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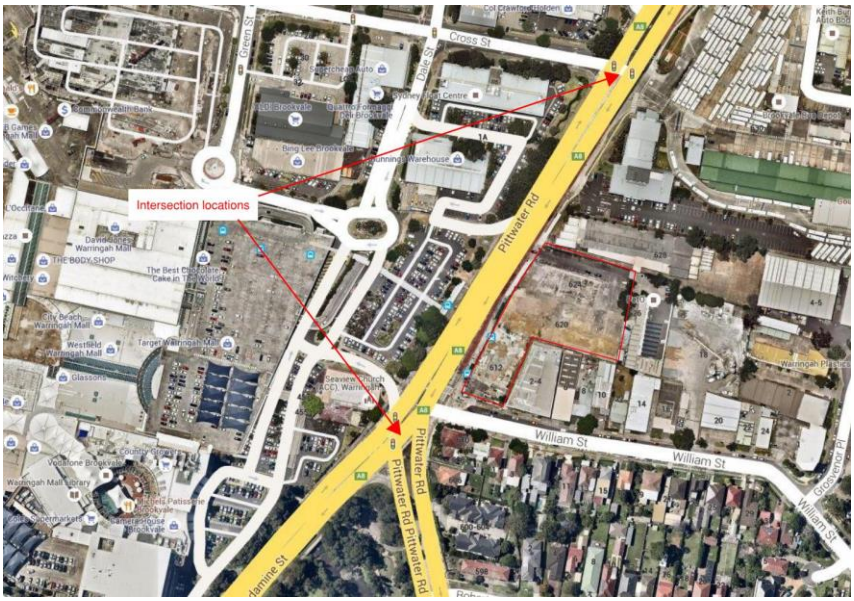
22 January 2016 121211 UTC

BROOKVALE COMMUNITY HEALTH CENTRE
SIDRA ANALYSIS
Two Intersections Network
William Street/Pittwater Road/Condamine St Intersection
&
Cross Street/Pittwater Road Intersection



LOCATION MAP

1. Objective

To review the impact to the existing traffic network consisting of William St/Pittwater Rd/ Condamine St/ Pittwater Rd and Cross Street/Pittwater Rd following the introduction of right turn movement at William Street and removal of the pedestrian crossing north of the intersection in a relation to the Brookvale Community Health Centre development.

2. Background

This revised report has been undertaken to address the comments from Roads and Maritime Services (RMS) in the letter dated 2 December 2015.

The following documents and information were consulted in preparing this report.

- Brookvale Pedestrian Bridge Options Analysis, GHD Consultants: 4 September 2014.
- Guide to Traffic Generating Developments, Roads and Maritime Services
- Transport and Accessibility Assessment Report, TTW Consulting Engineers report – 19 October 2015
- Traffic survey data undertaken in October 2015 for both the intersections provided by Transport for New South Wales was used for this modelling.

3. Introduction

The RMS raised concerns regarding the intersections considered for traffic modelling. The RMS comments are as follows:

"Sidra Modelling should not model the intersection in isolation but should be undertaken including the intersections in the north and south of the proposed development (Pittwater/ Cross Street and Old Pittwater Road/ Condamine Street). It should be noted that southbound movement on Pittwater Road in the vicinity of the development is known to queue back to Cross Street. The modelling shows some minor errors on the Pittwater Road north approach which should be 220m and not 240m. In addition, southbound lane 2 is a 150m in length and these changes will increase the queuing which will occur back to Cross Street and as per the above would be important considerations in the network model"

These concerns have been considered in this report and within the network model. The traffic flow from southern side of Old Pittwater Road and Condamine Street intersection flows to William Street/Condamine Street/Pittwater Road intersection. This northbound traffic to the development site is captured in the upstream intersection of William St/Pittwater Rd/ Condamine St intersection. Accordingly, the updated two intersections network model captures the existing traffic flow for southbound traffic and as such models of the Old Pittwater/ Condamine Street is not required.

Warringah Council concerns are as follows:

"Traffic queuing at the traffic signals in William Street will extend past the William Street entry/exit to the BCHC which will cause delays to those vehicles entering or exiting the Centre. Adequate provision should be made for the two movements from the exit (left and right) to queue independently.

The SIDRA output for the intersection of Pittwater Road/Condamine Street/William Street indicates that both of the traffic lanes from William Street will be 240m in length (Traffic and Accessibility Report - Appendix C, pages 6-9). This would require the removal of parking for that length in front of residences along William Street and is not considered acceptable."

With regards to query in William Street it is not anticipated Vehicles exiting the development from William Street will need to queue. Vehicles exiting the development site from William Street have the provision to queue within the internal roadway of development site.

With regards to query of parking removal in William Street. There is no proposal for parking loss in William Street since there will be two separate lanes for vehicles turning right within the 'No Stopping' area..

Sidra Network Models for AM and PM peak periods have been developed to assess the traffic impact. The network models included the following intersections located along Pittwater Road in the vicinity of the development site:

- Signalised intersection of Pittwater Road with Condamine Street and with William St;
- Signalised intersection of Pittwater Road with Cross Street and the access for the Bus Depot

4. Assumptions

These Assumptions are based on the Transport and Accessibility Assessment Report, TTW Consulting Engineers report – 19 October 2015

1. Minor intersection improvement to allow right turn movement of vehicles from William Street onto Pittwater Road northbound and removal of the at grade pedestrian crossing on the northern leg of Pittwater Road;

2. Signal cycle time 140sec as requested by RMS

3. The magnitude of additional traffic that would be generated by the proposed development would be 450 vehicles per hour (two ways). The directional split for the AM peak period has been calculated as follows:-
   - 70% (315 vph) arriving at the site; and
   - 30% (135 vph) departing from site.

   PM peak period is vice-versa.

   Arriving Traffic (315 vehicles)

   - 50% (158 vehicles) arriving during the morning peak period will approach the site from north along Pittwater Road. Traffic approaching from the north would enter the site via the new driveway on Pittwater Road (left in movement).
   - The balance of the traffic arriving in the morning (i.e. 50% or 158 vehicles) will approach the site from the south. Since the right turn movement of vehicles is not permitted from Pittwater Road (southern approach) into William Street, all traffic approaching from the south will enter the site via the driveway in William Street.

Departing Traffic (135 vehicles)

- 50% (68 vehicles) leaving the site during the morning peak period will travel southbound. 50% (34 vehicles) will depart the site via the driveway on Pittwater Road (left out movement). Another 50% (34 vehicles) will exit the site via the driveway on William Street and then turn left on Pittwater Road to travel southbound.
- The balance of the traffic departing the site (68 vehicles) will travel northbound. This traffic will exit the site via William Street and turn right at Pittwater Road to travel north. This movement is currently not permitted.

The directional split for the PM peak period will be visa versa.

5. Sensitivity analysis

Sensitivity analysis of the proposed network was undertaken by developing a model under an additional 200 vph (over the development traffic generation). This induced traffic is assumed to be coming from the eastern side, that is from the Mitchell Road. This estimation is based on the worst case scenario. Mitchell Road turns onto eastern and western side of Pittwater Road which has a traffic volume in the order of 150-160 vehicles during peak periods.

Summary of Results

The network with the proposed right turn facility from William Street onto Pittwater Road, in conjunction with the removal of the at grade pedestrian crossing across the northern arm of Pittwater Road, would continue to operate at a comparable Level of Service as the existing situation.

In AM peak period, the reduction in the delay by 1.5 seconds shown in the post development result is because of removal of push button crossing on Pittwater Road connecting to William Street.

Table 1a: Network - **Existing Analysis**

Criteria	AM Peak Hour	PM Peak Hour
Network Level of service	E	E
Travel Speed (Average)	27.8km/ hour	28.9km/ hour
Demand Flows (Total)	7627 veh/hour	7923 veh/hour
Control Delay (Average)	31.3 sec	28 sec

Table 1b: Network– **Post Development Analysis (New Right turn from William St & removal of existing crossing on Pittwater Rd)**

Criteria	AM Peak Hour	PM Peak Hour
Network Level of service	E	E
Travel Speed (Average)	28.7 km/hour	28.9 km/hour
Demand Flows (Total)	7944km/hour	7923 veh/hour
Control Delay (Average)	29.2 sec	28 sec

Table 1c: Network– **Sensitivity Analysis plus 200 additional induced traffic**

Criteria	AM Peak Hour	PM Peak Hour
Network Level of service	E	E
Travel Speed (Average)	28.2km/ hour	28 km/hour
Demand Flows (Total)	8154 veh/hour	8577 veh/hour
Control Delay (Average)	29.8sec	29.4sec

6. Conclusion

The network with the proposed right turn facility from William Street onto Pittwater Road, in conjunction with the removal of the at grade pedestrian crossing across the northern arm of Pittwater Road, would continue to operate at a comparable Level of Service as the existing situation.

A sensitivity analysis was undertaken for up to 200 vehicles turning right as a result of the proposed right turn facility. This induced traffic indicates the network will continue to operate at a comparable Level of Service as the existing environment.

This traffic report analysis demonstrates that the impact of the development on the existing network would be insignificant.

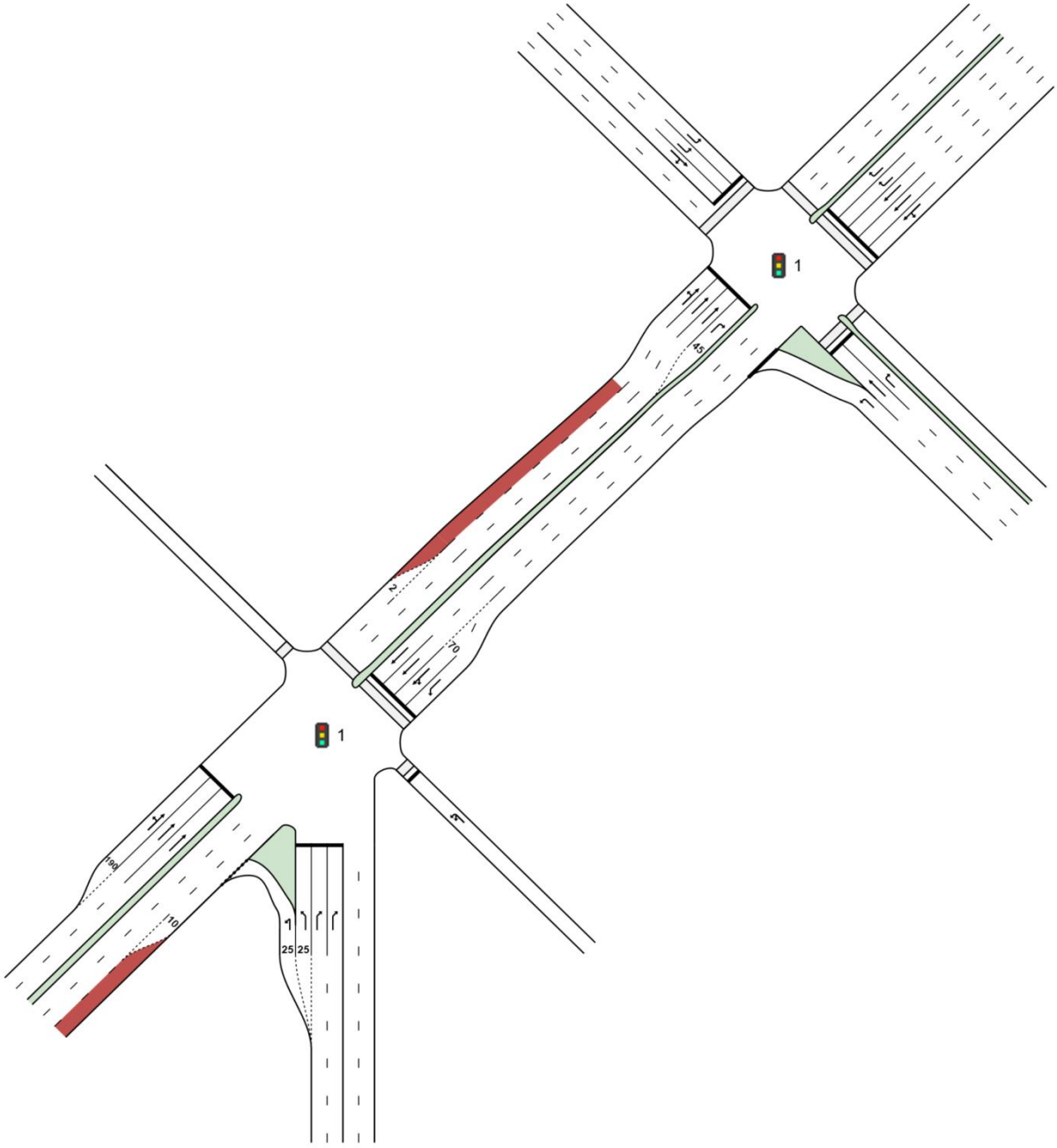
P:\2012\1212\121211\Reports\TTW\Traffic BCHC\SIDRA\161901_SIDRA ANALYSIS SUMMARY BCHC- Two intersection - Cross St_Pittwater Rd & Condamine St_William St_Pittwater Rd.docx

APPENDIX A

Existing Intersection Layout

NETWORK LAYOUT

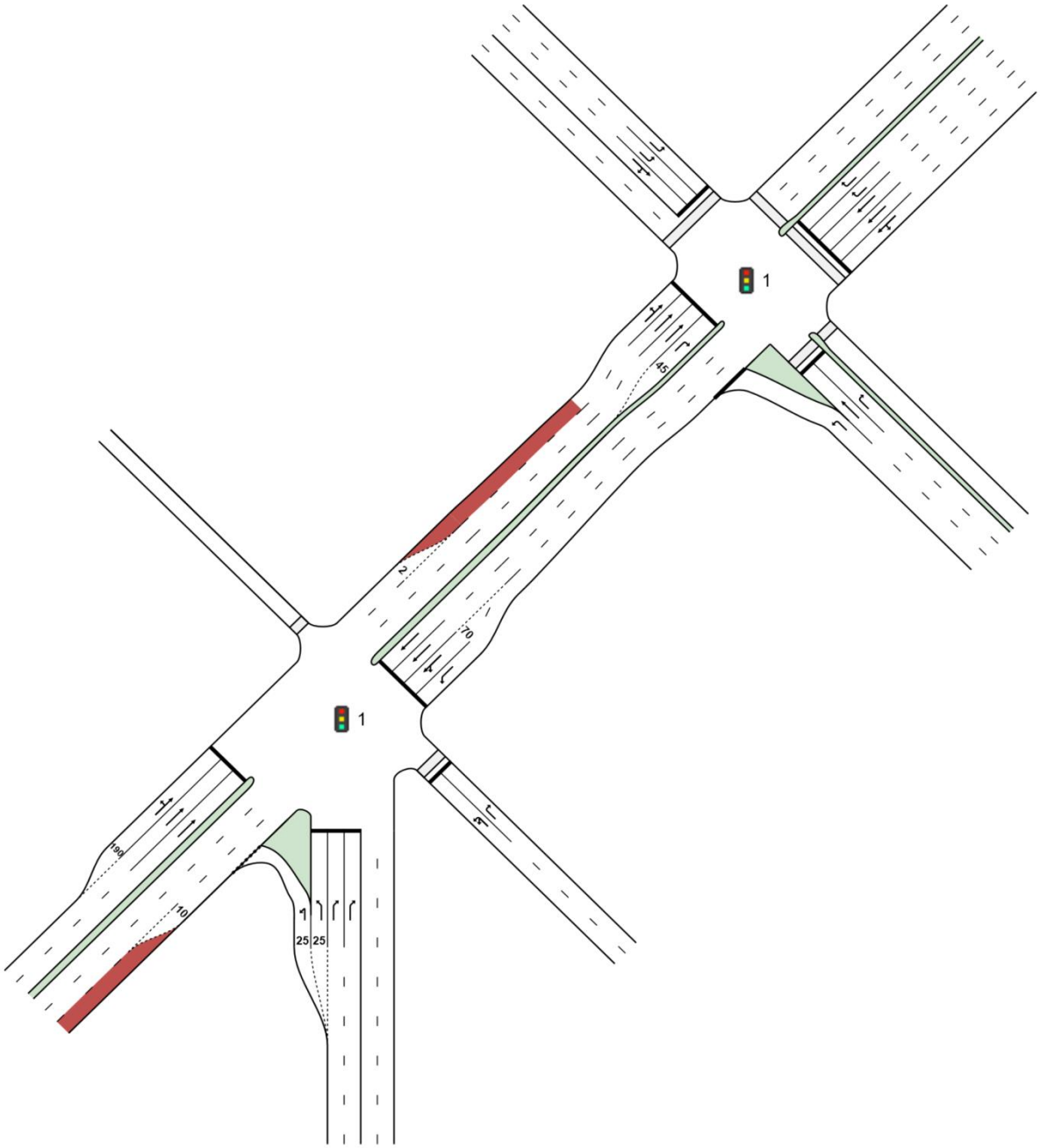
Network: Existing AM



Proposed Intersection Layout

NETWORK LAYOUT

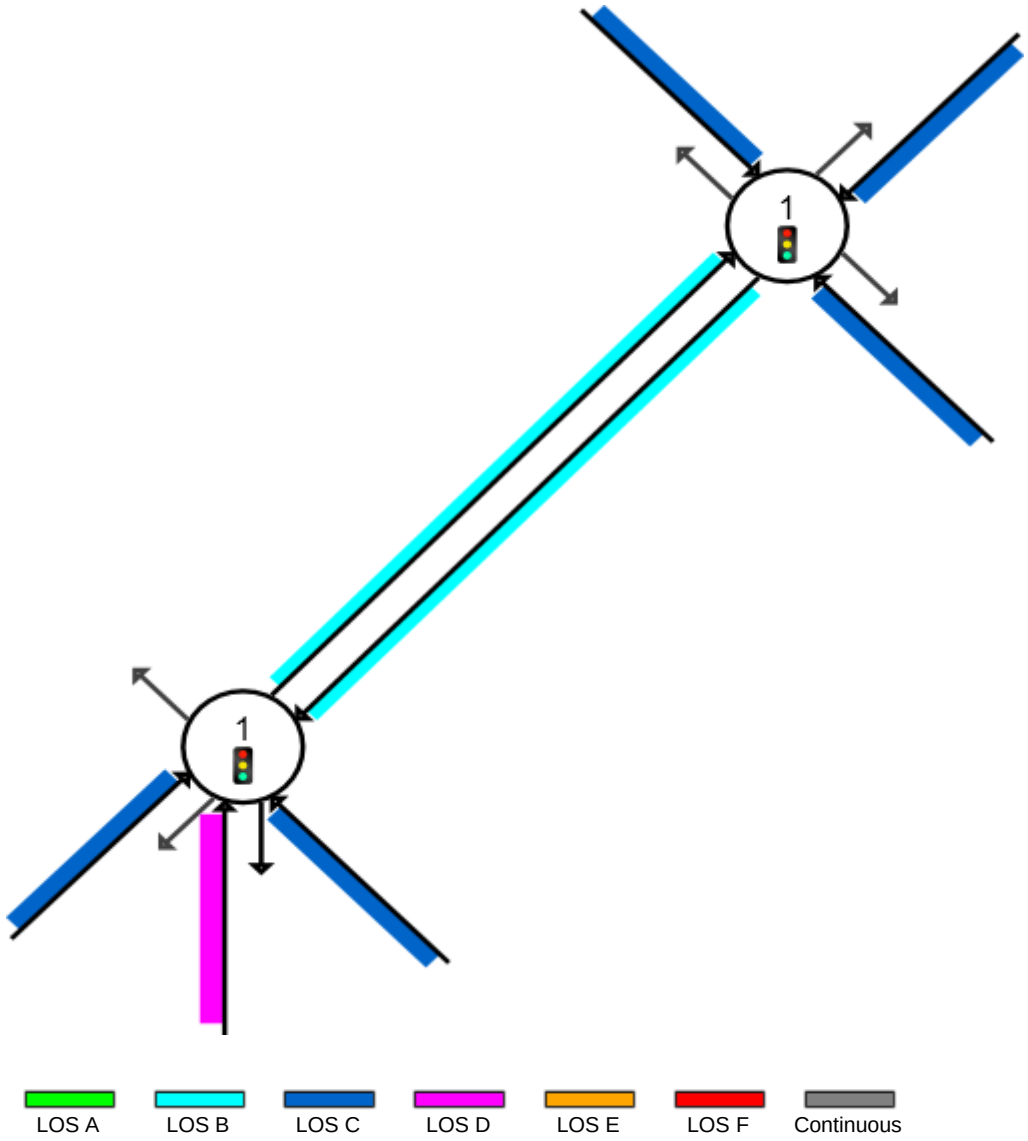
- **Network: Network– AM - Post Development Analysis**
- **Proposed right turn movement from William Street & removal of pedestrian Crossing.**



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

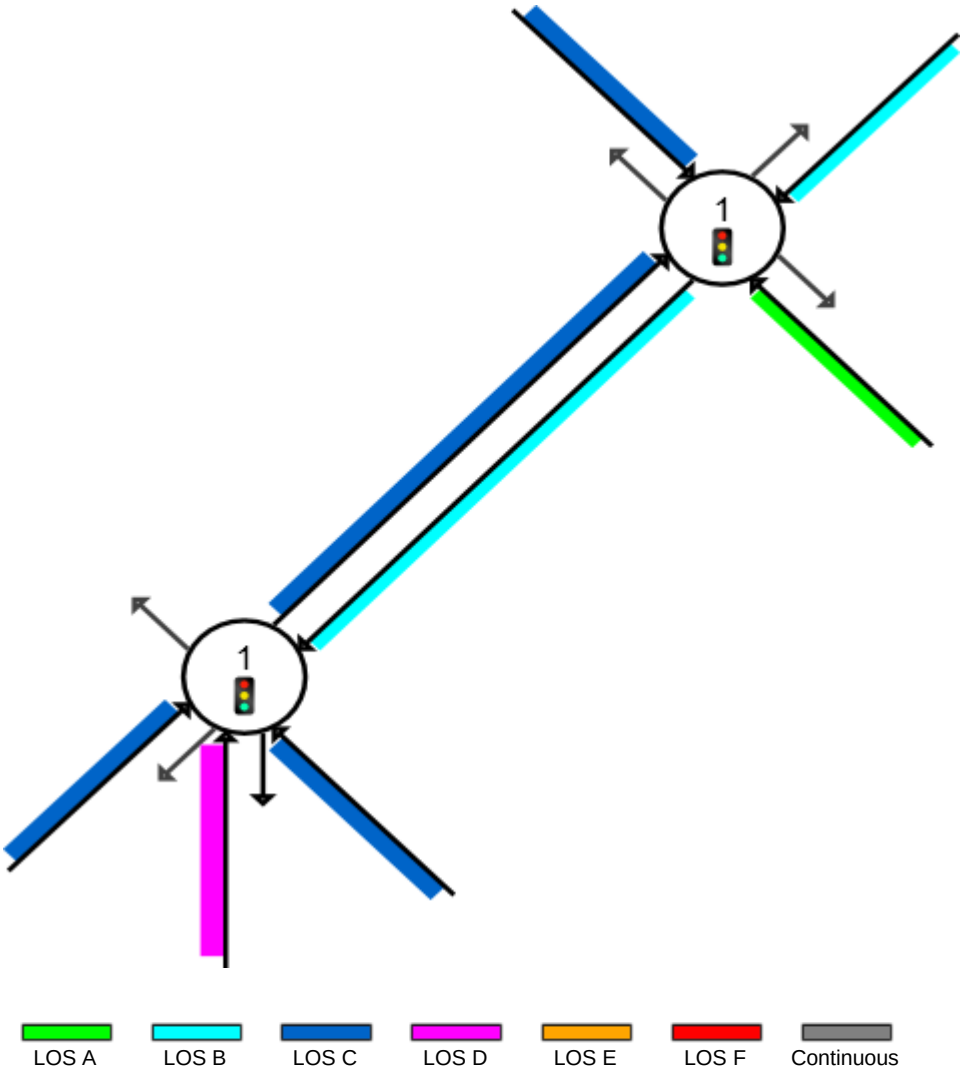
Network: AM Existing Network



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

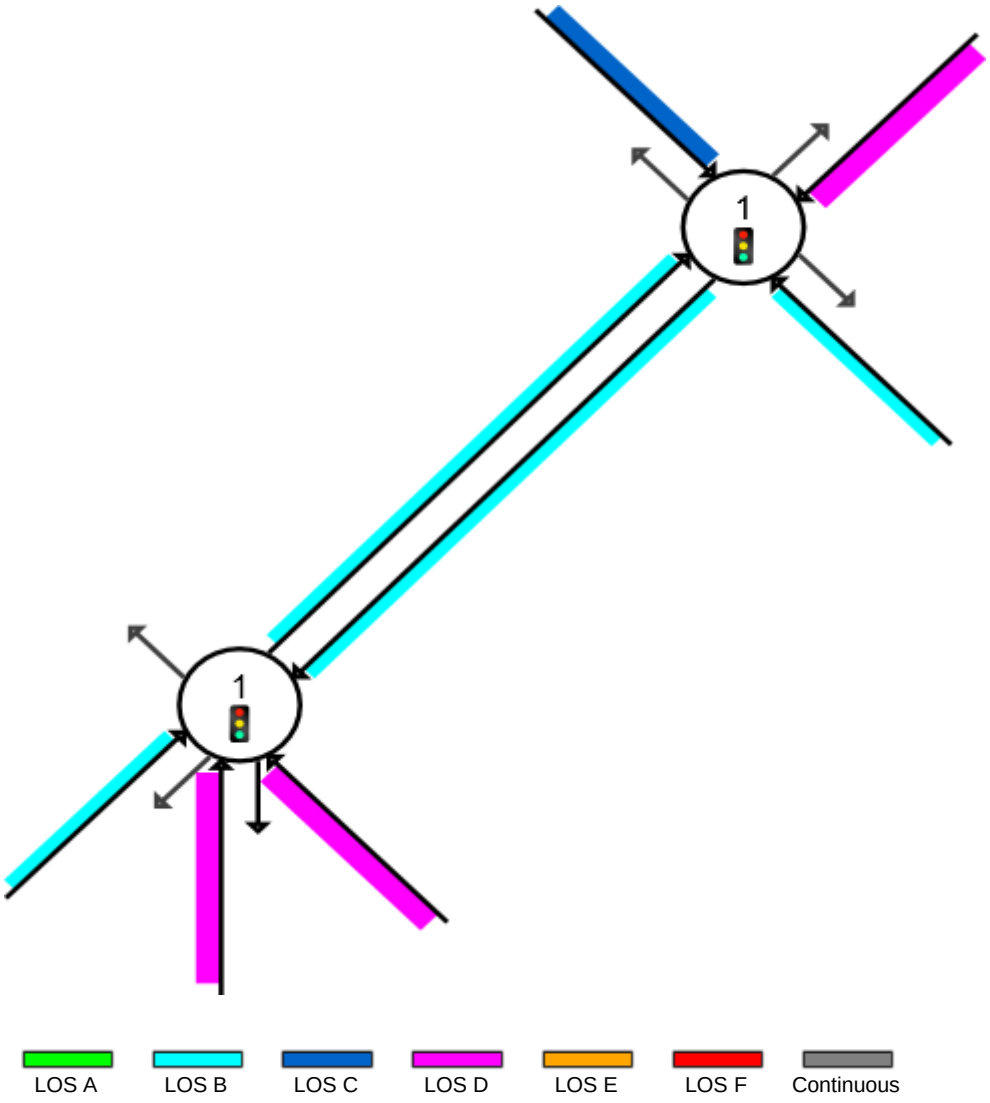
Network: PM Existing Network



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

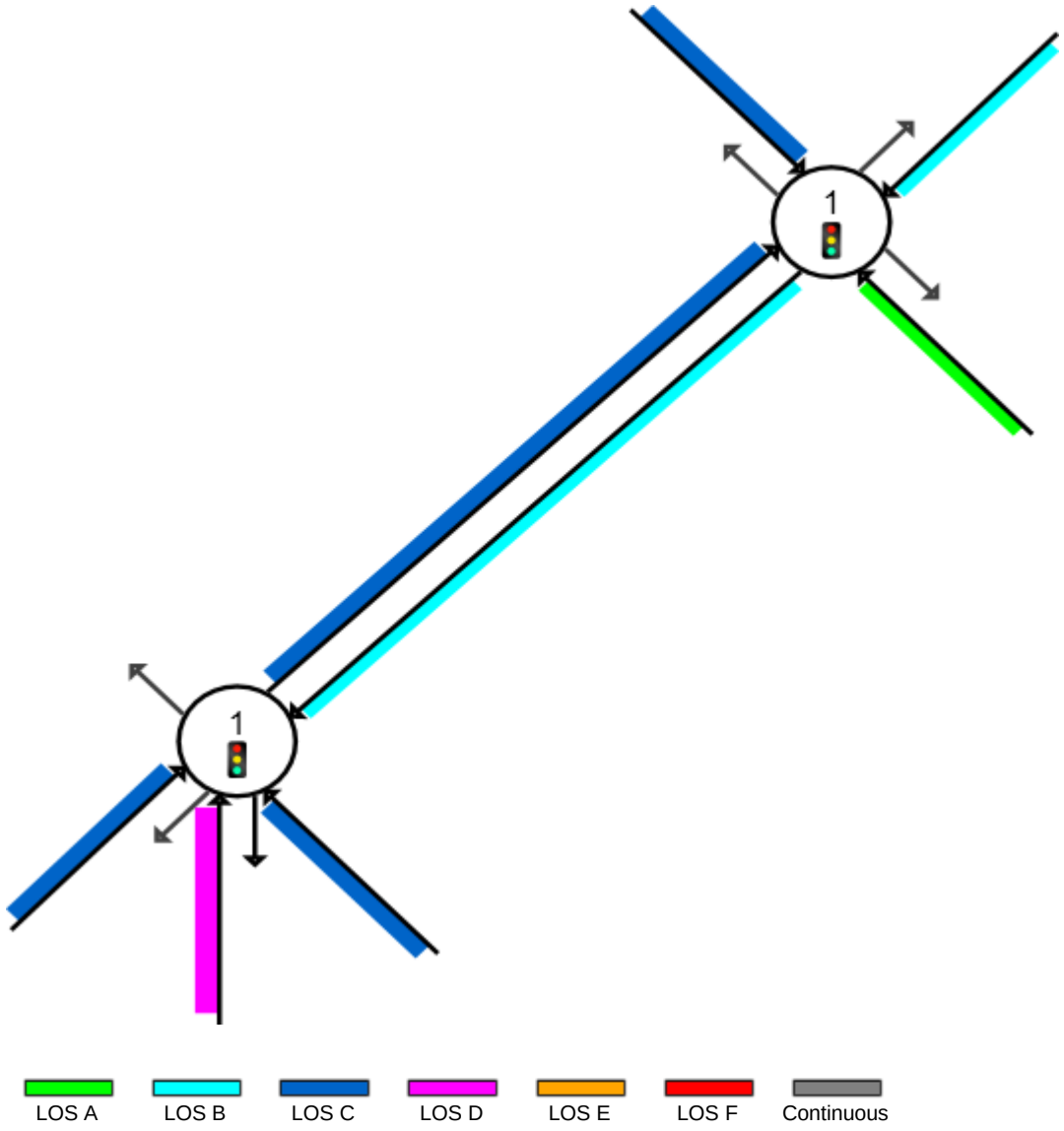
Network: AM Post Development Right Turn William



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

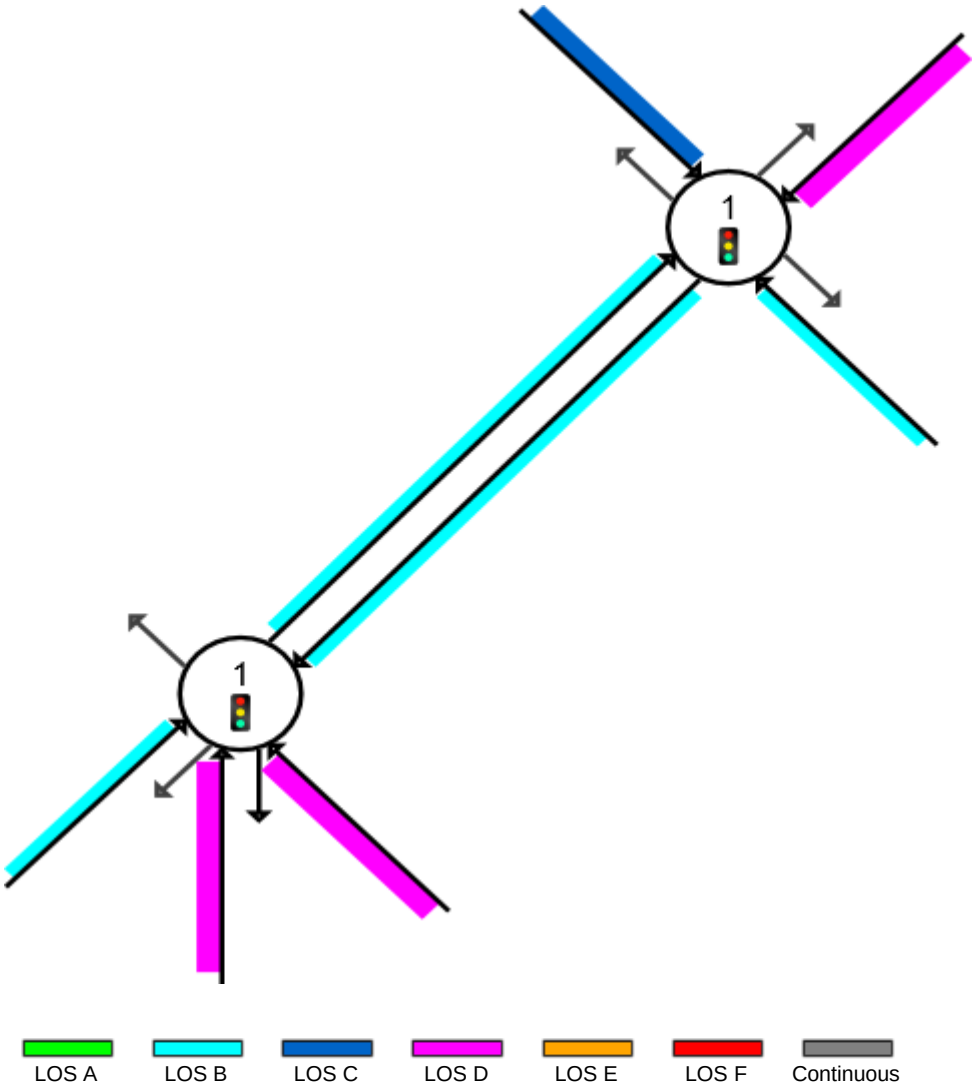
Network: PM Post Development Right Turn William



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

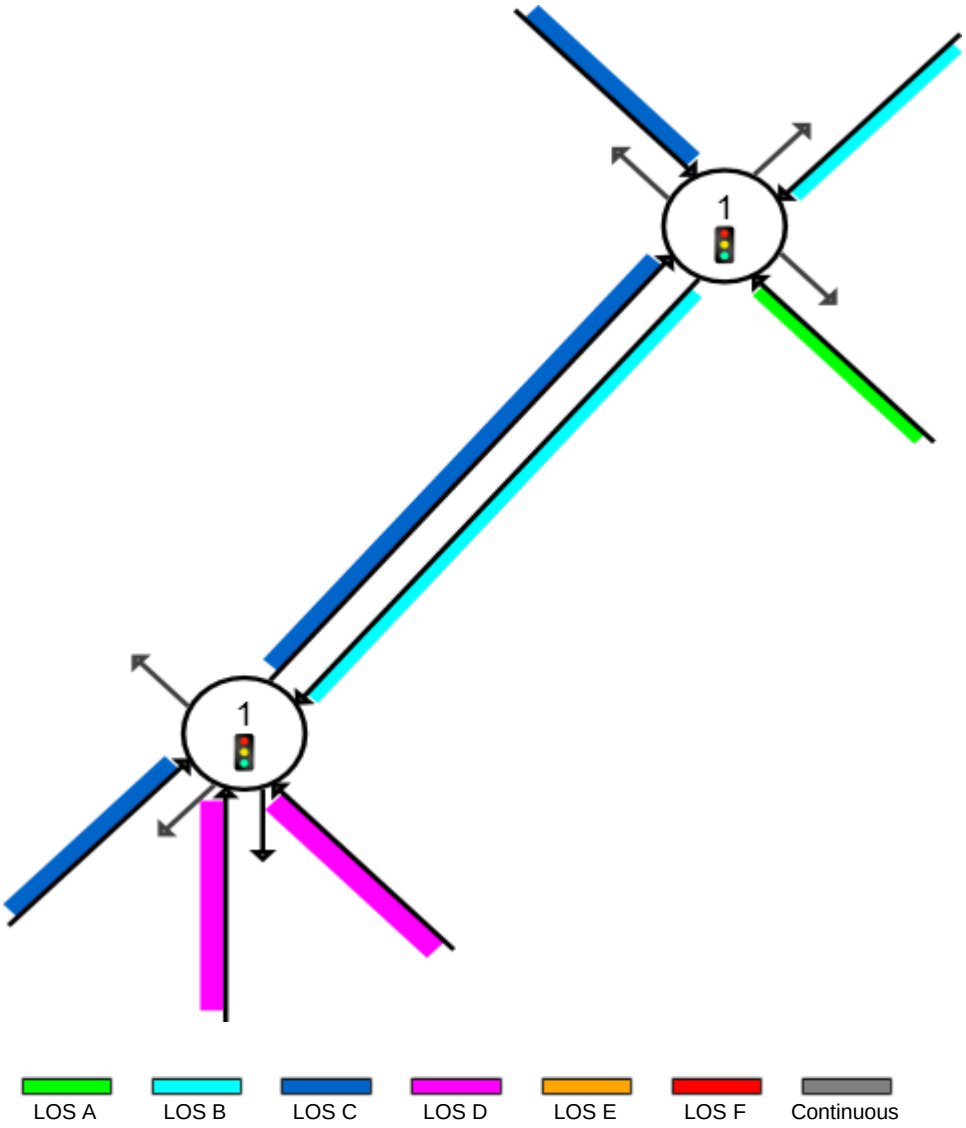
Network: AM Post Development Right Turn William + 200



SITE LEVEL OF SERVICE

Approach Level of Service for Network Sites

Network: PM Post Development Right Turn William + 200



NETWORK SUMMARY

Network: AM Existing Network

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.05							
Speed Efficiency	0.46							
Congestion Coefficient	2.15							
Travel Speed (Average)	27.8	km/h			2.2	km/h	24.3	km/h
Travel Distance (Total)	3490.3	veh-km/h			28.0	ped-km/h	7379.3	pers-km/h
Travel Time (Total)	125.3	veh-h/h			12.6	ped-h/h	303.8	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	7627	veh/h			651	ped/h	16879	pers/h
Arrival Flows (Total)	7627	veh/h			651	ped/h	16879	pers/h
Percent Heavy Vehicles (Demand)	6.7	%						
Percent Heavy Vehicles (Arrival)	6.7	%						
Degree of Saturation	0.862							
Control Delay (Total)	66.24	veh-h/h			6.60	ped-h/h	168.99	pers-h/h
Control Delay (Average)	31.3	sec			36.5	sec	36.0	sec
Control Delay (Worst Lane)	56.2	sec						
Control Delay (Worst Movement)	60.1	sec			44.9	sec	60.1	sec
Geometric Delay (Average)	1.4	sec						
Stop-Line Delay (Average)	29.8	sec						
Queue Storage Ratio (Worst Lane)	1.04							
Total Effective Stops	6414	veh/h			558	ped/h	15280	pers/h
Effective Stop Rate	0.84	per veh	1.8	per km	0.86	per ped	0.91	per pers
Proportion Queued	0.82				0.86		0.91	
Performance Index	475.5				15.7		491.2	

NETWORK SUMMARY

Network: PM Existing Network

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.23							
Speed Efficiency	0.48							
Congestion Coefficient	2.08							
Travel Speed (Average)	28.9	km/h			2.2	km/h	27.0	km/h
Travel Distance (Total)	3490.5	veh-km/h			31.9	ped-km/h	7570.4	pers-km/h
Travel Time (Total)	121.0	veh-h/h			14.4	ped-h/h	280.1	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	7923	veh/h			732	ped/h	17740	pers/h
Arrival Flows (Total)	7923	veh/h			732	ped/h	17740	pers/h
Percent Heavy Vehicles (Demand)	5.0	%						
Percent Heavy Vehicles (Arrival)	5.0	%						
Degree of Saturation	0.884							
Control Delay (Total)	61.60	veh-h/h			7.55	ped-h/h	137.84	pers-h/h
Control Delay (Average)	28.0	sec			37.1	sec	28.0	sec
Control Delay (Worst Lane)	56.1	sec						
Control Delay (Worst Movement)	59.6	sec			45.1	sec	59.6	sec
Geometric Delay (Average)	1.5	sec						
Stop-Line Delay (Average)	26.5	sec						
Queue Storage Ratio (Worst Lane)	0.82							
Total Effective Stops	6324	veh/h			633	ped/h	14519	pers/h
Effective Stop Rate	0.80	per veh	1.8	per km	0.86	per ped	0.82	per pers
Proportion Queued	0.80				0.86		0.79	
Performance Index	459.8				17.9		477.7	

NETWORK SUMMARY

Network: AM Post Development Right Turn William

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.20							
Speed Efficiency	0.48							
Congestion Coefficient	2.09							
Travel Speed (Average)	28.7	km/h			2.6	km/h	25.8	km/h
Travel Distance (Total)	3582.0	veh-km/h			9.0	ped-km/h	7454.6	pers-km/h
Travel Time (Total)	125.0	veh-h/h			3.5	ped-h/h	289.2	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	7944	veh/h			255	ped/h	17228	pers/h
Arrival Flows (Total)	7944	veh/h			255	ped/h	17228	pers/h
Percent Heavy Vehicles (Demand)	6.4	%						
Percent Heavy Vehicles (Arrival)	6.4	%						
Degree of Saturation	0.901							
Control Delay (Total)	64.36	veh-h/h			1.55	ped-h/h	156.86	pers-h/h
Control Delay (Average)	29.2	sec			21.8	sec	32.8	sec
Control Delay (Worst Lane)	50.2	sec						
Control Delay (Worst Movement)	56.4	sec			44.3	sec	56.4	sec
Geometric Delay (Average)	1.5	sec						
Stop-Line Delay (Average)	27.7	sec						
Queue Storage Ratio (Worst Lane)	1.33							
Total Effective Stops	6311	veh/h			172	ped/h	14621	pers/h
Effective Stop Rate	0.79	per veh	1.8	per km	0.67	per ped	0.85	per pers
Proportion Queued	0.80				0.67		0.86	
Performance Index	465.8				4.4		470.2	

NETWORK SUMMARY

Network: PM Post Development Right Turn William

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.23							
Speed Efficiency	0.48							
Congestion Coefficient	2.08							
Travel Speed (Average)	28.9	km/h			2.2	km/h	27.0	km/h
Travel Distance (Total)	3490.5	veh-km/h			31.9	ped-km/h	7570.4	pers-km/h
Travel Time (Total)	121.0	veh-h/h			14.4	ped-h/h	280.1	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	7923	veh/h			732	ped/h	17740	pers/h
Arrival Flows (Total)	7923	veh/h			732	ped/h	17740	pers/h
Percent Heavy Vehicles (Demand)	5.0	%						
Percent Heavy Vehicles (Arrival)	5.0	%						
Degree of Saturation	0.884							
Control Delay (Total)	61.60	veh-h/h			7.55	ped-h/h	137.84	pers-h/h
Control Delay (Average)	28.0	sec			37.1	sec	28.0	sec
Control Delay (Worst Lane)	56.1	sec						
Control Delay (Worst Movement)	59.6	sec			45.1	sec	59.6	sec
Geometric Delay (Average)	1.5	sec						
Stop-Line Delay (Average)	26.5	sec						
Queue Storage Ratio (Worst Lane)	0.82							
Total Effective Stops	6324	veh/h			633	ped/h	14519	pers/h
Effective Stop Rate	0.80	per veh	1.8	per km	0.86	per ped	0.82	per pers
Proportion Queued	0.80				0.86		0.79	
Performance Index	459.8				17.9		477.7	

NETWORK SUMMARY

Network: AM Post Development Right Turn William + 200

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.11							
Speed Efficiency	0.47							
Congestion Coefficient	2.13							
Travel Speed (Average)	28.2	km/h			2.6	km/h	25.6	km/h
Travel Distance (Total)	3636.4	veh-km/h			9.0	ped-km/h	7519.9	pers-km/h
Travel Time (Total)	129.0	veh-h/h			3.5	ped-h/h	294.2	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	8154	veh/h			255	ped/h	17481	pers/h
Arrival Flows (Total)	8154	veh/h			255	ped/h	17481	pers/h
Percent Heavy Vehicles (Demand)	6.2	%						
Percent Heavy Vehicles (Arrival)	6.2	%						
Degree of Saturation	0.901							
Control Delay (Total)	67.42	veh-h/h			1.55	ped-h/h	160.81	pers-h/h
Control Delay (Average)	29.8	sec			21.9	sec	33.1	sec
Control Delay (Worst Lane)	51.8	sec						
Control Delay (Worst Movement)	56.4	sec			44.3	sec	56.4	sec
Geometric Delay (Average)	1.6	sec						
Stop-Line Delay (Average)	28.2	sec						
Queue Storage Ratio (Worst Lane)	1.33							
Total Effective Stops	6534	veh/h			172	ped/h	14915	pers/h
Effective Stop Rate	0.80	per veh	1.8	per km	0.68	per ped	0.85	per pers
Proportion Queued	0.81				0.68		0.87	
Performance Index	477.7				4.4		482.1	

NETWORK SUMMARY

Network: PM Post Development Right Turn William + 200

New Network

Network Performance - Hourly Values								
Performance Measure	Vehicles		Per Unit Distance		Pedestrians		Persons	
Network Level of Service (LOS)	LOS E							
Travel Time Index	4.08							
Speed Efficiency	0.47							
Congestion Coefficient	2.14							
Travel Speed (Average)	28.0	km/h			2.6	km/h	27.0	km/h
Travel Distance (Total)	3751.2	veh-km/h			9.0	ped-km/h	7873.7	pers-km/h
Travel Time (Total)	133.9	veh-h/h			3.5	ped-h/h	291.5	pers-h/h
Desired Speed	60.0	km/h						
Demand Flows (Total)	8577	veh/h			255	ped/h	18524	pers/h
Arrival Flows (Total)	8577	veh/h			255	ped/h	18524	pers/h
Percent Heavy Vehicles (Demand)	4.6	%						
Percent Heavy Vehicles (Arrival)	4.6	%						
Degree of Saturation	0.895							
Control Delay (Total)	70.11	veh-h/h			1.58	ped-h/h	150.14	pers-h/h
Control Delay (Average)	29.4	sec			22.3	sec	29.2	sec
Control Delay (Worst Lane)	60.0	sec						
Control Delay (Worst Movement)	66.9	sec			44.3	sec	66.9	sec
Geometric Delay (Average)	1.8	sec						
Stop-Line Delay (Average)	27.7	sec						
Queue Storage Ratio (Worst Lane)	0.90							
Total Effective Stops	6941	veh/h			175	ped/h	14837	pers/h
Effective Stop Rate	0.81	per veh	1.9	per km	0.68	per ped	0.80	per pers
Proportion Queued	0.81				0.68		0.81	
Performance Index	519.7				4.5		524.2	