffic Demand, Evaluation of Future Traffic Conditions.

6.3.1 Stage 1 Data Collection

The data collection stage begins with a comprehensive review of the literature study, covering all documents and technical reports of all existing and proposed developments surrounding the development area. Engagement with local authorities shall be placed from this stage to identify other planning and future developments near the study area.

Then, the classified Count (CC) involves the recording of the number of vehicles, in 15-minute intervals, at mid-block sections and turning movement counts at junctions, according to the following five (5) classifications:

- Cars (which includes taxis and small vans)
- Lorries & Large Vans (Heavy 2-axles)
- Lorries with 3-axles & above
- Buses
- Motorcycles

The survey is to be conducted at peak hours that are determined based on 12 or 16-hour traffic counts.

6.3.2 Analysis of Existing Traffic Conditions

All relevant data collected in the Data Collection Stage is to be used in Stage 2, which is an analysis of the existing traffic and public transport data. Upon data processing, the existing traffic and public transport distribution patterns can be identified. The relationship between the traffic pattern and land use development pattern is also determined at this stage. The understanding and establishment of the existing transportation pattern is vital for forecasting future traffic demand. There will be other assessments at this stage which are:

- Parking & access provision
- Pick up/ drop-off & circulation
- Traffic operation plan
- Construction traffic
- management
- Road Safety Analysis

As part of the analysis requirements, a TIA report is to recommend improvements so that the road network (including junctions) performance in the study area operates within acceptable performance criteria. One of the common recommendations is the optimisation of a signalised junction. However, it is important to take into consideration the following when recommending junction optimisation as an improvement.

- Green time for pedestrians to cross the junction; and
- Safety aspects when revising phase sequences.

6.3.3 Future Forecast of Transport Demand

Forecasting the future traffic growth and public transport demand in an area is a function of demography which involves planning variables such as population growth, employment supply, vehicle ownership, committed and future property developments and future road network.

The future trip generation is calculated based on the above inputs and empirical trip rates which are established by the Highway Planning Division, Ministry of Works Malaysia and other relevant studies. In forecasting future traffic, it is necessary to determine the design year for which the analysis of future traffic is to be undertaken.

Traffic generated from the proposed and adjacent developments is overlaid on the design year traffic forecast to produce the total traffic volume for the Impact Analysis Year (IAY).

6.3.4 Evaluation of Future Traffic Conditions

After Stage 3, Stage 4 involves the evaluation of future traffic conditions.

Road link and intersection capacities have been assessed to determine whether the envisaged road network and future public transport services would be able to accommodate the user demand. Based on the traffic flow forecasts, recommendations have been made on the number and locations of ingress/ egress points required to service the full development and the form of access intersections required. Possible locations for access points to the existing road network and public transport need to be suggested, taking into account the intersection spacing standards to provide efficient traffic circulation.

6.3.5 Recommendation

Improvement measures and other recommendations will be carried out to mitigate traffic congestion and road network.

6.4 Traffic Impact Assessment Process

Table 6-1 Comparison of Objectives Between TIA Guidelines

Objectives		
AT(J) 38-2018 Guidelines for Traffic Impact Assessment	**Guidelines for Traffic Impact Assessment – REAM GL 10/2011**	**Independent Checker**
1. To achieve uniformity in the practice of TIA in the country. 2. To set the best practice of TIA. 3. To standardize the preparation of TIA reports. 4. To provide a basis for approving authorities in assessing and apportioning a developer's contribution to road infrastructure improvements.	1. To achieve uniformity in the practice of TIA in the country. 2. To set the best practice of TIA. 3. To standardize the preparation of TIA reports. 4. To provide the necessary technical links with the Environmental Impact Assessment and the Road Safety Audit. 5. To provide a basis for approving authorities in assessing and apportioning a developer's contribution to road infrastructure improvements.	1. To provide a typical methodology for TIA preparation. 2. To set the best practice of TIA. 3. To standardize the preparation of TIA reports. 4. To provide a basis for approving authorities in assessing and apportioning a developer's contribution to road infrastructure improvements.

The table above shows the comparison of three guidelines for Traffic Impact Assessment (TIA) preparation in Malaysia. As for Guidelines for Traffic Impact Assessment – REAM GL 10/2011 it is compulsory to provide the necessary technical links with the Environmental Impact Assessment and the Road Safety Audit.

Table 6-2 Comparison of Terminologies Between TIA Guidelines

Terminology				
		AT(J) 38-2018 Guidelines for Traffic Impact Assessment	**Guidelines for Traffic Impact Assessment – REAM GL 10/2011**	**Independent Checker**
Base Year (BY)	**The calendar year in which the TIA Study is carried out**	/	/	/
Submission year (SY)	The calendar year in which the Developer submits his Development Proposal Report to the Approving Authority for Planning Permission	/	/	/
Completion Year (CY)	The calendar year in which the proposed development is fully completed and operational. If the project is divided into phases, CY refers to the year the final phase is completed and operational	/	/	/

Terminology				
Impact Analysis Year (AY)	The calendar year when the development's impacts are compared to the base case impacts for offset determination purposes IAY is to be 10 years after the projected CY If CY is more than 10 years from SY (for staged development), in addition to (a), IAY shall include an interim analysis for the CY	/	/	/
Designated Locations	All points of connection between the development and the existing road network; and Sections of existing roads, junctions and locations of traffic conflict are identified by the Approving Authority in the existing network for traffic impact analysis. (In doing so, the Approving Authority shall take into consideration; (a) the routes which will be used by the generated traffic to and from the project; and (b) the diminishing impact of the generated traffic as it spreads over the road network)	/	/	-
Baseline Traffic	The current traffic volume without development traffic in the Base Year	/	-	-

Terminology				
Baseline Traffic Conditions in IAY	The traffic condition (LOS) in the IAY at designated locations of the road network within the demarcated Study Area, taking into consideration only the Non-Site Traffic growth in the network from SY to IAY, excluding the effect of the generated traffic from the development	/	/	-
Development Impacted Traffic Conditions in IAY	The traffic conditions (LOS) in IAY at designated locations of the road network within the demarcated Study Area, taking into consideration both the Non-Site Traffic Growth from SY to IAY in the network as well as the Site-Traffic generated from the development in IAY	/	/	-
Minimum traffic condition (LOS) after mitigation measures	The Level of Service (LOS) as shown in the Table in Section 11.0 for each of the Designated Locations to be achieved at IAY with mitigation measures	/	/	-

The table above shows the comparison of three terminology for Traffic Impact Assessment (TIA) preparation in Malaysia. The Independent Checker (IC) proposal does not consider the right step to provide good terminology for Traffic Impact Assessment (TIA) as such designated location, baseline traffic and traffic conditions in IAY, development Impact Traffic Condition in IAY and Minimum Traffic Condition (LOS) After Mitigation Measure. The IC did not recognise Sidra as analysis software. Aimsun (modelling software) will be proposed to do the analysis.

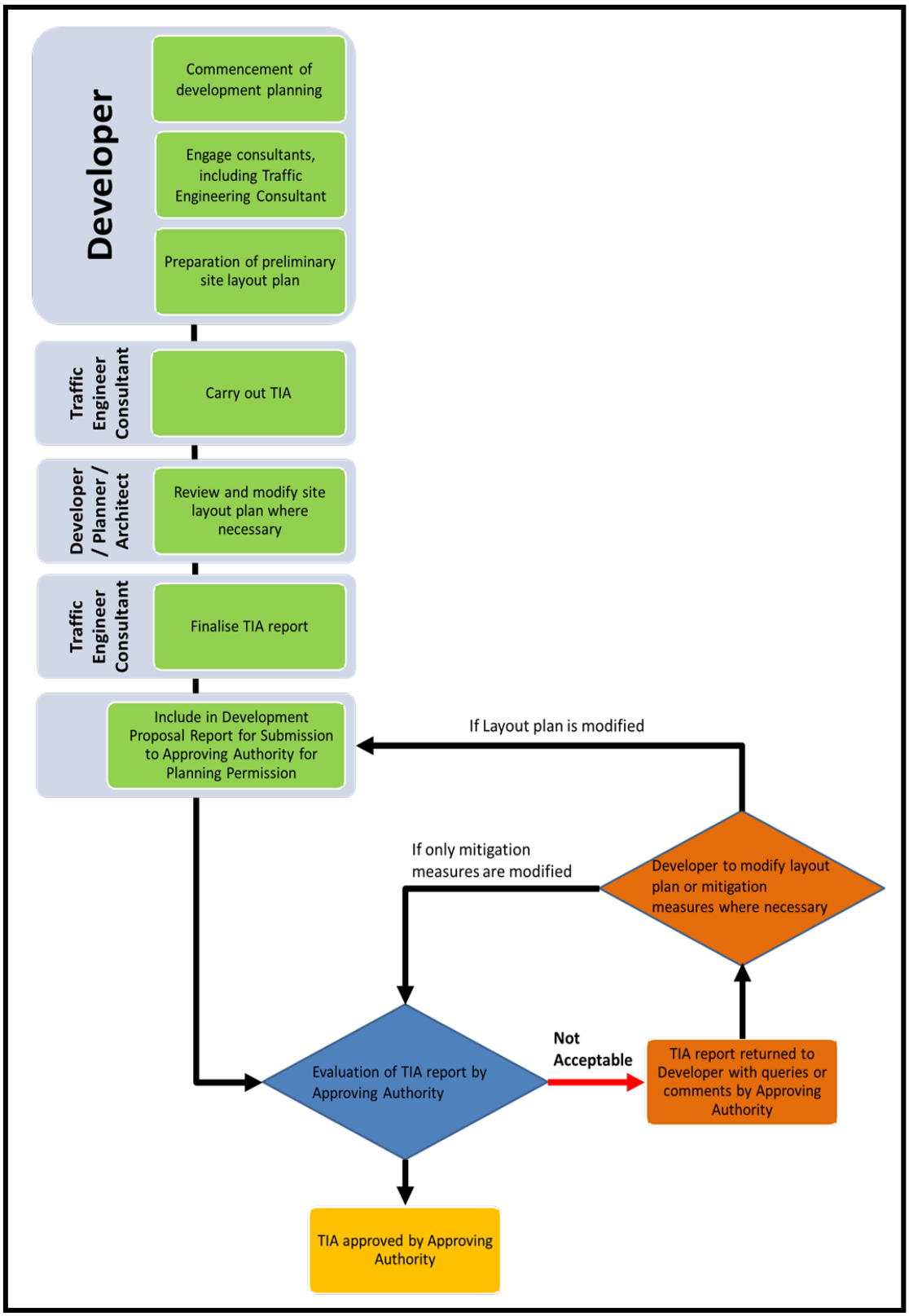


Figure 6-1 Guidelines for Traffic Impact Assessment from AT (J) 38/2018

Source: AT(J) 38/2018 Guidelines for Traffic Impact Assessment

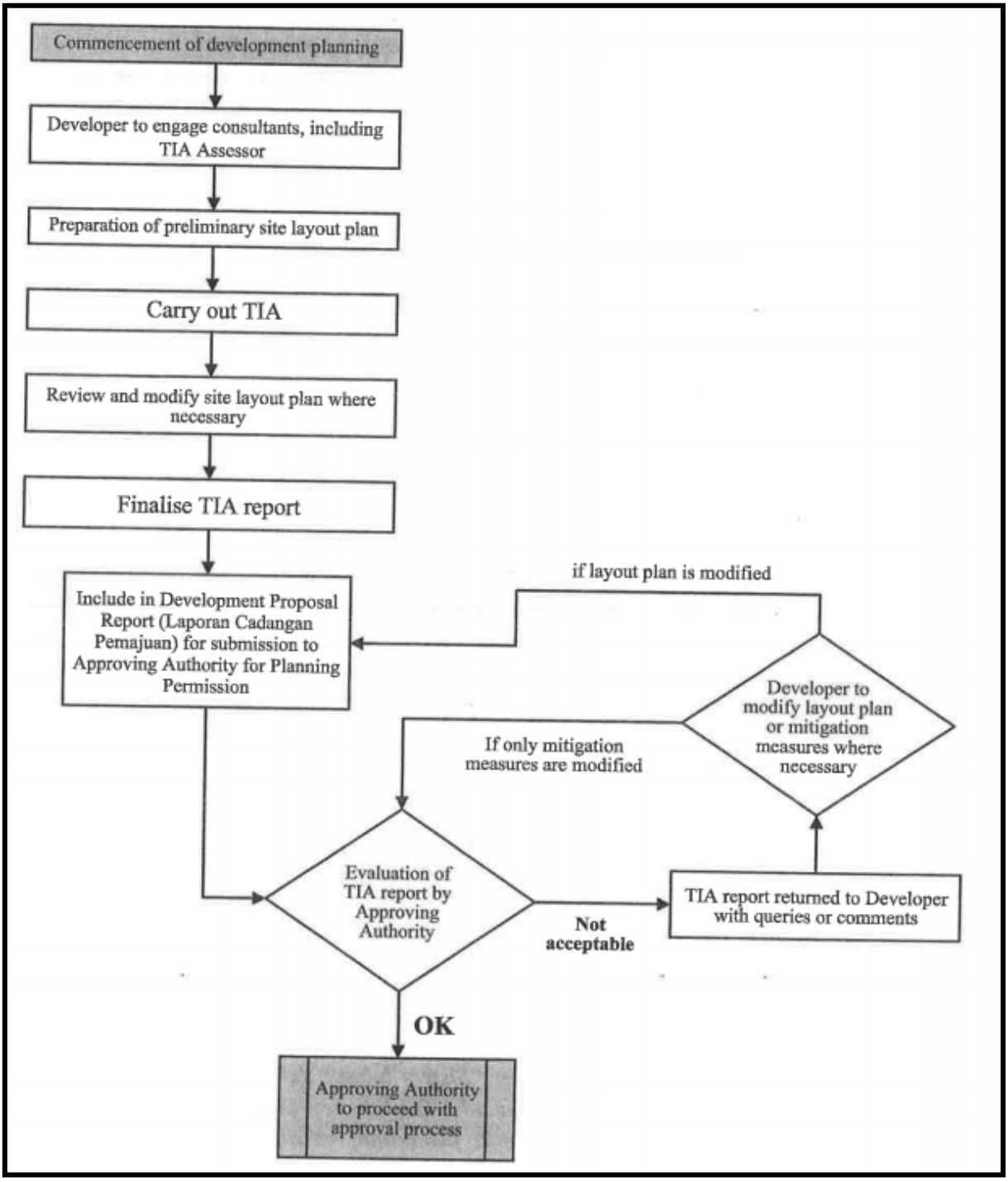


Figure 6-2 Guidelines for Traffic Impact Assessment from REAM GL 10/2011

Source: Guidelines for Traffic Impact Assessment – REAM GL 10/2011

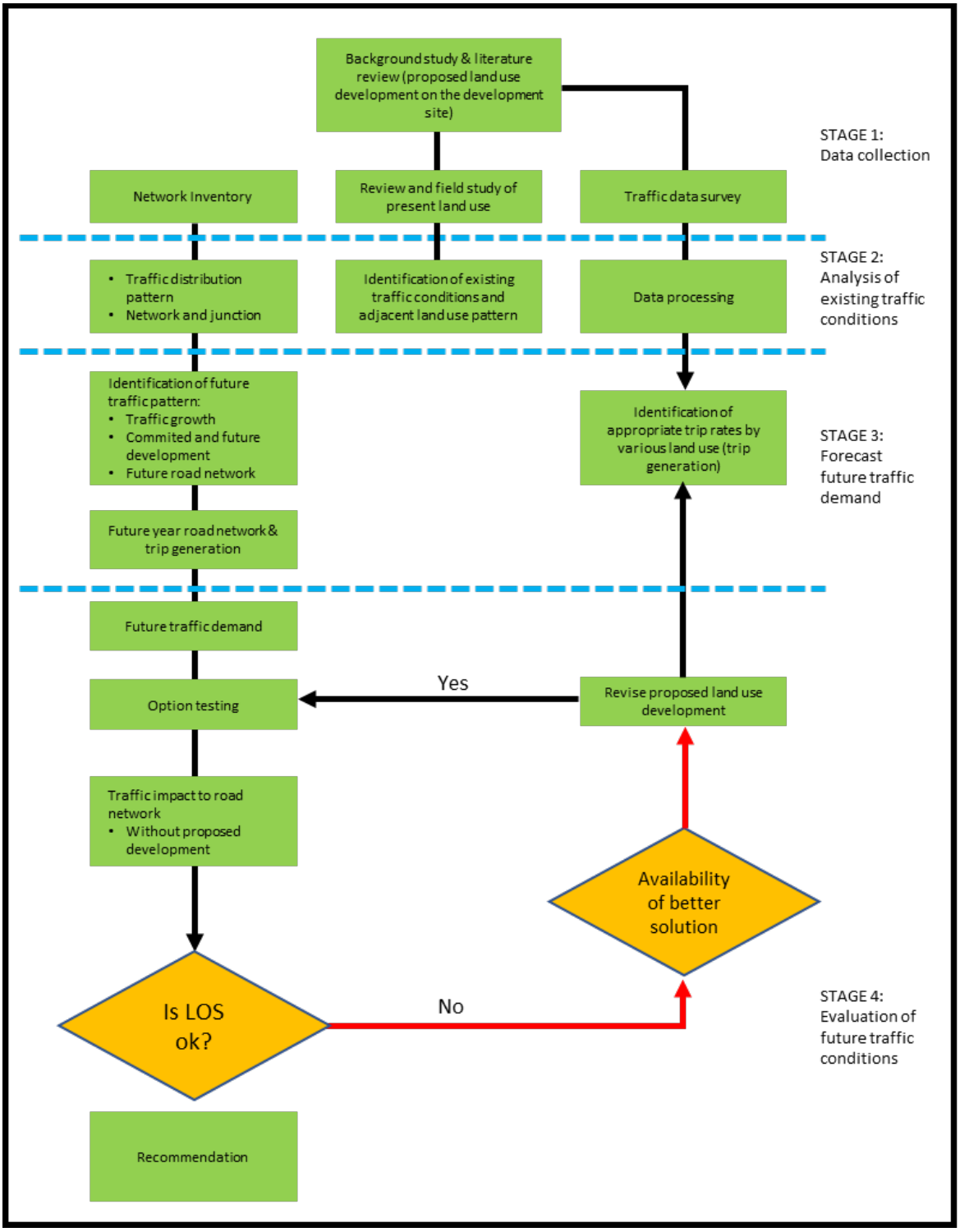


Figure 6-3 Approach to Carry Out Traffic Impact Assessment from AT (J) 38/2018

Source: AT(J) 38/2018 Guidelines for Traffic Impact Assessment

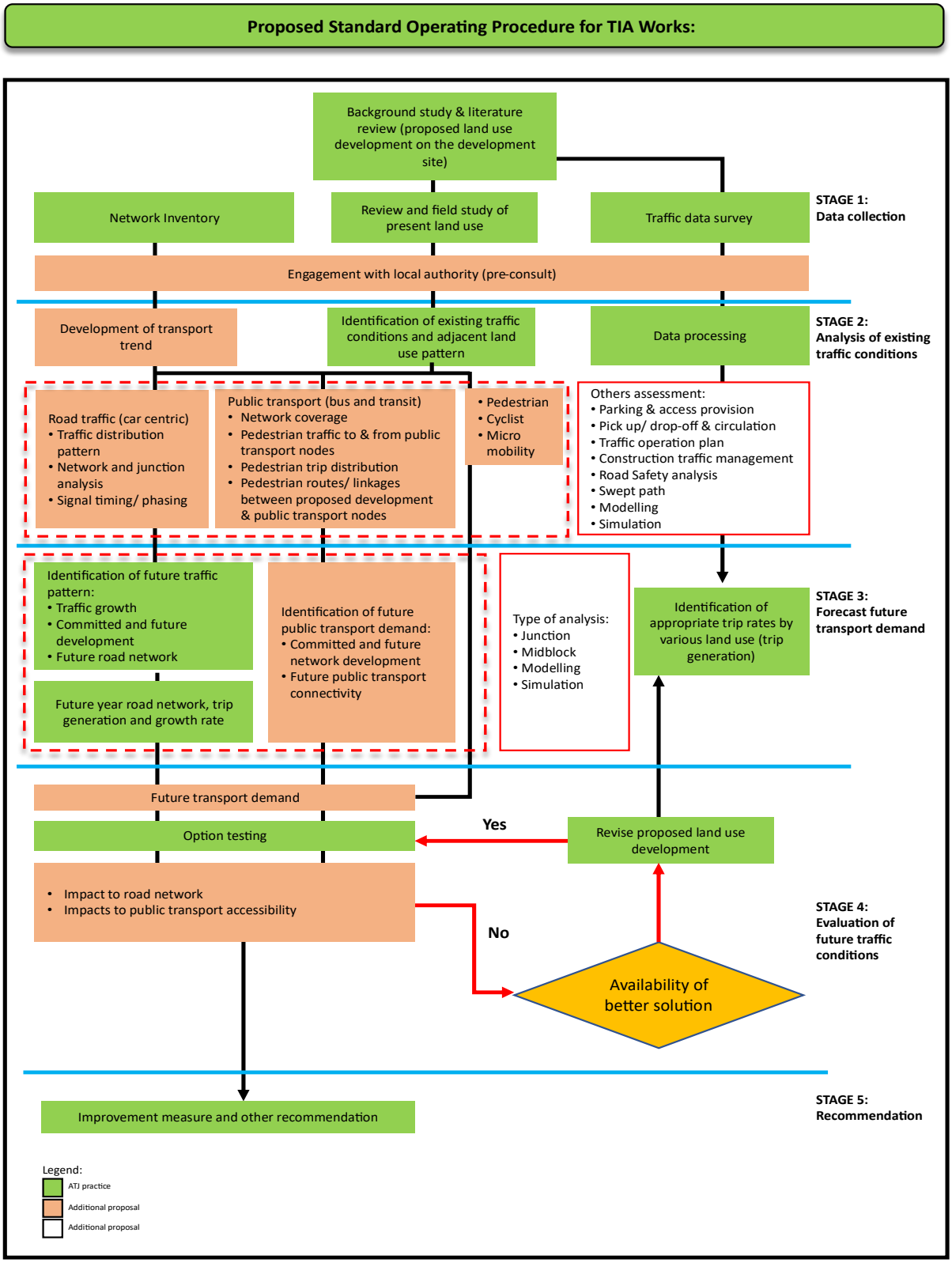


Figure 6-4 Proposed Procedure for Traffic Impact Assessment Works

Source: AT(J) 38/2018 Guidelines for Traffic Impact Assessment

6.5 Current Situation Analysis in Study Area

The analysis of the current situation in the Study Area is important as it will serve as the baseline situation for determining the impacts of the proposed development. The base-line analysis should cover issues listed and elaborated in the table below:

Table 6-3 Existing Situation in Study Area

Category	Data
Land use	• Current land use (type and density) in the vicinity of the area • Estimated increase in land-use activity and size • Anticipated development projects and planned completion dates, types and density • Information about the proposed development • Information from the structure and local plans
Demographics	• Information on current and future demographic patterns (to include socio-economic information)
Traffic Volume	• The current traffic volume (daily and peak rates) • The traffic volume from several previous years (to get the trend of changes) • Turning movements at junctions • Traffic volume fluctuation according to time and season • Traffic volume forecast from other reliable sources
Transportation System	• The current road characteristics (road type, width, number and direction of lanes, exit and entry points, internal circulation, access control) • Road hierarchy and the controlling authority • Traffic signal locations, coordination and timing • Local and regional plans • Public transport service and usage • Parking information • Road furniture • Other relevant information
Other Traffic Data	• Origin and destination information • Modal split information • Road accident record

6.6 Transportation Model and Simulation

The transportation model and simulation requirement are adopted from the Land Transport Authority (LTA, Singapore) requirement for the TIA submission. The submission of the model(s) must cover and include the following processes:

1. Model verification;
2. Model calibration;
3. Model validation; and
4. Evaluation output.

The model submission must include a technical note briefly describing the objective of the modelling exercise, the area that the model is covering, the methodology adopted as agreed during the scoping meeting, the model outputs & analysis and the conclusion & recommendations. The technical note should be clearly labelled for easy reference, for example, "Project A - Transport Model Technical Note 1 (Revision 1, Feb 2019)". When there is more than one technical note, they can (at the end of the project) be compiled to form part of / one whole final report for the project. A model submission is deemed incomplete without a technical note.

6.7 High Level Model Requirements

6.7.1 Step 1 – Model Verification

The submission of the model files must include the following (ideally all in one folder):

1. Network Model:
    a. Graphical / view settings in the submitted models and descriptions/explanations to show clearly:
        - road hierarchy;
        - capacity (links and turns);
        - free flow speed;
    b. Background files (e.g. CAD drawings in the DWG or DGN format, PDF files, JPG/PNG files) that were used as a reference to develop the network model.
    c. Ensure that details such as number of lanes, permitted/banned turn movements, lane allocations, signal phases etc. have been checked, verified and properly coded in before submitting the model(s).
    d. All junctions, approaches, key corridors and expressways must be labelled with valid and self-explanatory road names.
2. Matrix estimation/correction
    a. Ensure that the starting / initial matrix that was first assigned to the model is included in the model.
    b. Provide a figure/diagram showing the difference between the starting / initial matrix and the final matrix that is used in the model's highway assignment.
    c. Provide a description on the source, assumptions and zone disaggregation/aggregation (if any) of the starting / initial matrix.

6.7.2 Step 2 – Model Calibration

The submission must include the following in an Excel spreadsheet:

1. Table showing a list of link volume calibration with GEH statistics and R-square graph.
2. Table showing a list of turn volume calibration with GEH statistics and R-square graph.
3. A list of network object attributes (user-defined or default) that were used for model calibration.

6.7.3 Step 3 – Model Validation

The submission must include:

1. Visual diagrams of key corridors or routes where the travel time was measured.
2. Table showing the comparison between observed and modelled travel time of key corridors in the study area. The table should also include columns showing differences in terms of time (seconds) and percentage.
3. A graph showing the trip length distribution (can be in an Excel spreadsheet) and its skim matrix(s).
4. Table showing the comparison between observed and modelled average travel speed of key corridors. The table should also include columns showing the difference in terms of kph and percentage.

6.7.4 Step 4 – Evaluation Output

Minimally, the following evaluation output must be reported.

1. Visual diagrams of key corridors or routes where the travel time was measured.
2. Table showing the comparison between observed and modelled travel time of key corridors in the study area. The table should also include columns showing differences in terms of time (seconds) and percentage.
3. A graph showing the trip length distribution (can be in an excel spreadsheet) and its skim matrix(s).
4. Table showing the comparison between observed and modelled average travel speed of key corridors. The table should also include columns showing the difference in terms of kph and percentage.

However, additional evaluation may be required/requested as and when required.

6.8 Microsimulation Model Requirements

6.8.1 Step 1 – Model Verification

The submission of the model files must include the following (ideally all in one folder):

1. Network model
    a. Background files (e.g. CAD drawings in the DWG or DGN format, PDF files, JPG/PNG files) that were used as a reference to develop the network model.
    b. Ensure that details such as number of lanes, permitted/banned turn movements, lane allocations, signal phases etc. have been checked, verified and properly coded in before submitting the model(s).
    c. All junction nodes, approaches, key corridors and expressways must be labelled with valid and self-explanatory road names.
    d. List of assumptions made in the network development stage (example: aggregation of access points, speed reduction due to side frictions, etc.). This is to be supported with visual diagrams where necessary to aid the review of the submission.
    e. Vehicle speeds for all turn movements in the network must be reduced realistically to simulate the impact of geometric delays.
    f. The posted speed limit for all road links in the network should be coded properly.
    g. Priority movements (e.g. vehicles turning onto a major road from a minor road must give way to traffic on the major road) or yellow boxes should be coded properly in the network through the use of priority rules.
    h. Traffic signals must be coded in for signalized junctions.

i. For locations with high volume of pedestrian flows, pedestrian crossings must be coded in the model.

2. Vehicle inputs and Demand matrices
    a. For static routing – Table of vehicle inputs with the following information:
        i. a clear and legible name/description for the input
        ii. the road name of the input link
        iii. the input volume
        iv. vehicle classes/types (example: development traffic, background traffic, etc.)
    b. Settings for the simulation of vehicles entering the network model must be as close as possible to the input volume. For example, if the Vissim software is used as the simulation tool, the "volume type" for all traffic inputs must be set to "Exact".
    c. List the traffic compositions for the vehicle classes/types defined in the model.
    d. For assignment with matrix(s) – matrix with the following information.
        i. Zones with the road names and development names as identifier
        ii. Rows total
        iii. Column total

6.8.2 Step 2 – Model Calibration

The submission must include the following in an Excel spreadsheet:

1. Table showing a list of link volume calibration with GEH statistics and R-square graph.
2. Table showing a list of turn volume calibration with GEH statistics and R-square graph.
3. Table showing a list of queue length calibration with GEH statistics or percentage difference.
4. A list of:
    a. Any newly created / modified driving behaviour with clear explanations on the need to create a new driving behaviour and/or modify the default value(s) of parameters for driving behaviour.
    b. Other parameters that were modified / edited to calibrate the model.
5. If any, a list of network elements attributes (user-defined or default) that were used for model calibration.

6.8.3 Step 3 – Model Validation

The submission must include:

1. Visual diagrams of key corridors or routes where the travel time was measured.
2. Table showing the comparison between observed and modelled travel time of key corridors/routes in the study area. The table should also include columns showing differences in terms of time (seconds) and percentage.
3. Table showing the comparison between observed and modelled average travel speed of key corridors. The table should also include columns showing the difference in terms of kph and percentage.
4. Table comparing the observed with the modelled number of signal cycles to clear a junction for all signalized junctions.

6.8.4 Step 4 – Evaluation Output

Minimally, the following evaluation output must be reported.

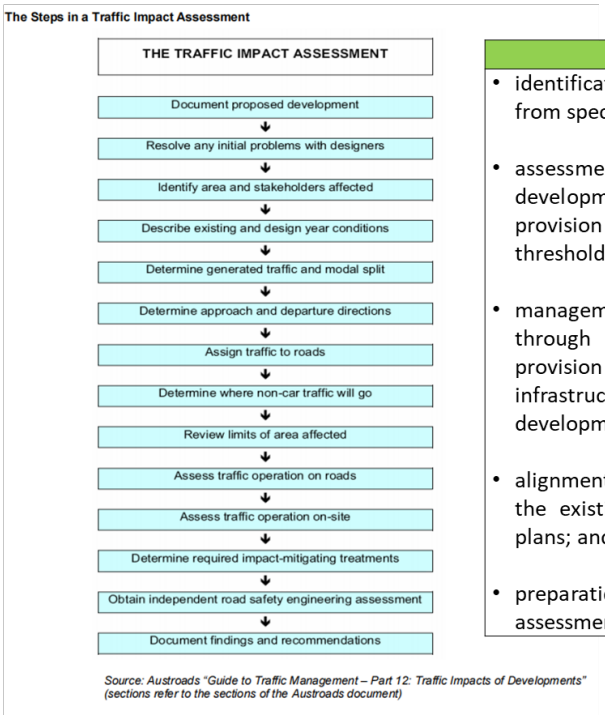
1. Delay by movement.
2. Maximum and average queue length by movement.
3. Number of cycles for queues to clear a junction by approach and by junction.
4. Average travel time on key corridors.
5. Average travel speed on key corridors.

6.9 Reference

In carrying out the TIA study, the following guidelines and documents are referred to:

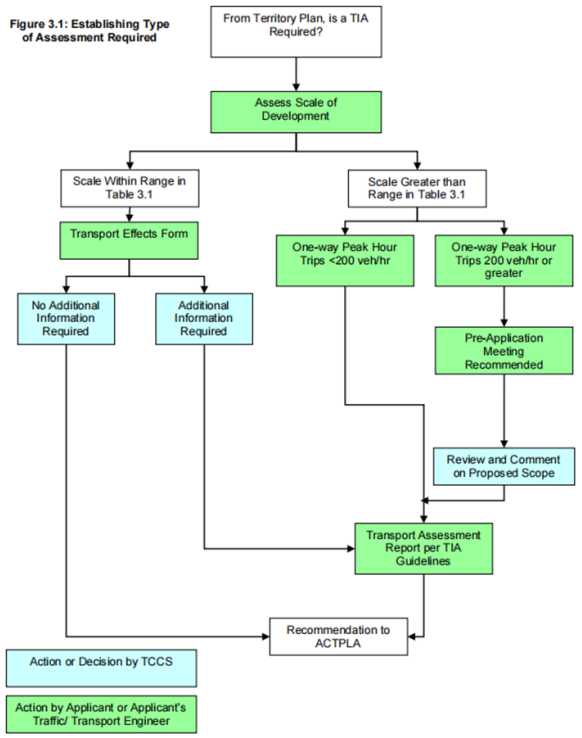
- AT(J) 38-2018 Guidelines for Traffic Impact Assessment
- Road Traffic Volume Malaysia – 2020 by HPU
- Guidelines for Traffic Impact Assessment – REAM GL 10/2011
- Trip Generation Manual 2010
- A Guide on Geometric Design of Roads – REAM GL 2 / 2002
- JKR Arahan Teknik (Jalan) 11 / 87 – A Guide to the Design of At-Grade Intersection
- JKR Arahan Teknik (Jalan) 8 / 86 – A Guide on Geometric Design of Roads

Australia



Source: Austroads "Guide to Traffic Management – Part 12: Traffic Impacts of Developments" (sections refer to the sections of the Austroads document)

Scope of a TIA	Intent and Criteria
• identification of impacts resulting from specific land use proposal; • assessment of the scale of the development proposals and provision of development thresholds; • management of transport impacts through existing infrastructure, provision of additional infrastructure or modifying the development proposal; • alignment of the assessment with the existing territory policies and plans; and • preparation of the transport assessment report.	• The road network can accommodate the amount of traffic that is likely to be generated by the development; • Safe and convenient movement of public transport passengers, pedestrians and cyclists is provided; • to provide for safe and efficient access, circulation and parking facilities for vehicles, cyclists and pedestrians; and • to ensure that parking facilities do not detract from streetscape amenity and surveillance of the street.



For the purpose of transport assessments in the ACT, the primary factor to be used to determine the type of assessment is the scale of proposed development, with vehicle trip generation used to define scale for larger and/or more complex assessments.

Two types of assessments have been identified:

Transport Effects Form (TEF) – The form is to be used for small, basic developments that will have minimal transport effects.

Transport Assessment Report (TAR) – For straightforward, moderate scale developments a transport assessment report should be prepared in accordance with these guidelines. For larger developments it is advisable for the applicant's engineer to meet with TCCS staff at the pre-application stage (i.e. prior to lodging the development application) to discuss transport impact assessment scope, using these guidelines as the basis.

Assessment report requirement
• the size and nature of the proposed development; • location; • catchment; • the surrounding road network; • public transport; and • accessibility for pedestrians, cyclists and people with disabilities.

Figure 6-5 Australia Reference – TIA Process

Singapore

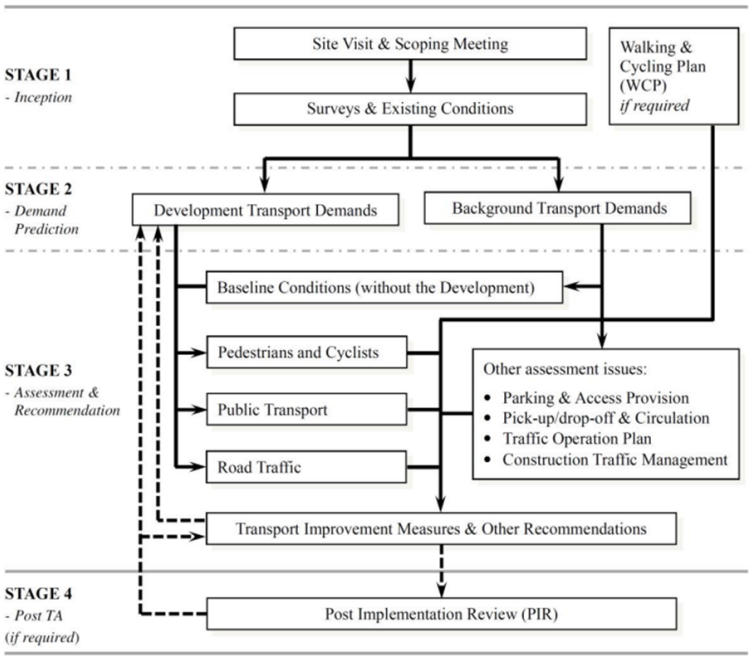
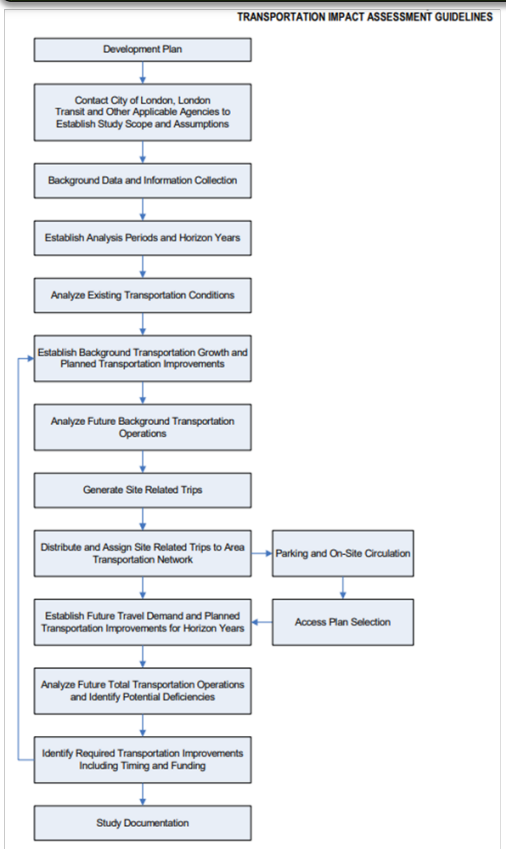


Figure 1.1 – Transport Impact Assessment Process (For Developments)

Objectives of a TIA
• Determine the transportation requirements of a new development / redevelopment, and propose adequate and appropriate design features, facilities, and infrastructural improvements to meet future transport demand; • Enhance the development's overall active and mass transport connectivity, accessibility and convenience in relation to the wider transport network with a focus on promoting walking, cycling and mass transport; • Identify the development's impacts on the surrounding transport network and recommend necessary measures to mitigate its negative impacts.

Figure 6-6 Singapore Reference – TIA Process

London



TIA Scope
Area Plan/Secondary Plan i. Identification of major/arterial transportation infrastructure and operational improvements associated with area wide development potential ii. Determination of the collector roadway network and the major intersection configurations and type of control **Draft Plan of Subdivision** i. Arterial and collector roadway requirements and operations ii. Phasing plan iii. General description of access locations and operations iv. Allocation of responsibility for funding and implementation of transportation infrastructure improvements **Rezoning** i. Phasing plan ii. Transportation infrastructure improvements tied to phasing plan iii. Description of access locations and operations iv. Allocation of responsibility for funding and implementation of transportation infrastructure improvements **Site Plan** i. Access location and operations ii. Transportation infrastructure improvements tied to phasing plan iii. Site specific impacts on road network including adjacent site operations

Figure 6-7 United Kingdom Reference – TIA Process

6.10 Vissim Model Checklist

It is important to get through a standard model submission for approval of Traffic Impact Assessment Report. To necessitate this a detailed model checklist is an important tool to clearly understand the inputs that have gone into model creation that will help the reviewer understand and approve the model results presented part of report submissions. The checklist for model review is presented in table below.

Table 6-5 Vissim Model Checklist

Project Title:			
Developer:		Date of model submission:	
Transport Consultant:		Submission number:	
Submission List ☐ Technical Note ☐ Model Verification ☐ Model Calibration ☐ Model Validation ☐ Outputs & Analysis ☐ Conclusion & Recommendations		Remarks: ☐	
Model Verification (e.g. Background file(s), starting matrix(s), junction geometry & controls, link & speed parameters, pedestrian crossings, graphical settings / layouts, logic checks, etc.) ☐		Remarks: ☐	
Model Calibration (e.g. GEH statistics, R-square graph, Excel spreadsheet, list of modified parameters and etc.) ☐		Remarks: ☐	
Model Validation (e.g. Visual diagrams or/and plots or/and comparison table of travel time, queue length and etc.) ☐		Remarks: ☐	
Evaluation Output (e.g. Graphical settings, tables, layouts, and visual diagrams or/and plots or/and comparison table of number of cycles, delay, queue length and etc.) ☐		Remarks: ☐	
Technical Note ☐ (e.g. area of coverage, methodology, zone / access aggregation or disaggregation, analysis, recommendations and etc.)		Remarks: ☐	

	Name	**Designation**	**Initial**	**Date**
Prepared by:				
Checked by:				

ABOUT THE ASEAN AUSTRALIA SMART CITIES TRUST FUND

The ASEAN Australia Smart Cities Trust Fund (AASCTF) assists ASEAN cities in enhancing their planning systems, service delivery, and financial management by developing and testing appropriate digital urban solutions and systems. By working with cities, AASCTF facilitates their transformation to become more livable, resilient, and inclusive, while in the process identifying scalable best and next practices to be replicated across cities in Asia and the Pacific. The Trust Fund is supported by the Government of Australia through the Department of Foreign Affairs and Trade, managed by the Asian Development Bank, and implemented by Ramboll.

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