

5. Traffic Impact Assessment

5.1 Traffic Generation

5.1.1 Centre Generated Traffic

The traffic generation rates for the anticipated future expansion are based on traffic surveys undertaken for the existing conditions at the Centre and informed by empirical analysis of the traffic generation rates for various other shopping centres in New South Wales, Queensland and Victoria. The data that underpins the below assessment is provided in Appendix C.

The floor area for each shopping centre has been plotted against the surveyed traffic generation rate for the weekday PM and Saturday peak hours and a regression analysis undertaken to establish the optimal functional relationship (logarithmic, power, polynomial etc.), the confidence level (R^2) and the standard deviation (degree of variation in the data set).

The resultant plots provided in Figure 5.1 and Figure 5.2 represent the relationship between floor area and traffic generation rates utilising a power function, which was found to provide the most accurate line of best fit for the plotted data.

Figure 5.1: Regression analysis line of best fit for weekday PM peak

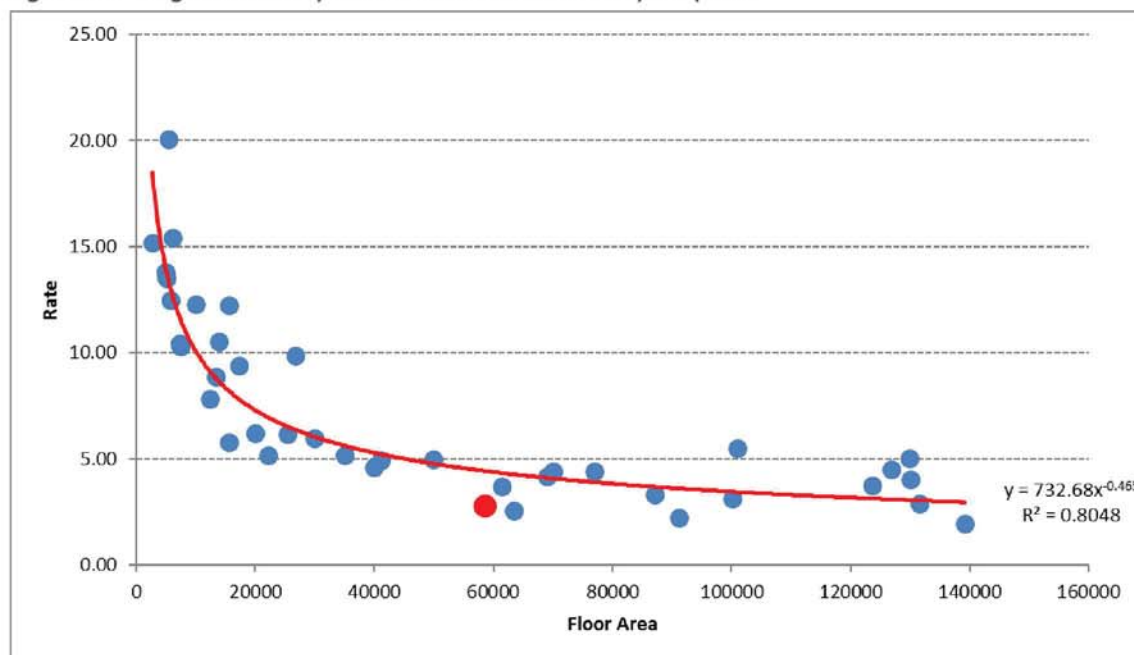
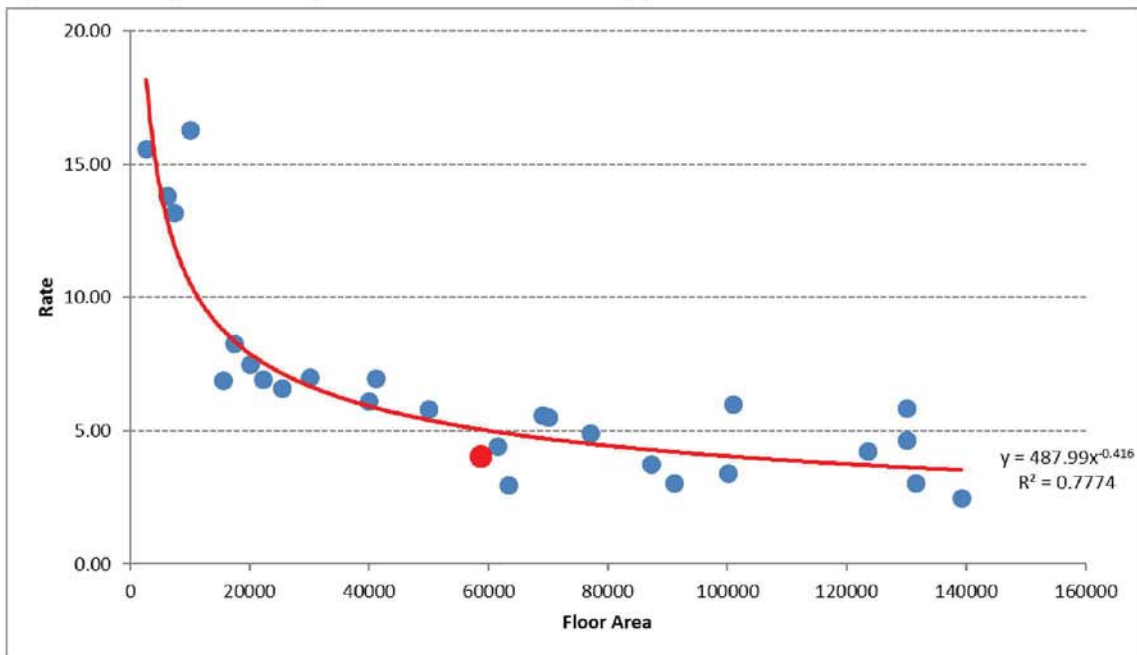


Figure 5.2: Regression analysis line of best fit for Saturday peak



The existing (58,650sq.m) and proposed post-development (75,650sq.m) floor areas were then used as inputs to the formulae of these curves to determine a ratio between existing and post-development traffic generation rates for each of the weekday PM and Saturday peaks. This ratio was applied to the surveyed existing traffic generation rates at the Centre to yield the rates for the proposed post-development floor area. The calculations and scaling factors are shown below in Table 5.1, along with the proposed post-development traffic generation rate for each peak.

Table 5.1: Traffic Generation Calculations

Peak	Existing			Post-Development			
	Surveyed Gen Rate	Floor Area	Calculated Gen Rate	Floor Area	Calculated Gen Rate	Existing to Post-Dev Gen Ratio	Post-Dev Traffic Gen Rate
Weekday PM	2.77	58,650	4.44	75,650	3.95	0.89	2.46
Saturday Peak	4.02		5.07		4.56	0.90	3.62

Given the post-development traffic generation rates calculated above, the anticipated additional traffic generated by the expansion of the site is presented in Table 5.2 below.

Table 5.2: Additional Traffic Generated by Centre Expansion

Peak	Existing Movements	Existing Floor Area	Existing Rate	Post-Dev Floor Area	Post-Dev Rate	Post-Dev Generation	Additional Traffic
Weekday PM	1625	58,650	2.77	75,650	2.46	1862	237
Saturday Peak	2358		4.02		3.62	2736	378

5.1.2 Other Traffic

There are a number of known developments in the vicinity of the site that will generate traffic to the intersections assessed in this report. These developments include:

- Mandarin Centre, 61-65 Albert Avenue, Chatswood – proposed
- 36-50 Hercules Street & 256-260 Victoria Avenue, Chatswood ("Hercules Street") – proposed.

A summary of the anticipated traffic generation from the two nearby developments is provided below in Table 5.3.

The traffic generation estimates for the Mandarin Centre site have been sourced from the GTA Consultants Planning Proposal report (September 2013) and applied to the west leg of the Albert Avenue/Archer Street intersection. Similarly, the traffic generation estimates for the 36-50 Hercules Street & 256-260 Victoria Avenue, Chatswood site have been adopted from the Varga Traffic Planning report (June 2015) for volumes moving from the development site onto Albert Avenue and Victoria Avenue.

Table 5.3: Total Traffic Generated by Each Proposed Development

Peak	Mandarin Centre (vph) GTA Consultants, September 2013	Hercules Street (vph) Varga Traffic Planning, June 2015
Weekday PM	+56	+616
Saturday	+80	+727

5.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- likely distribution of shopper's and employee's residences in relation to the site
- configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following entry/exit directional distributions from the subject site have been assumed, in line with the proposed additional parking being provided in close proximity to the Malvern Avenue access:

- Malvern Avenue access: 55%
- Archer Street access: 35%
- Victoria Avenue access: 10%.

In addition, the existing entry/exit ratios were broadly maintained for the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) in the respective peak hours (PM weekday and Saturday peaks), based on survey data:

- Weekday PM peak: 46.5% in, 53.5% out
- Saturday peak: 49.9% in, 50.1% out

For the broader road network, the existing distribution of turning movements at intersections was broadly adopted and applied to the additional traffic generated by the site and aforementioned developments. Traffic generated by the Mandarin Centre and 36-50 Hercules Street & 256-260 Victoria Avenue sites was assumed not to enter the Chatswood Chase subject site due to close proximity and additional volumes distributed onto Archer Street north of Victoria Avenue were assumed to travel to or from Boundary Street (i.e. no additional development traffic was distributed to Malvern Avenue or Ashley Street).

A summary of the modelling scenarios assessed is provided in Table 5.4.

Table 5.4: Traffic Modelling Scenarios Assessed

Scenario	Existing Layout	Existing Traffic Volumes	Nearby Development Traffic Volumes	Subject Site Traffic Volumes	Traffic Volume Figures
Existing Conditions	✓	✓	-	-	Appendix D1 and D2
Future Base Case	✓	✓	✓	-	Appendix D7 and D8
Post Development	✓	✓	✓	✓	Appendix D9 and D10

5.3 Traffic Impact

As for the existing conditions, the operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION⁶ for the future base and the post-development scenarios.

As aforementioned, the commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. Table 5.5 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 5.5: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

In undertaking the modelling and analysis for the future base and post-development scenarios, a number of assumptions were made, in line with expected future changes to signalisation as a result of increases in demand. These assumptions are:

- Cycle time was adopted from the existing conditions and SIDRA was allowed to determine the appropriate phase times
- The 'B' phase was set to variable for future base Saturday peak scenario and post-development weekday PM and Saturday peak scenarios for the Archer Street / Boundary Street intersection, as per IDM data observations.
- The timing of vehicle arrivals to the west approach of Archer Street / Boundary Street is assumed to be linked to the nearby intersection of Pacific Highway / Boundary Street, due to close proximity.
- The volume of traffic turning left into Malvern Avenue from Archer Street was halved and apportioned to the right turn into Malvern Avenue from Archer Street to reflect the

⁶ Program used under license from Akcelik & Associates Pty Ltd.

spread of utilisation of the additional car parking provision from all directions of the catchment.

Table 5.6 below presents a summary of the existing, future base and post-development operation of the intersection, with full results presented in Appendix E of this report.

Table 5.6: SIDRA Intersection results for existing conditions, future base and post-development scenarios

Peak Hour	Intersection	Existing Conditions				Base Scenario Mandarin Centre & Hercules St developments				Post-Development Scenario Mandarin Centre, Hercules St & Chatswood Chase			
		DOS (v/c)	Ave Delay (s)	95 th % Queue (m)	LOS (Delay)	DOS (v/c)	Ave Delay (s)	95 th % Queue (m)	LOS (Delay)	DOS (v/c)	Ave Delay (s)	95 th % Queue (m)	LOS (Delay)
PM	Archer St & Boundary St	0.95	32.0	220.5	LOS C	0.92	45.2	361.7	LOS D	0.90	43.7	352.2	LOS D
	Archer St & Ashley St	0.57	14.3	90.1	LOS A	0.59	14.1	95.2	LOS A	0.63	14.2	106.0	LOS A
	Archer St & Malvern Av	0.49	16.8	79.9	LOS B	0.51	17.0	85.3	LOS B	0.58	19.0	98.0	LOS B
	Archer St & Victoria Av	0.68	37.1	154.1	LOS C	0.58	31.6	149.9	LOS C	0.59	31.9	160.1	LOS C
	Victoria Av & Neridah St	0.51	14.2	42.8	LOS A	0.86	15.3	56.1	LOS B	0.87	15.5	59.0	LOS B
	Archer St & Albert Av	0.90	39.9	158.3	LOS C	0.90	40.2	191.3	LOS C	0.86	39.4	178.7	LOS C
	Archer St & Mowbray Rd	0.86	30.4	219.3	LOS C	0.61	20.5	150.3	LOS B	0.63	21.3	153.5	LOS B
	Archer St & Boundary St	0.79	26.7	285.1	LOS B	0.91	41.9	413.2	LOS C	0.93	43.9	442.4	LOS D
Sat	Archer St & Ashley St	0.88	19.7	124.1	LOS B	0.88	19.6	136.3	LOS B	0.97	20.4	163.3	LOS B
	Archer St & Malvern Av	0.55	20.3	132.1	LOS B	0.87	26.3	158.9	LOS B	0.91	28.9	181.0	LOS C
	Archer St & Victoria Av	0.72	34.3	152.8	LOS C	0.59	34.0	161.0	LOS C	0.62	33.3	173.6	LOS C
	Victoria Av & Neridah St	0.56	23.2	93.3	LOS B	0.77	24.2	109.5	LOS B	0.75	24.2	108.7	LOS B
	Archer St & Albert Av	1.16	41.7	143.5	LOS C	0.95	39.6	162.1	LOS C	0.91	39.6	155.9	LOS C
	Archer St & Mowbray Rd	0.88	36.2	245.5	LOS C	0.90	40.6	275.8	LOS C	0.95	49.6	331.4	LOS D

A summary of the future base operation of the intersections is discussed below:

- Overall, there is a general slight deterioration in degree of saturation (DOS), average vehicle delay, 95th percentile queue length and level of service (LOS) as the additional traffic generated by the Mandarin Centre and Hercules Street development is distributed to the network.
- The deterioration is generally minor, due to the relatively low increase in traffic volume to the network as a result of these developments.
- The degree of saturation, average vehicle delay, 95th percentile queue length and level of service improve at some intersections in both peak hours which may be attributed to SIDRA adjusting the signal phase times to optimise the intersection and network performance in line with future volume expectations, as outlined in the assumptions above.
- Generally, the modelled intersections operate to an adequate standard, meeting the satisfactory average vehicle delay requirements of 42 seconds to satisfy the LOS C standard set by RMS.
- The Archer Street / Boundary Street intersection deteriorates to LOS D in the weekday PM peak and has a theoretical average vehicle delay of 45.2 seconds and 95th percentile queue length approaching 400m, predominantly due to demand on the east approach of Boundary Street and the south approach of Archer Street. The analysis also indicates that this intersection experiences significant 95th percentile queue lengths (exceeding 400m) during the Saturday peak, again due to the increased demand on the east approach of Boundary Street.
- The modelling indicates that the Archer Street / Albert Avenue intersection will also operate near theoretical capacity in both peaks, with DOS's approaching 0.95.

In addition to the future base scenario, a summary of the post-development network operation is discussed below. Fluctuations in the performance of a given intersection between future base and post-development cases may be caused by reallocation of available cycle time by SIDRA to phases based on performance of the broader network, as outlined in Section 2.4.

- Again, there is a general deterioration in degree of saturation (DOS), average vehicle delay, 95th percentile queue length and level of service (LOS) as the additional traffic generated by the Chatswood Chase site development is distributed to the network.
- Fluctuations in the performance of a given intersection between future base and post-development cases may be caused by reallocation of available cycle time by SIDRA to phases based on performance of the broader network, as outlined in section 2.4.
- As per the future base case, the Archer Street / Boundary Street intersection is operating near capacity in the both peaks, according to the average vehicle delay of 43.7 seconds (weekday PM) and 43.9 seconds (Saturday), classified LOS D as per the RMS standards. In the Saturday peak, queues on the east approach exceed 400m.
- The modelling indicates that the intersection of Archer Street / Mowbray Road will deteriorate appreciably in the Saturday peak hour in comparison to the existing conditions, with delays of almost 50 seconds (LOS D). The modelled 95th percentile queue length theoretically extends over 330m on the Mowbray Road (east) approach and the DOS indicates that demand is expected to exceed capacity. Mitigation measures for this intersection are discussed later in this report.
- The intersection of Archer Street / Ashley Street also exceeds theoretical capacity due to queues on the west approach, which could be attributed to the short exit lane to the east of the intersection.

- Aside from these exceptions, the modelled network generally operates to an adequate standard, meeting the satisfactory average vehicle delay requirements of 42 seconds to satisfy the LOS C standard set by RMS.

In summary, the SIDRA modelling indicates that the Archer Street corridor is capable of accommodating the additional traffic generated by the proposed expansion to the Centre. It should be noted that improvement works are currently being undertaken on Boundary Street to improve capacity, which are expected to improve performance at the intersection with Archer Street. It should also be noted that further improvement works will be required at the Mowbray Road / Archer Street intersection to accommodate the additional future traffic volumes.

5.4 Possible Improvement Works

As detailed above, the additional traffic generated by the surrounding developments (Mandarin Centre and Hercules Street development) and Chatswood Chase will result in the Mowbray Road / Archer Street intersection operating near its theoretical capacity during the Saturday lunchtime peak. In this regard, GTA has undertaken an assessment of possible improvement measures to optimise the operation of the intersection.

It has been determined that the most effective improvement works would be to introduce a lengthened "No Stopping" or "Clearway" on the eastern departure side of the intersection (Saturday peak period only). The identified improvement works would result in the loss of approximately three on-street car spaces during the Saturday peak period.

The extent of the future restriction is illustrated in Figure 5.3.

Figure 5.3: Mowbray Road / Archer Street Intersection: Proposed Mitigation Works



(Source: NearMap Aerial Photography)

The operation of the intersection during the Saturday peak hour following the implementation of the potential improvement works is presented in Table 5.7.

Table 5.7: SIDRA Intersection Results Post Development (with Improvement Works)

Approach	DOS (v/c)	Ave Delay (s)	95 th % Queue (m)	LOS (Delay)
Mowbray Road (east)	0.88	42	161	C
Archer Street (north)	0.87	47	160	D
Mowbray Road (west)	0.89	34	222	C
Intersection	0.89	40	222	C

Table 5.7 indicates that the introduction of the improvement works will provide an enhanced operation of the Archer Street / Mowbray Road intersection. The average delays at the intersection are predicted to reduce from 50 to 40 seconds (20% reduction) and the 95th percentile queue length is predicted to reduce from 331m to 221m (33% reduction). The overall intersection LOS is predicted to improve from LOS D to C.

In addition, it is noted that the traffic generated by the Chatswood Chase expansion during the Saturday peak hour represents 2.9% of the existing traffic passing through the intersection. The traffic generated by the Mandarin Centre and Hercules Street projects represents a further 2.4% increase of the existing traffic.

5.5 Summary

Against existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposed development could not be expected to compromise the safety or function of the surrounding road network.

Furthermore, the Council transport study (detailed in Section 2) has identified a number of potential measures to improve traffic flow in and around Chatswood town centre. If adopted, some of these measures would remove traffic from the Archer Street corridor, further improving the operation of the surrounding road network.

6. Considerations

6.1 Bicycle End of Trip Facilities

It is envisaged that bicycle parking for the expanded floor area will be provided in accordance with the requirements of the Willoughby DCP.

6.2 Loading Facilities

It is envisaged that loading facilities for the expanded floor area will be provided in accordance with the requirements of the Willoughby DCP.

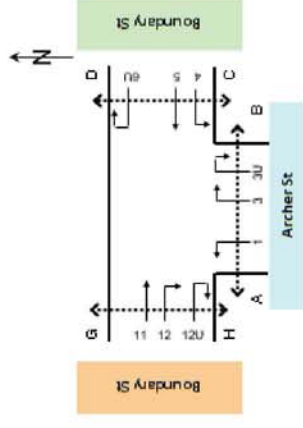
7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

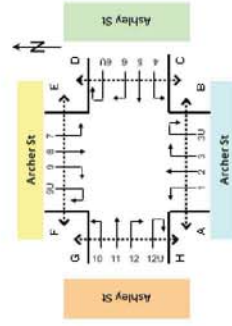
- i It is envisaged that future car parking, bicycle parking and loading facilities will be provided in accordance with the Willoughby DCP.
- ii Vehicle access to the existing shopping centre will be maintained.
- iii The future site redevelopment is expected to generate up to 224 and 358 vehicle movements during the weekday PM and Saturday lunchtime peak periods, respectively.
- iv SIDRA INTERSECTION modelling indicates that there is generally adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development. Potential improvement works have been identified for the Mowbray Road / Archer Street intersection.

Appendix A

Traffic Survey Results



MATRIX
— Traffic and Transport Data —



Job No.	: N2261
Client	: GTA
Suburb	: Chastwood
Location	: 2. Archer St / Ashley St
Day/Date	: Thu, 17th Mar 2016
Weather	: Fine
Description	: Classified Intersection Count
	: Hourly Summary

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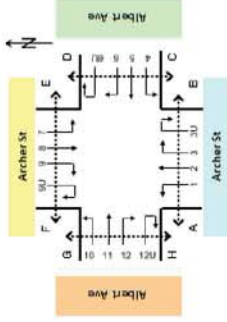


Hourly Summary

MATRIX
— Traffic and Transit Patterns

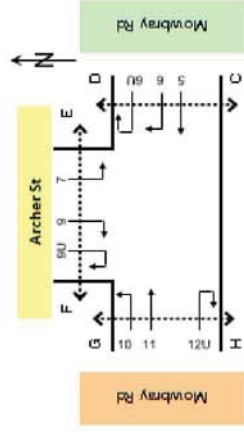


Approach	Archer St						East Approach						Archer St						West Approach														
	Direction 311 (U Turn)		Direction 3 (Right Turn)		Direction 2 (Through)		Direction 1 (Left Turn)		Direction 4 (Left Turn)		Direction 5 (Through)		Direction 6 (Right Turn)		Direction 611 (U Turn)		Direction 7 (Left Turn)		Direction 7 (Through)		Direction 8 (Right Turn)		Direction 9 (Left Turn)		Direction 10 (Right Turn)		Direction 11 (Through)		Direction 12 (Right Turn)		Direction 121 (U Turn)		
Time Period	Heavies	Light	Heavies	Light	Heavies	Total	Heavies	Light	Heavies	Light	Heavies	Total	Heavies	Light	Heavies	Total	Heavies	Light	Heavies	Light	Heavies	Total	Heavies	Light	Heavies	Total	Heavies	Light	Heavies	Total	Heavies	Light	
16:30 to 16:45	5	36	592	5	537	5	51	205	38	243	1	0	1	0	0	183	1	394	412	7	419	0	0	0	39	172	26	260	0	0	0	6	
16:45 to 16:45	2	100	634	5	639	0	43	201	56	237	1	0	1	0	0	166	1	167	447	7	454	0	0	0	47	159	34	193	0	0	0	0	
16:30 to 16:45	2	195	668	6	614	0	40	192	32	224	1	0	1	0	0	164	1	165	482	6	488	0	0	0	1	48	32	135	0	0	0	0	
16:45 to 16:45	5	110	742	6	740	0	35	191	26	207	1	0	1	0	0	117	2	377	432	5	437	0	0	0	0	37	162	25	195	0	0	0	0
16:30 to 16:45	5	197	725	7	728	0	31	197	24	221	0	0	0	0	0	160	3	380	449	4	453	0	0	0	0	42	162	35	227	0	0	0	0
16:45 to 16:45	3	116	718	2	721	0	36	211	25	236	0	0	0	0	0	204	4	208	465	5	470	0	0	0	0	33	208	257	0	0	0	0	
17:30 to 18:00	3	113	711	2	713	0	37	216	26	242	0	0	0	0	0	206	4	209	451	5	464	0	0	0	1	44	207	27	234	0	0	0	0
18:15 to 18:45	2	112	643	3	646	0	37	203	26	265	1	0	1	0	0	165	3	386	465	2	467	0	0	0	1	44	234	20	262	0	0	0	0
18:30 to 18:45	2	124	654	3	657	0	37	227	27	264	1	0	1	0	0	162	3	392	471	2	473	0	0	0	1	43	235	240	0	0	0	0	
Total	317	110	3227	1,311	11	1,302	0	639	83	728	2	0	2	0	0	555	1	556	1,332	13	1,405	0	0	0	3	1319	88	667	0	0	0	0	0



Job No. : N2261
 Client : GTA
 Suburb : Chatswood
 Location : S. Archer St / Albert Ave
 Day/Date : Thu, 17th Mar 2016
 Weather : Fine
 Description : Classified Intersection Count
 : Hourly Summary

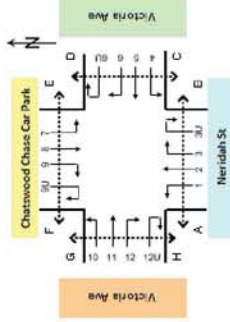
Approach Direction	Archer St						Albert Ave						Archer St						Albert Ave																		
	Direction 2 (U Thru)		Direction 3 (U Turn)		Direction 3U (U Turn)		Direction 4 (Left Turn)		Direction 5 (U Thru)		Direction 6 (Right Turn)		Direction 6U (U Turn)		Direction 7 (Left Turn)		Direction 8 (U Thru)		Direction 9 (Right Turn)		Direction 9U (U Turn)		Direction 10 (Left Turn)		Direction 11 (U Thru)		Direction 12 (Right Turn)		Direction 12U (U Turn)								
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total							
Time Period	0	116	116	0	376	376	0	83	83	0	279	279	0	40	40	0	69	69	2	251	251	0	202	202	0	232	232	0	235	235	0	56	56	0	0	0	0
15:00 to 16:00	0	116	116	0	412	412	0	72	72	0	293	293	0	44	44	0	64	64	2	243	243	0	212	212	0	250	250	0	245	245	0	59	59	0	0	0	0
16:00 to 17:00	0	116	116	0	409	409	0	67	67	0	304	304	0	42	42	0	55	55	2	238	238	0	207	207	0	307	307	0	250	250	0	61	61	0	0	0	0
17:00 to 18:00	0	126	126	0	435	435	0	73	73	0	319	319	0	47	47	0	51	51	2	233	233	0	204	204	0	300	300	0	246	246	0	62	62	0	0	0	0
18:00 to 19:00	0	127	127	0	412	412	0	56	56	0	315	315	0	45	45	0	45	45	2	237	237	0	193	193	0	326	326	0	230	230	0	66	66	0	0	0	0
19:00 to 20:00	0	137	137	0	402	402	0	43	43	0	306	306	0	50	50	0	46	46	2	253	253	0	194	194	0	328	328	0	236	236	0	68	68	0	0	0	0
20:00 to 21:00	0	131	131	0	450	450	0	48	48	0	306	306	0	55	55	0	43	43	2	263	263	0	196	196	0	328	328	0	236	236	0	68	68	0	0	0	0
21:00 to 22:00	0	133	133	0	445	445	0	51	51	0	338	338	0	64	64	0	55	55	0	252	252	0	202	202	0	328	328	0	235	235	0	68	68	0	0	0	0
22:00 to 23:00	0	126	126	0	439	439	0	55	55	0	361	361	0	67	67	0	61	61	2	243	243	0	221	221	0	296	296	0	206	206	0	68	68	0	0	0	0
23:00 to 00:00	0	128	128	0	446	446	0	56	56	0	384	384	0	66	66	0	67	67	2	244	244	0	227	227	0	297	297	0	216	216	0	68	68	0	0	0	0
Total	378	3	381	1,391	13	1,314	280	2	282	0	0	0	181	3	184	718	4	722	923	5	928	0	0	0	837	7	844	936	5	801	116	3	1173	0	0	0	0



Job No. : N2261
 Client : GTA
 Suburb : Chatswood
 Location : S. Archer St / Mowbray Rd
 Day/Date : Thu, 17th Mar 2016
 Weather : Fine
 Description : Classified Intersection Count
 : Hourly Summary

Approach	Mowbray Rd						Archer St						Mowbray Rd															
Direction	Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)			Direction 7 (Left Turn)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12U (U Turn)			
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	
Time Period																												
15:30 to 16:30	523	25	554	216	0	216	0	0	0	144	0	144	0	219	3	222	0	0	0	257	2	259	612	23	635	0	0	0
16:45 to 17:45	431	22	513	227	1	228	0	0	0	156	2	158	0	224	4	228	0	0	0	273	2	275	660	20	680	0	0	0
18:00 to 19:00	450	19	469	236	3	241	0	0	0	156	3	159	0	218	5	223	0	0	0	268	3	271	625	19	644	0	0	0
19:15 to 20:15	364	16	402	255	4	259	0	0	0	184	3	187	0	173	5	178	0	0	0	231	3	234	623	11	634	0	0	0
20:30 to 21:30	323	15	344	233	4	237	0	0	0	135	3	138	0	145	2	147	0	0	0	265	1	266	536	10	546	0	0	0
21:45 to 22:45	251	11	262	201	3	204	0	0	0	205	1	206	0	101	1	102	0	0	0	264	2	266	532	10	542	0	0	0
23:00 to 00:00	201	5	206	163	2	171	0	0	0	202	0	202	0	80	0	80	0	0	0	251	1	252	583	5	588	0	0	0
17:15 to 18:15	160	4	164	123	2	125	0	0	0	201	0	201	0	91	0	91	0	0	0	243	1	244	537	7	544	0	0	0
19:30 to 20:30	207	7	214	139	2	141	0	0	0	134	0	134	0	113	0	113	0	0	0	267	2	269	646	9	655	0	0	0
Total	1,065	47	1,112	588	6	594	0	0	0	533	3	536	0	477	5	482	0	0	0	810	5	815	1,314	42	1,356	0	0	0

Job No. : N2261
Client : GTA
Suburb : Chatswood
Location : 7 Victoria Ave / Neridah St
Day/Date : Thu, 17th Mar 2016
Weather : Fine
Description : Classified Intersection Count
Hourly Summary



Approach		Heridah St						Victoria Ave						Chatswood Chase Car Park						Victoria Ave																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Direction	Time Period	Direction 1 (Left Turn)		Direction 2 (Through)		Direction 3 (Right Turn)		Direction 3U (U Turn)		Direction 4 (Left Turn)		Direction 5 (Through)		Direction 6 (Right Turn)		Direction 6U (U Turn)		Direction 7 (Left Turn)		Direction 8 (Through)		Direction 9 (Right Turn)		Direction 9U (U Turn)		Direction 10 (Left Turn)		Direction 11 (Through)		Direction 12 (Right Turn)		Direction 12U (U Turn)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total	Lights	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
15:30 to 16:30	38	0	38	228	0	228	57	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
16:45 to 17:45	36	0	36	216	0	216	65	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
18:00 to 19:00	40	0	40	240	0	240	71	0	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
19:00 to 19:15	33	0	33	200	0	200	82	0	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
19:15 to 19:30	30	0	30	180	0	180	77	0	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
19:30 to 19:45	34	0	34	207	0	207	84	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
19:45 to 20:00	40	0	40	220	0	220	84	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
20:00 to 20:15	40	0	40	224	0	224	74	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
20:15 to 20:30	41	0	41	253	0	253	77	0	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Total	118	0	118	633	0	633	211	0	211	0	245	4	243	549	81	670	335	1	534	0	735	1	0	1	0	0	0	0	329	738	77	665	4	3	83	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1</

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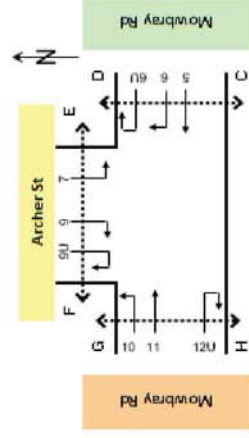
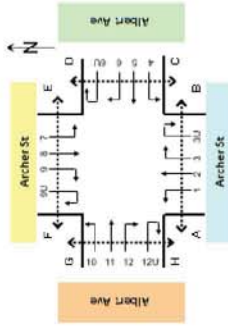


Hourly Summary

Job No.	: NZ261
Client	: GTA
Suburb	: Chatswood
Location	: 4, Archer St, / Victoria Ave
Day/Date	: Sat, 15th Mar 2016
Weather	: Fine
Description	: Classified Intersection Co



: Classified Intersection Count



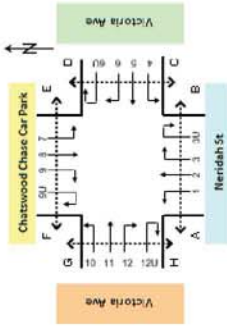
Job No.	N2261
Client	GTA
Suburb	Chatswood
Location	5 Archer St / Albert Ave
Day/Date	Sat, 19th Mar 2016
Weather	Fine
Description	Classified Intersection Count
	Hourly Summary

[illegible]

Job No.	: N2261
Client	: GTA
Suburb	: Chatswood
Location	: 6. Archer St / Mowbray Rd
Day/Date	: Sat, 19th Mar 2015
Weather	: Fine
Description	: Classified Intersection Count
	: Hourly Summary

Approach	Mowbray Rd												Archer St												Mowbray Rd											
Direction	Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)			Direction 7 (Left Turn)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12U (U Turn)											
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total									
Time Period																																				
11:30 to 12:30	577	14	591	223	1	240	0	0	0	133	5	144				305	2	307	0	0	0	134	4	138	654	12	666									
12:45 to 13:45	563	17	586	204	1	205	0	0	0	132	3	135				300	2	302	0	0	0	216	3	219	688	12	700									
13:00 to 13:00	573	16	589	205	0	205	0	0	0	146	2	148				310	1	311	0	0	0	218	4	222	630	14	704									
12:15 to 13:15	593	17	610	212	0	212	0	0	0	142	0	142				328	1	329	0	0	0	212	4	216	677	14	691									
12:30 to 13:30	574	13	587	212	0	212	0	0	0	133	0	133				335	1	336	0	0	0	203	1	210	637	10	707									
12:45 to 13:45	607	9	616	231	0	231	0	0	0	123	2	131				330	0	330	0	0	0	202	2	204	703	12	715									
13:00 to 14:00	575	8	583	236	1	237	0	0	0	136	2	138				340	2	342	0	0	0	202	2	204	678	12	630									
13:15 to 14:15	535	7	542	223	1	224	0	0	0	140	2	142				328	2	330	0	0	0	200	2	202	700	11	711									
13:30 to 14:30	521	8	529	216	1	217	0	0	0	141	2	143				320	2	322	0	0	0	220	2	222	693	7	700									
Total	1,672	35	1,707	667	2	669	0	0	0	413	7	420				960	5	965	0	0	0	623	7	630	2,044	29	2,073									

Job No. : N22161
 Client : GTA
 Suburb : Chatwood
 Location : 7 Victoria Ave / Neridah St
 Day/Date : Sat, 15th Mar 2016
 Weather : Fine
 Description : Classified Intersection Count
 : Hourly Summary



Approach	Neridah St						Victoria Ave						Chatwood Chase Car Park						Victoria Ave																
	Direction 1 (Left Turn)		Direction 2 (Through)		Direction 3 (Right Turn)		Direction 3U (U Turn)		Direction 4 (Left Turn)		Direction 5 (Through)		Direction 6 (Right Turn)		Direction 6U (U Turn)		Direction 7 (Left Turn)		Direction 8 (Through)		Direction 9 (Right Turn)		Direction 9U (U Turn)		Direction 10 (Left Turn)		Direction 11 (Through)		Direction 12 (Right Turn)		Direction 12U (U Turn)				
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy			
Time Period	11:30 to 12:30	32	0	32	336	0	336	47	0	47	0	0	106	1	107	162	15	157	157	1	158	0	0	0	0	153	0	153	0	1	1	0	0	0	0
	11:45 to 12:45	37	0	37	343	0	343	46	0	46	0	0	107	0	107	176	15	171	152	1	154	0	0	0	159	0	159	0	1	1	0	0	0	0	
	12:00 to 13:00	42	0	42	320	0	320	56	0	56	0	0	103	0	103	176	16	124	155	0	153	0	0	0	114	0	114	0	1	1	0	0	0	0	
	12:15 to 13:15	42	0	42	327	0	327	56	0	56	0	0	102	0	102	173	16	135	155	0	155	0	0	0	119	0	119	0	1	1	0	0	0	0	
	12:30 to 13:30	42	0	42	333	0	333	56	0	56	0	0	92	0	92	172	11	153	150	0	150	0	0	0	112	0	112	0	1	1	0	0	0	0	
	12:45 to 13:45	43	0	43	309	0	309	63	0	63	0	0	94	0	94	167	12	150	157	0	157	0	0	0	110	0	110	0	1	1	0	0	0	0	
	13:00 to 14:00	40	0	40	253	0	253	45	0	45	0	0	95	1	97	158	9	167	201	0	201	0	0	0	158	0	158	0	1	1	0	0	0	0	
	13:15 to 14:15	30	0	30	232	0	232	45	0	45	0	0	105	1	105	151	10	151	150	0	150	0	0	0	125	0	125	0	1	1	0	0	0	0	
	13:30 to 14:30	29	0	29	255	0	255	42	0	42	0	0	107	1	108	150	14	154	156	0	156	0	0	0	130	0	130	0	1	1	0	0	0	0	
Total		1003	0	1003	324	0	324	146	0	146	0	0	305	2	307	584	40	544	553	1	554	0	0	0	0	486	1	487	773	40	013	0	0	0	0

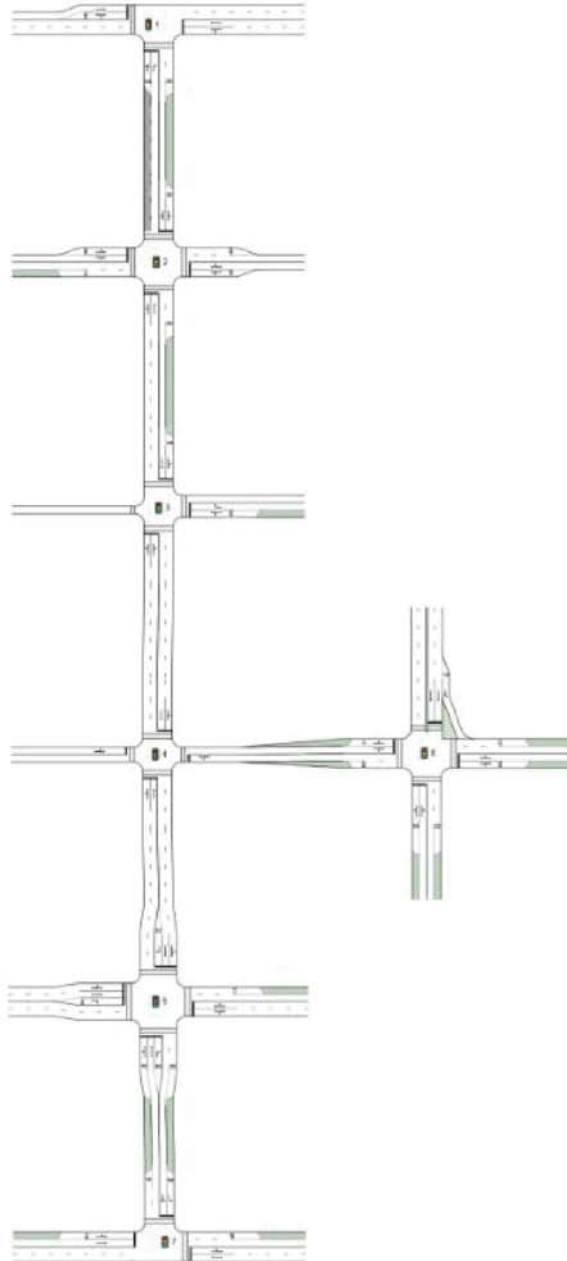
Appendix B

SIDRA INTERSECTION – Existing Conditions Results

NETWORK LAYOUT

☐☐ Network: Archer Street Network - Weekday PM

Weekday PM - 7 sites



SITES IN NETWORK

Site ID	Site Name
1	Archer Street & Boundary St (Existing)
2	Archer Street & Ashley Street (Existing)
3	Archer Street & Malvern Avenue & Wattle Lane (Existing)
4	Archer Street & Victoria Avenue (Existing)
5	Archer Street & Albert Avenue (Existing)
6	Victoria Avenue & Neridah Street (Existing)
7	Archer Street & Mowbray Road (Existing)

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Organisation: GTA CONSULTANTS | Created: Friday, 8 July 2016 1:53:23 PM

Project: X\115S1300-1399\15S1304102 - Archer St Planning Proposal\Modelling\SIDRA\Existing\160322sid-15S1304102 Archer Street PM.sip6

MOVEMENT SUMMARY

 Site: Archer Street & Boundary St (Existing)

Network: Archer Street Network

Archer Street & Boundary St
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (User-Given Phase Times)

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Arrival Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Archer Street (S)													
1	L2	64	2.0	64	2.0	0.952	97.5	LOS F	19.9	141.9	1.00	1.04	20.7
3	R2	552	2.0	552	2.0	0.952	97.7	LOS F	27.2	193.6	1.00	1.04	20.7
Approach		616	2.0	616	2.0	0.952	97.7	LOS F	27.2	193.6	1.00	1.04	20.7
East: Boundary Street (E)													
4	L2	302	4.0	302	4.0	0.613	30.2	LOS C	28.4	204.7	0.76	0.78	31.8
5	T1	900	3.0	900	3.0	0.613	26.5	LOS B	30.7	220.5	0.76	0.72	41.4
Approach		1202	3.3	1202	3.3	0.613	27.4	LOS B	30.7	220.5	0.76	0.74	39.7
West: Boundary Street (W)													
11	T1	1015	2.0	1015	2.0	0.677	4.6	LOS A	17.7	126.3	0.28	0.28	55.6
12	R2	311	0.0	311	0.0	0.677	8.7	LOS A	3.9	27.5	0.27	0.61	47.7
Approach		1327	1.5	1327	1.5	0.677	5.5	LOS A	17.7	126.3	0.28	0.36	54.4
All Vehicles		3145	2.3	3145	2.3	0.952	32.0	LOS C	30.7	220.5	0.60	0.64	37.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	23.0	LOS C	0.1	0.1	0.55	0.55
P4	West Full Crossing	53	60.0	LOS E	0.2	0.2	0.90	0.90
All Pedestrians		105	41.5	LOS E			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: GTA CONSULTANTS | Processed: Friday, 20 May 2016 1:25:46 PM

Project: X:\15S1300-1399\15S1304102 - Archer St Planning Proposal\Modelling\SIDRA\Existing\160322sid-15S1304102 Archer Street PM.sip8