Appendix K

EB2/EB3R Final Scenario – Lane performance Summaries

LANE SUMMARY

Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 30 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	780	11.0	780	11.0	1810	0.431	100	0.1	LOS A	0.0	0.0	Full	147	0.0	0.0
Lane 2	780	11.0	780	11.0	1810	0.431	100	0.1	LOS A	0.0	0.0	Full	147	0.0	0.0
Lane 3	68	5.9	68	5.9	267	0.255	100	18.2	LOS B	0.8	6.2	Short	14	0.0	NA
Lane 4 (B)	25	100.0	25	100.0	478	0.052	100	2.1	LOS A	0.1	0.9	Full	147	0.0	0.0
Approach	1652	12.2	1652	12.2		0.431		0.8	LOS A	0.8	6.2				
NorthWest: Ti Rakau Drive (West)															
Lane 1	533	14.2	533	14.2	711	0.750	100	11.1	LOS B	7.2	56.7	Full	73	0.0	0.0
Lane 2	533	14.2	533	14.2	711	0.750	100	11.1	LOS B	7.2	56.7	Full	73	0.0	0.0
Lane 3 (B)	13	100.0	13	100.0	478	0.027	100	2.1	LOS A	0.0	0.5	Full	73	0.0	0.0
Approach	1079	15.2	1079	15.2		0.750		11.0	LOS B	7.2	56.7				
Intersection	2731	13.4	2731	13.4		0.750		4.8	LOS A	7.2	56.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	U SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	780	-	780	11.0	1810	0.431	100	NA	NA
Lane 2	780	-	780	11.0	1810	0.431	100	NA	NA
Lane 3	-	68	68	5.9	267	0.255	100	0.0	2
Lane 4	25	-	25	100.0	478	0.052	100	NA	NA
Approach	1584	68	1652	12.2		0.431			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	533	533	14.2	711	0.750	100	NA	NA
Lane 2	533	533	14.2	711	0.750	100	NA	NA
Lane 3	13	13	100.0	478	0.027	100	NA	NA
Approach	1079	1079	15.2		0.750			

	Total	%HV	Deg.Satn (v/c)
Intersection	2731	13.4	0.750

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis											
	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

LANE SUMMARY

Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 40 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	771	10.7	771	10.7	998	0.773	100	10.6	LOS B	12.2[N4]	93.5[N4]	Full	64	0.0	50.0
Lane 2	771	10.7	771	10.7	998	0.773	100	10.6	LOS B	12.2[N4]	93.5[N4]	Full	64	0.0	50.0
Lane 3 (B)	25	100.0	25	100.0	657	0.038	100	0.2	LOS A	0.0	0.1	Full	64	0.0	0.0
Approach	1567	12.1	1567	12.1		0.773		10.5	LOS B	12.2	93.5				
NorthWest: Ti Rakau Drive (West)															
Lane 1	537	13.6	537	13.6	1783	0.302	100	0.0	LOS A	0.0	0.0	Full	81	0.0	0.0
Lane 2	538	13.6	538	13.6	1783	0.302	100	0.0	LOS A	0.0	0.0	Full	81	0.0	0.0
Lane 3	112	10.7	112	10.7	194	0.576	100	25.6	LOS C	2.1	16.0	Short	15	0.0	NA
Lane 4 (B)	13	100.0	13	100.0	657	0.020	100	0.2	LOS A	0.0	0.1	Full	81	0.0	0.0
Approach	1200	14.3	1200	14.3		0.576		2.4	LOS A	2.1	16.0				
Intersection	2767	13.0	2767	13.0		0.773		7.0	LOS A	12.2	93.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	771	771	10.7	998	0.773	100	NA	NA
Lane 2	771	771	10.7	998	0.773	100	NA	NA
Lane 3	25	25	100.0	657	0.038	100	NA	NA
Approach	1567	1567	12.1		0.773			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	U NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	537	-	537	13.6	1783	0.302	100	NA	NA
Lane 2	538	-	538	13.6	1783	0.302	100	NA	NA
Lane 3	-	112	112	10.7	194	0.576	100	20.7	2
Lane 4	13	-	13	100.0	657	0.020	100	NA	NA
Approach	1088	112	1200	14.3		0.576			

	Total	%HV	Deg.Satn (v/c)
Intersection	2767	13.0	0.773

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

LANE SUMMARY

Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Fremantle Place															
Lane 1	20	10.0	20	10.0	93	0.215	100	81.5	LOS F	1.3	10.0	Short	9	0.0	NA
Lane 2	21	4.8	21	4.8	98	0.213	100	79.0	LOS E	1.4	10.0	Full	285	0.0	0.0
Approach	41	7.3	41	7.3		0.215		80.2	LOS F	1.4	10.0				
East: Ti Rakau Drive (East)															
Lane 1	769	10.6	769	10.6	796	0.967	100	77.1	LOS E	63.7	486.1	Full	636	0.0	0.0
Lane 2	739	10.8	739	10.8	764[1]	0.967	100	76.8	LOS E	60.1	459.5	Full	636	0.0	0.0
Lane 3 (B)	28	100.0	28	100.0	204	0.137	100	34.7	LOS C	1.2	15.0	Short	60	0.0	NA
Lane 4	172	8.4	172	8.4	244	0.705	82[6]	73.4	LOS E	11.1	83.6	Short	150	0.0	NA
Lane 5	210	8.4	210	8.4	244	0.860	100	82.5	LOS F	14.9	111.9	Short	103	0.0	NA
Approach	1918	11.5	1918	11.5		0.967		76.6	LOS E	63.7	486.1				
North: Gossamer Drive															
Lane 1	359	9.5	359	9.5	365	0.982	100	101.3	LOS F	24.8	187.8	Short	150	0.0	NA
Lane 2	358	9.5	358	9.5	365[1]	0.982	100	101.0	LOS F	24.8	187.6	Full	1010	0.0	0.0
Lane 3	41	14.6	41	14.6	124	0.330	100	77.5	LOS E	2.7	20.9	Short	28	0.0	NA
Approach	758	9.8	758	9.8		0.982		99.9	LOS F	24.8	187.8				
West: Ti Rakau Drive (West)															
Lane 1	31	6.5	31	6.5	718	0.043	100	32.9	LOS C	1.2	8.8	Short	28	0.0	NA
Lane 2	505	13.7	505	13.7	542[1]	0.932	100	74.5	LOS E	38.4	300.7	Full	479	0.0	0.0
Lane 3	473	13.7	473	13.7	507[1]	0.932	100	74.4	LOS E	35.5	277.5	Full	479	0.0	0.0
Lane 4	53	7.5	53	7.5	194	0.274	100	69.3	LOS E	3.2	23.7	Short	23	0.0	NA
Lane 5 (B)	27	100.0	27	100.0	207	0.130	100	34.6	LOS C	1.1	14.4	Full	479	0.0	0.0
Approach	1089	15.3	1089	15.3		0.932		72.0	LOS E	38.4	300.7				
Intersection	3806	12.2	3806	12.2		0.982		80.0	LOS E	63.7	486.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

Approach Lane Flows (veh/h)

South: Fremantle Place

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	20	-	-	20	10.0	93	0.215	100	24.7	2
Lane 2	-	10	11	21	4.8	98	0.213	100	NA	NA

Approach	20	10	11	41	7.3			0.215			
East: Ti Rakau Drive (East)											
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	15	754	-	769	10.6		796	0.967	100	NA	NA
Lane 2	-	739	-	739	10.8		764[1]	0.967	100	NA	NA
Lane 3	-	28	-	28	100.0		204	0.137	100	0.0	2
Lane 4	-	-	172	172	8.4		244	0.705	82[6]	0.0	2
Lane 5	-	-	210	210	8.4		244	0.860	100	22.5	4
Approach	15	1521	382	1918	11.5			0.967			
North: Gossamer Drive											
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	359	-	-	359	9.5		365	0.982	100	35.6	2
Lane 2	358	-	-	358	9.5		365[1]	0.982	100	NA	NA
Lane 3	-	10	31	41	14.6		124	0.330	100	0.0	2
Approach	717	10	31	758	9.8			0.982			
West: Ti Rakau Drive (West)											
Mov. From W To Exit:	L2 N	T1 E	R2 S	U W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	31	-	-	-	31	6.5	718	0.043	100	0.0	2
Lane 2	-	505	-	-	505	13.7	542[1]	0.932	100	NA	NA
Lane 3	-	473	-	-	473	13.7	507[1]	0.932	100	NA	NA
Lane 4	-	-	10	43	53	7.5	194	0.274	100	17.7	3
Lane 5	-	27	-	-	27	100.0	207	0.130	100	NA	NA
Approach	31	1005	10	43	1089	15.3		0.932			
	Total	%HV	Deg.Satn (v/c)								
Intersection	3806	12.2	0.982								

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

6 Lane under-utilisation due to downstream effects

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Fremantle Place Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: Gossamer Drive Merge Type: **Zipper**												
Exit Short Lane	1	150	50.0	105	109	2.50	2.00	213	1675	0.127	0.0	0.0
Merge Lane	2	-	50.0	107	111	2.50	2.00	210	1674	0.125	0.0	0.0
West Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												

Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.
Full Length Lane	3	Merge Analysis not applied.

LANE SUMMARY

Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Ti Rakau Drive															
Lane 1	446	9.3	446	9.3	554	0.804	100	42.5	LOS D	19.4	146.4	Full	174	0.0	0.0
Lane 2	446	9.3	446	9.3	554	0.804	100	42.5	LOS D	19.4	146.4	Full	174	0.0	0.0
Lane 3	256	8.6	256	8.6	557	0.460	100	34.0	LOS C	9.0	67.5	Short	87	0.0	NA
Lane 4 (B)	53	100.0	53	100.0	263	0.202	100	28.3	LOS C	1.4	17.9	Full	174	0.0	0.0
Approach	1200	13.2	1200	13.2		0.804		40.1	LOS D	19.4	146.4				
East: Pakuranga Road (East)															
Lane 1	94	6.4	84	6.4	459	0.183	100	35.7	LOS D	2.9	21.2	Short	21	0.0	NA
Lane 2	372	4.3	333	4.4	416[1]	0.801	100	40.8	LOS D	14.3	104.0	Full	98	0.0	20.4
Lane 3	438	4.3	393	4.4	490	0.801	100	41.5	LOS D	17.3	126.0	Full	98	0.0	38.0
Approach	904	4.5	810[N1]	4.6		0.801		40.6	LOS D	17.3	126.0				
West: Pakuranga Road (West)															
Lane 1 (B)	23	100.0	23	100.0	263	0.087	100	27.4	LOS C	0.6	7.3	Full	380	0.0	0.0
Lane 2	296	5.7	296	5.7	486	0.609	100	35.5	LOS D	11.5	84.6	Full	380	0.0	0.0
Lane 3	296	5.7	296	5.7	486	0.609	100	35.5	LOS D	11.5	84.6	Full	380	0.0	0.0
Lane 4	319	17.9	319	17.9	393	0.810	100	49.1	LOS D	14.6	117.6	Short	178	0.0	NA
Lane 5	319	17.9	319	17.9	393	0.810	100	49.1	LOS D	14.6	117.6	Short	105	0.0	NA
Approach	1252	13.7	1252	13.7		0.810		42.3	LOS D	14.6	117.6				
Intersection	3356	11.0	3262[N1]	11.3		0.810		41.0	LOS D	19.4	146.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Approach Lane Flows (veh/h)

South: Ti Rakau Drive

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	446	-	446	9.3	554	0.804	100	NA	NA
Lane 2	446	-	446	9.3	554	0.804	100	NA	NA
Lane 3	-	256	256	8.6	557	0.460	100	0.0	2
Lane 4	53	-	53	100.0	263	0.202	100	NA	NA
Approach	944	256	1200	13.2		0.804			

East: Pakuranga Road (East)

Mov.	L2	T1	Total	%HV		Deg.	Lane	Prob.	Ov.

From E To Exit:	S	W			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	84	-	84	6.4	459	0.183	100	16.0	2
Lane 2	-	333	333	4.4	416[1]	0.801	100	NA	NA
Lane 3	-	393	393	4.4	490	0.801	100	NA	NA
Approach	84	725	810	4.6		0.801			

West: Pakuranga Road (West)

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	-	23	23	100.0	263	0.087	100	NA	NA
Lane 2	296	-	296	5.7	486	0.609	100	NA	NA
Lane 3	296	-	296	5.7	486	0.609	100	NA	NA
Lane 4	-	319	319	17.9	393	0.810	100	0.0	3
Lane 5	-	319	319	17.9	393	0.810	100	25.4	4
Approach	592	660	1252	13.7		0.810			

	Total	%HV	Deg.Satn (v/c)
Intersection	3262	11.3	0.810

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Ti Rakau Drive Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: Pakuranga Road (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

LANE SUMMARY

Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Pakuranga Road (East)															
Lane 1	479	4.5	428	4.6	1879	0.227	100	0.6	LOS A	0.0	0.0	Full	121	0.0	0.0
Lane 2	480	4.7	428	4.7	1882	0.227	100	0.0	LOS A	0.0	0.0	Full	121	0.0	0.0
Approach	959	4.6	856 N1	4.6		0.227		0.3	NA	0.0	0.0				
West: Pakuranga Road (West)															
Lane 1	521	6.9	521	6.9	1856	0.281	100	0.0	LOS A	0.0	0.0	Full	108	0.0	0.0
Lane 2	347	6.9	347	6.9	1238	0.281	100	0.0	LOS A	0.0	0.0	Full	108	-33.3 N3	0.0
Approach	868	6.9	868	6.9		0.281		0.0	NA	0.0	0.0				
SouthWest: Pakuranga Plaza															
Lane 1	46	4.3	46	4.3	87	0.527	100	48.9	LOS E	1.1	7.7	Full	196	-27.0 N7	0.0
Approach	46	4.3	46	4.3		0.527		48.9	LOS E	1.1	7.7				
Intersection	1873	5.7	1770 N1	6.0		0.527		1.4	NA	1.1	7.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

Approach Lane Flows (veh/h)

East: Pakuranga Road (East)

Mov. From E To Exit:	L1 SW	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	52	376	428	4.6	1879	0.227	100	NA	NA
Lane 2	-	428	428	4.7	1882	0.227	100	NA	NA
Approach	52	804	856	4.6		0.227			

West: Pakuranga Road (West)

Mov. From W To Exit:	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	521	521	6.9	1856	0.281	100	NA	NA
Lane 2	347	347	6.9	1238	0.281	100	NA	NA
Approach	868	868	6.9		0.281			

SouthWest: Pakuranga Plaza

Mov. From SW To Exit:	L3 W	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	12	34	46	4.3	87	0.527	100	NA	NA
Approach	12	34	46	4.3		0.527			

	Total	%HV	Deg.Satn (v/c)
Intersection	1770	6.0	0.527

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: Pakuranga Road (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
SouthWest Exit: Pakuranga Plaza Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Pakuranga Road (East)															
Lane 1 (B)	28	100.0	28	100.0	665	0.042	100	17.8	LOS B	0.7	9.4	Short	24	0.0	NA
Lane 2	1057	5.1	1057	5.1	1070[1]	0.988	100	74.8	LOS E	88.2	644.3	Full	183	0.0	100.0
Lane 3	1100	5.1	1100	5.1	1114	0.988	100	75.0	LOS E	94.9	693.1	Full	183	0.0	100.0
Lane 4	428	4.3	428	4.3	376[1]	1.138	100	212.5	LOS F	54.4	394.9	Full	183	0.0	87.5[8]
Lane 5	428	4.3	428	4.3	376[1]	1.138	100	212.5	LOS F	54.4	394.9	Short	60	0.0	NA
Approach	3041	5.8	3041	5.8		1.138		113.1	LOS F	94.9	693.1				
NorthWest: Pakuranga Road (West)															
Lane 1	313	5.6	313	5.6	708	0.442	100	26.4	LOS C	11.5	84.1	Full	121	0.0	0.0
Lane 2	313	5.6	313	5.6	708	0.442	100	26.4	LOS C	11.5	84.1	Full	121	0.0	33.3[8]
Lane 3	288	9.4	288	9.4	346	0.832	100	73.3	LOS E	19.5	147.8	Short	98	0.0	NA
Approach	913	6.8	913	6.8		0.832		41.1	LOS D	19.5	147.8				
West: Pakuranga Road Busway Link (Northbound)															
Lane 1 (B)	9	100.0	9	100.0	454	0.020	100	30.7	LOS C	0.4	4.7	Full	215	0.0	0.0
Approach	9	100.0	9	100.0		0.020		30.7	LOS C	0.4	4.7				
SouthWest: Flyover															
Lane 1	108	7.4	108	7.4	362	0.298	100	60.6	LOS E	6.0	44.9	Short	70	0.0	NA
Lane 2	388	4.9	388	4.9	644[1]	0.603	100	42.9	LOS D	19.6	142.7	Full	1162	0.0	0.0
Lane 3	435	4.9	435	4.9	721	0.603	100	44.1	LOS D	22.6	165.1	Full	1162	0.0	0.0
Approach	931	5.2	931	5.2		0.603		45.5	LOS D	22.6	165.1				
Intersection	4894	6.0	4894	6.0		1.138		86.7	LOS F	94.9	693.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

Approach Lane Flows (veh/h)

East: Pakuranga Road (East)

Mov. From E To Exit:	L2 S	L1 SW	R1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	28	-	-	28	100.0	665	0.042	100	0.0	2
Lane 2	-	1057	-	1057	5.1	1070[1]	0.988	100	NA	NA
Lane 3	-	1100	-	1100	5.1	1114	0.988	100	NA	NA
Lane 4	-	-	428	428	4.3	376[1]	1.138	100	NA	NA
Lane 5	-	-	428	428	4.3	376[1]	1.138	100	100.0	4

Approach	28	2157	856	3041	5.8		1.138				
NorthWest: Pakuranga Road (West)											
Mov. From NW To Exit:	L1 E	R2 SW	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	313	-	313	5.6		708	0.442	100	NA	NA	
Lane 2	313	-	313	5.6		708	0.442	100	NA	NA	
Lane 3	-	288	288	9.4		346	0.832	100	53.0	2	
Approach	625	288	913	6.8			0.832				
West: Pakuranga Road Busway Link (Northbound)											
Mov. From W To Exit:	T1 E	Total	%HV			Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	9	9	100.0			454	0.020	100	NA	NA	
Approach	9	9	100.0				0.020				
SouthWest: Flyover											
Mov. From SW To Exit:	L2 NW	R1 E	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	108	-	108	7.4		362	0.298	100	0.0	2	
Lane 2	-	388	388	4.9		644[1]	0.603	100	NA	NA	
Lane 3	-	435	435	4.9		721	0.603	100	NA	NA	
Approach	108	823	931	5.2			0.603				
	Total	%HV	Deg.Satn (v/c)								
Intersection	4894	6.0		1.138							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Pakuranga Road Busway Link (Southbound) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
NorthWest Exit: Pakuranga Road (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
SouthWest Exit: Flyover Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

Project: C:\Users\jacques.vandenheever\Downloads\2028 Final AM.sip9

LANE SUMMARY

Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 144 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Ti Rakau Drive (East)															
Lane 1	515	9.2	515	9.2	560	0.919	100	74.2	LOS E	21.3[N4]	160.7[N4]	Full	110	0.0	50.0
Lane 2	565	9.3	565	9.3	615[1]	0.919	100	65.4	LOS E	21.3[N4]	160.7[N4]	Full	110	0.0	50.0
Lane 3	33	6.1	33	6.1	135	0.244	100	74.4	LOS E	2.0	14.9	Short	86	0.0	NA
Lane 4 (B)	53	100.0	53	100.0	506	0.105	100	3.9	LOS A	0.4	4.6	Full	110	0.0	0.0
Approach	1166	13.3	1166	13.3		0.919		66.8	LOS E	21.3	160.7				
East: Aylesbury Street															
Lane 1	76	9.2	76	9.2	115	0.658	100	76.5	LOS E	5.0	37.5	Short	30	-10.5[N3]	NA
Lane 2	137	9.5	137	9.5	184[1]	0.746	100	70.2	LOS E	7.7[N4]	58.4[N4]	Full	40	0.0	50.0
Approach	213	9.4	213	9.4		0.746		72.5	LOS E	7.7	58.4				
North: Ti Rakau Drive (West)															
Lane 1 (B)	23	100.0	23	100.0	506	0.045	100	3.8	LOS A	0.1	1.9	Full	174	0.0	0.0
Lane 2	148	17.6	146	17.7	205	0.712	100	73.3	LOS E	9.3	74.7	Short	100	0.0	NA
Lane 3	290	16.5	286	16.7	544	0.526	100	40.3	LOS D	14.3	114.5	Full	174	-10.5[N3]	0.0
Lane 4	278	16.5	274	16.7	522[1]	0.526	100	39.9	LOS D	13.6	108.9	Full	174	-10.5[N3]	0.0
Lane 5	15	0.0	15	0.0	141	0.105	100	72.9	LOS E	0.9	6.2	Short	14	0.0	NA
Approach	754	19.0	744[N1]	19.1		0.712		46.1	LOS D	14.3	114.5				
West: Palm Avenue															
Lane 1	120	4.2	120	4.2	313	0.384	100	60.8	LOS E	6.7	48.6	Full	87	-4.0[N7]	0.0
Approach	120	4.2	120	4.2		0.384		60.8	LOS E	6.7	48.6				
Intersection	2253	14.3	2243[N1]	14.4		0.919		60.1	LOS E	21.3	160.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

Approach Lane Flows (veh/h)

South: Ti Rakau Drive (East)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	120	395	-	515	9.2	560	0.919	100	NA	NA
Lane 2	-	565	-	565	9.3	615[1]	0.919	100	NA	NA

Lane 3	-	-	33	33	6.1	135	0.244	100	0.0	2
Lane 4	-	53	-	53	100.0	506	0.105	100	NA	NA
Approach	120	1013	33	1166	13.3		0.919			

East: Aylesbury Street

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	76	-	-	76	9.2	115	0.658	100	35.5	2
Lane 2	-	10	127	137	9.5	184[1]	0.746	100	NA	NA
Approach	76	10	127	213	9.4		0.746			

North: Ti Rakau Drive (West)

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	-	23	-	23	100.0	506	0.045	100	NA	NA
Lane 2	146	-	-	146	17.7	205	0.712	100	0.0	3
Lane 3	-	286	-	286	16.7	544	0.526	100	NA	NA
Lane 4	-	274	-	274	16.7	522[1]	0.526	100	NA	NA
Lane 5	-	-	15	15	0.0	141	0.105	100	0.0	4
Approach	146	583	15	744	19.1		0.712			

West: Palm Avenue

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	51	27	42	120	4.2	313	0.384	100	NA	NA
Approach	51	27	42	120	4.2		0.384			

	Total	%HV	Deg.Satn (v/c)
Intersection	2243	14.4	0.919

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
East Exit: Aylesbury Street Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
West Exit: Palm Avenue Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 146 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	404	12.8	404	12.8	1229	0.328	100	12.3	LOS B	9.0	70.1	Short	50	0.0	NA
Lane 2	404	12.8	404	12.8	1229	0.328	100	12.3	LOS B	9.0	70.1	Full	90	0.0	0.0
Lane 3	474	9.1	474	9.1	464	1.020	100	121.3	LOS F	17.4 N4	131.5 N4	Full	90	-50.0 N3	50.0
Lane 4	474	9.1	474	9.1	464	1.020	100	121.3	LOS F	17.4 N6	131.5 N6	Full	90	-50.0 N3	50.0
Lane 5 (B)	25	100.0	25	100.0	155	0.161	100	32.9	LOS C	0.8	10.1	Full	90	0.0	0.0
Approach	1779	12.0	1779	12.0		1.020		70.6	LOS E	17.4	131.5				
NorthEast: Reeves Road															
Lane 1 (B)	28	100.0	28	100.0	368	0.076	100	23.3	LOS C	0.8	10.0	Full	50	0.0	0.0
Approach	28	100.0	28	100.0		0.076		23.3	LOS C	0.8	10.0				
NorthWest: Ti Rakau Drive (West)															
Lane 1 (B)	22	100.0	22	100.0	184	0.120	100	31.8	LOS C	0.6	8.4	Full	110	0.0	0.0
Lane 2	271	17.2	268	17.3	609	0.440	100	39.0	LOS D	13.0	104.7	Full	110	0.0	10.5
Lane 3	271	17.2	268	17.3	609	0.440	100	39.0	LOS D	13.0	104.7	Full	110	0.0	10.5
Lane 4	100	7.0	99	7.1	217	0.456	100	70.2	LOS E	6.0	44.5	Short	71	0.0	NA
Approach	664	18.4	657 N1	18.5		0.456		43.4	LOS D	13.0	104.7				
SouthWest: Pakuranga Highway															
Lane 1	132	10.6	132	10.6	263	0.502	100	41.8	LOS D	6.1	46.4	Short	72	-50.0 N3	NA
Lane 2	248	12.3	248	12.3	294 1	0.844	100	78.0	LOS E	16.7	129.1	Short	143	0.0	NA
Lane 3	259	12.3	259	12.3	307	0.844	100	78.2	LOS E	17.5	135.7	Short	240	0.0	NA
Lane 4	259	12.3	259	12.3	307	0.844	100	78.2	LOS E	17.5	135.7	Full	623	0.0	0.0
Approach	899	12.0	899	12.0		0.844		72.8	LOS E	17.5	135.7				
Intersection	3370	14.0	3363 N1	14.0		1.020		65.5	LOS E	17.5	135.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N6 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows) but average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE	L2	T1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

To Exit:	SW	NW			veh/h	v/c	%	%	No.
Lane 1	404	-	404	12.8	1229	0.328	100	46.1	2
Lane 2	404	-	404	12.8	1229	0.328	100	NA	NA
Lane 3	-	474	474	9.1	464	1.020	100	NA	NA
Lane 4	-	474	474	9.1	464	1.020	100	NA	NA
Lane 5	-	25	25	100.0	155	0.161	100	NA	NA
Approach	807	972	1779	12.0		1.020			

NorthEast: Reeves Road

Mov. From NE To Exit:	R2 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	28	28	100.0	368	0.076	100	NA	NA
Approach	28	28	100.0		0.076			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	L2 NE	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	9	13	-	22	100.0	184	0.120	100	NA	NA
Lane 2	-	268	-	268	17.3	609	0.440	100	NA	NA
Lane 3	-	268	-	268	17.3	609	0.440	100	NA	NA
Lane 4	-	-	99	99	7.1	217	0.456	100	0.0	3
Approach	9	549	99	657	18.5		0.456			

SouthWest: Pakuranga Highway

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	132	-	132	10.6	263	0.502	100	0.0	2
Lane 2	-	248	248	12.3	294[1]	0.844	100	5.7	3
Lane 3	-	259	259	12.3	307	0.844	100	0.0	4
Lane 4	-	259	259	12.3	307	0.844	100	NA	NA
Approach	132	767	899	12.0		0.844			

	Total	%HV	Deg.Satn (v/c)
Intersection	3363	14.0	1.020

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
NorthEast Exit: Reeves Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
SouthWest Exit: Pakuranga Highway Merge Type: **Zipper**												
Exit Short Lane	1	280	50.0	251	266	2.50	2.00	404	1477	0.273	0.0	0.2
Merge Lane	2	-	50.0	202	215	2.50	2.00	502	1545	0.325	0.0	0.1
SouthWest Exit: Pakuranga Highway Merge Type: **Zipper**												
Exit Short Lane	3	10	50.0	202	215	2.50	2.00	99	1545	0.064	0.0	0.1
Merge Lane	2	-	50.0	49	51	2.50	2.00	404	1743	0.232	0.0	0.0

CCG LANE SUMMARY

Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd]

Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 112 seconds (CCG User-Given Phase Times)

Lane Use and Performance (CCG)

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]															
SouthEast: Reeves Road (East)															
Lane 1	136	8.1	136	8.1	330	0.412	100	14.9	LOS B	2.4	18.0	Full	27	-8.6 N7	0.0
Approach	136	8.1	136	8.1		0.412		14.9	LOS B	2.4	18.0				
East: Pakuranga Rd Busway Link (Southbound)															
Lane 1 (B)	28	100.0	28	100.0	142	0.197	100	54.1	LOS D	1.3	16.8	Full	203	0.0	0.0
Approach	28	100.0	28	100.0		0.197		54.1	LOS D	1.3	16.8				
NorthWest: Aylesbury Street															
Lane 1	21	0.0	21	0.0	141	0.149	100	51.4	LOS D	1.0	6.8	Full	284	-31.1 N7	0.0
Approach	21	0.0	21	0.0		0.149		51.4	LOS D	1.0	6.8				
SouthWest: Reeves Road (South)															
Lane 1	116	22.5	115	22.6	193	0.596	100	48.0	LOS D	5.4	45.1	Full	180	-42.6 N7	0.0
Approach	116	22.5	115 N1	22.6		0.596		48.0	LOS D	5.4	45.1				
Intersection	301	21.6	300 N1	21.7		0.596		33.8	LOS C	5.4	45.1				
Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]															
SouthEast: Reeves Rd (East)															
Lane 1	303	8.3	303	8.3	321 1	0.943	100	76.2	LOS E	18.7	140.1	Full	810	0.0	0.0
Lane 2	108	7.4	108	7.4	376	0.287	100	43.4	LOS D	4.5	33.6	Short	45	0.0	NA
Approach	411	8.0	411	8.0		0.943		67.6	LOS E	18.7	140.1				
NorthWest: Reeves Rd (West)															
Lane 1	107	15.0	107	15.0	464	0.230	100	43.1	LOS D	4.8	37.9	Full	27	0.0	46.2
Approach	107	15.0	107	15.0		0.230		43.1	LOS D	4.8	37.9				
SouthWest: William Roberts Road (South)															
Lane 1	333	12.3	332	12.3	351	0.947	100	75.2	LOS E	21.0	162.3	Full	223	0.0	0.0
Approach	333	12.3	332 N1	12.3		0.947		75.2	LOS E	21.0	162.3				
Intersection	851	10.6	849 N1	10.6		0.947		67.5	LOS E	21.0	162.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

Approach Lane Flows (CCG) (veh/h)

Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]

SouthEast: Reeves Road (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	101	35	136	8.1	330	0.412	100	NA	NA
Approach	101	35	136	8.1		0.412			

East: Pakuranga Rd Busway Link (Southbound)

Mov. From E To Exit:	L1 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	28	28	100.0	142	0.197	100	NA	NA
Approach	28	28	100.0		0.197			

NorthWest: Aylesbury Street

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	11	10	21	0.0	141	0.149	100	NA	NA
Approach	11	10	21	0.0		0.149			

SouthWest: Reeves Road (South)

Mov. From SW To Exit:	L2 NW	T1 NE	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	12	9	95	115	22.6	193	0.596	100	NA	NA
Approach	12	9	95	115	22.6		0.596			

	Total	%HV	Deg.Satn (v/c)
Intersection	300	21.7	0.596

Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]

SouthEast: Reeves Rd (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	303	-	303	8.3	321[1]	0.943	100	NA	NA
Lane 2	-	108	108	7.4	376	0.287	100	0.0	1
Approach	303	108	411	8.0		0.943			

NorthWest: Reeves Rd (West)

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	85	22	107	15.0	464	0.230	100	NA	NA
Approach	85	22	107	15.0		0.230			

SouthWest: William Roberts Road (South)

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	25	307	332	12.3	351	0.947	100	NA	NA
Approach	25	307	332	12.3		0.947			

	Total	%HV	Deg.Satn (v/c)
Intersection	849	10.6	0.947

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis (CCG)

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
Site: 5.2v [5.2 Aylesbury St/ Reeves Rd/ Busway Link signalised]												
SouthEast Exit: Reeves Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Pakuranga Rd Busway Link (Northbound) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Aylesbury Street Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Reeves Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]												
SouthEast Exit: Reeves Rd (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Reeves Rd (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: William Roberts Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

CCG LANE SUMMARY

Common Control Group: CCG2 [WRR / Mattson]

Network: N101 [AM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (CCG User-Given Phase Times)

Lane Use and Performance (CCG)

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]															
SouthEast: Ti Rakau Drive (East)															
Lane 1	535	11.2	535	11.2	953	0.561	100	5.7	LOS A	7.1	54.7	Full	60	0.0	6.7
Lane 2	535	11.2	535	11.2	953	0.561	100	1.1	LOS A	1.6	12.3	Full	60	0.0	0.0
Lane 3	442	11.2	442	11.2	788	0.561	100	1.1	LOS A	1.3	10.1	Full	60	-17.4 N7	0.0
Lane 4	96	8.3	96	8.3	123 1	0.778	100	58.9	LOS E	4.8	36.3	Short	20	0.0	NA
Lane 5 (B)	25	100.0	25	100.0	630	0.040	100	0.6	LOS A	0.0	0.3	Full	60	0.0	0.0
Approach	1633	12.4	1633	12.4		0.778		6.0	LOS A	7.1	54.7				
NorthEast: William Roberts Road Extension															
Lane 1	165	10.3	165	10.3	313	0.527	100	46.9	LOS D	7.3	56.0	Short	80	0.0	NA
Lane 2	167	8.4	167	8.4	183	0.910	100	70.4	LOS E	9.7	73.0	Full	110	-17.4 N7	0.0
Approach	332	9.3	332	9.3		0.910		58.7	LOS E	9.7	73.0				
NorthWest: Ti Rakau Drive (West)															
Lane 1	359	11.6	358	11.6	706	0.507	100	23.6	LOS C	10.9	83.8	Full	107	0.0	0.0
Lane 2	474	15.2	472	15.3	930	0.507	100	17.9	LOS B	14.5	114.6	Full	107	0.0	21.3
Lane 3	474	15.2	472	15.3	930	0.507	100	17.9	LOS B	14.5	114.6	Full	107	0.0	21.3
Lane 4 (B)	13	100.0	13	100.0	630	0.021	100	0.6	LOS A	0.0	0.2	Full	107	0.0	0.0
Approach	1320	15.1	1314 N 1	15.1		0.507		19.3	LOS B	14.5	114.6				
Intersection	3285	13.2	3279 N 1	13.2		0.910		16.7	LOS B	14.5	114.6				
Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]															
SouthEast: Ti Rakau Drive (East)															
Lane 1	256	10.4	256	10.4	285	0.898	100	73.0	LOS E	15.3	116.8	Short	25	-46.3 N3	NA
Lane 2	472	11.1	472	11.1	525 1	0.898	100	40.5	LOS D	21.2	162.6	Full	143	-1.5 N7	26.7
Lane 3	857	11.1	857	11.1	954	0.898	100	37.0	LOS D	27.3 N4	209.0 N4	Full	143	0.0	50.0
Lane 4 (B)	25	100.0	25	100.0	620	0.040	100	13.3	LOS B	0.6	7.4	Full	143	0.0	0.0
Approach	1609	12.4	1609	12.4		0.898		43.4	LOS D	27.3	209.0				
NorthWest: Ti Rakau Drive (West)															
Lane 1	131	14.4	131	14.5	935	0.140	27 6	28.8	LOS C	5.8	45.7	Full	60	0.0	0.0
Lane 2	482	14.4	480	14.5	935	0.513	100	4.4	LOS A	4.8	38.0	Full	60	0.0	0.0
Lane 3	482	14.4	480	14.5	935	0.513	100	1.0	LOS A	1.2	9.8	Full	60	0.0	0.0
Lane 4	26	15.4	26	15.4	303	0.086	100	52.9	LOS D	1.2	9.8	Short	25	0.0	NA
Lane 5 (B)	13	100.0	13	100.0	620	0.021	100	1.5	LOS A	0.0	0.4	Full	60	0.0	0.0
Approach	1134	15.4	1130 N 1	15.5		0.513		6.9	LOS A	5.8	45.7				
SouthWest: Mattson Road															
Lane 1	54	7.4	54	7.4	160	0.338	100	49.2	LOS D	2.4	17.8	Full	282	-50.0 N3	0.0
Lane 2	25	12.0	25	12.0	217	0.115	100	51.5	LOS D	1.1	8.4	Full	282	0.0	0.0
Approach	79	8.9	79	8.9		0.338		50.0	LOS D	2.4	17.8				
Intersection	2822	13.5	2818 N 1	13.5		0.898		28.9	LOS C	27.3	209.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	R2 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	535	-	535	11.2	953	0.561	100	NA	NA
Lane 2	535	-	535	11.2	953	0.561	100	NA	NA
Lane 3	442	-	442	11.2	788	0.561	100	NA	NA
Lane 4	-	96	96	8.3	123[1]	0.778	100	70.7	3
Lane 5	25	-	25	100.0	630	0.040	100	NA	NA
Approach	1537	96	1633	12.4		0.778			

NorthEast: William Roberts Road Extension

Mov. From NE To Exit:	L2 SE	R2 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	165	-	165	10.3	313	0.527	100	0.0	2
Lane 2	-	167	167	8.4	183	0.910	100	NA	NA
Approach	165	167	332	9.3		0.910			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	L2 NE	T1 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	347	10	358	11.6	706	0.507	100	NA	NA
Lane 2	-	472	472	15.3	930	0.507	100	NA	NA
Lane 3	-	472	472	15.3	930	0.507	100	NA	NA
Lane 4	-	13	13	100.0	630	0.021	100	NA	NA
Approach	347	967	1314	15.1		0.507			

	Total	%HV	Deg.Satn (v/c)
Intersection	3279	13.2	0.910

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	221	256	10.4	285	0.898	100	100.0	2

Lane 2	-	472	472	11.1	525[1]	0.898	100	NA	NA
Lane 3	-	857	857	11.1	954	0.898	100	NA	NA
Lane 4	-	25	25	100.0	620	0.040	100	NA	NA
Approach	35	1574	1609	12.4		0.898			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	131	-	131	14.5	935	0.140	27[6]	NA	NA
Lane 2	480	-	480	14.5	935	0.513	100	NA	NA
Lane 3	480	-	480	14.5	935	0.513	100	NA	NA
Lane 4	-	26	26	15.4	303	0.086	100	0.0	3
Lane 5	13	-	13	100.0	620	0.021	100	NA	NA
Approach	1104	26	1130	15.5		0.513			

SouthWest: Mattson Road

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	54	-	54	7.4	160	0.338	100	NA	NA
Lane 2	-	25	25	12.0	217	0.115	100	NA	NA
Approach	54	25	79	8.9		0.338			

	Total	%HV	Deg.Satn (v/c)
Intersection	2818	13.5	0.898

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

6 Lane under-utilisation due to downstream effects

Merge Analysis (CCG)

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]												
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]												
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Priority**												
Exit Short Lane	1	40	0.0	480	515	3.00	2.00	131	1271	0.103	0.9	1.1
Merge Lane	2	-	100.0	Merge Lane is not Opposed				480	1800	0.267	0.0	0.0
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
SouthWest Exit: Mattson Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: AM)]

Network: N101 [AM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: William Roberts Road (North)															
Lane 1	368	8.7	368	8.7	1593	0.231	100	1.9	LOS A	0.7	5.1	Full	223	0.0	0.0
Approach	368	8.7	368	8.7		0.231		1.9	NA	0.7	5.1				
NorthWest: Cortina Place															
Lane 1	92	13.0	92	13.1	740	0.124	100	5.3	LOS A	0.3	2.7	Full	177	0.0	0.0
Approach	92	13.0	92	13.1		0.124		5.3	LOS A	0.3	2.7				
SouthWest: William Roberts Road (South)															
Lane 1	447	11.0	445	11.0	1740	0.256	100	0.7	LOS A	0.0	0.0	Full	110	0.0	0.0
Approach	447	11.0	445[N1]	11.0		0.256		0.7	NA	0.0	0.0				
Intersection	907	10.3	905[N1]	10.3		0.256		1.7	NA	0.7	5.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Approach Lane Flows (veh/h)

NorthEast: William Roberts Road (North)

Mov. From NE To Exit:	T1 SW	R2 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	284	84	368	8.7	1593	0.231	100	NA	NA
Approach	284	84	368	8.7		0.231			

NorthWest: Cortina Place

Mov. From NW To Exit:	L2 NE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	29	63	92	13.1	740	0.124	100	NA	NA
Approach	29	63	92	13.1		0.124			

SouthWest: William Roberts Road (South)

Mov. From SW To Exit:	L2 NW	T1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	149	296	445	11.0	1740	0.256	100	NA	NA
Approach	149	296	445	11.0		0.256			

	Total	%HV	Deg.Satn (v/c)

Intersection	905	10.3	0.256

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
NorthEast Exit: William Roberts Road (North) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Cortina Place Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: William Roberts Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 13.0 [13.0 Gossamer Dr / Ti Rakau Dr (Site Folder: PM)] Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Fremantle Place															
Lane 1	12	8.3	12	8.3	82	0.146	100	82.3	LOS F	0.8	5.9	Short	9	0.0	NA
Lane 2	27	7.4	27	7.4	84	0.321	100	81.8	LOS F	1.8	13.5	Full	285	0.0	0.0
Approach	39	7.7	39	7.7		0.321		82.0	LOS F	1.8	13.5				
East: Ti Rakau Drive (East)															
Lane 1	788	7.7	788	7.7	884	0.891	100	46.1	LOS D	51.1	381.5	Full	636	0.0	0.0
Lane 2	756	7.7	756	7.7	848[1]	0.891	100	45.6	LOS D	48.1	359.2	Full	636	0.0	0.0
Lane 3 (B)	28	100.0	28	100.0	235	0.119	100	35.0	LOS D	1.2	15.5	Short	60	0.0	NA
Lane 4	259	5.6	259	5.6	261	0.994	82[6]	118.0	LOS F	22.8	167.3	Short	150	0.0	NA
Lane 5	316	5.6	316	5.6	261	1.212	100	273.5	LOS F	44.3	324.5	Short	103	0.0	NA
Approach	2147	8.3	2147	8.3		1.212		87.9	LOS F	51.1	381.5				
North: Gossamer Drive															
Lane 1	167	8.7	167	8.7	321	0.518	100	56.1	LOS E	8.2	61.6	Short	150	0.0	NA
Lane 2	168	8.7	168	8.7	325	0.518	100	56.1	LOS E	8.3	62.2	Full	1010	0.0	0.0
Lane 3	59	5.1	59	5.1	72	0.821	100	90.6	LOS F	4.3	31.2	Short	28	0.0	NA
Approach	394	8.1	394	8.1		0.821		61.3	LOS E	8.3	62.2				
West: Ti Rakau Drive (West)															
Lane 1	116	1.7	116	1.7	815	0.142	100	30.4	LOS C	4.4	31.2	Short	28	0.0	NA
Lane 2	597	8.6	597	8.6	537[1]	1.112	100	183.5	LOS F	71.8	539.8	Full	479	0.0	25.9
Lane 3	630	8.6	630	8.6	566[1]	1.112	100	182.5	LOS F	75.5	567.6	Full	479	0.0	30.5
Lane 4	58	1.7	58	1.7	210	0.276	100	68.3	LOS E	3.4	24.5	Short	23	0.0	NA
Lane 5 (B)	27	100.0	27	100.0	239	0.113	100	34.9	LOS C	1.1	14.9	Full	479	0.0	0.0
Approach	1428	9.5	1428	9.5		1.112		163.1	LOS F	75.5	567.6				
Intersection	4008	8.7	4008	8.7		1.212		112.0	LOS F	75.5	567.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
6 Lane under-utilisation due to downstream effects

Approach Lane Flows (veh/h)

South: Fremantle Place

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	12	-	-	12	8.3	82	0.146	100	0.0	2
Lane 2	-	10	17	27	7.4	84	0.321	100	NA	NA

Approach	12	10	17	39	7.7			0.321			
East: Ti Rakau Drive (East)											
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	17	771	-	788	7.7		884	0.891	100	NA	NA
Lane 2	-	756	-	756	7.7		848[1]	0.891	100	NA	NA
Lane 3	-	28	-	28	100.0		235	0.119	100	0.0	2
Lane 4	-	-	259	259	5.6		261	0.994	82[6]	87.8	2
Lane 5	-	-	316	316	5.6		261	1.212	100	100.0	4
Approach	17	1555	575	2147	8.3			1.212			
North: Gossamer Drive											
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	167	-	-	167	8.7		321	0.518	100	0.0	2
Lane 2	168	-	-	168	8.7		325	0.518	100	NA	NA
Lane 3	-	10	49	59	5.1		72	0.821	100	25.0	2
Approach	335	10	49	394	8.1			0.821			
West: Ti Rakau Drive (West)											
Mov. From W To Exit:	L2 N	T1 E	R2 S	U W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	116	-	-	-	116	1.7	815	0.142	100	24.8	2
Lane 2	-	597	-	-	597	8.6	537[1]	1.112	100	NA	NA
Lane 3	-	630	-	-	630	8.6	566[1]	1.112	100	NA	NA
Lane 4	-	-	10	48	58	1.7	210	0.276	100	20.7	3
Lane 5	-	27	-	-	27	100.0	239	0.113	100	NA	NA
Approach	116	1254	10	48	1428	9.5		1.112			
	Total	%HV	Deg.Satn (v/c)								
Intersection	4008	8.7	1.212								

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

6 Lane under-utilisation due to downstream effects

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Fremantle Place Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: Gossamer Drive Merge Type: **Zipper**												
Exit Short Lane	1	150	50.0	130	134	2.50	2.00	385	1646	0.234	0.0	0.1
Merge Lane	2	-	50.0	193	197	2.50	2.00	261	1568	0.166	0.0	0.1
West Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												

Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.
Full Length Lane	3	Merge Analysis not applied.

LANE SUMMARY

Site: 1.0 [1.0 Pakuranga Rd / Ti Rakau Dr (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Ti Rakau Drive															
Lane 1	232	7.3	230	7.3	474	0.486	100	38.1	LOS D	8.6	63.7	Full	174	0.0	0.0
Lane 2	232	7.3	230	7.3	474	0.486	100	38.1	LOS D	8.6	63.7	Full	174	0.0	0.0
Lane 3	97	5.2	96	5.2	481	0.200	100	35.0	LOS D	3.3	23.8	Short	87	0.0	NA
Lane 4 (B)	23	100.0	23	100.0	285	0.081	100	25.2	LOS C	0.5	6.7	Full	174	0.0	0.0
Approach	584	10.6	580 N1	10.6		0.486		37.0	LOS D	8.6	63.7				
East: Pakuranga Road (East)															
Lane 1	65	10.8	61	10.8	484	0.126	100	32.9	LOS C	2.0	15.1	Short	21	-2.7 N3	NA
Lane 2	427	5.3	401	5.3	484 1	0.828	100	40.9	LOS D	17.7	129.6	Full	98	0.0	40.7
Lane 3	480	5.3	450	5.3	544	0.828	100	41.4	LOS D	19.6 N4	143.2 N4	Full	98	0.0	50.0
Approach	972	5.7	912 N1	5.7		0.828		40.6	LOS D	19.6	143.2				
West: Pakuranga Road (West)															
Lane 1 (B)	53	100.0	53	100.0	285	0.186	100	25.8	LOS C	1.3	16.4	Full	380	0.0	0.0
Lane 2	440	5.1	440	5.1	544	0.808	100	39.8	LOS D	19.3	141.3	Full	380	0.0	0.0
Lane 3	440	5.1	440	5.1	544	0.808	100	39.8	LOS D	19.3	141.3	Full	380	0.0	0.0
Lane 4	358	8.5	358	8.5	440	0.814	100	47.7	LOS D	16.3	122.3	Short	178	-2.7 N3	NA
Lane 5	369	8.5	369	8.5	453	0.814	100	47.5	LOS D	16.7	125.3	Short	105	0.0	NA
Approach	1660	9.6	1660	9.6		0.814		42.8	LOS D	19.3	141.3				
Intersection	3216	8.6	3152 N1	8.8		0.828		41.1	LOS D	19.6	143.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

South: Ti Rakau Drive

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	230	-	230	7.3	474	0.486	100	NA	NA
Lane 2	230	-	230	7.3	474	0.486	100	NA	NA
Lane 3	-	96	96	5.2	481	0.200	100	0.0	2
Lane 4	23	-	23	100.0	285	0.081	100	NA	NA
Approach	483	96	580	10.6		0.486			
East: Pakuranga Road (East)									

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	61	-	61	10.8	484	0.126	100	0.0	2
Lane 2	-	401	401	5.3	484[1]	0.828	100	NA	NA
Lane 3	-	450	450	5.3	544	0.828	100	NA	NA
Approach	61	851	912	5.7		0.828			

West: Pakuranga Road (West)

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	-	53	53	100.0	285	0.186	100	NA	NA
Lane 2	440	-	440	5.1	544	0.808	100	NA	NA
Lane 3	440	-	440	5.1	544	0.808	100	NA	NA
Lane 4	-	358	358	8.5	440	0.814	100	0.0	3
Lane 5	-	369	369	8.5	453	0.814	100	31.2	4
Approach	880	780	1660	9.6		0.814			

	Total	%HV	Deg.Satn (v/c)
Intersection	3152	8.8	0.828

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate sec	Capacity veh/h	Deg. Satn veh/h	Min. Delay v/c	Merge Delay sec	sec
South Exit: Ti Rakau Drive Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: Pakuranga Road (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

LANE SUMMARY

Site: 2.1 [2.1 Pakuranga Plaza / Pakuranga Rd (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Pakuranga Road (East)															
Lane 1	479	5.8	448	5.9	1867	0.240	100	0.3	LOS A	0.0	0.0	Full	121	0.0	0.0
Lane 2	481	5.7	449	5.7	1870	0.240	100	0.0	LOS A	0.0	0.0	Full	121	0.0	0.0
Approach	960	5.7	897[N1]	5.8		0.240		0.1	NA	0.0	0.0				
West: Pakuranga Road (West)															
Lane 1	492	5.1	492	5.1	1878	0.262	100	0.0	LOS A	0.6[N5]	4.7[N5]	Full	108	0.0	0.0
Lane 2	492	5.1	492	5.1	1878	0.262	100	0.0	LOS A	0.6[N5]	4.1[N5]	Full	108	0.0	0.0
Approach	984	5.1	983[N1]	5.1		0.262		0.0	NA	0.6	4.7				
SouthWest: Pakuranga Plaza															
Lane 1	106	4.7	106	4.7	317	0.334	100	7.3	LOS A	0.6	4.2	Full	196	-37.6[N7]	0.0
Approach	106	4.7	106	4.7		0.334		7.3	LOS A	0.6	4.2				
Intersection	2050	5.4	1986[N1]	5.5		0.334		0.5	NA	0.6	4.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N5 Continuous Lane results determined by Back of Queue values of downstream lanes (proportional to lane movement flows).
N7 The capacity reduction has been determined from the queue blockage probability of a Site further downstream due to intermediate continuous lanes.

Approach Lane Flows (veh/h)

East: Pakuranga Road (East)

Mov. From E To Exit:	L1 SW	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	426	448	5.9	1867	0.240	100	NA	NA
Lane 2	-	449	449	5.7	1870	0.240	100	NA	NA
Approach	21	875	897	5.8		0.240			

West: Pakuranga Road (West)

Mov. From W To Exit:	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	492	492	5.1	1878	0.262	100	NA	NA
Lane 2	492	492	5.1	1878	0.262	100	NA	NA
Approach	983	983	5.1		0.262			

SouthWest: Pakuranga Plaza

Mov. From SW To Exit:	L3 W	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	42	64	106	4.7	317	0.334	100	NA	NA
Approach	42	64	106	4.7		0.334			

	Total	%HV	Deg.Satn (v/c)
Intersection	1986	5.5	0.334

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate sec veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
West Exit: Pakuranga Road (West) Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
SouthWest Exit: Pakuranga Plaza Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 3.0 [3.0 Pakuranga Highway / Pakuranga Rd (Site Folder: PM)] — Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Pakuranga Road (East)															
Lane 1 (B)	9	100.0	9	100.0	701	0.013	100	15.6	LOS B	0.2	2.7	Short	24	0.0	NA
Lane 2	518	5.1	518	5.1	1152[1]	0.449	100	17.7	LOS B	16.6	121.2	Full	183	0.0	0.0
Lane 3	528	5.1	528	5.1	1176	0.449	100	17.8	LOS B	17.1	124.7	Full	183	0.0	0.0
Lane 4	418	5.0	418	5.0	386[1]	1.082	100	169.7	LOS F	47.6	347.5	Full	183	0.0	75.0[8]
Lane 5	418	5.0	418	5.0	386[1]	1.082	100	169.7	LOS F	47.6	347.5	Short	60	0.0	NA
Approach	1891	5.5	1891	5.5		1.082		84.9	LOS F	47.6	347.5				
NorthWest: Pakuranga Road (West)															
Lane 1	474	4.9	473	4.9	527	0.897	100	57.4	LOS E	24.2[N4]	176.8[N4]	Full	121	0.0	50.0
Lane 2	474	4.9	473	4.9	527	0.897	100	57.4	LOS E	24.2[N4]	176.8[N4]	Full	121	0.0	50.0
Lane 3	95	7.4	95	7.4	222	0.427	100	71.0	LOS E	5.9	43.6	Short	98	0.0	NA
Approach	1042	5.1	1041[N1]	5.1		0.897		58.6	LOS E	24.2	176.8				
West: Pakuranga Road Busway Link (Northbound)															
Lane 1 (B)	28	100.0	28	100.0	525	0.053	100	25.5	LOS C	1.0	13.5	Full	215	0.0	0.0
Approach	28	100.0	28	100.0		0.053		25.5	LOS C	1.0	13.5				
SouthWest: Flyover															
Lane 1	124	10.5	124	10.5	225	0.552	100	73.3	LOS E	7.8	59.5	Short	70	0.0	NA
Lane 2	711	4.3	711	4.3	742[1]	0.958	100	75.6	LOS E	54.4	395.0	Full	1162	0.0	0.0
Lane 3	803	4.3	803	4.3	838	0.958	100	75.7	LOS E	64.0	464.6	Full	1162	0.0	0.0
Approach	1638	4.8	1638	4.8		0.958		75.5	LOS E	64.0	464.6				
Intersection	4599	5.7	4598[N1]	5.7		1.082		75.2	LOS E	64.0	464.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

East: Pakuranga Road (East)

Mov. From E To Exit:	L2 S	L1 SW	R1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	9	-	-	9	100.0	701	0.013	100	0.0	2
Lane 2	-	518	-	518	5.1	1152[1]	0.449	100	NA	NA
Lane 3	-	528	-	528	5.1	1176	0.449	100	NA	NA

Lane 4	-	-	418	418	5.0	386[1]	1.082	100	NA	NA
Lane 5	-	-	418	418	5.0	386[1]	1.082	100	100.0	4
Approach	9	1046	836	1891	5.5		1.082			

NorthWest: Pakuranga Road (West)

Mov. From NW To Exit:	L1 E	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	473	-	473	4.9	527	0.897	100	NA	NA
Lane 2	473	-	473	4.9	527	0.897	100	NA	NA
Lane 3	-	95	95	7.4	222	0.427	100	0.0	2
Approach	946	95	1041	5.1		0.897			

West: Pakuranga Road Busway Link (Northbound)

Mov. From W To Exit:	T1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	28	28	100.0	525	0.053	100	NA	NA
Approach	28	28	100.0		0.053			

SouthWest: Flyover

Mov. From SW To Exit:	L2 NW	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	124	-	124	10.5	225	0.552	100	0.3	2
Lane 2	-	711	711	4.3	742[1]	0.958	100	NA	NA
Lane 3	-	803	803	4.3	838	0.958	100	NA	NA
Approach	124	1514	1638	4.8		0.958			

	Total	%HV	Deg.Satn (v/c)
Intersection	4598	5.7	1.082

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Pakuranga Road Busway Link (Southbound) Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: Pakuranga Road (East) Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
Full Length Lane	3	Merge Analysis not applied.									
NorthWest Exit: Pakuranga Road (West) Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									
SouthWest Exit: Flyover Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
Full Length Lane	2	Merge Analysis not applied.									

CCG LANE SUMMARY

Common Control Group: CCG3 [Aylesbury/ WR/ Reeves Rd] Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 108 seconds (CCG User-Given Phase Times)

Lane Use and Performance (CCG)

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised]															
SouthEast: Reeves Road (East)															
Lane 1	50	6.0	49	6.0	198	0.246	100	26.9	LOS C	1.3	9.2	Full	27	0.0	0.0
Approach	50	6.0	49[N1]	6.0		0.246		26.9	LOS C	1.3	9.2				
East: Pakuranga Rd Busway Link (Northbound)															
Lane 1 (B)	9	100.0	9	100.0	116	0.078	100	54.1	LOS D	0.4	5.3	Full	203	0.0	0.0
Approach	9	100.0	9	100.0		0.078		54.1	LOS D	0.4	5.3				
NorthWest: Aylesbury Street															
Lane 1	126	4.0	126	4.0	173	0.724	100	51.1	LOS D	6.2	45.0	Full	284	-47.9[N3]	0.0
Approach	126	4.0	126	4.0		0.724		51.1	LOS D	6.2	45.0				
SouthWest: Reeves Road (South)															
Lane 1	202	21.3	199	21.5	264	0.751	100	45.6	LOS D	9.5	78.9	Full	180	-44.7[N3]	0.0
Approach	202	21.3	199[N1]	21.5		0.751		45.6	LOS D	9.5	78.9				
Intersection	387	15.5	382[N1]	15.7		0.751		45.2	LOS D	9.5	78.9				
Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]															
SouthEast: Reeves Rd (East)															
Lane 1	121	4.1	121	4.1	200	0.604	100	56.2	LOS E	5.7	41.3	Full	810	0.0	0.0
Lane 2	28	3.6	28	3.6	208	0.134	100	50.3	LOS D	1.2	8.8	Short	45	0.0	NA
Approach	149	4.0	149	4.0		0.604		55.1	LOS E	5.7	41.3				
NorthWest: Reeves Rd (West)															
Lane 1	283	7.1	280	7.1	591	0.474	100	32.0	LOS C	5.3[N4]	39.5[N4]	Full	27	0.0	50.0
Approach	283	7.1	280[N1]	7.1		0.474		32.0	LOS C	5.3	39.5				
SouthWest: William Roberts Road (South)															
Lane 1	440	5.9	415	6.0	511	0.811	100	45.5	LOS D	19.7	145.3	Full	223	0.0	0.0
Approach	440	5.9	415[N1]	6.0		0.811		45.5	LOS D	19.7	145.3				
Intersection	872	6.0	844[N1]	6.2		0.811		42.7	LOS D	19.7	145.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (CCG) (veh/h)

Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised]

SouthEast: Reeves Road (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	37	12	49	6.0	198	0.246	100	NA	NA
Approach	37	12	49	6.0		0.246			

East: Pakuranga Rd Busway Link (Northbound)

Mov. From E To Exit:	L1 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	9	9	100.0	116	0.078	100	NA	NA
Approach	9	9	100.0		0.078			

NorthWest: Aylesbury Street

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	116	10	126	4.0	173	0.724	100	NA	NA
Approach	116	10	126	4.0		0.724			

SouthWest: Reeves Road (South)

Mov. From SW To Exit:	L2 NW	T1 NE	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	10	28	160	199	21.5	264	0.751	100	NA	NA
Approach	10	28	160	199	21.5		0.751			

	Total	%HV	Deg.Satn (v/c)
Intersection	382	15.7	0.751

Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]

SouthEast: Reeves Rd (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	121	-	121	4.1	200	0.604	100	NA	NA
Lane 2	-	28	28	3.6	208	0.134	100	0.0	1
Approach	121	28	149	4.0		0.604			

NorthWest: Reeves Rd (West)

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	212	68	280	7.1	591	0.474	100	NA	NA
Approach	212	68	280	7.1		0.474			

SouthWest: William Roberts Road (South)

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	20	395	415	6.0	511	0.811	100	NA	NA

Approach	20	395	415	6.0		0.811

	Total	%HV	Deg.Satn (v/c)
Intersection	844	6.2	0.811

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis (CCG)

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
Site: 5.2v [5.2 Aylesbury St/ Reeves Road/ Busway Link signalised]												
SouthEast Exit: Reeves Road (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Pakuranga Rd Busway Link (Southbound) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Aylesbury Street Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Reeves Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Site: 7.3v [7.3 William Roberts Rd / Reeves Rd signalised]												
SouthEast Exit: Reeves Rd (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Reeves Rd (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: William Roberts Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 7.1 [7.1 William Roberts Rd / Cortina Pl (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: William Roberts Road (North)															
Lane 1	192	6.3	191	6.2	1767	0.108	100	0.7	LOS A	0.1	0.9	Full	223	0.0	0.0
Approach	192	6.3	191[N1]	6.2		0.108		0.7	NA	0.1	0.9				
NorthWest: Cortina Place															
Lane 1	229	10.5	228	10.5	732	0.312	100	6.3	LOS A	1.1	8.3	Full	177	0.0	0.0
Approach	229	10.5	228[N1]	10.5		0.312		6.3	LOS A	1.1	8.3				
SouthWest: William Roberts Road (South)															
Lane 1	563	6.0	529	6.1	1805	0.293	100	0.5	LOS A	0.0	0.0	Full	110	0.0	0.0
Approach	563	6.0	529[N1]	6.1		0.293		0.5	NA	0.0	0.0				
Intersection	984	7.1	948[N1]	7.4		0.312		1.9	NA	1.1	8.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Approach Lane Flows (veh/h)

NorthEast: William Roberts Road (North)

Mov. From NE To Exit:	T1 SW	R2 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	178	13	191	6.2	1767	0.108	100	NA	NA
Approach	178	13	191	6.2		0.108			

NorthWest: Cortina Place

Mov. From NW To Exit:	L2 NE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	31	197	228	10.5	732	0.312	100	NA	NA
Approach	31	197	228	10.5		0.312			

SouthWest: William Roberts Road (South)

Mov. From SW To Exit:	L2 NW	T1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	122	407	529	6.1	1805	0.293	100	NA	NA
Approach	122	407	529	6.1		0.293			

	Total	%HV	Deg.Satn (v/c)

Intersection	948	7.4	0.312

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
NorthEast Exit: William Roberts Road (North) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Cortina Place Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: William Roberts Road (South) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 4.0 [4.0 Palm Ave / Aylesbury St (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 149 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Ti Rakau Drive (East)															
Lane 1	283	8.3	282	8.3	420	0.670	100	56.5	LOS E	14.9	112.1	Full	110	0.0	16.7
Lane 2	353	7.2	351	7.2	524[1]	0.670	100	49.9	LOS D	20.0	148.5	Full	110	0.0	42.6
Lane 3	49	6.1	49	6.1	345	0.141	100	58.0	LOS E	2.6	19.3	Short	86	0.0	NA
Lane 4 (B)	23	100.0	23	100.0	313	0.074	100	15.7	LOS B	0.5	6.2	Full	110	0.0	0.0
Approach	708	10.6	704[N1]	10.6		0.670		52.0	LOS D	20.0	148.5				
East: Aylesbury Street															
Lane 1	36	5.6	35	5.6	337	0.104	100	54.9	LOS D	1.9	13.7	Short	30	0.0	NA
Lane 2	84	6.0	82	6.0	347	0.235	100	55.7	LOS E	4.5	33.0	Full	40	0.0	0.0
Approach	120	5.8	117[N1]	5.8		0.235		55.5	LOS E	4.5	33.0				
North: Ti Rakau Drive (West)															
Lane 1 (B)	53	100.0	53	100.0	313	0.170	100	16.2	LOS B	1.2	15.1	Full	174	0.0	0.0
Lane 2	290	9.7	289	9.7	336	0.858	100	76.3	LOS E	20.0	151.9	Short	100	0.0	NA
Lane 3	250	8.8	249	8.8	283	0.879	100	77.7	LOS E	17.8	133.8	Full	174	0.0	2.7[8]
Lane 4	225	8.8	224	8.8	255[1]	0.879	100	77.4	LOS E	15.8	119.2	Full	174	0.0	0.0
Lane 5	30	3.3	30	3.3	109	0.274	100	79.8	LOS E	1.9	14.0	Short	14	0.0	NA
Approach	848	14.6	844[N1]	14.6		0.879		73.3	LOS E	20.0	151.9				
West: Palm Avenue															
Lane 1	87	2.3	87	2.3	284	0.306	100	64.9	LOS E	5.1	36.2	Full	87	0.0	0.0
Approach	87	2.3	87	2.3		0.306		64.9	LOS E	5.1	36.2				
Intersection	1763	11.8	1752[N1]	11.9		0.879		63.1	LOS E	20.0	151.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Approach Lane Flows (veh/h)

South: Ti Rakau Drive (East)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	149	132	-	282	8.3	420	0.670	100	NA	NA
Lane 2	-	351	-	351	7.2	524[1]	0.670	100	NA	NA
Lane 3	-	-	49	49	6.1	345	0.141	100	0.0	2
Lane 4	-	23	-	23	100.0	313	0.074	100	NA	NA

Approach	149	506	49	704	10.6		0.670			
East: Aylesbury Street										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	-	-	35	5.6	337	0.104	100	0.0	2
Lane 2	-	19	62	82	6.0	347	0.235	100	NA	NA
Approach	35	19	62	117	5.8		0.235			
North: Ti Rakau Drive (West)										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	-	53	-	53	100.0	313	0.170	100	NA	NA
Lane 2	289	-	-	289	9.7	336	0.858	100	53.7	3
Lane 3	-	249	-	249	8.8	283	0.879	100	NA	NA
Lane 4	-	224	-	224	8.8	255[1]	0.879	100	NA	NA
Lane 5	-	-	30	30	3.3	109	0.274	100	14.8	4
Approach	289	526	30	844	14.6		0.879			
West: Palm Avenue										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	32	36	87	2.3	284	0.306	100	NA	NA
Approach	19	32	36	87	2.3		0.306			
	Total	%HV	Deg.Satn (v/c)							
Intersection	1752	11.9	0.879							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
East Exit: Aylesbury Street Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
West Exit: Palm Avenue Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 5.0 [5.0 Pakuranga Highway / Reeves Rd (Site Folder: PM)] — Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Single Point Interchange (Signals) - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 131 seconds (Site User-Given Phase Times)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	430	8.5	427	8.5	1016[1]	0.421	100	16.0	LOS B	11.1	83.6	Short	50	0.0	NA
Lane 2	430	8.5	427	8.5	1016[1]	0.421	100	16.0	LOS B	11.1	83.6	Full	90	0.0	8.4[8]
Lane 3	316	7.7	314	7.7	564	0.557	100	35.5	LOS D	14.3	106.6	Full	90	-16.7[N3]	30.5
Lane 4	218	7.7	217	7.7	389	0.557	100	36.0	LOS D	10.0	74.6	Full	90	-42.6[N3]	0.0
Lane 5 (B)	13	100.0	13	100.0	118	0.110	100	32.2	LOS C	0.4	5.3	Full	90	0.0	0.0
Approach	1407	9.0	1398[N1]	9.0		0.557		23.6	LOS C	14.3	106.6				
NorthEast: Reeves Road															
Lane 1 (B)	9	100.0	9	100.0	243	0.037	100	33.5	LOS C	0.3	4.1	Full	50	0.0	0.0
Approach	9	100.0	9	100.0		0.037		33.5	LOS C	0.3	4.1				
NorthWest: Ti Rakau Drive (West)															
Lane 1 (B)	53	100.0	53	100.0	173	0.306	100	32.2	LOS C	1.6	21.4	Full	110	0.0	0.0
Lane 2	229	7.9	227	7.9	563	0.403	100	38.6	LOS D	10.3	76.6	Full	110	0.0	0.0
Lane 3	229	7.9	227	7.9	563	0.403	100	38.6	LOS D	10.3	76.6	Full	110	0.0	0.0
Lane 4	71	11.3	71	11.3	300	0.235	100	55.3	LOS E	3.5	26.9	Short	71	0.0	NA
Approach	581	16.7	578[N1]	16.7		0.403		40.1	LOS D	10.3	76.6				
SouthWest: Pakuranga Highway															
Lane 1	154	7.1	154	7.1	613	0.251	100	25.5	LOS C	4.6	33.8	Short	72	-16.7[N3]	NA
Lane 2	348	7.0	348	7.0	380[1]	0.916	100	77.7	LOS E	23.0	170.9	Short	143	0.0	NA
Lane 3	387	7.0	387	7.0	423	0.916	100	77.8	LOS E	26.0	192.9	Short	240	0.0	NA
Lane 4	387	7.0	387	7.0	423	0.916	100	77.8	LOS E	26.0	192.9	Full	623	0.0	0.0
Approach	1277	7.0	1277	7.0		0.916		71.5	LOS E	26.0	192.9				
Intersection	3274	9.9	3261[N1]	9.9		0.916		45.3	LOS D	26.0	192.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	427	-	427	8.5		1016[1]	0.421	100	62.8	2
Lane 2	427	-	427	8.5		1016[1]	0.421	100	NA	NA
Lane 3	-	314	314	7.7		564	0.557	100	NA	NA
Lane 4	-	217	217	7.7		389	0.557	100	NA	NA
Lane 5	-	13	13	100.0		118	0.110	100	NA	NA
Approach	854	543	1398	9.0			0.557			

NorthEast: Reeves Road

Mov. From NE To Exit:	R2 NW	Total	%HV		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	9	9	100.0		243	0.037	100	NA	NA
Approach	9	9	100.0			0.037			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	L2 NE	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	28	25	-	53	100.0	173	0.306	100	NA	NA
Lane 2	-	227	-	227	7.9	563	0.403	100	NA	NA
Lane 3	-	227	-	227	7.9	563	0.403	100	NA	NA
Lane 4	-	-	71	71	11.3	300	0.235	100	0.0	3
Approach	28	479	71	578	16.7		0.403			

SouthWest: Pakuranga Highway

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	154	-	154	7.1	613	0.251	100	0.0	2
Lane 2	-	348	348	7.0	380[1]	0.916	100	31.3	3
Lane 3	-	387	387	7.0	423	0.916	100	0.0	4
Lane 4	-	387	387	7.0	423	0.916	100	NA	NA
Approach	154	1123	1277	7.0		0.916			

	Total	%HV	Deg.Satn (v/c)
Intersection	3261	9.9	0.916

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
NorthEast Exit: Reeves Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

Full Length Lane	3	Merge Analysis not applied.										
SouthWest Exit: Pakuranga Highway Merge Type: **Zipper**												
Exit Short Lane	1	280	50.0	249	260	2.50	2.00	427	1485	0.288	0.0	0.2
Merge Lane	2	-	50.0	214	223	2.50	2.00	498	1535	0.324	0.0	0.1
SouthWest Exit: Pakuranga Highway Merge Type: **Zipper**												
Exit Short Lane	3	10	50.0	214	223	2.50	2.00	71	1534	0.046	0.0	0.1
Merge Lane	2	-	50.0	35	37	2.50	2.00	427	1758	0.243	0.0	0.0

CCG LANE SUMMARY

Common Control Group: CCG2 [WRR / Mattson]

Network: N101 [PM (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 69 seconds (CCG User-Given Phase Times)

Lane Use and Performance (CCG)

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]															
SouthEast: Ti Rakau Drive (East)															
Lane 1	436	8.1	436	8.1	801	0.545	100	12.4	LOS B	7.7	57.9	Full	60	0.0	11.8
Lane 2	436	8.1	436	8.1	801	0.545	100	4.7	LOS A	4.1	30.6	Full	60	0.0	0.0
Lane 3	436	8.1	436	8.1	801	0.545	100	4.7	LOS A	4.1	30.6	Full	60	0.0	0.0
Lane 4	198	7.1	198	7.1	243[1]	0.814	100	39.4	LOS D	6.6	48.7	Short	20	0.0	NA
Lane 5 (B)	13	100.0	13	100.0	519	0.025	100	2.8	LOS A	0.1	0.7	Full	60	0.0	0.0
Approach	1520	8.7	1520	8.7		0.814		11.4	LOS B	7.7	57.9				
NorthEast: William Roberts Road Extension															
Lane 1	234	9.0	233	9.0	453	0.515	100	26.2	LOS C	6.2	46.7	Short	80	0.0	NA
Lane 2	138	6.5	137	6.5	128	1.075	100	119.8	LOS F	9.0	66.4	Full	110	0.0	0.0
Approach	372	8.1	371[N1]	8.1		1.075		60.9	LOS E	9.0	66.4				
NorthWest: Ti Rakau Drive (West)															
Lane 1	369	5.7	368	5.7	335	1.101	100	131.1	LOS F	21.3[N4]	156.4[N4]	Full	107	0.0	50.0
Lane 2	498	7.8	497	7.8	573	0.868	79[5]	31.6	LOS C	17.9	133.5	Full	107	-28.6[N3]	35.3
Lane 3	698	7.8	697	7.8	803	0.868	79[5]	28.3	LOS C	20.9[N4]	156.4[N4]	Full	107	0.0	50.0
Lane 4 (B)	25	100.0	25	100.0	519	0.048	100	2.8	LOS A	0.1	1.3	Full	107	0.0	0.0
Approach	1590	8.7	1587[N1]	8.7		1.101		52.8	LOS D	21.3	156.4				
Intersection	3482	8.7	3478[N1]	8.7		1.101		35.6	LOS D	21.3	156.4				
Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]															
SouthEast: Ti Rakau Drive (East)															
Lane 1	226	6.9	226	6.9	238	0.949	100	58.4	LOS E	8.9	65.9	Short	25	-7.9[N3]	NA
Lane 2	578	8.0	578	8.0	610[1]	0.949	100	47.2	LOS D	24.1	180.0	Full	143	0.0	36.1
Lane 3	761	8.0	761	8.0	802	0.949	100	46.1	LOS D	27.9[N4]	209.0[N4]	Full	143	0.0	50.0
Lane 4 (B)	13	100.0	13	100.0	511	0.025	100	12.1	LOS B	0.2	2.9	Full	143	0.0	0.0
Approach	1578	8.6	1578	8.6		0.949		48.0	LOS D	27.9	209.0				
NorthWest: Ti Rakau Drive (West)															
Lane 1	164	8.0	164	8.0	802	0.204	27[6]	24.1	LOS C	4.9	36.4	Full	60	0.0	0.0
Lane 2	603	8.0	601	8.0	802	0.750	100	6.8	LOS A	9.3	69.6	Full	60	0.0	28.6
Lane 3	603	8.0	601	8.0	802	0.750	100	3.5	LOS A	5.4	40.6	Full	60	0.0	0.0
Lane 4	60	6.7	60	6.7	460	0.130	100	32.6	LOS C	1.8	13.4	Short	25	0.0	NA
Lane 5 (B)	25	100.0	25	100.0	511	0.049	100	3.8	LOS A	0.1	1.8	Full	60	0.0	0.0
Approach	1454	9.5	1451[N1]	9.5		0.750		8.4	LOS A	9.3	69.6				
SouthWest: Mattson Road															
Lane 1	26	3.8	26	3.8	414	0.063	100	25.6	LOS C	0.6	4.3	Full	282	-11.8[N3]	0.0
Lane 2	38	7.9	38	7.9	127	0.300	100	40.3	LOS D	1.2	8.9	Full	282	0.0	0.0
Approach	64	6.3	64	6.3		0.300		34.3	LOS C	1.2	8.9				
Intersection	3096	8.9	3093[N1]	9.0		0.949		29.1	LOS C	27.9	209.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.
N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (CCG) (veh/h)

Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	R2 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	436	-	436	8.1	801	0.545	100	NA	NA
Lane 2	436	-	436	8.1	801	0.545	100	NA	NA
Lane 3	436	-	436	8.1	801	0.545	100	NA	NA
Lane 4	-	198	198	7.1	243[1]	0.814	100	99.6	3
Lane 5	13	-	13	100.0	519	0.025	100	NA	NA
Approach	1322	198	1520	8.7		0.814			

NorthEast: William Roberts Road Extension

Mov. From NE To Exit:	L2 SE	R2 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	233	-	233	9.0	453	0.515	100	0.0	2
Lane 2	-	137	137	6.5	128	1.075	100	NA	NA
Approach	233	137	371	8.1		1.075			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	L2 NE	T1 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	368	-	368	5.7	335	1.101	100	NA	NA
Lane 2	-	497	497	7.8	573	0.868	79[5]	NA	NA
Lane 3	-	697	697	7.8	803	0.868	79[5]	NA	NA
Lane 4	-	25	25	100.0	519	0.048	100	NA	NA
Approach	368	1219	1587	8.7		1.101			

	Total	%HV	Deg.Satn (v/c)
Intersection	3478	8.7	1.101

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	L2 SW	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	81	145	226	6.9	238	0.949	100	100.0	2
Lane 2	-	578	578	8.0	610[1]	0.949	100	NA	NA

Lane 3	-	761	761	8.0	802	0.949	100	NA	NA
Lane 4	-	13	13	100.0	511	0.025	100	NA	NA
Approach	81	1497	1578	8.6		0.949			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	R2 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	164	-	164	8.0	802	0.204	27[6]	NA	NA
Lane 2	601	-	601	8.0	802	0.750	100	NA	NA
Lane 3	601	-	601	8.0	802	0.750	100	NA	NA
Lane 4	-	60	60	6.7	460	0.130	100	0.0	3
Lane 5	25	-	25	100.0	511	0.049	100	NA	NA
Approach	1391	60	1451	9.5		0.750			

SouthWest: Mattson Road

Mov. From SW To Exit:	L2 NW	R2 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	26	-	26	3.8	414	0.063	100	NA	NA
Lane 2	-	38	38	7.9	127	0.300	100	NA	NA
Approach	26	38	64	6.3		0.300			

	Total	%HV	Deg.Satn (v/c)
Intersection	3093	9.0	0.949

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

Merge Analysis (CCG)

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate sec	Capacity veh/h	Deg. Satn veh/h	Min. Delay v/c	Merge Delay sec	sec
Site: 7.0 [7.0 William Roberts Rd / Ti Rakau Dr]												
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
NorthEast Exit: William Roberts Road Extension Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										

Site: 7.5 [7.5 Mattson Rd/ Ti Rakau Dr]												
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Priority**												
Exit Short Lane	1	40	0.0	601	625	3.00	2.00	164	1154	0.142	1.1	1.5
Merge Lane	2	-	100.0	Merge Lane is not Opposed				601	1800	0.334	0.0	0.0
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
Full Length Lane	4	Merge Analysis not applied.										
SouthWest Exit: Mattson Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 8.1 [8.1 U-turn - West of Marriot Rd (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 40 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	781	7.8	781	7.8	1846	0.423	100	0.1	LOS A	0.0	0.0	Full	147	0.0	0.0
Lane 2	781	7.8	781	7.8	1846	0.423	100	0.1	LOS A	0.0	0.0	Full	147	0.0	0.0
Lane 3	95	6.3	95	6.3	200	0.476	100	24.8	LOS C	1.7	12.6	Short	14	0.0	NA
Lane 4 (B)	13	100.0	13	100.0	657	0.020	100	0.2	LOS A	0.0	0.1	Full	147	0.0	0.0
Approach	1670	8.4	1670	8.4		0.476		1.5	LOS A	1.7	12.6				
NorthWest: Ti Rakau Drive (West)															
Lane 1	700	7.9	699	7.9	1015	0.689	100	7.8	LOS A	9.5	70.7	Full	73	0.0	12.1
Lane 2	700	7.9	699	7.9	1015	0.689	100	7.8	LOS A	9.5	70.7	Full	73	0.0	12.1
Lane 3 (B)	25	100.0	25	100.0	657	0.038	100	0.2	LOS A	0.0	0.1	Full	73	0.0	0.0
Approach	1424	9.6	1423 N1	9.6		0.689		7.7	LOS A	9.5	70.7				
Intersection	3094	9.0	3093 N1	9.0		0.689		4.3	LOS A	9.5	70.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	U SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	781	-	781	7.8	1846	0.423	100	NA	NA
Lane 2	781	-	781	7.8	1846	0.423	100	NA	NA
Lane 3	-	95	95	6.3	200	0.476	100	5.3	2
Lane 4	13	-	13	100.0	657	0.020	100	NA	NA
Approach	1575	95	1670	8.4		0.476			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	699	699	7.9	1015	0.689	100	NA	NA
Lane 2	699	699	7.9	1015	0.689	100	NA	NA
Lane 3	25	25	100.0	657	0.038	100	NA	NA
Approach	1423	1423	9.6		0.689			

	Total	%HV	Deg.Satn (v/c)
Intersection	3093	9.0	0.689

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

LANE SUMMARY

Site: 10.1 [10.1 U-turn - East of Edgewater Dr (West) (Site Folder: PM)]

Network: N101 [PM (Network Folder: General)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 40 seconds (Site Practical Cycle Time)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Ti Rakau Drive (East)															
Lane 1	796	7.7	796	7.7	1016	0.783	100	11.0	LOS B	12.5[N4]	93.5[N4]	Full	64	0.0	50.0
Lane 2	796	7.7	796	7.7	1016	0.783	100	11.0	LOS B	12.5[N4]	93.5[N4]	Full	64	0.0	50.0
Lane 3 (B)	13	100.0	13	100.0	657	0.020	100	0.2	LOS A	0.0	0.1	Full	64	0.0	0.0
Approach	1604	8.4	1604	8.4		0.783		10.9	LOS B	12.5	93.5				
NorthWest: Ti Rakau Drive (West)															
Lane 1	678	8.0	678	8.0	1844	0.367	100	0.0	LOS A	0.0	0.0	Full	81	0.0	0.0
Lane 2	678	8.0	678	8.0	1844	0.367	100	0.0	LOS A	0.0	0.0	Full	81	0.0	0.0
Lane 3	117	6.8	117	6.8	199	0.588	100	25.7	LOS C	2.2	16.2	Short	15	0.0	NA
Lane 4 (B)	25	100.0	25	100.0	657	0.038	100	0.2	LOS A	0.0	0.1	Full	81	0.0	0.0
Approach	1497	9.4	1497	9.4		0.588		2.0	LOS A	2.2	16.2				
Intersection	3101	8.9	3101	8.9		0.783		6.6	LOS A	12.5	93.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

SouthEast: Ti Rakau Drive (East)

Mov. From SE To Exit:	T1 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	796	796	7.7	1016	0.783	100	NA	NA
Lane 2	796	796	7.7	1016	0.783	100	NA	NA
Lane 3	13	13	100.0	657	0.020	100	NA	NA
Approach	1604	1604	8.4		0.783			

NorthWest: Ti Rakau Drive (West)

Mov. From NW To Exit:	T1 SE	U NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	678	-	678	8.0	1844	0.367	100	NA	NA
Lane 2	678	-	678	8.0	1844	0.367	100	NA	NA
Lane 3	-	117	117	6.8	199	0.588	100	22.0	2
Lane 4	25	-	25	100.0	657	0.038	100	NA	NA
Approach	1380	117	1497	9.4		0.588			

	Total	%HV	Deg.Satn (v/c)
Intersection	3101	8.9	0.783

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
SouthEast Exit: Ti Rakau Drive (East) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										
NorthWest Exit: Ti Rakau Drive (West) Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
Full Length Lane	3	Merge Analysis not applied.										

Appendix L

Base 2018 Model Update Report

Eastern Busway - Base 2018 Model Update Report

Prepared for Auckland Transport (AT)
Prepared by Beca Limited

28 February 2019

Contents

Appendices

List of Abbreviations

Abbreviation	
ADTA	Auckland Dynamic Traffic Assignment (model)
AFC	Auckland Forecasting Centre
AMETI	Auckland-Manuka Eastern Transport Initiative
AT	Auckland Transport
GEH	Gesellschaft zur Erhaltung alter und gefährdeter Haustierrassen (statistic)
JDF	Junction Delay Function
MSM	Macro Strategic Model
NZTA	New Zealand Transport Agency
QLD	Queensland model (Aimsun model in Australia)
SCATS	Sydney Coordinated Adaptive Traffic System
TPF	Turn Delay Function
VDF	Volume Delay Function
EB	Eastern Busway

Table of Figures

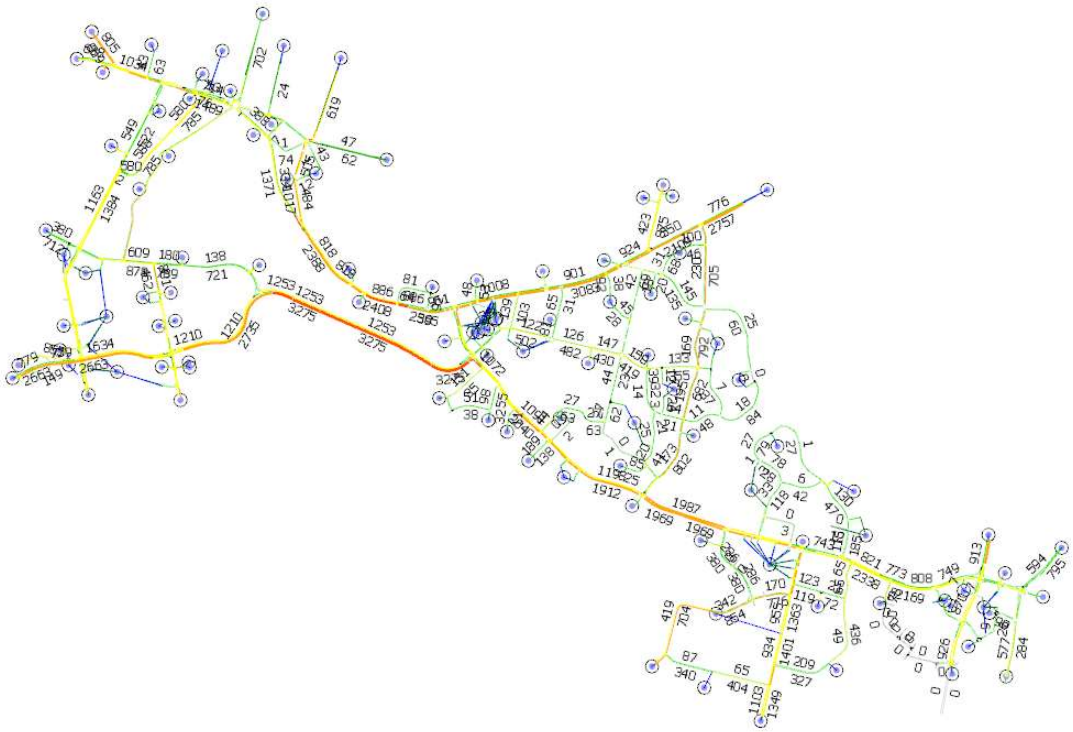
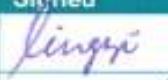
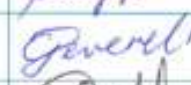
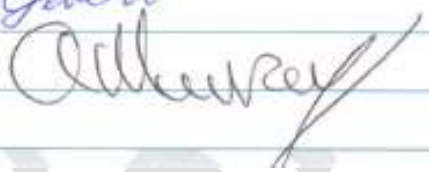


Table of Tables

Revision History

Revision Nº	Prepared By	Description	Date
1.0	**Ling Hoong**	Draft for client comments	1 March 2019

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Ling Hoong**		1 March 2019
Reviewed by	**Caleb Deverell / Nyan Aung Lin**		1 March 2019
Approved by	**Andrew Murray**		1 March 2019
on behalf of	Beca Limited		

Executive Summary

This report details the update and calibration/validation of the Aimsun model for the Eastern Busway Project. The purpose of this model is to provide a consistent and common base for project developments in the East Auckland Area, primarily along Ti Rakau Drive for the EB 2 and EB3 detailed design work.

The model covers two three-hour peak periods (6.30 am – 9.30 am, and 3.30 pm – 6.30 pm). The modelled periods were chosen to capture the congestion typically experienced in the modelled area.

The model consists of macro and micro tiers with the respective assignment methods: static assignment and microscopic dynamic assignment (DTA). The macro tier provides an interim stage to calibrate the demand through demand adjustment and to generate 80% of paths for the micro DTA. Based on previous modelling of the area, an 80-to-20 split in static versus dynamic path assignment was considered appropriate. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model is reasonable.

Various observed data were provided by Auckland Transport (AT) for the model development. These included traffic counts, travel time, public transport timing, and signal timing.

The traffic demands come from the AMETI EMME traffic model and were processed before assigning to the Aimsun model. This demand interface process includes a minor refinement of AMETI traffic model zones and application of 2-to-3 hour expansion factors to fit the Aimsun model period. Demand adjustment as part of the validation process was done manually.

The model network was developed in line with the Auckland Dynamic Traffic Assignment Model (ADTA) network coding guideline, which sets out the recommended network coding methodology for Aimsun models in Auckland. This included a standard system of classification and labelling of different turn movement types which were important function variables in the ADTA-developed cost functions also adopted in this model for calculating junction and turn delays.

Model validation showed that the model meets the validation target criteria for Category C: Urban Area in NZTA Model Development Guidelines on individual link flows and turn flows for each hour between 7am – 9am, and 4pm – 6pm. Travel times in the model fit reasonably well with the observed.

Overall, the base year model is considered acceptably calibrated and validated for the purposes of the EB2/3 design work.

1 Introduction

1.1 Background

This report documents the calibration and validation of the Aimsun model to the year 2018.

The Eastern Busway project is focused on developing an integrated multi-modal transport system that supports population and economic growth in East Auckland and Manukau. This involves providing more and better transport choices and aims to significantly enhance the safety, quality and attractiveness of passenger transport, walking and cycling environments.

Beca Ltd (Beca) was commissioned by the Auckland Transport (AT) to update the existing microsimulation model in Aimsun software for testing scenarios relating to the Eastern Busway project. Figure 1 shows the extent of the model. The model was calibrated to 2018 observations and will be used to forecast operational performance for various future scenarios in 2026.

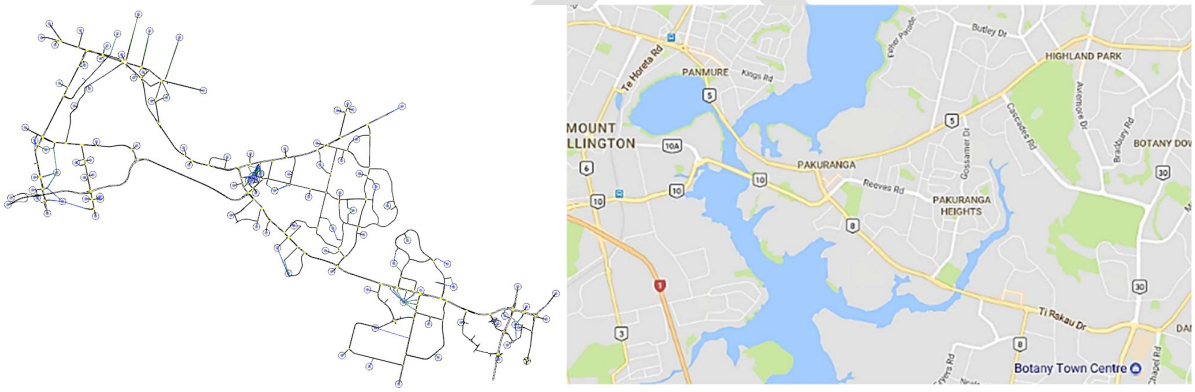


Figure 1 - Snapshot of Aimsun model network and zone structure

1.2 Report Structure

The remainder of this report is structured as follows:

Chapter 2 Describes the model's background and structure;

Chapter 3 Details the model's data inputs;

Chapter 4 Details the model's parameter inputs;

Chapter 5 Presents the calibration and validation results;

Chapter 6 Presents conclusions of this report;

2 Model Background and Structure

2.1 Background and Focus

Previously, an update of the Base model had been undertaken in 2017, focusing on the area around the Panmure Town Centre, including the Panmure roundabout, King's Roundabout and Lagoon Drive, which were of interest for the EB1 project. SCATS and manual traffic counts and observed travel time data were used to validate the model to a 2016 base year for EB1 option-testing.

This update focuses on the EB2/3 corridor which is along Ti Rakau Drive from Pakuranga Highway to Botany (Figure 2). This base year for this model update is 2018 where 2018 input demand were sourced from the AMETI traffic model and calibration/validation process used 2018 counts and travel time information.

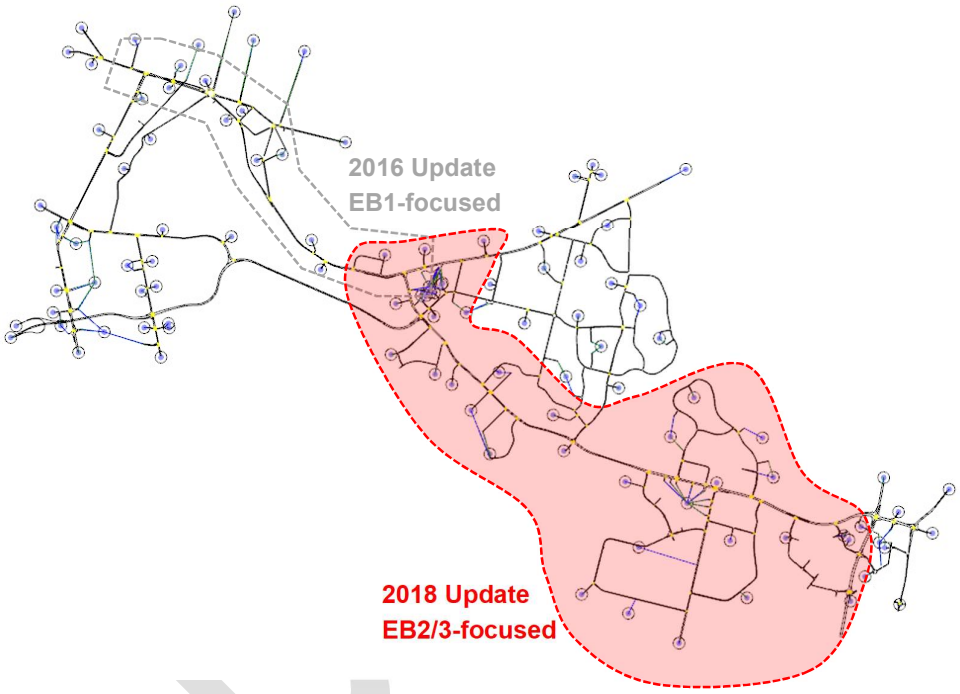


Figure 2 - Aimsun model focus areas: 2016/ EB1-focused (grey) and 2018/ EB2/3-focused (red)

2.2 Model Structure

The Aimsun model follows the hierarchical modelling structure that has been used successfully on other major projects in Auckland since the early 1990's. This involves the following three components:

- A strategic multi-modal **Demand (Macro Strategic Model, MSM)** model (an EMME model developed by AFC) that relates forecast land use (such as population and employment), to travel patterns at a strategic, region-wide level;
- A **Traffic Assignment** model (an EMME model developed by Arup) that has a more refined network representation for the wider study area. It takes the demand matrices from the Demand model and is calibrated to match traffic conditions particularly in the study area of interest. This model provides the cordon matrices for the Project Operational model.
- A **Project Operational** model (an Aimsun model and the focus of this report) that has a more refined network in a smaller project area. This model loads the vehicle trip patterns predicted by the assignment model onto the road network to test various options and investigate the traffic effects at a more detailed level.

It is the **project operational** model, developed in Aimsun that is detailed in this report.
The **demand** model was developed in EMME and is the Macro Strategic Model (MSM) developed by AFC. Also AMETI traffic assignment model was developed in EMME software.

The overall model structure is shown schematically in Figure 3 which comprises a hierarchical structure with the MSM model providing the multi-modal demand forecasts, and the EMME traffic assignment model and the Aimsun project model used for assignment and network performance modelling.

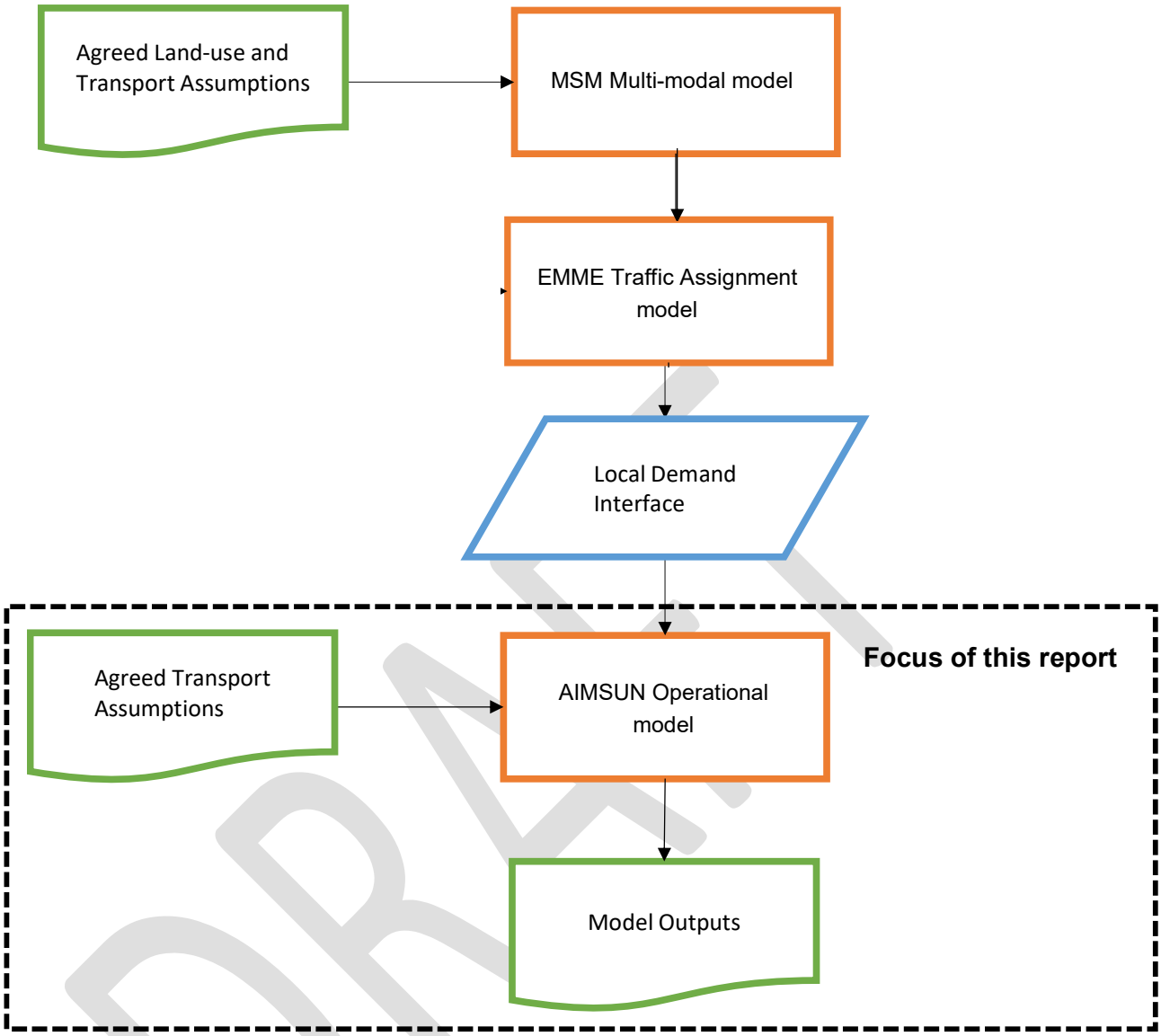


Figure 3 - Model Structure

2.2.1 MSM Demand Model

The MSM model is a traditional 4-step multi-modal model. The original model was developed for the year 2006, using the 2006 Census data and observed travel data. The model was updated in 2017/ 2018 using Census data from 2013, and validated to 2016 conditions. Separate models exist for the morning and evening commuter peaks and weekday inter-peak periods.

The model itself comprises the following key modules:

- **Trip Generation**. This is where the number of person-trips are estimated as a function of the land use data (population, employment, school roll etc.);
- **Mode Choice.** This is where the choice of preferred travel mode is determined, based on the relative attractiveness of the various modes. The key modes are car-driver, car passenger, bus passenger, train passenger and ferry passenger. A process is used to also consider 'slow' modes, such as walking and cycling;

- **Trip Distribution.** This is where the trips produced in each zone (generally by the households), are matched to a preferred destination. This distribution is predicted as a function of the relative attractiveness of each destination zone (generally related to employment), and the travel costs to reach each destination;
- **Time of Day.** This is where the proportion of daily trips occur in each peak. The proportion occurring in each peak changes in future-year models in response to the changes in travel time and costs; and
- **Trip Assignment**. This is where the resulting travel demands, in the form of origin to destination trip tables, are loaded to the road and public transport networks. An iterative process is used to firstly identify the lowest-cost route between each origin and destination, followed by an estimation of the speeds and delays on each route associated with the predicted traffic flows on the route.

The MSM model is operated by AFC and is implemented in the EMME software, which is a well-used and proven platform for this kind of analysis.

It is therefore the MSM model that predicts the overall regional traffic patterns, based on the inputs and forecasts of population and employment growth, together with the assumed level of road and public transport infrastructure.

The MSM standard model years are 2016, 2026 and so on. To get the 2018 regional demand, a demand interpolation process was undertaken between 2016 and 2026 scenarios. The 2016 scenario is the validated MSM base year scenario. As part of this project, a 2026 scenario was developed using the today network layout and bus service patterns.

2.2.2 EMME Traffic Assignment Model

This model was originally developed by Arup in 2010 and was peer-reviewed. This peer-reviewed model was used as the traffic assignment model for the previous AMETI project. The model takes its traffic demands from the MSM model and has the same model extent as MSM but has a more refined network representation in the wider study area of interest (Manukau and Auckland City areas). A zone refinement process was undertaken as an interface between the MSM and traffic assignment models.

2.2.3 Aimsun Operational Model

The Aimsun model is only a traffic operational model in that it takes the localised traffic demands from the EMME traffic assignment model, assigns them to the road network and tests the operation of the network. Land use data is not directly used in this part of the model, and it only considers vehicle traffic i.e. it represents bus vehicles but not passengers.

2.3 Model Time Period

The Aimsun model models two peak periods:

- AM: 6.30am – 9.30am
- PM: 3.30pm – 6.30pm

The traffic counts and typical traffic conditions were evaluated to determine that these time periods are suitable to capture the peak traffic on the network and ending at a time when traffic cooldown is typically observed. Each peak consists of a 15 minute warm-up prior to the peak start time in order to generate an appropriate level of demand inside the network before the official start of the peak.

3 Model Data Inputs

3.1 Network

Most of the road network was formed from the previous version of the Aimsun model (updated for 2016 base year). Additional road network was added in around Cryers Road and Burswood Road in the South East area of the model. Further refinements or error-checking over the whole model were conducted based on ADTA network coding conventions (Ref. 160520_DTA_Template_JMAC_v2.1.3). Network parameters are detailed in Chapter 4.1.

3.2 Demand

The initial demand was from the AMETI assignment model (refer to Chapter 2.2.2) and restructured to match the zone structure in the Aimsun model.

3.2.1 Demand Expansion

The two-hour to three-hour demand expansion factor for each peak was 1.38. This has been applied to the two-hour EMME demands to create a three-hour demand as a starting point for model calibration/validation.

3.2.2 Zone Disaggregation

As discussed earlier, most of the zone refinement was undertaken between the MSM and AMETI traffic assignment models. Only a very limited zone was further refined in the demand interface process between the AMETI traffic and Aimsun models. This process was retained from the previous base model 2016. A zone to zone correlation table is provided in Appendix A.

3.2.3 Demand Release Profiles

For developing traffic release profiles, the zones in the Aimsun model were grouped into six sectors: Panmure, West, Internal, North, East and South (Figure 4). Within the Internal sector, a subset of zones was created to separately represent the region nearest the Panmure Bridge and assigned its own demand profile.

Figure 5 and Figure 6 show the sector-to-sector profiles applied in the Aimsun model. Traffic count profiles at key locations on the network were used as a guideline to develop these demand profiles.

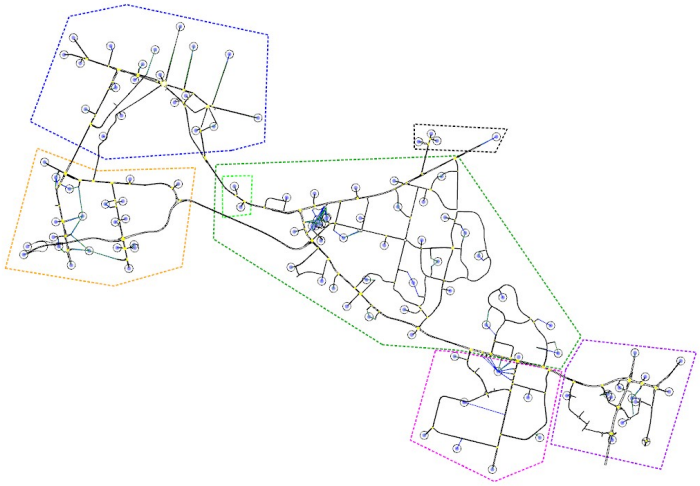


Figure 4 - Aimsun model sectors: Panmure (blue), West (yellow), Internal (dark green) with Panmure Bridge subset (light green), North (black), South (Pink), and East (purple)

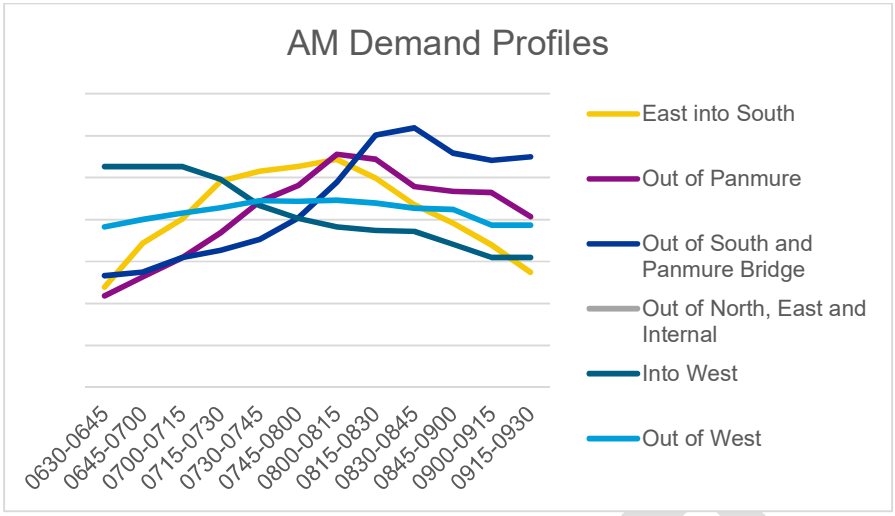


Figure 5 - AM Demand Profiles

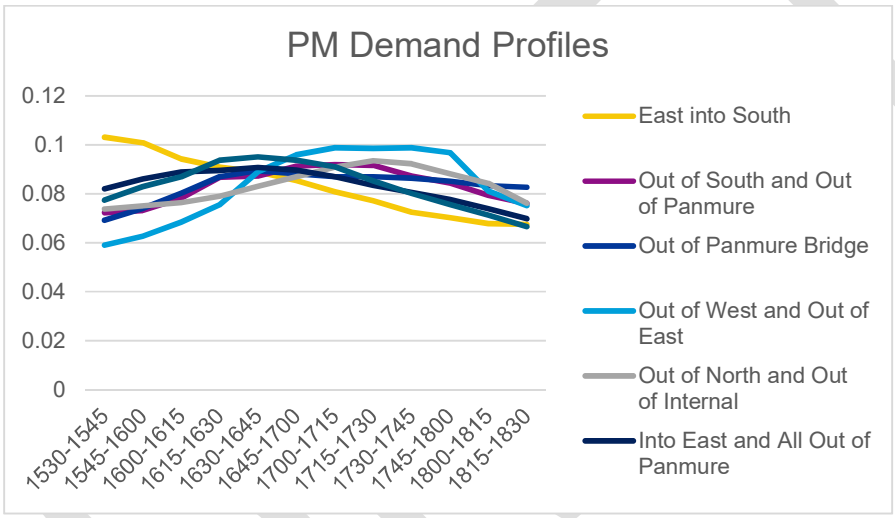


Figure 6 - PM Demand Profiles

3.3 Count Data

All count data for 2018 were provided by AFC, including SCATS detector counts and some manual counts. The locations of these counts used for link validation and turn validation (refer to Chapter 5) are shown in Figure 7 and Figure 8 respectively.

Link validation data was based on the average SCATS data of Tuesdays to Thursdays in March 2018. Turn validation data was based on the average of manual counts taken between Tuesday 12 June 2018 to Thursday 14 June 2018.

A sense-check of count continuity across the network was carried out and only counts that were consistent with adjacent counts were retained. This consisted of the majority of counts. All manual turn counts were checked for continuity with adjacent relevant SCATS counts and all were retained regardless of continuity since manual counts are considered more robust in general and these had been specifically provided by AFC for turn validation in the focus area. All counts used in validation were used as-is, without any further smoothing or processing.

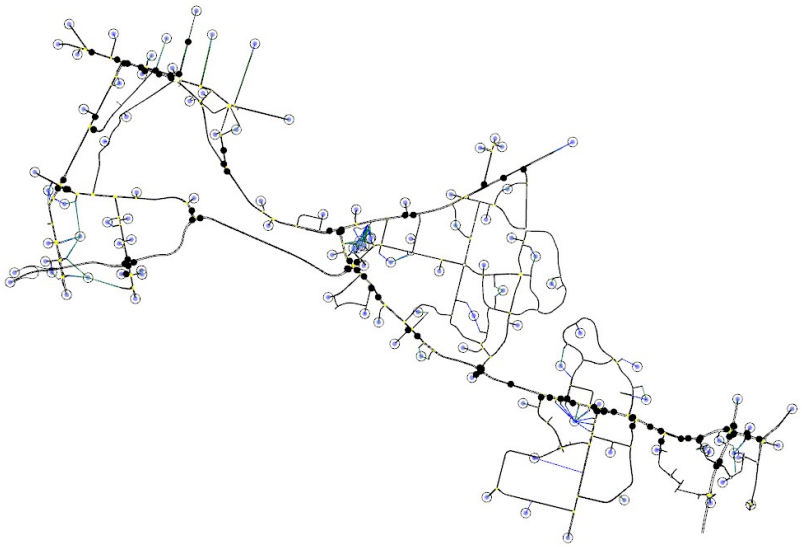


Figure 7 - Count locations used for link validation

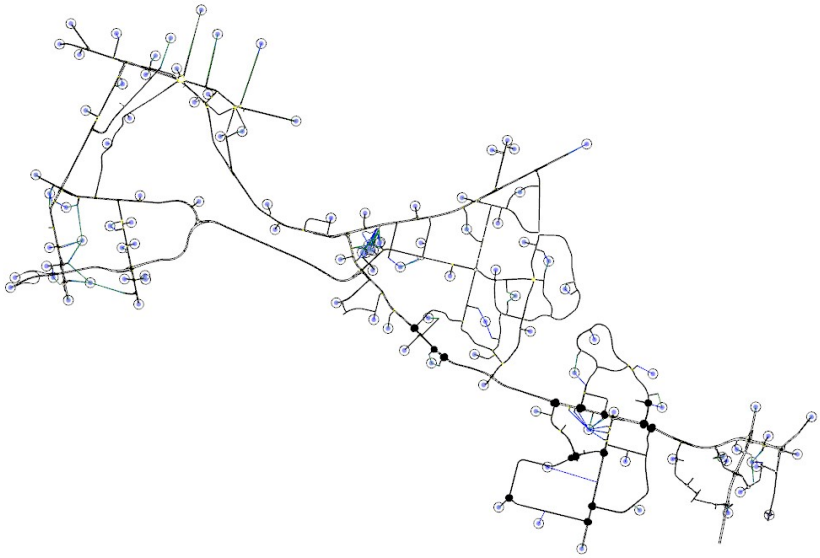


Figure 8 - Count locations used for turn validation, specifically for the model's focus area

3.4 Travel Time Data

The general traffic travel time data for key routes on the network (Figure 9) of Tuesdays to Thursdays in June 2018 was provided by AFC as summarised by Snitch GPS data. The full routes were provided in segments in order to understand the travel time and condition along the route. Following a sense-check of the travel times on Google, only the mean travel time on Ti Rakau Drive between Pakuranga Road and Pakuranga Highway was adjusted. All other travel times were accepted and retained for use in the validation.

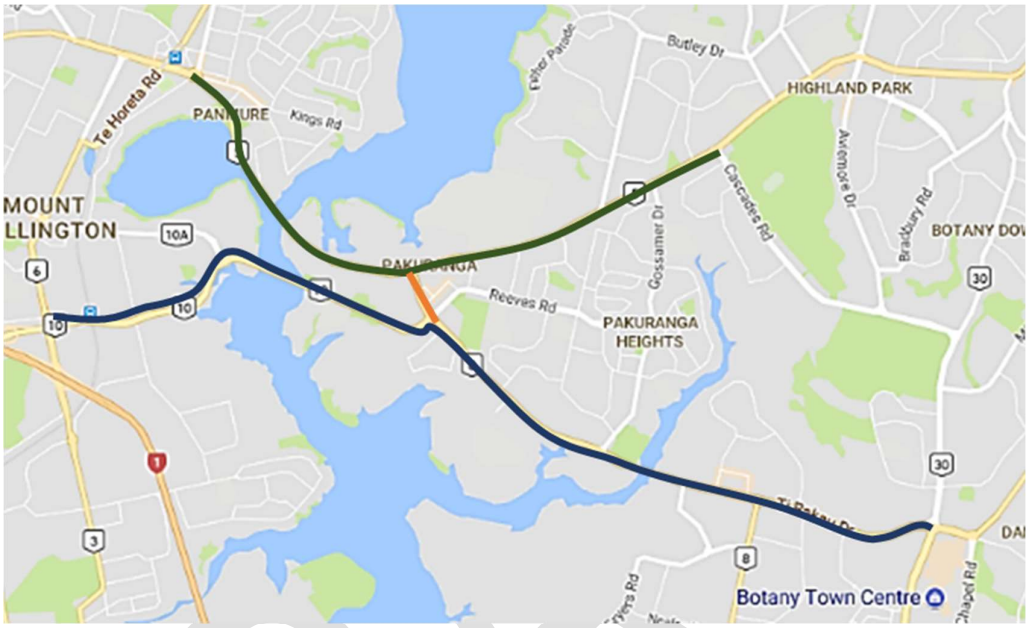


Figure 9 - Travel time routes from Snitch GPS data for reporting travel time validation in Chapter 5

3.5 Public Transport Data

All bus schedules and bus routes were obtained from the Auckland Transport (AT) website. Bus dwell time at bus stops were fixed at 30 sec mean stop time and deviation of 5. Bus travel time data was provided by AFC for March 2018 which included detailed timing of when each bus arrives and leaves each bus stop for each route. Following a sense-check of the travel times calculated from the raw data against AT's Journey Planner App, the average and maximum travel time of the routes were adjusted. The full list of bus services in the model is provided in Appendix D.

3.6 Signal Timing Data

The SCATS signal timing data of 7 March 2018 was provided by AFC for every signalised intersection within the model area. This was used to derive the signal timing coded into the model.

Average of maximum and minimum green times was used to develop the actuated control plan used in the dynamic assignment and initially used in the static assignment. During the model development process, it was noted that a fixed signal plan was more appropriate for model stability in the static assignment. Average green time from the single-day SCATS data was used as a starting point for developing the fixed control plan. Priority was placed on obtaining realistic turn delays and ensuring appropriate route choice distribution across the network rather than strict adherence to the average green times reported from that single day.

4 Model Parameter Inputs

4.1 Network Parameters

4.1.1 Road-Type Parameters

Road type distribution on the model network is summarised in Figure 10. Road type parameters were mostly retained from the ADTA model and provided in Appendix B. Adjustments were made to user-defined cost, third user-defined costs and capacity as part of the calibration process of route choice on the network. Lane-changing cooperation was also adjusted on certain road types to reflect the level of congestion as seen on Google's traffic view modes, and the travel time data.

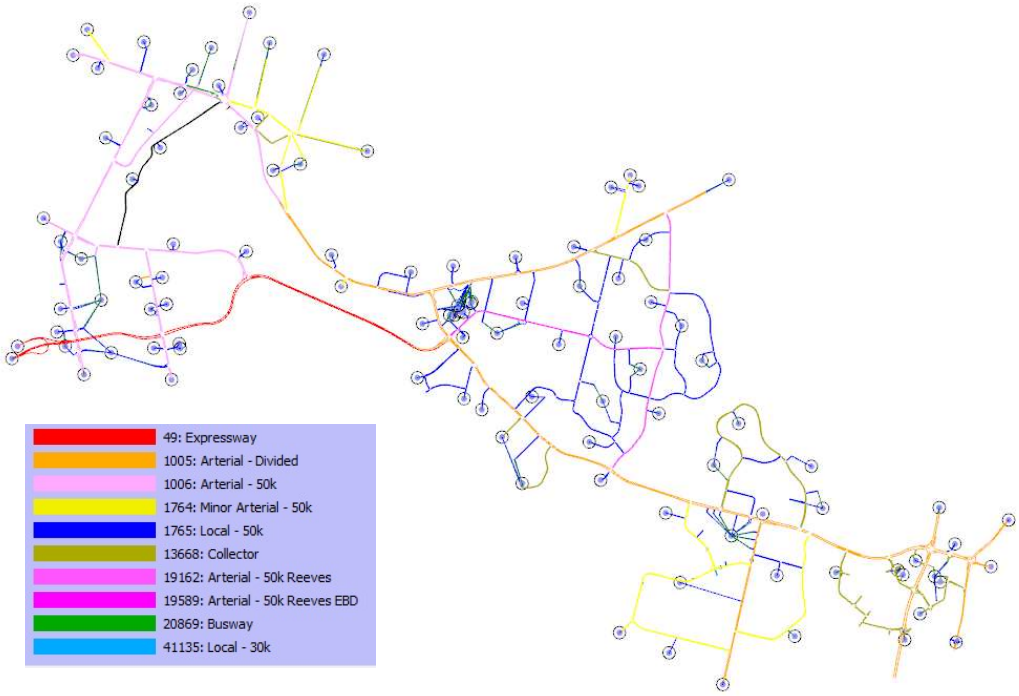


Figure 10 - Road Type Definition in the Aimsun Model

4.1.2 Attribute Overrides

The parameters of some sections and turns were controlled during assignment runs using Aimsun's attribute override functionality. This approach allows parameter values to be adjusted to a value more suitable than the default calculations at a particular section or turn. The parameter values that have been adjusted using attribute overrides are:

- Section maximum speed
- Turn capacity
- Turn look-ahead distance
- Lane-changing cooperation

The full list of these attribute overrides applied in the model is provided in Appendix E.

4.1.3 Traffic Management

Traffic management schemes on the network were applied using Aimsun's traffic management functionality. This approach also allows certain conditions of the road to be applied when they are typically observed during the modelled period and not necessarily throughout the period. Traffic management schemes in the model applied are:

- Panmure Bridge Eastbound Lane Closure: 1 Lane Closed, 6 am – 11 am
- Panmure Bridge Westbound Lane Closure: 1 Lane Closed, 3 pm – 8 pm
- Pakuranga Highway Maximum Speed Change to 55 km/h: 7.15 am – 8.45 am
- Pakuranga Highway Maximum Speed Change to 60 km/h: 4.15 pm – 6.15 pm

Ideally the speed reduction on Pakuranga Highway should be reflected by the model response, rather than the inputs. However this behaviour is hard to replicate in the model due to the unique nature of the road. For example, there is a hidden queue extended from the Pakuranga Highway and Carbine Road intersection to the Wipuna Road in the AM peak. The local drivers reduce their speeds on the bridge accordingly as they know there is a hidden queue in the downstream at the sharp corner. This traffic management inputs were not introduced in this update, they area inherited from the previous model.

4.2 Vehicle Parameters

Vehicle parameters were determined based on comparison and sensitivity testing with those adopted in existing Aimsun models such as ADTA (AFC), and QLD (Aecom) as well as input from the NZTA Axel Classification system. List of key vehicle parameters in the model are provided in Appendix C.

4.3 Cost Calculation

All functions related to calculating the cost of travel time and travel distance in the model were adopted from the ADTA model and used in the static assignment only. The travel time component consists of 1) link travel times, represented by a Volume Delay Function (VDF) on Sections, and 2) delays associated with making a turn at an intersection, represented by a Turn Penalty Function (TPF) and Junction Delay Function (JDF). Cost function scripts used in the model are provided in Appendix G.

The travel distance component reflects perceived vehicle operating costs and helps stabilise the traffic assignment.

4.3.1 Volume Delay Function

The VDF is based on the Akçelik VDF, which is widely adopted by strategic models in New Zealand, including MSM. Its formulation is as follows:

$$t = t_0 \{1 + 0.25 r_f [z + (z^2 + 8 J_A x / (Q t_0 r_f))^{0.5}]\}$$

where:

t = average travel time per unit distance (seconds per km)

t0 = free flow travel time per unit distance (seconds per km)

J_A = Akçelik friction parameter

z = x – 1

x = q / Q = degree of saturation

q = demand flow rate (pcu/hr)

Q = capacity (pcu/hr)

rf = the ratio of flow period to minimum travel time

The distance component, which is added to the travel time cost, is as follows:

d= df x rf x L

where:

d = the distance cost

df = distance factor (0.5 for cars and 1.0 for Trucks)

rf = road type factor

L = length of the section

This function was applied to every Section in the model, including centroid connectors. Different values of free flow speed, link capacity and Akçelik friction factors were defined by road type using Section attributes (Appendix B).

4.3.2 Intersection Delays – Signalised Movements

Aimsun provides default TPFs for signalised turning movements based on their respective green time split, adopting the procedures from Chapter 18 of the Highway Capacity Manual (HCM) 2010.

This procedure requires a movement capacity as an input and in the model this was estimated based on the following formula:

$Q = Q_s \times I \times g / C$

where:

Q = capacity of the turning movement (pcu/hr)

Q_s = saturation flow at signal for the turning movement (pcu/hr/lane)

I = number of lanes for the turning movement

g = green time for the turning movement

C = cycle time at the signal

The saturation flow Qs estimation was adopted from the ADTA model and is based on the relationship between saturation flow and turning speed from simulation tests conducted in Aimsun (Figure 11).

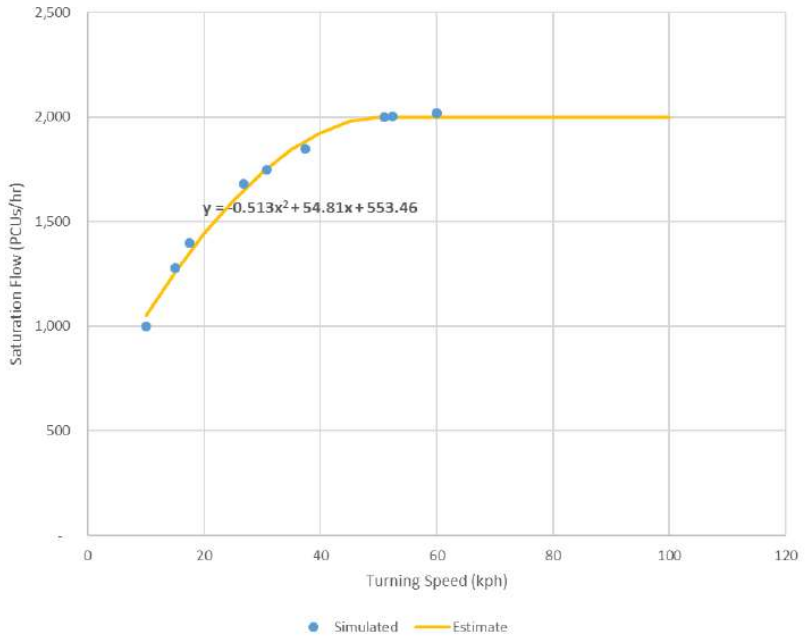


Figure 11 - Adopted Relationship between Signal Saturation Flow and Turning Speed. The line of best fit through the simulated saturation flows for turning speeds between 10 and 50 km/hr, where 10 km/hr is the minimum turning speed applied in ADTA. The saturation flow was capped at 2,000 pcu/hr/lane for turning speeds higher than 50 km/hr.

4.3.3 Intersection Delays – Priority Movements

Delays at priority-controlled intersections were represented by JDFs.

Relationships between the capacity of priority movements and the opposing flow were estimated using a linear relationship:

Q = Qs – r x fo

where:

Q = capacity of the turning movement (pcu/hr)

Q_s = saturation flow for the turning movement i.e. capacity of the turning movement at zero opposing flow (pcu/hr); intercept

r = the rate at which the capacity decreases as opposing flow increases; slope

f_o = the flow opposing this turning movement (pcu/hr)

The resulting turn capacity **Q** was applied to the Akçelik VDF formula from Chapter 4.3.1 assuming a friction factor of 1.0 to calculate the corresponding turning delay for the priority movement.

The calibrated capacity intercepts and slopes for all priority turning movement types as used in the ADTA model is provided in Appendix F.

4.4 Model Assignment Parameters

4.4.1 Assignment Methodology

Based on previous modelling, an 80-to-20 split in static versus dynamic path assignment was considered appropriate for the microscopic simulation. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model was reasonable and supported the use of the method.

4.4.2 Static Assignment Parameters

Table 1 shows the key parameters of the static assignment used in the Aimsun model.

Table 1 - Key Static Assignment Parameters

Static Assignment Parameters	
Assignment Engine	Frank and Wolf Assignment
Maximum Iterations	50
Relative Gap	0.1 %

4.4.3 Dynamic Assignment Parameters

All dynamic assignment parameters (Table 2 and Table 3) were determined based on comparison and sensitivity testing with those adopted in existing Aimsun models such as ADTA (AFC), and QLD (Aecom).

Table 2 - Key Dynamic Assignment Parameters

Dynamic Assignment Parameters		
Main		
Network Loading	Microscopic Simulator	
Assignment Approach	Stochastic Route Choice	
Using Warm-Up	(5% of demand, 15 min)	
Using a Saved Initial State	No	
Attributes Overrides	(refer to Appendix E)	
Performance Settings:		
Simulation Threads	4	
Route Choice Threads	4	
Behaviour		
Car Following:		
Two-Lane Car-Following Model	No	
Apply Slope Model	No	
Lane Changing:		
Distance Zone Variability	40%	
Two-Way Two-Lane Overtaking Model	No	
Queue Speeds:		
Queue Entry Speed	1 m/s	
Queue Exit Speed	1 m/s	

Table 3 - Key Dynamic Assignment Parameters continued

Dynamic Assignment Parameters						
Reaction Time						
Simulation Step	0.8 sec					
Reaction Time Settings	Fixed					
Reaction Time at Stop	1.15 sec					
Reaction Time at Traffic Light	1.35 sec					
Arrivals						
Global Arrivals	Normal					
Dynamic Traffic Assignment						
Costs:						
Cycle	5 min					
Number of Intervals	3					
Attractiveness Weight	5					
User-Defined Cost Weight	1					
Use Link Costs from Replication	None					
Group Route Choice Intervals	No					
Fixed Routes:	Following OD Routes	Following Input Path Assignment				
Car	100%	80%				
Truck	100%	100%				
Max. Paths to Use From Input Path Assignment	All					
Stochastic Route Choice:						
Model	C-Logit					
Enroute	No					
Enroute After Virtual Queue	No					
Stochastic Route Choice - Basic:						
Path Calculation	Source	Max. Number of Initial Paths to Consider				
	K-SP	1				
Max. Paths per Interval	For All Veh	3				
Stochastic Route Choice – Parameters:	Origin	Destination	Scale	Beta	Gamma	
	All	All	12	0.15	1	

5 Calibration and Validation Results

5.1 General Approach

Calibration and validation for the model were undertaken with reference to criteria for Category C: Urban Area in NZTA Model Development Guidelines (Criteria) on individual link flows, turn flows and travel time for each hour between 7am – 9am, and 4pm – 6pm.

Adjustments to demand and network during the calibration process were carefully considered with respect to implications on model response and forecasting.
Several sense-checks were made as part of the calibration process including checks on route-choice, turn delays in the static assignment, demand profiles, HCV counts and visual congestion on the network.

5.2 Demand Adjustment

5.2.1 Manual Adjustment

All demand adjustments for the model were done manually and summarised in Table 4 - Table 9. During the demand adjustment, care was taken to retain the demand distribution from the strategic model. Adjustments were made to resolve majority of the network issues in the first instance, before demand adjustments were made.

Table 4 – AM Post-Adjusted Sector-to-Sector Demands

	East	Internal	North	South	Panmure	West	
East	3,465	1,664	210	6,545	940	2,889	15,713
Internal	965	1,101	1,160	1,922	1,570	2,769	9,487
North	520	1,301	0	860	4,128	3,451	10,260
South	3,716	1,268	90	2,865	374	499	8,811
Panmure	493	558	982	448	4,957	5,700	13,137
West	1,177	1,001	1,039	992	3,931	8,024	16,164
	10,336	6,892	3,481	13,632	15,900	23,331	73,572

Table 5 - AM Sector-to-Sector Demand Adjustment

	East	Internal	North	South	Panmure	West	Total
East	-651	-77	-37	21	74	217	-454
Internal	-506	-68	17	-180	-154	12	-880
North	-397	-50	0	-104	-576	0	-1,128
South	-537	-192	-185	64	2	117	-731
Panmure	-99	-85	230	-417	-1,187	-433	-1,991
West	-25	-6	-3	172	-198	-276	-336
Total	-2,216	-478	22	-444	-2,040	-364	-5,520

Table 6 - AM Sector-to-Sector Demand Percent Adjustment

	East	Internal	North	South	Panmure	West	Total
East	-16%	-4%	-15%	0%	8%	8%	-3%
Internal	-34%	-6%	2%	-9%	-9%	0%	-8%
North	-43%	-4%	0%	-11%	-12%	0%	-10%
South	-13%	-13%	-67%	2%	1%	30%	-8%
Panmure	-17%	-13%	31%	-48%	-19%	-7%	-13%
West	-2%	-1%	0%	21%	-5%	-3%	-2%
Total	-18%	-6%	1%	-3%	-11%	-2%	-7%

Table 7 - PM Post-Adjusted Sector-to-Sector Demands

	East	Internal	North	South	Panmure	West	
East	4,374	2,299	916	3,808	1,104	1,881	14,382
Internal	2,293	1,224	1,867	1,239	733	1,431	8,787
North	131	1,582	0	169	1,296	1,319	4,498
South	8,000	2,248	229	3,166	873	793	15,310
Panmure	928	1,671	3,528	507	4,548	4,777	15,958
West	1,867	3,065	4,493	375	5,892	7,621	23,314
	17,592	12,089	11,033	9,264	14,447	17,823	82,249

Table 8 - PM Sector-to-Sector Demand Adjustment

	East	Internal	North	South	Panmure	West	Total
East	800	420	162	-218	420	299	1,882
Internal	-216	-21	566	-348	-131	-36	-185
North	-370	356	0	-341	99	-432	-688
South	11	378	-471	599	134	126	778
Panmure	-216	42	976	-129	-335	425	763
West	2	593	-269	-20	141	-1,035	-586
Total	11	1,768	964	-456	329	-653	1,963

Table 9 - PM Sector-to-Sector Demand Percent Adjustment

	East	Internal	North	South	Panmure	West	Total
East	22%	22%	21%	-5%	61%	19%	15%
Internal	-9%	-2%	44%	-22%	-15%	-2%	-2%
North	-74%	29%	0%	-67%	8%	-25%	-13%
South	0%	20%	-67%	23%	18%	19%	5%
Panmure	-19%	3%	38%	-20%	-7%	10%	5%
West	0%	24%	-6%	-5%	2%	-12%	-2%
Total	0%	17%	10%	-5%	2%	-4%	2%

5.2.2 Turn Delay Check

Turn delays from the static assignment were monitored to ensure that no major delays were adversely affecting path assignment and route distribution, as well as to gauge model stability.

To facilitate stability of the static assignment, a fixed signal control plan was used (whereas an actuated control plan was used in the dynamic assignment). Priority was placed on reducing turn delay and ensuring appropriate route choice distribution across the network rather than strict adherence to the maximum green times reported from the single-day SCATS data.

5.3 Static Assignment Results

5.3.1 Convergence

The static assignment for each modelled period was stable and attained the relative gap (rgap) before 50 iterations (Figure 12 and Figure 13). 80% of the path assignments from the static assignment was set to be retained during the dynamic assignment.

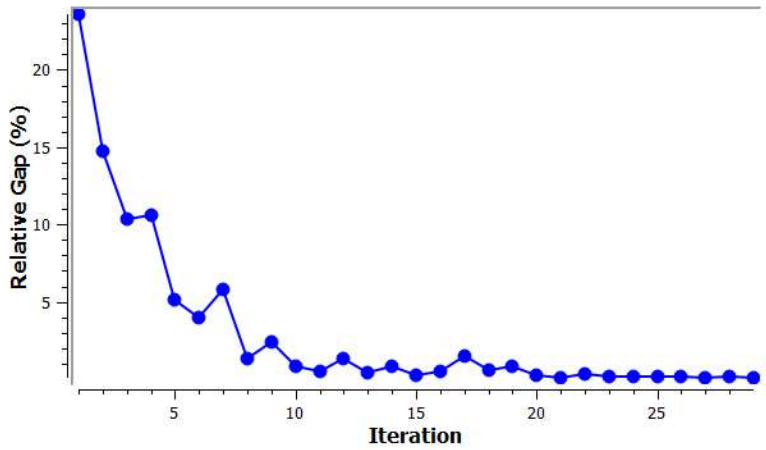


Figure 12 - AM Peak Static Assignment Convergence

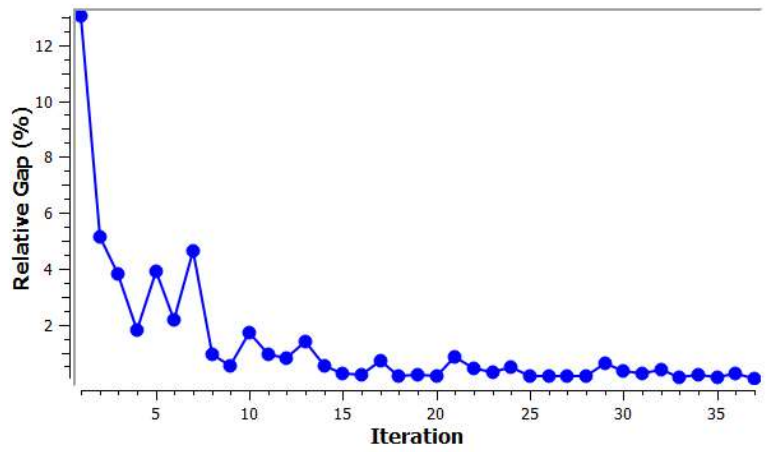


Figure 13 - PM Peak Static Assignment Convergence

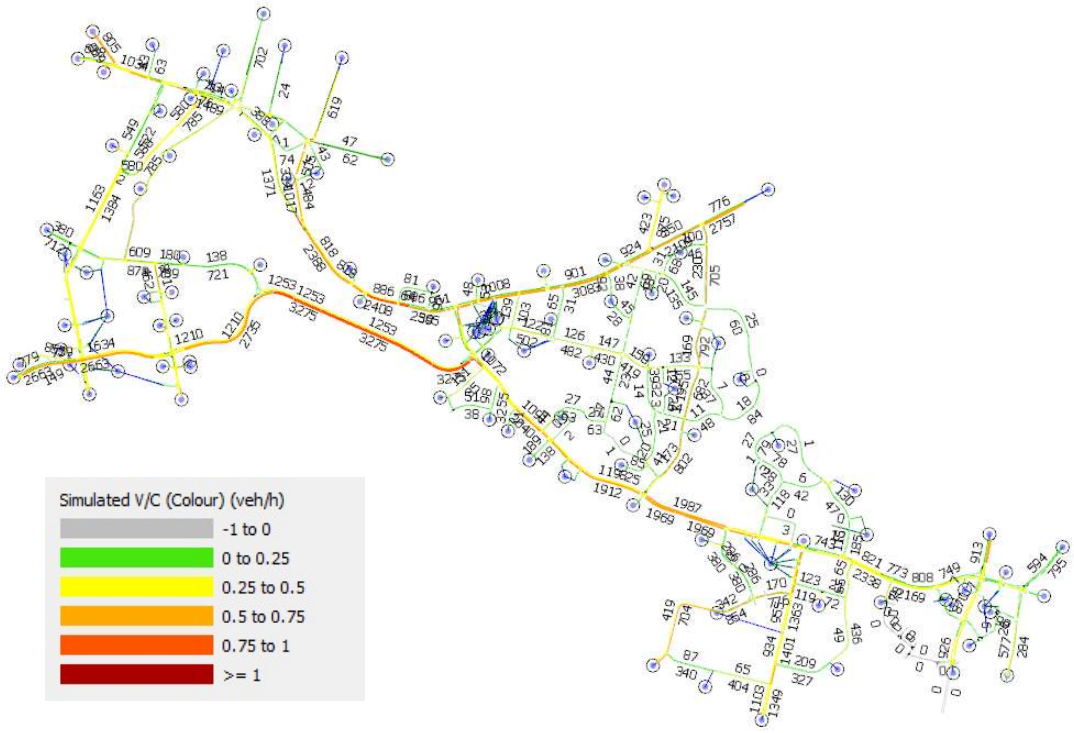


Figure 14 - AM Peak Assigned Flow in PCU/hr (6.15 am – 9.30 am)

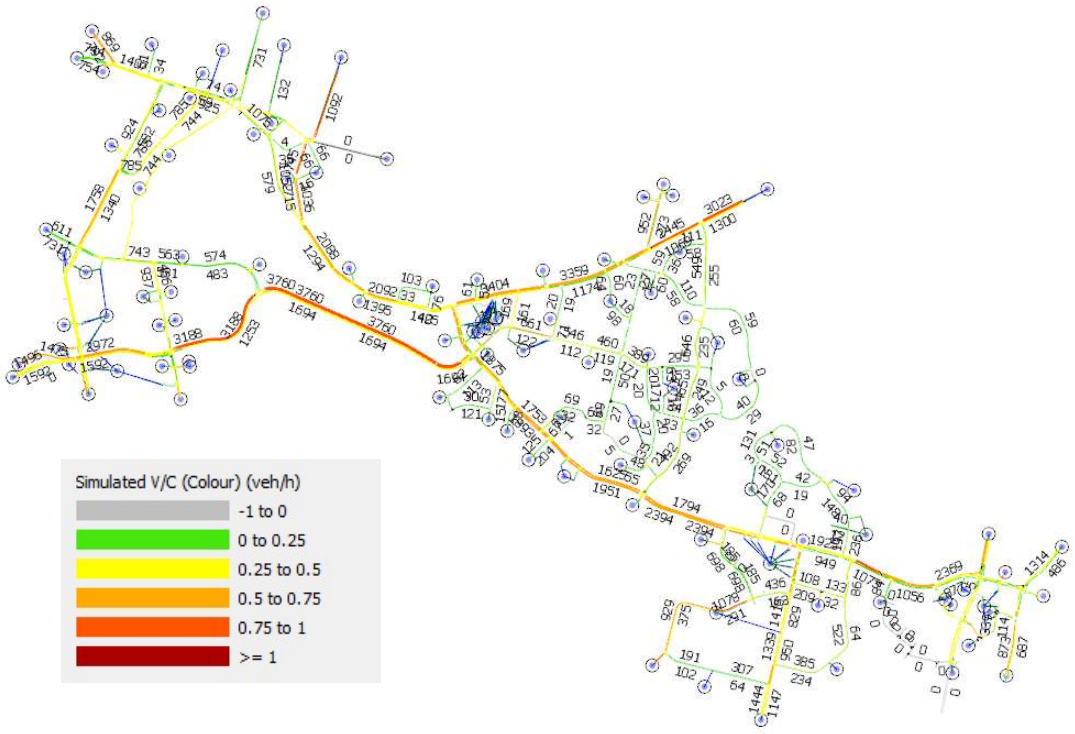


Figure 15 - PM Peak Assigned Flow in PCU/hr (3.15 pm – 6.30 pm)

5.4 Validation Results

5.4.1 Link Counts Validation

Results for individual link counts (Table 10 and Figure 16) network-wide show that the model satisfies the validation criteria for GEH, R^2 and RMSE.

Table 10 - Summary of Individual Link Counts Validation Results across Network

	AM (%)		PM (%)		NZTA Guideline
	7am - 8am	8am - 9am	4pm - 5pm	5pm - 6pm	Category C
GEH <5	85	85	91	87	>80%
GEH <7.5	94	95	98	99	>85%
GEH <10	99	98	99	100	>90%
R^2	0.98	0.98	0.99	0.99	>0.95
RMSE	12	13	10	9	<20%

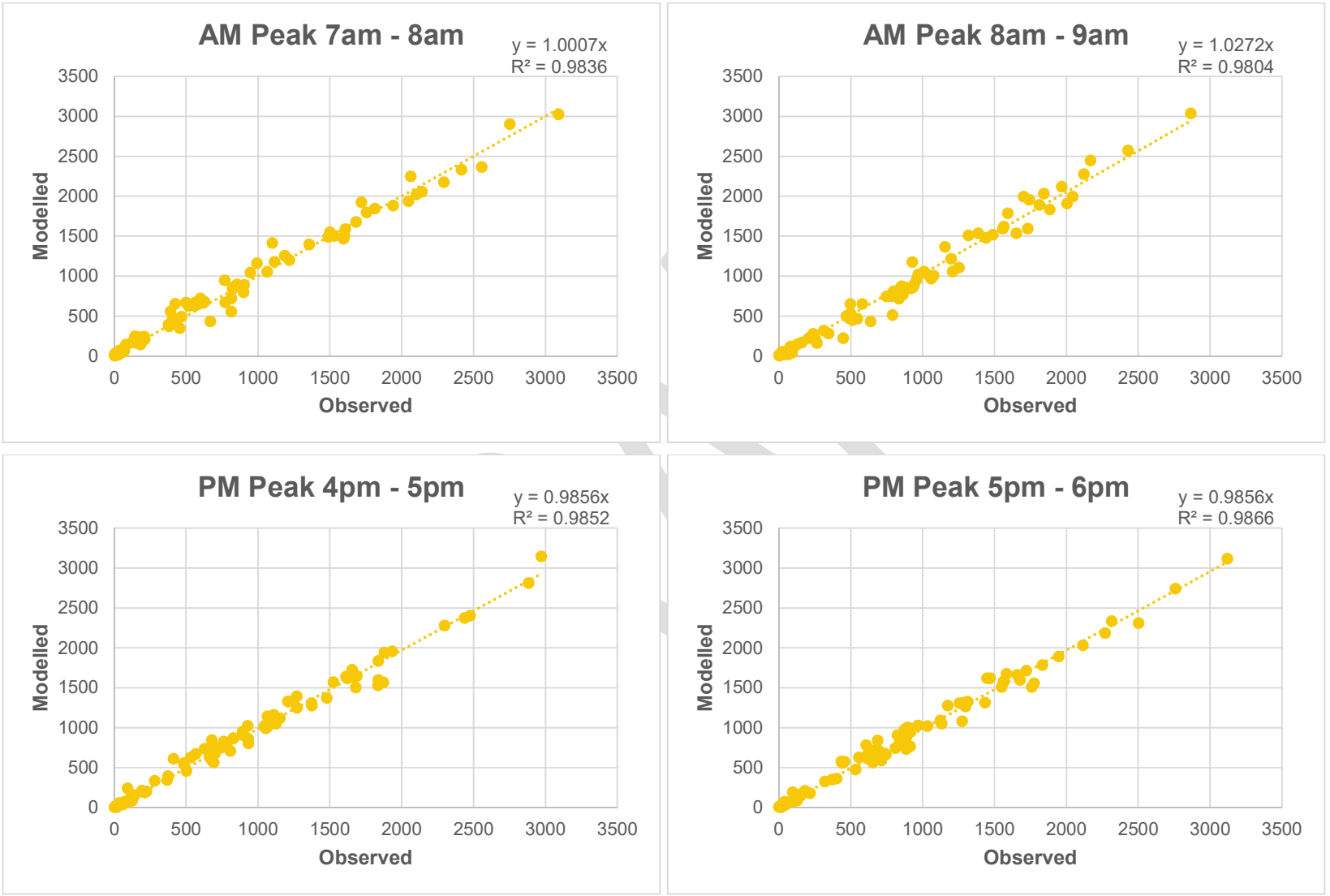


Figure 16 - Link Counts Validation Scatter Plots

5.4.2 Turn Counts Validation

Results for individual turn counts (Table 11) in the focus area show that the model satisfies the validation criteria for GEH, R^2 and RMSE. Where the modelled counts did not meet the GEH <5 criteria, the manual counts at that turn were either found to be unreasonable when cross-checked with adjacent counts or there was lack of information on reliability and therefore given less priority for validation.

Table 11 - Summary of Individual Turn Counts Validation Results in Focused Area

	AM (%)		PM (%)		NZTA Guideline
	7am - 8am	8am - 9am	4pm - 5pm	5pm - 6pm	Category C
GEH <5	84	85	78	84	>80%
GEH <7.5	93	91	94	94	>85%
GEH <10	96	98	99	100	>90%
R^2	0.99	0.98	0.99	0.99	>0.95
RMSE	19	19	19	14	<20%

5.5 Flow Profile Validation

Flow profiles at key locations across the network (Figure 17) were monitored. Overall, the modelled flow profiles follow the observed profiles reasonably well (Figure 18 and Figure 19).

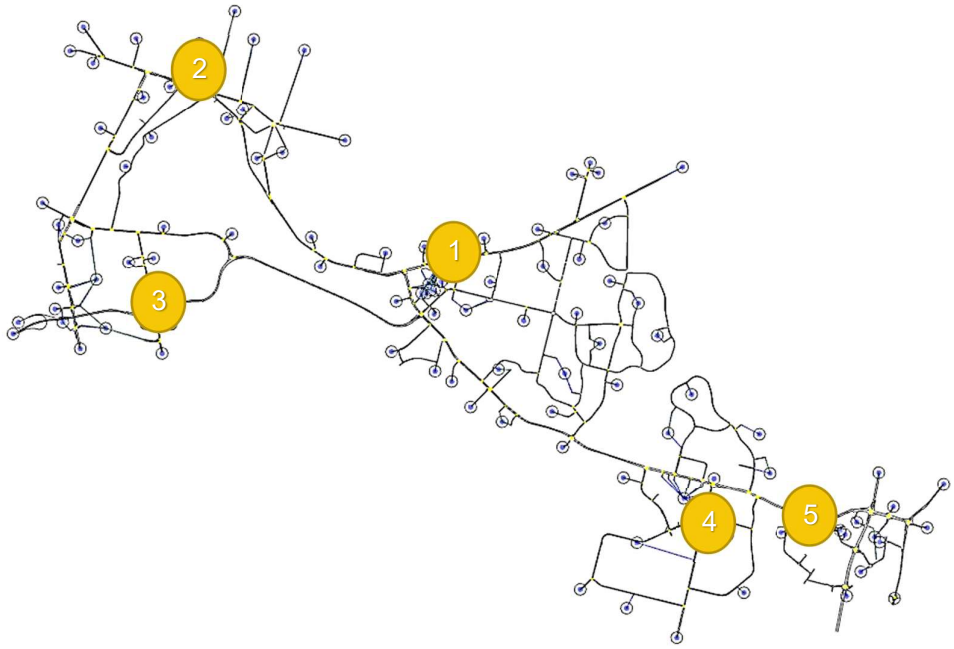
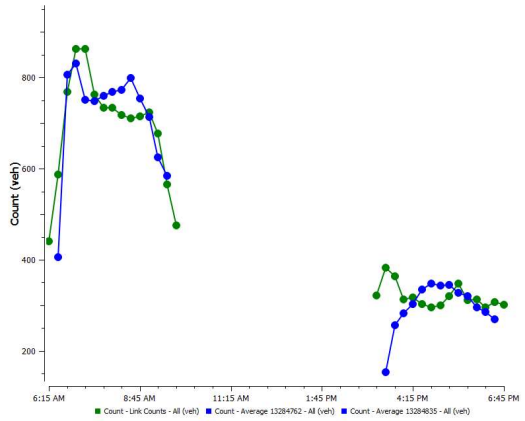


Figure 17 - Profile Validation Locations

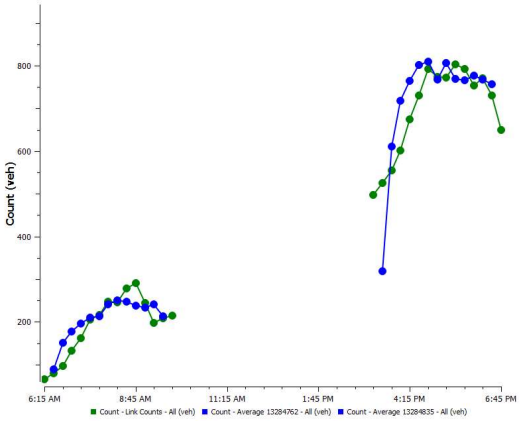
1 – Pakuranga Road / Lewis Road

Westbound



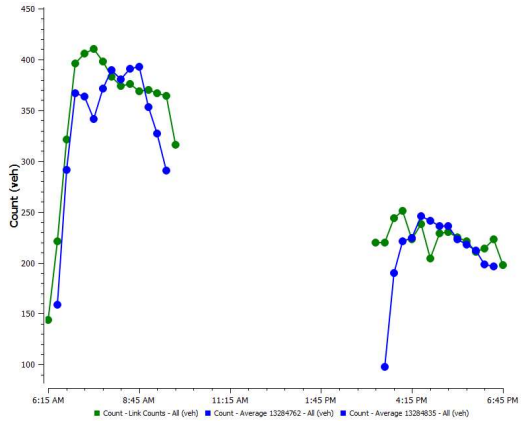
1 – Pakuranga Road / Lewis Road

Eastbound



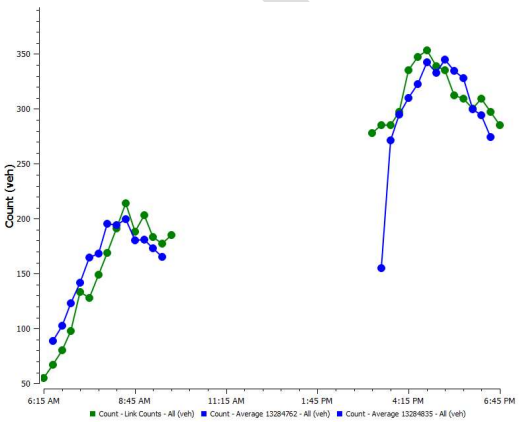
2 – Panmure Roundabout, Mount Wellington Approach

Westbound



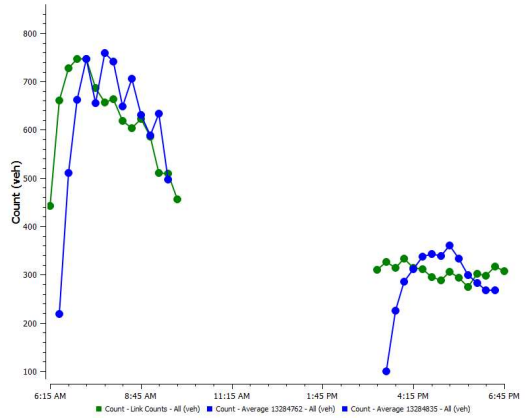
2 – Panmure Roundabout, Mount Wellington Approach

Eastbound



3 –South-Eastern Highway / Carbine Road

Westbound



3 – South-Eastern Highway / Carbine Road

Eastbound

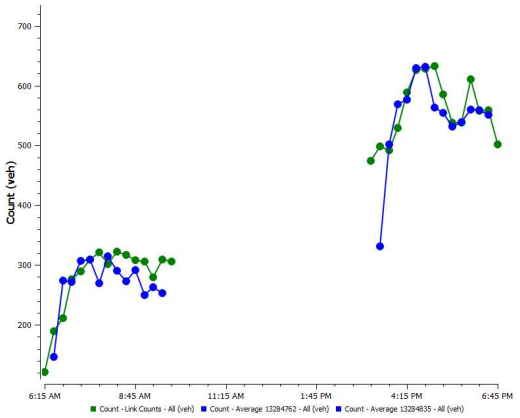
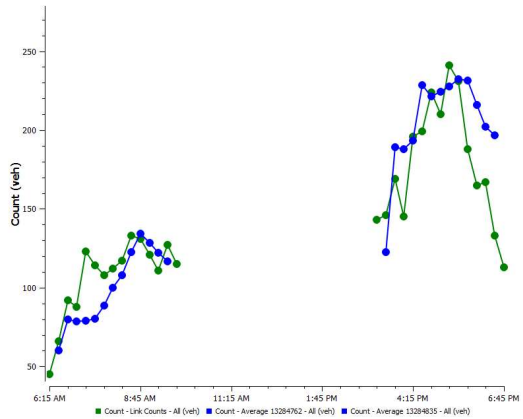


Figure 18 - Flow Profile Validation (modelled in blue, observed in green)

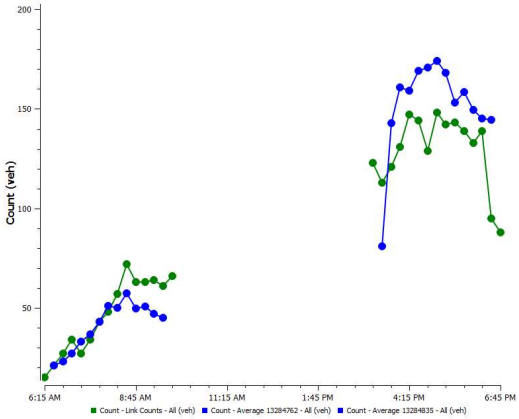
4 –Ti Rakau Drive / Harris Road

Harris Road Westbound



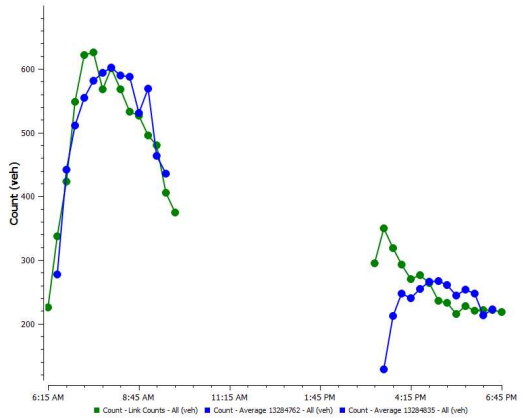
4 –Ti Rakau Drive / Harris Road

Harris Road Eastbound



5 – Ti Rakau Drive / Huntington Drive

Westbound



5 – Ti Rakau Drive / Huntington Drive

Eastbound

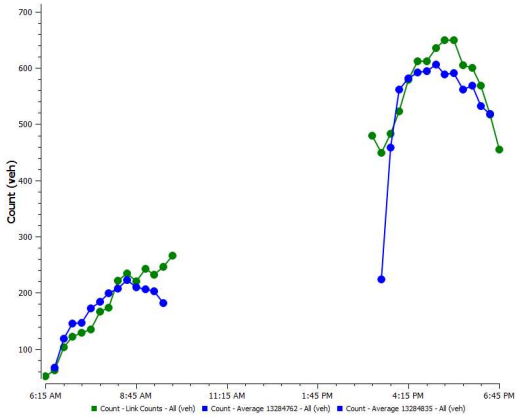


Figure 19 - Flow Profile Validation (modelled in blue, observed in green) continued

5.6 HCV Count Validation

A sense-check of the modelled proportion of vehicles assigned as NZTA Axel Class 4 and above (medium and heavy vehicles) was made at key locations across the network. Estimates of car to HCV proportions were made based on available tube count data and judgement. Overall, the modelled proportions match the estimates reasonably well (Figure 20).

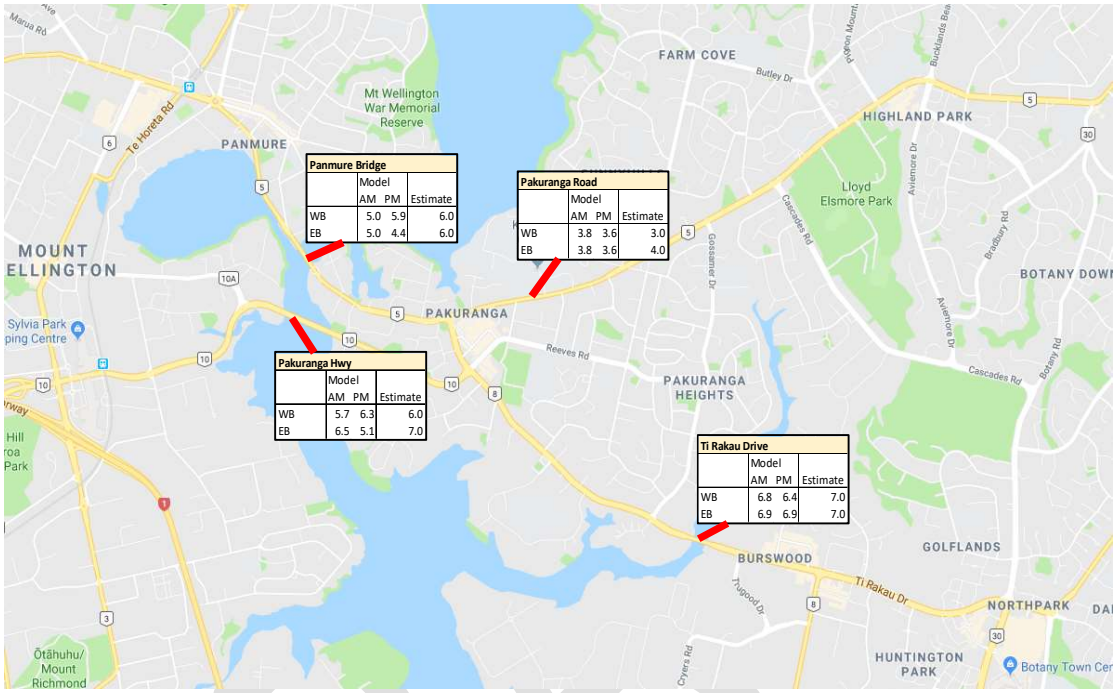


Figure 20 - Comparison of HCV percentage at key locations on the network

As described, the HCV includes MCV counts and we understand the survey at intersections only include pure HCV and hence this data was not used in this validation.

5.7 Travel Time Validation

Journey time versus distance graphs show that the modelled travel times were generally a good fit to the observed travel time (Figure 22 - **Error! Reference source not found.**). Signals at the modelled intersections were actuated based on minimum and maximum green times provided from the SCATS data of 7 March 2018. Adjustments were made up to five seconds above and below the maximum green time where required to calibrate travel times. Despite these adjustments, it is noted that:

- For the AM peak, modelled travel time from Edgewater Drive to Pakuranga Highway on Ti Rakau Drive is slightly low in the second hour. Overall 92% of the routes meet the Criteria for the AM peak.
- For the PM peak, modelled travel time from Jellicoe Road to Ti Rakau Drive is slightly low in the second hour. Overall 92% of the routes meet the Criteria for the PM peak.

Nevertheless, all modelled travel times (routes summarised in Figure 21) were within the 15th and 85th percentile of observed travel time. Therefore, the model is considered acceptably validated for travel time.

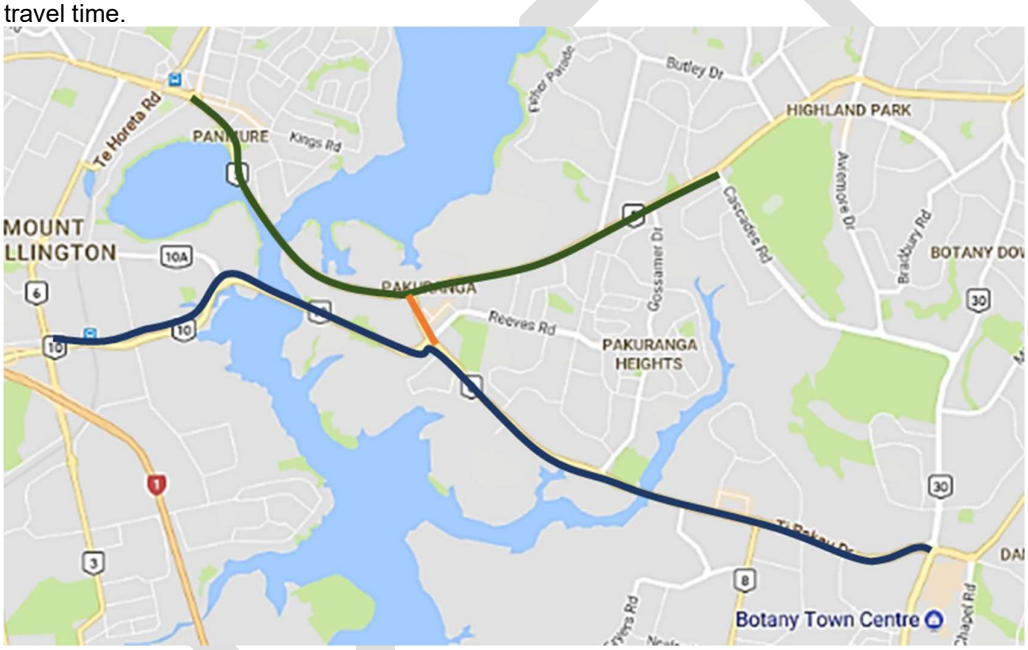


Figure 21 - Travel time routes (traffic) from Snitch GPS data for reporting travel time validation in Chapter 5

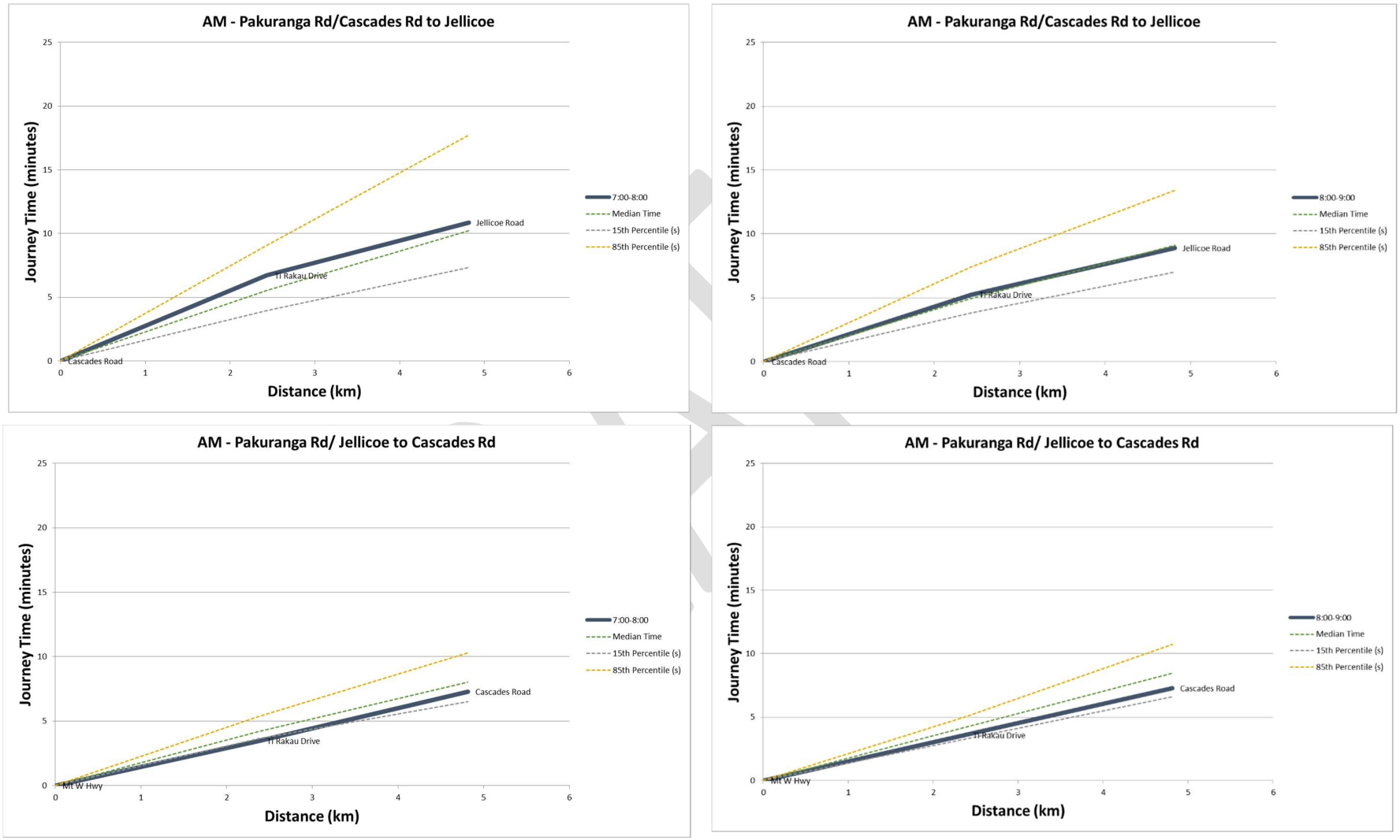


Figure 22 - Travel Time Validation Graphs: AM Pakuranga Road/ Cascades Road to Mount Wellington Highway

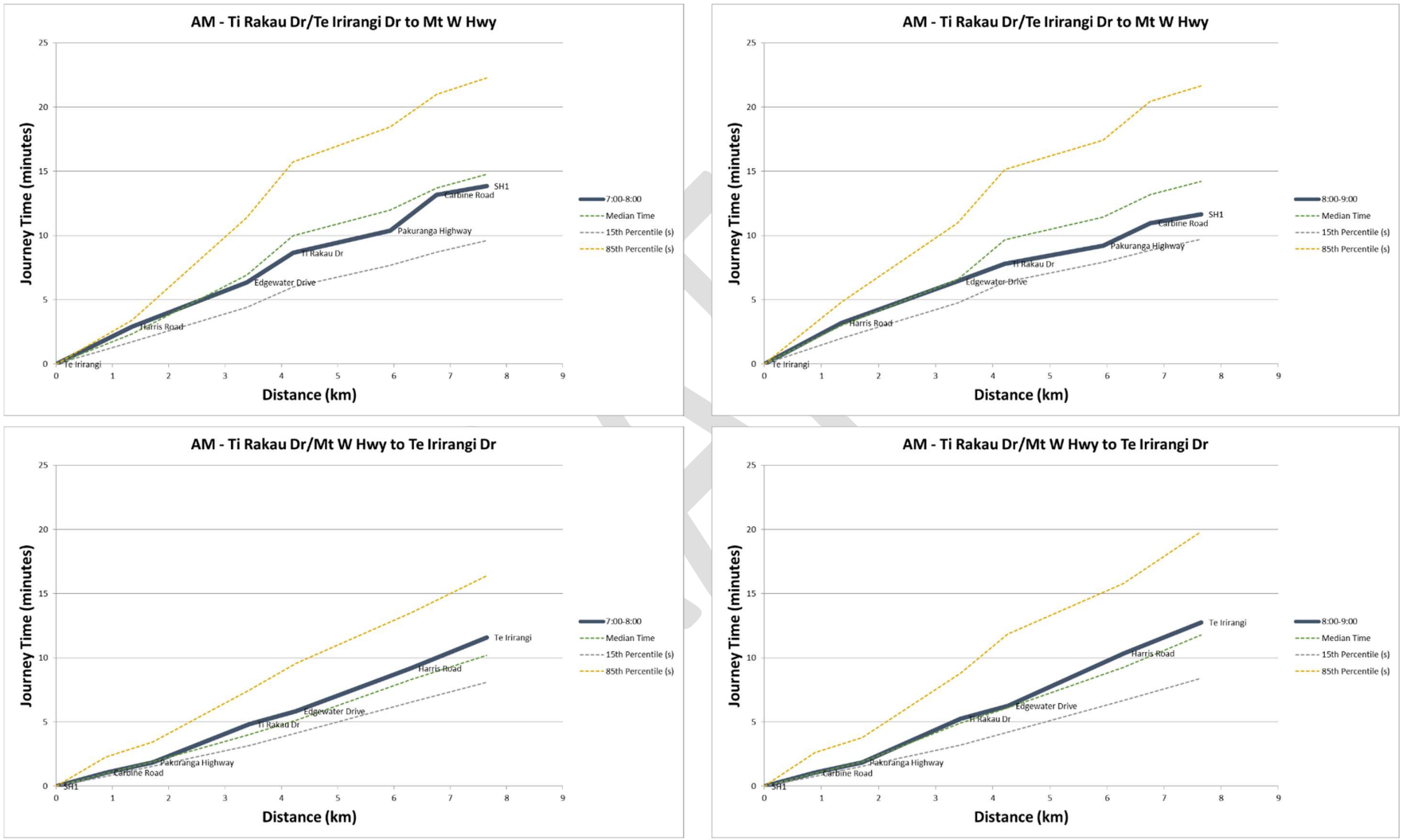


Figure 23 - Travel Time Validation Graphs: AM Ti Rakau Drive/ Te Irirangi Drive to Mount Wellington Highway

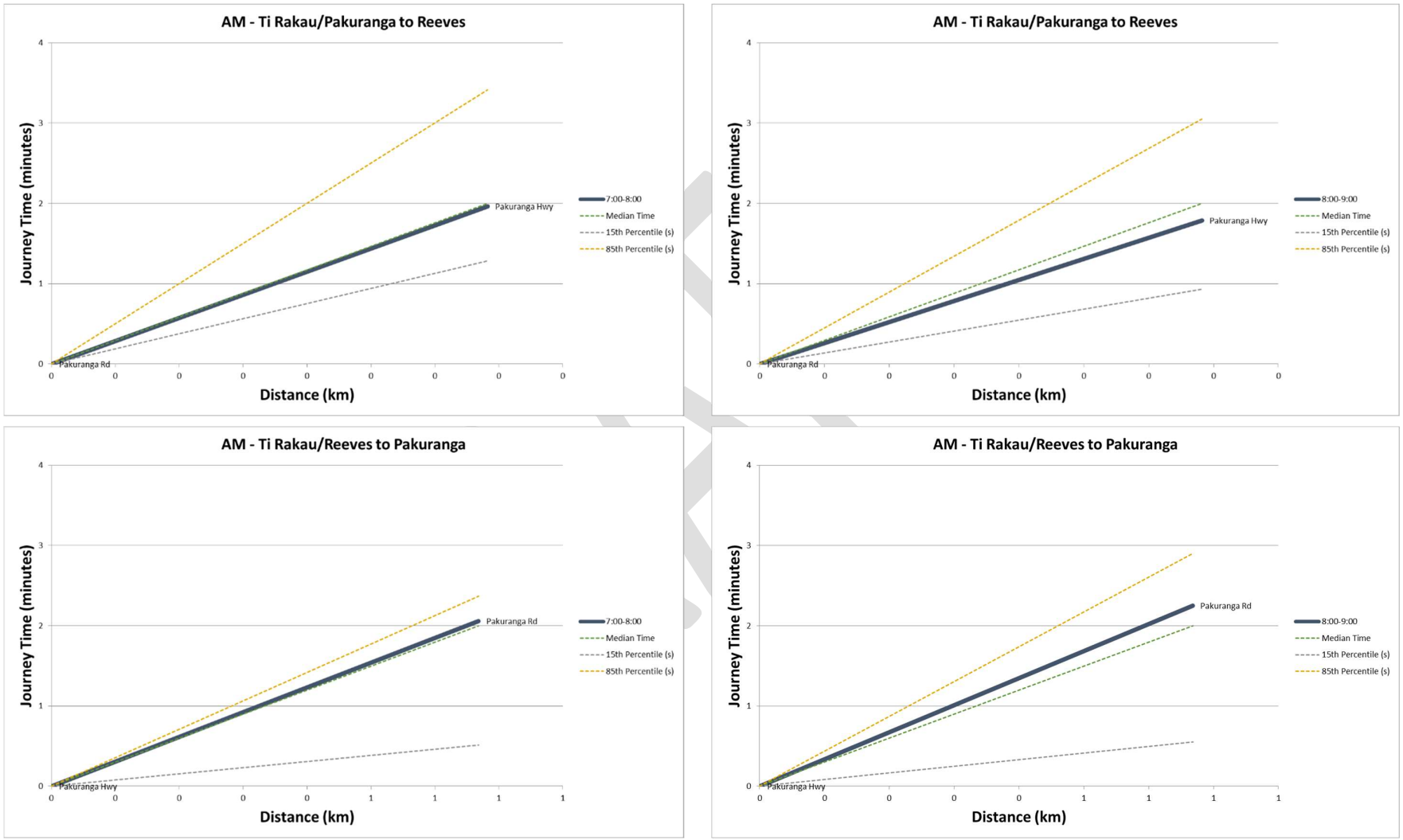


Figure 24 - Travel Time Validation Graphs: AM Ti Rakau Drive/ Pakuranga Road to Reeves Road

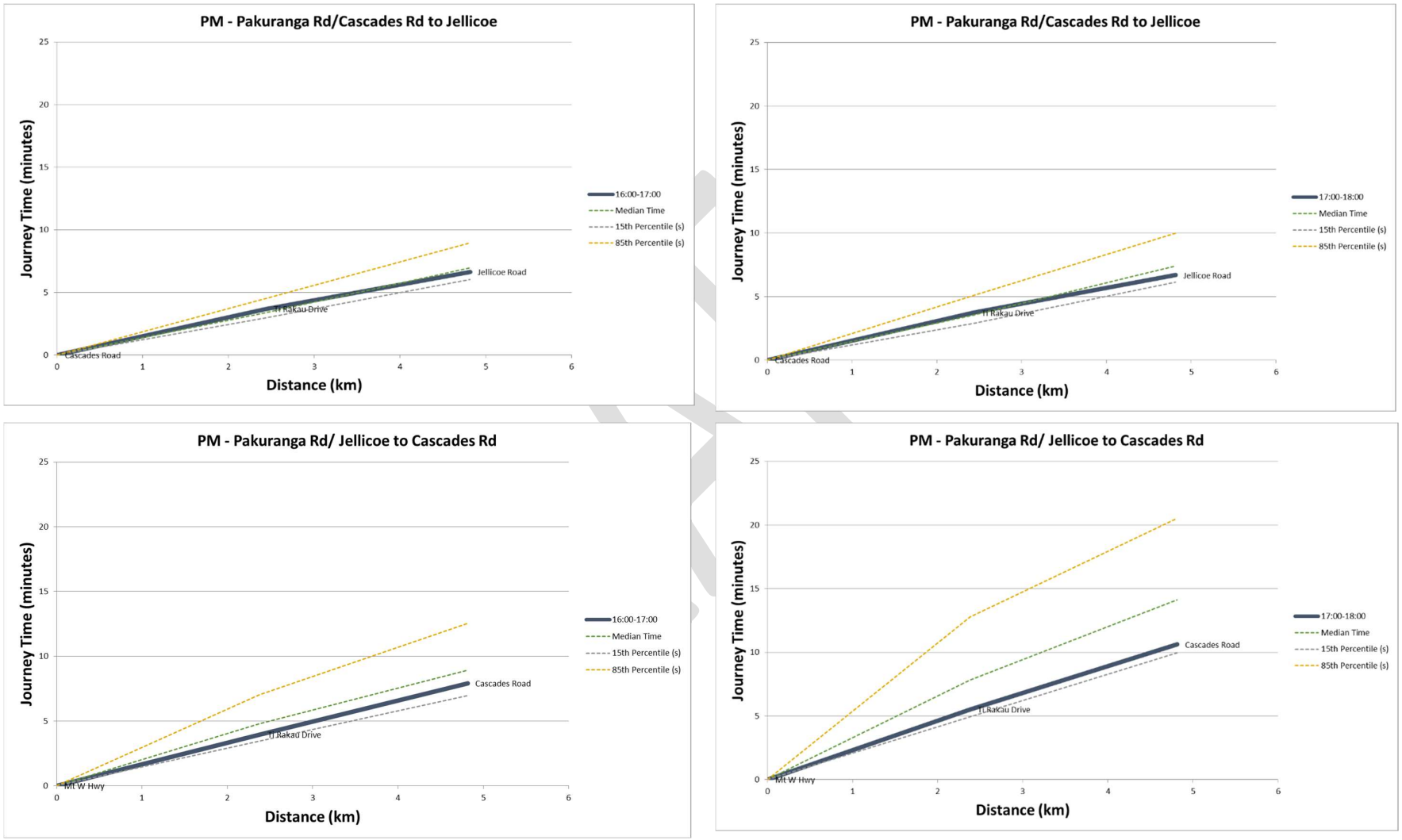


Figure 25 - Travel Time Validation Graphs: PM Pakuranga Road/ Cascades Road to Mount Wellington Highway

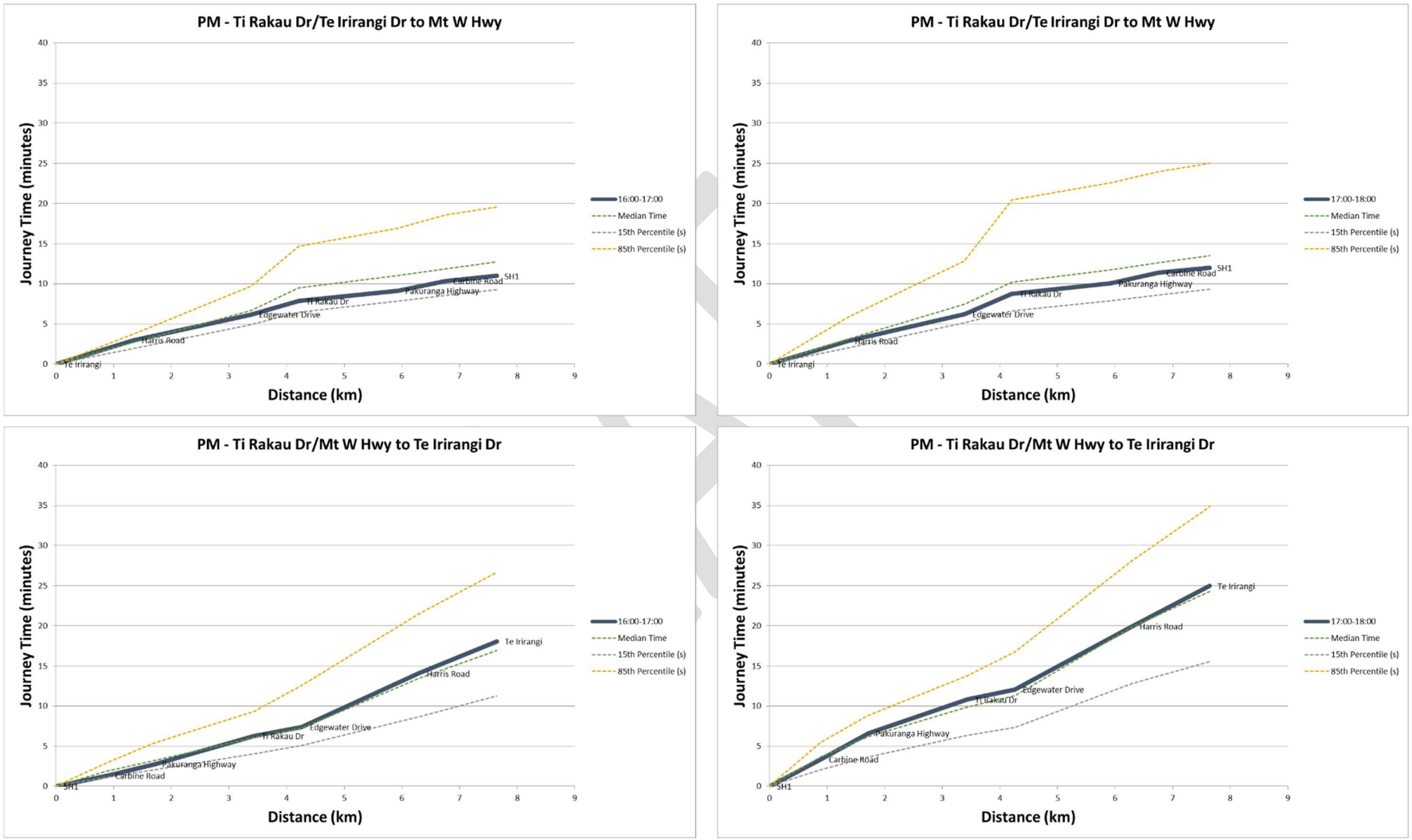


Figure 26 - Travel Time Validation Graphs: PM Ti Rakau Drive/ Te Irirangi Drive to Mount Wellington Highway

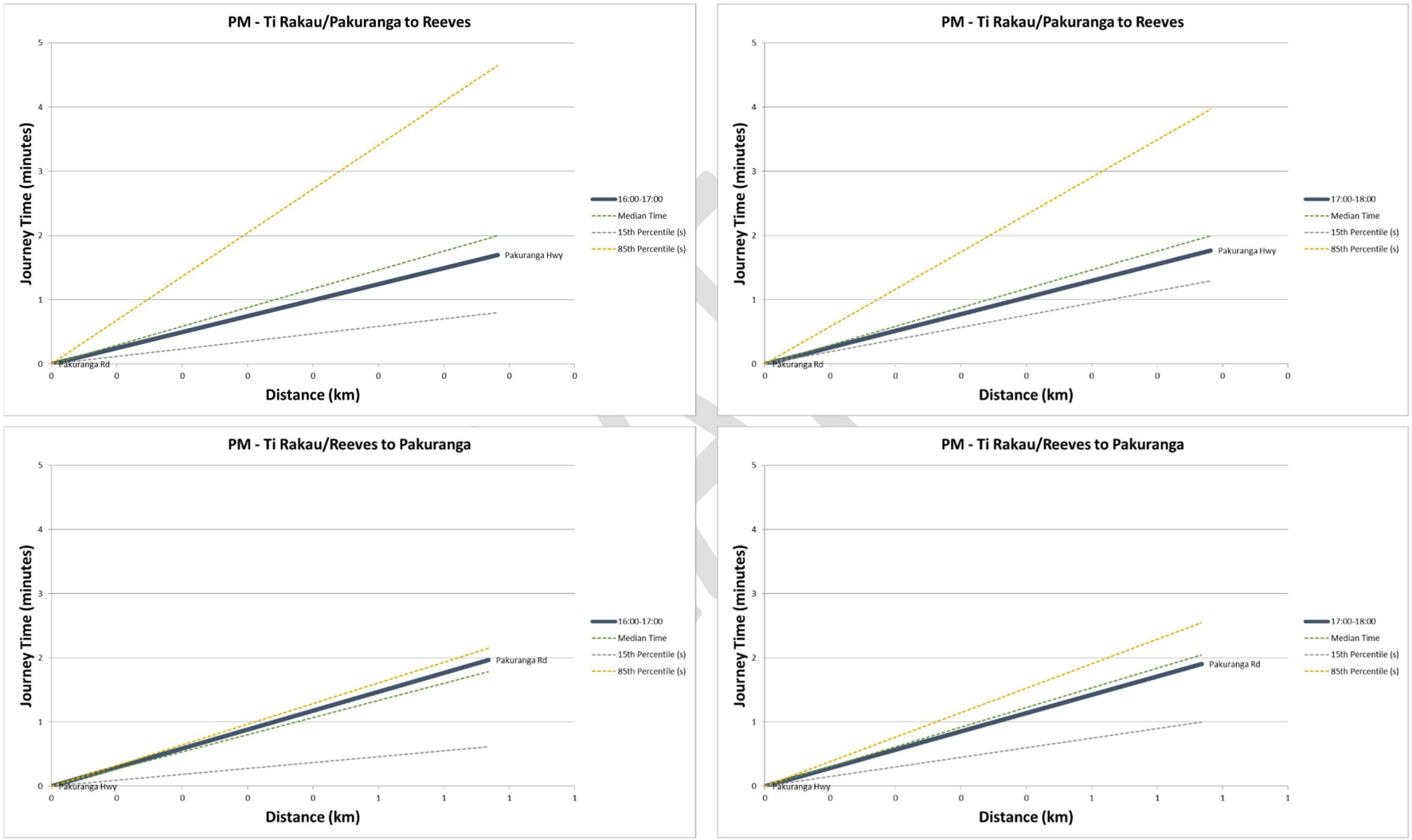


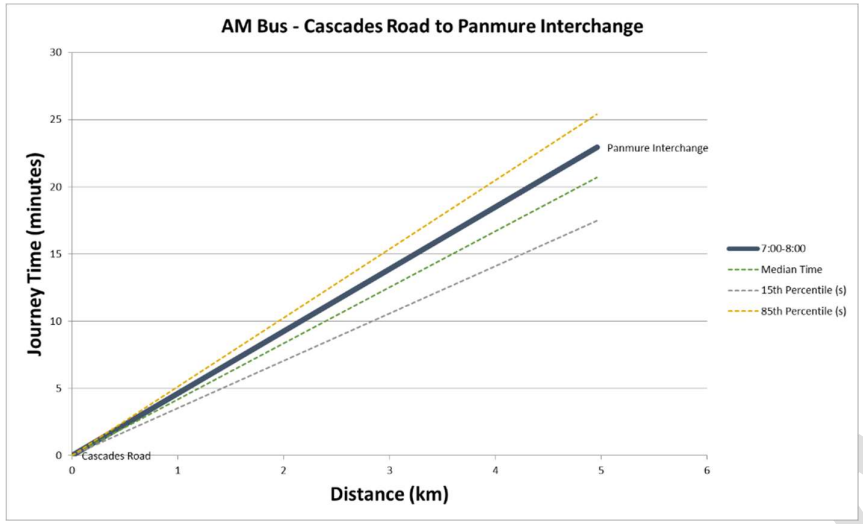
Figure 27 - Travel Time Validation Graphs: PM Ti Rakau Drive/ Pakuranga Road to Reeves Road

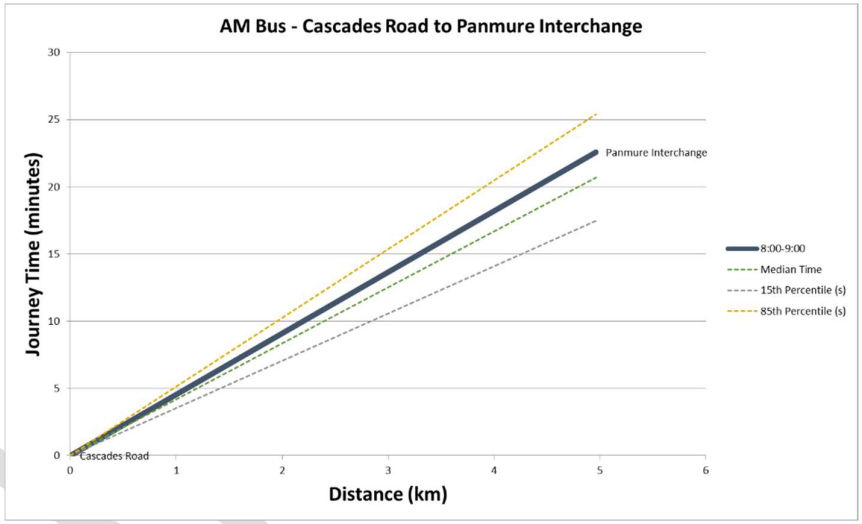
Bus travel time for key corridors in the model also fit reasonably well with observed (Figure 28 - Figure 29). The routes are:

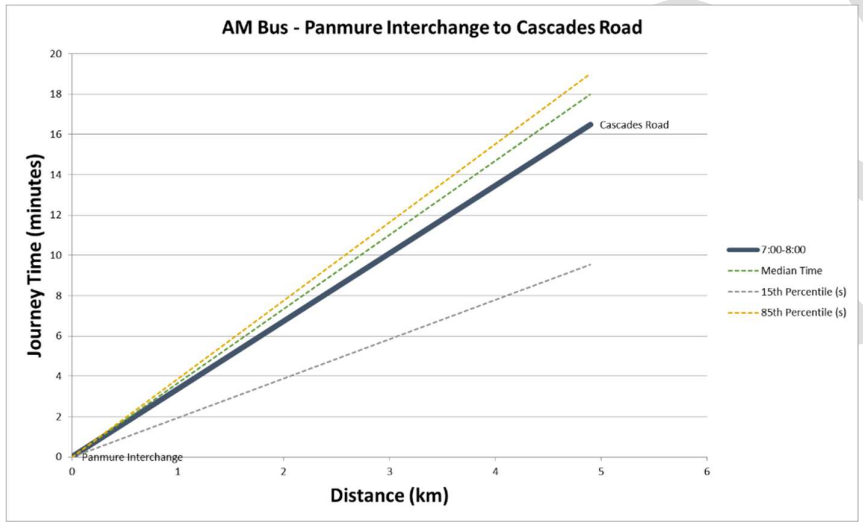
- Bus Route 70 – between Botany Town Centre and Panmure Interchange.
- Bus Route 72 – between Cascades Road and Panmure Interchange.

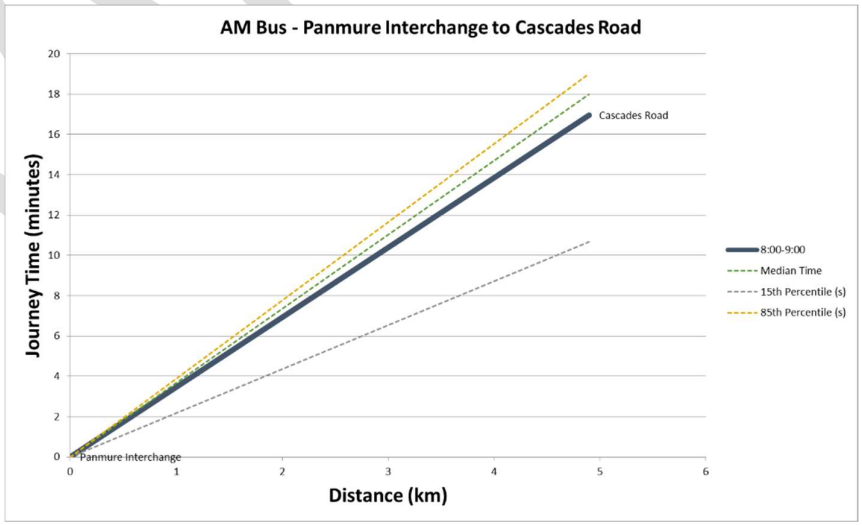
From the bus journey time graphs, it is noted that

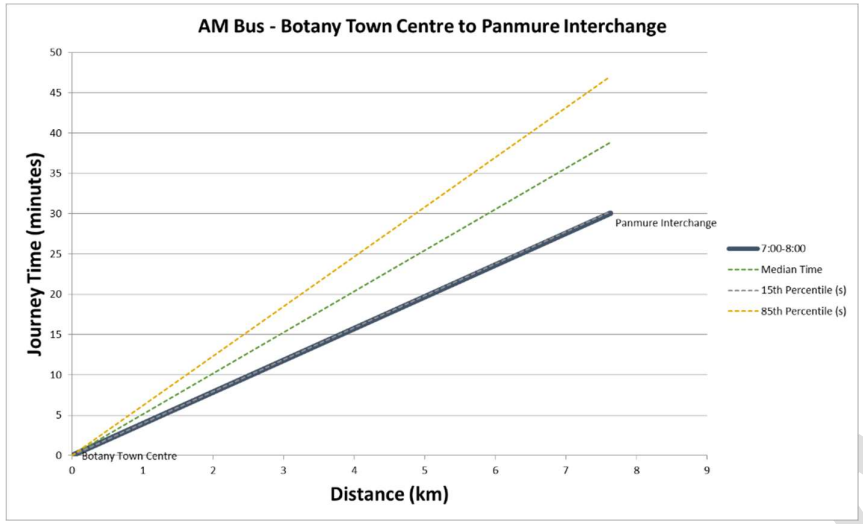
- For the AM peak, modelled travel time from the Botany to Panmure Town Centre is low in the first hour. Overall 88% of the routes meet the Criteria for the AM peak.
- For the PM peak, modelled travel time between the Botany and Panmure from Jellicoe Road to Ti Rakau Drive is high in the second hour. The additional travel time is occurring in the Panmure area and does not impact on the focus area. For the future year, the bus travel time along this route will be monitored to ensure it does not increase unrealistically. Overall 75% of the routes meet the Criteria for the PM peak which is below the target 85%.

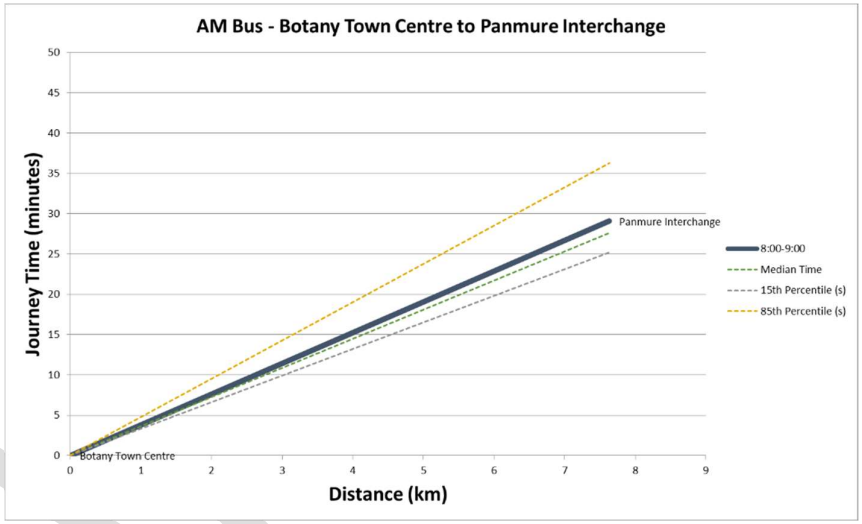

AM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
7:00-8:00
Median Time
15th Percentile (s)
85th Percentile (s)

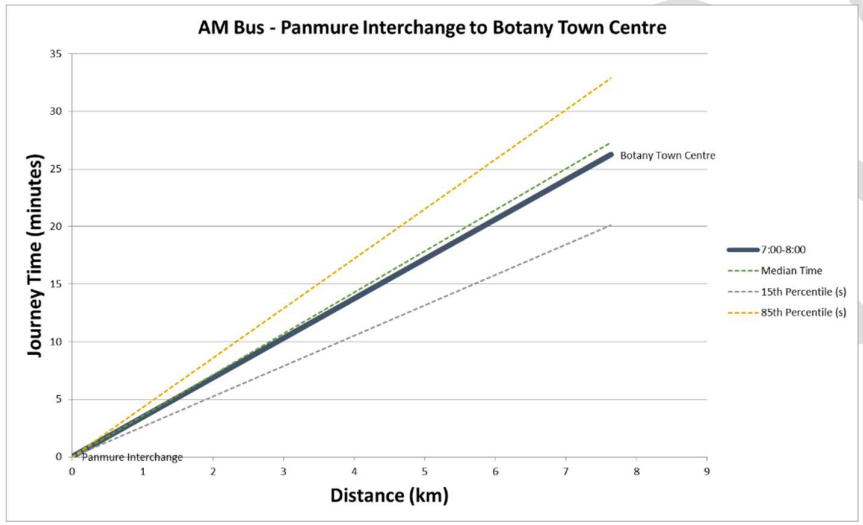

AM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
8:00-9:00
Median Time
15th Percentile (s)
85th Percentile (s)


AM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
7:00-8:00
Median Time
15th Percentile (s)
85th Percentile (s)


AM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
8:00-9:00
Median Time
15th Percentile (s)
85th Percentile (s)







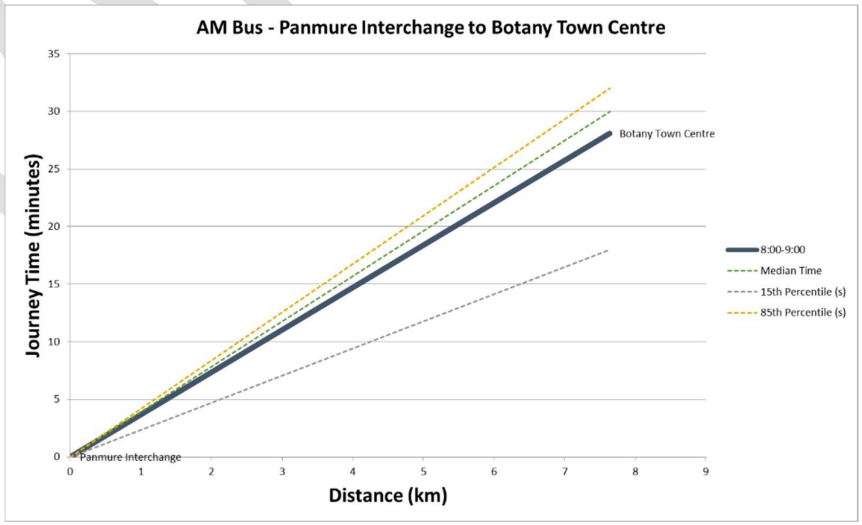
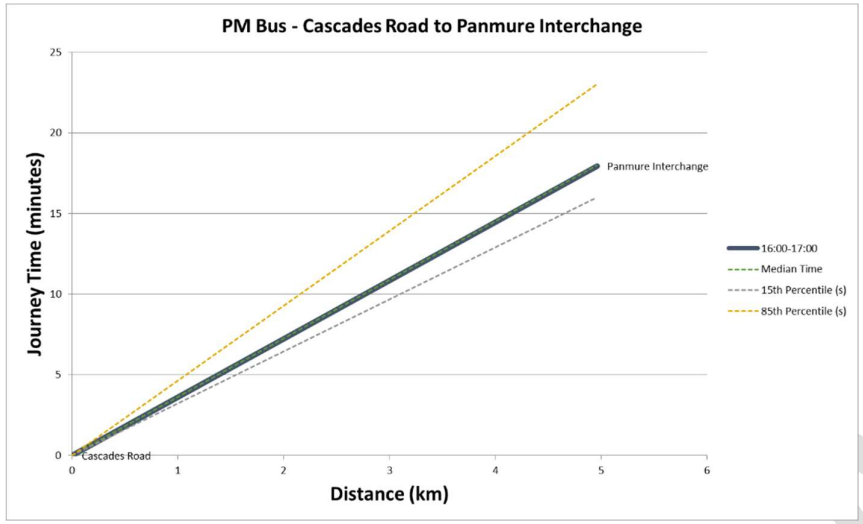
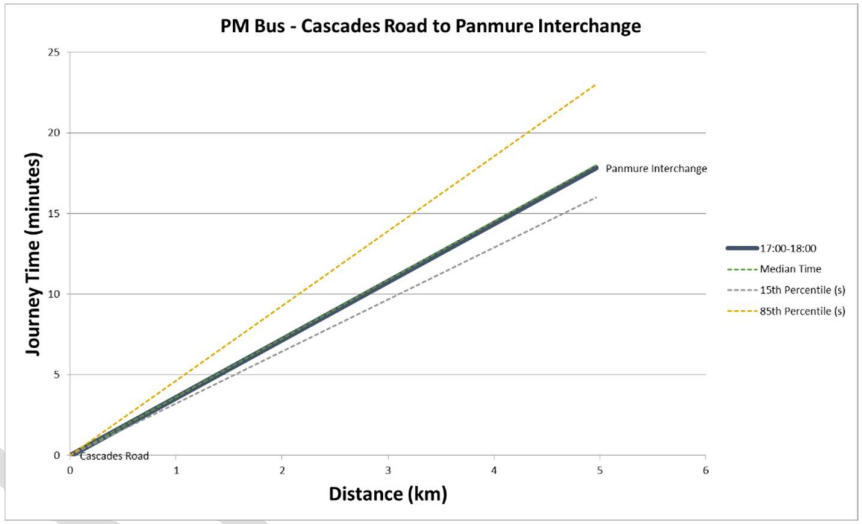
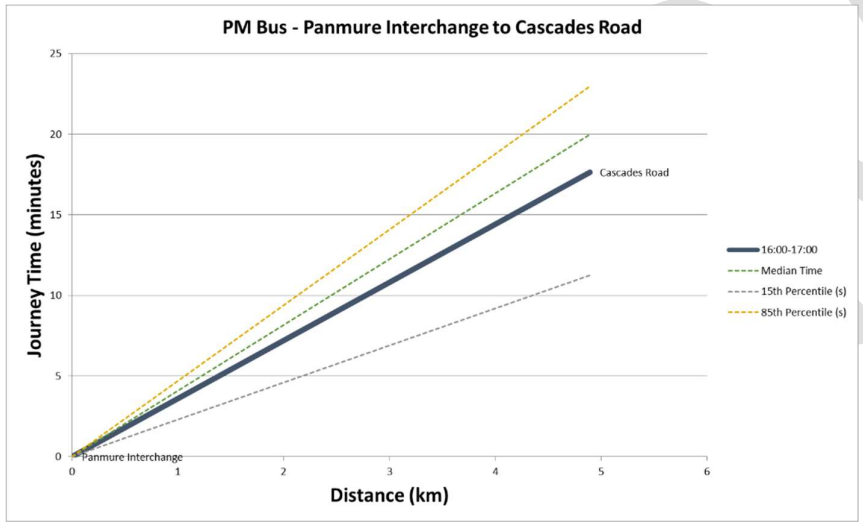
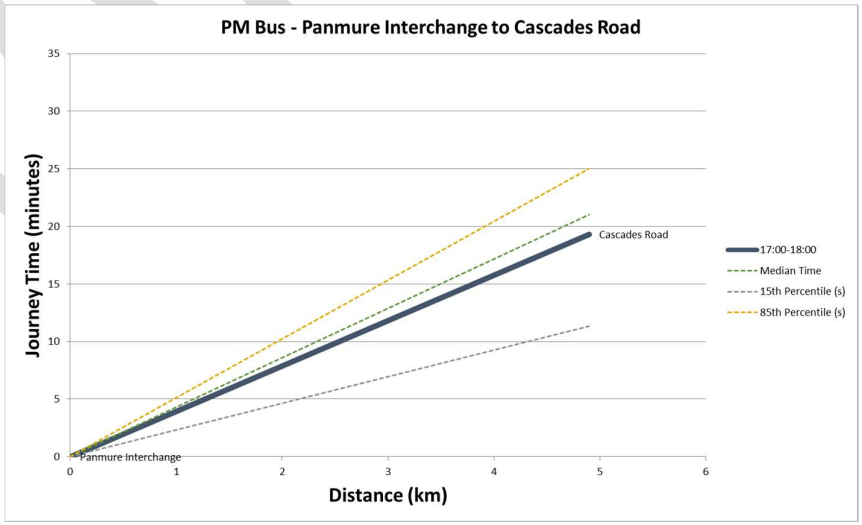


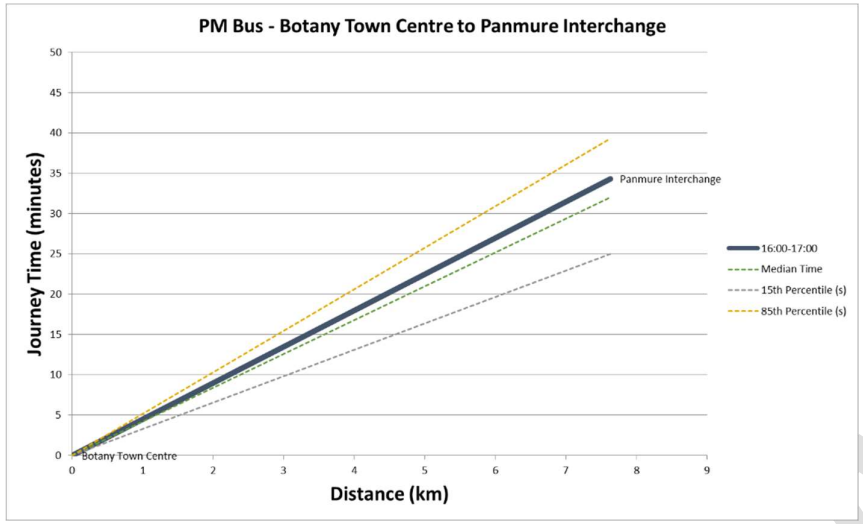
Figure 28 – Travel Time Validation: AM Bus

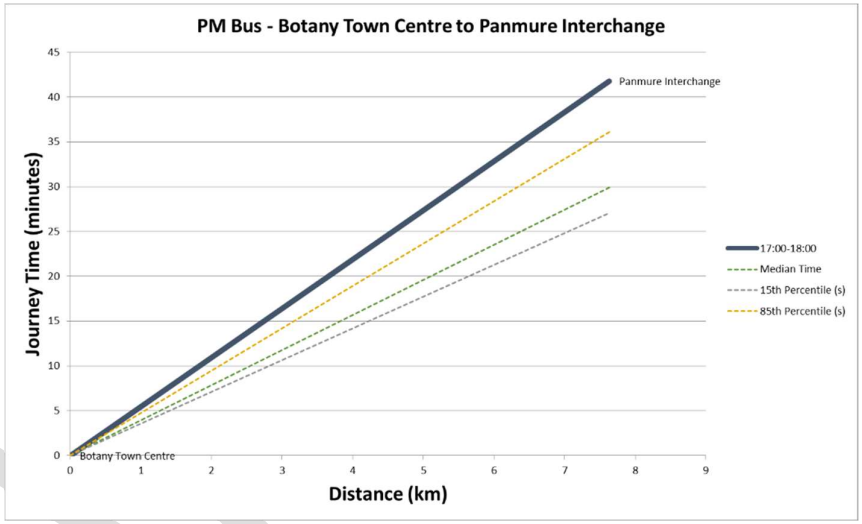

PM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
16:00-17:00
Median Time
15th Percentile (s)
85th Percentile (s)

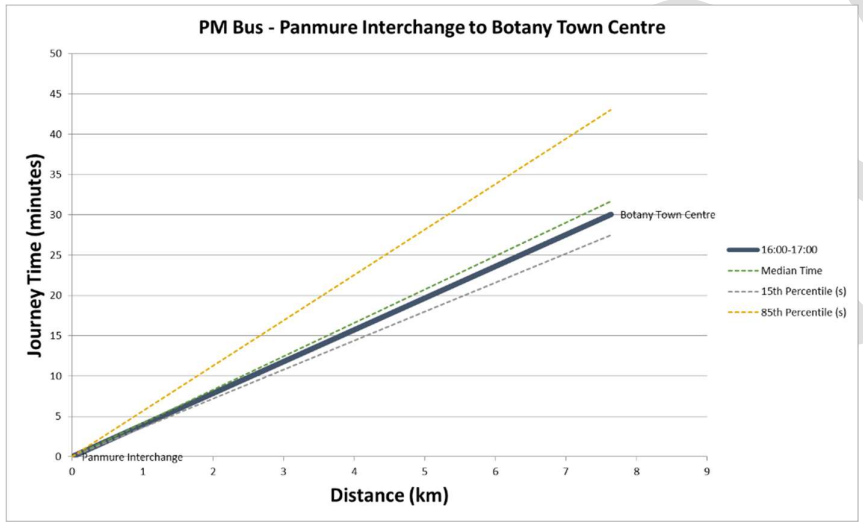

PM Bus - Cascades Road to Panmure Interchange
Journey Time (minutes)
Distance (km)
Panmure Interchange
Cascades Road
17:00-18:00
Median Time
15th Percentile (s)
85th Percentile (s)


PM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
16:00-17:00
Median Time
15th Percentile (s)
85th Percentile (s)


PM Bus - Panmure Interchange to Cascades Road
Journey Time (minutes)
Distance (km)
Cascades Road
Panmure Interchange
17:00-18:00
Median Time
15th Percentile (s)
85th Percentile (s)







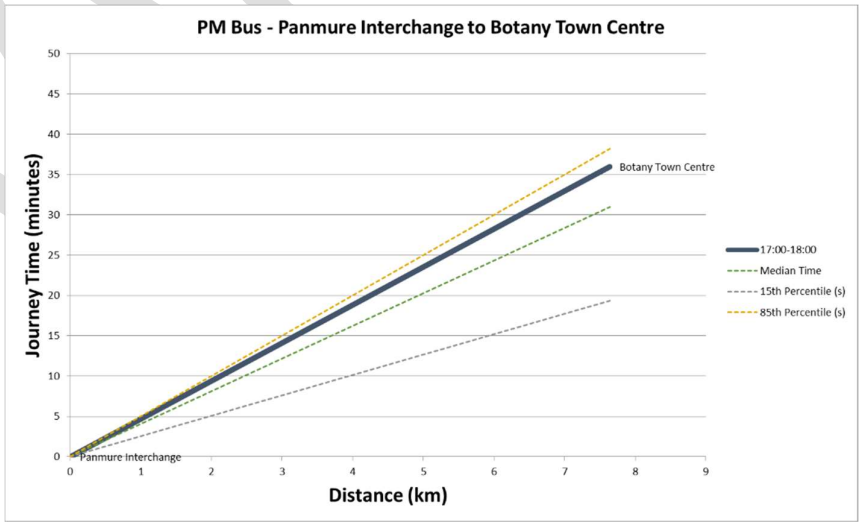


Figure 29 - Travel Time Validation: PM Bus

5.8 Traffic Congestion Check

Traffic count and travel time data are the principle measures of the model performance. Traffic congestion on the network was monitored as an additional sense-check of model performance.

Side-by-side comparison to Google's live traffic view-mode for Thursday 21 February 2019 show that the model represents congestion on the network reasonably well (Figure 30 and Figure 31). In the AM peak, less congestion was seen on Ti Rakau Drive Northbound in the model compared to observed, and this was reflected in the faster travel time for that segment. However, also in the AM, although less congestion was seen on Pakuranga Highway Westbound in the model compared to observed, this was not reflected in the travel time validation. In the PM peak, less congestion was seen on Ti Rakau Eastbound in the model, however this was not reflected in the travel time validation.

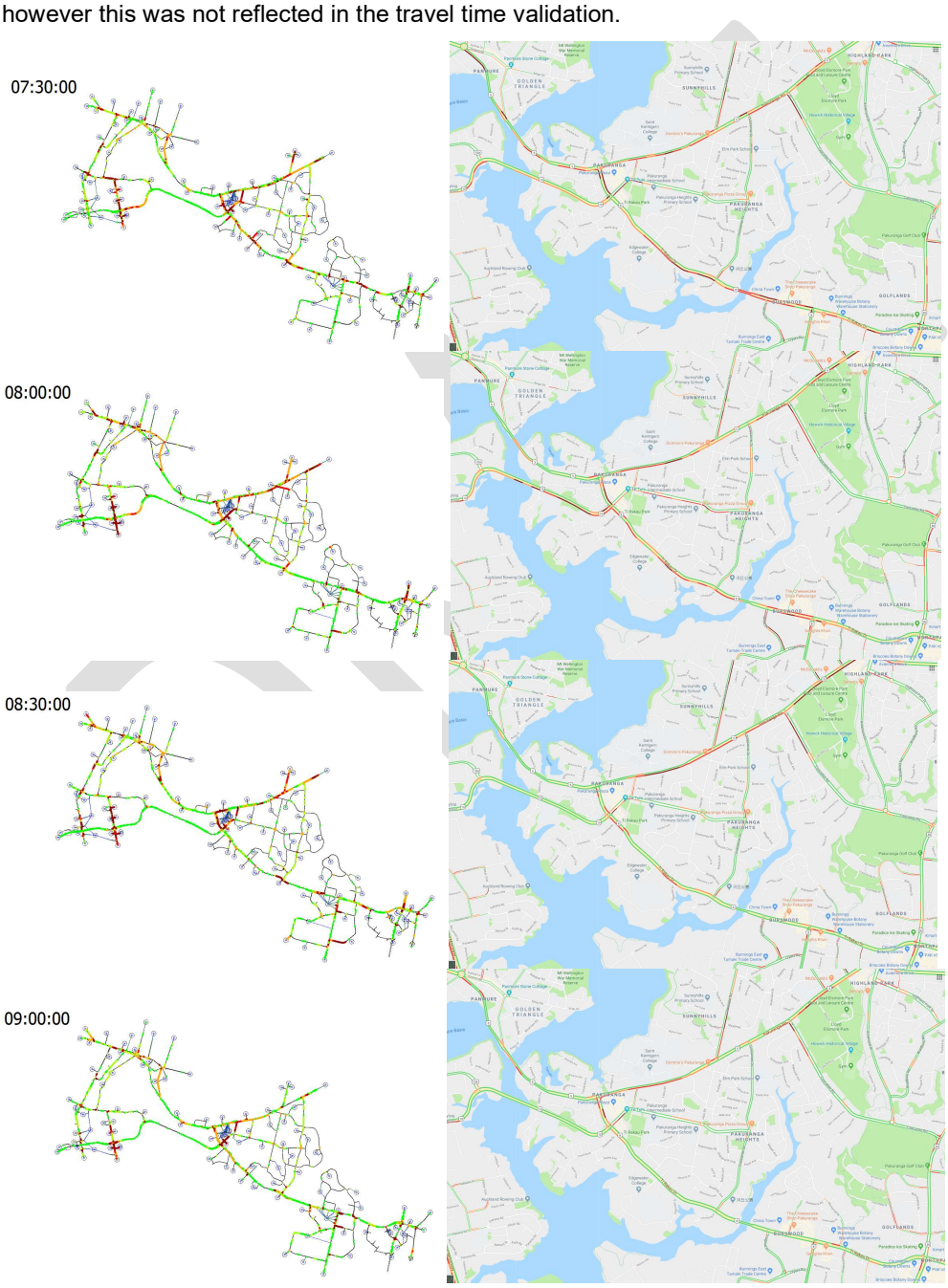


Figure 30 – AM Modelled Congestion versus Observed

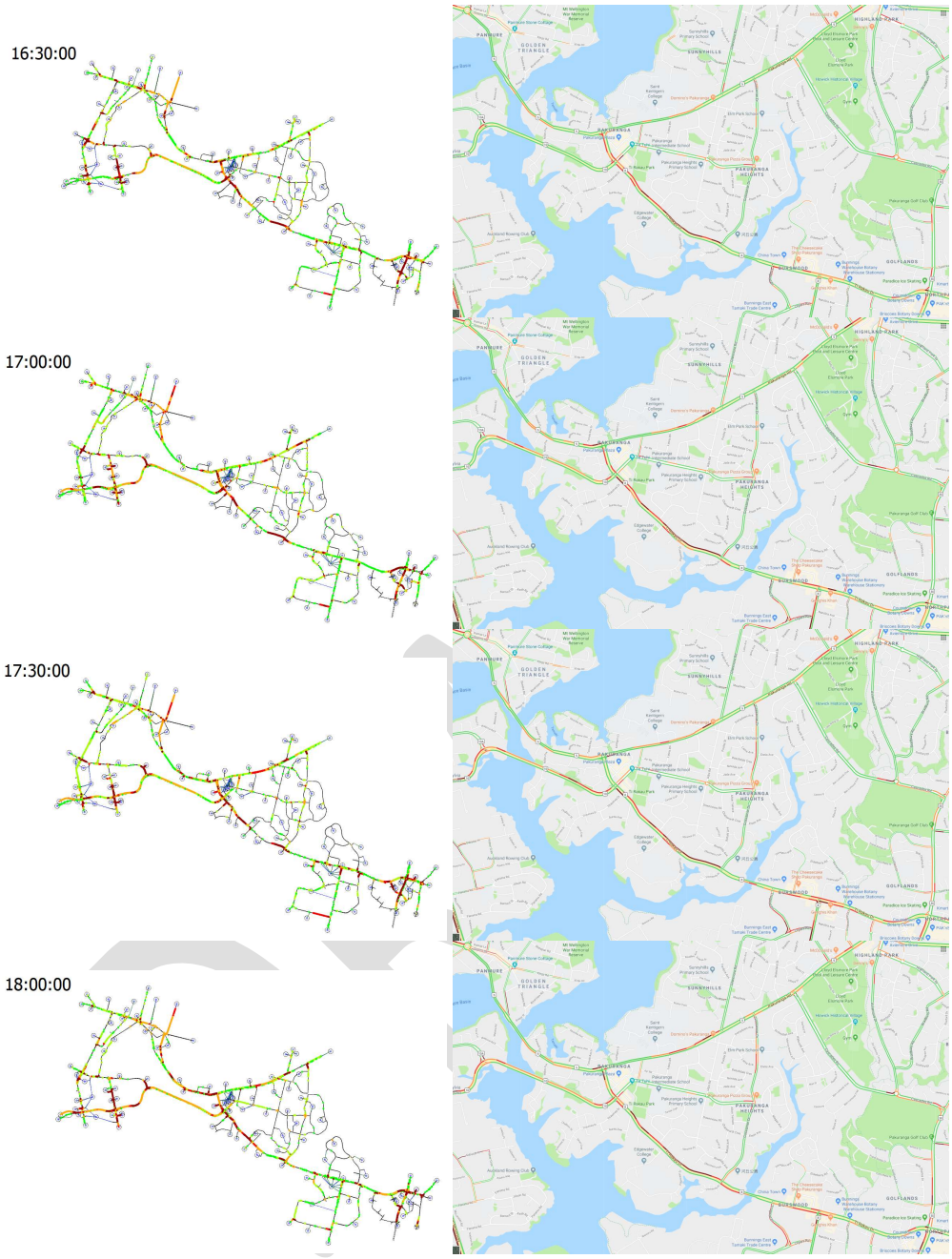


Figure 31 - PM Modelled Congestion versus Observed

This comparison is useful to understand the location of the congestion however the exact definition of congestion in Google's traffic is unknown. Hence it is used as an indication.

5.9 Route Choice Sense Check

Route choice in the model could not be directly calibrated and/or validated because there was no available data. However, sense-checks were made in the **static** model (which contributes 80% of the route choice) using previous experiences and observed traffic count-split information at intersections. Overall, route distribution in the model appears reasonable (Figure 32 - Figure 34).

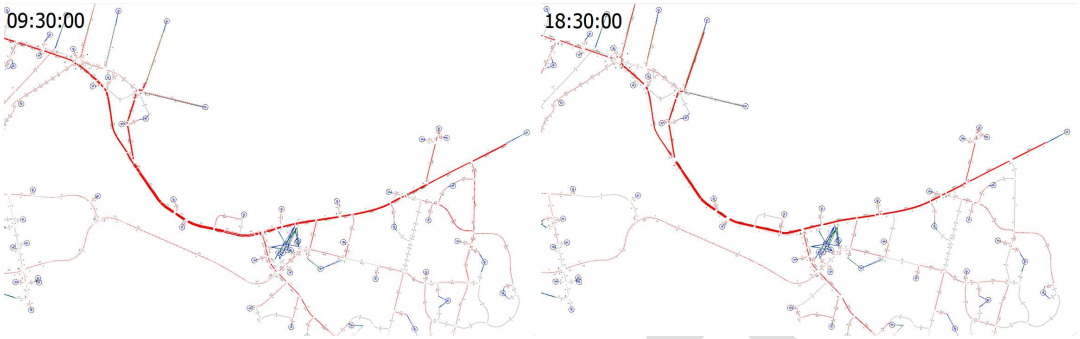


Figure 32 - Route Choice Split: AM Panmure Bridge Westbound (left) and PM Panmure Bridge Eastbound (right)

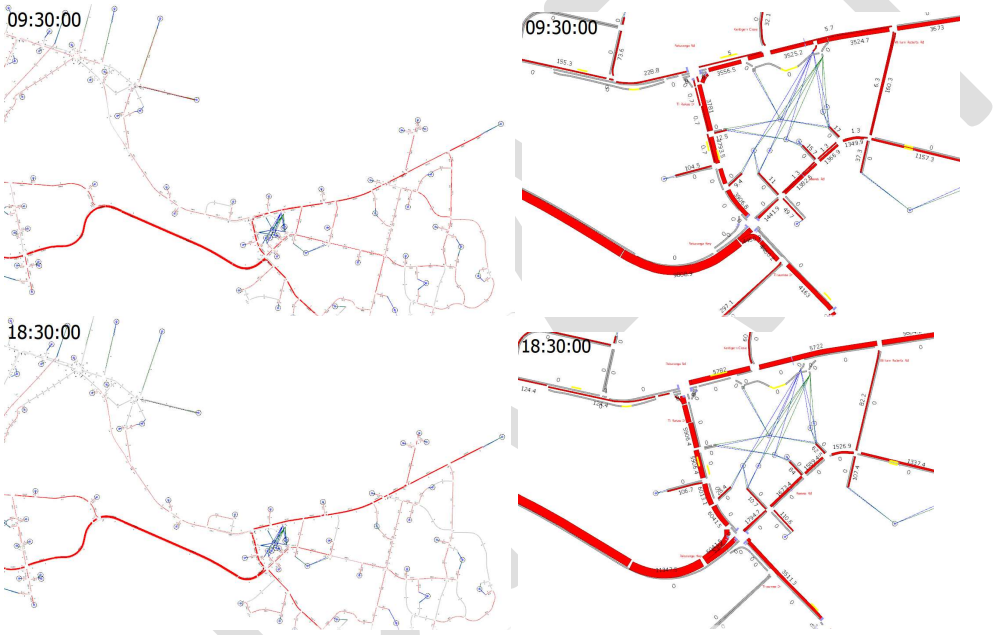


Figure 33 - Route Choice Split: AM Pakuranga Highway Westbound (above) and PM Pakuranga Highway Eastbound (below)

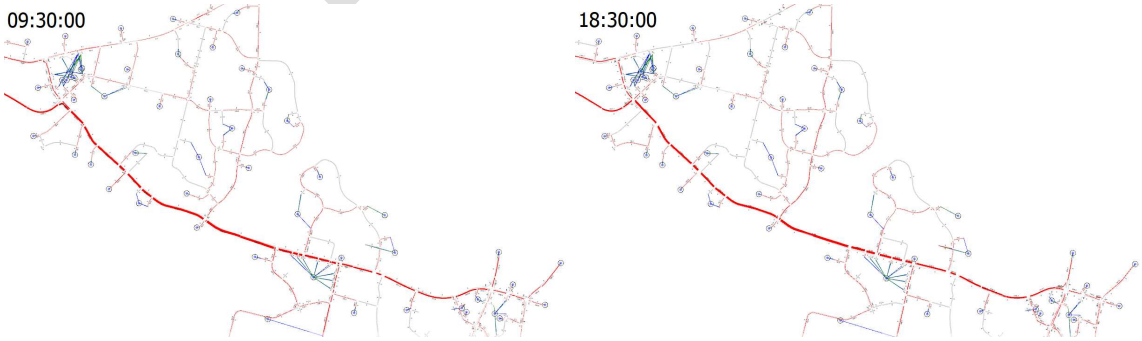


Figure 34 - Route Choice Split: AM Pakuranga Highway Westbound (above) and PM Pakuranga Highway Eastbound (below)

5.10 Model Stability

Model stability was monitored and found to be within acceptable thresholds of a coefficient of variance (COV) <5% across the modelled periods, except in the AM past 9am (Figure 35). However, since the demand and the total travel time are fulling at approximately the same profile, this is not an issue.

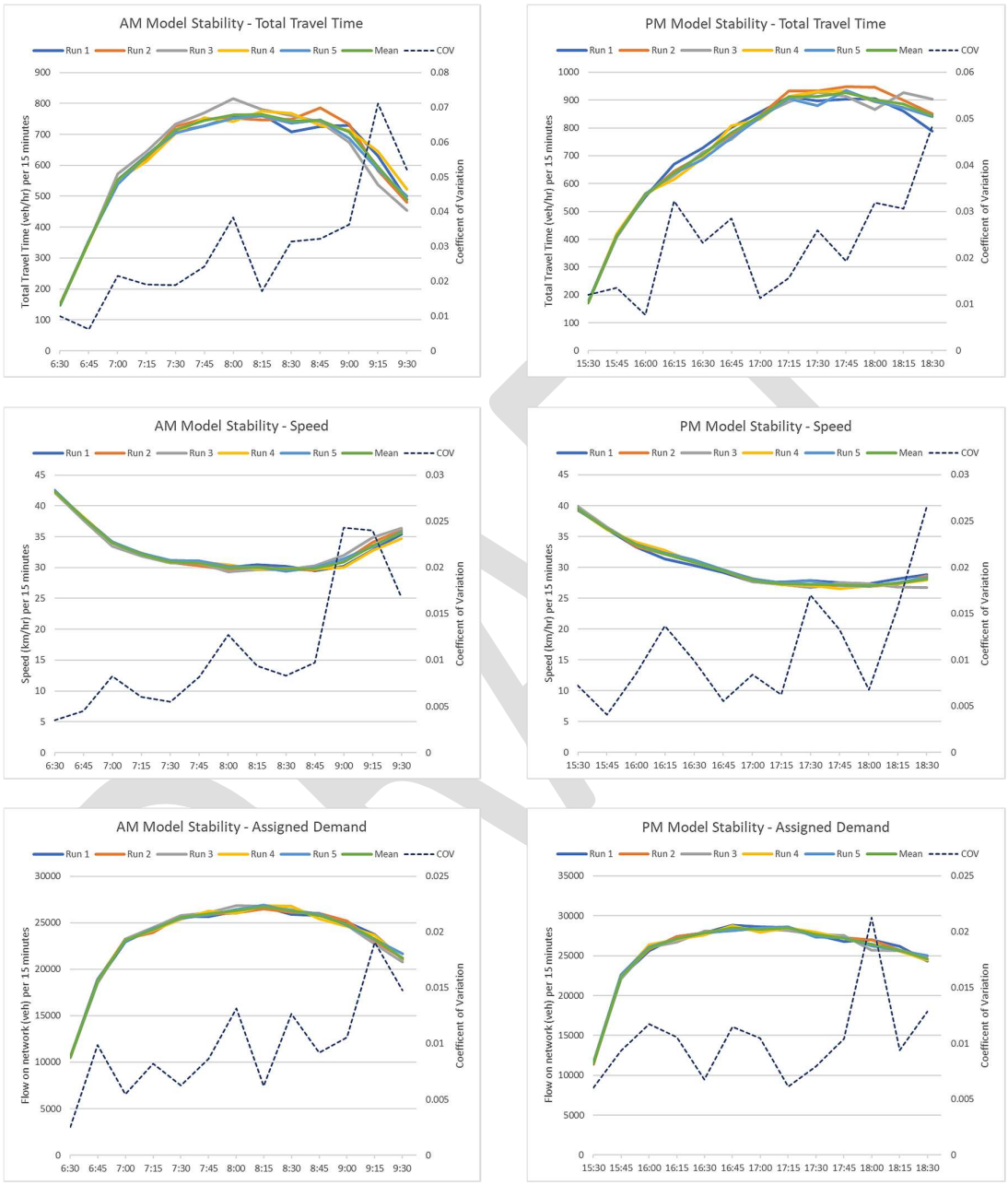


Figure 35 - Model Stability: Total Travel Time, Speed and Flow Plots

6 Conclusion

This report details the update and calibration/validation of the Aimsun model for the Eastern Busway Project. The purpose of this model is to provide a consistent and common base for project developments in the East Auckland Area, primarily along Ti Rakau Drive for the EB 2 and EB3 detailed design work.

The model covers two three-hour peak periods (6.30 am – 9.30 am, and 3.30 pm – 6.30 pm). The modelled periods were chosen to capture the congestion typically experienced in the modelled area.

The model consists of macro and micro tiers with the respective assignment methods: static assignment and microscopic dynamic assignment (DTA). The macro tier provides an interim stage to calibrate the demand through demand adjustment and to generate 80% of paths for the micro DTA. Based on previous modelling of the area, an 80-to-20 split in static versus dynamic path assignment was considered appropriate. This gave better control of modelling route choice in the area and sense-checks during the model development process showed that route distribution in the model is reasonable.

Various observed data were provided by Auckland Transport (AT) for the model development. These included traffic counts, travel time, public transport timing, and signal timing.

The traffic demands come from the AMETI EMME traffic model and were processed before assigning to the Aimsun model. This demand interface process includes a minor refinement of AMETI traffic model zones and application of 2-to-3 hour expansion factors to fit the Aimsun model period. Demand adjustment as part of the validation process was done manually.

The model network was developed in line with the Auckland Dynamic Traffic Assignment Model (ADTA) network coding guideline, which sets out the recommended network coding methodology for Aimsun models in Auckland. This included a standard system of classification and labelling of different turn movement types which were important function variables in the ADTA-developed cost functions also adopted in this model for calculating junction and turn delays.

Model validation showed that the model meets the validation target criteria for Category C: Urban Area in NZTA Model Development Guidelines on individual link flows and turn flows for each hour between 7am – 9am, and 4pm – 6pm. Travel times in the model fit reasonably well with the observed.

Overall, the base year model is considered acceptably calibrated and validated for the purposes of the EB2/3 design work.

Appendix A

Traffic to Aimsun Zone Correspondence

Aimsun Zone	NEW CORDON Aimsun-EMME REF
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
205	205
210	210
286	286
296	296
297	297
412	412
540	540
545	545
546	546
547	547
548	548
555	555
560	560
561	561
562	562
563	563
568	568
572	572
582	582
583	583
599	599
649	649
650	650
651	651
652	652
653	653
654	654
655	655
656	656
657	657
658	658
659	659
660	660
662	662
663	663
664	664

Aimsun Zone	NEW CORDON Aimsun-EMME REF
665	665
666	666
667	667
668	668
669	669
670	670
671	671
672	672
673	673
677	677
678	678
693	693
694	694
695	695
697	697
698	698
699	699
705	705
706	706
865	865
867	867
868	868
869	869
870	870
871	871
873	873
896	896
897	897
900	900
901	901
902	902
903	903
1013	13
1017	17
1654	654
1656	656
1902	902
1903	903
2903	903

Appendix B

Road Parameters

Table B1 – Key Road Type Parameters: Main

	Maximum Speed (km/h)	User-Defined Cost	Third User-Defined Cost	Capacity per Lane (PCUs/h)
Arterial	50	1.4	1.2	1600
Arterial - 50k Reeves	50	1.6	1.4	1200
Arterial - 50k Reeves EBD	50	1.6	1.4	1200
Arterial - Divided	60	1.2	1.1	1600
Busway	60	1	1.2	1600
Collector	50	2	1.4	900
Collector - Ireland	50	2	1.4	900
Expressway	80	0.9	0.2	2100
Local - 30k	30	5	2	500
Local - 50k	50	3	1.6	500
Minor Arterial	50	1.4	1.2	1400

Table B2 - Key Road Type Parameters: Dynamic Models

Road-Type Parameters								
Dynamic Models - Section Parameters								
	Lane Changing				**Side Lane**			**Consider Two-Lane Car Following Model**
	Cooperation (%)	**Aggressiveness (%)**	**Breaking Intensity**	**Imprudent Lane Changing**	**Cooperation Distance**	**Merging Distance**	**Merge: First veh on is first veh off**	
Arterial	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Arterial - 50k Reeves	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Arterial - 50k Reeves EBD	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Arterial - Divided	80	0	Regular	No	Whole Lane	Default	Yes	Yes
Busway	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Collector	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Collector - Ireland	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Expressway	80	0	Regular	No	Whole Lane	Default	Yes	Yes
Local - 30k	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Local - 50k	50	0	Regular	No	Whole Lane	Default	Yes	Yes
Minor Arterial	50	0	Regular	No	Whole Lane	Default	Yes	Yes
	Queue Discharge							
	Acceleration Factor	**Additional Reaction Time at Stop (sec)**	**Additional Reaction Time at Traffic Light (sec)**					
Arterial	No Change	0	0					
Arterial - 50k Reeves	No Change	0	0					
Arterial - 50k Reeves EBD	No Change	0	0					
Arterial - Divided	No Change	0	0					
Busway	No Change	0	0					
Collector	No Change	0	0					
Collector - Ireland	No Change	0	0					
Expressway	No Change	0	0					
Local - 30k	No Change	0	0					
Local - 50k	No Change	0	0					
Minor Arterial	No Change	0	0					

Table B3 - Key Road Type Parameters: Dynamic Models continued

Road-Type Parameters							
Dynamic Models - Turn Parameters							
	Microscopic Model						
	Distance Zone 1 (m)	**Distance Zone 2 (m)**	**Additional Waiting Time Before Losing Turn (sec)**	**Yellow Box Speed (km/h)**			
Arterial	333.3	166.67	0	10			
Arterial - 50k Reeves	333.3	166.67	0	10			
Arterial - 50k Reeves EBD	333.3	166.67	0	10			
Arterial - Divided	333.3	166.67	0	10			
Busway	333.3	166.67	0	10			
Collector	277.78	138.89	0	10			
Collector - Ireland	277.78	138.89	0	10			
Expressway	555.56	277.78	0	10			
Local - 30k	277.78	138.89	0	10			
Local - 50k	277.78	138.89	0	10			
Minor Arterial	277.78	138.89	0	10			
	Giveway Model						
	Initial Safety Margin (sec)	**Initial Giveway Time Factor**	**Visibility to Give Way (m)**	**Final Safety Margin (sec)**	**Final Give Way Time Factor**	**Visibility along Main Stream (m)**	
Arterial	3	1	25	1	2	60	
Arterial - 50k Reeves	3	1	25	1	2	60	
Arterial - 50k Reeves EBD	3	1	25	1	2	60	
Arterial - Divided	3	1	25	1	2	60	
Busway	3	1	25	1	2	60	
Collector	3	1	25	1	2	60	
Collector - Ireland	3	1	25	1	2	60	
Expressway	3	1	25	1	2	100	
Local - 30k	3	1	25	1	2	60	
Local - 50k	3	1	25	1	2	60	
Minor Arterial	3	1	25	1	2	60	

Appendix C

Vehicle Parameters

Table C1 - Key Vehicle Parameters

Vehicle Parameters				
Main				
Length (m)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	4.5	0.4	3.3	5.3
Truck	11.3	4.3	6.5	19.1
Bus	13	1	12.6	13.5
Width (m)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	1.75	0	1.75	1.75
Truck	2.4	0	2.4	2.4
Bus	2.4	0	2.4	2.4
Max Desired Speed (km/h)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	110	10	80	120
Truck	100	5	80	110
Bus	90	10	70	100
Dynamic Models - Main				
Speed Acceptance	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	1.05	0.1	0.9	1.3
Truck	1.05	0.1	1	1.1
Bus	1	0.1	0.9	1.1
Clearance (m)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	1.5	0.5	1	2.3
Truck	2	0.5	1.5	3
Bus	1.5	0.5	1	2.5
Max Give Way Time (secs)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	10	2.5	5	15
Truck	25	5	10	35
Bus	35	10	20	60
Dynamic Models - Experiment Defaults				
	Reaction Time	**Reaction Time at Stop**	**Reaction Time for Front Veh**	**Probability**
Car	0.8	1.15	1.35	1
Truck	0.8	1.3	1.7	1
Bus	0.8	1.3	1.7	1

Table C1 - Key Vehicle Parameters continued

Vehicle Parameters				
Microscopic Model - Main				
Max Acceleration (m/s2)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	2.7	0.2	2.2	3.5
Truck	1.45	0.6	0.5	2.4
Bus	1	0.3	0.8	1.8
Normal Deceleration (m/s2)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	3.5	0.2	3	4
Truck	3	0.3	2	3.5
Bus	2	1	1.5	4.5
Max Deceleration (m/s2)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	6	0.5	5	7
Truck	5	0.5	4	6
Bus	5	1	4	6
Sensitivity Factor	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	1.1	0	1.1	1.1
Truck	1.1	0	1.1	1.1
Bus	1	0	1	1
Gap (secs)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	1.1	0.2	0.5	2
Truck	1.3	0.2	0.5	2.5
Bus	1.1	0.2	0.5	2.5
Headway Aggressiveness	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	0	0	-1	1
Truck	0	0	-1	1
Bus	0	0	-1	1
Favours Stop and Go				
Car	No			
Truck	No			
Bus	No			
Lane-Changing Model	**Staying in Overtaking Lane**	**Imprudent Lane Changing**		
Car	No	No		
Truck	No	No		
Bus	No	No		
Margin for Overtaking Manouver (secs)	**Mean**	**Deviation**	**Minimum**	**Maximum**
Car	5	3	1	10
Truck	5	3	1	10
Bus	5	3	1	10

Table C1 - Key Vehicle Parameters continued

Vehicle Parameters			
Static Models			
	Transportation Mode	**PCUs**	
Car	None	1	
Truck	None	2.5	
Bus	None	2.5	

Appendix D

Bus Services List

Base 2018 Bus Services
31
35
70
72X
72M
72C
352
351
353
711
355
739
712
735
733
734
323
743
751

Appendix E

Attribute Overrides and Applicability

Attribute Overrides and Applicability

Attribute Override Name	AM	PM	Static	Dynamic
Base 2016 Yellow Box	√	√	√	√
Base 2018 Section Speed	√	√	√	√
Base 2018 Turn Capacity	√	√	√	√
Harris Rd Lane Cooperation	√	√	√	√
Ti Rakau Lane Cooperation	√		√	√
Pakuranga Rd Look Aheads	√		√	√
Pakuranga Rd Section Speed		√	√	√

Appendix F

Junction and Turn Delay Calculation Parameters

Intersection Coding Adopted from ADTA

To assist with scripting and automation, a classification system was applied to turn movements to signify different conflict situations at intersections. The external ID of each turn movement was set to a 4-digit code following the convention below:
XYZZ
where **X** = intersection type
Y = number of approaches/legs
ZZ = movement type
These 4-digit codes were used in each JDF and TPF cost function scripts to allocate the correct calibration parameters to each turn at the calibration stage

X	INTERSECTION TYPE
1	Signalised
2	Roundabout
3	Priority intersection – Give-way sign at Minor Road
4	Priority intersection – Stop sign at Minor Road
5	Two-way one lane bridge
6	Zebra pedestrian crossing
Y	**NUMBER OF APPROACHES**
ZZ	**MOVEMENT TYPE[3]**
00	Unopposed Turn (e.g. Through and left turn on Major Road, as well as signalised movements)
01	Left Turn – 1-lane opposing
02	Left Turn – 2-lane or more opposing
03	Through Movement Crossing One-way Road – 2-lane one-way
04	Through Movement Crossing One-way Road – 3-lane one-way
05	Through Movement Crossing One-way Road – 4-lane one-way
06	Through Movement Crossing Two-way Road – 2-lane two-way
07	Through Movement Crossing Two-way Road – 4-lane two-way
08	Through Movement Crossing Two-way Road – 6-lane two-way
09	Right Turn from Major Road - Across 1 lane
10	Right Turn from Major Road - Across 2 lanes
11	Right Turn from Major Road - Across 3 lanes
12	Right Turn from Minor Road – One-way
13	Right Turn from Minor Road – 2-lane two-way Major Road / Across 1 lane
14	Right Turn from Minor Road – 4-lane two-way Major Road / Across 2 lanes
15	Right Turn from Minor Road – 6-lane two-way Major Road / Across 3 lanes
16	Staged Right Turn from Minor Road – Across 1 lane with flush median or merge lane in the middle
17	Staged Right Turn from Minor Road – Across 2 lanes with flush median or merge lane in the middle
18	Staged Right Turn from Minor Road – Across 3 lanes with flush median or merge lane in the middle

ADTA-Calibrated Intercept and Slope Values for turn types used in JDF

Turn External Id	Number of Approach lanes for this Movement	Intercept	Slope
1x01	x	735	0.37
1x02	x	925	0.35
1x03	x	400	0.18
1x04	x	330	0.15
1x06	x	300	0.08
1x07	x	225	0.05
1x09	x	595	0.29
1x10	x	595	0.25
1x11	x	630	0.27
1x13	x	300	0.08
1x14	x	225	0.05
1x15	x	225	0.05
2xxx	1	1,200	0.7
2xxx	2	2,500	0.8
2xxx	3	3,100	0.8
3x01	x	735	0.37
3x02	x	925	0.35
3x03	x	400	0.18
3x04	x	330	0.15
3x05	x	330	0.15
3x06	x	300	0.08
3x07	x	225	0.05
3x08	x	225	0.05
3x09	x	595	0.29
3x10	x	595	0.25
3x11	x	630	0.27
3x12	x	400	0.18
3x13	x	300	0.08
3x14	x	225	0.05
3x15	x	225	0.05
3x16	x	400	0.18
3x17	x	330	0.15
3x18	x	330	0.15
4x01	x	510	0.21
4x02	x	505	0.09
4x03	x	355	0.15
4x04	x	310	0.14
4x05	x	310	0.14
4x06	x	230	0.05
4x07	x	230	0.05
4x08	x	230	0.05
4x09	x	595	0.29
4x10	x	595	0.25
4x11	x	630	0.27
4312	x	355	0.15
4313	x	230	0.05
4314	x	230	0.05
4315	x	230	0.05
4316	x	355	0.15
4317	x	310	0.14
4318	x	310	0.14
4412	x	355	0.15
4413	x	235	0.16
4414	x	235	0.16
4415	x	230	0.05
4416	x	355	0.15
4417	x	310	0.14
4418	x	310	0.14
5x03	x	500	0.2

Appendix G

Cost Function Scripts

Volume Delay Function

```
model = None
tollCarColumn = None
tollTruckColumn = None
assignedVolColumn = None
laneCapacityColumn = None

def checkExperimentContext(context, turning):
	global model
	global tollCarColumn
	global tollTruckColumn
	global assignedVolColumn
	global laneCapacityColumn
	if model == None:
		model = context.experiment.getModel()

	# get the section type
	sectionType = model.getType('GKSection')
	if tollCarColumn == None:
		tollCarColumn = sectionType.getColumnByExternalName ("TOLL - CAR", 0)
	if tollTruckColumn == None:
		tollTruckColumn = sectionType.getColumnByExternalName ("TOLL - TRUCK", 0)

	# get the road type
	roadType = model.getType('GKRoadType')
	if laneCapacityColumn == None:
		laneCapacityColumn = roadType.getColumnByExternalName('Lane Capacity',0)

	turnType = model.getType('GKTurning')
	if assignedVolColumn == None:
		assignedVolColumn = turnType.getColumn('MACRO::' + str(context.experiment.getId()) + '_GKTurning_macroAssignedVolume_0', 0)

def travelTime(context, section, funcVolume):

	global model

	#define the peak hour factor based on peak
	# get the experiment
	experiment = context.experiment
	# get the scenario
	scenario = experiment.getScenario()
	# get the traffic demand
	trafficDemand = scenario.getDemand()
	# get the start time of the demand
	startTime = trafficDemand.initialTime()
	# get the duration of the demand
	assignmentDuration = trafficDemand.duration().hour()

	#set parameters from sections
	speed = section.getSpeed()
	volume = funcVolume.getVolume()
	length = section.length3D()
	capacity = section.getCapacity()
	capacityperlane = section.getRoadType().getDataValueDouble(laneCapacityColumn)
	JA = section.getUserDefinedCost3()

	# assign volume peak hour factor based on peak
	phfVol = 1.0

	# fixed, global factor
	if startTime.hour() == 6:
		phfVol = 1.15
	elif startTime.hour() == 11:
		phfVol = 1.02
	elif startTime.hour() == 15:
		phfVol = 1.05


	# assign speed peak hour factor based on peak
	phfSpeed = 1.0
	'''
	# fixed, global factor
	if startTime.hour() == 6:
		phfSpeed = 1.1595
	elif startTime.hour() == 11:
		phfSpeed = 1.0707
	elif startTime.hour() == 15:
		phfSpeed = 1.1422
	'''
	#calculate additional parameters
	#apply peak volume factor when calculating degree of saturation
	X = (volume * phfVol) / capacity
	T0 = 1000 / (speed / 3.6) # minimum travel time for section

	#calculate dealy based of the Akcelik delay function

	Tf = 1.0 # Analysis Flow Period, taken as 1 hour
	Rf = (Tf*3600) / T0 # unitless ratio
	#JA = 0.2
	eightX = (8.0 * JA * X ) / (capacityperlane * Tf)

	Time = T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)) #give seconds per Km

	# peak hour travel time in seconds
	peakHourTravelTime = (Time * (length / 1000))
```

```
        # peak hour speed in m/s
        peakHourSpeed = length / peakHourTravelTime
        # three hour average speed in m/s
        threeHourAveSpeed = peakHourSpeed * phfSpeed
        # cap the speed at the section maximum speed
        if threeHourAveSpeed > (speed / 3.6):
            threeHourAveSpeed = (speed / 3.6)
        # four hour average travel time in seconds
        threeHourAveTravelTime = length / threeHourAveSpeed

        return (threeHourAveTravelTime /60)

def distCost(context, section, funcVolume):

        '''
        The distance factor adopted from Wellington N2A model
        P:\429\4291565\Technical\300 Technical\320 Models\321 Network Build\N2A_GeneralisedCostDistanceFactor.xlsx

        Assumptions
        Fuel cost                                                       1.75        $/litre
        fuel consumption                                    9.5                     l/100km
        fuel rate                                                       0.16625     $/km
        Assume gc is just fuel cost

        Assumed acg Value of time           16.27       $/hr, 2002 (EEM urban arterial)
        Update factor to 2015                           1.44        EEM
        VoT 2015                                                    23.43       $/hr
        Update factor 2016 estimated 1.01
        VoT 2016 est                                        23.66   $/hr, 2002 (EEM urban arterial)
        Value of time                                       2.536   min/$
        gc of fuel                                                  0.422       mins per km

        Assume 0.4 for Car

        Truck factor was agreed to be 1.0
        '''

        # get the length of the section
        length = section.length3D()/1000 # length in km

        # factor for the distance component (unit: mins/km)
        className = str(context.userClass.getName())
        if className[0:3] == "Car":
            distFactor = 0.5
        else:
            distFactor = 1.0

        # get the user defined cost of the section
        roadTypeFactor = section.getUserDefinedCost()

        # calculate the distance cost
        distanceCost = distFactor * roadTypeFactor * length

        return distanceCost

# this function calculates the speed in km/hr of the section
def calculateSpeed(context, section, funcVolume):
        # convert travel time to seconds
        tTime = travelTime(context, section, funcVolume) * 60.0
        # get the section length in metres
        length = section.length3D()
        # calculate and return the speed in km/hr
        return (length / tTime)*3.6

# this function calculates the truck percentage
def calculateTruckPercentage(context, section, funcVolume):
        # get the car volume
        carVolume = (funcVolume.getVolume(model.getCatalog().findByName('Car - ALL', model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - L - LOV',
model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - L - HOV',
model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - M - LOV',
model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - M - HOV',
model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - H - LOV',
model.getType('GKVehicle'))) +
                                                    funcVolume.getVolume(model.getCatalog().findByName('Car - H - HOV',
model.getType('GKVehicle'))) )
        # get the truck volume
        truckVolume = funcVolume.getVolume(model.getCatalog().findByName('Truck', model.getType('GKVehicle')))

        # error handling for zero volume
        if (carVolume + truckVolume) > 0:
            truckPercentage = (truckVolume / (carVolume + truckVolume)) * 100
        else:
            truckPercentage = 0
        # return the truck percenage
        return truckPercentage

def vdf(context, section, funcVolume):

        # assign the global variables
        checkExperimentContext(context, section)

        # calculate average section speed in km/hr
        speed = calculateSpeed(context, section, funcVolume)
```

```
    # calculate the truck percentage on this section
    truckPercentage = calculateTruckPercentage(context, section, funcVolume)

    # calculate total cost
    totalCost = travelTime(context, section, funcVolume) + distCost(context, section, funcVolume)

    return totalCost
```

Volume Delay Function (Connector)

```
def travelTimeConnector(context, connection, funcVolume):

    # work out the time period
    experiment = context.experiment
    scenario = experiment.getScenario()
    trafficDemand = scenario.getDemand()
    duration = trafficDemand.duration()
    durationInHours = duration.toHours()

    #set parameters
    speed = 30.0
    capacity = 200.0 * durationInHours # set to 200 veh/hr, capacity need to be total over three hours
    capacityperlane = 200.0
    JA = 10.0

    volume = funcVolume.getVolume()
    length = connection.length3D()
    totalVolume = volume

    #calculate additional parameters

    X = totalVolume / capacity
    T0 = 1000 / (speed / 3.6) # minimum travel time for section

    #calculate dealy based of the Akcelik delay function

    Tf = 1.0 # Analysis Flow Period, taken as 1 hour
    Rf = (Tf*3600) / T0 # unitless ratio
    #JA = 0.2
    eightX = (8.0 * JA * X ) / (capacityperlane * Tf)

    Time = T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)) #give seconds per Km

    TotalTravelTime = (Time * (length / 1000))/60

    return TotalTravelTime

def distCostConnector(context, connection, funcVolume):

    '''
    The distance factor adopted from Wellington N2A model
    P:\429\4291565\Technical\300 Technical\320 Models\321 Network Build\N2A_GeneralisedCostDistanceFactor.xlsx

    Assumptions
    Fuel cost                                                   1.75        $/litre
    fuel consumption                                    9.5                 l/100km
    fuel rate                                                   0.16625     $/km
    Assume gc is just fuel cost

    Assumed acg Value of time       16.27       $/hr, 2002 (EEM urban arterial)
    Update factor to 2015                       1.44        EEM
    VoT 2015                                                    23.43       $/hr
    Update factor 2016 estimated 1.01
    VoT 2016 est                                        23.66   $/hr, 2002 (EEM urban arterial)
    Value of time                                       2.536   min/$
    gc of fuel                                                  0.422       mins per km

    Assume 0.4 for Car

    Truck factor was agreed to be 1.0
    '''

    # get the length of the section
    length = connection.length3D()/1000 # length in km

    # factor for the distance component (unit: mins/km)
    className = str(context.userClass.getName())
    dashIndex = className.find(' - ')
    vehName = className[:dashIndex]
    if vehName == "Car" :
        distFactor = 0.5
    elif vehName == "Truck":
        distFactor = 1.0
    else:
        distFactor = 0.0

    # calculate the distance cost
    distanceCost = distFactor * length

    return distanceCost

def vdf(context, connection, funcVolume):
```

```
    # calculate total cost
    totalCost = travelTimeConnector(context, connection, funcVolume) + distCostConnector(context, connection, funcVolume)

    return totalCost
```

Junction Delay Function

```
def travelTime( context, turn, volume, ownVolume, conflictVolume ):
    model = context.experiment.getModel()
    # work out the time period
    experiment = context.experiment
    scenario = experiment.getScenario()
    trafficDemand = scenario.getDemand()
    duration = trafficDemand.duration()
    durationInHours = duration.toHours()

    #define the peak hour factor based on peak
    # get the experiment
    experiment = context.experiment
    # get the scenario
    scenario = experiment.getScenario()
    # get the traffic demand
    trafficDemand = scenario.getDemand()
    # get the start time of the demand
    startTime = trafficDemand.initialTime()
    # assign peak hour factor based on peak
    # use 1.0 to start adjust as required during calibration - base on observed data
    phfVol = 1.0

    if startTime.hour() == 6:
        phfVol = 1.15
    elif startTime.hour() == 11:
        phfVol = 1.02
    elif startTime.hour() == 15:
        phfVol = 1.05

    # assign travel time factor to reduce peak hour travel time to three hour average travel time
    phfTT = 1.0
    '''
    if startTime.hour() == 6:
        phfTT = 0.6946
    elif startTime.hour() == 11:
        phfTT = 0.8726
    elif startTime.hour() == 15:
        phfTT = 0.7902
    '''
    turnType = model.getType('GKTurning')
    userSlopeColumn = turnType.getColumnByExternalName('Turn Capacity Slope',0)

    #set give-way linear parameters and calculate give-way turn capacity
    Slope = turn.getDataValueDouble(userSlopeColumn)
    Intercept = turn.getCapacity ()
    OpposingFlow = (conflictVolume.getVolume() * phfVol) / durationInHours # AIMSUN return total volume over the time period

    overrides = experiment.getNetworkAttributesOverrides()
    targetId = turn.getId()
    for override in overrides:
        objects = override.getObjects()
        for object in objects:
            if object.getId() == targetId:
                for column, value in override.getObjectData(object).iteritems():
                    if column.getName() == 'GKTurning::capacityAtt':
                        Intercept = int(value)

    Capacity = (Intercept - Slope * OpposingFlow) # per hour
```

```
	#calculate dealy based of the Akcelik dealy function
	turnFlow = volume.getVolume()
	if Capacity < 50:
		if Intercept < 50:
			Capacity = Intercept
		else:
			Capacity = 50

	X = (turnFlow * phfVol) / (Capacity * durationInHours)
	TurnLength = turn.length3D()
	TurnSpeed = turn.getSpeed()
	T0 = 1
	Tf = 1.0
	Rf = (Tf*3600) / T0
	JA = 1.0 # Curve Parameter
	eightX = 8.0 * JA * X / (Capacity * Tf)

	Time = (T0 *( 1 + 0.25*Rf*((X-1.0)+((X-1.0)**2 + eightX)**0.5)))/60

	return Time * phfTT

def jdf( context, turn, volume, ownVolume, conflictVolume ):

	TT = travelTime( context, turn, volume, ownVolume, conflictVolume )

	#debugging
	#print 'JDF of turn %i with volume of %f and opposing volume of %f calculated the travel time at %f' % (turn.getId(), volume.getVolume(),
conflictVolume.getVolume(), TT)

	return TT
```

Turn Delay Function

```
'''
Updated 04/05/2017
From built-in Aimsun 8.2 TPF - Example for Signalized Intersection

Updated 01/08/2017
Refined turn saturation flow to be a function of turn speed
'''
experimentId = None
analysisPeriod = 0.0 # [h]
phfVol = 1.0
phfTT = 1.0

def initialiseContext(context):
	global experimentId
	global analysisPeriod
	global phfVol
	global phfTT
	if context.experiment.getId() != experimentId:
		experimentId = context.experiment.getId()
		analysisPeriod = context.experiment.getScenario().getDemand().duration().toHours()
	#define the peak hour factor based on peak
	# get the experiment
	experiment = context.experiment
	# get the scenario
	scenario = experiment.getScenario()
	# get the traffic demand
	trafficDemand = scenario.getDemand()
	# get the start time of the demand
	startTime = trafficDemand.initialTime()
	# assign peak hour factor based on peak
	phfVol = 1

	if startTime.hour() == 6:
		phfVol = 1.15
	elif startTime.hour() == 10:
```

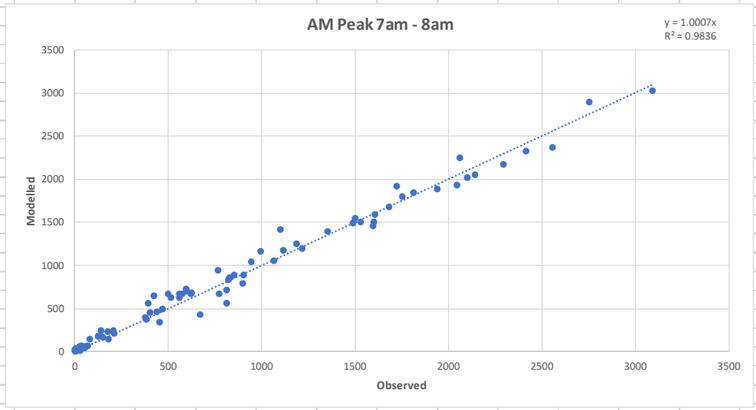
```
            phfVol = 1.02
        elif startTime.hour() == 15:
            phfVol = 1.05

        # assign travel time factor to reduce peak hour travel time to four hour average travel time
        phfTT = 1
        '''
        if startTime.hour() == 6:
            phfTT = 0.6946
        elif startTime.hour() == 10:
            phfTT = 0.8726
        elif startTime.hour() == 15:
            phfTT = 0.7902
        '''
# free flow travel time [min]
def freeFlowTravelTime(turn):
        return turn.length3D()/1000.0 * 60.0/turn.getSpeed()

# actual green duration for actuated phases [s]
# calculated considering the demand and the queue discharge rate
def actualGreen(turn, volume):
        dischargeRate = 0.5 # [veh/s]
        requiredGreen = volume / dischargeRate # [s]
        numberOfCycles = 3600.0 * analysisPeriod / turn.getCycle()
        return min(max(requiredGreen / numberOfCycles, turn.getMinGreenTime()), turn.getMaxGreenTime())

# HCM2010 progression adjustment factor
def progressionAdjustmentFactor(green, cycle):
        g_over_c = green / cycle
        P = min(1.33 * g_over_c, 1.0)
        top_part = (1.0 - P)
        bottom_part = 1.0 - g_over_c
        return top_part / bottom_part

# HCM2010 uniform control delay (quick estimation method) [s]
def uniformControlDelay(volume, capacity, green, cycle):
        g_over_c = green / cycle
        X = (volume * phfVol) / (capacity * analysisPeriod)
        top_part = 0.5 * cycle * (1.0 - g_over_c)**2
        bottom_part = 1.0 - (min(1.0, X) * g_over_c)
        return top_part / bottom_part

# HCM2010 incremental delay (quick estimation method) [s]
def incrementalDelay(volume, capacity):
        X = (volume * phfVol) / (capacity * analysisPeriod)
        return 900.0 * analysisPeriod * ((X - 1.0) + ((X - 1.0)**2 + (4.0 * X / (capacity * analysisPeriod)))**0.5)

# HCM2010 control delay (quick estimation method) [min]
def controlDelay(volume, capacity, green, cycle):
        pf = progressionAdjustmentFactor(green, cycle)
        d_one = uniformControlDelay(volume, capacity, green, cycle)
        d_two = incrementalDelay(volume, capacity)
        res = (pf * d_one) + d_two
        return res / 60.0 * phfTT

def calculateCapacity(turn):
        # get the speed of the turn
        speed = turn.getSpeed()
        # if the speed is less than 50 km/hr
        if speed < 50:
            # calculate saturation flow based on speed
            s = -0.513*speed**2 + 54.81*speed + 553.46
        # else
        else:
            # saturation flow (PCUs/hr)
            s = 2000.0
        # get the turn object as coded (GKTurn)
        turnObject = turn.getMaster()
```

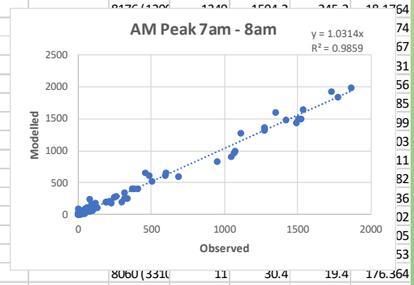
```
        # get the index of the left most lane for this turn
        leftMostLanes = turnObject.getOriginFromLane()
        # get the index of the right most lane for this turn
        rightMostLanes = turnObject.getOriginToLane()
        # calculate number of lanes
        lanes = rightMostLanes - leftMostLanes + 1
        #  the capacity is saturation flow * lanes * green / cycle
        capacity = s * lanes * (turn.getGreenTime() / turn.getCycle())

        return capacity

def tpf(context, turn, volume):
        initialiseContext(context)
        res = freeFlowTravelTime(turn)
        if turn.getCycle() > 0.0:
                green = turn.getGreenTime()
                if turn.getControlJunctionType() == 4: # actuated
                        green = actualGreen(turn, volume.getVolume())
                # error handling for 0 green time in control plan for this turn
                if green > 0:
                        if green < turn.getCycle():
                                res += controlDelay(volume.getVolume(), calculateCapacity(turn), green, turn.getCycle())
                else:
                        print 'turn %u in node %u has no green time in the control plan used' % (turn.getMaster().getId(), turn.getMaster().getNode().getId())
        return res
```

Appendix H

Count Validation Tables

Object	Count - Li	Count - A	Absolute	Relative D	GEH		Diff^2	Obs/N
11897	670	434.6	-235.4	-35.1343	10.0166		55413.16	8.170732
7732	816	557	-259	-31.7402	9.88506		67081	9.95122
16548	424	652.8	228.8	53.9623	9.8606		52349.44	5.170732
12210502	1100	1413	313	28.4545	8.83005		97969	13.41463
16517	393	559.8	166.8	42.4427	7.64206		27822.24	4.792683
7276	144	247.2	103.2	71.6667	7.37896		10650.24	1.756098
7400	500	667.2	167.2	33.44	6.92116		27955.84	6.097561
12210282	770	946.8	176.8	22.961	6.03445		31258.24	9.390244
7104	81	143.6	62.6	77.284	5.90724		3918.76	0.987805
7228	8	34	26	325	5.67367		676	0.097561
7166	457	347.8	-109.2	-23.895	5.44369		11924.64	5.573171
12210663	994	1160.6	166.6	16.7606	5.07583		27755.56	12.12195
15953	599	721.6	122.6	20.4674	4.77111		15030.76	7.304878
7074	1721	1923.8	202.8	11.7838	4.75057		41127.84	20.9878
7092	25	54	29	116	4.61423		841	0.304878
12870	518	626	108	20.8494	4.51571		11664	6.317073
12211719	563	668.8	105.8	18.7922	4.26315		11193.64	6.865854
7438	38	69	31	81.5789	4.23823		961	0.463415
12210270	2	13.8	11.8	590	4.19825		139.24	0.02439
7210	177	234.8	57.8	32.6554	4.02809		3340.84	2.158537
7042	2064	2249.4	185.4	8.98256	3.99222		34373.16	25.17073
7274	2557	2365.2	-191.8	-7.50098	3.8662		36787.24	31.18293
7410	127	174.2	47.2	37.1654	3.84618		2227.84	1.54878
7222	603	701.2	98.2	16.2852	3.84551		9643.24	7.353659
12211551	772	672.4	-99.6	-12.9016	3.70621		9920.16	9.414634
12211562	579	670.2	91.2	15.7513	3.64917		8317.44	7.060976
7524	901	797.2	-103.8	-11.5205	3.5622		10774.44	10.9878
7192	816	719.2	-96.8	-11.8627	3.49388		9370.24	9.95122
17220	30	52.2	22.2	74	3.46284		492.84	0.365854
12211622	1597	1465.4	-131.6	-8.24045	3.3631		17318.56	19.47561
7730	184	143.2	-40.8	-22.1739	3.18984		1664.64	2.243902
7724	947	1045.8	98.8	10.4329	3.12997		9761.44	11.54878
7140	142	180.2	38.2	26.9014	3.00965		1459.24	1.731707
13643	2753	2901.8	148.8	5.40501	2.7984		22141.44	33.57317
15596	563	628.8	65.8	11.6874	2.6955		4329.64	6.865854
7220	2295	2174	-121	-5.27233	2.55974		14641	27.9878
7126	30	17.6	-12.4	-41.3333	2.54175		153.76	0.365854
7390	1601	1501	-100	-6.2461	2.53918		10000	19.52439
15955	2048	1936.4	-111.6	-5.44922	2.50033		12454.56	24.97561
12211544	406	454.2	48.2	11.8719	2.32414		2323.24	4.95122
7540	208	238.6	30.6	14.7115	2.04775		936.36	2.536585
7442	210	240.2	30.2	14.381	2.01289		912.04	2.560976
7356	629	679.4	50.4	8.01272	1.97049		2540.16	7.670732
7428	1187	1254.8	67.8	5.71188	1.94039		4596.84	14.47561
7180	1115	1178.6	63.6	5.70404	1.87808		4044.96	13.59756
7240	2141	2055	-86	-4.01681	1.87757		7396	26.10976
6920	621	667	46	7.40741	1.81265		2116	7.573171
7532	2104	2023	-81	-3.84981	1.78313		6561	25.65854
16027	2417	2331.8	-85.2	-3.52503	1.74849		7259.04	29.47561
12211629	4	1.2	-2.8	-70	1.73649		7.84	0.04878
7066	56	46.2	-9.8	-17.5	1.37093		96.04	0.682927
7118	1941	1883	-58	-2.98815	1.32643		3364	23.67073
12210676	18	12.8	-5.2	-28.8889	1.32508		27.04	0.219512
12210661	855	894	39	4.5614	1.31882		1521	10.42683
12211631	23	29.4	6.4	27.8261	1.25034		40.96	0.280488
7036	47	55.8	8.8	18.7234	1.22744		77.44	0.573171
6964	3093	3026.2	-66.8	-2.15972	1.20766		4462.24	37.71951
12152	1501	1547.8	46.8	3.11792	1.19866		2190.24	18.30488
6962	831	862.2	31.2	3.75451	1.0723		973.44	10.13415
6940	468	491.4	23.4	5	1.06839		547.56	5.707317
12210262	1357	1396.6	39.6	2.9182	1.06723		1568.16	16.54878
12210650	440	461	21	4.77273	0.9894		441	5.365854
7164	152	164.4	12.4	8.15789	0.985867		153.76	1.853659
12210320	1756	1795.8	39.8	2.26651	0.944439		1584.04	21.41463
7106	831	856	25	3.00842	0.86079		625	10.13415
7116	1814	1845.8	31.8	1.75303	0.743384		1011.24	22.12195
12210514	379	392.8	13.8	3.64116	0.702493		190.44	4.621951
7040	57	62.2	5.2	9.12281	0.673566		27.04	0.695122
12126	1530	1504	-26	-1.69935	0.667545		676	18.65854
17011	72	67.2	-4.8	-6.66667	0.575356		23.04	0.878049
16525	1220	1200.2	-19.8	-1.62295	0.569186		392.04	14.87805
12210516	383	372.8	-10.2	-2.66319	0.524701		104.04	4.670732
10618	1608	1588.4	-19.6	-1.21891	0.490276		384.16	19.60976
16119	903	889.4	-13.6	-1.50609	0.454293		184.96	11.0122
7408	1065	1052.2	-12.8	-1.20188	0.393409		163.84	12.9878
7214	38	36.2	-1.8	-4.73684	0.295519		3.24	0.463415
7254	212	208	-4	-1.88679	0.276026		16	2.585366
12211564	24	22.8	-1.2	-5	0.248069		1.44	0.292683
12155	1683	1678.2	-4.8	-0.28521	0.117087		23.04	20.52439
7172	1489	1490	1	0.067159	0.025911		1	18.15854
7098	28	28	0	0	0		0	0.341463
12211534	25	25	0	0	0		0	0.304878
Mean	823.78	841.234	17.4537	2.11873				

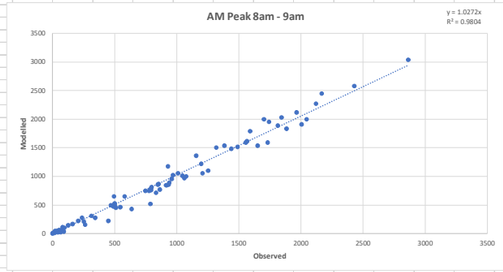




Link			Turn	
<5	85%		<5	84%
<7.5	94%		<7.5	93%
<10	99%		<10	96%
82 RMSE	12%		80 RMSE	19%

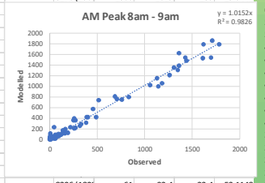
	Object	Count - Li	Count - A	Absolute	Relative D	GEH		Diff^2	Obs/N
Data issue?	13284072 (	2	93.6	91.6	4580	13.249		8390.56	0.02439
Rat running	8062 (331	81	236.4	155.4	191.852	12.3357		24149.16	0.987805
	13284134 (	6	72.4	66.4	1106.67	10.6054		4408.96	0.073171
	13284124 (	9	68.8	59.8	664.444	9.58796		3576.04	0.109756
	8218 (331(	0	38.6	38.6	inf	8.78635		1489.96	0
	8308 (130(	462	651.8	189.8	41.0823	8.04281		36024.04	5.634146
	13284092 (	91.6667	164.8	73.1333	79.7818	6.45825		5348.48	1.117887
						74	6.15486	9447.84	3.634146
						67	5.96803	2621.44	0.585366
						31	5.4066	16027.56	5.914634
						56	5.30801	4147.36	1.402439
						85	5.20633	2304	0.743902
						99	4.89065	6988.96	4.073171
						03	4.75553	22022.56	12.78049
						11	4.7224	432.64	0.109756
						82	4.6766	1797.76	0.743902
						36	4.61863	38966.76	21.07317
						02	4.5091	24211.36	13.57317
						05	4.35465	1024	0.463415
						53	4.2883	1971.36	1.036585
	8060 (331(	11	30.4	19.4	176.364	4.26399		376.36	0.134146
	8200 (320	47	22.2	-24.8	-52.766	4.21613		615.04	0.573171
	12426 (130	38	16.8	-21.2	-55.7895	4.05005		449.44	0.463415
	13284070 (	947	827.8	-119.2	-12.5871	4.00144		14208.64	11.54878
	13284113 (	8	0	-8	-100	4		64	0.097561
	8170 (320	320	252.4	-67.6	-21.125	3.99587		4569.76	3.902439
	13284126 (	97	62.8	-34.2	-35.2577	3.82607		1169.64	1.182927
	13284095 (	6.33333	20	13.6667	215.789	3.76638		186.7787	0.077236
	8320 (130(	31	55.6	24.6	79.3548	3.73845		605.16	0.378049
	8312 (130(	43	69.8	26.8	62.3256	3.56858		718.24	0.52439
	13284135 (	682	595	-87	-12.7566	3.44301		7569	8.317073
	13284125 (	1069	968.2	-100.8	-9.42937	3.15834		10160.64	13.03659
	8318 (130(	23	11.6	-11.4	-49.5652	2.74083		129.96	0.280488
	13562 (340	228	188.6	-39.4	-17.2807	2.72993		1552.36	2.780488
	13284123 (	76	55	-21	-27.6316	2.59477		441	0.926829
	13284068 (	1272	1364	92	7.2327	2.53414		8464	15.5122
	8182 (130(	1539	1639.6	100.6	6.53671	2.52345		10120.36	18.76829
	8050 (330(	1866	1975.8	109.8	5.88424	2.50524		12056.04	22.7561
	8228 (330(	1070	991.4	-78.6	-7.34579	2.44825		6177.96	13.04878
	13564 (340	599	660.2	61.2	10.217	2.43904		3745.44	7.304878
	8238 (331	15	25.6	10.6	70.6667	2.35265		112.36	0.182927
	13284112 (	2	0	-2	-100	2		4	0.02439
	13284130 (	245	274.6	29.6	12.0816	1.83642		876.16	2.987805
	13563 (340	127	107.2	-19.8	-15.5906	1.82973		392.04	1.54878
	8316 (130(	370	405.8	35.8	9.67568	1.8177		1281.64	4.512195
	8210 (180(	1418	1482.2	64.2	4.5275	1.68592		4121.64	17.29268
	8056 (330(	15	22.2	7.2	48	1.66946		51.84	0.182927
	8184 (130(	25	17.6	-7.4	-29.6	1.6034		54.76	0.304878
	13284096 (	2	4.8	2.8	140	1.51851		7.84	0.02439
	8208 (180(	1493	1435.2	-57.8	-3.8714	1.51058		3340.84	18.20732
	8212 (180(	54	65.6	11.6	21.4815	1.50006		134.56	0.658537
	13284121 (	261	285.8	24.8	9.50192	1.49987		615.04	3.182927
	13284093 (	1	0	-1	-100	1.41421		1	0.012195
	13284109 (	1	0	-1	-100	1.41421		1	0.012195
	13284132 (	100	86.8	-13.2	-13.2	1.36584		174.24	1.219512
	12425 (130	1777	1832.6	55.6	3.12887	1.30876		3091.36	21.67073
	10379 (330	1272	1318.8	46.8	3.67925	1.3003		2190.24	15.5122
	12404 (130	31	38.6	7.6	24.5161	1.28832		57.76	0.378049
	10376 (330	316	338.6	22.6	7.1519	1.24921		510.76	3.853659
	8224 (331(	2.33333	0.8	-1.53333	-65.7143	1.22503		2.351101	0.028455
	13566 (340	25	31	6	24	1.13389		36	0.304878
	8232 (331(	6	3.6	-2.4	-40	1.09545		5.76	0.073171
	8236 (330	11	8	-3	-27.2727	0.973329		9	0.134146
	13284069 (	26	30.4	4.4	16.9231	0.828568		19.36	0.317073
	12423 (130	54	60	6	11.1111	0.794719		36	0.658537
	8240 (330(	36	31.4	-4.6	-12.7778	0.792397		21.16	0.439024
	13284131 (	10	7.8	-2.2	-22	0.737442		4.84	0.121951
	13284097 (	0.666667	0.2	-0.46667	-70	0.708918		0.217778	0.00813
	10374 (330	115	107.8	-7.2	-6.26087	0.682166		51.84	1.402439
	12118	1527	1502.4	-24.6	-1.611	0.63208		605.16	18.62195
	10378 (331	503	514	11	2.18688	0.487806		121	6.134146
	13284133 (	408	399.8	-8.2	-2.0098	0.408016		67.24	4.97561
	8260 (320(	1505	1490.6	-14.4	-0.95681	0.372079		207.36	18.35366
	10377 (330	597	605	8	1.34003	0.326327		64	7.280488
	13554	211	207.8	-3.2	-1.51659	0.221137		10.24	2.573171
	13284071 (	191	194	3	1.57068	0.216225		9	2.329268
	13284073 (	196	194	-2	-1.02041	0.143223		4	2.390244
	13284108 (	0	0	0	0	0		0	0
	13284110 (	0	0	0	0	0		0	0
	Mean	379.313	396.687	17.375	4.58066				

Object	Count - Li	Count - Av	Absolute	Relative D	GEH	12.4186	Diff^2	Obs/N
7540	449	221.6	-227.4	-50.6459	12.4186		51710.76	5.47561
7732	791	513.2	-277.8	-35.1201	10.8787		77172.84	9.646341
11897	638	432.2	-205.8	-32.2571	8.89668		42353.64	7.780488
12210663	928	1174.8	246.8	26.5948	7.61134		60910.24	11.31707
7098	68	19.8	-48.2	-70.8824	7.27469		2323.24	0.829268
7730	264	160.6	-103.4	-39.1667	7.09652		10691.56	3.219512
7240	1703	1994	291	17.0875	6.76836		84681	20.76829
7066	91	39	-52	-57.1429	6.44981		2704	1.109756
16548	497	649	152	30.5835	6.34989		23104	6.060976
12210502	1157	1364.2	207.2	17.9084	5.83581		42931.84	14.10976
7274	2168	2446.4	278.4	12.8413	5.79598		77506.56	26.43902
12210262	1319	1507.6	188.6	14.2987	5.01677		35569.96	16.08537
12210320	1743	1954.6	211.6	12.14	4.9212		44774.56	21.2561
7074	1592	1786.4	194.4	12.2111	4.72994		37791.36	19.41463
7228	22	50	28	127.273	4.66667		784	0.268293
12210661	1209	1057.4	-151.6	-12.5393	4.50346		22982.56	14.7439
16525	1253	1104.6	-148.4	-11.8436	4.32229		22022.56	15.28049
7042	1844	2032.2	188.2	10.2061	4.27495		35419.24	22.4878
12211551	836	717.6	-118.4	-14.1627	4.24812		14018.56	10.19512
7390	1387	1535.2	148.2	10.6849	3.87711		21963.24	16.91463
7126	48	25	-23	-47.9167	3.80699		529	0.585366
17220	41	20	-21	-51.2195	3.8025		441	0.5
12210270	4	15.8	11.8	295	3.75029		139.24	0.04878
7254	346	280.2	-65.8	-19.0173	3.71864		4329.64	4.219512
7036	59	34	-25	-42.3729	3.66618		625	0.719512
7104	81	117.2	36.2	44.6914	3.6364		1310.44	0.987805
12210514	546	465.8	-80.2	-14.6886	3.56568		6432.04	6.658537
12152	1732	1593.6	-138.4	-7.99076	3.39403		19154.56	21.12195
7220	1968	2120.2	152.2	7.73374	3.36638		23164.84	24
15596	862	767.2	-94.8	-10.9977	3.32151		8987.04	10.5122
16027	2123	2276.6	153.6	7.23504	3.27491		23592.96	25.89024
6964	2867	3038.6	171.6	5.98535	3.15791		29446.56	34.96341
7164	255	207.6	-47.4	-18.5882	3.11667		2246.76	3.109756
12210516	512	447.6	-64.4	-12.5781	2.94006		4147.36	6.243902
7172	1653	1537.4	-115.6	-6.99335	2.89434		13363.36	20.15854
6962	1060	968	-92	-8.67925	2.88914		8464	12.92683
13643	2430	2573.6	143.6	5.90947	2.87097		20620.96	29.63415
12870	581	649.6	68.6	11.8072	2.76554		4705.96	7.085366
7222	919	846.6	-72.4	-7.87813	2.43673		5241.76	11.20732
15953	935	862.8	-72.2	-7.72193	2.40814		5212.84	11.40244
7276	239	277.4	38.4	16.0669	2.38975		1474.56	2.914634
7408	1077	1004.2	-72.8	-6.75952	2.25678		5299.84	13.13415
7106	916	849.6	-66.4	-7.24891	2.23479		4408.96	11.17073
7116	2006	1909.4	-96.6	-4.81555	2.18325		9331.56	24.46341
15955	1812	1890.2	78.2	4.31567	1.81757		6115.24	22.09756
7040	73	59	-14	-19.1781	1.72328		196	0.890244
7140	127	147	20	15.748	1.70872		400	1.54878
7092	34	44.4	10.4	30.5882	1.66108		108.16	0.414634
7180	969	1020.2	51.2	5.2838	1.62348		2621.44	11.81707
12211631	24	32.4	8.4	35	1.58181		70.56	0.292683
16517	499	534.8	35.8	7.17435	1.57463		1281.64	6.085366
7356	940	892.6	-47.4	-5.04255	1.56588		2246.76	11.46341
12211562	796	754.6	-41.4	-5.20101	1.48684		1713.96	9.707317
7724	1010	1055.8	45.8	4.53465	1.42507		2097.64	12.31707
6940	470	501.4	31.4	6.68085	1.42477		985.96	5.731707
10618	1565	1618.8	53.8	3.4377	1.34842		2894.44	19.08537
7118	1884	1831.8	-52.2	-2.7707	1.21104		2724.84	22.97561
7438	53	61.8	8.8	16.6038	1.16152		77.44	0.646341
16119	1045	1008.6	-36.4	-3.48325	1.13595		1324.96	12.7439
7532	2045	1994.6	-50.4	-2.46455	1.12144		2540.16	24.93902
12210650	493	469.6	-23.4	-4.74645	1.06662		547.56	6.012195
12211719	778	749.2	-28.8	-3.7018	1.04222		829.44	9.487805
12126	1442	1479.4	37.4	2.59362	0.978568		1398.76	17.58537
7210	209	222.6	13.6	6.50718	0.925791		184.96	2.54878
12155	1558	1593.2	35.2	2.25931	0.886788		1239.04	19
12211629	3	1.8	-1.2	-40	0.774597		1.44	0.036585
12211622	1489	1517.4	28.4	1.90732	0.732504		806.56	18.15854
12211534	27	30.8	3.8	14.0741	0.706862		14.44	0.329268
7410	162	170.8	8.8	5.4321	0.682191		77.44	1.97561
7400	854	874	20	2.34192	0.680414		400	10.41463
7428	1199	1214.4	15.4	1.2844	0.443324		237.16	14.62195
7192	798	810.4	12.4	1.55388	0.43726		153.76	9.731707
7166	502	493.4	-8.6	-1.71315	0.385491		73.96	6.121951
12211564	24	22.2	-1.8	-7.5	0.374513		3.24	0.292683
12210676	17	15.6	-1.4	-8.23529	0.346764		1.96	0.207317
17011	98	101.2	3.2	3.26531	0.320642		10.24	1.195122
7442	312	315.6	3.6	1.15385	0.203224		12.96	3.804878
6920	749	744.2	-4.8	-0.64085	0.17567		23.04	9.134146
7524	792	787.4	-4.6	-0.58081	0.163692		21.16	9.658537
12210282	960	955.6	-4.4	-0.45833	0.142172		19.36	11.70732
7214	58	57.4	-0.6	-1.03448	0.078988		0.36	0.707317
12211544	496	495	-1	-0.20161	0.044924		1	6.04878
Mean	848.598	856.312	7.71463	0.909104				

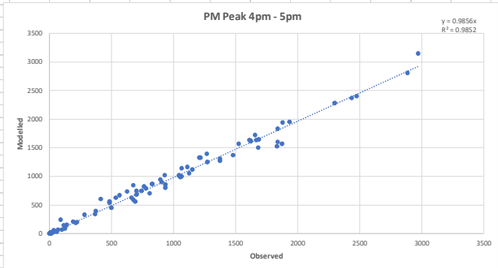


Link		Turn	
<5	85%	<5	85%
<7.5	95%	<7.5	91%
<10	98%	<10	98%
82 RMSE	13%	80 RMSE	19%

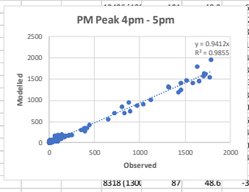
	Object	Count - Li	Count - Av	Absolute	Relative D	GEH		Diff^2	Obs/N
Rat running	8062 (331	47	233.2	186.2	396.17	15.7312		34670.44	0.573171
Data issue?	13284072 (	8	115	107	1337.5	13.6441		11449	0.097561
	13284134 (	10	75.2	65.2	652	9.98948		4251.04	0.121951
	13564 (340	514	736.6	222.6	43.3074	8.90186		49550.76	6.268293
	13284124 (	16	70.4	54.4	340	8.2767		2959.36	0.195122
	8218 (3310	2	36.2	34.2	1710	7.82545		1169.64	0.02439
	10376 (330	260	399.2	139.2	53.5385	7.66736		19376.64	3.170732
	12426 (130	63	16	-47	-74.6032	7.47824		2209	0.768293
	8176 (1300	1360	1619	259	19.0441	6.71088		67081	16.58537
						6.03708		11025	3.04878
						5.23414		4356	2.341463
						5.14151		13595.56	5.560976
						4.90774		852.64	0.609756
						4.73587		7089.64	3.341463
						4.69042		121	0.134146
						4.67844		23409	13.97561
						4.58382		15775.36	8.390244
						4.13811		2342.56	1.963415
						4.05032		1296	1.182927
						3.98401		25664.04	20.69512
						3.97285		26830.44	19.73171
						3.79991		217.0701	0.093496
						3.72853		3969	1.865854
	8206 (1800	61	93.4	32.4	53.1148	3.68754		1049.76	0.743902
	8228 (3300	1183	1060.4	-122.6	-10.3635	3.6606		15030.76	14.42683
	8170 (3202	381	313	-68	-17.8478	3.65043		4624	4.646341
	8240 (3300	65	39.2	-25.8	-39.6923	3.57438		665.64	0.792683
	13284132 (	120	84.2	-35.8	-29.8333	3.54299		1281.64	1.463415
	8314 (1300	1713	1859.8	146.8	8.56976	3.47326		21550.24	20.89024
	13284108 (	6	0	-6	-100	3.4641		36	0.073171
	10374 (330	169	127.2	-41.8	-24.7337	3.43478		1747.24	2.060976
	13284133 (	488	415.8	-72.2	-14.7951	3.39638		5212.84	5.95122
	10375 (331	15	30.8	15.8	105.333	3.30171		249.64	0.182927
	13554	271	220.2	-50.8	-18.7454	3.24153		2580.64	3.304878
	8224 (3315	5.33333	0.2	-5.13333	-96.25	3.08618		26.35108	0.065041
	13284073 (	255	209.6	-45.4	-17.8039	2.97873		2061.16	3.109756
	8182 (1300	1425	1538.6	113.6	7.97193	2.9511		12904.96	17.37805
	8184 (1300	42	25	-17	-40.4762	2.93715		289	0.512195
	8236 (3302	15	5.8	-9.2	-61.3333	2.8528		84.64	0.182927
	12404 (130	36	54.6	18.6	51.6667	2.76353		345.96	0.439024
	12423 (130	80	58.4	-21.6	-27	2.59657		466.56	0.97561
	13284112 (	3	0	-3	-100	2.44949		9	0.036585
	12424 (130	135	109.2	-25.8	-19.1111	2.33487		665.64	1.646341
	13284092 (	137.333	165	27.6667	20.1456	2.25024		765.4463	1.674793
	8180 (1300	328	290.4	-37.6	-11.4634	2.1383		1413.76	4
	10377 (330	707	764.6	57.6	8.1471	2.12345		3317.76	8.621951
	8210 (1800	1611	1530.4	-80.6	-5.0031	2.03371		6496.36	19.64634
	13284071 (	165	191.6	26.6	16.1212	1.99208		707.56	2.012195
	12422 (130	133	112.4	-20.6	-15.4887	1.85971		424.36	1.621951
	8312 (1300	53	66	13	24.5283	1.68533		169	0.646341
	13566 (340	41	31.2	-9.8	-23.9024	1.63107		96.04	0.5
	8316 (1302	387	417.8	30.8	7.95866	1.5354		948.64	4.719512
	13284122 (	1262	1212.4	-49.6	-3.93027	1.41014		2460.16	15.39024
	8060 (3310	41	32.6	-8.4	-20.4878	1.3847		70.56	0.5
	8212 (1800	75	63.8	-11.2	-14.9333	1.34443		125.44	0.914634
	13284126 (	58	68.6	10.6	18.2759	1.33231		112.36	0.707317
	13284068 (	1308	1356.4	48.4	3.70031	1.32605		2342.56	15.95122
	13284094 (	92	103.6	11.6	12.6087	1.17297		134.56	1.121951
	8308 (1302	830	796.8	-33.2	-4	1.16409		1102.24	10.12195
	13284070 (	1059	1022.4	-36.6	-3.45609	1.13454		1339.56	12.91463
	8202 (1800	161	147.4	-13.6	-8.4472	1.09521		184.96	1.963415
	10379 (330	1346	1307	-39	-2.89747	1.07081		1521	16.41463
	8318 (1300	39	32.6	-6.4	-16.4103	1.06964		40.96	0.47561
	12118	1438	1478.6	40.6	2.82337	1.06317		1648.36	17.53659
	13562 (340	220	235.4	15.4	7	1.02056		237.16	2.682927
	13284069 (	39	33	-6	-15.3846	1		36	0.47561
	8238 (3315	18	21.8	3.8	21.1111	0.851838		14.44	0.219512
	8320 (1302	74	68.6	-5.4	-7.2973	0.639512		29.16	0.902439
	13284125 (	1131	1152	21	1.85676	0.621558		441	13.79268
	8208 (1800	1363	1385.4	22.4	1.64343	0.604259		501.76	16.62195
	8056 (3300	26	28.8	2.8	10.7692	0.534913		7.84	0.317073
	12421 (130	763	751.6	-11.4	-1.4941	0.414258		129.96	9.304878
	8232 (3310	7	6.2	-0.8	-11.4286	0.3114		0.64	0.085366
	13284131 (	17	16.2	-0.8	-4.70588	0.196352		0.64	0.207317
	13284097 (	0.666667	0.8	0.133333	20	0.1557		0.017778	0.00813
	8050 (3300	1780	1784.8	4.8	0.269663	0.113694		23.04	21.70732
	13284096 (	5.66667	5.6	-0.06667	-1.17647	0.028088		0.004444	0.069106
	13284093 (	0	0	0	0	0		0	0
	13284109 (	0	0	0	0	0		0	0
	13284110 (	0	0	0	0	0		0	0
	Mean	405.358	415.447	10.0892	2.48895				



Object	Count - SC	Count - Ar	Absolute	Relative E	GEH		Diff^2	Obs/N
7228	93	242.2	149.2	160.43	11.5248	11.5248	22260.64	1.134146
12210663	413	609.2	196.2	47.5061	8.67853		38494.44	5.036585
7172	1836	1531.6	-304.4	-16.5795	7.41821		92659.36	22.39024
7116	1873	1566.8	-306.2	-16.3481	7.38335		93758.44	22.84146
7428	679	844.6	165.6	24.3888	5.99984		27423.36	8.280488
12152	1838	1599	-239	-13.0033	5.76532		57121	22.41463
7540	693	564.6	-128.4	-18.5281	5.12046		16486.56	8.45122
16119	1682	1502.4	-179.6	-10.6778	4.50098		32256.16	20.5122
16517	934	803.8	-130.2	-13.94	4.41699		16952.04	11.39024
7164	568	672.8	104.8	18.4507	4.20751		10983.04	6.926829
12211544	629	735.2	106.2	16.8839	4.06631		11278.44	7.670732
7442	534	628.4	94.4	17.6779	3.9157		8911.36	6.512195
7180	808	707	-101	-12.5	3.6697		10201	9.853659
7210	126	89.2	-36.8	-29.2063	3.54766		1354.24	1.536585
13643	1209	1330.2	121.2	10.0248	3.40149		14689.44	14.7439
12210320	1270	1392.8	122.8	9.66929	3.36546		15079.84	15.4878
7410	101	70	-31	-30.6931	3.35258		961	1.231707
7730	487	559.2	72.2	14.8255	3.15678		5212.84	5.939024
17011	677	597.6	-79.4	-11.7282	3.1452		6304.36	8.256098
7066	61	38.8	-22.2	-36.3934	3.1427		492.84	0.743902
6964	1216	1328	112	9.21053	3.14032		12544	14.82927
7098	36	57.2	21.2	58.8889	3.10558		449.44	0.439024
6962	2972	3143.4	171.4	5.76716	3.09966		29377.96	36.2439
7276	282	335.6	53.6	19.0071	3.05018		2872.96	3.439024
10618	929	1023.8	94.8	10.2045	3.03385		8987.04	11.32927
12210282	1479	1371.4	-107.6	-7.27519	2.85019		11577.76	18.03659
12210270	1	6.2	5.2	520	2.74064		27.04	0.012195
12211719	1375	1277	-98	-7.12727	2.69125		9604	16.76829
16548	484	545	61	12.6033	2.68929		3721	5.902439
12211629	16	7.4	-8.6	-53.75	2.51423		73.96	0.195122
7036	22	11.8	-10.2	-46.3636	2.48117		104.04	0.268293
7390	933	860.2	-72.8	-7.80279	2.43126		5299.84	11.37805
12211631	13	22.6	9.6	73.8462	2.27542		92.16	0.158537
7214	119	145	26	21.8487	2.26301		676	1.45122
7400	1126	1051.6	-74.4	-6.60746	2.25475		5535.36	13.73171
7254	1066	1140.8	74.8	7.01689	2.25183		5595.04	13
7240	763	826.4	63.4	8.30931	2.24899		4019.56	9.304878
7106	502	457.6	-44.4	-8.84462	2.027		1971.36	6.121951
7356	1065	1003.6	-61.4	-5.76526	1.90917		3769.96	12.9878
15955	1054	993	-61	-5.78748	1.90672		3721	12.85366
12211562	1374	1307.4	-66.6	-4.84716	1.8189		4435.56	16.7561
12211622	894	948.4	54.4	6.08501	1.79235		2959.36	10.90244
7192	225	200.2	-24.8	-11.0222	1.70087		615.04	2.743902
7126	213	189.2	-23.8	-11.1737	1.67831		566.44	2.597561
7074	1656	1724.6	68.6	4.14251	1.66856		4705.96	20.19512
12211551	702	746.6	44.6	6.35328	1.6572		1989.16	8.560976
16525	2476	2400.8	-75.2	-3.03716	1.52288		5655.04	30.19512
7274	1111	1161.6	50.6	4.55446	1.50108		2560.36	13.54878
7724	2884	2809.6	-74.4	-2.57975	1.39442		5535.36	35.17073
7524	194	213.6	19.6	10.1031	1.37295		384.16	2.365854
12210661	1880	1939.4	59.4	3.15957	1.35926		3528.36	22.92683
12210676	11	7	-4	-36.3636	1.33333		16	0.134146
7166	829	867.6	38.6	4.65621	1.3253		1489.96	10.10976
12210502	664	630.4	-33.6	-5.06024	1.32075		1128.96	8.097561
11897	369	344.4	-24.6	-6.66667	1.30252		605.16	4.5
7222	2438	2375.2	-62.8	-2.57588	1.28014		3943.84	29.73171
7408	830	867	37	4.45783	1.27021		1369	10.12195
12126	1525	1569.2	44.2	2.89836	1.12373		1953.64	18.59756
7140	142	155.4	13.4	9.43662	1.09888		179.56	1.731707
7220	1045	1009.8	-35.2	-3.36842	1.09818		1239.04	12.7439
7532	1153	1117.2	-35.8	-3.10494	1.06259		1281.64	14.06098
12155	1688	1648	-40	-2.36967	0.979404		1600	20.58537
7732	375	392.8	17.8	4.74667	0.908471		316.84	4.573171
7040	38	43.6	5.6	14.7368	0.876714		31.36	0.463415
12870	703	681.2	-21.8	-3.101	0.828652		475.24	8.573171
7092	37	32.6	-4.4	-11.8919	0.74587		19.36	0.45122
7042	1666	1636	-30	-1.80072	0.738325		900	20.31707
12210516	1272	1248.4	-23.6	-1.85535	0.664802		556.96	15.5122
6940	1613	1639.2	26.2	1.6243	0.649722		686.44	19.67073
7438	136	143.6	7.6	5.58824	0.642777		57.76	1.658537
16027	1046	1027.2	-18.8	-1.79732	0.583919		353.44	12.7561
12210262	781	794.6	13.6	1.74136	0.484541		184.96	9.52439
15953	1935	1954.4	19.4	1.00258	0.439922		376.36	23.59756
7118	2299	2278.2	-20.8	-0.90474	0.434789		432.64	28.03659
7104	40	37.8	-2.2	-5.5	0.352734		4.84	0.487805
12210514	744	750.6	6.6	0.887097	0.241433		43.56	9.073171
12211534	20	19.2	-0.8	-4	0.180702		0.64	0.243902
12210650	1624	1617.6	-6.4	-0.39409	0.15897		40.96	19.80488
17220	73	71.8	-1.2	-1.64384	0.14103		1.44	0.890244
12211564	30	29.8	-0.2	-0.66667	0.036576		0.04	0.365854
6920	1622	1620.6	-1.4	-0.08631	0.034769		1.96	19.78049
15596	1837	1836.8	-0.2	-0.01089	0.004666		0.04	22.40244
Mean	904.366	899.776	-4.59024	-0.50757				

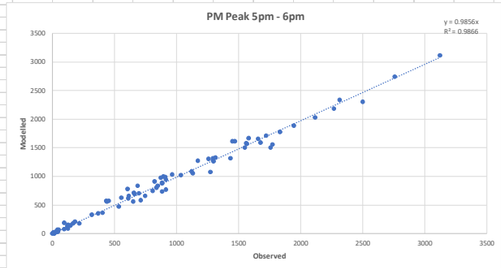


Link		Turn	
<5	91%	<5	78%
<7.5	98%	<7.5	94%
<10	99%	<10	99%
82 RMSE	10%	80 RMSE	19%



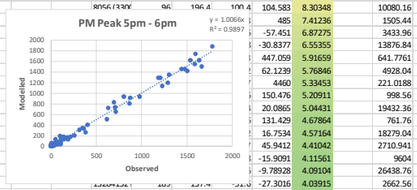
Object	Count - SC	Count - Ar	Absolute	Relative E	GEH		Diff^2	Obs/N
8056 (330	64	176.2	112.2	175.312	10.2381		12588.84	0.780488
13284072	7	66.4	59.4	848.571	9.80513		3528.36	0.085366
13284096	3	48.2	45.2	1506.67	8.93343		2043.04	0.036585
10376 (33	67	157.8	90.8	135.522	8.56451		8244.64	0.817073
8062 (331	5	46.4	41.4	828	8.16646		1713.96	0.060976
			20.8	-60.198	7.23604		3696.64	1.231707
			250	-17.4825	6.92046		62500	17.43902
			10.8	84.1667	6.91838		6528.64	1.170732
			9.4	-30.0756	6.50124		14256.36	4.841463
			10.6	203	6.39549		1648.36	0.243902
			1.2	312	6.16644		973.44	0.121951
			333	495.714	5.74162		535.1496	0.056911
			2.8	-13.1451	5.72317		54195.84	21.59756
			7.4	-14.2641	5.64409		43014.76	17.73171
			2.8	56.0714	5.24427		3943.84	1.365854
			5.2	-45.6566	5.17121		2043.04	1.207317
			2.4	-12.2296	5.13467		40965.76	20.18293
			4.6	-16.229	5.05366		20909.16	10.86585
			14	1400	4.94975		196	0.012195
8318 (130	87	48.6	-38.4	-44.1379	4.66355		1474.56	1.060976
13284133	1041	903.8	-137.2	-13.1796	4.39979		18823.84	12.69512
10379 (33	829	707.2	-121.8	-14.6924	4.39479		14835.24	10.10976
13564(34	141	198.2	57.2	40.5674	4.39221		3271.84	1.719512
13284123	253	188.2	-64.8	-25.6126	4.36287		4199.04	3.085366
8208 (180	1583	1414.8	-168.2	-10.6254	4.3445		28291.24	19.30488
13566 (34	74	41.4	-32.6	-44.0541	4.2917		1062.76	0.902439
13284108	9	0	-9	-100	4.24264		81	0.109756
8320 (130	652	549.2	-102.8	-15.7669	4.1947		10567.84	7.95122
12421 (13	1635	1796.4	161.4	9.87156	3.89657		26049.96	19.93902
10375 (33	52	83.8	31.8	61.1538	3.85916		1011.24	0.634146
8308 (130	1789	1946.8	157.8	8.82057	3.65115		24900.84	21.81707
13284122	1125	1007.4	-117.6	-10.4533	3.60154		13829.76	13.71951
13284073	218	169	-49	-22.4771	3.52254		2401	2.658537
13284135	416	350.8	-65.2	-15.6731	3.32983		4251.04	5.073171
12118	1703	1574.2	-128.8	-7.56312	3.18185		16589.44	20.76829
10374 (33	357	299.4	-57.6	-16.1345	3.17946		3317.76	4.353659
8180 (130	135	100.6	-34.4	-25.4815	3.16946		1183.36	1.646341
13284068	967	873.4	-93.6	-9.67942	3.08557		8760.96	11.79268
8232 (331	15	5.2	-9.8	-65.3333	3.08365		96.04	0.182927
13284069	34	54	20	58.8235	3.01511		400	0.414634
8312 (130	21	9.4	-11.6	-55.2381	2.97534		134.56	0.256098
8182 (130	1726	1609.2	-116.8	-6.76709	2.8602		13642.24	21.04878
13284112	4	0	-4	-100	2.82843		16	0.04878
13284130	129	99	-30	-23.2558	2.80976		900	1.573171
8224 (331	4.33333	0.2	-4.13333	-95.3846	2.74541		17.08442	0.052845
8240 (330	41	25.4	-15.6	-38.0488	2.70742		243.36	0.5
13284121	52	35.4	-16.6	-31.9231	2.51112		275.56	0.634146
13284109	3	0	-3	-100	2.44949		9	0.036585
13565 (34	164	134.6	-29.4	-17.9268	2.40612		864.36	2
8314 (130	877	946.8	69.8	7.95895	2.31144		4872.04	10.69512
13563 (34	388	344.6	-43.4	-11.1856	2.26763		1883.56	4.731707
8184 (130	220	189.2	-30.8	-14	2.15327		948.64	2.682927
8050 (330	1711	1629	-82	-4.79252	2.00658		6724	20.86585
13284110	2	0	-2	-100	2		4	0.02439
13284113	2	0	-2	-100	2		4	0.02439
12422 (13	182	159.2	-22.8	-12.5275	1.7456		519.84	2.219512
13284126	38	28	-10	-26.3158	1.74078		100	0.463415
12424 (13	131	150.2	19.2	14.6565	1.61923		368.64	1.597561
8212 (180	167	147	-20	-11.976	1.59617		400	2.036585
10378 (33	106	122.6	16.6	15.6604	1.55269		275.56	1.292683
8206 (180	135	153.4	18.4	13.6296	1.53227		338.56	1.646341
8238 (331	12	17.6	5.6	46.6667	1.45565		31.36	0.146341
12425 (13	802	842.4	40.4	5.03741	1.40894		1632.16	9.780488
13562 (34	71	83.2	12.2	17.1831	1.38942		148.84	0.865854
8176 (130	1516	1465.4	-50.6	-3.33773	1.31056		2560.36	18.4878
13284125	1454	1414.6	-39.4	-2.70977	1.04034		1552.36	17.73171
13284132	179	165.4	-13.6	-7.59777	1.03639		184.96	2.182927
13284124	76	84.6	8.6	11.3158	0.959711		73.96	0.926829
13284093	0.333333	0	-0.33333	-100	0.816497		0.111111	0.004065
8202 (180	166	156.2	-9.8	-5.90361	0.772108		96.04	2.02439
8236 (330	10	7.8	-2.2	-22	0.737442		4.84	0.121951
8170 (320	719	701.8	-17.2	-2.39221	0.645323		295.84	8.768293
8058 (330	28	24.8	-3.2	-11.4286	0.622799		10.24	0.341463
8060 (331	76	80.8	4.8	6.31579	0.542105		23.04	0.926829
12404 (13	36	38.4	2.4	6.66667	0.393496		5.76	0.439024
8316 (130	76	79.2	3.2	4.21053	0.363261		10.24	0.926829
10377 (33	1321	1308.8	-12.2	-0.92354	0.336445		148.84	16.10976
13284070	1317	1324.8	7.8	0.592255	0.214615		60.84	16.06098
13284097	0.333333	0.4	0.066667	20	0.110096		0.004444	0.004065
12423 (13	65	65.8	0.8	1.23077	0.088924		0.64	0.792683
Mean	441.633	418.553	-23.0808	-5.22624				

Object	Count - SC	Count - Ar	Absolute	Relative D	GEH		Diff^2	Obs/N
7228	96	191.8	95.8	99.7917	7.98611		9177.64	1.170732
7240	608	782.4	174.4	28.6842	6.61442		30415.36	7.414634
12210663	435	578.4	143.4	32.9655	6.3705		20563.56	5.304878
7172	1759	1510.2	-248.8	-14.1444	6.15382		61901.44	21.45122
7532	1276	1080.6	-195.4	-15.3135	5.69242		38181.16	15.56098
7428	687	840.2	153.2	22.2999	5.54403		23470.24	8.378049
7116	1776	1555	-221	-12.4437	5.41527		48841	21.65854
7390	887	733.2	-153.8	-17.3393	5.40365		23654.44	10.81707
16548	441	557.8	116.8	26.4853	5.22659		13642.24	5.378049
7730	457	572.8	115.8	25.3392	5.10325		13409.64	5.573171
16517	914	766.6	-147.4	-16.1269	5.08488		21726.76	11.14634
12210502	713	589	-124	-17.3913	4.85994		15376	8.695122
7098	39	73.8	34.8	89.2308	4.63383		1211.04	0.47561
6940	1449	1618.8	169.8	11.7184	4.3355		28832.04	17.67073
7222	2503	2310	-193	-7.71075	3.93427		37249	30.52439
12210270	0	7.6	7.6	inf	3.89872		57.76	0
12126	1470	1619.4	149.4	10.1633	3.80127		22320.36	17.92683
7210	127	89	-38	-29.9213	3.65655		1444	1.54878
17011	653	564.4	-88.6	-13.5681	3.59114		7849.96	7.963415
16027	896	1005	109	12.1652	3.5355		11881	10.92683
7220	876	980.4	104.4	11.9178	3.42673		10899.36	10.68293
12210282	1434	1314.4	-119.6	-8.34081	3.22631		14304.16	17.4878
7540	746	665.4	-80.6	-10.8043	3.03407		6496.36	9.097561
7164	557	629.2	72.2	12.9623	2.96465		5212.84	6.792683
13643	1175	1276.8	101.8	8.66383	2.9075		10363.24	14.32927
12211629	16	6.4	-9.6	-60	2.86855		92.16	0.195122
7166	825	907.6	82.6	10.0121	2.80638		6822.76	10.06098
15955	908	990.6	82.6	9.09692	2.68089		6822.76	11.07317
7126	217	180	-37	-17.0507	2.62616		1369	2.646341
7106	535	477.4	-57.6	-10.7664	2.56013		3317.76	6.52439
7400	1133	1052	-81	-7.14916	2.45061		6561	13.81707
12210262	811	744	-67	-8.26141	2.40284		4489	9.890244
12211631	13	23.2	10.2	78.4615	2.39751		104.04	0.158537
7410	97	75.6	-21.4	-22.0619	2.30361		457.96	1.182927
7438	126	152.4	26.4	20.9524	2.23761		696.96	1.536585
7074	1584	1673.6	89.6	5.65657	2.22011		8028.16	19.31707
7036	23	13.6	-9.4	-40.8696	2.19737		88.36	0.280488
12211551	657	714.4	57.4	8.73668	2.19202		3294.76	8.012195
17220	52	68.2	16.2	31.1538	2.08967		262.44	0.634146
7732	403	362.2	-40.8	-10.1241	2.08587		1664.64	4.914634
12152	1677	1596.4	-80.6	-4.8062	1.99228		6496.36	20.45122
7524	182	209.8	27.8	15.2747	1.98622		772.84	2.219512
7274	968	1030	62	6.40496	1.96159		3844	11.90488
12210676	13	7	-6	-46.1538	1.89737		36	0.158537
12210661	2115	2030.8	-84.2	-3.98109	1.84937		7089.64	25.79268
16525	2271	2185.8	-85.2	-3.75165	1.80486		7259.04	27.69512
12870	617	660.8	43.8	7.09887	1.73284		1918.44	7.52439
7066	48	37.2	-10.8	-22.5	1.6547		116.64	0.585366
12211562	1256	1306.8	50.8	4.04459	1.41913		2580.64	15.31707
12210514	838	799.2	-38.8	-4.63007	1.35611		1505.44	10.21951
7192	166	183.6	17.6	10.6024	1.3312		309.76	2.02439
15953	1948	1889.8	-58.2	-2.98768	1.32861		3387.24	23.7561
15596	1834	1784	-50	-2.72628	1.17558		2500	22.36585
12211544	662	691.4	29.4	4.44109	1.13018		864.36	8.073171
7254	1124	1089	-35	-3.11388	1.05219		1225	13.70732
12211534	17	21.6	4.6	27.0588	1.04708		21.16	0.207317
16119	1550	1509.6	-40.4	-2.60645	1.03291		1632.16	18.90244
10618	917	948.2	31.2	3.4024	1.02166		973.44	11.18293
11897	370	350.8	-19.2	-5.18919	1.01137		368.64	4.512195
12211719	1299	1263.4	-35.6	-2.74057	0.994584		1267.36	15.84146
7214	123	133.2	10.2	8.29268	0.901209		104.04	1.5
7092	35	31	-4	-11.4286	0.696311		16	0.426829
7040	40	44	4	10	0.617213		16	0.487805
12210320	1292	1314	22	1.70279	0.609467		484	15.7561
7408	848	832.8	-15.2	-1.79245	0.524325		231.04	10.34146
7104	41	38	-3	-7.31707	0.477334		9	0.5
7180	698	709.6	11.6	1.66189	0.437254		134.56	8.512195
7276	320	327.2	7.2	2.25	0.400247		51.84	3.902439
7356	1034	1021.2	-12.8	-1.23791	0.399299		163.84	12.60976
7724	2759	2739.6	-19.4	-0.70315	0.369991		376.36	33.64634
7118	2316	2333.6	17.6	0.759931	0.365023		309.76	28.2439
7042	1564	1578.2	14.2	0.907928	0.35825		201.64	19.07317
12210516	1314	1326.6	12.6	0.958904	0.346764		158.76	16.02439
7140	149	144.8	-4.2	-2.81879	0.346528		17.64	1.817073
12210650	1565	1574.8	9.8	0.626198	0.247338		96.04	19.08537
12211564	32	33.2	1.2	3.75	0.210171		1.44	0.390244
6920	1722	1714.2	-7.8	-0.45296	0.188179		60.84	21
7442	612	615.6	3.6	0.588235	0.145308		12.96	7.463415
6964	1293	1288.8	-4.2	-0.32483	0.116897		17.64	15.76829
12155	1659	1663	4	0.241109	0.098147		16	20.23171
6962	3121	3117.4	-3.6	-0.11535	0.064459		12.96	38.06098
12211622	887	888.8	1.8	0.202931	0.060407		3.24	10.81707
Mean	886.22	883.149	-3.07073	-0.3465				



Link		
<5	87%	
<7.5	99%	
<10	100%	
82 RMSE	9%	

Turn	
<5	84%
<7.5	94%
<10	100%
80 RMSE	14%



Object	Count - SC	Count - Ar	Absolute	Relative D	GEH		Diff^2	Obs/N
13284072	5	61.2	56.2	1124	9.76837		3158.44	0.060976
10376 (330	50	137.4	87.4	174.8	9.02904		7638.76	0.609756
13284096	0.666667	40.4	39.7333	5960	8.7685		1578.735	0.00813
13284131	3	43.4	40.4	1346.67	8.38759		1632.16	0.036585
8056 (330	96	196.4	100.4	104.583	8.30348		10080.16	1.170732
13284124	54	88	34	62.963	4.03506		1156	0.658537
12426 (130	71	41.6	-29.4	-41.4085	3.91826		864.36	0.865854
8170 (3200	628	728.6	100.6	16.0191	3.86267		10120.36	7.658537
13566 (340	64	37.2	-26.8	-41.875	3.76755		718.24	0.780488
12421 (130	1590	1742.4	152.4	9.58491	3.73355		23225.76	19.39024
10375 (330	49	77.4	28.4	57.9592	3.5724		806.56	0.597561
13284094	139.667	185	45.3333	32.4582	3.55806		2055.108	1.703256
13284108	6	0	-6	-100	3.4641		36	0.073171
8206 (1800	120	160.4	40.4	33.6667	3.41199		1632.16	1.463415
13284123	254	202.6	-51.4	-20.2362	3.40181		2641.96	3.097561
8238 (3315	8	20	12	150	3.20713		144	0.097561
12423 (130	39	60.8	21.8	55.8974	3.08607		475.24	0.47561
13284109	4	0	-4	-100	2.82843		16	0.04878
13284070	1187	1286.4	99.4	8.37405	2.82653		9880.36	14.47561
8202 (1800	179	144.8	-34.2	-19.1061	2.68784		1169.64	2.182927
8232 (3310	16	7	-9	-56.25	2.65396		81	0.195122
8228 (3300	1225	1137	-88	-7.18367	2.56069		7744	14.93902
8308 (1300	1780	1882	102	5.73034	2.38372		10404	21.70732
8060 (3310	104	81.2	-22.8	-21.9231	2.36935		519.84	1.268293
8054 (3300	1285	1201.8	-83.2	-6.47471	2.35949		6922.24	15.67073
8184 (1300	213	180	-33	-15.493	2.35414		1089	2.597561
10377 (330	1205	1287	82	6.80498	2.32303		6724	14.69512
12422 (130	173	145.4	-27.6	-15.9538	2.18745		761.76	2.109756
8210 (1800	1501	1419.6	-81.4	-5.42305	2.13012		6625.96	18.30488
12118	1536	1616.2	80.2	5.22135	2.02014		6432.04	18.73171
10379 (330	712	659.4	-52.6	-7.38764	2.00872		2766.76	8.682927
13284068	869	813	-56	-6.44419	1.93103		3136	10.59756
8236 (3302	12	6.4	-5.6	-46.6667	1.84627		31.36	0.146341
8312 (1300	13	7.2	-5.8	-44.6154	1.82502		33.64	0.158537
8240 (3300	43	32.2	-10.8	-25.1163	1.76129		116.64	0.52439
8316 (1300	52	64.4	12.4	23.8462	1.6254		153.76	0.634146
13284135	362	333.6	-28.4	-7.8453	1.52284		806.56	4.414634
12424 (130	140	157.6	17.6	12.5714	1.44282		309.76	1.707317
13284110	1	0	-1	-100	1.41421		1	0.012195
13284112	1	0	-1	-100	1.41421		1	0.012195
13284093	1	0	-1	-100	1.41421		1	0.012195
12404 (130	30	38	8	26.6667	1.37199		64	0.365854
13284097	0.333333	1.6	1.26667	380	1.28832		1.604453	0.004065
13284121	42	34.2	-7.8	-18.5714	1.26367		60.84	0.512195
10378 (330	103	116.2	13.2	12.8155	1.26087		174.24	1.256098
13284125	1303	1348.4	45.4	3.48427	1.2469		2061.16	15.89024
13554	706	739.4	33.4	4.73088	1.24242		1115.56	8.609756
8180 (1300	106	93.6	-12.4	-11.6981	1.24124		153.76	1.292683
13284122	979	940.8	-38.2	-3.90194	1.23296		1459.24	11.93902
13284133	874	909.2	35.2	4.02746	1.17885		1239.04	10.65854
8224 (3310	1	0.2	-0.8	-80	1.0328		0.64	0.012195
8058 (3300	28	24	-4	-14.2857	0.784465		16	0.341463
8050 (3300	1584	1554	-30	-1.89394	0.757373		900	19.31707
13562 (340	78	71.6	-6.4	-8.20513	0.739996		40.96	0.95122
13284126	30	26.4	-3.6	-12	0.677919		12.96	0.365854
13565 (343	137	130	-7	-5.10949	0.605839		49	1.670732
8208 (1800	1442	1459.8	17.8	1.2344	0.467306		316.84	17.58537
13563 (340	346	351.6	5.6	1.6185	0.299847		31.36	4.219512
8318 (1300	49	47	-2	-4.08163	0.288675		4	0.597561
8176 (1300	1472	1461.2	-10.8	-0.7337	0.282012		116.64	17.95122
8182 (1300	1635	1625.4	-9.6	-0.58716	0.237767		92.16	19.93902
13284073	159	161.8	2.8	1.76101	0.221083		7.84	1.939024
13284130	95	93.2	-1.8	-1.89474	0.185557		3.24	1.158537
8212 (1800	178	175.8	-2.2	-1.23596	0.165409		4.84	2.170732
10374 (330	314	312.4	-1.6	-0.50955	0.090409		2.56	3.829268
13284113	0	0	0	0	0		0	0
Mean	402.7	409.758	7.0575	1.75255				

Appendix I

Travel Time Validation Tables

AM

Almsun	Route Nar	Year_Mon	Period	Route ID	Route Nar	Seg ID	From	To	0700-0800 Length	0700-0800 Median Ti	0700-0800 15th Perce	0700-0800 85th Percentile (s	0800-0900 Median Ti	0800-0900 15th Perce	0800-0900 85th Perce	Route Nar	Cumul Dis	0700-0800 Median Ti	0700-0800 15th Perce	0700-0800 85th Perce	0800-0900 Median Ti	0800-0900 15th Perce	0800-0900 85th Perce	7:00-8:00 Av	7:00-8:00 Cumulative	8:00-9:00 Av	8:00-9:00 Cumulative	0 13284762	5	6	7	8	9	10	11	12	13	14	15			
	AM - Pakuranga Rd/Cascades Rd to Mt W Hwy																											7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45			
								Cascades Road									0	0	0	0	0	0	0	0	0	0	0															
13284775	Ellerslie P	201806	7:00-8:00	55	Ellerslie P	795	Cascades Road	Ti Rakau Drive	2436	333	238	544	298	230	446	Ellerslie P	2.436	5.55	3.966667	9.066667	4.966667	3.833333	7.433333	6.715237134	6.715237134	5.252887086	5.252887086	440.4762	381.5404	386.7261	394.8797	346.6544	275.7413	243.4176	189.8557	173.8853	#N/A	#N/A			100%	
13284791	Ellerslie P	201806	7:00-8:00	55	Ellerslie P	796	Ti Rakau Drive	Jellicoe Road	2379	281	201	520	250	191	360	Ellerslie P	4.815	10.23333	7.316667	17.73333	9.133333	7.016667	13.43333	4.142544307	10.85778144	3.655526584	8.908413669	235.7302	255.7841	254.1436	225.1594	220.0202	226.7243	205.4225	196.219	190.8661	#N/A	#N/A				
13285848	Ellerslie P	201806	7:00-8:00	55	Ellerslie P	797	Jellicoe Road	Mt W Hwy	549	92	61	131	87	62	113	Ellerslie P	5.364	11.76667	8.333333	19.91667	10.58333	8.05	15.31667	1.496765815	12.35454726	1.445537407	10.35395108	87.71831	85.02526	96.67428	88.01156	95.77518	82.33967	80.80258	72.91596	66.866	#N/A	#N/A			OK	OK
	AM - Pakuranga Rd/ Mt W Hwy to Cascades Rd																																								
								Mt W Hwy									0	0	0	0	0	0	0	0	0	0	0															
13285849	Ellerslie P	201806	7:00-8:00	193	Ellerslie P	1628	Mt Wellington Highwa	Jellicoe Road	549	69	47	95	62	44	89	Ellerslie P	0.549	1.15	0.783333	1.583333	1.033333	0.733333	1.483333	1.053888111	1.053888111	1.117161018	1.117161018	58.6654	61.37602	69.65844	71.0786	67.08065	67.206	62.7534	64.68988	64.66237	#N/A	#N/A				
13284792	Ellerslie P	201806	7:00-8:00	193	Ellerslie P	1629	Jellicoe Road	Ti Rakau Drive	2379	252	219	323	251	196	301	Ellerslie P	2.928	5.35	4.433333	9.966667	5.216667	4	6.5	3.473369498	4.527257609	3.586402588	4.703563606	216.1577	202.7737	206.2751	214.7854	219.6861	213.8163	212.4488	200.9834	209.5098	#N/A	#N/A				
13284793	Ellerslie P	201806	7:00-8:00	193	Ellerslie P	1630	Ti Rakau Drive	Cascades Road	2436	230	172	294	257	201	344	Ellerslie P	5.364	9.183333	7.3	11.86667	9.5	7.35	12.23333	3.815852882	8.343110491	3.698984091	8.402547697	217.0994	232.8622	236.892	228.2255	225.4598	217.3337	216.7372	214.5611	192.4057	#N/A	#N/A			OK	OK
	AM - Ti Rakau Dr/Te Irirangi Dr to Mt W Hwy																																								
								Te Irirangi									0	0	0	0	0	0	0	0	0	0	0															
13284776	Ellerslie P	201806	7:00-8:00	193	Ellerslie P	1638	Te Irirangi	Harris Road	1351	141	103	206	180	120	289	Ellerslie P	1.351	2.35	1.716667	3.433333	3	2	4.816667	2.933602381	2.933602381	3.19143616	3.19143616	169.6078	178.2053	180.2353	165.015	180.2173	211.3492	209.3632	162.2794	155.0845	#N/A	#N/A				
13285850	Freight - S	201806	7:00-8:00	32	Freight - S	286	Harris Road	Edgewater Drive	2035	274	163	477	216	166	371	Freight - S	3.386	6.916667	4.433333	11.38333	6.6	4.766667	11	3.423284854	6.356887235	3.264148074	6.455584234	205.697	222.7637	187.7305	188.9014	195.8394	194.4593	204.1954	193.5673	173.2855	#N/A	#N/A				
13284777	Freight - S	201806	7:00-8:00	32	Freight - S	287	Edgewater Drive	Ti Rakau Dr	823	184	94	261	185	97	249	Freight - S	4.209	9.983333	6	15.73333	9.683333	6.383333	15.15	2.291097843	8.647985078	1.348770252	7.804354485	145.67	156.7759	109.9516	83.04348	80.13192	78.86989	81.65957	73.86161	67.44692	#N/A	#N/A				
13284778	Freight - S	201806	7:00-8:00	32	Freight - S	288	Ti Rakau Dr	Pakuranga Highway	1722	121	102	163	106	92	136	Freight - S	5.931	12	7.7	18.45	11.45	7.916667	17.41667	1.745227332	10.39331241	1.420618457	9.224972942	101.5622	110.9832	101.6135	86.12433	85.77199	84.06021	84.99189	84.51595	81.66155	#N/A	#N/A				
13285851	Freight - S	201806	7:00-8:00	32	Freight - S	289	Pakuranga Highway	Carbine Road	826	102	61	153	105	57	181	Freight - S	6.757	13.7	8.716667	21	13.2	8.866667	20.43333	2.772824454	13.16613686	1.756137231	10.98111017	165.1919	167.087	166.8296	137.3861	101.8616	94.86441	87.36082	89.79646	83.38686	#N/A	#N/A				
13284779	Freight - S	201806	7:00-8:00	32	Freight - S	290	Carbine Road	SH1	889	65	53	77	61	51	73	Freight - S	7.646	14.78333	9.6	22.28333	14.21667	9.716667	21.65	0.698891413	13.86502828	0.687764383	11.66887456	41.94585	41.78626	42.06834	41.99305	41.11108	40.7525	41.20683	40.54274	40.07985	#N/A	#N/A			OK	OK
	AM - Ti Rakau Dr/Mt W Hwy to Te Irirangi Dr																																								
								SH1									0	0	0	0	0	0	0	0	0	0	0															
13284780	Freight - S	201806	7:00-8:00	32	Freight - S	290	SH1	Carbine Road	889	61	47	137	60	47	158	Freight - S	0.889	1.016667	0.783333	2.283333	1	0.783333	2.633333	1.056718255	1.056718255	1.055825798	1.055825798	64.4477	61.61637	64.14522	63.33931	62.67607	64.38094	63.00186	64.30032	64.14703	#N/A	#N/A				
13285861	Freight - S	201806	7:00-8:00	32	Freight - S	289	Carbine Road	Pakuranga Highway	826	54	46	70	54	46	70	Freight - S	1.715	1.916667	1.55	3.45	1.9	1.55	3.8	0.806079663	1.862797918	0.810367347	1.866193145	47.90932	47.77321	49.41181	48.5792	48.839	48.75928	48.31069	47.78683	46.38716	#N/A	#N/A				
13284781	Freight - S	201806	7:00-8:00	32	Freight - S	288	Pakuranga Highway	Ti Rakau Dr	1722	127	98	244	182	99	301	Freight - S	3.437	4.033333	3.183333	7.516667	4.933333	3.2	8.816667	2.97181444	4.834612359	3.396308137	5.262501282	165.7252	176.4436	192.7578	223.008	230.1351	196.8289	165.142	175.4729	163.554	#N/A	#N/A				
13284782	Freight - S	201806	7:00-8:00	32	Freight - S	287	Ti Rakau Dr	Edgewater Drive	823	66	57	123	71	61	181	Freight - S	4.26	5.133333	4.133333	9.566667	6.116667	4.216667	11.83333	1.00422865	5.838841009	1.010173131	6.272674413	61.77564	59.16104	59.82447	58.96715	60.55422	60.77331	62.14687	62.85486	58.27952	#N/A	#N/A				
13284783	Freight - S	201806	7:00-8:00	32	Freight - S	286	Edgewater Drive	Harris Road	2035	191	144	236	188	149	239	Freight - S	6.295	8.316667	6.533333	13.5	9.25	6.7	15.81667	3.348044962	9.186885971	4.072943874	10.34561829	192.2772	195.4956	214.8753	221.0975	230.4707	250.5756	275.3627	218.8658	207.7454	#N/A	#N/A				
13285862	Ellerslie P	201806	7:00-8:00	32	Freight - S	787	Harris Road	Te Irirangi	1351	113	94	174	151	102	241	Freight - S	7.646	10.2	8.1	16.4	11.76667	8.4	19.83333	2.408427732	11.5953157	2.427727494	12.77334578	138.7867	140.4843	154.246	136.5582	143.505	149.0525	153.4989	150.2803	148.3059	#N/A	#N/A			OK	OK
	AM - Pakuranga Rd to Pakuranga Highway and vice versa																																								
								Pakuranga Rd									0	0	0	0	0	0	0	0	0	0	0															
13284788	Ti Rakau D	201806	7:00-8:00	197	Ti Rakau D	1642	Pakuranga Rd	Pakuranga Hwy	341	135	77	205	99	56	183	Ti Rakau D	0.341	2	1.283333	3.416667	2	0.933333	3.05	1.96656028	1.96656028	1.790551845	1.790551845	116.9302	118.2226	118.828	109.1476	111.1534	106.0589	103.3725	99.48425	82.47163	#N/A	#N/A			OK	OK
								Pakuranga Hwy									0	0	0	0	0	0	0	0	0	0	0															
13284787	Ti Rakau D	201806	7:00-8:00	196	Ti Rakau D	1641	Pakuranga Hwy	Pakuranga Rd	327	80	31	142	77	33	174	Ti Rakau D	0.668	2	0.516667	2.366667	2	0.55	2.9	2.05992453	2.05992453	2.249934948	2.249934948	116.7869	116.8271	137.1725	131.714	134.9766	141.989	131.3048	110.9097	99.61536	#N/A	#N/A			OK	OK
	AM - Gossamer/Ti Rakau Dr to Pakuranga Rd																																								
								Ti Rakau Dr									0	0	0	0	0	0	0	0	0	0	0															
13284784	Gossamer	201806	7:00-8:00	164	Gossamer	1433	Ti Rakau Dr	Chatsworth Cr / Ennis /	645	52	47	181	56	48	155	Gossamer	0.645	0.866667	0.783333	3.016667	0.933333	0.8	2.583333	0.885232182	0.885232182	0.902051166	0.902051166	55.50934	52.24112	51.59133	54.12953	54.7835	55.25712	52.32212	53.18494	51.87362	#N/A	#N/A				
13285866	Gossamer	201806	7:00-8:00	164	Gossamer	1434	Chatsworth Cr / Ennis /	Reeves Rd	395	35	29	51	40	34	80	Gossamer	1.04	1.45	1.266667	3.866667	1.6	1.366667	3.916667	0.664773858	1.55006604	0.659771456	1.561822622	41.07973	39.97202	38.60754	41.00231	40.60318	38.68965	38.05001	37.52435	37.64223	#N/A	#N/A				
13285870	Gossamer	201806	7:00-8:00	164	Gossamer	1435	Reeves Rd	Larne Ave	454	36	32	44	42	36	49	Gossamer	1.494	2.05	1.8	4.6	2.3	1.966667	4.733333	0.60098122	2.15088726	0.60318482	2.165007442	36.51309	35.9744	35.68913	36.02549	36.57902	36.22032	35.93953	35.81905	37.12194	#N/A	#N/A				
13285874	Gossamer	201806	7:00-8:00	164	Gossamer	1436	Larne Ave	Pakuranga Rd	601	73	53	154	170	81	559	Gossamer	2.095	3.266667	2.683333	7.166667	5.133333	3.316667	14.05	1.730070943	3.881058204	1.807190997	3.972198438	101.7532	106.0285	103.6311	109.0441	106.3685	112.0688	106.2444	101.6535	109.228	#N/A	#N/A			OK	OK
	AM - Gossamer/Pakuranga Rd to Ti Rakau Dr																																								
								Pakuranga Rd									0	0	0	0	0	0	0	0	0	0	0															
13284796	Gossamer	201806	7:00-8:00	164	Gossamer	1436	Pakuranga Rd	Larne Ave	601	49	45	65	71	46	129	Gossamer	0.601	0.816667	0.75	1.083333	1.183333	0.766667	2.15	0.858634454	0.858634454	0.849688087	0.849688087	52.028	51.39223	51.13396	50.38556	52.03655	51.07142	50.43161	50.3199	49.06647	#N/A	#N/A				
13285878	Gossamer	201806	7:00-8:00	164	Gossamer	1435	Larne Ave	Reeves Rd	454	48	38	57	48	39	82	Gossamer	1.055	1.616667	1.383333	2.033333	1.983333	1.416667	3.516667	0.775669683	1.634304137	0.750392167	1.600088254	48.23585	46.50015	44.88444	44.30616	46.71995	44.74986	44.31815	42.05678	42.01707	#N/A	#N/A				
13285882	Gossamer	201806	7:00-8:00	164	Gossamer	1434	Reeves Rd	Chatsworth Cr / Ennis /	395	29	25	33	35	28	104	Gossamer	1.45	2.1	1.8	2.583333	2.566667	1.883333	5.25	0.516202321	2.150506458	0.515693172	2.115773427	31.00559	30.9713	30.93953	30.90586	31.1137	31.00629	30.74051	31.04925	30.96776	#N/A	#N/A				
13285886	Gossamer	201806	7:00-8:00	164	Gossamer	1433	Chatsworth Cr / Ennis /	Ti Rakau Dr	645	72	48	150	154	76	271	Gossamer	2.095	3.3	2.6	5.083333	5.133333	3.15	9.766667	1.696491139	3.846997598	1.797266661	3.913040088	92.74557	110.0827	102.5401	112.0977	105.9941	110.7331	102.5192	98.72786	104.3459	#N/A	#N/A			OK	OK
	AM - Bus									Median Ti	15th Perce	85th Perce	Median Ti	15th Perce	85th Perce													3															
								Botany Town Centre									0	0	0	0	0	0	0	0	0	0	0															
19206840							Botany Town Centre	Panmure Interchange									7.63	38.83333	30.23333	47.01667	27.63333	25.22	36.31667	30.03937771	30.03937771	29.06571162	29.06571162	1750.953	1795.066	1861.068	1743.562	1752.677	1801.477	1678.054	1813.218	1700.757	#N/A	#N/A				
								Panmure Interchange									0	0	0	0	0	0	0	0	0	0	0															
19206842							Panmure Interchange	Botany Town Centre									7.638	27.28333	20.11667	32.88333	30	18	32	26.22906907	26.22906907	28.09448037	28.09448037	1544.36	1496.846	1680.026	1576.824	1668.109	1721.432	1776.311	1604.345	1496.002	#N/A	#N/A				
								Cascades Road									0	0	0	0	0	0	0	0	0	0	0															
19206841							Cascades Road	Panmure Interchange									4.962	20.71667	17.46667	25.39167	20.71667	17.46667	25.39167	22.92836997	22.92836997	22.59312132	22.59312132	1373.438	1380.146	1373.523	1325.09	1426.063	1336.073	1335.122	1266.16	1056.849	#N/A	#N/A				
								Panmure Interchange									0	0	0	0	0	0	0	0	0	0	0															
19206843							Panmure Interchange	Cascades Road									4.897	18	9.533333	19	18	10.66167	19	16.49977349	16.49977349	16.96103015	16.96103015	988.45	973.2352	1008.274	1020.141	1027.344	1026.23	996.9319	986.3285	962.0151	#N/A	#N/A				

PM

Aimsun	Route Nai	Year	Mon	Period	Route ID	Route Nai	Seg ID	From	To	Length	1600-1700 Median Ti	15th Perce	85th Percentile (s	Median Ti	1700-1800 15th Perce	85th Perce	Route Nai	Cumul Dis	1600-1700 Median Ti	15th Perce	85th Perce	Median Ti	1700-1800 15th Perce	85th Perce	16:00-17:00 Av	16:00-17:00 Cummulative	17:00-18:00 Av	17:00-18:00 Cummulative	0 13284835	0	5	6	7	8	9	10	11	12	13	14	15		
	PM - Pakuranga Rd/Cascades Rd to Mt W Hwy																												16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45		
									Cascades Road									0	0	0	0	0	0	0	0	0	0	0														
13284775	Ellerslie P	201806	7:00-8:00		55	Ellerslie P	795	Cascades Road	Ti Rakau Drive	2436	204	178	271	213	175	307	Ellerslie P	2.436	3.4	2.966667	4.516667	3.55	2.916667	5.116667	3.672386476	3.672386476	3.729485955	3.729485955	219.7794	218.2562	222.9939	226.2317	217.7831	228.5905	222.4713	219.5799	223.4172	215.0311	#N/A	#N/A		81%		
13284791	Ellerslie P	201806	7:00-8:00		55	Ellerslie P	796	Ti Rakau Drive	Jellicoe Road	2379	214	184	267	231	193	292	Ellerslie P	4.815	6.966667	6.033333	8.966667	7.4	6.133333	9.983333	2.966762449	6.639148926	2.960384108	6.689870063	176.9659	181.8054	175.2459	177.8604	178.8053	177.8888	175.9376	173.5232	174.5689	175.7231	#N/A	#N/A				
13285848	Ellerslie P	201806	7:00-8:00		55	Ellerslie P	797	Jellicoe Road	Mt W Hwy	549	77	51	122	80	48	153	Ellerslie P	5.364	8.25	6.883333	11	8.733333	6.933333	12.53333	1.175093382	7.814242308	1.176770011	7.866640074	69.3579	72.02161	70.13729	70.38239	70.37246	70.56143	71.10852	69.54756	67.61011	63.14393	#N/A	#N/A		OK	OK	
	PM - Pakuranga Rd/ Mt W Hwy to Cascades Rd																																									
									Mt W Hwy									0	0	0	0	0	0	0	0	0	0	0														
13285849	Ellerslie P	201806	7:00-8:00		193	Ellerslie P	1628	Mt Wellington Highwa	Jellicoe Road	549	157	84	228	243	164	312	Ellerslie P	0.549	2.616667	1.4	3.8	4.05	2.733333	5.2	1.351156253	1.351156253	1.551183367	1.551183367	74.34868	83.82057	85.03887	93.89767	90.84426	98.01386	89.52822	78.86495	74.08614	68.25999	#N/A	#N/A				
13284792	Ellerslie P	201806	7:00-8:00		193	Ellerslie P	1629	Jellicoe Road	Ti Rakau Drive	2379	287	208	422	469	295	767	Ellerslie P	2.928	7.4	4.866667	10.83333	11.86667	7.65	17.98333	3.949620592	5.300776845	5.512754337	7.063937704	229.5614	233.9628	247.4075	280.642	302.7486	340.5109	399.1595	481.6804	467.5166	432.7425	#N/A	#N/A				
13284793	Ellerslie P	201806	7:00-8:00		193	Ellerslie P	1630	Ti Rakau Drive	Cascades Road	2436	248	209	331	379	303	463	Ellerslie P	5.364	11.53333	8.35	16.35	18.18333	12.7	25.7	3.959955448	9.260732294	5.102215299	12.1661 53	213.8126	231.8755	267.1039	285.2944	293.0839	320.1452	326.0083	310.9813	307.0724	271.7908	#N/A	#N/A		OK	:(	
	PM - Ti Rakau Dr/Te Irirangi Dr to Mt W Hwy																																									
									Te Irirangi									0	0	0	0	0	0	0	0	0	0	0														
13284776	Ellerslie P	201806	7:00-8:00		193	Ellerslie P	1638	Te Irirangi	Harris Road	1351	164	117	227	186	122	347	Ellerslie P	1.351	2.733333	1.95	3.783333	3.1	2.033333	5.783333	2.996646152	2.996646152	2.854877477	2.854877477	174.9167	184.412	180.0675	172.4086	162.0063	180.2206	170.5351	174.2074	172.8762	179.1294	#N/A	#N/A				
13285850	Freight - S	201806	7:00-8:00		32	Freight - S	286	Harris Road	Edgewater Drive	2035	237	179	356	260	188	424	Freight - S	3.386	6.683333	4.933333	9.716667	7.433333	5.166667	12.85	3.184632109	6.181278262	3.37198965	6.226867127	175.6967	193.4484	204.0887	191.3311	202.0108	208.2878	207.6479	241.3509	287.7392	292.7797	#N/A	#N/A				
13284777	Freight - S	201806	7:00-8:00		32	Freight - S	287	Edgewater Drive	Ti Rakau Dr	823	167	92	296	168	87	457	Freight - S	4.209	9.466667	6.466667	14.65	10.23333	6.616667	20.46667	1.671360645	7.852638906	2.542705856	8.769572983	84.0801	95.02923	121.7356	180.4905	142.2249	136.2698	151.2642	170.808	195.1949	170.1465	#N/A	#N/A				
13284778	Freight - S	201806	7:00-8:00		32	Freight - S	288	Ti Rakau Dr	Pakuranga Highway	1722	93	83	136	91	77	129	Freight - S	5.931	11.01667	7.85	16.91667	11.75	7.5	22.61667	1.284673323	9.13731223	1.28951806	10.05909104	76.93013	76.58362	77.72745	77.78598	77.66823	77.33698	76.69314	76.5434	76.23417	76.29361	#N/A	#N/A				
13285851	Freight - S	201806	7:00-8:00		32	Freight - S	289	Pakuranga Highway	Carbine Road	826	50	41	99	54	43	80	Freight - S	6.757	11.85	8.533333	18.56667	12.65	8.616667	23.95	1.22097178	10.35828401	1.323229088	11.38232013	67.99326	70.93437	80.8473	80.82416	79.77451	79.69257	77.28374	75.41792	78.31787	73.91309	#N/A	#N/A				
13284779	Freight - S	201806	7:00-8:00		32	Freight - S	290	Carbine Road	SH1	889	53	45	61	51	43	63	Freight - S	7.646	12.73333	9.283333	19.58333	13.5	9.333333	25	0.626877309	10.98516132	0.638241363	12.02056149	37.17142	37.252	38.4145	38.37633	38.7038	38.33495	37.76285	37.56767	37.53474	37.50876	#N/A	#N/A		OK	OK	
	PM - Ti Rakau Dr/Mt W Hwy to Te Irirangi Dr																																									
									SH1									0	0	0	0	0	0	0	0	0	0	0														
13284780	Freight - S	201806	7:00-8:00		32	Freight - S	290	SH1	Carbine Road	889	114	69	178	219	124	327	Freight - S	0.889	1.9	1.15	2.966667	3.65	2.066667	5.45	1.345064957	1.345064957	3.374359507	3.374359507	75.48622	80.01641	86.60906	165.3861	208.0027	212.9573	223.5001	197.6962	198.629	196.575	#N/A	#N/A				
13285861	Freight - S	201806	7:00-8:00		32	Freight - S	289	Carbine Road	Pakuranga Highway	826	80	54	146	153	96	203	Freight - S	1.715	3.233333	2.05	5.4	6.2	3.666667	8.333333	1.433112498	2.778177455	3.232694485	6.607053992	55.36503	67.54587	135.0493	194.4563	189.6552	196.2735	195.4616	180.5886	182.8227	197.316	#N/A	#N/A				
13284781	Freight - S	201806	7:00-8:00		32	Freight - S	288	Pakuranga Highway	Ti Rakau Dr	1722	170	121	237	222	160	297	Freight - S	3.437	6.066667	4.066667	9.35	9.9	6.333333	13.78333	3.491695509	6.269836964	4.207693114	10.81474711	174.3283	211.5984	242.572	250.3782	250.1193	262.7635	246.5854	245.3859	254.4818	268.6982	#N/A	#N/A				
13284782	Freight - S	201806	7:00-8:00		32	Freight - S	287	Ti Rakau Dr	Edgewater Drive	823	71	60	192	83	61	178	Freight - S	4.26	7.25	5.066667	12.55	11.28333	7.35	16.75	1.114326877	7.384163841	1.23034951	12.04509662	66.68746	68.36258	65.52881	68.19181	72.22885	78.83919	76.02403	80.6121	82.86103	79.03827	#N/A	#N/A				
13284783	Freight - S	201806	7:00-8:00		32	Freight - S	286	Edgewater Drive	Harris Road	2035	371	215	537	512	326	680	Freight - S	6.295	13.43333	8.65	21.5	19.81667	12.78333	28.08333	6.694758894	14.07892274	7.87886034	19.92395696	348.2213	405.0955	451.7397	464.8879	510.9525	468.521	446.5651	465.3191	460.2442	472.3467	#N/A	#N/A				
13285862	Ellerslie P	201806	7:00-8:00		32	Freight - S	787	Harris Road	Te Irirangi	1351	210	156	309	269	167	406	Freight - S	7.646	16.93333	11.25	26.65	24.3	15.56667	34.85	3.981469813	18.06039255	5.038878356	24.96283531	219.9947	233.6889	262.9809	300.5452	314.9621	301.3707	292.4528	290.3868	253.6829	194.2535	#N/A	#N/A		OK	OK	
	PM - Pakuranga Rd to Pakuranga Highway and vice versa																																									
									Pakuranga Rd									0	0	0	0	0	0	0	0	0	0	0														
13284788	Ti Rakau D	201806	7:00-8:00		197	Ti Rakau D	1642	Pakuranga Rd	Pakuranga Hwy	341	147	48	279	141	78	238	Ti Rakau D	0.341	2	0.8	4.65	2	1.3	3.966667	1.702523223	1.702523223	1.771228996	1.771228996	99.2407	102.8184	104.3967	108.1075	109.1288	106.201	101.6576	103.6174	104.8745	100.1289	#N/A	#N/A		OK	OK	
									Pakuranga Hwy									0	0	0	0	0	0	0	0	0	0	0														
13284787	Ti Rakau D	201806	7:00-8:00		196	Ti Rakau D	1641	Pakuranga Hwy	Pakuranga Rd	327	107	37	129	123	60	153	Ti Rakau D	0.668	1.783333	0.616667	2.15	2.05	1	2.55	1.969262132	1.969262132	1.906575235	1.906575235	116.596	117.7154	120.1557	116.0114	121.3794	100.5643	119.623	130.1888	119.8587	107.1413	#N/A	#N/A		OK	OK	
	PM - Gossamer/Ti Rakau Dr to Pakuranga Rd																																									
									Ti Rakau Dr									0	0	0	0	0	0	0	0	0	0	0														
13284784	Gossamer	201806	7:00-8:00		164	Gossamer	1433	Ti Rakau Dr	Chatsworth Cr / Ennis /	645	52	49	58	52	49	63	Gossamer	0.645	0.866667	0.816667	0.966667	0.866667	0.816667	1.05	0.924053235	0.924053235	0.930076103	0.930076103	55.55813	55.03185	55.7396	55.13666	55.70274	56.54814	55.83073	55.61799	55.23948	55.08163	#N/A	#N/A				
13285866	Gossamer	201806	7:00-8:00		164	Gossamer	1434	Chatsworth Cr / Ennis /	Reeves Rd	395	36	30	40	34	27	50	Gossamer	1.04	1.466667	1.316667	1.633333	1.433333	1.266667	1.883333	0.644485482	1.568538716	0.646303777	1.576379881	38.7924	38.22575	38.98924	38.59636	38.58211	39.37888	38.55556	38.67347	38.43066	38.22625	#N/A	#N/A				
13285870	Gossamer	201806	7:00-8:00		164	Gossamer	1435	Reeves Rd	Larne Ave	454	37	34	41	41	35	87	Gossamer	1.494	2.083333	1.883333	2.316667	2.116667	1.85	3.333333	0.61376967	2.182308387	0.614425966	2.193805847	37.3418	36.691	36.44574	37.09026	36.69769	36.90775	36.76654	36.68242	36.80475	36.80433	#N/A	#N/A				
13285874	Gossamer	201806	7:00-8:00		164	Gossamer	1436	Larne Ave	Pakuranga Rd	601	129	82	193	223	109	385	Gossamer	2.095	4.233333	3.25	5.533333	5.833333	3.666667	9.75	1.644612721	3.826921107	1.692846159	3.883652006	99.7732	99.20631	97.05078	97.6546	99.17301	106.5627	102.8928	98.85815	100.4477	102.5011	#N/A	#N/A		OK	:(	
	PM - Gossamer/Pakuranga Rd to Ti Rakau Dr																																									
									Pakuranga Rd									0	0	0	0	0	0	0	0	0	0	0														
13284796	Gossamer	201806	7:00-8:00		164	Gossamer	1436	Pakuranga Rd	Larne Ave	601	48	44	111	49	44	56	Gossamer	0.601	0.8	0.733333	1.85	0.816667	0.733333	0.933333	0.801570582	0.801570582	0.810898816	0.810898816	48.24005	48.1795	47.86315	47.8039	48.45717	49.34373	49.01092	48.25483	48.78706	48.65613	#N/A	#N/A				
13285878	Gossamer	201806	7:00-8:00		164	Gossamer	1435	Larne Ave	Reeves Rd	454	42	38	49	45	34	53	Gossamer	1.055	1.5	1.366667	2.666667	1.566667	1.3	1.816667	0.681652994	1.483223576	0.684442075	1.495340891	41.40261	40.16048	41.13445	41.0816	41.20696	40.86016	41.11738	40.8232	41.2704	40.67774	#N/A	#N/A				
13285882	Gossamer	201806	7:00-8:00		164	Gossamer	1434	Reeves Rd	Chatsworth Cr / Ennis /	395	31	27	37	32	27	45	Gossamer	1.45	2.016667	1.816667	3.283333	2.1	1.75	2.566667	0.50957196	1.992795536	0.508546463	2.003887354	30.51677	30.62805	30.57813	30.60602	30.45761	30.57072	30.4168	30.46105	30.8859	30.72589	#N/A	#N/A				
13285886	Gossamer	201806	7:00-8:00		164	Gossamer	1433	Chatsworth Cr / Ennis /	Ti Rakau Dr	645	56	45	93	57	45	107	Gossamer	2.095	2.95	2.566667	4.833333	3.05	2.5	4.35	2.049160027	4.041955563	1.785142203	3.789029557	125.381	113.1702	130.2976	82.40907	113.6328	120.0437	112.3486	95.27297	118.8606	120.795	#N/A	#N/A		:(	OK	
	AM - Bus																		Median Ti	15th Perce	85th Perce	Median Ti	15th Perce	85th Percentile (s)					3													
									Botany Town Centre									0	0	0	0	0	0	0	0	0	0	0														
19206840								Botany Town Centre	Panmure Interchange									7.63	32	24.98333	39.31667	29.91667	27.06	36.1	34.31789006	34.31789006	41.77545029	41.77545029	2019.738	2115.785	2041.696	2286.365	2434.836	2614.659	2690.249	2574.8	2622.602	2650.862	#N/A				
									Panmure Interchange									0	0	0	0	0	0	0	0	0	0	0														
19206842								Panmure Interchange	Botany Town Centre									7.638	31.69167	27.475	43	31	19.33333	38.23333	30.07516254	30.07516254	35.98015616	35.98015616	1584.004	1851.134	1978.392	2015.969	2178.627	2190.471	2250.17	2335.352	2289.128	2437.627	#N/A				
									Cascades Road									0	0	0	0	0	0	0	0	0	0	0														
19206841								Cascades Road	Panmure Interchange									4.962	18	16	23	18	16	23	17.94052257	17.94052257	17.82903687	17.82903687	1047.784	1124.981	1056.529	1109.705	1081.476	1034.967	1052.821	1027.834	1035.117	1017.107	#N/A				
									Panmure Interchange									0	0	0	0	0	0	0	0	0	0	0														
19206843								Panmure Interchange	Cascades Road									4.897	20	11.26333	23	21	11.31333	25	17.64189456	17.64189456	19.31552166	19.31552166	1061.597	1026.393	1087.55	1117.556	1133.384	1166.271	1218.514	1238.809	1235.37	1233.232	#N/A				