GTAconsultants

Goulburn CBD Plan
Masterplan Development Assessment
Traffic, Transport and Parking

EDAW
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Document Issue

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Executive Summary

EDAW has prepared a Masterplan for the Goulburn CBD with up to seven development areas that have been identified for future growth, including a range of residential, retail and commercial land uses, as well as additional car parking.

In support of the Masterplan and in order to further improve pedestrian safety and amenity in the areas abutting Auburn Street, the road hierarchy through Goulburn CBD has been amended, such that access to the CBD and specifically parking takes place via Bourke and Sloane Streets and that any through traffic use Bourke Street as the route through Goulburn CBD. Diverting these through vehicle movements enables pedestrian amenity to be maximised within the CBD core.

Vehicle access into the proposed new developments is to be located at the new CBD bypass loop. This would include access to off-street parking for both existing accesses and any proposed as part of the future development sites.

Traffic generation estimates indicate that the future development sites in total could be expected to generate up to some 1,000 vehicle movements in a typical weekday PM peak hour.

It is expected that all intersections within the Goulburn CBD and externally on the arterial road network are expected to be able to operate satisfactorily in the future following the redirection of traffic away from Auburn Street and full build out of the proposed development sites. Those intersections which would require further investigation and likely intersection widening and/or modification include Sloane St/Bradley St, Bradley St/Bourke St, Clinton St/Sloane St and Clinton St/Bourke St. It is also recommended that all future site accesses for proposed development sites be reassessed at the development application stage to determine their feasibility and expected function.

The development sites in the vicinity of the Auburn St/Bradley St roundabout intersection are likely to result in an increase in the level of pedestrian activity and crossing movements at this intersection. Roundabouts are not a pedestrian friendly treatment and as such, it is recommended that the intersection of Bradley Street and Auburn Street be converted to signals following full development of the nearby development sites to better accommodate the se pedestrian movements.

On-street parking numbers are to be reduced as a result of Masterplan streetscape proposals. As such, this would result in a deficit in on-street parking in Auburn Street, Montague Street and Market Street. There is existing capacity within the surrounding streets of the CBD to accommodate loss of parking as a result of the proposed streetscape works.

Parking estimates indicate that the proposed future Masterplan development sites would generate a total parking requirement of 683 spaces. The proposed Masterplan supply of 461 spaces is not sufficient to accommodate the parking demand of the future Masterplan development. As such, it is recommended that the future deficit of 222 spaces be accommodated through additional on-site parking (residential and commercial land uses) or available vacancies within the CBD (retail land uses).

An initiative of the Masterplan is to encourage greater use of public transport within the Goulburn CBD and surrounding area. In terms of rail travel, it is recommended that accessibility to the train station for all connecting transport modes, including buses, pedestrians, cyclists, taxis and vehicles drop-off/pick-up (i.e. kiss-and-ride) be improved. Buses currently experience low patronage, so it is recommended that in consultation with the Ministry of Transport and local bus operators, service frequencies of existing bus services within the CBD should be increased during both peak and off-peak times.

Increased travel by modes of walking and cycling is to be encouraged as part of the Masterplan through a range of measures such as the Masterplan improvements within the CBD, which are to create a safer environment for pedestrians. The proposed Masterplan works must take into consideration the routes detailed in the latest bicycle plan included in the Goulburn Mulwaree Bicycle Strategy 2008-2018. This includes consideration of the proposed hierarchy changes and how this may affect the suitability of any proposed bicycle facilities (for example, Bradley Street). Facilities at the existing railway crossing of Blackshaw Road to the northeast of the station are to be upgraded to better accommodate bicycle and pedestrian movements.

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Traffic Characteristics of Public Car Parks (Adam Pekol Consulting, 1999)

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1. Introduction

1.1 Background

This report supplements the Goulburn CBD Existing Conditions Assessment – Traffic, Transport and Parking report completed in February 2008.

The existing conditions report identified the existing traffic, transport and parking characteristics of the Goulburn CBD study area including consideration of all different transport modes.

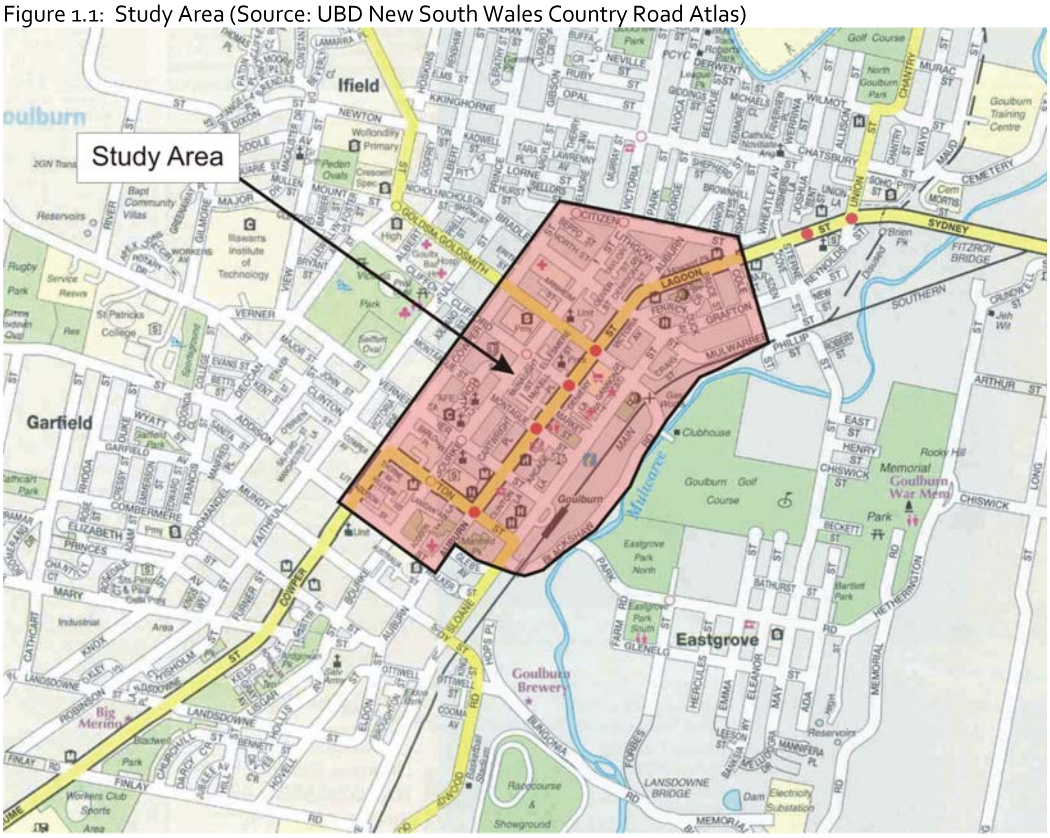
It is intended that this Masterplan report consider the Masterplan proposal prepared by EDAW for future retail, commercial and residential development in the Goulburn CBD.

This report primarily provides advice on the potential traffic and transport measures required to support and compliment the proposed future growth with the Goulburn CBD.

1.2 Study Area

The Study Area and the surrounding environs are shown in Figure 1.1.

Figure 1.1: Study Area (Source: UBD New South Wales Country Road Atlas)



1.3 Purpose of This Report

This report provides a summary of impacts of future development within the Goulburn CBD on the existing road network and makes recommendations about how these impacts can be accommodated in terms of traffic, transport and parking. This report includes consideration of the following:

i Proposed Masterplan;

ii Future road hierarchy and traffic volumes;

iii Intersection and mid-block treatments and improvements;

iv Adequacy of future parking supply;

v Public transport improvements; and

vi Pedestrian and bicycle improvements.

1.4 Referenced Documents

In preparing this report, reference has been made to a number of background documents, including:

- Draft Goulburn Mulwaree Strategy 2020, Parsons Brinckerhoff;
- Cycle Safety Strategy 2002 to 2006, Goulburn City Council;
- Goulburn CBD Pedestrian Access Mobility Plan (PAMP) 2002, Cardno MBK Engineering;
- Traffic surveys undertaken on behalf of GTA Consultants as referenced in the context of this report;
- Car parking surveys undertaken by Goulburn Mulwaree Council as referenced in the context of this report;
- Various technical data as referenced in this report;
- An inspection of the site and its surrounds; and
- Other documents as nominated.

2. Proposed Masterplan

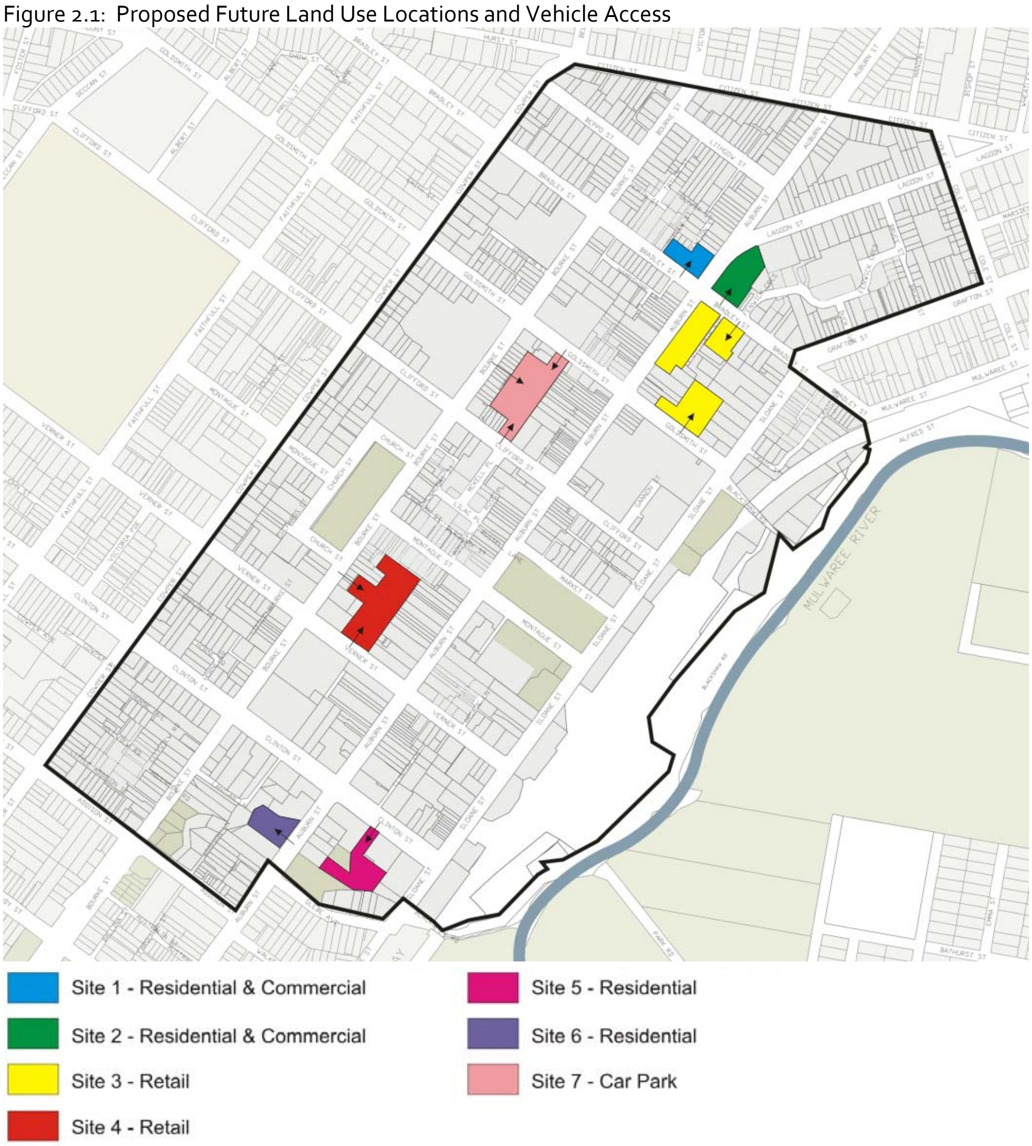
2.1 Future Land Use

EDAW has prepared a Masterplan which indicates those areas that have been identified for future growth in the Goulburn CBD. These include a range of residential, retail and commercial land uses as detailed in Table 2.1. Figure 2.1 shows the locations of these development sites.

Table 2.1: Proposed Future Land Use Details

Site No.	Site Name	Site Area	Land Use	GFA	No. of Parking Spaces
1	Ford/Goulburn Engineering (Auburn St/Bradley Street)	8,070m²	Residential (apartments x 30)	2,100m²	30 spaces
			Commercial	2,100m²	28 spaces
2	Pizza Hut (Auburn St/Bradley St)	5,330m²	Residential (apartments x 20)	1,400m²	20 spaces
			Commercial	2,500m²	34 spaces
3	Target Site (Auburn St/Goldsmith St/Bradley St)	19,177m²	Retail (large floor plate x 3)	9,950m²	126 spaces
			Retail (small floor plate x 13)	1,300m²	17 spaces
4	St Patricks (Verner St/Bourke St)	18,730m²	Retail (large floor plate x 1)	2,400m²	30 spaces
			Retail (small floor plate x 36)	5,400m²	68 spaces
5	Manfred Park (Clinton St/Sloane St)	5,544m²	Residential (townhouses x 8)	1,200m²	12 spaces
			Residential (apartments x 36)	3,960m²	36 spaces
			Residential (mews houses x 5)	450m²	5 spaces
6	Military lands (Clinton St/Auburn St)	6,424m²	Residential (townhouses x 14)	2,100m²	21 spaces
			Residential (apartments x 34)	2,380m²	34 spaces
7	Ellesmere Street	10,640m²	Car park (3 floors)	30,000m²	750 spaces

Figure 2.1: Proposed Future Land Use Locations and Vehicle Access



2.2 Vehicle Access and Parking

Vehicle access into the proposed new developments is to be located at the new CBD bypass loop. This would include access to off-street parking, both existing and that proposed as part of the future development.

These accesses are shown in Figure 2.1.

2.3 Road Network

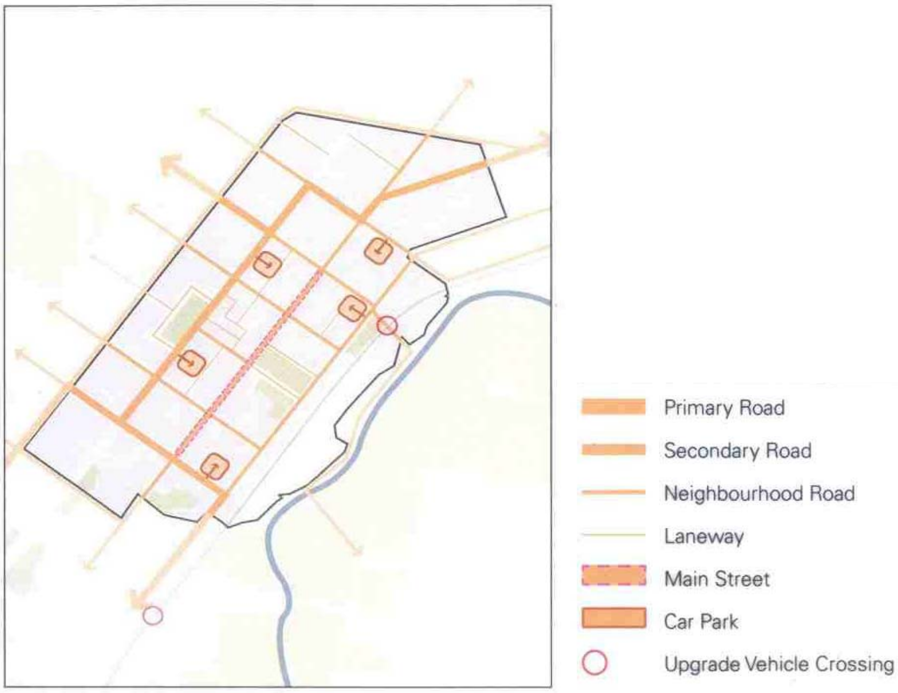
In support of the Masterplan objectives and in order to further improve pedestrian safety and amenity on Auburn Street, the Masterplan involves an update of the existing road hierarchy. Both through vehicles and those seeking to access the CBD are to bypass the Goulburn CBD via Bourke and Sloane Streets at the proposed "Gateways" at Bradley Street and Clinton Street. Diverting the Auburn Street vehicle movements enables pedestrian amenity to be maximised within the CBD core. This loop would include the following roads:

- Bradley Street (Auburn Street to Bourke Street);
- Bourke Street (Bradley Street to Clinton Street);
- Sloane Street (Bradley Street to Clinton Street); and
- Clinton Street.

The above sections of Bradley Street and Bourke Street, which are currently classified as Local Roads, would be reclassified as arterial (State) roads.

The proposed new road network is shown in Figure 2.2.

Figure 2.2: Proposed Road Network



To encourage the use of the proposed CBD bypass route, the "Gateways" at the intersections of Bradley Street/Auburn Street and Clinton Street/Auburn Street are to be treated with directional signage, including signage to parking areas, and traffic calming to discourage vehicle use of Auburn Street.

2.4 Railway Crossing

The existing railway crossing at Blackshaw Road and Sloane Street is to be upgraded. This would help to provide better connection across the barrier of the railway line for all road users, including cyclists and pedestrians.

3. Traffic Modelling

3.1 Traffic Generation and Assignment

3.1.1 Traffic Generation

Traffic generation estimates for each of the proposed developments have been sourced from the RTA Guide to Traffic Generating Developments (October 2002). Results from surveys undertaken by GTA Consultants at other similar developments have also been sourced where the RTA does not specify a rate. These are detailed below in Table 3.1 for a typical weekday peak hour.

Table 3.1: Traffic Generation Rates

Land Use	Traffic Generation Rate
Retail (Large floor plate- bulky goods)	RTA: No rate given GTA: 2.12 trips/100m2 GLFA
Retail (Large floor plate- supermarket)	RTA: No rate given GTA: 13.94 trips/100m2 GLFA
Retail (Small floor plate- specialty shops)	RTA: 5.6 trips/100m2 GLFA
Commercial	RTA: 2 trips/100m2 GLFA
Residential (Apartments)	RTA: 0.4-0.5 trips/dwelling
Residential (Townhouses)	RTA: 0.5-0.65 trips/dwelling
Residential (Mews houses)	RTA: 0.5-0.65 trips/dwelling
Public Car Park	RTA: No rate given Other source: Adam Pekol Consulting Practice note – Traffic Characteristics of public car parks (1999) included in Appendix A. Trips entering: 5.5% of car parking capacity Trips exiting: 18.5% of car park capacity

An estimate of peak hour traffic volumes resulting from the proposed Masterplan development are set out in Table 3.2.

Table 3.2: Traffic Generation Estimates – PM Weekday Peak Period

Site No.	Land Use	Traffic Generation Rate	Unit	Vehicle Movements (combination of in and out)
1	Residential	0.4-0.5 trips/dwelling	30 apartments	12-15 trips
	Commercial	2 trips/100m² GFA	2,100m²	42 trips
2	Residential	0.4-0.5 trips/dwelling	20 apartments	8-10 trips
	Commercial	2 trips/100m² GFA	2,500m²	50 trips
3	Retail (bulky goods)	2.12 trips/100m² GLFA [1]	9,950m²	158 trips
	Retail (specialty)	5.6 trips/100m² GLFA [1]	1,300m²	55 trips
4	Retail (supermarket)	13.94 trips/100m² GLFA [1]	2,400m²	251 trips
	Retail (specialty)	5.6 trips/100m² GLFA [1]	5,400m²	227 trips
5	Residential	0.5-0.65 trips/dwelling	8 townhouses	4-5 trips
	Residential	0.4-0.5 trips/dwelling	36 apartments	14-18 trips
	Residential	0.5-0.65 trips/dwelling	5 mews houses	3 trips
6	Residential	0.5-0.65 trips/dwelling	14 townhouses	7-9 trips
	Residential	0.4-0.5 trips/dwelling	34 apartments	14-17 trips
7	Public Car Park	5.5% of car park capacity entering 18.5% of car park capacity exiting	750 spaces	41 trips entering 139 trips exiting Total 180 trips
Total				**1,025-1,040**

Notes: [1] Gross Leasable Floor Area (GLFA) is assumed to be 75% of the GFA, as per the RTA Guide to Traffic Generating Developments.

Table 3.2 indicates that the future development sites could potentially generate some 1,000 vehicle movements in a PM weekday peak hour. It is likely that this number may be lower in reality for a number of reasons, such as a single trip catering for multiple trip purposes and some of the trips being generated by people already within the centre. As such, the number of trips estimated is likely to represent the maximum (i.e. worst-case scenario).

3.1.2 Traffic Distribution and Assignment

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

i The configuration of the arterial road network in the immediate vicinity of the site;

ii The existing operation of intersections providing access between the local and arterial road network;

iii The distribution of households in the vicinity of the site;

iv The surrounding employment centres in relation to the site;

v The likely distribution of employees residences in relation to the site; and

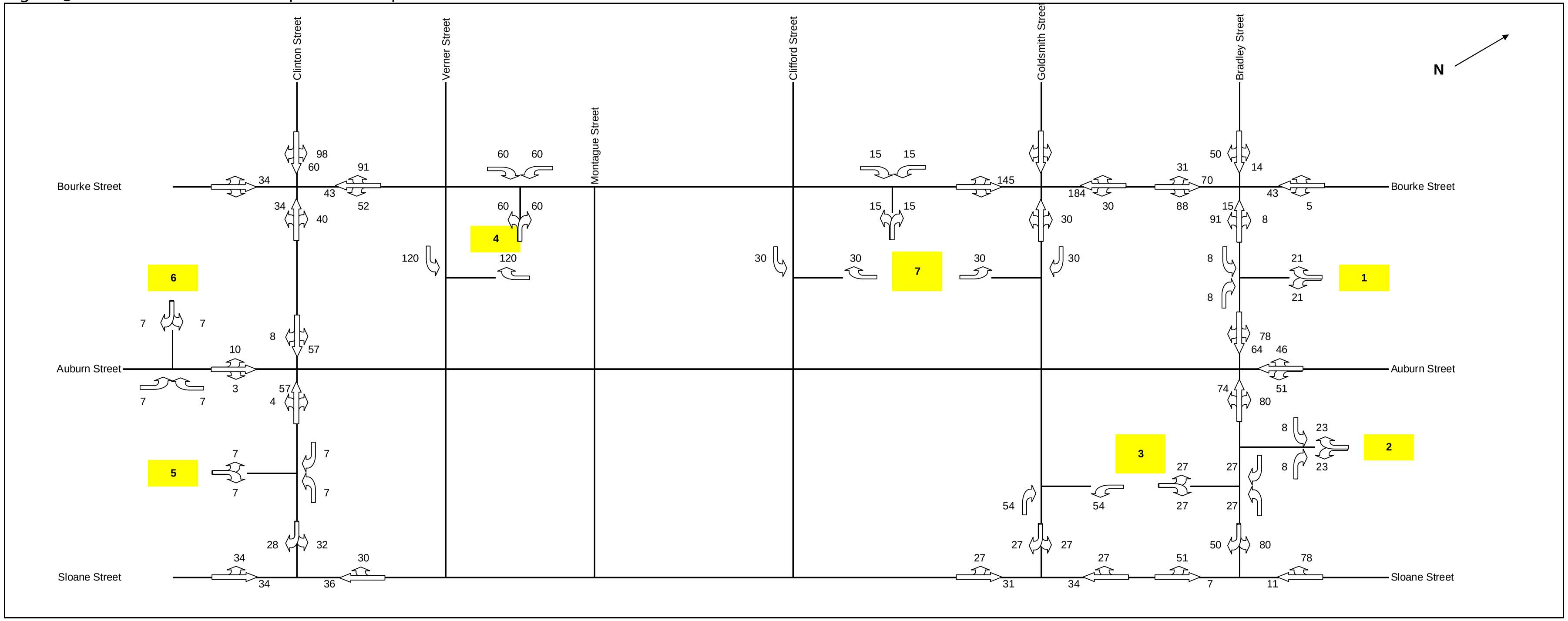
vi The configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distribution assumptions have been made:

- All land uses (except for commercial) experience a 50:50 ratio of in and out movements;
- Commercial land uses experience a 20:80 ratio of in and out movements;
- A 50:50 ratio applies at all site accesses (i.e. 50% left-in/left-out, 50% right-in/right-out);
- All movements are to be assigned only to the primary and secondary road network and not encroach into the main street area of Auburn Street; and
- At the intersections on the periphery of the CBD core, movements are to be assigned based on existing ratios.

Based on the above, Figure 3.1 has been prepared to show the estimated increase in turning movements within the Goulburn CBD following full buildout of the Masterplan development.

Figure 3.1: PM Peak Hour Masterplan Development Site Generated Traffic Volumes



3.2 "Base Case"

To assess the impact of this development at key points of time it is appropriate to have consideration to a relevant "Base Case" against which to test the development impact. A "Base Case" examines the performance of the road network ***without*** the proposed development at the key points in time. The standard key point in time is typically 10 years post development.

In this instance a "Base Case" has been developed that shows the traffic performance of the road network ***without*** the proposed development but adopting the road hierarchy structure proposed within the Masterplan. And as indicated in Figure 2.2, the time period of Year 2018 (existing plus 10 years) has been assessed, assuming a 3% growth factor for all roads in the network, expect for Auburn Street.

The growth factor was derived from historical AADT data on the Old Hume Highway to the northeast and southwest of the study area. The growth factor was applied to all movements except for Auburn Street where the historical data indicated negative growth over the last ten years since the opening of the Goulburn Hume Highway bypass. As such, Auburn Street volumes were assumed to remain the same in the Year 2018 base case model prior to any traffic reassignment as a result of the proposed road network hierarchy structure changes.

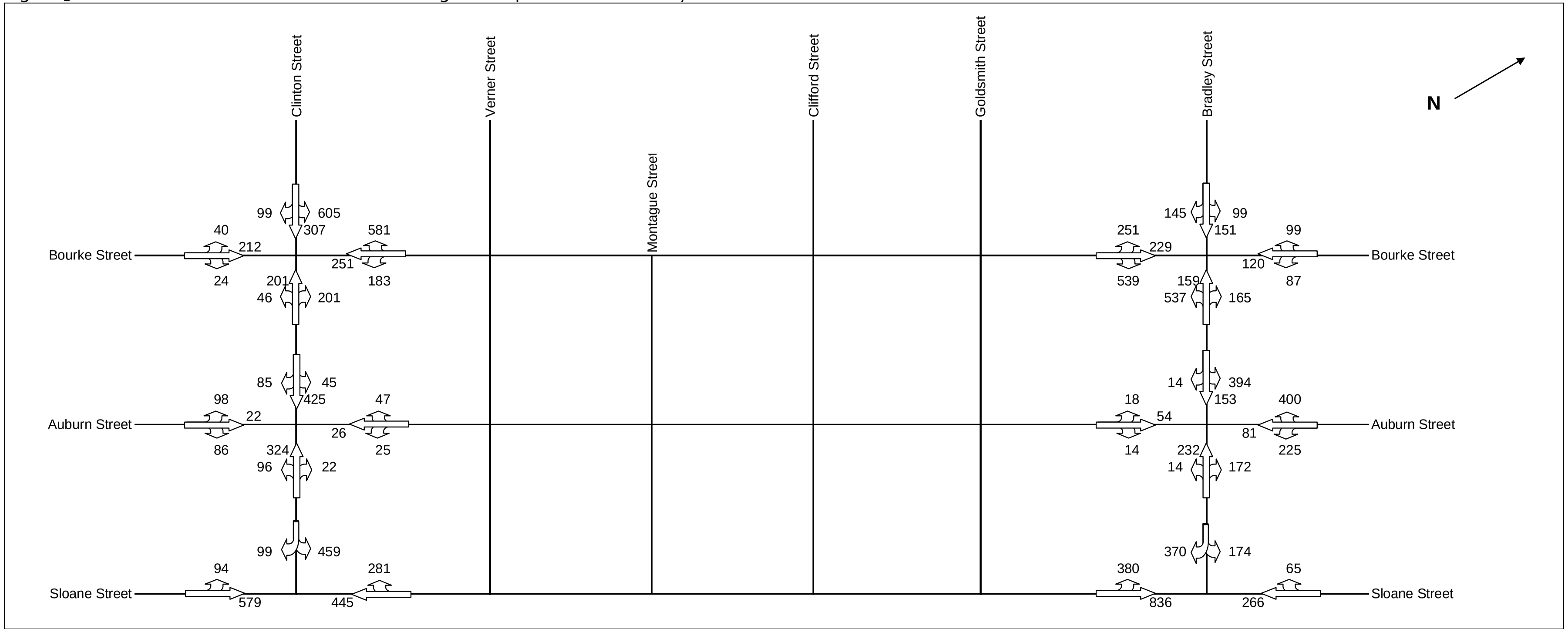
The following assumptions were made when reassigning traffic from Auburn Street to the network for the proposed new road hierarchy:

- 15% of traffic currently using Auburn Street is assumed as being through traffic, with the remaining 85% of traffic currently using Auburn Street to access the land uses within the CBD[1];
- All existing through traffic would be diverted in the future to Bourke Street and Sloane Street via Clinton Street or Bradley Street;
- 80% of existing traffic accessing the CBD would be diverted around Auburn Street in the future at Clinton Street and Bradley Street to on-street and off-street parking access points around the periphery of the CBD on the primary and secondary road network, including Bourke Street and Sloane Street; and
- The remaining 20% of existing traffic accessing the CBD via Auburn Street would continue to do so in the future.

Based on the above assumptions, Figure 3.2 has been prepared to show the estimated turning movements within the Goulburn CBD following changes to the road hierarchy.

[1] Based on discussions with Goulburn Mulwaree Council.

Figure 3.2: PM Peak Hour Traffic Volumes following Masterplan Road Hierarchy Modifications



Based on the existing conditions assessment presented in the Existing Conditions Assessment report, Tables 3.2 to 3.7 present a summary of the "Base Case" operation of the key intersections surrounding the Goulburn CBD, with full results presented in Appendix B of this report.

Table 3.2: Auburn Street/Clinton Street Intersection – Base Case Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	2	Right	0.306	38.6	44	C
East (Clinton St)	1	Left (45m)	0.391	25.5	35	B
North (Auburn St)	1	Left (20m)	0.215	36.5	10	C
West (Clinton St)	2	Through	0.547	22.8	126	B
Intersection	-	-	0.547	25.7	126	B

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.2 indicate that the intersection of Auburn Street/Clinton Street could be expected to operate with acceptable queuing and delays on all approaches. However, it would require some modifications to the existing signal phasing to maximise the intersection capacity. The phasing information is included in Appendix B.

Table 3.3: Clinton Street/Sloane Street Intersection – Base Case Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Sloane St)	1	Left (25m)	0.053	8.2	0	A
North (Sloane St)	2	Right	0.673	22.2	59	B
West (Clinton St)	2	Right	0.493	31.3	17	C
Intersection	-	-	0.678	10.6	59	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.3 indicate that the intersection of Clinton Street/Sloane Street could be expected to operate with acceptable queuing and delays on all approaches. No changes to its current layout are required.

Table 3.4: Clinton Street/Bourke Street Intersection – Base case Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bourke St)	2	Right	0.373	16.4	21	B
East (Clinton St)	2	Right	0.453	20.6	32	B
North (Bourke St)	2	Right	0.788	17.7	94	B
West (Clinton St)	2	Right	0.456	14.1	27	A
Intersection	-	-	0.788	12.4	94	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.4 indicate that the intersection of Clinton Street/Bourke Street could be expected to operate with acceptable queuing and delays on all approaches. No changes to its current layout are required.

Table 3.5: Auburn Street/Bradley Street Intersection – Base case Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	1	Right	0.152	17.5	9	B
East (Bradley St)	1	Right	0.504	15.2	33	B
North (Auburn St)	2	Right	0.380	12.3	24	A
West (Bradley St)	1	Right	0.536	12.9	34	A
Intersection	-	-	0.536	9.5	34	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.5 indicate that the intersection of Auburn Street/Bradley Street could be expected to operate with acceptable queuing and delays on all approaches. No changes to its current layout are required.

Table 3.6: Sloane Street/Bradley Street Intersection – Base case Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Sloane St)	1	Left	0.223	8.4	0	A
North (Sloane St)	2	Right (50m)	0.245	22.3	8	B
West (Bradley St)	2	Right	2.047	987.0	971	F
Intersection	-	-	2.047	179.1	971	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.6 indicate that the intersection of Sloane Street/Bradley Street would experience unacceptable delays and queuing on the west intersection approach as a result of issues with the right turn movement. The increased number of right turn movements expected at this intersection as part of the new road hierarchy would cause this movement to fail. As such, the intersection was modelled as a roundabout to determine if conversion would improve the operation of the intersection. The results are included in Table 3.7.

Table 3.7: Sloane St/Bradley St – Base case Operating Conditions in PM Peak – Modified Layout (Roundabout)

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Sloane St)	1	Left	0.870	8.3	135	A
North (Sloane St)	1	Right	0.340	12.5	16	A
West (Bradley St)	2	Right	0.515	17.8	40	B
Intersection	-	-	0.870	9.2	135	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.7 indicate that the modified intersection layout for the intersection of Sloane Street/Bradley Street would operate with acceptable queuing and delays on all approaches. However, further detailed analysis, including updated intersection count information, is required prior to implementing any mitigating works.

The intersection of Bradley Street and Bourke Street was modelled for the Base Case condition in its current layout and was found to experience unacceptable delays and queuing on all approaches. As such, the intersection was modified in the model to incorporate two approach lanes and two circulating lanes throughout the intersection which currently only provides for one-lane approaches and one circulating lane. The results of the analysis using the modified layout are included in Table 3.8.

Table 3.8: Bradley St/Bourke St Intersection – Base case Operating Conditions in PM Peak – Modified Layout

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bradley St)	2	Right	0.734	17.4	84	B
East (Bradley St)	2	Right	0.368	13.8	22	A
North (Bourke St)	2	Right	0.329	16.9	23	B
West (Bradley St)	2	Right	0.550	22.9	50	B
Intersection	-	-	0.734	13.9	84	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.8 indicate that the intersection of Bradley Street/Bourke Street could be expected to operate with acceptable queuing and delays on all approaches following modification of the intersection layout. However, further detailed analysis, including updated intersection count information, is required prior to implementing any mitigating works.

3.3 Post Development Analysis

3.3.1 Post Development Traffic Volumes

By adding the development traffic to the "Base Case" we can obtain the Post-Development traffic volumes. These are outlined in Figure 3.3.

3.3.2 Post Development Traffic Performance

Existing Intersections

The impact of the development traffic upon the existing key intersections in the vicinity of the site was assessed using *SIDRA INTERSECTION 3.2*. On the basis of the turning movement estimates presented in Figure 3.1, Tables 3.9 to 3.15 present a summary of the anticipated future operation of the key intersections surrounding the CBD following the full development of each of the sites. Detailed results of this analysis are provided in Appendix C of this report.

Table 3.9: Auburn Street/Clinton Street Intersection – Post Development Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	2	Right	0.313	38.7	45	C
East (Clinton St)	1	Left (45m)	0.449	26.4	40	B
North (Auburn St)	1	Left (20m)	0.215	36.5	10	C
West (Clinton St)	2	Through	0.621	23.8	145	B
Intersection	-	-	0.621	26.1	145	B

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.9 indicate that the intersection of Auburn Street/Clinton Street could be expected to operate with acceptable queuing and delays on all approaches. The phasing information required to maximise the intersection capacity is included in Appendix C.

Figure 3.3: Post-Development PM Peak Hour Traffic Volumes

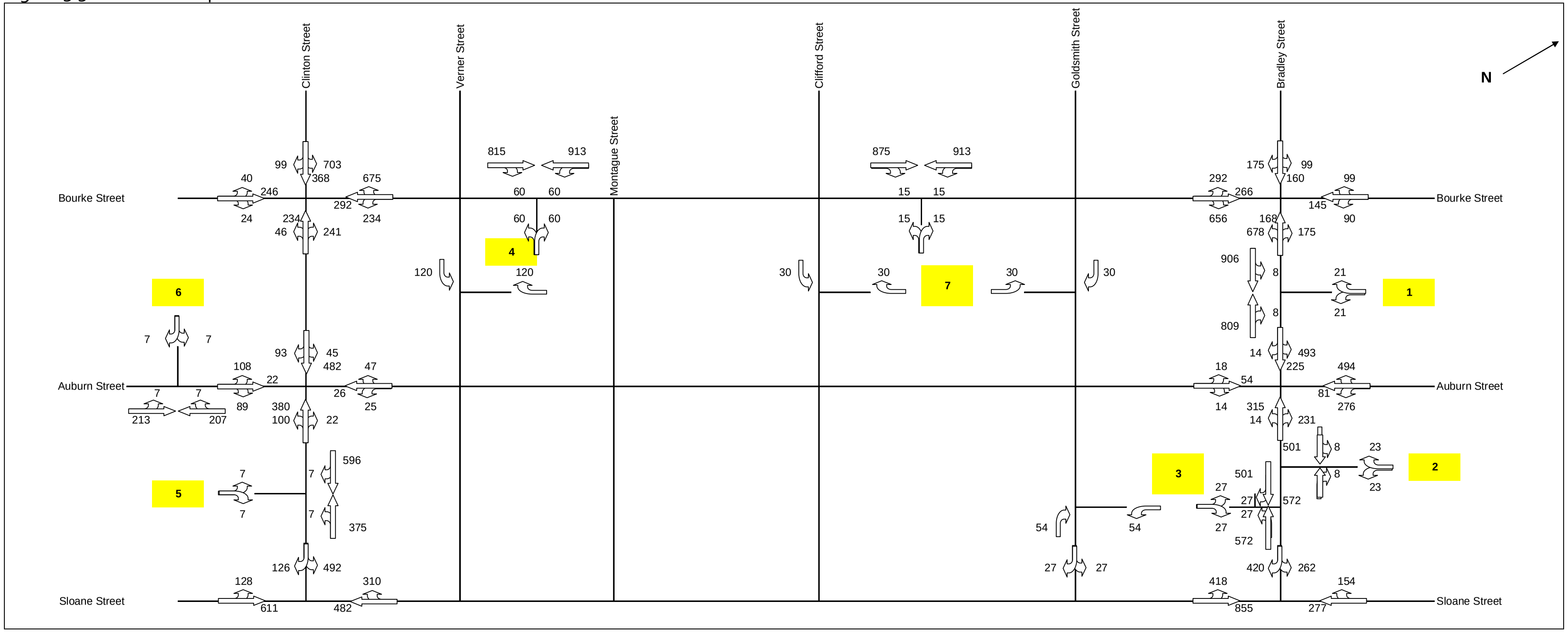


Table 3.10: Clinton Street/Sloane Street Intersection – Post Development Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Sloane St)	1	Left (25m)	0.073	8.2	0	A
North (Sloane St)	2	Right	0.797	27.8	73	B
West (Clinton St)	2	Right	0.747	48..4	31	D
Intersection	-	-	0.797	13.8	73	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.10 indicate that the intersection of Clinton Street/Sloane Street could be expected to operate with acceptable queuing and delays on the north and south approaches, with delays increasing on the west approach particularly for the right turn movement. To improve the average delay for this movement, one option would be to convert the intersection to a roundabout arrangement. However, any mitigating works should only be determined following reassessment of the traffic impacts at the development application stage with updated turning movement volumes.

Table 3.11: Clinton Street/Bourke Street Intersection – Post Development Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bourke St)	2	Right	0.510	20.5	35	B
East (Clinton St)	2	Right	0.732	38.9	69	C
North (Bourke St)	2	Right	0.981	40.6	270	C
West (Clinton St)	2	Right	0.565	16.1	41	B
Intersection	-	-	0.981	23.2	270	B

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.11 indicate that the intersection of Clinton Street/Bourke Street could be expected to operate with acceptable queuing and delays on all approaches except for the northern Bourke Street approach, where the length of queuing is unacceptable. In order to address this issue, the intersection was modelled again with reallocation of the lane configuration on the northern approach to allow right turn movements to be undertaken from both approach lanes. The results are included below in Table 3.12.

Table 3.12: Clinton St/Bourke St Intersection – Post Development Operating Conditions in PM Peak – Modified

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bourke St)	2	Right	0.410	16.4	22	B
East (Clinton St)	2	Right	0.423	16.1	22	B
North (Bourke St)	2	Right	0.658	16.7	61	B
West (Clinton St)	2	Right	0.559	16.0	40	B
Intersection	-	-	0.698	12.3	68	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.12 indicate that this change would reduce the queuing on the north approach and improve the overall operation of the intersection to Level of Service A. However, any mitigating works should only be determined following reassessment of the traffic impacts at the development application stage with updated turning movement volumes.

Table 3.13: Auburn Street/Bradley Street Intersection – Post Development Operating Conditions in PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	1	Right	0.221	22.0	14	B
East (Bradley St)	1	Right	0.760	21.5	80	B
North (Auburn St)	2	Right	0.493	12.9	36	A
West (Bradley St)	1	Right	0.750	15.7	75	B
Intersection	-	-	0.761	12.3	80	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.13 indicate that the intersection of Auburn Street/Bradley Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.14: Sloane St/Bradley St – Post Development Operating Conditions in PM Peak (Roundabout Layout)

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Sloane St)	1	Left	0.386	8.7	21	A
North (Sloane St)	1	Right	0.464	13.0	25	A
West (Bradley St)	2	Right	0.563	19.1	47	B
Intersection	-	-	0.621	10.0	47	A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.14 indicate that the intersection of Sloane Street/Bradley Street could be expected to operate with acceptable queuing and delays on all approaches as a roundabout layout.

Table 3.15: Bradley St/Bourke St – Post Development Operating Conditions in PM Peak – Modified Layout

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bradley St)	2	Right	0.647	16.0	62	B
East (Bradley St)	2	Right	0.429	14.5	27	A
North (Bourke St)	2	Right	0.450	21.4	36	B
West (Bradley St)	2	Right	0.551	33.0	44	C
Intersection	-	-	0.655	16.3	64	B

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.15 indicate that the intersection of Bradley Street/Bourke Street could be expected to operate with acceptable queuing and delays on all approaches following modification of the intersection layout. Further modification may be required including widening the circulating area to allow two circulating lanes. However, further detailed analysis in the development application stage, including updated intersection count information, is required to be undertaken prior to implementing any mitigating works.

Unsignalised Intersections

The impact of the development traffic upon the proposed unsignalised access points leading to each of the development sites were assessed using *SIDRA INTERSECTION 3.2*.

The results of this analysis are set out in Tables 3.16 to 3.27, with detailed results included in Appendix C of this report.

Table 3.16: Site 1 Bradley Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
East (Bradley St)	2	Right (20m)	0.022	16	1	B
North (Site Access)	2	Right	0.229	48.4	6	D
West (Bradley St)	1	Left (20m)	0.005	8.4	0	A
Intersection	-	-	0.505	0.9	6	N/A

Note: 1. Movement with the greatest value of average delay.

Table 3.16 indicates that some delays may be expected for the right turn movement out of the site with average delays causing it to operate at Level of Service D. This is as a result of the high traffic volumes along Bradley Street. Prior to consideration of any mitigating works, this access would need to be reassessed at the development application stage using updated traffic volumes for Bradley Street.

Table 3.17: Site 2 Bradley Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
East (Bradley St)	2	Right (20m)	0.013	11.3	0	A
North (Site Access)	2	Right	0.081	19.3	2	B
West (Bradley St)	1	Left (20m)	0.005	8.4	0	A
Intersection	-	-	0.319	0.8	2	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.17 indicate that the Site 2 access at Bradley Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.18: Site 3 Bradley St Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Site Access)	2	Right	0.098	19.9	3	B
East (Bradley St)	1	Left (20m)	0.015	8.4	0	A
West (Bradley St)	2	Right (20m)	0.040	11.9	1	A
Intersection	-	-	0.319	1.2	3	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.18 indicate that the Site 3 access at Bradley Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.19: Site 3 Goldsmith Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
East (Goldsmith St)	2	Right (20m)	0.073	10.3	2	A
North (Site Access)	2	Right	0.011	26.1	0	B
West (Goldsmith St)	1	Left (20m)	0.001	8.2	0	A
Intersection	-	-	0.223	1.3	3	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.19 indicate that the Site 3 access at Goldsmith Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.20: Site 4 Verner Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
East (Verner St)	2	Right (20m)	0.005	14.1	0	A
North (Site Access)	2	Right	0.304	17.3	11	B
West (Verner St)	1	Left (20m)	0.070	8.4	0	A
Intersection	-	-	0.304	3.0	11	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.20 indicate that the Site 4 access at Verner Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.21: Site 4 Bourke Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bourke St)	2	Right (20m)	0.074	15.8	2	B
East (Site Access)	2	Right	0.381	61.3	11	E
North (Bourke St)	1	Left (20m)	0.018	8.4	0	A
Intersection	-	-	0.509	1.7	11	N/A

Note: 1. Movement with the greatest value of average delay.

Table 3.21 indicates that some delays may be expected for the right turn movement out of the site with average delays causing it to operate at Level of Service E. This is as a result of the high traffic volumes along Bourke Street. Prior to consideration of any mitigating works, this access would need to be reassessed at the development application stage using updated traffic volumes for Bourke Street.

Table 3.22: Site 5 Clinton Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Site Access)	2	Right	0.033	22.3	1	B
East (Clinton St)	1	Left (20m)	0.004	8.2	0	A
West (Clinton St)	2	Right	0.171	10.3	13	A
Intersection	-	-	0.171	0.9	13	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.22 indicate that the Site 5 access at Clinton Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.23: Site 6 Auburn Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	1	Left (20m)	0.061	8.2	0	A
North (Auburn St)	2	Right (20m)	0.061	9.1	4	A
West (Site Access)	2	Right	0.014	11.9	0	A
Intersection	-	-	0.061	0.8	4	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.23 indicate that the Site 6 access at Auburn Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.24: Site 7 Goldsmith Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Site Access)	2	Right	0.004	21.4	0	B
East (Goldsmith St)	1	Left (20m)	0.001	8.2	0	A
West (Goldsmith St)	2	Right	0.044	11.4	1	A
Intersection	-	-	0.335	0.6	2	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.24 indicate that the Site 7 access at Goldsmith Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.25: Site 7 Clifford Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
East (Clifford St)	2	Right (20m)	0.001	10.8	0	A
North (Site Access)	2	Right	0.096	17.8	3	B
West (Clifford St)	1	Left	0.017	8.2	0	A
Intersection	-	-	0.278	0.8	3	N/A

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.25 indicate that the Site 7 access at Clifford Street could be expected to operate with acceptable queuing and delays on all approaches.

Table 3.26: Site 7 Bourke Street Access – Future PM Peak

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Bourke St)	2	Right (20m)	0.072	15.3	2	B
East (Site Access)	2	Right	0.410	66.1	11	E
North (Bourke St)	1	Left (20m)	0.017	8.2	0	A
Intersection	-	-	0.509	1.7	11	N/A

Note: 1. Movement with the greatest value of average delay.

Table 3.26 indicates that delays may be expected for the right turn movement out of the site access with average delays causing it to operate at Level of Service E. This is as a result of the high traffic volumes along Bourke Street. Prior to consideration of any mitigating works, this access would need to be reassessed at the development application stage using updated traffic volumes for Bourke Street.

3.4 Mitigating Measures and Intersection Works

3.4.1 Auburn Street and Bradley Street

The intersection of Auburn Street and Bradley Street currently operates as a roundabout. Roundabouts do not always cater adequately for pedestrian movements, yet the proposed development around the Auburn Street/Bradley Street intersection would generate an increase in the level of pedestrian activity and crossing movements. This pedestrian activity is likely to occur during the lunch peak when commercial workers walk to get lunch, go shopping, etc and also on evenings and weekends with residents travelling to the CBD/retail area.

Whilst the roundabout is expected to operate satisfactorily with the proposed future traffic volumes, it is recommended that this intersection be considered for conversion to a signalised intersection, potentially with a scramble crossing phase. The operation of this intersection as a signalised intersection has been modelled in *SIDRA INTERSECTION 3.2*. Figure 3.4 shows the recommended layout for this intersection, while Table 3.27 presents a summary of the anticipated future operation of this intersection following the full development of the Masterplan sites, with detailed results provided in Appendix C of this report.

Figure 3.4: Auburn St/Bradley St Intersection Layout – Traffic Signals

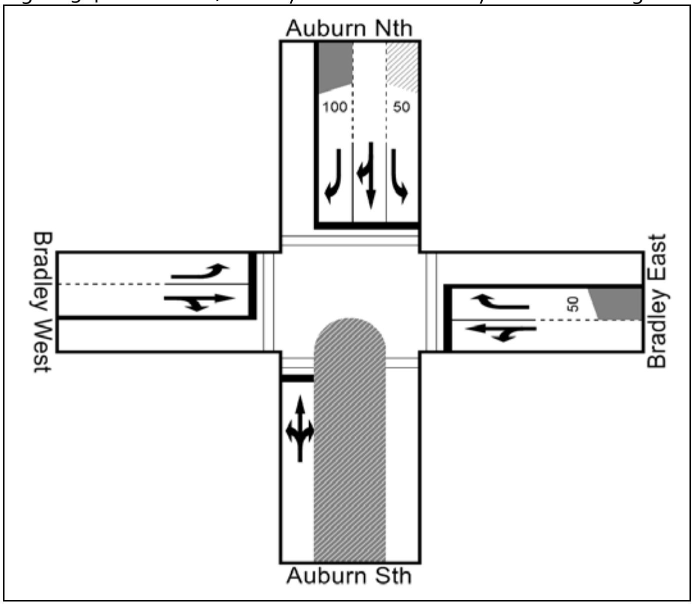


Table 3.27: Auburn St/Bradley St – Post Development Operating Conditions in PM Peak – Traffic Signal Layout

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	1	Right	0.270	37.9	30	C
East (Bradley St)	2	Right (50m)	0.915	43.2	72	D
North (Auburn St)	3	Right (100m)	0.891	36.5	131	C
West (Bradley St)	2	Right	0.716	39.6	76	C
Intersection	-	-	0.915	29.2	131	C

Note: 1. Movement with the greatest value of average delay.

The results in Table 3.27 indicate that the intersection of Auburn Street and Bradley Street could be expected to operate with acceptable queuing and delays on most approaches, with some delays increasing for the right turn movement on the Bradley Street east approach. However, the intersection as a whole would operate at an acceptable Level of Service C. The phasing information required to maximise the intersection capacity is included in Appendix C. It is recommended that prior to undertaking any mitigating works, this intersection be reassessed at the development application stage using updated traffic volumes for each of the turning movements.

3.4.2 Auburn Street and Montague Street

To improve accessibility for pedestrians through the CBD at traffic signals, it is recommended that a scramble crossing phase be implemented within the signal phasing for the intersection of Auburn Street and Montague Street. The scramble crossing phase would allocate a stage in the signal phase that would allow all pedestrian movements to occur simultaneously, including diagonal movements. This is consistent with the adjacent streetscape works and pedestrian-priority treatments to be implemented in the vicinity of this intersection and the park. The signalised intersection of Auburn

Street and Montague Street has been assessed using *SIDRA INTERSECTION 3.2* to determine the suitability for the proposed signal phasing changes using the existing intersection traffic volumes. The results are included in Table 3.28 and Table 3.29.

Table 3.28: Auburn St/Montague St – Existing PM Peak incorporating Scramble Crossing Phase

Approach	Critical Turning Movements[1]					
	Lane No.	Movements (Short Lane Length)	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service
South (Auburn St)	2	Right	0.803	33.5	152	C
East (Montague St)	2	Right	0.432	44.0	42	D
North (Auburn St)	2	Right	0.884	39.0	208	C
West (Montague St)	2	Right	0.818	52.4	70	D
Intersection	**-**	**-**	**0.885**	**40.3**	**120**	**C**

Note: 1. Movement with the greatest value of average delay.

Table 3.29: Auburn St/Montague St – PM Peak with and without Scramble Crossing Phase – Comparison of Pedestrian Delays

Movement	Without Scramble Crossing Phase		With Scramble Crossing Phase	
	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of Service
E-W (South – Auburn St)	26.6	C	39.2	D
N-S (East – Montague St)	11.4	B	38.3	D
E-W (North – Auburn St)	26.6	C	39.2	D
N-S (West – Montague St)	11.4	B	38.3	D
All pedestrians	**19.0**	**B**	**38.7**	**C**

The results in Table 3.28 indicate that the intersection of Auburn Street and Montague Street would be able to operate with a scramble crossing phase with some queuing and delays on all approaches. However, the intersection as a whole would operate at an acceptable Level of Service C, with each of the 95th percentile queue lengths avoiding extension into any upstream intersections.

In terms of the pedestrian delays and levels of service, the results in Table 3.29 indicate that the scramble crossing phase would increase delays for pedestrians crossing on a single east-west or north-south movement. However, the delays are comparable for diagonal movements, where the delays could be expected to be in the order of 38 seconds without the scramble crossing phase and 39 seconds with the scramble crossing phase. The scramble crossing phase has added safety benefits in that pedestrians are never competing with vehicles within the same phase, which is particularly beneficial for less mobile pedestrians that are able to cross without the pressure of turning vehicles. This is an important safety benefit for an area where pedestrian movements are sought to be encouraged in the future.

It should be noted that this analysis represents the worst case scenario for this intersection. As a result of the proposed Masterplan streetscape works and encouragement of traffic away from Auburn Street, it is likely that this intersection would operate in the future with fewer traffic volumes due to reduced vehicle numbers along Auburn Street, including movements turning from and to Auburn Street. This would in turn reduce the length of cycle time required to maximise the intersection capacity, resulting in reduced pedestrian and vehicle delays and corresponding Levels of Service.

4. Car Parking

4.1 Anticipated Future Parking Requirement

4.1.1 Design Rates

Requirements for the provision of car parking are set out in the Goulburn Mulwaree Development Control Plan No. 8 – Off Street Parking Code. Where a specific land use is not referenced in the DCP, the RTA Guide to Traffic Generating Developments and previous surveys undertaken by GTA Consultants have been referenced.

Details of the parking rates relevant to each of the development proposals are set out in Table 4.1.

Table 4.1: Parking Rates

Land Use	Parking Rate
Retail (Large floor plate- bulky goods)	DCP/RTA: No rate given GTA: Weekday= 1.33 spaces per 100m2 GLFA (85th percentile) Weekend= 1.74 spaces per 100m2 GLFA (85th percentile)
Retail (Large floor plate- supermarket)	DCP: 4.4 spaces/100m2 GLFA for developments of 200m2 or greater
Retail (Small floor plate- specialty shops)	DCP: 1 space per 40m2 GFA for shops less than 200 m2 GFA
Commercial	DCP: Office- 1 space per 40m2 GFA
Residential (Apartments)	DCP: Multi-unit development- 1 space per dwelling (small) plus 1.5 spaces/ dwelling (medium) plus 2 spaces/dwelling (large) plus 0.25 spaces/dwelling (visitor spaces)
Residential (Townhouses)	DCP: Multi-unit development- 1 space per dwelling (small) plus 1.5 spaces/ dwelling (medium) plus 2 spaces/dwelling (large) plus 0.25 spaces/dwelling (visitor spaces)
Residential (Mews houses)	DCP: Multi-unit development- 1 space per dwelling (small) plus 1.5 spaces/ dwelling (medium) plus 2 spaces/dwelling (large) plus 0.25 spaces/dwelling (visitor spaces)

4.1.2 Parking Requirement

Table 4.2 has been prepared to show the future parking requirement based on the proposed land use types and areas and using the rates specified above.

Table 4.2: Parking Requirement

Site No.	Land Use	GFA	Parking Rate	Parking Requirement
1	Residential (apartments x 30)	2,100m²	1 space per dwelling (small) plus 0.25 spaces per dwelling (visitor spaces)	37 spaces
	Commercial	2,100m²	1 space per 40m² GFA	52 spaces
2	Residential (apartments x 20)	1,400m²	1 space per dwelling (small) plus 0.25 spaces per dwelling (visitor spaces)	25 spaces
	Commercial	2,500m²	1 space per 40m² GFA	62 spaces
3	Retail (large floor plate – bulky goods x 3)	9,950m²	1.74 spaces per 100m² GLFA [1]	130 spaces
	Retail (small floor plate x 13)	1,300m²	1 space per 40m² GFA	32 spaces
4	Retail (large floor plate – supermarket x 1)	2,400m²	4.4 spaces per 100m² GLFA [1]	79 spaces
	Retail (small floor plate x 36)	5,400m²	1 space per 40m² GFA	135 spaces
5	Residential (townhouses x 8)	1,200m²	1.5 spaces per dwelling (medium) plus 0.25 spaces per dwelling (visitor spaces)	14 spaces
	Residential (apartments x 36)	3,960m²	1 space per dwelling (small) plus 0.25 spaces per dwelling (visitor spaces)	45 spaces
	Residential (mews houses x 5)	450m²	1 spaces per dwelling (small) plus 0.25 spaces per dwelling (visitor spaces)	6 spaces
6	Residential (townhouses x 14)	2,100m²	1.5 spaces per dwelling (medium) plus 0.25 spaces per dwelling (visitor spaces)	24 spaces
	Residential (apartments x 34)	2,380m²	1 space per dwelling (small) plus 0.25 spaces per dwelling (visitor spaces)	42 spaces

Notes: [1] Gross Leasable Floor Area (GLFA) is assumed to be 75% of the GFA, as per the RTA Guide to Traffic Generating Developments.

4.2 Loss of On-Street Parking

On-street parking numbers are to be reduced as a result of the Masterplan streetscape proposals. The following locations are to be affected:

- Auburn Street between Clinton Street and Verner Street – loss of 14 spaces on east side and 14 spaces on west side;
- Auburn Street between Verner Street and Montague Street – loss of 17 spaces on east side and 18 spaces on west side;
- Auburn Street between Montague Street and Market Street – loss of 15 spaces on east side and 18 spaces on west side;
- Auburn Street between Goldsmith Street and Bradley Street – loss of 11 spaces on east side and 21 spaces on west side;
- Montague Street between Bourke Street and Sloane Street – angle parking replaced with parallel parking resulting in loss of 18 spaces on north side and 42 spaces on south side; and
- Market Street between Auburn Street and Sloane Street – angle parking replaced with parallel parking resulting in loss of 14 spaces on north side and 19 spaces on south side.

The above indicates that there will be a total loss of 221 on-street spaces as a result of Masterplan streetscape proposals for the Goulburn CBD.

4.3 Adequacy of Parking Supply

4.3.1 Masterplan Streetscape Works excluding Future Development

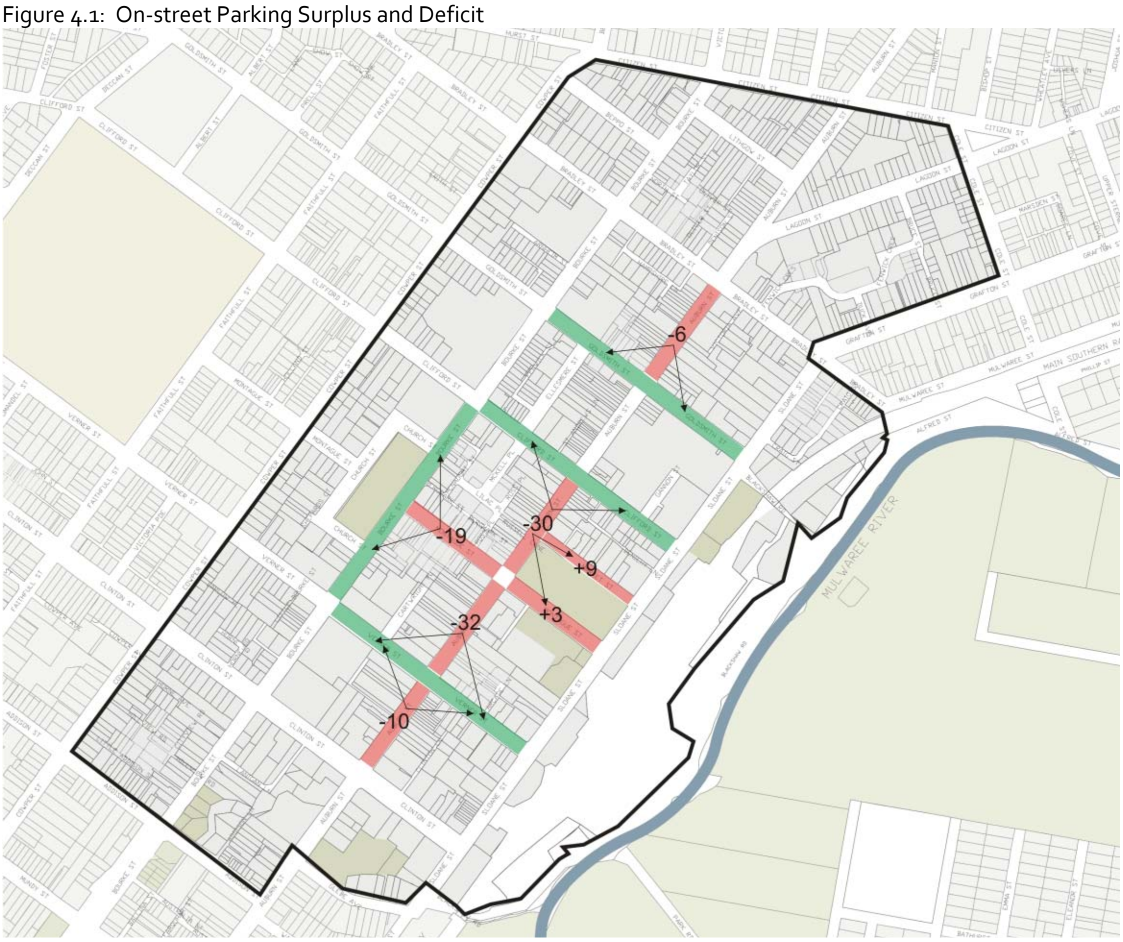
An assessment of the spare capacity within the existing surrounding on-street parking areas to accommodate loss of parking resulting from the streetscape proposals was undertaken, the details of which are indicated in Table 4.3.

Table 4.3: On-street Car Parking Assessment

Location	No. of Parking Spaces	Reduced No. of Parking Spaces	Existing Peak Demand	Surplus/Deficit
Auburn Street				
Between Clinton Street and Verner Street	58	30	40	-10
Between Verner Street and Montague Street	72	37	69	-32
Between Montague Street and Market Street	52	19	49	-30
Between Goldsmith Street and Bradley Street	64	32	38	-6
Montague Street				
Between Bourke Street and Auburn Street	81	49	68	-19
Between Auburn Street and Sloane Street	69	41	38	+3
Market Street				
Between Auburn Street and Sloane Street	93	60	51	+9

Table 4.3 indicates that there would be adequate capacity in Market Street to accommodate the loss of parking resulting from the Masterplan streetscape works. However, there would be a parking deficit in both Auburn Street and Montague Street. The surplus and deficit locations are shown in red in Figure 4.1.

Figure 4.1: On-street Parking Surplus and Deficit



The existing on-street parking deficit would need to be accommodated on nearby streets as close as possible to where the parking has been lost. Assessment of the parking demand survey data for the nearby streets of Bourke Street, Verner Street, Clifford Street and Goldsmith Street during peak times indicates that there is sufficient available parking capacity in these streets to accommodate the parking deficit as indicated in Figures 4.2 to 4.5.

Figure 4.2: Bourke Street Parking Demand

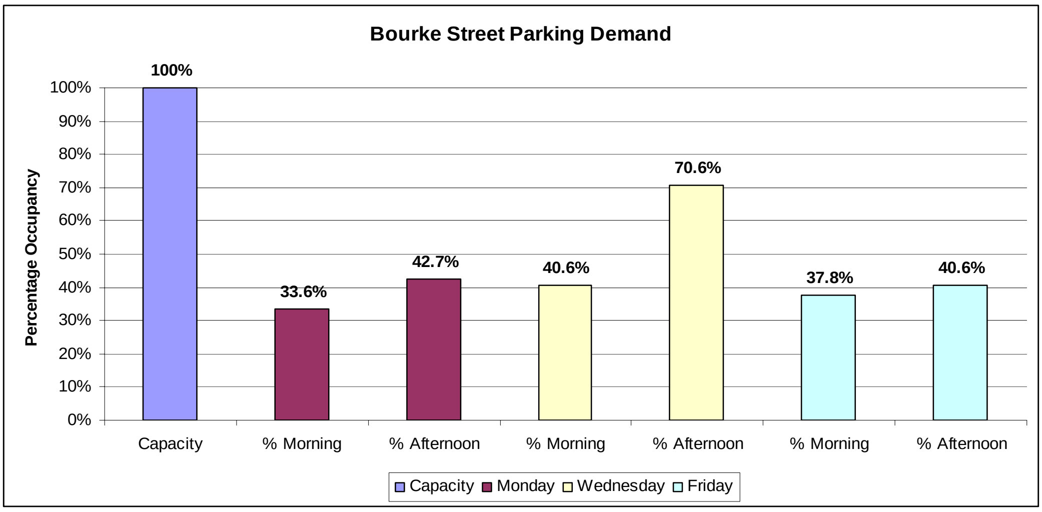


Figure 4.3: Verner Street Parking Demand

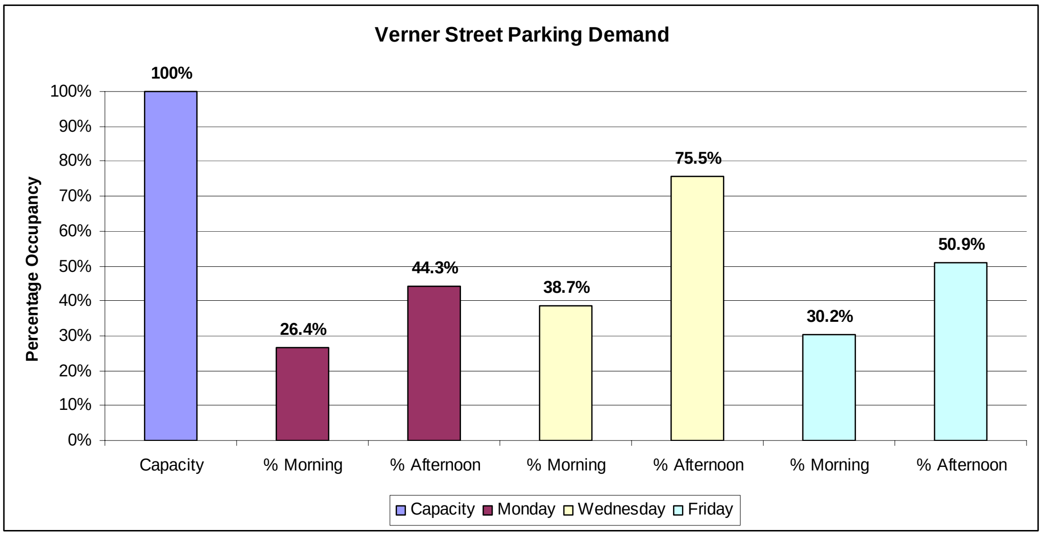


Figure 4.4: Clifford Street Parking Demand

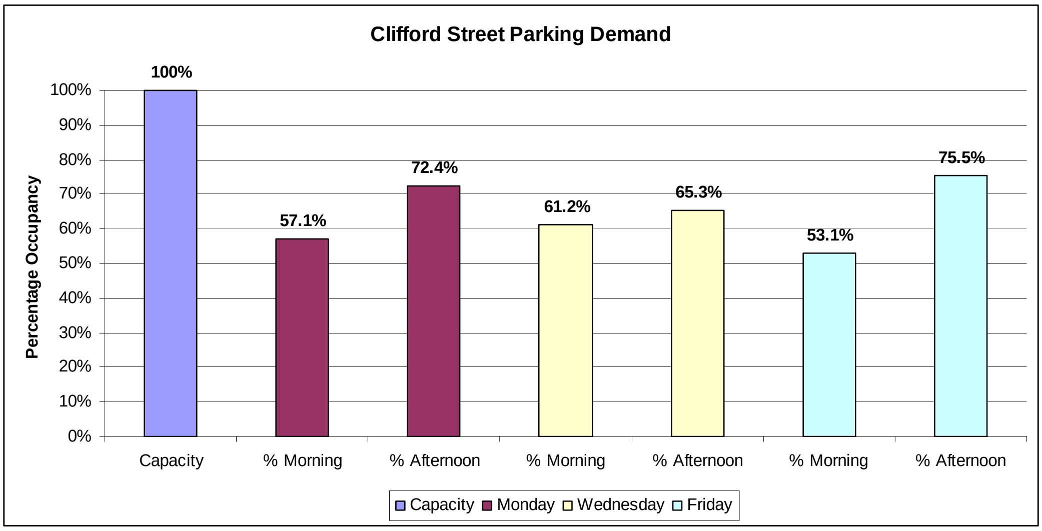
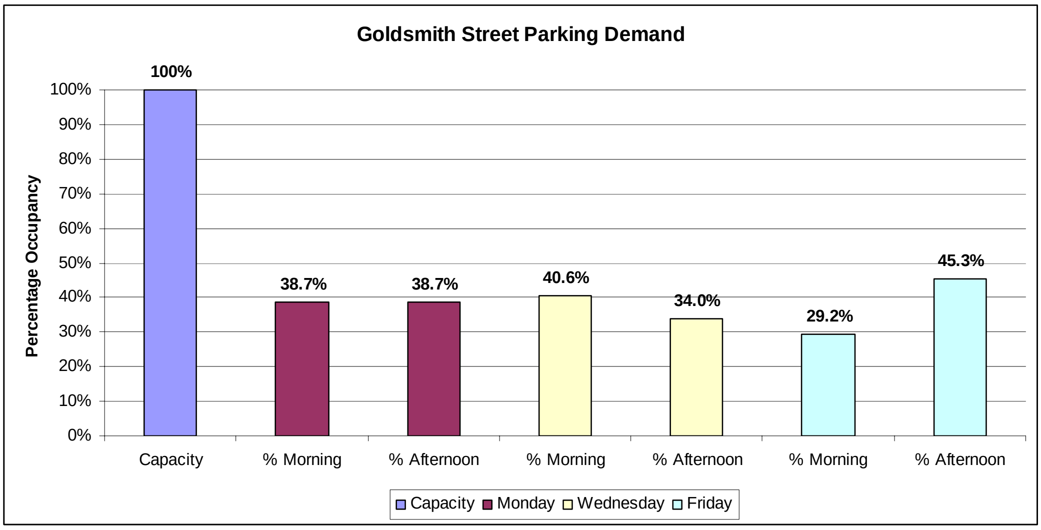


Figure 4.5: Goldsmith Street Parking Demand



4.3.2 Masterplan Streetscape Works including Future Development

Each of the new development sites are proposed to have parking accommodated on-site sufficient to meet the needs of the proposed land use. Table 4.4 shows the difference between the parking requirement (specified in Table 4.1) and the proposed supply.

Table 4.4: Proposed Parking Supply vs. Parking Requirement

Site No.	Land Use	Parking Requirement	Proposed Supply	Difference
1	Residential (apartments x 30)	37 spaces	30 spaces	-7 spaces
	Commercial	52 spaces	28 spaces	-24 spaces
2	Residential (apartments x 20)	25 spaces	20 spaces	-5 spaces
	Commercial	62 spaces	34 spaces	-28 spaces
3	Retail (large floor plate – bulky goods x 3)	130 spaces	126 spaces	-4 spaces
	Retail (small floor plate x 13)	32 spaces	17 spaces	-15 spaces
4	Retail (large floor plate – supermarket x 1)	79 spaces	30 spaces	-49 space
	Retail (small floor plate x 36)	135 spaces	68 spaces	-67 spaces
5	Residential (townhouses x 8)	14 spaces	12 spaces	-2 spaces
	Residential (apartments x 36)	45 spaces	36 spaces	-9 spaces
	Residential (mews houses x 5)	6 spaces	5 spaces	-1 space
6	Residential (townhouses x 14)	24 spaces	21 spaces	-3 spaces
	Residential (apartments x 34)	42 spaces	34 spaces	-8 spaces
Total		**683 spaces**	**461 spaces**	**-222 spaces**

Table 4.4 indicates that there would be future deficit of 222 spaces which must either be accommodated through additional on-site parking or elsewhere within the CBD.

The additional parking should be designed to accommodate the typical parking characteristics of the proposed land uses. The parking associated with the different land uses is as follows:

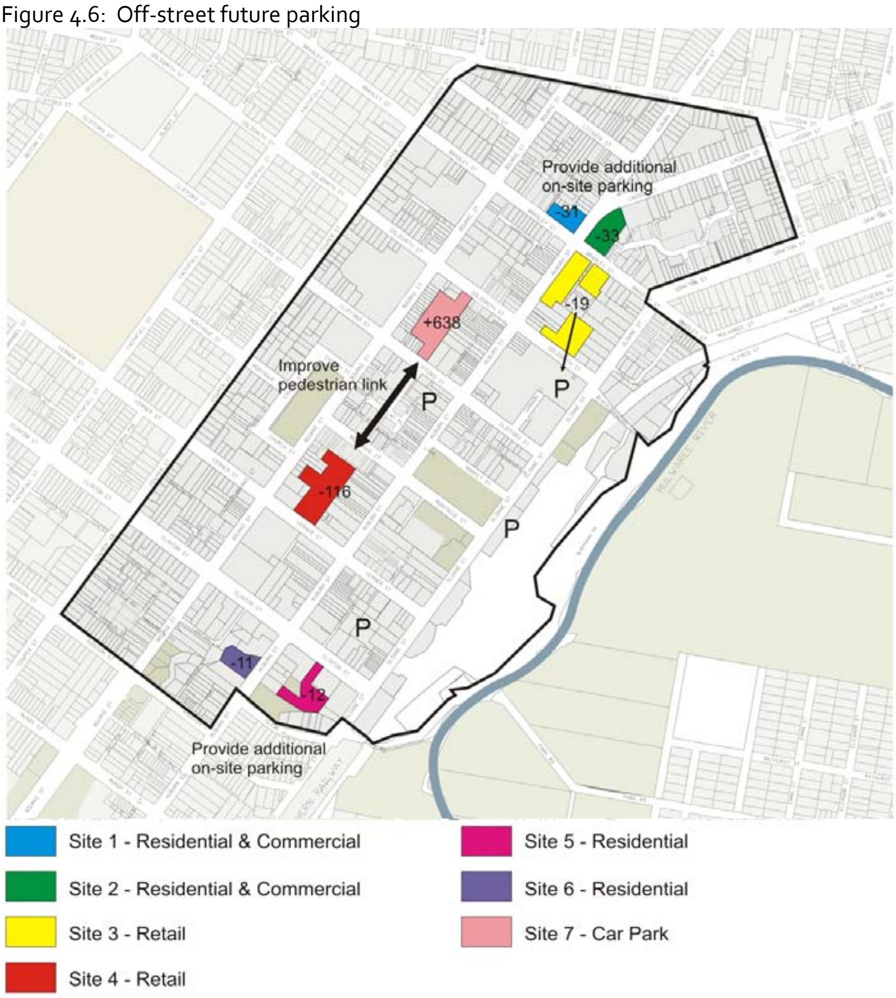
- Residential land uses – long-term resident parking;
- Commercial land uses – long-term staff parking; and
- Retail – short-term shopper/visitor parking short-term.

With regards to the residential land uses within Site No. 1, 2, 5 and 6 it is recommended that proposed on-site parking supply be increased in accordance with the DCP parking requirements. This would remove the need for long-term parking to be accommodated on-street and would allow all residents to park their vehicles on-site.

With regards to commercial land uses within Site No. 1 and 2, it is recommended that the proposed on-site parking supply be increased in accordance with the DCP parking requirements to remove the long-term staff parking vehicles from being on-street. Due to the close proximity of the proposed expanded Ellesmere Street car park, there is an opportunity to allocate a section of this redeveloped car park for use by long-term staff parking for the nearby commercial land uses.

With regards to parking associated with the retail land uses within Site No. 3 and 4, there is an opportunity to use the existing on-street and off-street parking to accommodate the difference in the parking requirement and the proposed on-site supply. Site No. 3 is located in close proximity to the existing multi-level car park on the corner of Goldsmith Street and Sloane Street. There is expected to be adequate capacity within this 452-space car park to accommodate the expected peak deficit of 19 spaces. There is also available on-street parking capacity within the adjoining streets of Goldsmith Street and Bradley Street. Site No. 4 has a deficit of 116 spaces, but is located approximately 350m from the Ellesmere Street car park, which is proposed to be expanded to accommodate up to 750 spaces. Whilst it would be preferable to have a parking supply to meet the requirement accommodated within or adjacent to the site, there is an opportunity to improve pedestrian facilities through Ross Place and McKell Place between Montague Street and Clifford Street to provide an accessible link between the proposed retail area and available off-street parking. Figure 4.6 details the above discussion.

Figure 4.6: Off-street future parking



5. Transport Infrastructure Improvements

5.1 Train

Currently the train station is in an isolated location in terms of proximity to the CBD and accessibility to a range of other transport modes. To encourage the use of trains, it is recommended that improvements be made to the accessibility to the train station for all connecting transport modes, including buses, pedestrians, cyclists, taxis and vehicles drop-off/pick-up (i.e. kiss-and-ride). Such measures include:

- Encourage the inclusion of the railway station as part of all local bus routes. Currently there is a bus zone at the station entrance which can be used for this purpose;
- Provide bicycle parking at the railway station, particularly secure bicycle lockers which provide a high level of security for long-term commuter parking;
- Develop a comprehensive directional signage strategy for pedestrians to encourage and raise awareness of the links between the CBD and the station; and
- Provide kiss-and-ride facilities for vehicle drop-off and pick-up.

There is currently a taxi zone provided at the railway station entrance.

Along with improved accessibility, public consultation undertaken as part of the development process for the Goulburn Mulwaree Strategy 2020 indicated that increased train services to the city are required to accommodate future growth in Goulburn. Increasing the number of train services between Goulburn and Sydney would be a positive measure which would not only encourage people to live in Goulburn but would attract more visitors.

5.2 Buses

Discussions with Council staff indicated that current patronage of the local bus services is low. Whilst there are some bus routes currently servicing the local network, there are some improvements that could be made to the existing services to help increase patronage and establish the bus as a more viable transport option. Some initiatives may include:

- Continue to run bus routes along Auburn Street, to provide convenient access through a direct service into the CBD; and
- Increase the frequency of the existing services. Services are currently very infrequent, with all four existing routes currently providing frequencies anywhere from 20 to 30 minutes in the peak periods up to 3 hours in off-peak times. In consultation with the Ministry of Transport and local bus operators, service frequencies should be encouraged to be improved to a regular frequency of 30 minutes including off-peak times.

5.3 Pedestrians

Auburn Street is the main street through the Goulburn CBD and as such, there is a high level of pedestrian activity along both sides as well as crossing over Auburn Street. Through the proposed Masterplan treatments for the CBD, Auburn Street is to be encouraged to become more pedestrian friendly due to the increased safety benefits. The proposed treatments may include:

- Reduced speed limit, including posted speed limit reductions along with physical measures such as traffic calming and streetscape improvement measures;
- Reduced traffic volumes due to redirecting of traffic from Auburn Street;
- Footpath widening;
- Scramble crossings at signalised intersections where suitable; and
- Marked zebra mid-block crossing points in place of the pedestrian refuge crossings between signals where pedestrians are given priority over vehicles.

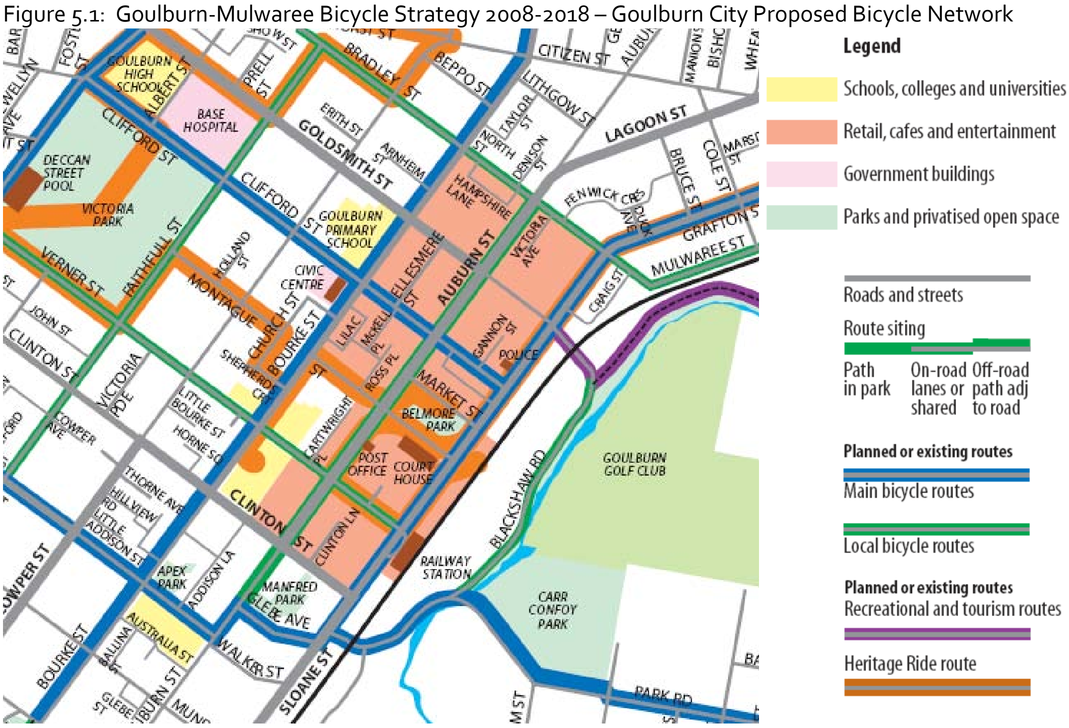
Other initiatives which may be implemented to improve facilities for pedestrians in the Goulburn CBD include:

- Establishing a strong link between Ellesmere Street and Cartwright Place to provide direct access for pedestrians between the parking structure and retail developments; and
- Establishing a pedestrian bridge link across the railway line as an extension of Montague Street from the CBD to the proposed future Riverside Park at Blackshaw Road.

5.4 Cyclists

It is important that any proposed Masterplan works take into consideration the routes detailed in the latest bicycle plans. Figure 5.1 indicates the proposed future bicycle routes for Goulburn City as part of the Goulburn-Mulwaree Bicycle Strategy 2008-2018.

Figure 5.1: Goulburn-Mulwaree Bicycle Strategy 2008-2018 – Goulburn City Proposed Bicycle Network



The routes within the Goulburn CBD are as follows:

- Main Bicycle Routes:
  - Sloane Street – bicycle shoulder lanes,
  - Clifford Street – bicycle shoulder lanes,
  - Bourke Street – shared path (off-road),
  - Addison Street/Glebe Avenue/Park Road – bicycle shoulder lanes;
- Local Bicycle Routes:
  - Auburn Street – bicycle shoulder lanes,
  - Verner Street – mixed traffic (logos and intersection markings),
  - Bradley Street – mixed traffic (logos and intersection markings),
  - Blackshaw Road – shared path (off-road);
- Recreational and Tourism Routes:
  - Blackshaw Road/Mulwaree River – bicycle shoulder lanes and off-road shared path; and
- Heritage Ride Route:
  - Belmore Park, Market Street, Montague Street, Bourke Street, Verner Street, Sloane Street, Church Street – mostly on-road mixed traffic, directional signage provided.

Currently Bradley Street between Bourke Street and Sloane Street is proposed to be treated as a local route with an on-road mixed traffic arrangement. However as a result of the proposed road hierarchy changes, future traffic volumes on Bradley Street are expected to be in excess of 10,000 vehicles per day (i.e. similar to the volumes currently carried by Auburn Street) with a speed limit of 60km/h, which would require a higher level of bicycle facility. Consideration needs to be made to the implementation of more formal bicycle facilities such as bicycle shoulder lanes on this section of Bradley Street to provide increased safety to cyclists.

The bicycle plan suggests implementation of bicycle shoulder lanes on Auburn Street between Addision Street and Bradley Street. However, the Masterplan Heritage Core layout proposed for this section of Auburn Street mixes cyclists with other vehicles in a mixed traffic arrangement. Implementation of the Masterplan measures would reduce the number of vehicles using Auburn Street to somewhere in the order of 3,000 to 4,000 vehicles per day, along with a reduction in the speed limit to 40km/h. Figure 3.2 of the NSW Bicycle Guidelines indicates that a mixed traffic arrangement would be suitable for the proposed traffic speed and volume.

5.5 Railway Crossing

The existing cross section at the railway crossing of Blackshaw Road to the northeast of the station is proposed to be upgraded to accommodate vehicles, pedestrians and cyclists.

The latest bicycle plan indicates an on-road arrangement of bicycle shoulder lanes in this location. The relevant standards indicate a minimum roadway width of 6.0m for vehicles (one lane in each direction) with a minimum 1.5m wide bike lane in each direction. To accommodate pedestrian movements, a separate footpath with minimum width of 1.2m would need to be provided on at least one side of the carriageway with a minimum clearance of 1.0m from the edge of the carriageway. This would equate to a total carriageway width of 11.2m.

Alternatively an off-road shared bicycle and pedestrian path could be implemented on one side of the carriageway. The shared path would need to be a minimum width of 2.5m with a minimum clearance of 1.0m from the edge of the carriageway. With a road carriageway width of 6.0m, this would result in a minimum carriageway width of 9.5m.

6. Conclusions and Recommendations

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

i The Masterplan proposes to update the existing road hierarchy in support of the Masterplan objectives and in order to further improve pedestrian safety and amenity on Auburn Street. Both through vehicles and those seeking to access the CBD are to be encouraged to bypass the Goulburn CBD via Bourke and Sloane Streets at the proposed "Gateways" at Bradley Street and Clinton Street. Diverting the Auburn Street vehicle movements enables pedestrian amenity to be maximised within the CBD core;

ii It is proposed that Bradley Street (Auburn Street to Bourke Street) and Bourke Street (Bradley Street to Clinton Street), which are currently classified as Local Roads, would be reclassified as arterial (State) roads;

iii To encourage the use of the proposed CBD bypass route, it is proposed to treat the "Gateways" at the intersections of Bradley Street/Auburn Street and Clinton Street/Auburn Street with directional signage, including signage to parking areas, and traffic calming to discourage vehicle use of Auburn Street;

iv The proposed development sites are expected to generate in total up to some 1,000 vehicle movements in a typical weekday PM peak hour;

v All intersections within the Goulburn CBD and externally on the arterial road network are expected to be able to operate satisfactorily in the future following the redirection of traffic away from Auburn Street and full development of the proposed development sites. Those intersections which would require further investigation in the future to assess the requirement for any intersection widening and/or modification include Sloane St/Bradley St, Bradley St/Bourke St, Clinton St/Sloane St and Clinton St/Bourke St;

vi It is recommended that the intersection of Bradley Street and Auburn Street be considered for conversion to signals following full development of the nearby development sites to better accommodate the expected increase in the level of pedestrian activity and crossing movements. It is noted that this would be the responsibility of the RTA but Council should work with them to ensure that safety and intersection capacity is achieved at this intersection;

vii It is recommended that all future site accesses for proposed development sites be reassessed at the development application stage to determine their feasibility;

viii Masterplan changes to Auburn Street, Montague Street and Market Street result in a deficit in on-street parking;

ix There is existing capacity within the surrounding streets of the CBD to accommodate loss of parking as a result of the proposed streetscape works;

x The proposed future Masterplan development sites would generate a total parking requirement of 683 spaces;

xi The proposed Masterplan supply of 461 spaces is not sufficient to accommodate the parking demand of the future Masterplan development;

xii It is recommended that the future deficit of 222 spaces be accommodated through additional on-site parking (residential and commercial land uses) or available vacancies within the CBD (retail land uses);

xiii It is recommended that accessibility to the train station for all connecting transport modes, including buses, pedestrians, cyclists, taxis and vehicles drop-off/pick-up (i.e. kiss-and-ride) be improved;

xiv In consultation with the Ministry of Transport and local bus operators, service frequencies of existing bus services within the CBD should be encouraged to be increased during both peak and off-peak times;

xv Masterplan improvements within the CBD are expected to create a safer environment for pedestrians;

xvi The proposed Masterplan works must take into consideration the routes detailed in the latest bicycle plan included in the Goulburn Mulwaree Bicycle Strategy 2008-2018. This includes consideration of the proposed hierarchy changes and how this may affect the suitability of any proposed bicycle facilities (for example, Bradley Street); and

xvii Facilities at the existing railway crossing at Blackshaw Road should be upgraded to accommodate bicycle and pedestrian movements.

Appendix A

Traffic Characteristics of Public Car Parks (Adam Pekol Consulting, 1999)

PRACTICE NOTES

TRAFFIC CHARACTERISTICS OF PUBLIC CAR PARKS … ■

BACKGROUND

For the planning of new large car parks, particularly in CBD areas, it is necessary to obtain an indication of traffic operating characteristics of existing car parks of a similar function, size and in similar locations.

METHODOLOGY

In September 1999, Adam Pekol Consulting surveyed a number of off-street public car parks within the Southport CBD. These surveys were undertaken for both a typical Wednesday and Friday between the hours of 8:00am and 5:00pm (ie nine hours duration). The surveyed car parks included:

- Mal Burke (Council operated);
- Broadwater (Council operated);
- Athol Patterson (Council operated);
- Southport School Site (privately operated).

These car parks ranged in size from 340 spaces to about 750 spaces.

From the survey data it was possible to determine the variation in operating characteristics of each car park over the nine hour survey period. These characteristics included:

- turn-over rate;
- peak occupancy;
- average length of stay; and
- peak hour generation.

TURN-OVER RATE

For each of the four car parks the turn-over rate was calculated. This is defined as the total number of entry movements expressed as a percentage of the car park's total capacity.

The daily turn-over rates observed for each of the four car parks are summarised in Table 1.

TABLE 1: TURN-OVER – WEDNESDAY PM PEAK

Car Park	Turnover Rate		
	Wednesday	Friday	Average
Mal Burke	103%	90%	97%
Broadwater	225%	209%	217%
Athol Patterson	119%	109%	114%
School Site	106%	104%	105%

As shown, average turn over rates:

- varied significantly between 97% and 217% across the four facilities surveyed; and
- were relatively similar across different days of the week for the same facility (ie the variation in turn-over rate by day of week was ≤ 16%).

PEAK OCCUPANCY

The peak occupancy is defined as the maximum ratio of the number of cars parked to the car park's total capacity. The peak occupancy, and the approximate time of day at which it was observed, are summarised in Table 2 for the four car parks surveyed.

TABLE 2: PEAK OCCUPANCY

Car Park	Wednesday		Friday	
	Peak Occ	Time	Peak Occ	Time
Mal Burke	67%	10:00-11:00	56%	10:00-11:00
Broadwater	84%	12:00-13:00	66%	11:00-12:00
Athol Patterson	62%	11:00-12:00	60%	11:00-12:00
School Site	86%	12:00-13:00	84%	11:00-12:00

These results suggest that for the surveyed public car parks:

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PRACTICE NOTES

TRAFFIC CHARACTERISTICS OF PUBLIC CAR PARKS ... ■

- peak occupancies for a typical weekday operations range between 56% and 86%;
- the average peak occupancy is slightly higher on Wednesdays (ie 75%) than Fridays (ie 67%); and
- peak occupancies tend to occur between 10:00am and 1:00pm, with the busiest hour being just before lunch (ie 11:00am to 12:00noon).

AVERAGE LENGTH OF STAY

The average length of stay for these car parks during a typical weekday ranged from 3.5 hours to 4.1 hours. It would be reasonable to suggest that these durations would be typical of large car parks within CBD areas such as Southport.

TRAFFIC GENERATION

Data obtained from the surveys has been used to provide an estimate of the likely traffic generating potential of large public car parks. The traffic generation of these car parks has been based on the total vehicles entering and leaving the car park during the peak hour expressed as a percentage of the car parks total capacity. For the purpose of this analysis, the operational period selected is the evening peak hour. This analysis is summarised in Table 3.

TABLE 3: GENERATION – WEEKDAY PM PEAK

Public Car Park	Number of Spaces	Percentage of Peak Hour Movements IN	Percentage of Peak Hour Movements OUT
Mal Burke	340	1.5%	12.4%
Broadwater	743	15.3%	30.2%
Athol Patterson	491	3.3%	13.6%
School Site	528	2.2%	17.6%
Average	526	5.5%	18.5%

These results suggest that, on average:

- 5.5% of the car park's total capacity enters during the evening peak hour; and
- 18.5% of the car park's total capacity exits during the evening peak hour.

CONCLUSION

Using data obtained from surveys of large public car parks within the Southport CBD, it has been possible to quantify the average travel characteristics of large regional CBD car parks.

While not definitive, the results presented above would prove a useful starting point when planning major new public car parks in regional CBD areas.

REFERENCES

ADAM PEKOL CONSULTING (1999). Southport Car Parking Study, for Gold Coast City Council.

DISCLAIMER

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Appendix B

SIDRA INTERSECTION Results – "Base Case" Conditions

SIDRA INTERSECTION

Movement Summary

Clinton St/Auburn St

PM Base Case

Signalised - Fixed time **Cycle Time = 100 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn St South										
1	L	103	4.9	0.190	37.9	LOS C	38	0.80	0.77	29.4
2	T	23	4.3	0.306	30.7	LOS C	44	0.85	0.69	32.4
3	R	91	5.5	0.306	38.6	LOS C	44	0.85	0.79	29.3
Approach		**217**	**5.1**	**0.306**	**37.4**	**LOS C**	**44**	**0.83**	**0.77**	**29.6**
Clinton St East										
4	L	101	5.0	0.391	25.5	LOS B	35	0.62	0.75	35.3
5	T	341	5.0	0.391	20.7	LOS B	89	0.72	0.62	38.3
6	R	23	4.3	0.079	22.8	LOS B	6	0.72	0.69	37.0
Approach		**465**	**4.9**	**0.391**	**21.8**	**LOS B**	**89**	**0.70**	**0.65**	**37.5**
Auburn St North										
7	L	26	3.8	0.215	36.5	LOS C	10	0.76	0.70	30.0
8	T	27	3.7	0.068	34.1	LOS C	12	0.83	0.61	31.0
9	R	49	4.1	0.134	35.4	LOS C	19	0.82	0.72	30.5
Approach		**102**	**3.9**	**0.215**	**35.4**	**LOS C**	**19**	**0.81**	**0.69**	**30.5**
Clinton St West										
10	L	47	4.3	0.048	21.9	LOS B	13	0.54	0.72	37.6
11	T	447	4.9	0.547	22.8	LOS B	126	0.80	0.70	36.9
12	R	89	4.5	0.306	22.4	LOS B	24	0.69	0.74	37.3
Approach		**583**	**4.8**	**0.547**	**22.6**	**LOS B**	**126**	**0.76**	**0.71**	**37.0**
All Vehicles		**1367**	**4.8**	**0.547**	**25.7**	**LOS B**	**126**	**0.75**	**0.70**	**35.2**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	25.2	LOS C	0	0.71	0.71
P3	53	43.2	LOS E	0	0.93	0.93
P5	53	23.8	LOS C	0	0.69	0.69

P7	53	44.2	LOS E	0	0.94	0.94
All Peds	**212**	**34.1**	**LOS C**	**0**	**0.82**	**0.82**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Base Case
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Processed May 14, 2008 10:54:42AM

A0121, GTA Consultants, Large Office
Produced by SIDRA Intersection 3.2.2.1563

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SIDRA INTERSECTION

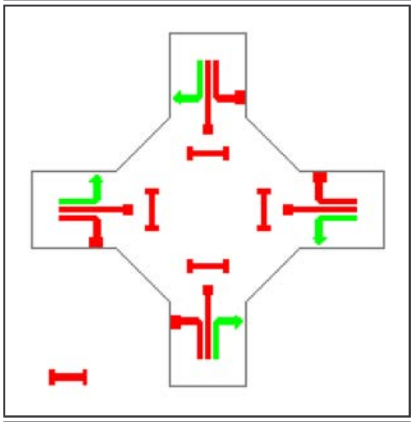
Phasing Summary

Clinton St/Auburn St

PM Base Case

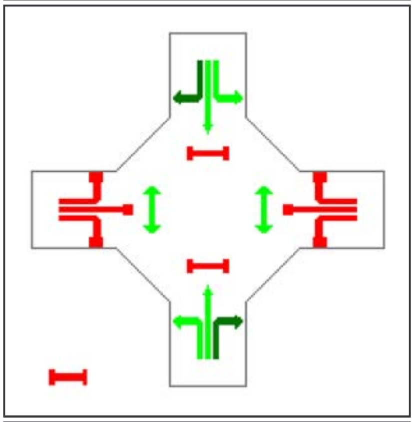
C = **100** seconds
Cycle Time Option: **User-specified cycle time**
Phase times determined by the program.

Phase A



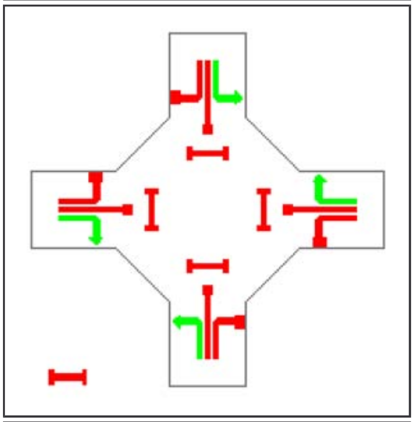
Green Time = **6** seconds
Phase Time = **12** seconds
Phase Split = **12** %

Phase C



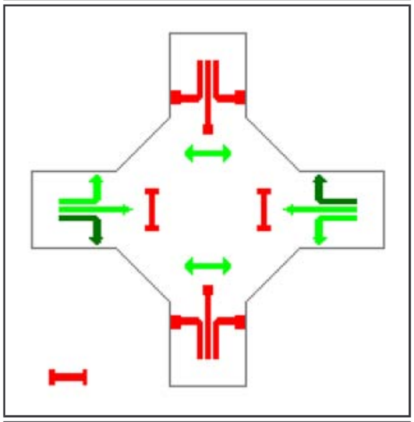
Green Time = **21** seconds
Phase Time = **27** seconds
Phase Split = **27** %

Phase F



Green Time = **6** seconds
Phase Time = **12** seconds
Phase Split = **12** %

Phase D



Green Time = **43** seconds
Phase Time = **49** seconds
Phase Split = **49** %

Normal Movement	Permitted/Opposed
Slip-Lane	Opposed Slip-Lane
Stopped Movement	Continuous
Turn On Red	

SIDRA INTERSECTION

Movement Summary

Sloan St/Clinton St

PM Base Case

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Sloane St South										
1	L	99	0.0	0.053	8.2	LOS A	0	0.00	0.67	49.0
2	T	609	0.0	0.312	0.0	LOS A	0	0.00	0.00	60.0
Approach		**708**	**0.0**	**0.312**	**1.1**	**LOS A**		**0.00**	**0.09**	**58.2**
Sloane St North										
8	T	468	0.0	0.672	6.3	LOS A	59	0.44	0.00	51.2
9	R	296	0.0	0.673	22.2	LOS B	59	1.00	1.25	37.3
Approach		**764**	**0.0**	**0.672**	**12.5**	**LOS A**	**59**	**0.66**	**0.49**	**44.7**
Clinton St West										
10	L	483	0.0	0.678	17.1	LOS B	50	0.76	1.18	40.8
12	R	104	0.0	0.493	31.3	LOS C	17	0.90	1.05	32.3
Approach		**587**	**0.0**	**0.678**	**19.6**	**LOS B**	**50**	**0.79**	**1.15**	**39.0**
All Vehicles		**2059**	**0.0**	**0.678**	**10.6**	**Not Applicable**	**59**	**0.47**	**0.54**	**46.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Base Case
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Processed May 13, 2008 03:00:01PM

A0121, GTA Consultants, Large Office
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SIDRA INTERSECTION

Movement Summary

Clinton St / Bourke St

PM Base Case

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
1	L	42	4.8	0.109	14.2	LOS A	5	0.73	0.89	43.3
2	T	223	4.9	0.375	10.4	LOS A	21	0.82	0.92	46.9
3	R	25	4.0	0.373	16.4	LOS B	21	0.82	0.96	42.3
Approach		**290**	**4.8**	**0.375**	**11.4**	**LOS A**	**21**	**0.81**	**0.92**	**45.9**
Clinton St East										
4	L	48	4.2	0.449	13.3	LOS A	35	0.99	0.99	44.0
5	T	212	5.2	0.450	12.9	LOS A	35	0.99	0.99	44.5
6	R	212	5.2	0.453	20.6	LOS B	32	0.96	1.04	39.4
Approach		**472**	**5.1**	**0.453**	**16.4**	**LOS B**	**35**	**0.98**	**1.01**	**41.9**
Bourke St North										
7	L	193	5.2	0.282	8.9	LOS A	14	0.61	0.74	48.0
8	T	264	4.9	0.788	10.9	LOS A	94	0.91	0.96	46.4
9	R	612	5.1	0.788	17.7	LOS B	94	0.91	0.99	41.3
Approach		**1069**	**5.1**	**0.787**	**14.5**	**LOS A**	**94**	**0.85**	**0.94**	**43.5**
Clinton St West										
10	L	637	5.0	0.569	8.8	LOS A	42	0.71	0.77	47.4
11	T	323	5.0	0.456	7.2	LOS A	27	0.66	0.65	48.5
12	R	104	4.8	0.456	14.1	LOS A	27	0.66	0.81	43.9
Approach		**1064**	**5.0**	**0.569**	**8.9**	**LOS A**	**42**	**0.69**	**0.74**	**47.3**
All Vehicles		**2895**	**5.0**	**0.788**	**12.4**	**LOS A**	**94**	**0.81**	**0.87**	**44.8**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Auburn Street & Bradley Street

PM Base Case

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn Sth										
1	L	19	5.3	0.152	13.4	LOS A	9	0.79	0.83	44.0
2	T	57	5.3	0.152	11.4	LOS A	9	0.79	0.80	45.8
3	R	15	6.7	0.152	17.5	LOS B	9	0.79	0.77	41.5
Approach		**91**	**5.5**	**0.151**	**12.8**	**LOS A**	**9**	**0.79**	**0.80**	**44.6**
Bradley East										
4	L	15	6.7	0.500	9.4	LOS A	33	0.72	0.82	47.5
5	T	244	4.9	0.504	9.2	LOS A	33	0.72	0.81	47.6
6	R	181	5.0	0.504	15.2	LOS B	33	0.72	0.83	43.2
Approach		**440**	**5.0**	**0.504**	**11.7**	**LOS A**	**33**	**0.72**	**0.82**	**45.6**
Auburn Nth										
7	L	237	5.1	0.231	6.9	LOS A	12	0.43	0.55	49.2
8	T	85	4.7	0.379	5.5	LOS A	24	0.46	0.49	50.0
9	R	421	5.0	0.380	12.3	LOS A	24	0.46	0.67	44.7
Approach		**743**	**5.0**	**0.380**	**9.8**	**LOS A**	**24**	**0.45**	**0.61**	**46.6**
Bradley West										
10	L	415	5.1	0.531	7.0	LOS A	34	0.56	0.61	48.5
11	T	161	5.0	0.531	6.1	LOS A	34	0.56	0.54	49.2
12	R	15	6.7	0.536	12.9	LOS A	34	0.56	0.70	44.3
Approach		**591**	**5.1**	**0.531**	**6.9**	**LOS A**	**34**	**0.56**	**0.59**	**48.5**
All Vehicles		**1865**	**5.0**	**0.536**	**9.5**	**LOS A**	**34**	**0.57**	**0.66**	**46.8**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Sloane St / Bradley St

PM Base Case

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
SloaneSt-S										
1	L	400	5.0	0.223	8.4	LOS A	0	0.00	0.67	49.0
2	T	880	5.0	0.466	0.0	LOS A	0	0.00	0.00	60.0
Approach		**1280**	**5.0**	**0.466**	**2.6**	**LOS A**		**0.00**	**0.21**	**56.1**
SloaneSt-N										
8	T	280	5.0	0.148	0.0	LOS A	0	0.00	0.00	60.0
9	R	68	4.4	0.245	22.3	LOS B	8	0.85	0.97	37.4
Approach		**348**	**4.9**	**0.246**	**4.4**	**LOS A**	**8**	**0.17**	**0.19**	**53.6**
BradleySt-W										
10	L	183	4.9	0.647	28.8	LOS C	29	0.90	1.14	33.8
12	R	389	4.9	2.047	987.0	LOS F	971	1.00	6.19	2.2
Approach		**572**	**4.9**	**2.049**	**680.4**	**LOS F**	**971**	**0.97**	**4.58**	**3.1**
All Vehicles		**2200**	**5.0**	**2.047**	**179.1**	**Not Applicable**	**971**	**0.28**	**1.34**	**10.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Base Case
P:\FS11000-11990\FS11590\Sidra\Sloan_Bradley.aap
Processed May 14, 2008 12:32:55PM

A0121, GTA Consultants, Large Office
Produced by SIDRA Intersection 3.2.2.1563

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SIDRA INTERSECTION

Movement Summary

Sloane St / Bradley St

PM Base Case - Roundabout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
SloaneSt-S										
1	L	400	5.0	0.870	8.3	LOS A	135	0.64	0.52	46.9
2	T	880	5.0	0.869	6.2	LOS A	135	0.64	0.47	48.1
Approach		**1280**	**5.0**	**0.869**	**6.9**	**LOS A**	**135**	**0.64**	**0.48**	**47.7**
SloaneSt-N										
8	T	280	5.0	0.341	5.7	LOS A	16	0.50	0.51	49.7
9	R	68	4.4	0.340	12.5	LOS A	16	0.50	0.76	44.5
Approach		**348**	**4.9**	**0.341**	**7.0**	**LOS A**	**16**	**0.50**	**0.56**	**48.5**
BradleySt-W										
10	L	183	4.9	0.318	11.2	LOS A	18	0.82	0.89	46.1
12	R	389	4.9	0.515	17.8	LOS B	40	0.92	1.00	41.5
Approach		**572**	**4.9**	**0.515**	**15.7**	**LOS B**	**40**	**0.89**	**0.96**	**42.8**
All Vehicles		**2200**	**5.0**	**0.870**	**9.2**	**LOS A**	**135**	**0.68**	**0.62**	**46.4**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: Conversion of PM Base Case
P:\FS11000-11990\FS11590\Sidra\Sloan_Bradley.aap
Processed May 15, 2008 01:45:48PM

A0121, GTA Consultants, Large Office

SIDRA INTERSECTION

Movement Summary

Bradley St / Bourke St

PM Base Case - Modified Layout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BourkeSt - S										
1	L	264	4.9	0.352	11.0	LOS A	20	0.69	0.79	46.2
2	T	241	5.0	0.733	12.3	LOS A	84	0.90	0.93	45.0
3	R	567	4.9	0.734	17.4	LOS B	84	0.90	0.95	41.2
Approach		**1072**	**4.9**	**0.733**	**14.7**	**LOS B**	**84**	**0.84**	**0.91**	**43.1**
BradleySt-E										
4	L	565	5.0	0.493	9.6	LOS A	35	0.69	0.73	46.6
5	T	167	4.8	0.368	8.6	LOS A	22	0.65	0.70	47.6
6	R	174	5.2	0.368	13.8	LOS A	22	0.65	0.78	44.1
Approach		**906**	**5.0**	**0.494**	**10.3**	**LOS A**	**35**	**0.68**	**0.74**	**46.3**
BourkeSt-N										
7	L	92	5.4	0.186	14.5	LOS A	11	0.84	0.88	43.0
8	T	126	4.8	0.329	11.8	LOS A	23	0.91	0.87	45.4
9	R	104	4.8	0.329	16.9	LOS B	23	0.91	0.89	41.5
Approach		**322**	**5.0**	**0.329**	**14.2**	**LOS A**	**23**	**0.89**	**0.88**	**43.4**
BradleySt-W										
10	L	104	4.8	0.268	16.6	LOS B	17	0.92	0.96	41.3
11	T	159	5.0	0.550	17.8	LOS B	50	1.00	1.07	40.4
12	R	153	5.2	0.550	22.9	LOS B	50	1.00	1.07	37.4
Approach		**416**	**5.0**	**0.550**	**19.4**	**LOS B**	**50**	**0.98**	**1.05**	**39.4**
All Vehicles		**2716**	**5.0**	**0.734**	**13.9**	**LOS A**	**84**	**0.81**	**0.87**	**43.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

Appendix C

SIDRA INTERSECTION Results – Future Conditions Following Full Site Development

SIDRA INTERSECTION

Movement Summary

Clinton St / Bourke St

PM Base Case & Site Generated Traffic - Modified Layout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
1	L	42	4.8	0.105	13.7	LOS A	4	0.70	0.88	43.7
2	T	259	5.0	0.412	10.3	LOS A	22	0.79	0.92	46.9
3	R	25	4.0	0.410	16.4	LOS B	22	0.79	0.97	42.4
Approach		**326**	**4.9**	**0.412**	**11.2**	**LOS A**	**22**	**0.78**	**0.92**	**46.1**
Clinton St East										
4	L	48	4.2	0.384	9.1	LOS A	21	0.80	0.80	46.8
5	T	246	4.9	0.385	8.6	LOS A	21	0.80	0.77	47.0
6	R	254	5.1	0.423	16.1	LOS B	22	0.80	0.97	42.6
Approach		**548**	**4.9**	**0.423**	**12.1**	**LOS A**	**22**	**0.80**	**0.87**	**44.8**
Bourke St North										
7	L	246	4.9	0.658	10.5	LOS A	61	0.85	0.90	46.6
8	T	307	4.9	0.657	9.2	LOS A	61	0.85	0.88	47.2
9	R	711	5.1	0.658	16.7	LOS B	61	0.85	0.95	42.1
Approach		**1264**	**5.0**	**0.658**	**13.7**	**LOS A**	**61**	**0.85**	**0.93**	**44.0**
Clinton St West										
10	L	740	5.0	0.698	11.5	LOS A	68	0.84	0.94	45.8
11	T	387	4.9	0.559	9.1	LOS A	40	0.76	0.85	47.8
12	R	104	4.8	0.559	16.0	LOS B	40	0.76	0.92	42.8
Approach		**1231**	**5.0**	**0.698**	**11.1**	**LOS A**	**68**	**0.81**	**0.91**	**46.1**
All Vehicles		**3369**	**5.0**	**0.698**	**12.3**	**LOS A**	**68**	**0.82**	**0.91**	**45.1**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

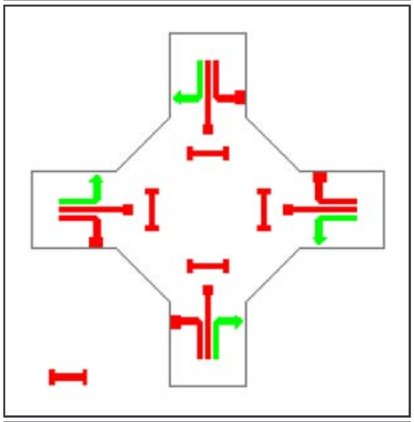
Phasing Summary

Clinton St/Auburn St

PM Base Case & Site Generated Traffic

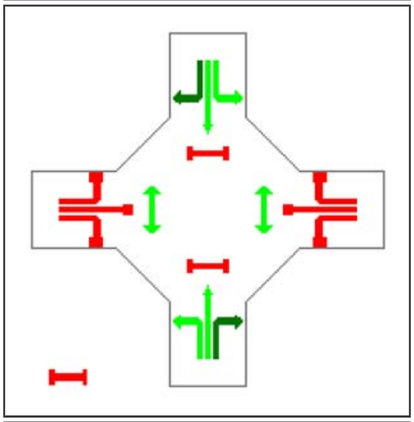
C = **100** seconds
Cycle Time Option: **User-specified cycle time**
Phase times determined by the program.

Phase A



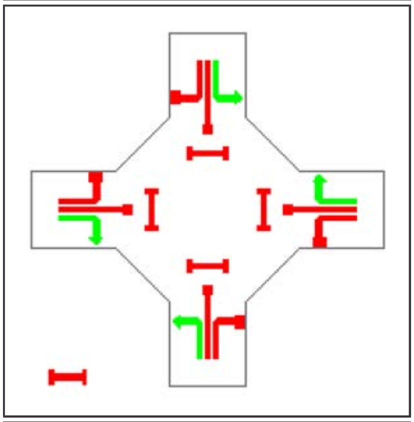
Green Time = **6** seconds
Phase Time = **12** seconds
Phase Split = **12** %

Phase C



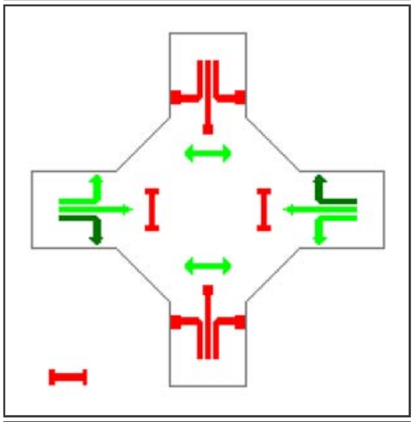
Green Time = **21** seconds
Phase Time = **27** seconds
Phase Split = **27** %

Phase F



Green Time = **6** seconds
Phase Time = **12** seconds
Phase Split = **12** %

Phase D



Green Time = **43** seconds
Phase Time = **49** seconds
Phase Split = **49** %

Normal Movement
Slip-Lane
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous

SIDRA INTERSECTION

Movement Summary

Sloan St/Clinton St

PM Base Case Site Generated Traffic

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Sloane St South										
1	L	135	0.0	0.073	8.2	LOS A	0	0.00	0.67	49.0
2	T	643	0.0	0.330	0.0	LOS A	0	0.00	0.00	60.0
Approach		**778**	**0.0**	**0.330**	**1.4**	**LOS A**		**0.00**	**0.12**	**57.7**
Sloane St North										
8	T	507	0.0	0.797	7.7	LOS A	73	0.39	0.00	49.6
9	R	326	0.0	0.797	27.8	LOS B	73	1.00	1.41	34.0
Approach		**833**	**0.0**	**0.797**	**15.5**	**LOS B**	**73**	**0.63**	**0.55**	**42.0**
Clinton St West										
10	L	518	0.0	0.778	20.6	LOS B	68	0.84	1.35	38.3
12	R	133	0.0	0.747	48.4	LOS D	31	0.96	1.20	25.8
Approach		**651**	**0.0**	**0.778**	**26.3**	**LOS B**	**68**	**0.86**	**1.32**	**34.8**
All Vehicles		**2262**	**0.0**	**0.797**	**13.8**	**Not Applicable**	**73**	**0.48**	**0.62**	**43.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Base Case & Traffic
P:\FS11000-11990\FS11590\Sidra\Sloan_Clinton.aap
Processed May 13, 2008 03:00:01PM

A0121, GTA Consultants, Large Office
Produced by SIDRA Intersection 3.2.2.1563

SIDRA INTERSECTION

Movement Summary

Clinton St / Bourke St

PM Base Case Site Generated Traffic

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
1	L	42	4.8	0.129	16.0	LOS B	6	0.79	0.92	41.8
2	T	259	5.0	0.514	14.5	LOS A	35	0.92	1.04	43.1
3	R	25	4.0	0.510	20.5	LOS B	35	0.92	1.06	39.4
Approach		**326**	**4.9**	**0.514**	**15.1**	**LOS B**	**35**	**0.90**	**1.02**	**42.6**
Clinton St East										
4	L	48	4.2	0.676	26.8	LOS B	68	1.00	1.19	34.6
5	T	246	4.9	0.676	26.4	LOS B	68	1.00	1.19	35.0
6	R	254	5.1	0.732	38.9	LOS C	69	1.00	1.23	30.1
Approach		**548**	**4.9**	**0.732**	**32.2**	**LOS C**	**69**	**1.00**	**1.21**	**32.4**
Bourke St North										
7	L	246	4.9	0.384	9.7	LOS A	20	0.70	0.81	47.4
8	T	307	4.9	0.981	33.8	LOS C	270	1.00	1.72	31.3
9	R	711	5.1	0.981	40.6	LOS C	270	1.00	1.72	29.4
Approach		**1264**	**5.0**	**0.980**	**32.9**	**LOS C**	**270**	**0.94**	**1.54**	**32.2**
Clinton St West										
10	L	740	5.0	0.705	11.6	LOS A	71	0.86	0.95	45.6
11	T	387	4.9	0.565	9.2	LOS A	41	0.77	0.86	47.7
12	R	104	4.8	0.565	16.1	LOS B	41	0.77	0.92	42.8
Approach		**1231**	**5.0**	**0.706**	**11.2**	**LOS A**	**71**	**0.82**	**0.92**	**46.0**
All Vehicles		**3369**	**5.0**	**0.981**	**23.2**	**LOS B**	**270**	**0.90**	**1.21**	**37.1**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Clinton St / Bourke St

PM Base Case & Site Generated Traffic - Modified Layout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
1	L	42	4.8	0.105	13.7	LOS A	4	0.70	0.88	43.7
2	T	259	5.0	0.412	10.3	LOS A	22	0.79	0.92	46.9
3	R	25	4.0	0.410	16.4	LOS B	22	0.79	0.97	42.4
Approach		**326**	**4.9**	**0.412**	**11.2**	**LOS A**	**22**	**0.78**	**0.92**	**46.1**
Clinton St East										
4	L	48	4.2	0.384	9.1	LOS A	21	0.80	0.80	46.8
5	T	246	4.9	0.385	8.6	LOS A	21	0.80	0.77	47.0
6	R	254	5.1	0.423	16.1	LOS B	22	0.80	0.97	42.6
Approach		**548**	**4.9**	**0.423**	**12.1**	**LOS A**	**22**	**0.80**	**0.87**	**44.8**
Bourke St North										
7	L	246	4.9	0.658	10.5	LOS A	61	0.85	0.90	46.6
8	T	307	4.9	0.657	9.2	LOS A	61	0.85	0.88	47.2
9	R	711	5.1	0.658	16.7	LOS B	61	0.85	0.95	42.1
Approach		**1264**	**5.0**	**0.658**	**13.7**	**LOS A**	**61**	**0.85**	**0.93**	**44.0**
Clinton St West										
10	L	740	5.0	0.698	11.5	LOS A	68	0.84	0.94	45.8
11	T	387	4.9	0.559	9.1	LOS A	40	0.76	0.85	47.8
12	R	104	4.8	0.559	16.0	LOS B	40	0.76	0.92	42.8
Approach		**1231**	**5.0**	**0.698**	**11.1**	**LOS A**	**68**	**0.81**	**0.91**	**46.1**
All Vehicles		**3369**	**5.0**	**0.698**	**12.3**	**LOS A**	**68**	**0.82**	**0.91**	**45.1**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Auburn Street & Bradley Street

PM Base Case & Site Generated Traffic

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn Sth										
1	L	19	5.3	0.221	17.9	LOS B	14	0.93	0.93	40.3
2	T	57	5.3	0.220	16.0	LOS B	14	0.93	0.92	41.8
3	R	15	6.7	0.221	22.0	LOS B	14	0.93	0.82	38.4
Approach		**91**	**5.5**	**0.220**	**17.4**	**LOS B**	**14**	**0.93**	**0.91**	**40.9**
Bradley East										
4	L	15	6.7	0.750	15.6	LOS B	80	0.95	1.15	42.1
5	T	332	5.1	0.761	15.4	LOS B	80	0.95	1.14	42.3
6	R	244	4.9	0.760	21.5	LOS B	80	0.95	1.07	38.7
Approach		**591**	**5.1**	**0.761**	**17.9**	**LOS B**	**80**	**0.95**	**1.11**	**40.7**
Auburn Nth										
7	L	291	5.2	0.309	7.5	LOS A	18	0.55	0.62	48.4
8	T	85	4.7	0.494	6.1	LOS A	36	0.62	0.54	48.8
9	R	520	5.0	0.493	12.9	LOS A	36	0.62	0.71	44.1
Approach		**896**	**5.0**	**0.493**	**10.5**	**LOS A**	**36**	**0.60**	**0.66**	**45.8**
Bradley West										
10	L	519	5.0	0.737	9.8	LOS A	75	0.81	0.82	46.9
11	T	237	5.1	0.736	8.8	LOS A	75	0.81	0.81	47.4
12	R	15	6.7	0.750	15.7	LOS B	75	0.81	0.83	43.0
Approach		**771**	**5.1**	**0.737**	**9.6**	**LOS A**	**75**	**0.81**	**0.82**	**47.0**
All Vehicles		**2349**	**5.1**	**0.761**	**12.3**	**LOS A**	**80**	**0.77**	**0.84**	**44.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Sloane St / Bradley St

PM Base Case & Site Generated Traffic - Roundabout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
SloaneSt-S										
1	L	440	5.0	0.386	8.7	LOS A	21	0.39	0.64	47.7
2	T	900	5.0	0.621	6.1	LOS A	47	0.49	0.53	49.1
Approach		**1340**	**5.0**	**0.621**	**7.0**	**LOS A**	**47**	**0.46**	**0.57**	**48.6**
SloaneSt-N										
8	T	292	5.1	0.465	6.2	LOS A	25	0.60	0.56	48.9
9	R	162	4.9	0.464	13.0	LOS A	25	0.60	0.81	44.1
Approach		**454**	**5.1**	**0.465**	**8.7**	**LOS A**	**25**	**0.60**	**0.65**	**47.1**
BradleySt-W										
10	L	276	5.1	0.441	12.7	LOS A	28	0.85	0.96	44.7
12	R	442	5.0	0.563	19.1	LOS B	47	0.92	1.04	40.6
Approach		**718**	**5.0**	**0.563**	**16.6**	**LOS B**	**47**	**0.89**	**1.01**	**42.0**
All Vehicles		**2512**	**5.0**	**0.621**	**10.0**	**LOS A**	**47**	**0.61**	**0.71**	**46.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: Conversion of PM Base Case & Traffic
P:\FS11000-11990\FS11590\Sidra\Sloan_Bradley.aap
Processed May 15, 2008 01:46:17PM

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SIDRA INTERSECTION

Movement Summary

Bradley St / Bourke St

PM Base Case & Site Generated Traffic - Modified Layout

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BourkeSt - S										
1	L	307	4.9	0.645	13.3	LOS A	60	0.86	0.93	44.1
2	T	280	5.0	0.645	12.0	LOS A	60	0.86	0.92	45.3
3	R	691	5.1	0.647	16.0	LOS B	62	0.85	0.90	42.2
Approach		**1278**	**5.0**	**0.647**	**14.5**	**LOS A**	**62**	**0.85**	**0.91**	**43.3**
BradleySt-E										
4	L	714	5.0	0.655	12.0	LOS A	64	0.84	0.87	45.2
5	T	177	5.1	0.429	9.4	LOS A	27	0.72	0.76	47.2
6	R	184	4.9	0.429	14.5	LOS A	27	0.72	0.82	43.5
Approach		**1075**	**5.0**	**0.655**	**12.0**	**LOS A**	**64**	**0.80**	**0.85**	**45.2**
BourkeSt-N										
7	L	95	5.3	0.239	17.6	LOS B	15	0.91	0.95	40.5
8	T	153	5.2	0.450	16.3	LOS B	36	1.00	1.01	41.6
9	R	104	4.8	0.450	21.4	LOS B	36	1.00	1.01	38.4
Approach		**352**	**5.1**	**0.450**	**18.2**	**LOS B**	**36**	**0.98**	**0.99**	**40.3**
BradleySt-W										
10	L	104	4.8	0.612	28.8	LOS C	61	1.00	1.18	33.5
11	T	168	4.8	0.613	27.5	LOS B	61	1.00	1.18	34.3
12	R	184	4.9	0.551	33.0	LOS C	44	1.00	1.13	32.1
Approach		**456**	**4.8**	**0.612**	**30.0**	**LOS C**	**61**	**1.00**	**1.16**	**33.2**
All Vehicles		**3161**	**5.0**	**0.655**	**16.3**	**LOS B**	**64**	**0.87**	**0.93**	**41.7**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA INTERSECTION

Movement Summary

Site 1 Bradley Street Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bradley St East										
5	T	852	5.0	0.451	0.0	LOS A	0	0.00	0.00	60.0
6	R	8	11.1	0.022	16.0	LOS B	1	0.70	0.85	41.8
Approach		**861**	**5.1**	**0.451**	**0.2**	**LOS A**	**1**	**0.01**	**0.01**	**59.7**
Site 1 Access										
7	L	22	4.5	0.077	17.1	LOS B	2	0.72	0.91	40.9
9	R	22	4.5	0.229	48.4	LOS D	6	0.94	0.99	25.7
Approach		**44**	**4.5**	**0.230**	**32.7**	**LOS C**	**6**	**0.83**	**0.95**	**31.6**
Bradley St West										
10	L	8	11.1	0.005	8.4	LOS A	0	0.00	0.67	49.0
11	T	954	5.0	0.505	0.0	LOS A	0	0.00	0.00	60.0
Approach		**963**	**5.1**	**0.505**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.9**
All Vehicles		**1868**	**5.1**	**0.505**	**0.9**	**Not Applicable**	**6**	**0.02**	**0.03**	**58.6**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
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SIDRA INTERSECTION

Movement Summary

Site 2 Bradley Street Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bradley St East										
5	T	602	5.0	0.319	0.0	LOS A	0	0.00	0.00	60.0
6	R	8	11.1	0.013	11.3	LOS A	0	0.51	0.70	45.9
Approach		**611**	**5.1**	**0.319**	**0.2**	**LOS A**	**0**	**0.01**	**0.01**	**59.7**
Site 2 Access										
7	L	24	4.2	0.056	11.6	LOS A	1	0.50	0.74	45.7
9	R	24	4.2	0.081	19.3	LOS B	2	0.77	0.93	39.3
Approach		**48**	**4.2**	**0.081**	**15.4**	**LOS B**	**2**	**0.63**	**0.83**	**42.2**
Bradley St West										
10	L	8	11.1	0.005	8.4	LOS A	0	0.00	0.67	49.0
11	T	527	4.9	0.279	0.0	LOS A	0	0.00	0.00	60.0
Approach		**536**	**5.0**	**0.279**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
All Vehicles		**1195**	**5.0**	**0.319**	**0.8**	**Not Applicable**	**2**	**0.03**	**0.04**	**58.8**

Symbols which may appear in this table:

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Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
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SIDRA INTERSECTION

Movement Summary

Site 3 Bradley Street Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Site 3 Access										
1	L	28	3.6	0.070	12.4	LOS A	2	0.54	0.79	44.9
3	R	28	3.6	0.098	19.9	LOS B	3	0.78	0.93	38.8
Approach		**56**	**3.6**	**0.098**	**16.1**	**LOS B**	**3**	**0.66**	**0.86**	**41.7**
Bradley St East										
4	L	28	3.6	0.015	8.4	LOS A	0	0.00	0.67	49.0
5	T	602	5.0	0.319	0.0	LOS A	0	0.00	0.00	60.0
Approach		**630**	**4.9**	**0.319**	**0.4**	**LOS A**		**0.00**	**0.03**	**59.4**
Bradley St West										
11	T	527	4.9	0.279	0.0	LOS A	0	0.00	0.00	60.0
12	R	28	3.6	0.040	11.9	LOS A	1	0.54	0.78	45.4
Approach		**555**	**4.9**	**0.279**	**0.6**	**LOS A**	**1**	**0.03**	**0.04**	**59.0**
All Vehicles		**1241**	**4.8**	**0.319**	**1.2**	**Not Applicable**	**3**	**0.04**	**0.07**	**58.1**

Symbols which may appear in this table:

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* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 3 bradley st.aap
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SIDRA INTERSECTION

Movement Summary

Site 3 Goldsmith Street Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Goldsmith St East										
5	T	421	5.0	0.223	0.0	LOS A	0	0.00	0.00	60.0
6	R	57	5.3	0.073	10.3	LOS A	2	0.45	0.70	46.9
Approach		**478**	**5.0**	**0.223**	**1.2**	**LOS A**	**2**	**0.05**	**0.08**	**58.1**
Site Access N										
7	L	57	5.3	0.124	10.8	LOS A	3	0.46	0.73	46.4
9	R	1	50.0	0.011	26.1	LOS B	0	0.79	0.89	34.8
Approach		**59**	**6.8**	**0.124**	**11.3**	**LOS A**	**3**	**0.47**	**0.74**	**45.9**
Golsmith St West										
10	L	1	50.0	0.001	8.2	LOS A	0	0.00	0.67	49.0
11	T	421	5.0	0.223	0.0	LOS A	0	0.00	0.00	60.0
Approach		**423**	**5.2**	**0.223**	**0.0**	**LOS A**		**0.00**	**0.00**	**59.9**
All Vehicles		**960**	**5.2**	**0.223**	**1.3**	**Not Applicable**	**3**	**0.06**	**0.09**	**57.9**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 3 goldsmith st.aap
Processed May 17, 2008 01:44:21PM

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SIDRA INTERSECTION

Movement Summary

Site 4 Bourke St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
2	T	858	5.0	0.454	0.0	LOS A	0	0.00	0.00	60.0
3	R	32	6.2	0.074	15.8	LOS B	2	0.71	0.91	41.9
Approach		**890**	**5.1**	**0.454**	**0.6**	**LOS A**	**2**	**0.03**	**0.03**	**59.1**
Site Access E										
4	L	32	6.2	0.118	17.9	LOS B	3	0.74	0.91	40.3
6	R	32	6.2	0.381	61.3	LOS E	11	0.96	1.02	22.3
Approach		**64**	**6.2**	**0.383**	**39.6**	**LOS C**	**11**	**0.85**	**0.97**	**28.7**
Bourke St North										
7	L	32	6.2	0.018	8.4	LOS A	0	0.00	0.67	49.0
8	T	961	5.0	0.509	0.0	LOS A	0	0.00	0.00	60.0
Approach		**993**	**5.0**	**0.509**	**0.3**	**LOS A**		**0.00**	**0.02**	**59.6**
All Vehicles		**1947**	**5.1**	**0.509**	**1.7**	**Not Applicable**	**11**	**0.04**	**0.06**	**57.3**

Symbols which may appear in this table:

Following Degree of Saturation
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* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
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SIDRA INTERSECTION

Movement Summary

Site 4 Verner St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Verner St East										
5	T	421	5.0	0.223	0.0	LOS A	0	0.00	0.00	60.0
6	R	1	50.0	0.005	14.1	LOS A	0	0.58	0.70	43.2
Approach		**423**	**5.2**	**0.223**	**0.1**	**LOS A**	**0**	**0.00**	**0.00**	**59.9**
Site Access N										
7	L	1	50.0	0.006	14.5	LOS A	0	0.55	0.70	42.9
9	R	126	4.8	0.304	17.3	LOS B	11	0.73	0.96	40.7
Approach		**128**	**5.5**	**0.303**	**17.3**	**LOS B**	**11**	**0.73**	**0.95**	**40.7**
Verner St West										
10	L	126	4.8	0.070	8.4	LOS A	0	0.00	0.67	49.0
11	T	421	5.0	0.223	0.0	LOS A	0	0.00	0.00	60.0
Approach		**547**	**4.9**	**0.223**	**1.9**	**LOS A**		**0.00**	**0.15**	**57.0**
All Vehicles		**1098**	**5.1**	**0.304**	**3.0**	**Not Applicable**	**11**	**0.09**	**0.19**	**55.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 4 verner st.aap
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SIDRA INTERSECTION

Movement Summary

Site 5 Clinton St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Site Access S										
1	L	7	0.0	0.014	10.2	LOS A	0	0.42	0.65	46.9
3	R	7	0.0	0.033	22.3	LOS B	1	0.77	0.92	37.2
Approach		**14**	**0.0**	**0.033**	**16.2**	**LOS B**	**1**	**0.60**	**0.79**	**41.5**
Clinton St East										
4	L	7	0.0	0.004	8.2	LOS A	0	0.00	0.67	49.0
5	T	395	5.1	0.105	0.0	LOS A	0	0.00	0.00	60.0
Approach		**402**	**5.0**	**0.105**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Clinton St West										
11	T	627	4.9	0.170	1.0	LOS A	13	0.26	0.00	56.5
12	R	7	0.0	0.171	10.3	LOS A	13	0.54	0.74	46.7
Approach		**634**	**4.9**	**0.170**	**1.1**	**LOS A**	**13**	**0.27**	**0.01**	**56.4**
All Vehicles		**1050**	**4.9**	**0.171**	**0.9**	**Not Applicable**	**13**	**0.17**	**0.02**	**57.3**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 5 clinton st.aap
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SIDRA INTERSECTION

Movement Summary

Site 6 Auburn St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn St South										
1	L	7	0.0	0.061	8.2	LOS A	0	0.00	0.67	49.0
2	T	224	4.9	0.061	0.0	LOS A	0	0.00	0.00	60.0
Approach		**231**	**4.8**	**0.061**	**0.2**	**LOS A**		**0.00**	**0.02**	**59.6**
Auburn St North										
8	T	218	5.0	0.061	0.4	LOS A	4	0.17	0.00	57.7
9	R	7	0.0	0.061	9.1	LOS A	4	0.36	0.64	47.4
Approach		**225**	**4.9**	**0.061**	**0.7**	**LOS A**	**4**	**0.18**	**0.02**	**57.3**
Site Access W										
10	L	7	0.0	0.013	9.2	LOS A	0	0.31	0.62	47.6
12	R	7	0.0	0.014	11.9	LOS A	0	0.46	0.72	45.2
Approach		**14**	**0.0**	**0.014**	**10.5**	**LOS A**	**0**	**0.39**	**0.67**	**46.3**
All Vehicles		**470**	**4.7**	**0.061**	**0.8**	**Not Applicable**	**4**	**0.10**	**0.04**	**58.0**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 6 auburn st.aap
Processed May 17, 2008 02:28:33PM

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SIDRA INTERSECTION

Movement Summary

Site 7 Bourke St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bourke St South										
2	T	921	5.0	0.488	0.0	LOS A	0	0.00	0.00	60.0
3	R	32	0.0	0.072	15.3	LOS B	2	0.71	0.91	42.1
Approach		**953**	**4.8**	**0.488**	**0.5**	**LOS A**	**2**	**0.02**	**0.03**	**59.2**
Site Access E										
4	L	32	0.0	0.110	17.4	LOS B	3	0.74	0.91	40.6
6	R	32	0.0	0.410	66.1	LOS E	11	0.96	1.03	21.2
Approach		**64**	**0.0**	**0.409**	**41.7**	**LOS C**	**11**	**0.85**	**0.97**	**27.9**
Bourke St North										
7	L	32	0.0	0.017	8.2	LOS A	0	0.00	0.67	49.0
8	T	961	5.0	0.509	0.0	LOS A	0	0.00	0.00	60.0
Approach		**993**	**4.8**	**0.509**	**0.3**	**LOS A**		**0.00**	**0.02**	**59.6**
All Vehicles		**2010**	**4.7**	**0.509**	**1.7**	**Not Applicable**	**11**	**0.04**	**0.06**	**57.3**

Symbols which may appear in this table:

Following Degree of Saturation
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* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
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SIDRA INTERSECTION

Movement Summary

Site 7 Clifford St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Clifford St East										
5	T	526	4.9	0.278	0.0	LOS A	0	0.00	0.00	60.0
6	R	1	0.0	0.001	10.8	LOS A	0	0.50	0.62	46.2
Approach		**527**	**4.9**	**0.278**	**0.0**	**LOS A**	**0**	**0.00**	**0.00**	**60.0**
Site Access N										
7	L	1	0.0	0.002	11.2	LOS A	0	0.49	0.63	45.8
9	R	32	0.0	0.096	17.8	LOS B	3	0.74	0.92	40.2
Approach		**33**	**0.0**	**0.096**	**17.6**	**LOS B**	**3**	**0.73**	**0.91**	**40.4**
Clifford St West										
10	L	32	0.0	0.017	8.2	LOS A	0	0.00	0.67	49.0
11	T	526	4.9	0.278	0.0	LOS A	0	0.00	0.00	60.0
Approach		**558**	**4.7**	**0.278**	**0.5**	**LOS A**		**0.00**	**0.04**	**59.2**
All Vehicles		**1118**	**4.7**	**0.278**	**0.8**	**Not Applicable**	**3**	**0.02**	**0.05**	**58.8**

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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 7 clifford st.aap
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SIDRA INTERSECTION

Movement Summary

Site 7 Goldsmith St Access

PM Future

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Site Access S										
1	L	32	0.0	0.079	12.4	LOS A	2	0.54	0.80	44.7
3	R	1	0.0	0.004	21.4	LOS B	0	0.80	0.83	37.7
Approach		**33**	**0.0**	**0.079**	**12.7**	**LOS A**	**2**	**0.55**	**0.80**	**44.5**
Goldsmith St East										
4	L	1	0.0	0.001	8.2	LOS A	0	0.00	0.67	49.0
5	T	632	5.1	0.335	0.0	LOS A	0	0.00	0.00	60.0
Approach		**633**	**5.1**	**0.335**	**0.0**	**LOS A**		**0.00**	**0.00**	**60.0**
Goldsmith St West										
11	T	632	5.1	0.335	0.0	LOS A	0	0.00	0.00	60.0
12	R	32	0.0	0.044	11.4	LOS A	1	0.54	0.76	45.6
Approach		**664**	**4.8**	**0.335**	**0.6**	**LOS A**	**1**	**0.03**	**0.04**	**59.1**
All Vehicles		**1330**	**4.8**	**0.335**	**0.6**	**Not Applicable**	**2**	**0.03**	**0.04**	**59.0**

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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Future
P:\FS11000-11990\FS11590\Sidra\Development site accesses\site 7 goldsmith st.aap
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P7	53	29.3	LOS C	0	0.91	0.91
All Peds	**212**	**28.2**	**LOS B**	**0**	**0.90**	**0.90**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
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Following Queue
- Density for continuous movement

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Site: PM Base Case & Traffic - Signals
P:\FS11000-11990\FS11590\Sidra\Auburn_Bradley.aap
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SIDRA INTERSECTION

Movement Summary

Auburn Street / Bradley Street

PM Base Case & Site Generated Traffic - Signalised

Signalised - Fixed time **Cycle Time = 70 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn Sth										
1	L	19	5.3	0.270	37.3	LOS C	29	0.92	0.76	29.7
2	T	57	5.3	0.270	28.9	LOS C	29	0.92	0.71	33.4
3	R	15	6.7	0.270	37.9	LOS C	30	0.93	0.77	29.4
Approach		**91**	**5.5**	**0.270**	**32.1**	**LOS C**	**29**	**0.92**	**0.73**	**31.9**
Bradley East										
4	L	15	6.7	0.499	26.9	LOS B	80	0.82	0.82	34.6
5	T	332	5.1	0.496	18.5	LOS B	80	0.82	0.70	39.8
6	R	244	4.9	0.915	43.2	LOS D	72	1.00	1.06	27.5
Approach		**591**	**5.1**	**0.915**	**28.9**	**LOS C**	**80**	**0.89**	**0.85**	**33.5**
Auburn Nth										
7	L	291	5.2	0.649	22.3	LOS B	61	0.69	0.80	37.3
8	T	85	4.7	0.178	12.5	LOS A	25	0.71	0.53	44.2
9	R	520	5.0	0.891	36.5	LOS C	131	0.98	1.03	29.9
Approach		**896**	**5.0**	**0.891**	**29.6**	**LOS C**	**131**	**0.86**	**0.91**	**33.1**
Bradley West										
10	L	519	5.0	0.699	27.1	LOS B	118	0.88	0.87	34.4
11	T	237	5.1	0.715	30.9	LOS C	76	0.99	0.88	32.4
12	R	15	6.7	0.716	39.6	LOS C	76	0.99	0.89	28.7
Approach		**771**	**5.1**	**0.715**	**28.6**	**LOS C**	**118**	**0.92**	**0.87**	**33.6**
All Vehicles		**2349**	**5.1**	**0.915**	**29.2**	**LOS C**	**131**	**0.89**	**0.88**	**33.3**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	24.9	LOS C	0	0.84	0.84
P3	53	29.3	LOS C	0	0.91	0.91
P5	53	29.3	LOS C	0	0.91	0.91

SIDRA INTERSECTION

Movement Summary

Auburn St/Montague St

PM Existing incl. Scramble Crossing Phase

Signalised - Fixed time **Cycle Time = 80 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Auburn St South										
1	L	116	0.0	0.455	29.5	LOS C	71	0.80	0.81	33.1
2	T	436	0.0	0.809	31.4	LOS C	101	0.92	0.85	32.2
3	R	46	0.0	0.808	45.6	LOS D	101	1.00	0.96	26.7
Approach		**598**	**0.0**	**0.809**	**32.1**	**LOS C**	**101**	**0.91**	**0.85**	**31.9**
Montague St East										
4	L	116	0.0	0.339	40.3	LOS C	39	0.92	0.78	28.4
5	T	49	0.0	0.426	36.8	LOS C	33	0.97	0.75	29.8
6	R	39	0.0	0.426	44.8	LOS D	33	0.97	0.77	26.9
Approach		**204**	**0.0**	**0.426**	**40.3**	**LOS C**	**39**	**0.94**	**0.77**	**28.4**
Auburn St North										
7	L	73	0.0	0.470	29.5	LOS C	74	0.81	0.81	33.1
8	T	553	0.0	0.836	31.0	LOS C	120	0.92	0.87	32.4
9	R	48	0.0	0.837	45.5	LOS D	120	1.00	1.00	26.7
Approach		**674**	**0.0**	**0.836**	**31.9**	**LOS C**	**120**	**0.91**	**0.87**	**32.0**
Montague St West										
10	L	182	0.0	0.744	44.3	LOS D	61	0.96	0.89	27.0
11	T	60	0.0	0.818	43.9	LOS D	62	1.00	0.96	27.2
12	R	105	0.0	0.819	51.9	LOS D	62	1.00	0.96	24.8
Approach		**347**	**0.0**	**0.819**	**46.5**	**LOS D**	**62**	**0.98**	**0.92**	**26.3**
All Vehicles		**1823**	**0.0**	**0.837**	**35.7**	**LOS C**	**120**	**0.93**	**0.86**	**30.3**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	34.2	LOS D	0	0.93	0.93
P3	53	29.8	LOS C	0	0.86	0.86
P5	53	34.2	LOS D	0	0.93	0.93

P7	53	29.8	LOS C	0	0.86	0.86
All Peds	**212**	**32.0**	**LOS C**	**0**	**0.89**	**0.89**

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Following LOS
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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: PM Existing scramble phase
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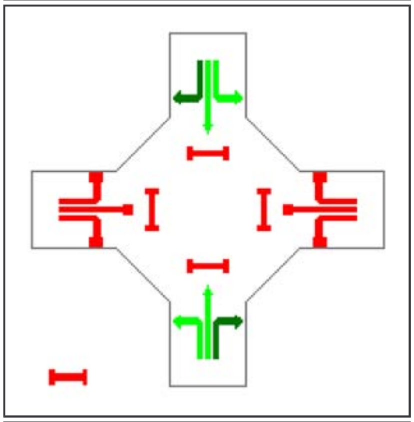
Phasing Summary

Auburn St/Montague St

PM Existing incl. Scramble Crossing Phase

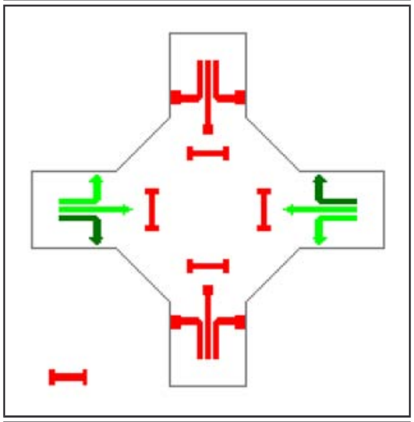
C = **80** seconds
Cycle Time Option: **Optimum cycle time (Minimum Delay)**
Phase times determined by the program.

Phase A



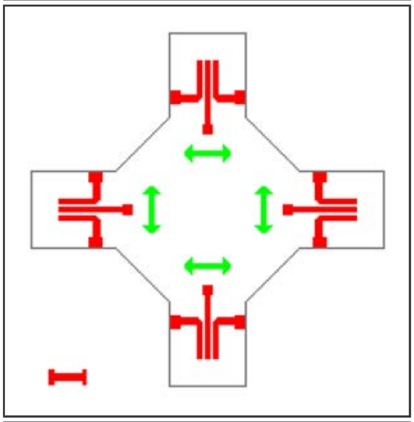
Green Time = **28** seconds
Phase Time = **34** seconds
Phase Split = **43** %

Phase B



Green Time = **14** seconds
Phase Time = **20** seconds
Phase Split = **25** %

Phase Peds



Green Time = **20** seconds
Phase Time = **26** seconds
Phase Split = **33** %

Normal Movement	Permitted/Opposed
Slip-Lane	Opposed Slip-Lane
Stopped Movement	Continuous
Turn On Red	

SIDRA SOLUTIONS

Site: PM Existing scramble phase
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