

# Latrobe City Council

## Moe CBD Traffic Study



### Traffic Engineering Report

1 Rev A

June 2011

R W Stamp & Associates Pty Ltd

Tel: 9898 2230

Fax: 9898 2606

### Document History

Issue	Revision	Issued to	Copies	Date	Approved
1	1	Latrobe City Council	1	3/ 5/10	R Stamp
	Rev A	Latrobe City Council	1	28/ 6/11	R Stamp

---

ACN: 099 065 380 Address: 103 Carrington Road, Box Hill 3128  
Tel: (03) 9898 2230 Fax: (03) 9898 2606 Mobile 0402 319 652 E-mail: [rwstamp@optusnet.com.au](mailto:rwstamp@optusnet.com.au)

<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 MOE CBD STUDY AREA .....	1
<b>2. EXISTING ROAD NETWORK</b> .....	<b>2</b>
2.1 ROAD HIERARCHY .....	2
2.2 ARTERIAL ROADS .....	2
2.2.1 Moe – Glengarry Road.....	2
2.2.1 Moe – Rawson Road.....	4
2.3 MAJOR ACCESS ROADS .....	5
2.4 URBAN LINK ROADS .....	6
2.4.1 Waterloo Road .....	6
2.4.2 Saviges Road.....	6
2.5 MINOR ACCESS ROADS .....	6
2.5.1 George Street.....	6
2.5.2 Albert Street .....	7
2.5.3 Market Street.....	7
2.5.4 Moore Street.....	7
2.5.5 Kirk Street .....	8
2.6 TRAFFIC VOLUMES .....	8
2.7 PREDICTED TRAFFIC GROWTH .....	8
2.8 INTERSECTION OPERATION .....	11
2.8.1 Moe – Glengarry Road / Moe – Rawson Road intersection .....	11
2.8.2 Moe – Glengarry Road / Fowler Street Intersection.....	14
2.9 CASUALTY CRASH HISTORY .....	16
2.9.1 Moe – Glengarry Road.....	16
2.9.2 Moe – Rawson Road.....	17
2.9.3 Moore Street.....	17
2.9.4 Albert Street .....	17
2.9.5 Other crashes.....	17
<b>3. CHANGES TO THE MOE ROAD NETWORK</b> .....	<b>18</b>
3.1 GENERAL .....	18
3.2 REVIEW OF THE WATERLOO ROAD RAILWAY CROSSING .....	18
3.3 HEAVY TRANSPORT ROUTES STUDY.....	18
3.4 MOE RAIL PRECINCT REVITALISATION PROJECT .....	19
3.5 CLIFTON STREET DEVELOPMENT .....	19
3.6 LATROBE VALLEY BUS LINES STUDY .....	20
<b>4. RECOMMENDED ROAD NETWORK</b> .....	<b>21</b>
4.1 ROAD HIERARCHY PLAN .....	21
4.2 CHANGES TO ROAD NETWORK FOR HEAVY TRANSPORT ROUTE.....	21
4.2.1 Railway level crossing between Moe – Glengarry Road and Waterloo Road....	21
4.2.2 Waterloo Road / George Street / Saviges Road intersection. ....	21
4.2.3 Saviges Road widening .....	22
4.2.3 Saviges Road widening .....	23
4.2.4 Della Torre Road curve widening.....	23
4.2.5 Moore Street / Della Torre Road intersection.....	23
4.3 OTHER ROAD NETWORK IMPROVEMENTS.....	23
4.3.1 Moore Street / Bell Street / Haigh Street intersection .....	23
4.3.2 Haigh Street between Moore Street and Anzac Street intersections. ....	23
4.4 PEDESTRIAN FACILITIES .....	24
4.5 MOE – GLENGARRY ROAD / MOE RAWSON ROAD / GEORGE STREET / HIGH STREET ROUNDAABOUT .....	24

---

4.5.1	Geometry of the roundabout .....	25
4.5.2	Pedestrian safety at roundabout .....	25
4.5.3	Traffic operation of roundabout.....	26
4.6	LLOYD STREET / FOWLER STREET INTERSECTION.....	27
4.6.1	Fowler Street classification .....	27
4.6.2	Traffic operation of the intersection .....	27
4.6.3	Pedestrian crossing .....	28
<b>5.</b>	<b>STAKEHOLDER DISCUSSIONS .....</b>	<b>29</b>
5.1	VICROADS.....	29
5.2	COMMUNITY FOR MOE .....	29
5.3	LATROBE VALLEY BUS LINES .....	29
<b>6.</b>	<b>SUMMARY AND CONCLUSIONS.....</b>	<b>30</b>
<b>APPENDIX A</b>	<b>TRAFFIC COUNTS.....</b>	<b>31</b>
<b>APPENDIX B</b>	<b>INTERSECTION ANALYSIS .....</b>	<b>34</b>
<b>APPENDIX C</b>	<b>REPORTED CASUALTY CRASHES IN MOE CBD AREA .....</b>	<b>35</b>
<b>APPENDIX D</b>	<b>CONCEPT PLANS OF INTERSECTION IMPROVEMENTS.....</b>	<b>36</b>
<b>APPENDIX E</b>	<b>ESTIMATED COSTS .....</b>	<b>1</b>

## EXECUTIVE SUMMARY

The Central Business District (CBD) of Moe is located on the north side of the Melbourne – Traralgon railway line. There are several developments in the Moe CBD which will influence the existing and future traffic movements in and around the area.

A Study of the traffic movements in and around the Moe CBD was carried out which included traffic counts, analysis of the traffic operation of the key intersections and an assessment of the reported casualty crashes. Two other Studies have been carried out which should be read in conjunction with this Report. These studies include the traffic engineering assessment of the railway crossing between the Moe – Glengarry Road and Waterloo Road and the development of a Heavy Transport Route through Moe.

The traffic operation of roundabout at the intersection of Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street was assessed. The existing traffic operation is satisfactory with the Narracan Drive approach having the highest degree of saturation and longest traffic queues. It is predicted that by the Year 2021, the degrees of saturation on the Narracan Drive approach will be approaching the upper level of acceptable traffic operation.

There have been 23 casualty crashes on the roads in the Moe CBD during the period between 1<sup>st</sup> July 2004 and the 30<sup>th</sup> June 2009. There were nine casualty crashes on the Moe – Glengarry Road with 14 crashes in the central area north of the railway line. Five of the crashes involved pedestrians and two bicyclists were injured while crossing at pedestrian crossings.

A review of the road hierarchy in the Moe CBD was carried out. Changes to the classification of several roads was recommended to comply with the conclusions from the Heavy Transport Routes Study

### Conclusions

Changes to the roads to be used as the Heavy Transport Route to Future Arterial Roads and downgrading the sections of the existing arterial roads to Future Major Access Streets were recommended.

Options to improve the traffic operation of the roundabout included the installation of metered traffic signals and widening of the Narracan Drive approach. The use of metered traffic signals was predicted to have a minor improvement to the Narracan Drive approach while having a significant adverse impact of the Anzac Street traffic. This option was not considered further.

Widening of the Narracan Drive approach would require widening of the eastern bridge and raising the level of the pavement to improve the sight distance.

## 1. Introduction

The Central Business District of Moe is located on the north side of the Melbourne – Traralgon railway line and includes the major supermarkets, department stores and retail outlets.

There are several developments in the Moe CBD which will influence the traffic movements in and around the area. These developments include the Moe Rail Revitalisation Project, Heavy Transport Routes traffic study, Latrobe Valley Bus Lines service review and the Clifton Street Precinct.

This Report details the traffic study of the Moe CBD area. During the course of this Study, traffic counts have been carried out, the reported casualty crashes in the area assessed and the operation of the road network in and around Moe reviewed.

### 1.1 Moe CBD Study Area

The Moe CBD Study Area is bounded by Bell Street and Haigh Street on the north, Anzac Street (Moe – Rawson Road) on the east, Lloyd Street (Moe – Glengarry Road) on the south and Waterloo Road and Saviges Road on the west side.

The Study Area is detailed on **Figure 1.1**.

**Figure 1.1 Moe CBD Study Area**



## 2. Existing Road Network

### 2.1 Road Hierarchy

Latrobe City Council has adopted a road hierarchy for the Moe and Newborough area. A copy of the existing road hierarchy is detailed in **Figure 2.1**.

In the CBD area, the south and east and part of the north boundaries are VicRoads declared arterial roads. The Moe – Rawson Road includes Haigh Street and Anzac Street along the north and east sides. The Moe – Glengarry Road incorporates Lloyd Street along the southern boundary.

Waterloo Road and Saviges Road are Urban Link roads and Bell Street is classified as a Major Access Street.

The internal roads within the CBD area are classified as Minor Access Streets. There are only two crossings of the railway line. At the western end of the town there is the at grade railway crossing at Waterloo Road. At the eastern end of Moe, the large roundabout at the intersection of Lloyd Road, Anzac Street, George Street, Narracan Drive and High Street provides a grade separated crossing of the railway.

The main commercial area in Moe is located on the north side of the railway line. The road network is basically rectangular with the industrial area located at the northern side of the town. The residential area is located on the south side of the railway line.

### 2.2 Arterial Roads

In the Latrobe Road Hierarchy Plan, the arterial roads in Moe are the VicRoads declared main roads. The two VicRoads declared main roads in Moe are the Moe – Glengarry Road and the Moe – Rawson Road.

#### 2.2.1 Moe – Glengarry Road

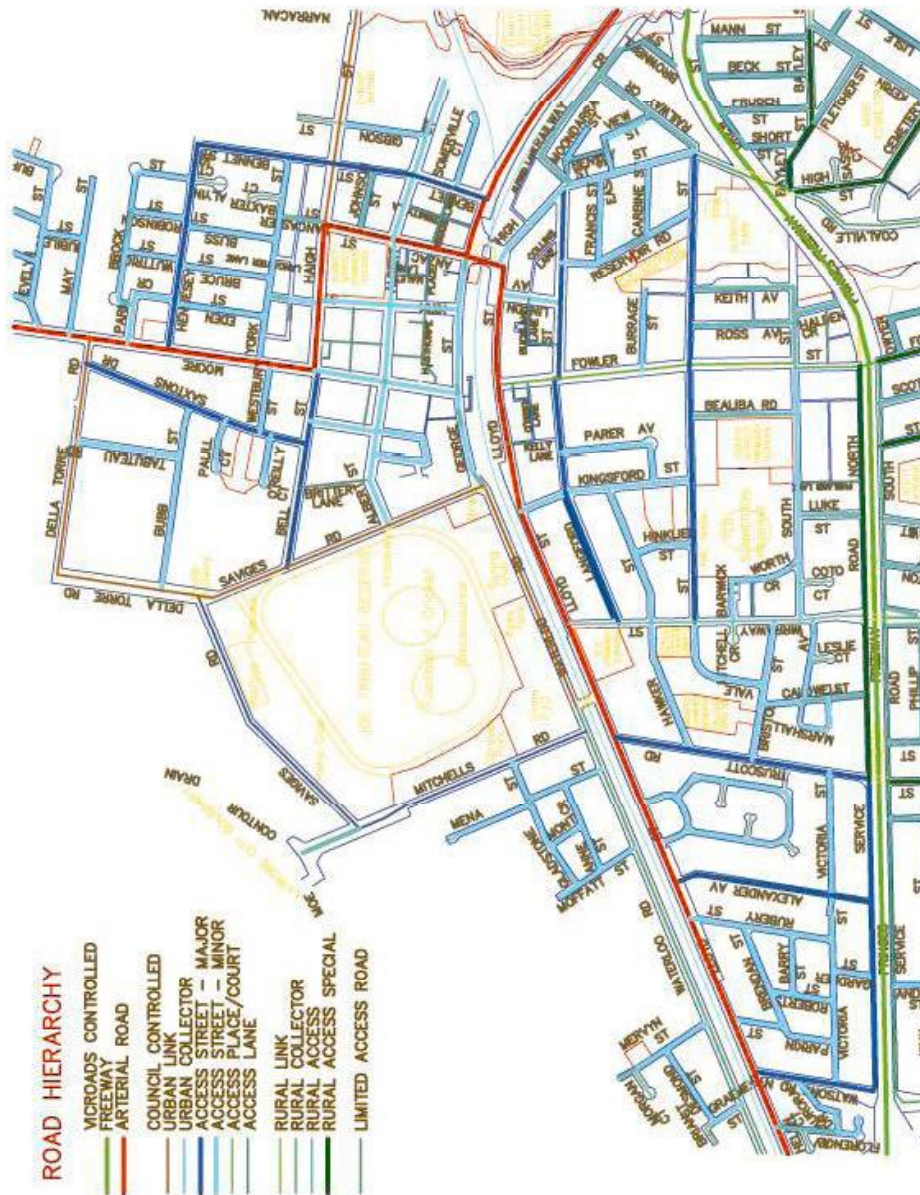
Moe – Glengarry Road is a VicRoads declared main road in the east - west direction in Moe. It is classified as an arterial road in the Latrobe City Council Road Hierarchy. It extends from the Princes Freeway at the western end of Moe to Tyers north of Traralgon. Lloyd Street forms the south boundary of the Moe CBD area.

#### Lloyd Street

Lloyd Street is a two lane, two way road with residential development on the south side and the railway reserve on the north. The pavement is 12.8 metres wide with a centreline marked. There is kerb and channel on the south side and an unsealed shoulder on the north side.

The access to the Moe railway station with an off street carpark is located opposite the Fowler Street intersection.

Figure 2.1 Existing Road Hierarchy Plan





**Photograph 1** Lloyd Street near Fowler Street intersection



**Photograph 2** Haigh Street east of Moore Street intersection. Angle parking on both sides of road

### 2.2.1 Moe – Rawson Road

The Moe – Rawson Road is a VicRoads main Road and is the main north - south arterial road in Moe. It connects the Moe – Glengarry Road at the roundabout at Narracan Drive and Lloyd Street to the Moe – Walhalla Road. In the Moe CBD area, it consists of sections of Haigh Street and Anzac Street.

#### Haigh Street

Haigh Street is a two lane, two way road in the east - west direction. In the section of the VicRoads main road between Moore Street and Anzac Street, it has a pavement width of 21.8 metres with angle parking on both sides of the road. There is concrete kerb and channel on both sides of the road with large trees located within the angle parking. The width of the eastbound traffic lane is 4.2 metres and the westbound lane is 6.2 metres.

On the north side of Haigh Street, there is a retirement village east of the Moore Street intersection. There is a large government building and the Albert Street Primary School on the south side.

#### Anzac Street

Anzac Street is a two lane divided road in a north - south road. It has concrete kerb and channel on both side of each carriageway with a grassed central median. The pavement width on each carriageway is 6.65 metres which provides for one traffic lane of 4.75 metres and a 2.1 metre wide parking lane. There is a roundabout at the Albert Street intersection. There is residential development and the Moe Police Station on the east side. The Albert Street Primary School and the Woolworths supermarket are located on the west side of the road.





**Photograph 3** Anzac Street north of Haigh Street.



**Photograph 4** Roundabout at intersection of Anzac Street and Albert Street.

### 2.3 Major Access Roads

The Major Access Road in the Moe CBD area is Bell Street between the intersection of Haigh Street and Moore Street and Saviges Road.

Bell Street connects Saviges Road in the west to Moore Street and Haigh Street in the east. It is a two lane, two way road with a pavement width of 12.2 metres and concrete kerb and channel on both sides.

The development between Moore Street and Saxtons Drive is residential on the north side and commercial on the south side. In the section between Saxtons Drive and Saviges Road, there are industrial developments on the north side and the Coles supermarket and K Mart on the south side.

Bell Street is used by large trucks to access the supermarkets and department stores off Saviges Road to avoid the roundabout at the Moore Street and Haigh Street intersection.



**Photograph 5** Bell Street east of Saviges Road intersection



**Photograph 6** Waterloo Road east of railway level crossing.

## 2.4 Urban Link Roads

The Urban Link Roads in the Moe CBDE area include Waterloo Road and Saviges Road.

### 2.4.1 Waterloo Road

Waterloo Road runs parallel to, and to the north of, the Melbourne – Traralgon railway line between the level crossing and intersection with the Moe – Glengarry Road and Saviges Road.

Waterloo Road is a two lane, two way road with concrete kerb and channel on both sides and a pavement width of twelve metres. The development on the north side consists of the Apex Park and Moe Racecourse. The railway reserve occupies the south side of Waterloo Road.

### 2.4.2 Saviges Road

Saviges Road is a two lane, two way road along the western boundary of the CBD area. There is concrete kerb and channel on both sides of the road between Waterloo Road and Market Street. There is angle parking on the west side of Saviges Road adjacent to the Moe Bowling Club.

The pavement width is 10.75 metres in a twenty metre wide road reservation. The Moe Racecourse and Joe Tabauteau Reserve are located on the west side and the commercial developments including Aldi supermarket and Sam's Warehouse are located on the east side of the road. There is an access to the Aldi supermarket opposite the main access road to the sporting grounds at the Joe Tabauteau Reserve.



**Photograph 7** Saviges Road at intersection of access roads to Aldi supermarket and recreation reserve.



**Photograph 8** George Street east of Moore Street intersection.

## 2.5 Minor Access Roads

In the Moe CBD area, the Minor Access Roads include George Street, Albert Street, Market Street, Moore Street and Kirk Street.

### 2.5.1 George Street

George Street is a two lane, two way road along the north side of the Melbourne – Traralgon Railway line. There is concrete kerb and channel on both sides of the road.

The pavement width is 12.7 metres providing one traffic lane and parallel kerbside parking in each direction.

There are sections of angle parking on the south side of George Street. The pavement width in these areas is 16.25 metres. There is parallel kerbside parking in the north side and angle parking on the south side.

The railway line and Moe Station are located on the south side of George Street. There are several shops opposite the Moore Street intersection and the skate park in the section between Anzac Street and the Kirk Street intersection on the south side of George Street.

On the north side of George Street, there is a range of retail outlets including the timber and hardware store, shops, businesses and the Woolworths supermarket.

### 2.5.2 Albert Street

Albert Street is a two lane, two way road in the east - west direction through the central part of the CBD area. West of Moore Street, Albert Street provides access to K Mart and Coles supermarket on the north and Aldi supermarket and Reece Plumbing store on the south.

It has a pavement width of 23 metres in a thirty metre wide road reservation. There is one traffic lane 6.1 metres wide with angle parking in both directions. There is concrete kerb and channel on both sides of the road with large trees located within the angle parking.



**Photograph 9** Albert Street west of Kirk Street



**Photograph 10** Moore Street south of Haigh Street

### 2.5.3 Market Street

Market Street is a two lane, two way road in the north - south direction between Albert Street and Bell Street. There is one traffic lane in each direction with the central bus terminal located on the west side. The pavement width including the bus bays is 15.9 metres.

The Coles supermarket is located on the west side and there are shops and businesses on the east side.

### 2.5.4 Moore Street

Moore Street, between Haigh Street and George Street, is a two way access road in a north – south direction through the central CBD area. It has a pavement width of 22 metres with one traffic lane of six metres and angle parking in each direction.

In the section between Albert Street and George Street, Moore Street is signed as a shared zone with a speed limit of 10 km/h.

### 2.5.5 Kirk Street

Kirk Street between George Street and Haigh Street is a two way access road in a north – south direction through the central CBD area. It has a pavement width of 20.1 metres with one traffic lane and angle parking in each direction.

In the section between George Street and Albert Street, the abutting development is retail and commercial premises on both sides. The Albert Street Primary School is located on the east side of Kirk Street between Albert Street and Haigh Street.

## 2.6 Traffic Volumes

The Latrobe City Council in 2009 carried out automatic traffic counts on many of the roads in the central area of Moe. The counts classified the traffic volumes according to the vehicle length and the number of axles in accordance with the Austroads Vehicle Classification System.

The number of vehicles by type using the roads in the CBD are detailed in **Table A1** in **Appendix A**.

The average daily two way traffic volumes on the roads in the CBD area of Moe are shown on **Figure 2.1**. The highest traffic volumes are on Anzac Street and Saviges Road south of Albert Street and on Albert Street. These sections of road provide for the traffic accessing the central area of Moe and the Albert Street Primary School.

The average daily two way truck volumes are shown on **Figure 2.2**. The truck volumes shown are the semi trailers and B Double trucks. The rigid trucks detailed in **Table A1** in **Appendix A** include the buses accessing the central area.

The roads with the highest truck volumes include the Waterloo Road, Saviges Road, Haigh Street and Anzac Street.

## 2.7 Predicted Traffic growth

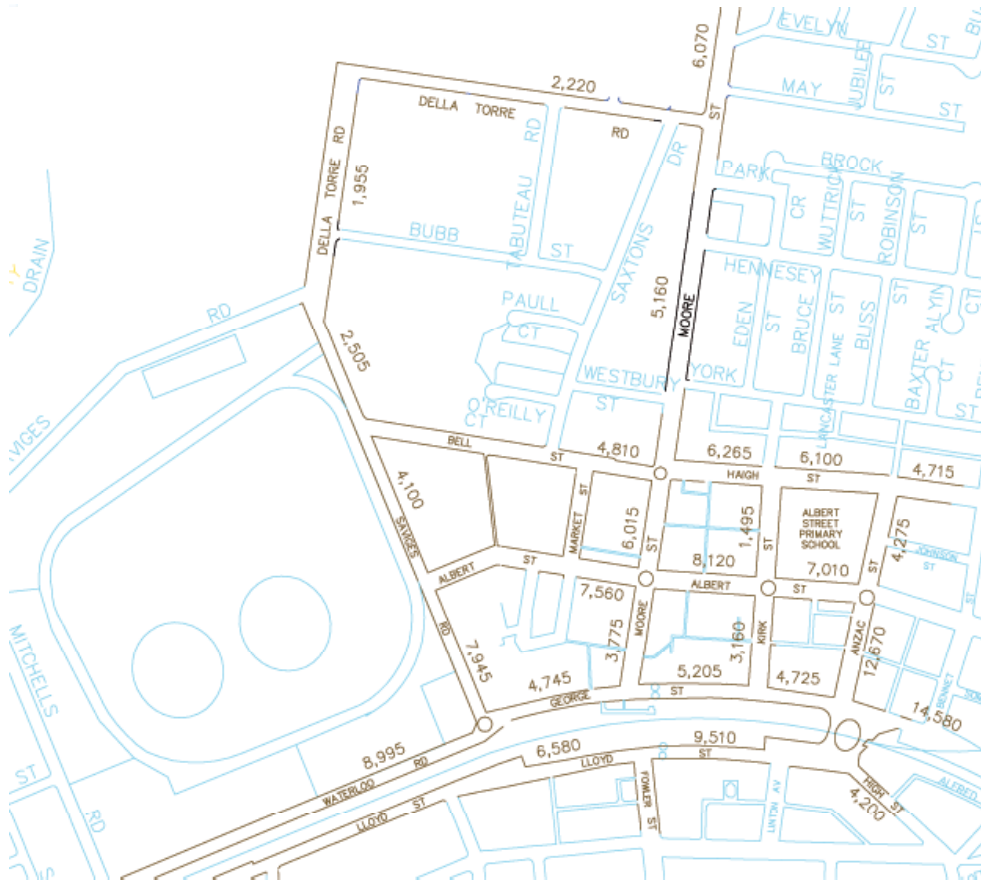
The population forecasts detailed in the Latrobe City Council Community Profile for the Moe – Moe South area predict that there will be an average growth rate of 0.86 % in the population between 2006 and 2021. It is expected that there will be an increase of 700 households in this period.

The forecast population increase is assumed to be centred in the south side of Moe. Assuming the traffic volumes in Moe increase at a rate comparable with the predicted population increase, the traffic volumes using the Moe – Glengarry Road in the Year 2021 are estimated in **Table 2.1**.

**Table 2.1 Predicted 2021 Traffic Volumes**

Road	Vehicle Type	Daily Traffic Volumes (Vehicles / day)	
		Eastbound	Westbound
Moe – Glengarry Road West of Fowler Street	Total vehicles	3,445	3,425
Moe – Glengarry Road East of Fowler Road	Total vehicles	5,005	5,350

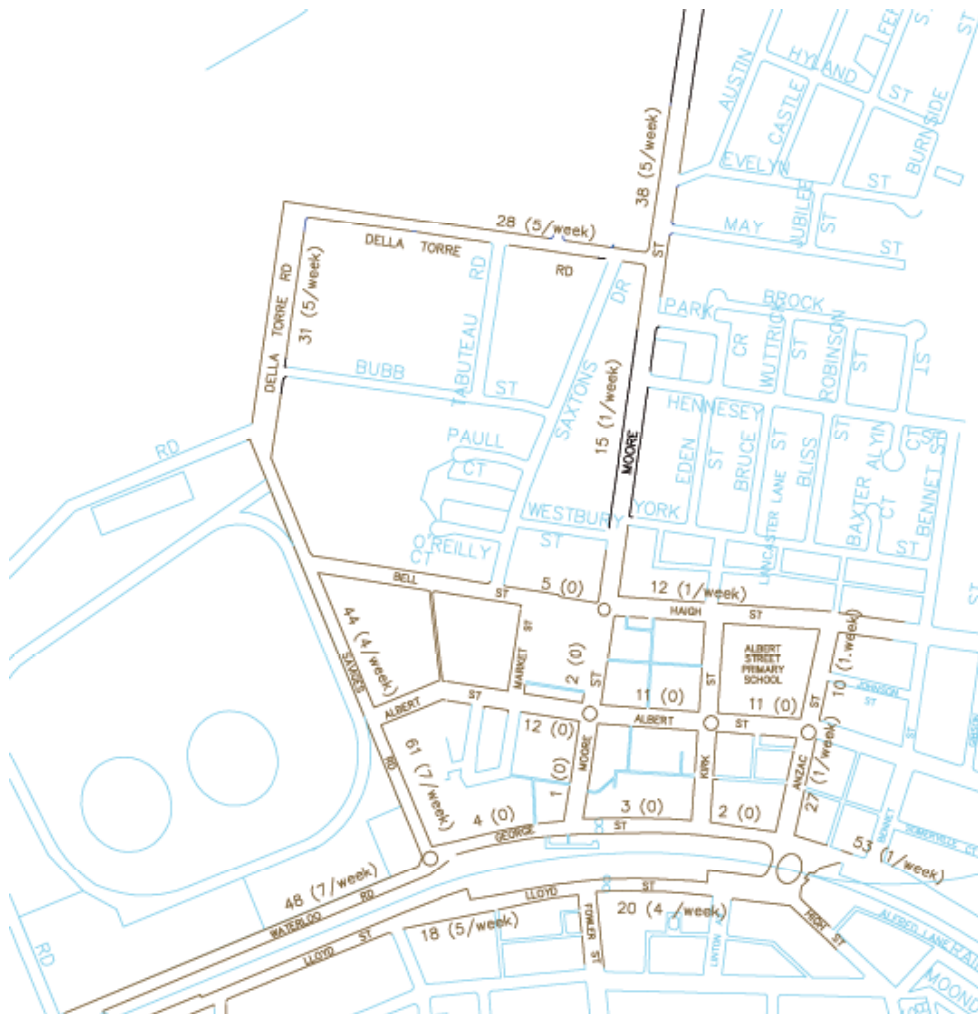
**Figure 2.1 Two way daily traffic volumes (2009)**



**Note:**

**4100 No of vehicles per day**

**Figure 2.2 Two way daily truck volumes (2009)**



**Note:**  
 44 (4/week) No of Semi trailers per day  
 18 (5/week) No of B Doubles per week

## 2.8 Intersection Operation

Intersection turning movement counts were carried out at the intersection of Moe – Glengarry Road and Moe – Rawson Road and at the intersection of Moe – Glengarry Road and Fowler Street.

The peak period traffic operation of the existing intersections was analysed using the aaSIDRA 4.0 software with the existing 2010 and predicted 2021 traffic volumes.

### 2.8.1 Moe – Glengarry Road / Moe – Rawson Road intersection

The intersection turning movement count at the Moe – Glengarry Road with Moe – Rawson Road was carried out on Wednesday 3<sup>rd</sup> February 2010 between 8.00 AM and 6.00 PM. The local named roads at the intersection are Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street.

The morning and afternoon peak period turning movements are detailed in **Figures 2.3** and **2.4**. The results of the intersection turning movement count are attached in **Appendix A**. The results of the intersection traffic analysis is detailed in **Appendix B** and summarised in **Tables 2.2** and **2.3**.

**Table 2.2 Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street intersection analysis**

Approach	Movement	Year 2010 Volumes				Year 2021 Volumes			
		AM Peak (8.15–9.15)		PM Peak (4.30–5.30)		AM Peak (8.15–9.15)		PM Peak (4.30–5.30)	
		DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue
Lloyd Street South West	Left Turn	0.216	1.8	0.173	1.3	0.239	2.0	0.190	1.5
	Right	0.208	1.6	0.173	1.2	0.239	1.9	0.209	1.5
George Street West	Left Turn	0.042	0.3	0.110	0.8	0.045	0.4	0.118	0.9
Anzac Street	Left Turn	0.174	1.3	0.252	2.0	0.191	1.5	0.279	2.3
	Right Turn	0.214	1.1	0.249	1.3	0.242	1.3	0.265	1.6
Narracan Drive East	Left Turn	0.449	4.1	0.665	8.4	0.504	4.9	0.750	11.8
High Street South East	Left Turn	0.048	0.3	0.027	0.2	0.051	0.3	0.032	0.3
	Right Turn	0.228	2.0	0.193	1.9	0.248	2.3	0.227	2.4

**Note:** DoS Degree of Saturation  
95<sup>th</sup>ile Queue 95<sup>th</sup> Percentile Traffic Queue

The traffic analysis of the existing intersection indicates that it is operating satisfactorily in both the morning and evening peak period. The length of the traffic queues on the Narracan Drive approach was consistent with the observed queues during the morning and evening peak periods.

It is predicted that in Year 2021, the degree of saturation on the Narracan Drive approach would be 0.75. All other approaches to the roundabout are predicted to continue to operate satisfactorily with low levels of saturation and short traffic queues.

Figure 2.3 Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street AM Peak  
8.00 - 9.00 AM

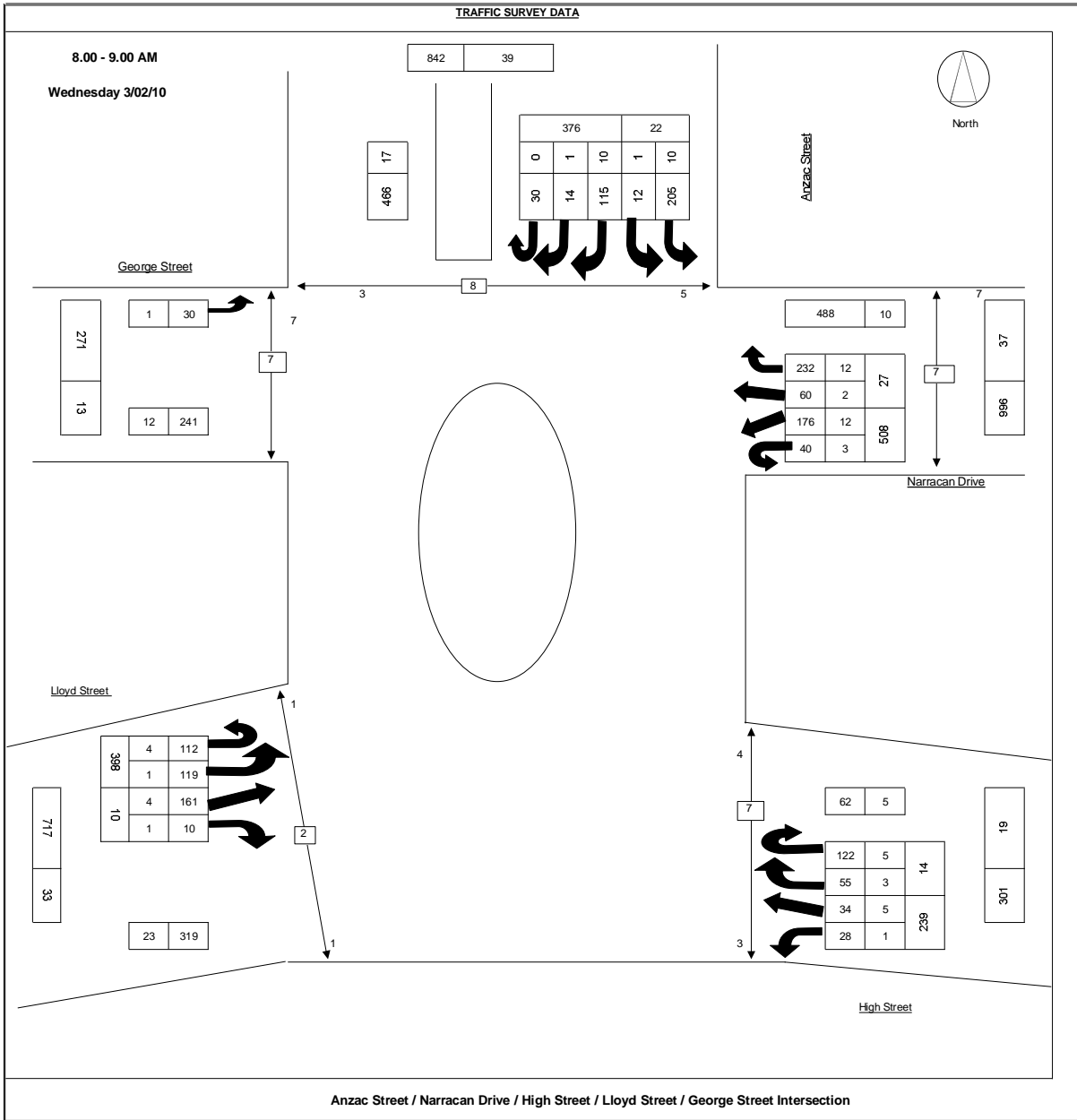
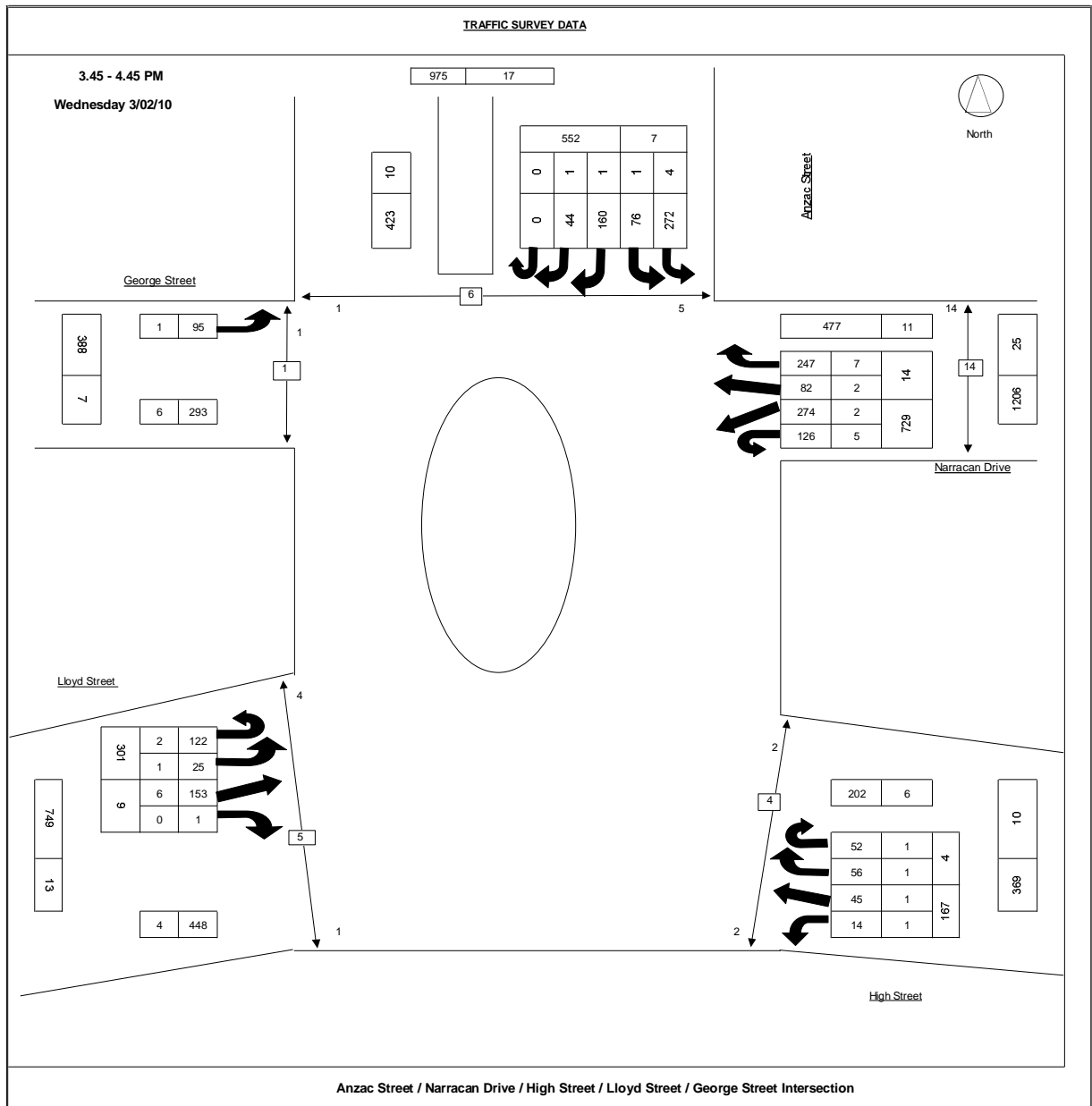




Figure 2.4 Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street PM Peak  
3.45 - 4.45 PM



**2.8.2 Moe – Glengarry Road / Fowler Street Intersection**

At the intersection of Moe – Glengarry Road (Lloyd Street) and Fowler Street, peak period turning movement counts were carried out between 7.30 – 9.30 AM and 3.00 – 6.00 on Wednesday 10<sup>th</sup> February 2010

The morning and afternoon peak period turning movements are detailed in **Figure 2.5**. The results of the intersection turning movement count are attached in **Appendix A**.

The results of the intersection traffic analysis is detailed in **Appendix B** and summarised in **Table 2.3**.

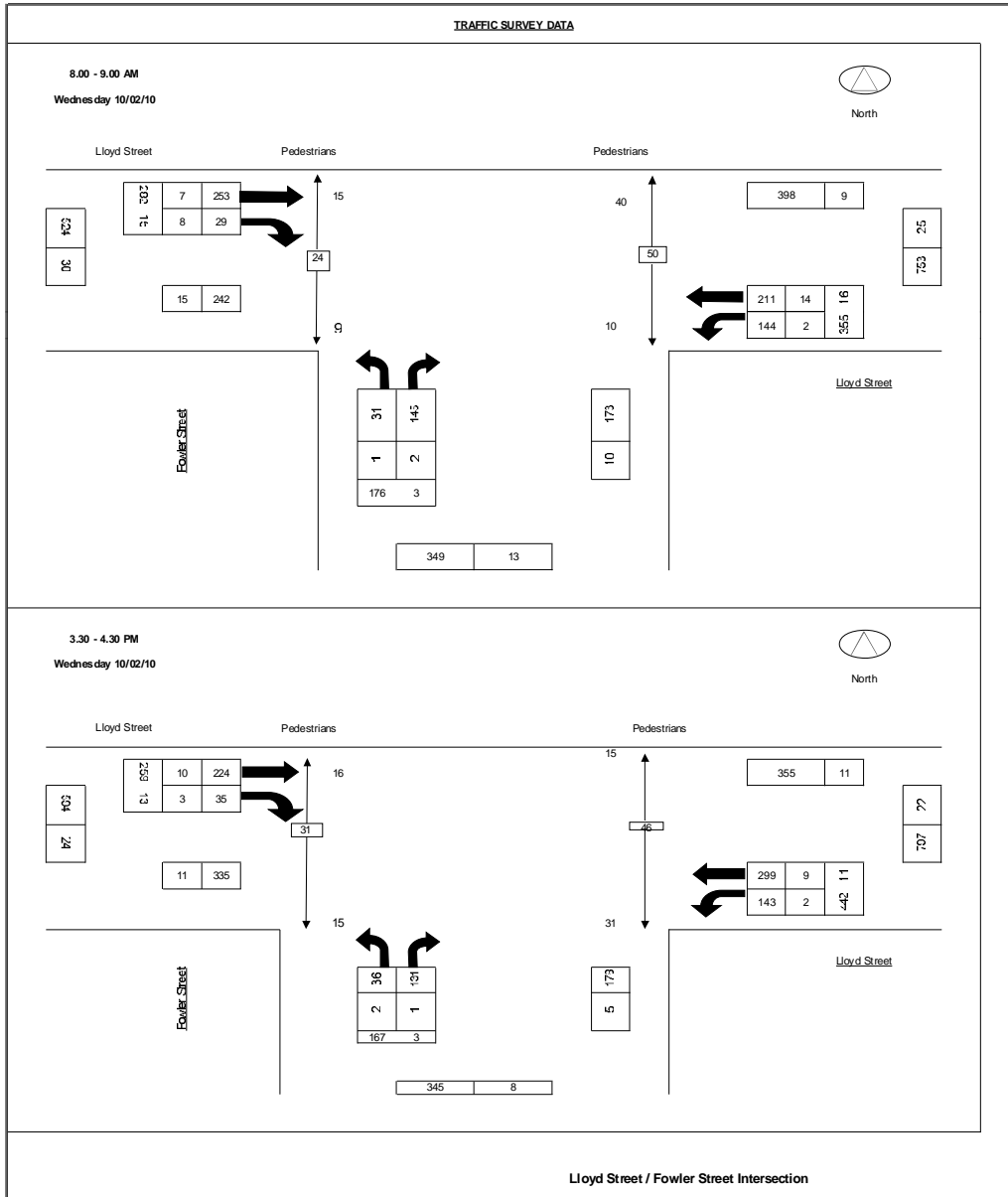
**Table 2.3 Moe – Glengarry Road / Fowler Street intersection analysis**

Approach	Movement	Year 2010 Volumes				Year 2021 Volumes			
		AM Peak (8.15–9.15)		PM Peak (4.30–5.30)		AM Peak (8.15–9.15)		PM Peak (4.30–5.30)	
		DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue	DoS	95 <sup>th</sup> ile Queue
Moe – Glengarry Rd West	Left Turn	0.143	0	0.130	0	0.157	0	0.143	0
	Right	0.104	0.5	0.102	0.5	0.125	0.6	0.118	0.5
Fowler Street South	Left Turn	0.030	0.1	0.039	0.2	0.033	0.2	0.045	0.2
	Right Turn	0.192	1.0	0.185	0.9	0.224	1.1	0.216	1.1
Moe – Glengarry Road East	Left Turn	0.084	1.3	0.083	0	0.091	0	0.091	0
	Right Turn	0.126	1.1	0.174	0	0.139	0	0.187	0
Station carpark exit	Left Turn	0.071	0.3	0.077	0.3	0.078	0.4	0.085	0.4
	Through	0.071	0.3	0.077	0.3	0.078	0.4	0.085	0.4
	Right Turn	0.071	0.3	0.077	0.3	0.078	0.4	0.085	0.4

**Note:** DoS Degree of Saturation  
95<sup>th</sup>ile Queue 95<sup>th</sup> Percentile Traffic Queue

The traffic analysis of the existing intersection indicates that it is operating satisfactorily in both the morning and evening peak period. It is predicted that in Year 2021, the intersection would still be operating satisfactorily with low degrees of saturation and minimal traffic queues.

Figure 2.5 Lloyd Street / Fowler Street Intersection



## 2.9 Casualty Crash History

The reported casualty crashes on the roads in the Moe CBD area for the period between 1<sup>st</sup> July 2004 and 30<sup>th</sup> June 2009 were obtained from the VicRoads CRASHSTATS database.

There were 23 casualty crashes on the roads in the CBD area between July 2004 and June 2009 consisting of one fatality, three serious injuries and 19 other injuries. None of the casualty crashes in the CBD area involved a truck.

The casualty crashes on each of the roads in the central area is summarised in **Table 2.4**. Sketches of the casualty crashes are shown in **Appendix C**.

**Table 2.4 Casualty crashes in Moe CBD**

Road	Casualty crashes			Comments
	Fatal	Serious Injury	Other Injury	
Moe – Glengarry Road Lloyd Street		2	7	Six car crashes, two bicyclist and one motorcycle crash.
Moe – Rawson Road Moore Street Haigh Street			2 3	Two crashes at Bell Street roundabout Three car crashes
Moore Street George St – Haigh St			3	One pedestrian, one motorcycle and one car crash
Bell Street / Market Street		1		One pedestrian crash
Waterloo Road	1			Fatal pedestrian crash
Albert Street Saviges Rd – Anzac St			3	Two pedestrian and one car crash.
Kirk Street			1	One car crash with parking manoeuvre
<b>Total</b>	<b>1</b>	<b>3</b>	<b>19</b>	

### 2.9.1 Moe – Glengarry Road

There were nine casualty crashes reported on the Moe – Glengarry Road (Lloyd Street) between the railway crossing at Waterloo Road and the roundabout at Anzac Street / George Street / High Street intersection.

There were three crashes at the Fowler Street intersection involving a bicyclist on the pedestrian crossing, a rear end crash at the pedestrian crossing and a right turning crash at the intersection.

**2.9.2 Moe – Rawson Road**

There were five casualty crashes on the Moe – Rawson Road with two crashes at the Moore Street / Bell Street / Haigh Street roundabout and three crashes on Haigh Street.

There were two crashes at the intersection of Haigh Street and Kirk Street and one crash at the intersection of Anzac Street and Haigh Street.

**2.9.3 Moore Street**

There were three casualty crashes on Moore Street. There were two crashes within 15 metres either side of the roundabout at the Albert Street intersection. One crash involved a pedestrian crossing Moore Street.

**2.9.4 Albert Street**

There were three casualty crashes on Albert Street between Market Street and Kirk Street. Two of the crashes involved pedestrians.

**2.9.5 Other crashes**

There was one casualty crash at the intersection of Bell Street and Market Street which involved a pedestrian.

There was a fatal pedestrian crash on Waterloo Road and a crash on Kirk Street south of the Albert Street intersection involving a parking manoeuvre.

### **3. Changes to the Moe Road Network**

#### **3.1 General**

There are several studies which have been or are in the process of being carried out which will impact on the road network in the Moe CBD area. These studies include the following.

- Review of the operation of the railway level crossing between the Moe – Glengarry Road and Waterloo Road.
- Heavy Transport Routes Study including the upgrading of the railway level crossing between Moe – Glengarry Road and Waterloo Road.
- Moe Rail Precinct Revitalisation Project – Draft Masterplan
- Clifton Street Development.
- Latrobe Valley Bus Lines Study

#### **3.2 Review of the Waterloo Road railway crossing**

A review was carried out of the traffic operation of the railway level crossing between the Moe – Glengarry Road and Waterloo Road. The use of this railway crossing by B Doubles in both directions would require widening of the pavement.

The results of the review and the options considered for the upgrading of the crossing are detailed in the Report ‘Moe – Glengarry Road to Waterloo Road, Moe Railway Level Crossing. Traffic Engineering Report, June 2011’.

Four options were considered for the upgrading of the level crossing. The upgrading of Waterloo Road between Trafalgar and Moe was also included in the assessment of the upgrading options.

The installation of traffic signals activated by an approaching train was recommended as the most cost effective option for the upgrading of the level crossing.

#### **3.3 Heavy Transport Routes Study**

The heavy vehicles travelling to and through Moe currently use the VicRoads declared main roads. These roads consist of the Moe – Glengarry Road in the east – west direction and the Moe - Rawson Road in the north – south direction.

A review of the heavy vehicle routes in Moe was undertaken involving discussions with the local transport operators and the major developments. It was recommended that the use of the Moe – Glengarry Road should be retained as the heavy vehicle route in the east – west direction.

The upgrading of the level crossing at Waterloo Road and the use of the Saviges Road, Della Torre Road and Moore Street route was recommended as the heavy vehicle route for the north – south traffic in Moe.

The results of the review and the options considered for the Heavy Vehicle Routes in Moe are detailed in the Report ‘Heavy Transport Routes Study. Traffic Engineering Report, June 2011’.

### 3.4 Moe Rail Precinct Revitalisation Project

The Moe Rail Precinct Revitalisation Project developed a Masterplan for the redevelopment of the Moe Rail Precinct. It included several urban design initiatives aimed at revitalising the centre of Moe.

There are three components of the Master Plan.

- Development of a Civic / Community Hub including a City Square and pedestrian plaza, connection to Moore Street north of the railway station, construction of a three level building providing for Council functions, meeting rooms and outdoor deck areas, and integration of the existing railway station buildings.
- Moore Street Shared Space involving the construction of a continuous paved area with pedestrian priority and the relocation of on street parking to the northern end. Short term drop off zones will be provided.
- Commercial Precinct between the railway line and George Street involving opportunities for future commercial buildings, residential or mixed use development.

The development of the Rail Precinct will have the following impacts on the road network.

- The through traffic movement on George Street will be downgraded at the Moore Street intersection. Access to the on street carparking at the northern end of Moore Street will be provided.
- A taxi rank will be developed on the south side of George Street west of Moore Street.
- A transport interchange providing for four buses will be developed on the south side of George Street, east of Moore Street.
- Additional on street angle parking will be provided on the south side of George Street.
- The existing commuter carpark on the north side of Lloyd Street will be reconfigured and expanded. The access to the carpark will be relocated to the west of the Fowler Street intersection. A separate VLine and tourist coach interchange will be developed to the west of Fowler Street.
- A public carpark will be developed on the south side of George Street east of Kirk Street.

### 3.5 Clifton Street Development

Clifton Street is a north south road connecting the carpark at the rear of the TM & H Hardware to Albert Street. The Council has plans to close Clifton Street and extend Market Street south of Albert Street through the carpark to connect to Saviges Road.

The carpark on either side of Market Street will be reconfigured and a direct access road constructed to the Sams Warehouse carpark.

The existing access road to the Aldi carpark will be upgraded to form part of the Market Street extension. The intersection with Saviges Road and Market Street will be opposite the access road to the recreation grounds at the Joe Tabateau Reserve.

### **3.6 Latrobe Valley Bus Lines Study**

The Department of Transport is carrying out a study of the bus services in the Latrobe Valley including Moe. The Study includes a review of the operation of the existing and proposed bus services.

In Moe, the review will take into account the proposed development of the transport interchange in George Street. The results of the Study have not been released.



## 4. Recommended Road Network

### 4.1 Road Hierarchy Plan

The review of the existing traffic conditions and the reported crashes and the proposed changes to the road network arising from the proposed developments in the Moe CBD have been used to determine changes to the road hierarchy in the central area.

The biggest impact on the road network will be the changes to the Heavy Transport routes in and through Moe. The following changes to the road hierarchy in Moe are recommended.

- Della Torre Road, Saviges Road and Waterloo Road between George Street and the railway crossing north of Moe – Glengarry Road to be classified as ‘Proposed Arterial Road’.
- Moore Street between Della Torre Road and Haigh Street, Haigh Street between Moore Street and Anzac Street and Anzac Street between Haigh Street and Albert Street to be classified as ‘Future Urban Link Road’.
- Moe – Glengarry Road and Anzac Street between George Street and Albert Street to be retained as an ‘Arterial Road’.

The recommended Road Hierarchy Plan is detailed in **Figure 4.1**.

### 4.2 Changes to road network for Heavy Transport Route

The following changes to the road network are recommended to implement the Recommended Road Hierarchy. The development of the Heavy Transport Route using the Waterloo Road railway crossing and Waterloo Road, Saviges Road and Della Torre Road would require the road network improvements detailed in the following sections.

#### 4.2.1 Railway level crossing between Moe – Glengarry Road and Waterloo Road

The use of the railway crossing between the Moe – Glengarry Road and Waterloo Road by B Doubles in both directions would require widening of the pavement, relocation of boom barriers and flashing lights on the east side and the installation of traffic signals activated by the approaching train to clear any vehicles from the railway line.

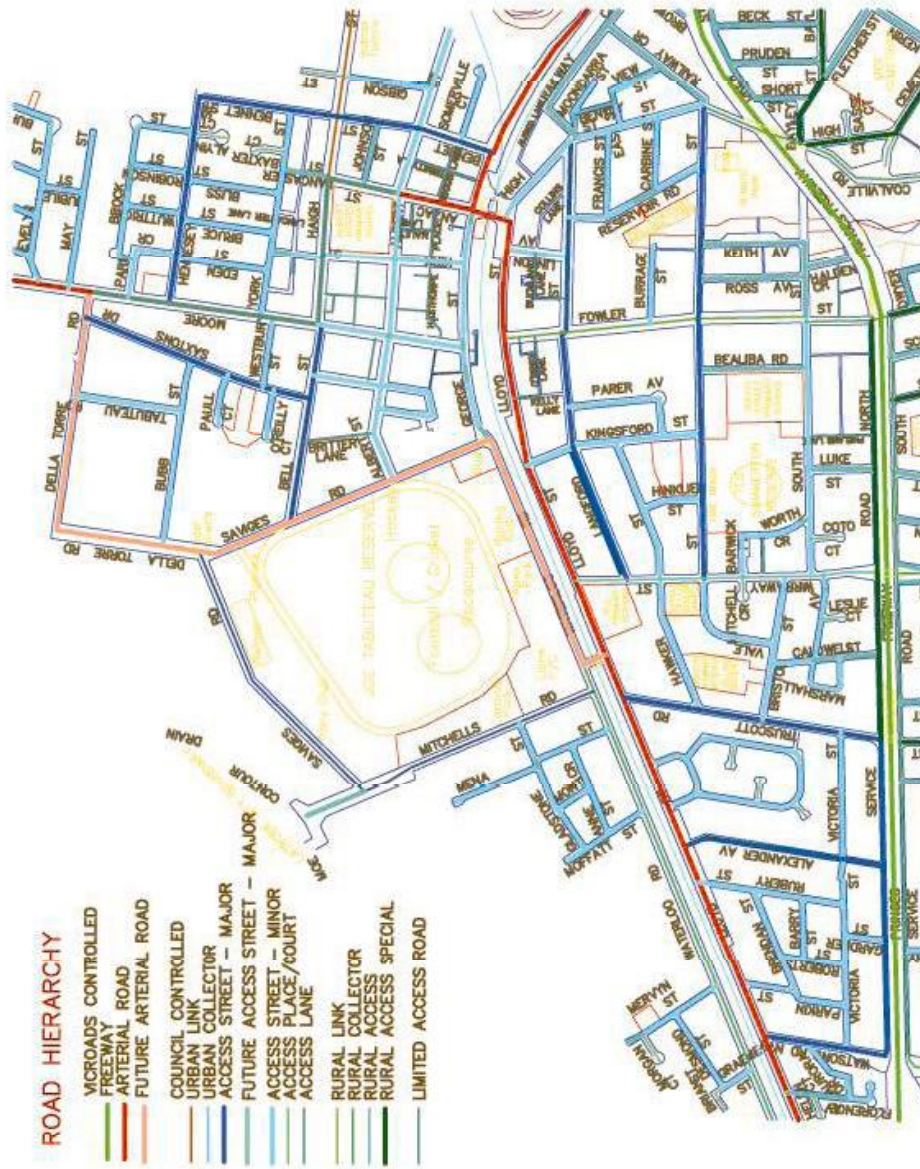
The proposed layout of the metered traffic signals at the railway crossing is detailed in the Report ‘Moe - Glengarry Road to Waterloo Road, Moe Railway Level Crossing, Traffic Engineering Report.’

#### 4.2.2 Waterloo Road / George Street / Saviges Road intersection.

The use of Waterloo Road and Saviges Road by B Doubles in both directions would require the removal of the existing roundabout at the intersection of Waterloo Road / Saviges Road / George Street.

The proposed intersection layout would include a right turn lane for the traffic accessing George Street from the west approach. A copy of the concept layout plan is detailed in **Appendix D**. The estimated cost of the intersection works is \$ 203,200.

Figure 4.1 Recommended Road Hierarchy Plan



#### **4.2.3 Saviges Road widening**

The Clifton Street Development would involve the realignment of Market Street south of Albert Street to connect to Saviges Road opposite the access road to the Joe Tabateau Reserve.

Widening of Saviges Road to provide indented right turn lanes on both approaches and a left turn deceleration lane on the north approach is recommended.

A copy of the concept layout plan is detailed in **Appendix D**. The estimated cost of the proposed widening is \$ 86,200.

#### **4.2.4 Della Torre Road curve widening**

The use of Della Torre Road by B Doubles in both directions would require widening of the curve at the northern extent of the industrial area. The radius of the inner curve is approximately 12 metres. Widening on the inside of the curve is required to provide for the large trucks. Relocation of the stays to the power poles maybe required. The estimated cost of the pavement widening, excluding the service relocation costs, is \$ 40,000.

#### **4.2.5 Moore Street / Della Torre Road intersection**

The provision of an indented right turn lane on Moore Street on the north approach to the Della Torre Road intersection is recommended. The concept plan of the proposed right turn lane is detailed in **Appendix D**. The estimated cost of the proposed right turn lane is \$87,500.

### **4.3 Other road network improvements**

The following road improvements are recommended to address the reported casualty crashes in the Moe CBD area.

#### **4.3.1 Moore Street / Bell Street / Haigh Street intersection**

There have been two casualty crashes at the roundabout at the intersection of Moore Street / Bell Street / Haigh Street intersection. All of the crashes have involved right angle crashes from the north approach.

It is proposed to modify the southeast corner to improve the intersection sight distance. A copy of the concept layout plan is detailed in **Appendix D**. The increased width of the traffic island on the Haigh Street east approach would improve the crossing facilities for the elderly citizens from the adjacent retirement village. The estimated cost of the proposed works is \$ 65,000.

#### **4.3.2 Haigh Street between Moore Street and Anzac Street intersections.**

There have been two casualty crashes at the Kirk Street intersection. The crashes have involved crossing and turning vehicles. It is recommended that a central median be constructed across the intersection to address the casualty crashes. The estimated cost of the proposed works is \$ 50,000.

Narrowing the through traffic lanes to provide a central right turn lane for the vehicles accessing the angle parking is recommended. The provision of the right turn lane would only involve linemarking and the estimated cost is \$ 8,000.

#### 4.4 Pedestrian facilities

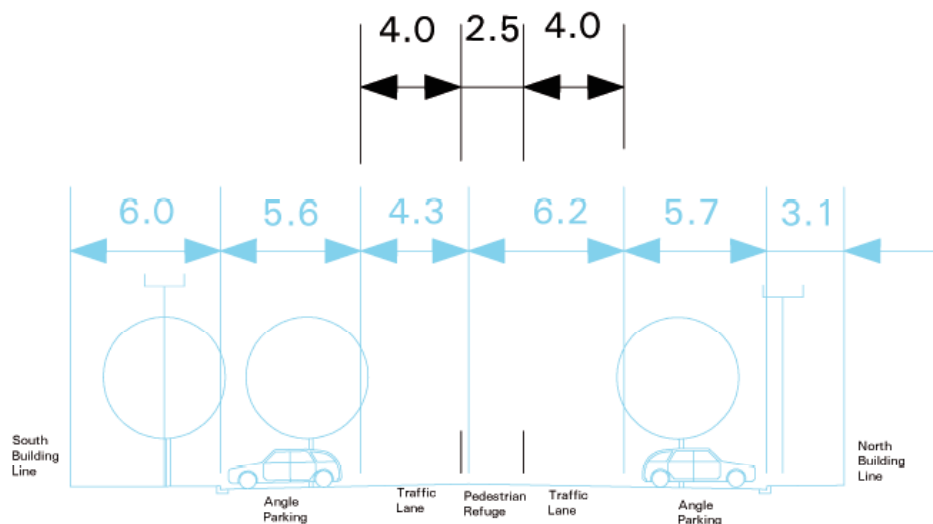
There are no pedestrian facilities in the midblock sections on the roads in the CBD area. There have been four casualty crashes involving pedestrians in the Moe CBD area. One crash in Moore Street south of the Albert Street intersection involved a pedestrian crossing in the midblock area.

It is proposed to narrow the through traffic lanes and provide a narrow painted central median. The painted central medians would be provided in the following midblock sections.

- Haigh Street between Moore Street and Kirk Street intersections
- Albert Street between Moore Street and Kirk Street intersections
- Moore Street between Albert Street and Haigh Street / Bell Street intersections.

The installation of the painted central medians will prevent motorists from turning right across the road centreline to access the angle parking. They will have to travel to the roundabouts at the adjacent intersections.

The installation of the central medians would provide a refuge for pedestrians crossing the road. The works would involve linemarking and the total estimated cost is \$ 25,700.



#### Haigh Street East of Moore Street Proposed Pedestrian Refuge

#### 4.5 Moe – Glengarry Road / Moe Rawson Road / George Street / High Street Roundabout

The roundabout at the intersection of Lloyd Street (Moe – Glengarry Road) / George Street / Anzac Street (Moe – Rawson Road) / Narracan Drive (Moe – Glengarry Road / High Street) provides a grade separated crossing of the Melbourne – Traralgon railway line.

There are several problems with the geometry of the roundabout and pedestrian safety. The traffic operation of the roundabout was assessed using the aaSIDRA 4.0 software.

#### 4.5.1 Geometry of the roundabout

It is understood that there was one bridge over the railway line with traffic signals installed on the north side. After several casualty crashes at the traffic signals, it was decided to construct an additional bridge to the east of the existing and create a roundabout linking the approach roads on both sides of the roundabout.

The existing layout operates as a roundabout but the vertical geometry on the approaches to the bridges result in inadequate stopping sight distance. Several near misses were observed during the traffic surveys caused by entering cars not seeing the circulating traffic.

The main area for concern is the Narracan Drive approach. The level of the eastern bridge is approximately one metre above the pavement level on the approach. This results in entering vehicles from the High Street approach not seeing the circulating traffic until they come over the crest on the bridge.

The pavement level on the Narracan Drive approach would have to be raised by up to one metre to improve the sight distance for the traffic entering the roundabout from High Street and Lloyd Street.

The trees in the central island restrict the sight distance for the vehicles entering from the Lloyd Street approach. Removal of some of the trees in the central island should be carried out to improve the sight distance.

#### 4.5.2 Pedestrian safety at roundabout

There are narrow footpaths on both sides of the existing bridges and on the approaches. There are pram crossings and median cut throughs on the Anzac Street and Narracan Drive approaches.

Several pedestrians were observed crossing Lloyd Street at the approach to the roundabout and climbing over the guard fence on the south side to walk down High Street. There is a level difference of several metres between the westbound carriageway of Lloyd Street and the southern service.

There is a relatively steep downgrade from the bridge to access George Street and the vegetation of the southwest corner of the intersection restricts visibility to the pedestrians.

It is proposed to relocate the pedestrian crossing in George Street approximately 20 metres to the west of the Anzac Street intersection, construct a central median refuge and install pedestrian fencing on the southwest corner of George Street / Anzac Street intersection to direct the pedestrians to the crossing.

At the Lloyd Street approach, it is proposed to install pedestrian fencing on the north side of Lloyd Street for approximately 60 metres towards the west to direct the pedestrians from crossing at the roundabout.

The installation of fencing on the north side of High Street is also proposed to direct pedestrians to cross High Street at least 20 metres from the approach to the roundabout.

#### 4.5.3 Traffic operation of roundabout

The traffic operation of the roundabout in both peak periods is considered to be satisfactory with low levels of saturation and relatively short traffic queues. The Narracan Drive approach has higher degrees of saturation and longer traffic queues in the afternoon peak period than the other approaches.

In the Year 2021, it is predicted that the degrees of saturation and traffic queues on the Narracan Drive approach will increase. The degrees of saturation would be approaching the upper end of an acceptable range for a roundabout by the Year 2021.

Two options were investigated to address the traffic queuing on the Narracan Drive approach.

##### Metered traffic signals on Anzac Street approach

The installation of metered traffic signals on the Anzac Street approach was considered to improve the flow on the Narracan Drive approach. When the traffic queues on the Narracan Drive approach exceeded a predetermined distance, traffic signals would stop the southbound traffic on Anzac Street enabling the Narracan Drive traffic to enter the roundabout.

The results of the aaSIDRA 4.0 analysis indicated that the installation of the metered signals would result in a minor improvement in the Narracan Drive approach but would have a significant adverse impact on the degree of saturation and the length of the traffic queues on the Anzac Street approach. This option was not considered further.

##### Widening of Narracan Drive approach

There is one wide traffic lane on the Narracan Drive approach to the roundabout. This option would widen the Narracan Drive approach to provide two traffic lanes for approximately 100 metres in advance of the roundabout. It is proposed to install traffic instruction signs indicating

High Street	CDB
Lloyd Street	Right Lane
Left Lane	

The proposed widening of the Narracan Drive would have a significant improvement on the traffic operation of the Narracan Drive approach without adversely affecting the operation of the roundabout. The results of the aaSIDRA 4.0 analysis of the roundabout with the widened Narracan Drive approach are summarised in **Table 4.1** and attached in **Appendix B**.

Widening into the south side of the central median and correction to the pavement crossfall for the circulating traffic would also be included. A concept plan of the proposed layout is detailed in **Appendix D**.

The cost of widening the Narracan Drive approach, raising the pavement level and the installation of pedestrian fencing is estimated to be \$ 987,000.



### **4.6.3 Pedestrian crossing**

The existing pedestrian crossing has flashing lights with mast arms on both sides of the road. The traffic surveys indicated that there were as many pedestrians crossing Lloyd Street on the west side as using the pedestrian crossing on the east side.

Several bus services stopped on the southwest side of the Fowler Street intersection. The pedestrians accessing the railway station crossed Lloyd Street from the bus stop on the west side of the intersection rather than using the pedestrian crossing on the east side.

The crossing on the east side of the Fowler Street intersection aligns with the existing pedestrian crossing of the railway line. It is proposed to construct convenience retail outlets along the path between the pedestrian crossing of Lloyd Street and the railway pedestrian crossing.

Relocation of the pedestrian crossing to the west side of the intersection would improve the operation of the Fowler Street intersection and provide for the pedestrians from the bus stops. The new location would match the proposed future footbridge linking the railway station to the proposed town square on the north side of the railway line. However, relocation in the short term would not comply with the proposed Master Plan of the Revitalisation Project.

Relocation of the pedestrian crossing to the west side should be considered as a long term option when the footbridge is constructed.



## **5. Stakeholder Discussions**

### **5.1 VicRoads**

VicRoads only have responsibility for the declared arterial roads in Moe. Any proposals for changes to the roundabout at the intersection of Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street would require approval from VicRoads.

### **5.2 Community for Moe**

The proposed changes to the road network in the Moe CBD area were discussed with Tony Flynn of the Community for Moe. He indicated that the roundabout at the intersection of Narracan Drive / George Street / Lloyd Street / High Street was used by residents from south of the railway line accessing the schools to the east of the central area.

He had concerns about the roundabout with the camber, sight distance problems and the lack of access for pedestrians.

He indicated support for the use of the Waterloo Road / Saviges Road / Della Torre Road route for heavy vehicles as it provided direct access to the supermarkets on the west side of the central area.

He expressed concern with the loss of parking near the banks in Moore Street arising from the shared zone north of the George Street intersection.

### **5.3 Latrobe Valley Bus Lines**

The Latrobe Valley Bus Lines operate 92 bus services in around Moe each day. In addition, there were 13 bus services to and from Traralgon and five route services to Newborough each day.

The changes to the road network in Moe were discussed with Cameron Cuthbertson of Latrobe Valley Bus Lines. He indicated that the redevelopment of the Moe railway station would include bus bays in George Street. He supported the proposal in principle but was concerned about the bus bays being located adjacent to the proposed skate park.

He indicated that there were no problem areas for buses in Moe.

## 6. Summary and Conclusions

- q The Central Business District (CBD) of Moe is located on the north side of the Melbourne – Traralgon railway line. There are several developments in the Moe CBD which will influence the existing and future traffic movements in and around the area.
- q A Study of the traffic movements in and around the Moe CBD was carried out which included traffic counts, analysis of the traffic operation of the key intersections and an assessment of the reported casualty crashes.
- q Two other Studies have been carried out which should be read in conjunction with this Report. These studies include the traffic engineering assessment of the railway crossing between the Moe – Glengarry Road and Waterloo Road and the development of a Heavy Transport Route through Moe.
- q The traffic operation of roundabout at the intersection of Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street was assessed. The existing traffic operation is satisfactory with the Narracan Drive approach having the highest degree of saturation and longest traffic queues. It is predicted that by the Year 2021, the degrees of saturation on the Narracan Drive approach will be approaching the upper level of acceptable traffic operation.
- q Options to improve the traffic operation of the roundabout included the installation of metered traffic signals and widening of the Narracan Drive approach. The use of metered traffic signals was predicted to have a minor improvement to the Narracan Drive approach while having a significant adverse impact of the Anzac Street traffic. This option was not considered further. Widening of the Narracan Drive approach would require widening of the eastern bridge and raising of the pavement to improve the sight distance.
- q There have been 23 casualty crashes on the roads in the Moe CBD during the period between 1<sup>st</sup> July 2004 and the 30<sup>th</sup> June 2009. There were nine casualty crashes on the Moe – Glengarry Road with 14 crashes in the central area north of the railway line. Five of the crashes involved pedestrians and two bicyclists were injured while crossing at pedestrian crossings.
- q A review of the road hierarchy in the Moe CBD was carried out. Changes to the roads to be used as the Heavy Transport Route to Future Arterial Roads and downgrading the sections of the existing arterial roads to Future Major Access Streets were recommended.

## **Appendix A      Traffic Counts**

**Table A1 Average Daily Traffic Volumes in Central Area of Moe**  
(Source: Latrobe City Council Counts 2009)

Road	Direction	Daily Traffic Volumes (Vehicles / day)				Total
		Cars	Rigid Trucks	Semi Trailers	B Double	
Moore Street	North	2,095	68	1	0	2,185
North of George Street	South	1,535	43	0	0	1,590
Moore Street	North	2,755	82	1	0	2,875
South of Haigh Street	South	3,010	102	1	0	3,140
Moore Street	North	2,790	102	3	0	2,945
North of Haigh Street	South	3,010	135	6	0	3,205
Moore Street	North	2,365	104	5	0	2,510
North of York Street	South	2,470	125	10	1 / week	2,650
Moore Street	North	2,820	138	18	2 / week	3,050
South of Evelyn Street	South	2,785	134	20	3 / week	3,020
Haigh Street	East	2,892	161	7	1 / week	3,105
East of Moore Street	West	2,990	115	5	0	3,160
Haigh Street	East	2,862	177	8	0	3,090
West of Anzac Street	West	2,875	80	4	0	3,010
Haigh Street	East	2,348	48	1	0	2,425
East of Anzac Street	West	2,232	28	0	0	2,290
Anzac Street	North	2,080	69	5	1 / week	2,195
North of Johnson Street	South	1,905	128	5	0	2,080
Anzac Street	North	5,720	136	9	0	5,925
North of George Street	South	6,385	275	18	0	6,745
Lloyd Street	East	3,145	104	9	2 / week	3,305
West of Fowler Street	West	3,115	100	9	3 / week	3,277
Lloyd Street	East	4,382	142	10	2 / week	4,595
East of Fowler Street	West	4,660	183	10	2 / week	4,915
Narracan Drive	East	6,540	232	24	1 / week	6,885
West of Bennett Street	West	7,215	363	29	0	7,695
Bell Street	East	2,210	124	3	0	2,367
West of Moore Street	West	2,345	55	2	0	2,445
Waterloo Road	East	4,062	129	23	5 / week	4,290
East of Railway crossing	West	4,475	130	25	2 / week	4,705
Saviges Road	North	3,388	148	35	5 / week	3,649
South of Albert Street	South	4,085	117	26	2 / week	4,295
Saviges Road	North	1,680	121	25	2 / week	1,885
North of Albert Street	South	2,037	96	19	2 / week	2,217
Saviges Road	North	1,225	90	18	2 / week	1,390
North of Bell Street	South	960	82	17	1 / week	1,115
Della Torre Road	North	947	79	18	3 / week	1,095
North of Bubb Street	South	742	68	13	2 / week	861
Della Torre Road	East	1,050	86	16	3 / week	1,200
East of Tabateau Road	West	890	76	12	2 / week	1,020
George Street	East	2,455	70	3	0	2,550
West of Moore Street	West	2,100	61	1	0	2,195
George Street East of	East	2,265	33	1	0	2,310
Moore Street	West	2,785	84	3	0	2,895
George Street	East	2,350	69	1	0	2,440
West of Kirk Street	West	3,030	63	2	0	3,125

---

George Street	East	1,035	24	0	0	1,070
East of Kirk Street	West	3,510	117	2	0	3,655
Albert Street	East	3,186	121	6	0	3,345
West of Moore Street	West	4,035	130	6	0	4,215
Albert Street	East	4,085	120	6	0	4,310
Moore St – Kirk St	West	3,640	126	5	0	3,810
Albert Street	East	4,070	129	9	0	4,240
West of Anzac Street	West	2,680	60	2	0	2,770
Kirk Street	North	2,185	92	1	0	2,290
North of George Street	South	840	25	0	0	870
Kirk Street	North	696	11	0	0	710
South of Haigh Street	South	740	43	0	0	785

Approach from Movement	East Hwy Street			West Hwy Street			South-Power Street		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
NA/Stopping									
7:30-7:45	5	13	1	19	1	1	3	4	4
7:45-8:00	14	36	1	36	2	4	2	33	1
8:00-8:15	35	50	5	45	2	4	5	31	1
8:15-8:30	28	53	2	71	2	7	2	34	1
8:30-8:45	40	69	4	71	2	4	2	36	1
8:45-9:00	41	43	1	36	1	2	7	44	1
9:00-9:15	35	40	3	44	1	0	1	29	1
9:15-9:30	30	54	4	40	2	4	11	47	2
9:30-9:45									
9:45-10:00									
10:00-10:15									
10:15-10:30									
10:30-10:45									
10:45-11:00									
11:00-11:15									
11:15-11:30									
11:30-11:45									
11:45-12:00									
12:00-12:15									
12:15-12:30									
12:30-12:45									
12:45-1:00									
1:00-1:15									
1:15-1:30									
1:30-1:45									
1:45-2:00									
2:00-2:15									
2:15-2:30									
2:30-2:45									
2:45-3:00									
3:00-3:15	39	65	3	39	4	6	4	1	35
3:15-3:30	38	62	3	49	3	4	5	39	2
3:30-3:45	45	81	2	53	2	8	1	47	1
3:45-4:00	37	69	1	51	2	6	5	21	1
4:00-4:15	32	74	4	30	2	8	1	35	1
4:15-4:30	29	79	2	54	3	3	1	28	1
4:30-4:45	28	49	1	57	1	10	6	22	1
4:45-5:00	35	66	3	59	1	7	2	31	1
5:00-5:15	46	80	2	48	1	7	4	23	1
5:15-5:30	33	55	6	55	1	2	2	28	1
5:30-5:45	34	63	3	58	1	2	3	30	1
5:45-6:00									
6:00-6:15									
6:15-6:30	613	1017	1	1041	51	133	12	131	1
6:30-6:45	544	753	1	753	7	29	3	21	1
6:45-7:00	543	753	1	753	9	35	3	36	1
7:00-7:15	143	293	1	293	1	3	1	0	1
7:15-7:30									
7:30-7:45									
7:45-8:00									
8:00-8:15									
8:15-8:30									
8:30-8:45									
8:45-9:00									
9:00-9:15									
9:15-9:30									
9:30-9:45									
9:45-10:00									
10:00-10:15									
10:15-10:30									
10:30-10:45									
10:45-11:00									
11:00-11:15									
11:15-11:30									
11:30-11:45									
11:45-12:00									
12:00-12:15									
12:15-12:30									
12:30-12:45									
12:45-1:00									
1:00-1:15									
1:15-1:30									
1:30-1:45									
1:45-2:00									
2:00-2:15									
2:15-2:30									
2:30-2:45									
2:45-3:00									
3:00-3:15									
3:15-3:30									
3:30-3:45									
3:45-4:00									
4:00-4:15									
4:15-4:30									
4:30-4:45									
4:45-5:00									
5:00-5:15									
5:15-5:30									
5:30-5:45									
5:45-6:00									
6:00-6:15									
6:15-6:30									
6:30-6:45									
6:45-7:00									
7:00-7:15									
7:15-7:30									
7:30-7:45									
7:45-8:00									
8:00-8:15									
8:15-8:30									
8:30-8:45									
8:45-9:00									
9:00-9:15									
9:15-9:30									
9:30-9:45									
9:45-10:00									
10:00-10:15									
10:15-10:30									
10:30-10:45									
10:45-11:00									
11:00-11:15									
11:15-11:30									
11:30-11:45									
11:45-12:00									
12:00-12:15									
12:15-12:30									
12:30-12:45									
12:45-1:00									
1:00-1:15									
1:15-1:30									
1:30-1:45									
1:45-2:00									
2:00-2:15									
2:15-2:30									
2:30-2:45									
2:45-3:00									
3:00-3:15									
3:15-3:30									
3:30-3:45									
3:45-4:00									
4:00-4:15									
4:15-4:30									
4:30-4:45									
4:45-5:00									
5:00-5:15									
5:15-5:30									
5:30-5:45									
5:45-6:00									
6:00-6:15									
6:15-6:30									
6:30-6:45									
6:45-7:00									
7:00-7:15									
7:15-7:30									
7:30-7:45									
7:45-8:00									
8:00-8:15									
8:15-8:30									
8:30-8:45									
8:45-9:00									
9:00-9:15									
9:15-9:30									
9:30-9:45									
9:45-10:00									
10:00-10:15									
10:15-10:30									
10:30-10:45									
10:45-11:00									
11:00-11:15									
11:15-11:30									
11:30-11:45									
11:45-12:00									
12:00-12:15									
12:15-12:30									
12:30-12:45									
12:45-1:00									
1:00-1:15									
1:15-1:30									
1:30-1:45									
1:45-2:00									
2:00-2:15			</						



## **Appendix B      Intersection Analysis**



## MOVEMENT SUMMARY

Site: Year 2010 AM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
Existing Layout and Volumes  
8.00 - 9.00 AM  
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	31	3.4	0.048	9.9	LOS A	0.3	2.2	0.69	0.67	47.3
23	R	236	5.8	0.228	13.2	LOS B	2.0	14.8	0.75	0.77	44.5
Approach		266	5.5	0.228	12.8	LOS B	2.0	14.8	0.74	0.76	44.8
East: Narracan Drive											
4	L	565	5.4	0.449	8.1	LOS A	4.1	30.1	0.52	0.60	47.8
Approach		565	5.4	0.449	8.1	LOS A	4.1	30.1	0.52	0.60	47.8
North: Anzac Street											
7	L	240	4.8	0.174	6.9	LOS A	1.3	9.5	0.47	0.57	48.8
9	R	179	6.5	0.214	12.5	LOS B	1.1	8.5	0.49	0.69	44.9
Approach		419	5.5	0.214	9.3	LOS B	1.3	9.5	0.48	0.62	47.0
West: George Street West											
10	L	33	3.2	0.042	9.9	LOS A	0.3	2.3	0.71	0.67	47.3
Approach		33	3.2	0.042	9.9	LOS A	0.3	2.3	0.71	0.67	47.3
South West: Lloyd Street SW											
30	L	248	2.1	0.216	8.1	LOS A	1.8	12.8	0.67	0.68	47.8
32	R	185	2.8	0.208	13.6	LOS B	1.6	11.3	0.67	0.78	44.4
Approach		434	2.4	0.216	10.4	LOS B	1.8	12.8	0.67	0.72	46.2
All Vehicles		1717	4.7	0.449	9.7	LOS A	4.1	30.1	0.58	0.66	46.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2010 PM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
Existing Layout and Volumes  
3.45 - 4.45 PM  
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	16	6.7	0.027	11.5	LOS B	0.2	1.6	0.79	0.69	45.9
23	R	164	1.9	0.193	12.8	LOS B	1.9	13.4	0.86	0.79	44.9
Approach		180	2.3	0.193	12.7	LOS B	1.9	13.4	0.86	0.78	45.0
East: Narracan Drive											
4	L	784	2.1	0.665	9.4	LOS A	8.4	59.7	0.75	0.73	46.8
Approach		784	2.1	0.665	9.4	LOS A	8.4	59.7	0.75	0.73	46.8
North: Anzac Street											
7	L	372	1.4	0.252	6.3	LOS A	2.0	14.3	0.43	0.53	49.3
9	R	217	1.0	0.249	11.4	LOS B	1.3	9.4	0.43	0.66	45.5
Approach		588	1.3	0.252	8.2	LOS B	2.0	14.3	0.43	0.58	47.8
West: George Street West											
10	L	101	1.0	0.110	8.4	LOS A	0.8	5.7	0.63	0.66	47.9
Approach		101	1.0	0.110	8.4	LOS A	0.8	5.7	0.63	0.66	47.9
South West: Lloyd Street SW											
30	L	158	2.0	0.173	9.1	LOS A	1.3	9.5	0.66	0.71	47.4
32	R	168	3.8	0.173	12.4	LOS B	1.2	8.7	0.64	0.71	44.7
Approach		326	2.9	0.173	10.8	LOS B	1.3	9.5	0.65	0.71	45.9
All Vehicles		1980	2.0	0.665	9.5	LOS A	8.4	59.7	0.64	0.68	46.8

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Processed: Monday, February 20, 2012 10:41:10 AM

Copyright ©2000-2010 Akcelik & Associates Pty Ltd

SIDRA INTERSECTION 4.0.19.1104

[www.sidrasolutions.com](http://www.sidrasolutions.com)

Project: C:\Documents and Settings\Owner\My Documents\Latobe Traffic Management Studies\Moe CBD Traffic

Study\Lloyd St\_ Anzac St\_ Narracan Drive Exist PM.sip

8000249, RW STAMP AND ASSOCIATES PTY LTD, SINGLE



## MOVEMENT SUMMARY

Site: Year 2021 AM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
Existing Layout and Year 2021 Volumes  
8.00 - 9.00 AM  
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	31	3.4	0.051	10.6	LOS B	0.3	2.5	0.74	0.70	46.6
23	R	236	5.8	0.248	13.8	LOS B	2.3	16.9	0.81	0.79	44.2
Approach		266	5.5	0.248	13.5	LOS B	2.3	16.9	0.80	0.78	44.5
East: Narracan Drive											
4	L	621	5.4	0.504	8.3	LOS A	4.9	35.7	0.57	0.62	47.4
Approach		621	5.4	0.504	8.3	LOS A	4.9	35.7	0.57	0.62	47.4
North: Anzac Street											
7	L	259	4.9	0.191	7.1	LOS A	1.5	10.7	0.50	0.58	48.6
9	R	201	6.3	0.242	12.5	LOS B	1.3	9.9	0.52	0.70	44.8
Approach		460	5.5	0.242	9.4	LOS B	1.5	10.7	0.51	0.63	46.8
West: George Street West											
10	L	33	3.2	0.045	10.7	LOS B	0.4	2.5	0.76	0.69	46.5
Approach		33	3.2	0.045	10.7	LOS B	0.4	2.5	0.76	0.69	46.5
South West: Lloyd Street SW											
30	L	268	2.0	0.239	8.2	LOS A	2.0	14.6	0.70	0.69	47.6
32	R	207	3.0	0.239	13.9	LOS B	1.9	13.4	0.70	0.80	44.2
Approach		476	2.4	0.240	10.7	LOS B	2.0	14.6	0.70	0.74	46.0
All Vehicles		1856	4.7	0.504	10.0	LOS A	4.9	35.7	0.63	0.68	46.4

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2021 PM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
Existing Layout and Year 2021 Volumes  
3.45 - 4.45 PM  
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	16	6.7	0.032	12.7	LOS B	0.3	2.0	0.86	0.73	44.7
23	R	164	1.9	0.227	14.1	LOS B	2.4	16.8	0.95	0.84	43.9
Approach		180	2.3	0.227	14.0	LOS B	2.4	16.8	0.94	0.83	43.9
East: Narracan Drive											
4	L	862	2.1	0.750	11.3	LOS B	11.8	84.4	0.85	0.84	46.0
Approach		862	2.1	0.750	11.3	LOS B	11.8	84.4	0.85	0.84	46.0
North: Anzac Street											
7	L	401	1.6	0.279	6.5	LOS A	2.3	16.4	0.47	0.55	49.0
9	R	245	0.9	0.285	11.5	LOS B	1.6	11.2	0.47	0.67	45.3
Approach		646	1.3	0.284	8.4	LOS B	2.3	16.4	0.47	0.59	47.5
West: George Street West											
10	L	101	1.0	0.118	8.9	LOS A	0.9	6.3	0.68	0.69	47.6
Approach		101	1.0	0.118	8.9	LOS A	0.9	6.3	0.68	0.69	47.6
South West: Lloyd Street SW											
30	L	163	1.9	0.190	9.3	LOS A	1.5	10.8	0.70	0.73	47.2
32	R	195	3.8	0.209	12.7	LOS B	1.5	11.2	0.69	0.73	44.5
Approach		358	2.9	0.209	11.2	LOS B	1.5	11.2	0.70	0.73	45.6
All Vehicles		2147	2.0	0.750	10.5	LOS B	11.8	84.4	0.71	0.74	46.3

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2010 Option 1 AM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
 Widened Narracan Road and Year 2010 Volumes  
 8.00 - 9.00 AM  
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	31	3.4	0.047	10.0	LOS B	0.3	2.1	0.68	0.67	47.2
23	R	236	5.8	0.226	13.2	LOS B	2.0	14.4	0.74	0.77	44.5
Approach		266	5.5	0.226	12.9	LOS B	2.0	14.4	0.73	0.76	44.8
East: Narracan Drive											
4	L	565	5.4	0.210	7.7	LOS A	1.6	11.8	0.42	0.56	48.3
Approach		565	5.4	0.210	7.7	LOS A	1.6	11.8	0.42	0.56	48.3
North: Anzac Street											
7	L	259	4.9	0.188	7.0	LOS A	1.4	10.4	0.48	0.57	48.8
9	R	185	9.7	0.175	12.8	LOS B	1.2	9.4	0.50	0.69	44.8
Approach		444	6.9	0.188	9.4	LOS B	1.4	10.4	0.49	0.62	47.0
West: George Street West											
10	L	33	3.2	0.043	10.0	LOS B	0.3	2.3	0.72	0.67	47.2
Approach		33	3.2	0.043	10.0	LOS B	0.3	2.3	0.72	0.67	47.2
South West: Lloyd Street SW											
30	L	248	2.1	0.217	8.1	LOS A	1.8	12.9	0.67	0.68	47.8
32	R	185	2.8	0.210	13.7	LOS B	1.6	11.4	0.68	0.78	44.3
Approach		434	2.4	0.217	10.5	LOS B	1.8	12.9	0.67	0.72	46.2
All Vehicles		1742	5.0	0.226	9.7	LOS A	2.0	14.4	0.55	0.65	46.8

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2010 Option 1 PM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
 Widened Narracan Road and Year 2010 Volumes  
 3.45 - 4.45 PM  
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	16	6.7	0.026	11.5	LOS B	0.2	1.4	0.76	0.68	45.9
23	R	164	1.9	0.181	12.8	LOS B	1.7	12.0	0.82	0.78	45.0
Approach		180	2.3	0.182	12.7	LOS B	1.7	12.0	0.82	0.77	45.1
East: Narracan Drive											
4	L	784	2.1	0.307	7.6	LOS A	2.5	18.2	0.52	0.61	48.1
Approach		784	2.1	0.307	7.6	LOS A	2.5	18.2	0.52	0.61	48.1
North: Anzac Street											
7	L	372	1.4	0.252	6.3	LOS A	2.0	14.2	0.42	0.53	49.3
9	R	217	1.0	0.184	11.4	LOS B	1.3	9.4	0.43	0.66	45.5
Approach		588	1.3	0.252	8.2	LOS B	2.0	14.2	0.43	0.58	47.8
West: George Street West											
10	L	101	1.0	0.108	8.4	LOS A	0.8	5.4	0.62	0.66	48.0
Approach		101	1.0	0.108	8.4	LOS A	0.8	5.4	0.62	0.66	48.0
South West: Lloyd Street SW											
30	L	158	2.0	0.169	9.1	LOS A	1.3	9.0	0.64	0.70	47.5
32	R	168	4.4	0.169	12.4	LOS B	1.1	8.2	0.62	0.71	44.8
Approach		326	3.2	0.169	10.8	LOS B	1.3	9.0	0.63	0.71	46.0
All Vehicles		1980	2.0	0.307	8.8	LOS A	2.5	18.2	0.54	0.63	47.4

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2021 Option 1 AM Peak

Lloyd St / George St / Anzac St / Narracan Drive / High Street Roundabout  
 Widened Narracan Road and Year 2021 Volumes  
 8.00 - 9.00 AM  
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: High Street SE											
21	L	31	3.4	0.045	10.7	LOS B	0.3	2.4	0.73	0.69	46.5
23	R	236	5.8	0.243	13.9	LOS B	2.2	16.2	0.79	0.79	44.2
Approach		266	5.5	0.243	13.6	LOS B	2.2	16.2	0.78	0.78	44.5
East: Narracan Drive											
4	L	621	5.4	0.236	7.9	LOS A	1.9	13.6	0.45	0.58	48.1
Approach		621	5.4	0.236	7.9	LOS A	1.9	13.6	0.45	0.58	48.1
North: Anzac Street											
7	L	259	4.9	0.191	7.1	LOS A	1.5	10.7	0.50	0.58	48.6
9	R	207	9.1	0.197	12.8	LOS B	1.4	10.8	0.52	0.70	44.8
Approach		466	6.8	0.197	9.6	LOS B	1.5	10.8	0.51	0.63	46.8
West: George Street West											
10	L	33	3.2	0.046	10.8	LOS B	0.4	2.6	0.76	0.69	46.4
Approach		33	3.2	0.046	10.8	LOS B	0.4	2.6	0.76	0.69	46.4
South West: Lloyd Street SW											
30	L	268	2.0	0.240	8.3	LOS A	2.1	14.6	0.70	0.70	47.6
32	R	207	3.0	0.241	14.0	LOS B	1.9	13.5	0.71	0.80	44.1
Approach		476	2.4	0.241	10.8	LOS B	2.1	14.6	0.70	0.74	46.0
All Vehicles		1862	5.0	0.243	9.9	LOS A	2.2	16.2	0.58	0.67	46.6

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

## MOVEMENT SUMMARY

Site: Year 2021 Option 1 PM Peak

Lloyd St / George St / Anzac St / Narracan Rd / High Street Roundabout  
 Widened Narracan Road and Year 2021 Volumes  
 3.45 - 4.45 PM  
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South East High Street SE												
21	L	16	6.7	0.029	12.7	LOS B	0.2	1.7	0.82	0.71	44.7	
23	R	164	1.9	0.206	14.1	LOS B	2.0	14.4	0.89	0.82	43.9	
Approach		180	2.3	0.205	14.0	LOS B	2.0	14.4	0.89	0.81	43.9	
East Narracan Road												
4	L	862	2.1	0.346	7.9	LOS A	3.0	21.3	0.56	0.63	47.8	
Approach		862	2.1	0.346	7.9	LOS A	3.0	21.3	0.56	0.63	47.8	
North Anzac Street												
7	L	401	1.6	0.278	6.5	LOS A	2.3	16.2	0.46	0.55	49.0	
9	R	245	0.9	0.212	11.5	LOS B	1.6	11.1	0.46	0.67	45.3	
Approach		646	1.3	0.278	8.4	LOS B	2.3	16.2	0.46	0.59	47.5	
West George Street West												
10	L	101	1.0	0.115	8.9	LOS A	0.8	5.9	0.66	0.68	47.8	
Approach		101	1.0	0.115	8.9	LOS A	0.8	5.9	0.66	0.68	47.8	
South West Lloyd Street SW												
30	L	163	1.9	0.184	9.3	LOS A	1.4	10.0	0.67	0.72	47.3	
32	R	195	3.8	0.200	12.7	LOS B	1.4	10.2	0.66	0.73	44.6	
Approach		358	2.9	0.200	11.2	LOS B	1.4	10.2	0.67	0.73	45.8	
All Vehicles		2147	2.0	0.346	9.1	LOS A	3.0	21.3	0.58	0.65	47.0	

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).  
 Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).  
 Approach LOS values are based on the worst delay for any vehicle movement.  
 Roundabout LOS Method: Same as Signalised Intersections.  
 Roundabout Capacity Model: SIDRA Standard.



## MOVEMENT SUMMARY

Site: Year 2010 AM Peak

Moe - Glengarry Road / Fowler Street Intersection  
Existing Layout and Volumes  
8.00 - 9.00 AM  
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South		Fowler Street										
1	L	34	3.1	0.030	11.8	LOS B	0.1	1.0	0.33	0.86	46.1	
3	R	155	1.4	0.192	13.9	LOS B	1.0	7.0	0.55	0.96	44.6	
Approach		188	1.7	0.192	13.5	LOS B	1.0	7.0	0.51	0.94	44.8	
East		Moe - Glengarry Road East										
4	L	154	1.4	0.084	8.2	LOS A	0.0	0.0	0.00	0.67	49.0	
5	T	237	6.2	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		391	4.3	0.126	3.2	LOS A	0.0	0.0	0.00	0.26	55.1	
North		Station Carpark Exit										
7	L	17	6.3	0.071	16.6	LOS C	0.3	2.4	0.53	0.84	42.4	
8	T	11	0.0	0.071	16.1	LOS C	0.3	2.4	0.53	0.99	42.4	
9	R	6	16.7	0.071	17.3	LOS C	0.3	2.4	0.53	0.94	42.4	
Approach		34	6.3	0.071	16.6	LOS C	0.3	2.4	0.53	0.91	42.4	
West		Moe - Glengarry Road West										
11	T	274	2.7	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
12	R	39	21.6	0.104	16.0	LOS C	0.5	4.0	0.57	0.82	42.4	
Approach		313	5.1	0.143	2.0	LOS C	0.5	4.0	0.07	0.10	57.1	
All Vehicles		925	4.1	0.192	5.4	NA	1.0	7.0	0.15	0.37	52.7	

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

## MOVEMENT SUMMARY

Site: Year 2010 PM Peak

Moe - Glengarry Road / Fowler Street Intersection  
Existing Layout and Volumes  
3.30 - 4.30 PM  
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South - Fowler Street</b>											
1	L	40	5.3	0.039	12.5	LOS B	0.2	1.4	0.40	0.87	45.8
3	R	139	0.8	0.185	14.3	LOS B	0.9	6.5	0.57	0.97	44.2
Approach		179	1.8	0.185	13.9	LOS B	0.9	6.5	0.53	0.95	44.5
<b>East - Moe - Glengarry Road East</b>											
4	L	153	1.4	0.083	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	329	4.5	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		482	3.5	0.174	2.6	LOS A	0.0	0.0	0.00	0.21	56.0
<b>North - Station Carpark Exit</b>											
7	L	17	6.3	0.077	17.4	LOS C	0.3	2.6	0.53	0.83	41.7
8	T	11	0.0	0.077	16.9	LOS C	0.3	2.6	0.53	1.00	41.8
9	R	6	16.7	0.077	18.1	LOS C	0.3	2.6	0.53	0.96	41.8
Approach		34	6.3	0.077	17.4	LOS C	0.3	2.6	0.53	0.91	41.7
<b>West - Moe - Glengarry Road West</b>											
11	T	246	4.3	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	40	7.9	0.102	15.4	LOS C	0.5	3.5	0.58	0.84	42.4
Approach		286	4.8	0.130	2.1	LOS C	0.5	3.5	0.08	0.12	56.7
All Vehicles		981	3.6	0.185	5.0	NA	0.9	6.5	0.14	0.34	53.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

## MOVEMENT SUMMARY

Site: Year 2021 AM Peak

Moe - Glengarry Road / Fowler Street Intersection  
Existing Layout and 2021 Volumes  
8.00 - 9.00 AM  
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South - Fowler Street</b>											
1	L	37	2.9	0.033	11.9	LOS B	0.2	1.2	0.35	0.86	46.0
3	R	169	1.2	0.224	14.3	LOS B	1.1	8.1	0.58	0.98	44.2
Approach		206	1.5	0.224	13.9	LOS B	1.1	8.1	0.54	0.96	44.5
<b>East - Moe - Glengarry Road East</b>											
4	L	168	1.3	0.091	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	260	6.1	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		428	4.2	0.139	3.2	LOS A	0.0	0.0	0.00	0.26	55.1
<b>North - Station Carpark Exit</b>											
7	L	17	6.3	0.078	17.6	LOS C	0.4	2.6	0.56	0.85	41.6
8	T	11	0.0	0.079	17.0	LOS C	0.4	2.6	0.56	1.00	41.7
9	R	6	16.7	0.078	18.3	LOS C	0.4	2.6	0.56	0.95	41.7
Approach		34	6.3	0.078	17.5	LOS C	0.4	2.6	0.56	0.92	41.7
<b>West - Moe - Glengarry Road West</b>											
11	T	301	2.8	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	43	22.0	0.125	17.1	LOS C	0.6	4.9	0.59	0.86	41.5
Approach		344	5.2	0.157	2.1	LOS C	0.6	4.9	0.07	0.11	56.8
All Vehicles		1013	4.1	0.224	5.5	NA	1.1	8.1	0.15	0.37	52.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Processed: Friday, April 23, 2010 4:18:52 PM  
SIDRA INTERSECTION 4.0.16.1074

Copyright © 2000-2010 Akcelik & Associates Pty Ltd  
[www.sidrasolutions.com](http://www.sidrasolutions.com)

Project: C:\Documents and Settings\Owner\My Documents\Latobe Traffic Management Studies\Moe CBD Traffic Study\Lloyd St - Fowler St 2021 AM.sip  
8000249, RW STAMP AND ASSOCIATES PTY LTD, SINGLE



## MOVEMENT SUMMARY

Site: Year 2021 AM Peak

Moe - Glengarry Road / Fowler Street Intersection  
Existing Layout and 2021 Volumes  
8.00 - 9.00 AM  
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South - Fowler Street</b>											
1	L	37	2.9	0.033	11.9	LOS B	0.2	1.2	0.35	0.86	46.0
3	R	169	1.2	0.224	14.3	LOS B	1.1	8.1	0.58	0.98	44.2
Approach		206	1.5	0.224	13.9	LOS B	1.1	8.1	0.54	0.96	44.5
<b>East - Moe - Glengarry Road East</b>											
4	L	168	1.3	0.091	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	260	6.1	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		428	4.2	0.139	3.2	LOS A	0.0	0.0	0.00	0.26	55.1
<b>North - Station Carpark Exit</b>											
7	L	17	6.3	0.078	17.6	LOS C	0.4	2.6	0.56	0.85	41.6
8	T	11	0.0	0.079	17.0	LOS C	0.4	2.6	0.56	1.00	41.7
9	R	6	16.7	0.078	18.3	LOS C	0.4	2.6	0.56	0.95	41.7
Approach		34	6.3	0.078	17.5	LOS C	0.4	2.6	0.56	0.92	41.7
<b>West - Moe - Glengarry Road West</b>											
11	T	301	2.8	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	43	22.0	0.125	17.1	LOS C	0.6	4.9	0.59	0.86	41.5
Approach		344	5.2	0.157	2.1	LOS C	0.6	4.9	0.07	0.11	56.8
All Vehicles		1013	4.1	0.224	5.5	NA	1.1	8.1	0.15	0.37	52.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

## MOVEMENT SUMMARY

Site: Year 2021 PM Peak

Moe - Glengarry Road / Fowler Street Intersection  
Existing Layout and 2021 Volumes  
3.30 - 4.30 PM  
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South - Fowler Street</b>											
1	L	44	4.8	0.045	12.6	LOS B	0.2	1.6	0.42	0.87	45.7
3	R	153	0.7	0.216	14.7	LOS B	1.1	7.7	0.60	1.00	43.8
Approach		197	1.6	0.216	14.3	LOS B	1.1	7.7	0.56	0.97	44.2
<b>East - Moe - Glengarry Road East</b>											
4	L	167	1.3	0.091	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	357	2.9	0.187	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		524	2.4	0.187	2.6	LOS A	0.0	0.0	0.00	0.21	56.0
<b>North - Station Carpark Exit</b>											
7	L	17	6.3	0.085	18.5	LOS C	0.4	2.8	0.56	0.84	40.9
8	T	11	0.0	0.086	18.0	LOS C	0.4	2.8	0.56	1.00	41.0
9	R	6	16.7	0.085	19.2	LOS C	0.4	2.8	0.56	0.97	41.0
Approach		34	6.3	0.085	18.5	LOS C	0.4	2.8	0.56	0.91	41.0
<b>West - Moe - Glengarry Road West</b>											
11	T	271	4.3	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	43	7.3	0.118	16.2	LOS C	0.5	4.0	0.61	0.87	41.7
Approach		314	4.7	0.143	2.2	LOS C	0.5	4.0	0.08	0.12	56.6
All Vehicles		1068	3.1	0.216	5.2	NA	1.1	7.7	0.14	0.35	52.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Processed: Friday, April 23, 2010 4:13:24 PM  
SIDRA INTERSECTION 4.0.16.1074

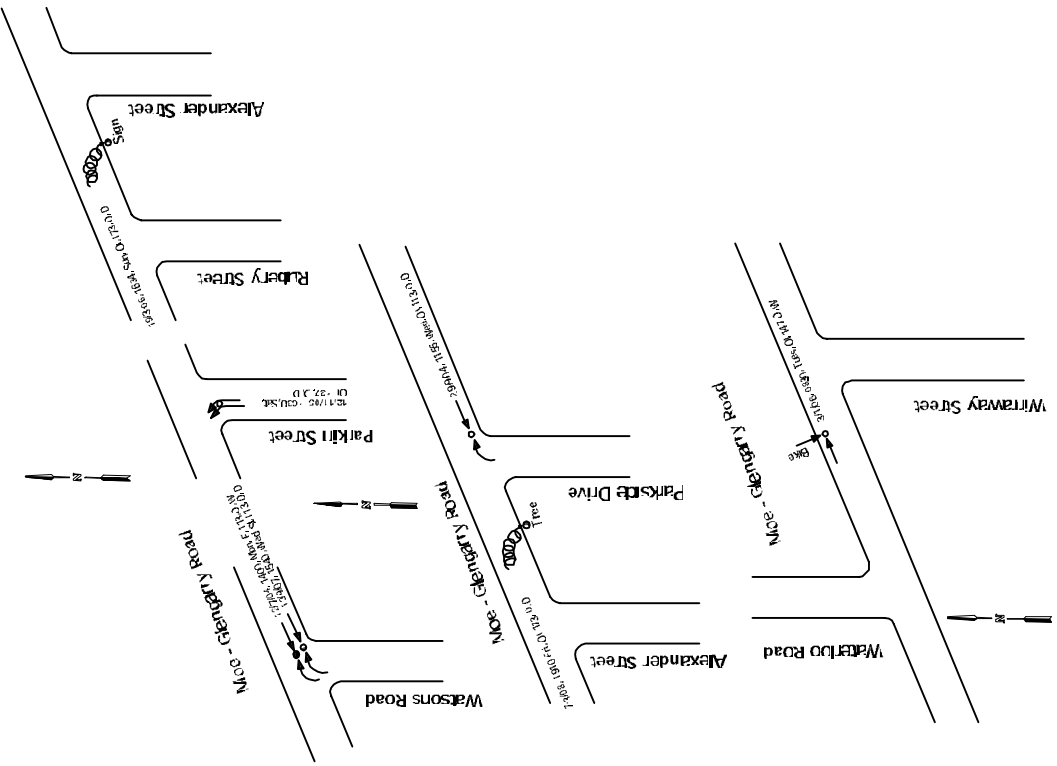
Copyright © 2000-2010 Akcelik & Associates Pty Ltd  
[www.sidrasolutions.com](http://www.sidrasolutions.com)

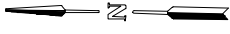
Project: C:\Documents and Settings\Owner\My Documents\Latobe Traffic Management Studies\Moe CBD Traffic Study\Lloyd St - Fowler St 2021 PM.sip

8000249, RW STAMP AND ASSOCIATES PTY LTD, SINGLE



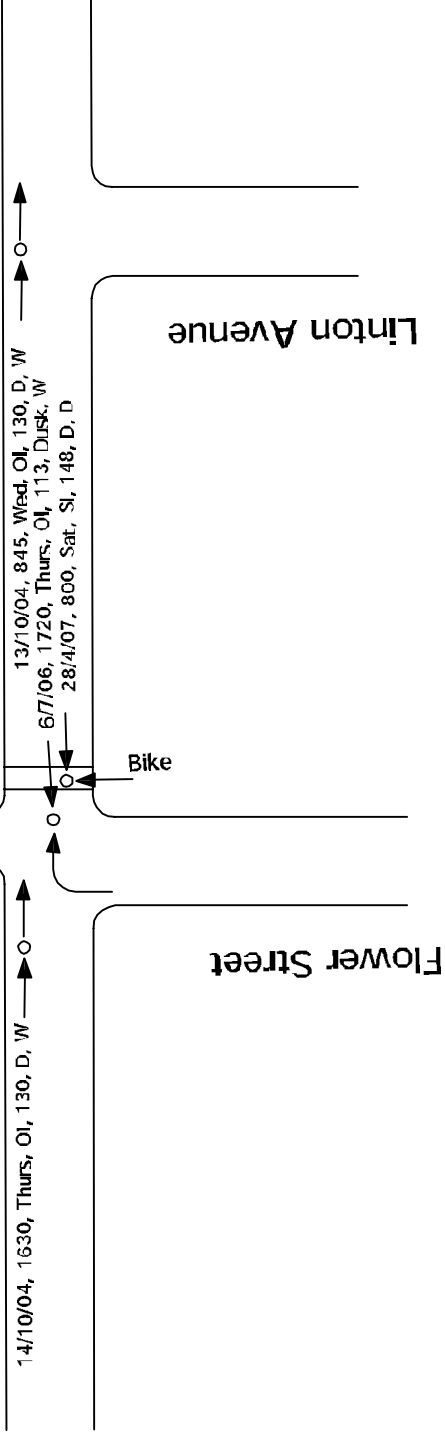
## **Appendix C      Reported Casualty Crashes in Moe CBD Area**





Moe Station  
Carpark Exit

Moe - Glengarry Road



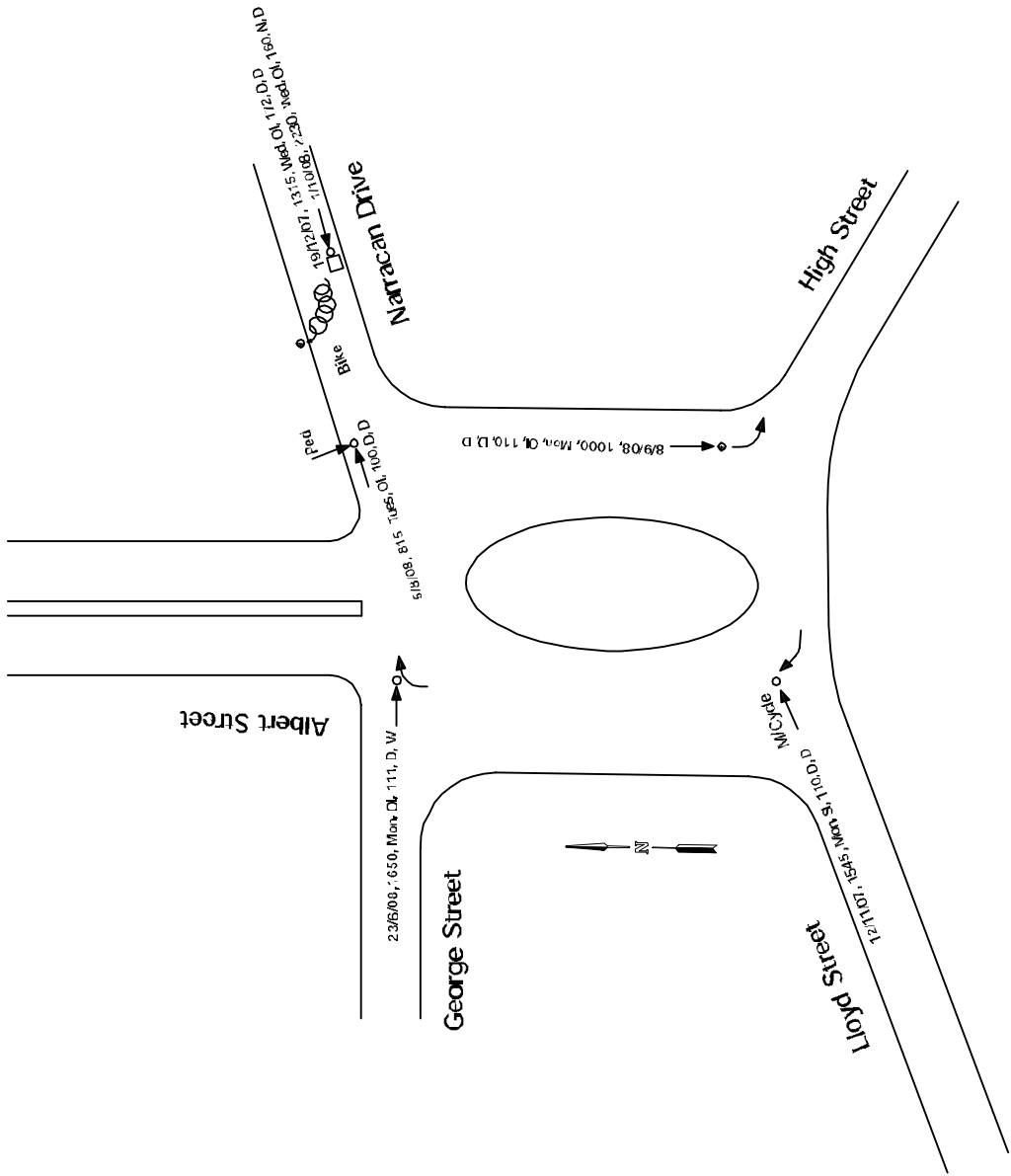
Linton Avenue

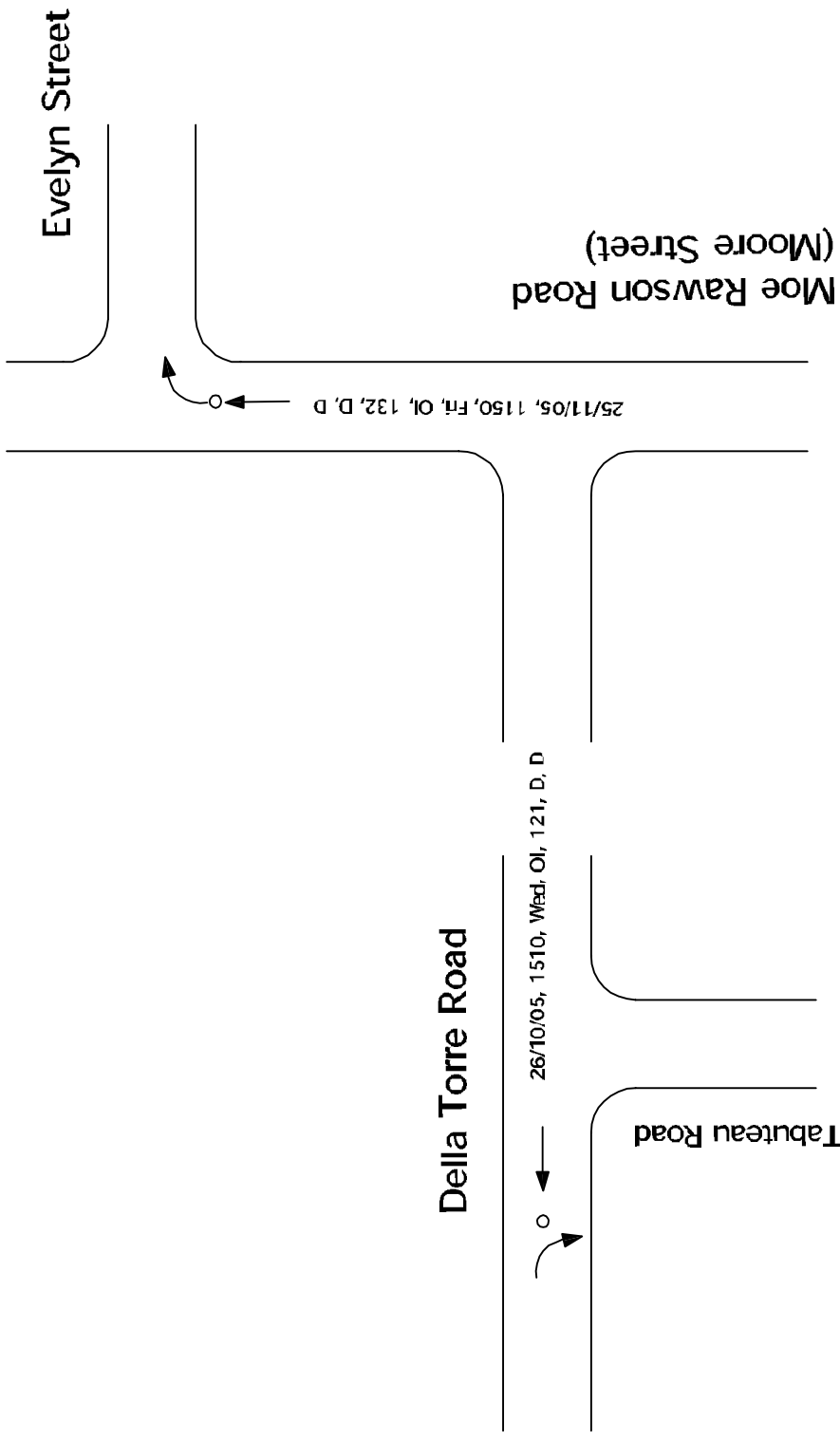
Flower Street

Bike

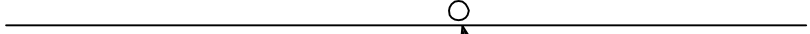
13/10/04, 845, Wed, OI, 130, D, W  
6/7/06, 1720, Thurs, OI, 113, Dusk, W  
28/4/07, 800, Sat, SI, 148, D, D  
14/10/04, 1630, Thurs, OI, 130, D, W





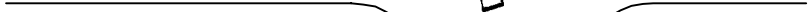


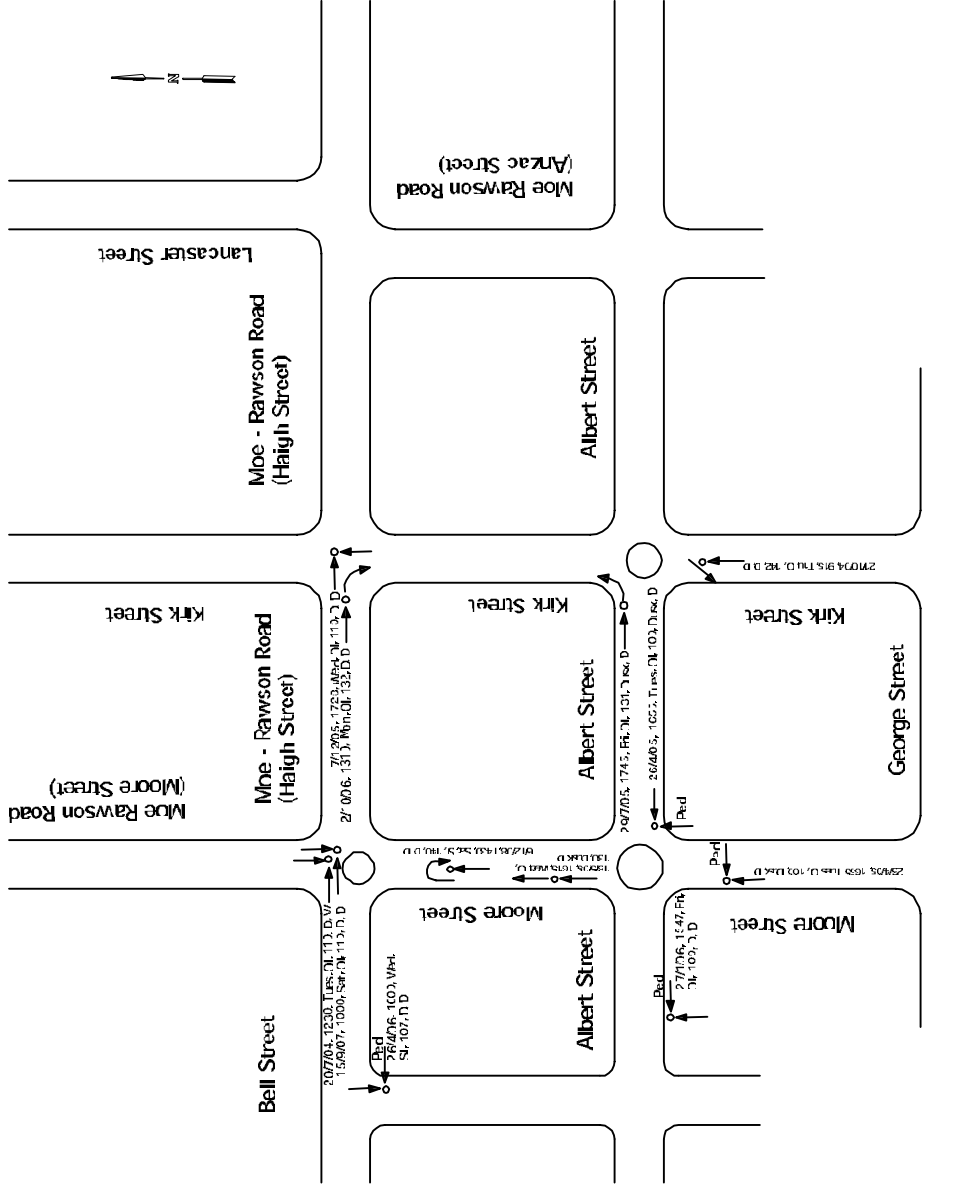
Della Torre Road

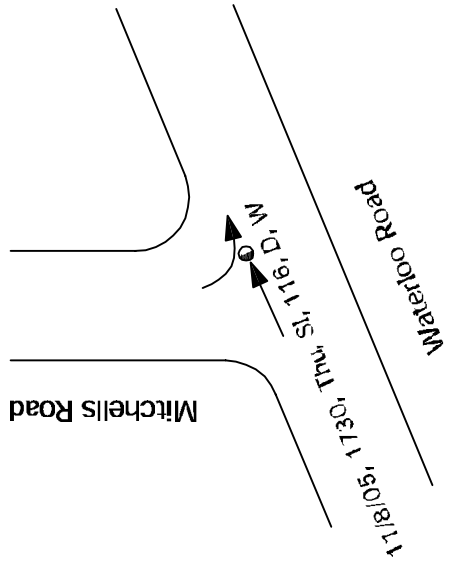
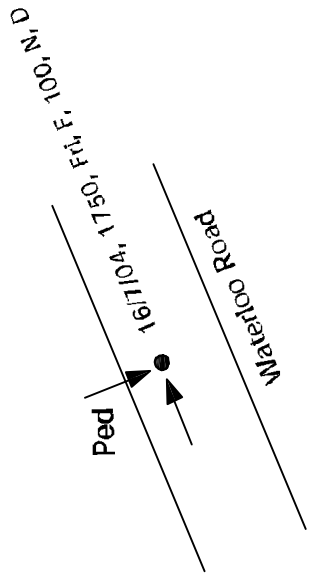


Saviges Road

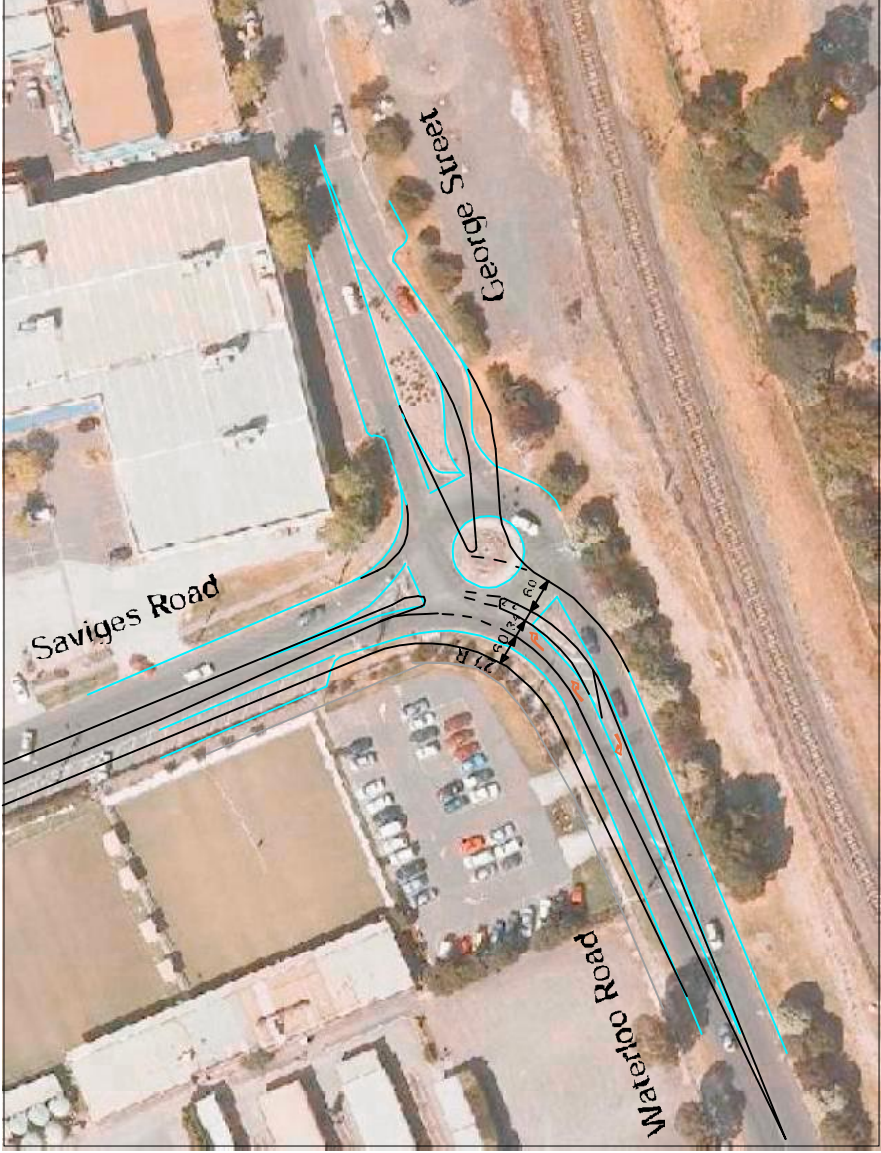
8/19/08, 0030, Mon, Sl, 175, N, D







## **Appendix D      Concept Plans of Intersection Improvements**

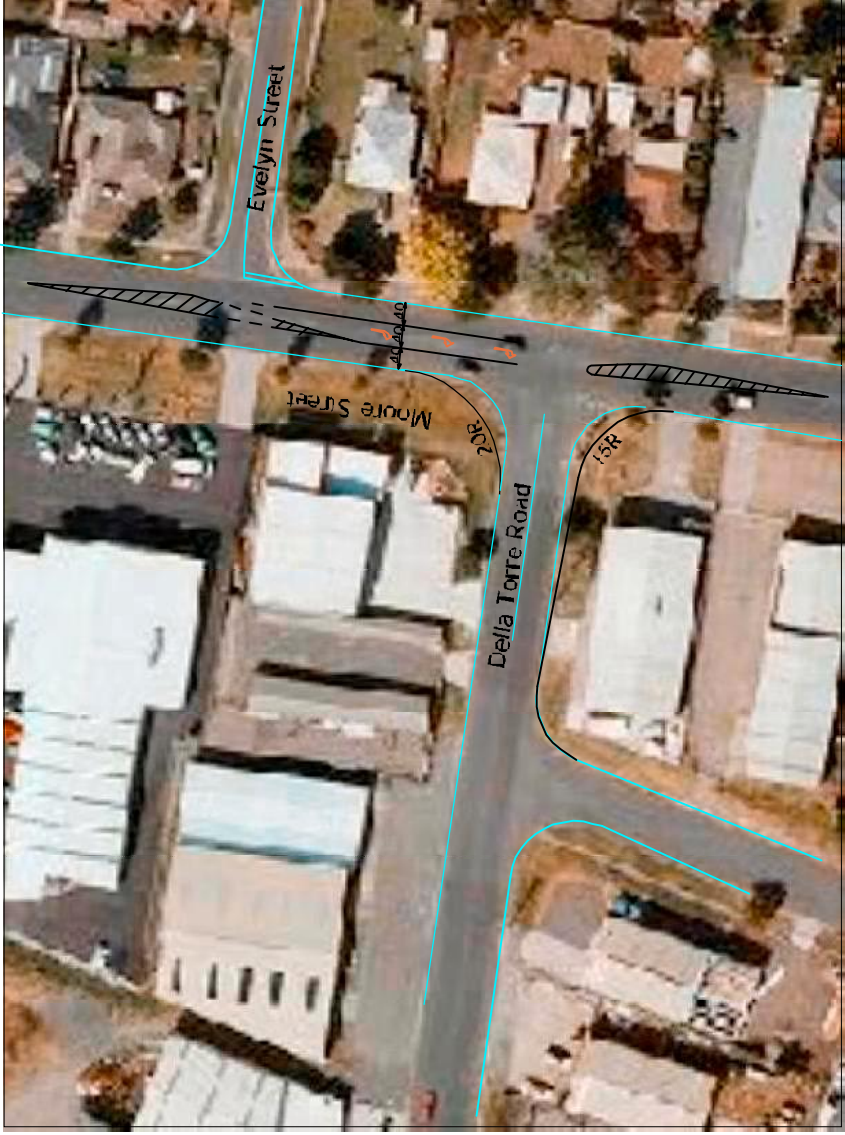


Waterton Road / George Street / Saviges Road  
Intersection  
Proposed Intersection Modification  
Scale: 1: 500 (A3 Size)

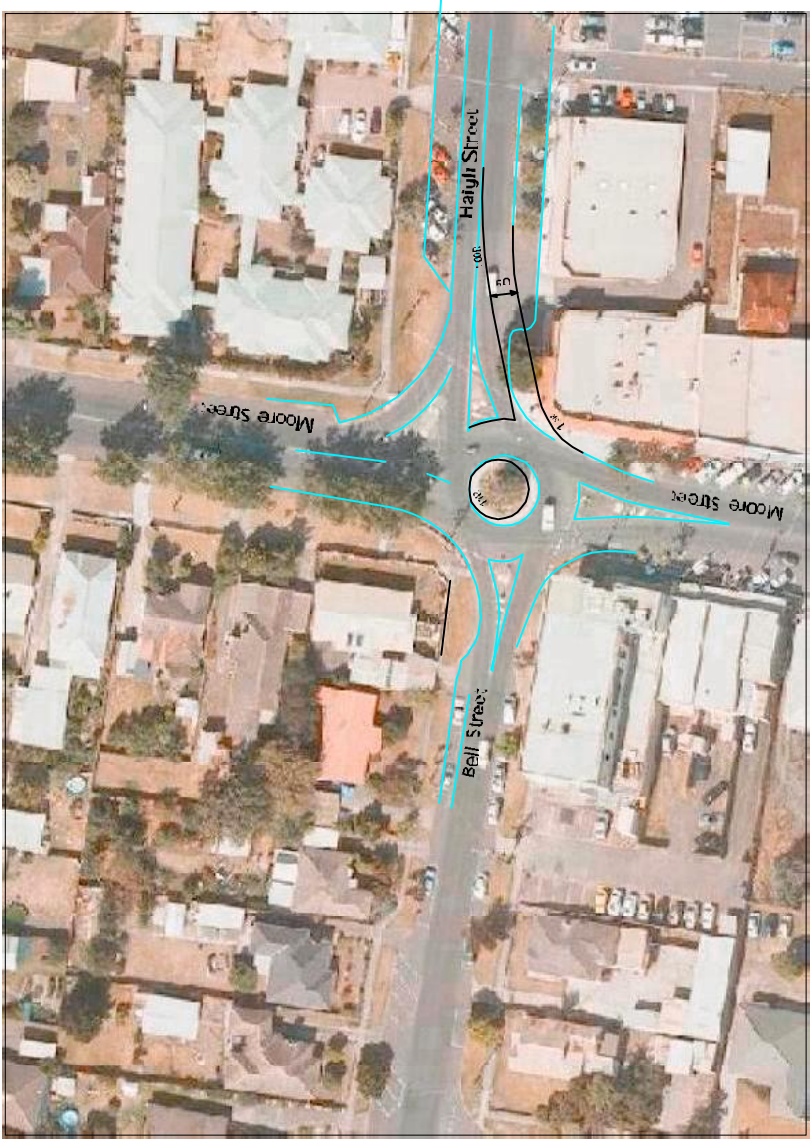


Saviges Road / Market Street Extension  
Proposed Widening of Saviges Road  
Scale: 1: 500 (A3 Size)

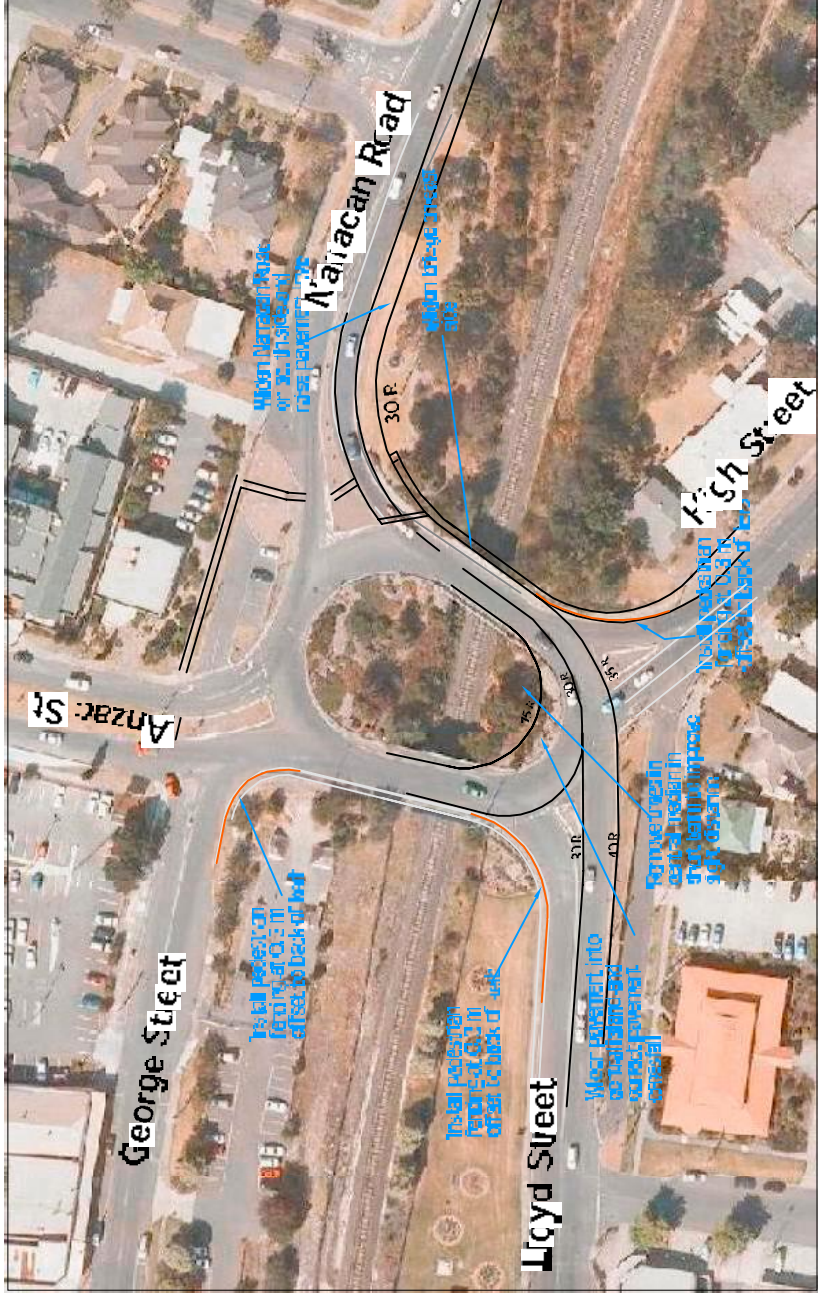




Della Torre Road / Moore Street  
Intersection  
Intersection Modifications  
Scale: 1:500 (A3 Size)



Moore Street / Bell Street / Haigh Street  
Intersection  
Modifications to Roundabout  
Scale: 1: 500 (A3 Size)



**Lloyd St / George St / Anzac St / Narraacan Rd / High St Intersection**  
**Proposed Changes at Roundabout**  
 Scale 1:900 (A3 Size)

## **Appendix E      Estimated Costs**

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Waterloo Road / George Street / Saviges Road intersection

Removal of roundabout

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$11,448
1.1	Design & Investigation	Item			\$5,724
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$2,500
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	300	\$20	\$6,000
2.2	Excavation cut to waste	m <sup>3</sup>	1150	\$30	\$34,500
2.3	Treat unsuitable material	Item			\$5,000
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	300	\$45	\$13,500
3.2	Install 375 mm diameter RCP	m	40	\$150	\$6,000
3.3	Install concrete kerb and channel	m	400	\$40	\$16,000
3.4	Install Side Entry Pit	No	4	\$1,250	\$5,000
3.5	Install paving 100 mm thick	m <sup>2</sup>	600	\$40	\$24,000
3.6	Supply and place subsurface drains	m	400	\$45	\$18,000
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m		\$35	\$0
4.2	Supply and place RRPM's	No	30	\$10	\$300
4.3	100 mm solid lines	m	200	\$2	\$300
4.4	Supply and install guideposts	No	0	\$15	\$0
	Subtotal				\$143,100
	Contingency 30 %				\$42,930
	Total				\$203,202

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Saviges Road Della Torre Road - Mitchells Road

Widening to 7 metre seal and one metre shoulders

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$11,840
1.1	Design & Investigation	Item			\$5,920
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$2,500
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m		\$20	\$0
2.2	Excavation cut to waste	m <sup>3</sup>	1000	\$20	\$20,000
2.3	Treat unsuitable material	Item			\$1,000
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	2500	\$45	\$112,500
3.2	Install 375 mm diameter RCP	m	0	\$150	\$0
3.3	Install concrete kerb and channel	m	0	\$40	\$0
3.4	Install Side Entry Pit	No	0	\$1,250	\$0
3.5	Install paving 100 mm thick	m <sup>2</sup>	0	\$40	\$0
3.6	Supply and place subsurface drains	m	0	\$45	\$0
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m	0	\$35	\$0
4.2	Supply and place RRPM's	No	0	\$10	\$0
4.3	100 mm solid lines	m	0	\$2	\$0
4.4	Chevron markings	m <sup>2</sup>	0	\$15	\$0
4.5	Turn Arrows	No	0	\$600	\$0
	Subtotal				\$148,000
	Contingency 30 %				\$44,400
	Total				\$210,160

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Della Torre Road Right Angle Bend

Widening at bend for semi and car to pass 12.3 metre seal required

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$2,255
1.1	Design & Investigation	Item			\$1,128
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$2,500
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	0	\$20	\$0
2.2	Excavation cut to waste	m <sup>3</sup>	100	\$30	\$3,000
2.3	Treat unsuitable material	Item			\$1,000
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	70	\$45	\$3,150
3.2	Install 375 mm diameter RCP	m	0	\$150	\$0
3.3	Install concrete kerb and channel	m	60	\$40	\$2,400
3.4	Install Side Entry Pit	No	1	\$1,250	\$1,250
3.5	Install paving 100 mm thick	m <sup>2</sup>	0	\$40	\$0
3.6	Supply and place subsurface drains	m	60	\$45	\$2,700
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m		\$35	\$0
4.2	Supply and place RRPM's	No	10	\$10	\$100
4.3	100 mm solid lines	m	60	\$2	\$90
4.4	Supply and install guideposts	No	0	\$15	\$0
	Subtotal				\$28,190
	Contingency 30 %				\$8,457
	Total				\$40,030

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Moore Street / Della Torre Road intersection

Right turn lane

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$4,910
1.1	Design & Investigation	Item			\$2,455
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$2,500
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	110	\$20	\$2,200
2.2	Excavation cut to waste	m <sup>3</sup>	300	\$30	\$9,000
2.3	Treat unsuitable material	Item			\$5,000
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	250	\$45	\$11,250
3.2	Install 375 mm diameter RCP	m	10	\$150	\$1,500
3.3	Install concrete kerb and channel	m	110	\$40	\$4,400
3.4	Install Side Entry Pit	No	2	\$1,250	\$2,500
3.5	Install paving 100 mm thick	m <sup>2</sup>	0	\$40	\$0
3.6	Supply and place subsurface drains	m	110	\$45	\$4,950
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m	15	\$35	\$525
4.2	Supply and place RRPM's	No	30	\$10	\$300
4.3	100 mm solid lines	m	300	\$2	\$450
4.4	Chevron markings	m <sup>2</sup>	200	\$15	\$3,000
4.5	Turn Arrows	No	3	\$600	\$1,800
	Subtotal				\$61,375
	Contingency 30 %				\$18,413
	Total				\$87,153



Latrobe Heavy Vehicle Routes Study

Estimated Costs

Moore Street / Bell Street / Haigh Street Intersection

Modification of roundabout

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$3,534
1.1	Design & Investigation	Item			\$1,767
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$2,500
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	90	\$20	\$1,800
2.2	Excavation cut to waste	m <sup>3</sup>	120	\$30	\$3,600
2.3	Treat unsuitable material	Item			\$1,000
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	130	\$45	\$5,850
3.2	Install 375 mm diameter RCP	m	0	\$150	\$0
3.3	Install concrete kerb and channel	m	90	\$40	\$3,600
3.4	Install Side Entry Pit	No	2	\$1,250	\$2,500
3.5	Install paving 100 mm thick	m <sup>2</sup>	180	\$40	\$7,200
3.6	Supply and place subsurface drains	m	90	\$45	\$4,050
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m		\$35	\$0
4.2	Supply and place RRPM's	No	0	\$10	\$0
4.3	100 mm solid lines	m	50	\$2	\$75
4.4	Supply and install guideposts	No	0	\$15	\$0
	Subtotal				\$44,175
	Contingency 30 %				\$13,253
	Total				\$62,729

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Haigh Street / Kirk Street intersection

Central median

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$2,872
1.1	Design & Investigation	Item			\$1,436
2	General Contract				
2.1	Survey	Item			\$2,000
2.2	Site Establishment	Item			\$1,000
2.3	Site Management and Supervision	Item			\$3,000
2.4	Prepare and Maintain Quality System	Item			\$1,000
2.3	Traffic Control	Item			\$4,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	0	\$20	\$0
2.2	Excavation cut to waste	m <sup>3</sup>	100	\$30	\$3,000
2.3	Treat unsuitable material	Item			\$0
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	120	\$45	\$5,400
3.2	Install 375 mm diameter RCP	m	10	\$150	\$1,500
3.3	Install concrete kerb and channel	m	120	\$40	\$4,800
3.4	Install Side Entry Pit	No	0	\$1,250	\$0
3.5	Install paving 100 mm thick	m <sup>2</sup>	120	\$40	\$4,800
3.6	Supply and place subsurface drains	m	120	\$45	\$5,400
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m	0	\$35	\$0
4.2	Supply and place RRPM's	No	0	\$10	\$0
4.3	100 mm solid lines	m	0	\$2	\$0
4.4	Chevron markings	m <sup>2</sup>	0	\$15	\$0
4.5	Turn Arrows	No	0	\$600	\$0
	Subtotal				\$35,900
	Contingency 30 %				\$10,770
	Total				\$50,978

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Haigh Street School Crossing - Anzac Street

Painted Central median

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$444
1.1	Design & Investigation	Item			\$222
2	General Contract				
2.1	Survey	Item			\$0
2.2	Site Establishment	Item			\$1,500
2.3	Site Management and Supervision	Item			\$0
2.4	Prepare and Maintain Quality System	Item			\$0
2.3	Traffic Control	Item			\$0
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	0	\$20	\$0
2.2	Excavation cut to waste	m <sup>3</sup>	0	\$30	\$0
2.3	Treat unsuitable material	Item			\$0
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	0	\$45	\$0
3.2	Install 375 mm diameter RCP	m	0	\$150	\$0
3.3	Install concrete kerb and channel	m	0	\$40	\$0
3.4	Install Side Entry Pit	No	0	\$1,250	\$0
3.5	Install paving 100 mm thick	m <sup>2</sup>	0	\$40	\$0
3.6	Supply and place subsurface drains	m	0	\$45	\$0
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m	0	\$35	\$0
4.2	Supply and place RRPM's	No	0	\$10	\$0
4.3	100 mm solid lines	m	300	1.5	\$450
4.4	Chevron markings	m <sup>2</sup>	0	\$15	\$0
4.5	Turn Arrows	No	6	\$600	\$3,600
	Subtotal				\$5,550
	Contingency 30 %				\$1,665
	Total				\$7,881

Latrobe Heavy Vehicle Routes Study

Estimated Costs

Painted Central Medians

Albert Street Moore Street - Kirk Street 180 m

Haigh Street Moore Street - Kirk Street 150 m

Moore Street Albert Street - Haigh Street / Bell Street 180 m

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$1,448
1.1	Design & Investigation	Item			\$724
2	General Contract				
2.1	Survey	Item			\$0
2.2	Site Establishment	Item			\$1,500
2.3	Site Management and Supervision	Item			\$0
2.4	Prepare and Maintain Quality System	Item			\$0
2.3	Traffic Control	Item			\$1,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	0	\$20	\$0
2.2	Excavation cut to waste	m <sup>3</sup>	0	\$30	\$0
2.3	Treat unsuitable material	Item			\$0
2.4	Relocate Power pole	Item			
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	0	\$45	\$0
3.2	Install 375 mm diameter RCP	m	0	\$150	\$0
3.3	Install concrete kerb and channel	m	0	\$40	\$0
3.4	Install Side Entry Pit	No	0	\$1,250	\$0
3.5	Install paving 100 mm thick	m <sup>2</sup>	0	\$40	\$0
3.6	Supply and place subsurface drains	m	0	\$45	\$0
4	Pavement Markings and Road Furniture				
4.1	Stop bars 600 mm wide	m	0	\$35	\$0
4.2	Supply and place RRPM's	No	0	\$10	\$0
4.3	100 mm solid lines	m	1020	\$5.0	\$5,100
4.4	Chevron markings	m <sup>2</sup>	175	\$60	\$10,500
4.5	Turn Arrows	No		\$600	\$0
	Subtotal				\$18,100
	Contingency 30 %				\$5,430
	Total				\$25,702

Moe CBD Traffic Study

Estimated Costs

Lloyd Street / George Street / Anzac Street / Narracan Drive / High Street Roundabout

Widening of Narracan Drive approach and pedestrian fencing

Item	Description	Unit	Quantity	Rate	Cost
1	Project Management	Item			\$55,606
1.1	Design & Investigation	Item			\$27,803
2	General Contract				
2.1	Survey	Item			\$4,000
2.2	Site Establishment	Item			\$3,000
2.3	Site Management and Supervision	Item			\$5,000
2.4	Prepare and Maintain Quality System	Item			\$5,000
2.3	Traffic Control	Item			\$10,000
2	Earthworks				
2.1	Removal of concrete kerb and channel	m	200	\$20	\$4,000
2.2	Excavation cut to waste	m <sup>3</sup>	225	\$20	\$4,500
2.3	Supply & place filling	m <sup>3</sup>	900	\$40	\$36,000
2.4	Treat unsuitable material	Item			\$5,000
3	Pavement				
3.1	Supply and place pavement 400 mm thick	m <sup>2</sup>	1650	\$45	\$74,250
3.2	Install 375 mm diameter RCP	m	170	\$150	\$25,500
3.3	Install concrete kerb and channel	m	400	\$40	\$16,000
3.4	Install Side Entry Pit	No	6	\$1,250	\$7,500
3.5	Install paving 100 mm thick	m <sup>2</sup>	325	\$40	\$13,000
3.6	Supply and place subsurface drains	m	400	\$45	\$18,000
4	Structural Works				
4.1	Widen east side of bridge	m <sup>2</sup>	75	\$3,000	\$225,000
4.2	Retaining wall in Narracan Rd median	m <sup>2</sup>	112.5	\$1,200	\$135,000
4.3	Retaining wall in central island	m <sup>2</sup>	75	\$1,200	\$90,000
5	Pavement Markings and Road Furniture				
5.1	Stop bars 600 mm wide	m	10	\$35	\$350
5.2	Supply and place RRPM's	No	0	\$10	\$0
5.3	100 mm solid lines	m	250	\$1.5	\$375
5.4	Chevron markings	m <sup>2</sup>	0	\$15	\$0
5.5	Turn Arrows	No	6	\$600	\$3,600
6	Fencing				
6.1	George Street SW corner	m	25	\$100	\$2,500
6.2	Lloyd Street NW corner	m	50	\$100	\$5,000
6.3	High Street NE corner	m	25	\$100	\$2,500
	Subtotal				\$695,075
	Contingency 30 %				\$208,523
	Total				\$987,007