TRAFFIC IMPACT ASSESSMENT

FOR PROPOSED DEVELOPMENT

OF

ERVEN 10653/4, 3988, 6991 AND REMAINDER OF ERF 4195

GQEBERHA

WITHIN

NELSON MANDELA BAY MUNICIPALITY

SEPTEMBER 2022
(version 2)

PREPARED FOR**:**

c/o
Adendorff Architects (Pty) Ltd

[redacted]

Telephone: +[redacted]
Cellular: +[redacted]

Telephone:[redacted]
Cellular:[redacted]

PREPARED BY:

EMONTI CONSULTING Engineers cc

[redacted]

Telephone:[redacted]
Cellular:[redacted]
E-mail: [redacted]

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ECDOT	Eastern Cape Department of Transport
GLA	Gross Leasable Area
HCM	Highway Capacity Manual
LOS	Level of Service (as defined by Highway Capacity Manual)
NA	Not Analysed
NMBM	Nelson Mandela Bay Municipality
ped	pedestrian
SIDRA	Software for the design and evaluation of traffic/ pedestrian intersections
TIA	Traffic Impact Assessment
veh/h	vehicles per hour

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Emonti Consulting Engineers CC was approached to prepare a Traffic Impact Assessment (TIA) for the proposed rezoning, consolidation and subdivision of the following properties: Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Gqeberha – situated within the Nelson Mandela Bay Municipality (NMBM) area. The property is commonly known as the Arlington Race Course.

According to South African Traffic Impact and Site Traffic Assessment Manual, Volume 1, commonly referred to as TMH16 (Reference Four), a TIA must be undertaken when:

i. An application is submitted for a change in land use, and
ii. The highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour.

Both these conditions are met with this application and therefor the need to undertake this TIA in support for the proposed rezoning, consolidation and subdivision of the said development. It should be noted that the required town planning applications for the various land-use changes will be submitted to the relevant department/s for official endorsed/approved by Council. Should the applications materially change during the submission process, for whatever reason, the TIA will be amended accordingly to take into account any such material changes that could impact on the proposed development from a traffic engineering perspective.

Following the investigation and study, recommendations regarding site access from the public road network, road network improvements, internal site layout, traffic safety, on-site circulation, parking and any loading facilities, will be made.

The approach and methodology followed in conducting this study were in terms of the references included in Chapter Ten.

1.2 Proposed development

The site is located in Walmer, a suburb situated within the NMBM area. A site locality map can be seen in Figure 1.1.

The current use of the site, coupled with the existing structures found thereon, generate very limited trips for the peak hours.

The proposed development comprises a multi-use development comprising social housing, retail, offices, warehousing, service industry, education, open space, road way, and will commonly be referred to hereafter as “the site” and/or “the development”.

The proposed land uses of the development are given in Table C.1 in Appendix C. The proposed site layout is illustrated in Figure 1.2.

2. EXISTING OPERATING CONDITIONS

2.1 Intersection control

Control strategies at the existing intersections relevant to this study are presented in Table 2.1.

Table 2.1: Control strategies

No.	Intersection	Control
1	Genadendal Road/Buffelsfontein Road	Priority /stop
2	Glendore Road/Unnamed Road	
3	Victoria Drive/Glendore Road	
4	Victoria Drive/DR01908	Traffic circle
5	Buffelsfontein Road/Victoria Drive	Traffic signals

The following photographs reveal a number of intersections that will be utilised by traffic generated by the development.

Genadendal Road/Buffelsfontein Road intersection

Glendore Road/Unnamed Road intersection

Victoria Drive/Glendore Road intersection

Victoria Drive/DR01908 intersection

Buffelsfontein Road/Victoria Drive intersection

2.2 Capacity along access roads

Victoria Drive, also referred to as the M18 and/or MR00421, is a main road and provides access to the M9 (Buffelsfontein Road) in the north and to Marine Drive in the south. From on-site observations sufficient spare capacity appears to exist along the road network to cater for the medium to long term future regarding anticipated traffic growth, including future trips relating to this development. This will however be analysed and commented on later in this report.

The development is of a magnitude that suggests that a pavement assessment be conducted to determine the structural integrity of the existing roads.

2.3 Traffic calming

Traffic calming, in the form of a speed hump, exists along Glendore Road just north of the proposed western access to the site. The posted speed limit is 60 km/h. From on-site observations the vehicular speeds passed the proposed western access, are in excess of the posted speed limit.

In additions, raised pedestrian tables and a traffic circle exist at the Victoria Drive/southern access (DR01908) intersection. As a result of the traffic calming, the observed vehicular speeds in the vicinity of the traffic calming rarely exceed the posted speed limit.

The following photographs depict the traffic calming measures discussed.

Speed hump along Glendore Road

Traffic circle, with raised pedestrian tables, at the Victoria Drive/DR01908 intersection

2.4 Pedestrian and cycle facilities

No cycle facilities are currently available on the surrounding road network. However, limited formalised pedestrian facilities are currently available. These include the raised pedestrian tables at the Victoria Drive/DR01908 intersection and surfaced sidewalks along the DR01908 as illustrated below.

Raised pedestrian crossings at the Victoria Drive/DR01908 intersection

Surfaced sidewalk along the DR01908

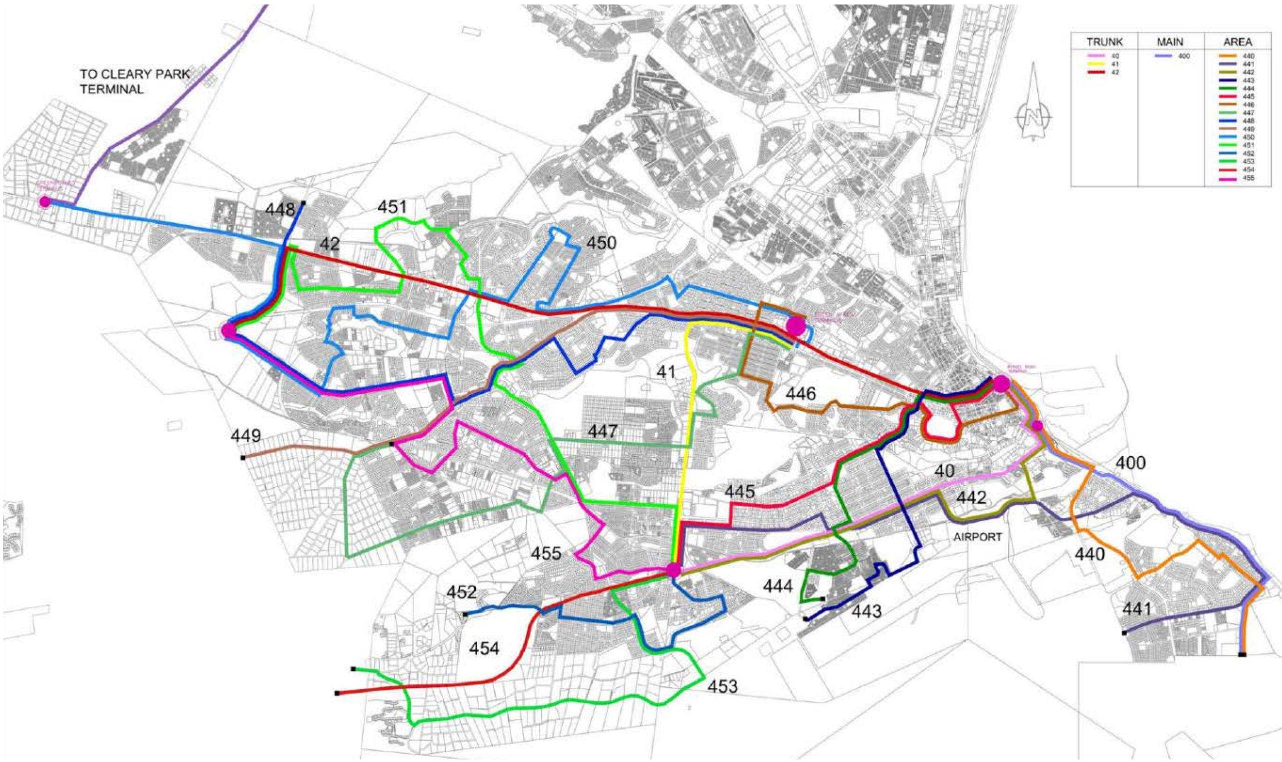
2.5 Public transport facilities

Formalised public transport facilities are currently available on the surrounding road network. These include the taxi/bus bays in the vicinity of the Victoria Drive/DR01908 intersection.

Victoria Drive/DR01908 (westbound) public transport facility

Victoria Drive/DR01908 (eastbound) public transport facility

The diagram hereafter illustrates the Western Suburbs IPTS Routes (Full Contract Area). The development will be serviced by routes 452 and 453 (Reference Seven).



Western Suburbs IPTS Routes (Full Contract Area)

3. EXISTING TRAFFIC VOLUMES

In order to establish the current traffic conditions relevant traffic count information was used. This traffic count information is available in Appendix D.

Table 3.1 provides a summary of the traffic count information utilised in this study.

Table 3.1 Traffic count data used

No.	Station	Data Type	Date
1	Genadendal Road/Buffelsfontein Road	12 hr manual unclassified traffic volume	21-Jul-22
2	Victoria Drive/Glendore Road		
3	Victoria Drive/DR01908		
4	Buffelsfontein Road/Victoria Drive		

The analysis of current traffic performance is based on the observed traffic data that, when necessary, have been adjusted and smoothed in order to represent a balance network of traffic volumes for 2022. The balanced peak hour traffic flow volumes are displayed as network diagrams in Figures 4.1 to 4.5.

4. FUTURE TRAFFIC VOLUMES

For purposes of this study it was assumed that the development will be functional in 2022 and therefore a design horizon of five years (i.e. 2027) was used for the future operational LOS analysis.

In terms of COTLO (Reference Four) an assessment must be undertaken for the hours during which the combined effect of background and development traffic will result in the highest traffic demand." In this regard, most of the proposed land uses have their peak traffic volumes being a week day AM and PM peaks, except for the relatively small retail component. Before choosing the weekday AM and PM as the critical peaks, a check was undertaken on the trip generation for a Saturday (i.e. the time when retail has the highest trip generation). Please refer to Table C.1 in this regards. The proposed development is expected to generate in the order of 1130, 1310 and 880 new trips in each of the AM, PM and SAT peaks respectively. When adding these to the current traffic in those peaks, the critical peaks remain the weekday AM and PM. It was for this reason that the SAT peak was not analysed any further. A typical day, in this case a Thursday was counted for a 12 hour period. This included both the AM and PM peaks. A typical day is normally a Tuesday or Thursday, but Mondays and Wednesday could also be used.

The recommended critical peak hours for analysing retail developments are weekday PM and SAT peak hours and weekday AM and PM peak hours for most other land uses. In this study the analyses were made for both the future weekday AM and PM peaks to address anticipated capacity problems in the peak hours most relevant to the development. The trips generated for the SAT peak were lower than the weekday PM peaks and were therefore not analysed further.

It is acceptable to project future traffic volumes by taking the recorded growth history of traffic counts into consideration. The generally accepted growth rate in the study area is 3% per annum. Applying the growth rate of 3% from the base year to the design horizon year the growth factor would be 1.16, meaning an increase in background traffic volume of 16% over the five year design horizon.

According to Table 4.1 (Reference Five), this can be regarded as a *"low to average growth area"*.

Table 4.1: Typical traffic growth rates

Development Area	Growth rate
Low growth area	**0 - 3%**
Average growth area	**3 - 4%**
Above average growth area	4 - 6%
Fast growing area	6 - 8%
Exceptionally high growth area	> 8%

For the future scenario analysis the current traffic volumes were maintained as background traffic and increased by an annual growth factor. New trips relating to the proposed development were added to obtain the future estimated traffic volumes for 2027.

4.1 Traffic generation

The recommended vehicle trip generation rates (as per References One and Four) for the land uses listed in Table C.1 were used to calculate the estimated number of trips for the various peak hours in order to determine the critical peak hour. Note the values used are based on Reference Four.

The recommended vehicle trip generation rates were then adjusted to take into account site specifics. The following factors, amongst others, were considered when making the trip generation adjustments:

i. public transport,
ii. predicted car ownership, and
iii. land use mix.

The following is a motivation as to the use of the trip generation adjustment/reduction factors.

Vehicle ownership and transit availability

The trip generation rates provided in TMH 17 (Tables 3.1 and 3.3) are applicable to areas with high vehicle ownership and where a low level of transit (public transport) service is provided. For other areas, a lower trip generation rate can be expected. Trip reduction factors that can be used for such developments or areas are provided in TMH 17 (Table 3.2). These factors can be applied to reduce the trip generation rates.

Typically, the vehicle ownership in areas with high levels of vehicle ownership varies between one to two vehicles per household. In areas with a low level of vehicle ownership, the majority of households (more than 50%) does not own a vehicle and relies on public transport for transportation. In areas with very low level of vehicle ownership, nearly all households (i.e. more than 90%) do not own a vehicle and rely on public transportation. As this development caters for social housing, is can be concluded that the area will remain a low car ownership area. This is similar to other social housing developments.

Although it would be ideal for car ownership to increase in these areas as residents become more financially well off, it is extremely unlikely that the car will rise beyond 50%. It is therefore considered that these areas will remain as low level of vehicle ownership areas.

The reduction factors provided in the table are those that are considered reasonable for low vehicle ownership areas and areas with a high level of transit services. The factors have been established considering current trip generation rates in the different areas. It is unlikely that the trip generation rates will remain at current low levels, but at the same time it is also unlikely that the rates will grow to those in high vehicle ownership areas. The reduction factors provided in the table provide for some reduction in trip rates, but not to the levels currently being experienced (i.e. the author of the THM 17 are being conservative).

The transit reduction factors provided in Table 3.2 (TMH 17) are applicable to developments that are located within a reasonable walking distance from a major transit node or stops on a major transit corridor. For this development, it will be serviced by IPTS routes 452 and 453 (Reference Seven). It should therefore be considered as a major transit corridor and thus qualifies for this reduction.

Mixed-use development

Mixed-use developments are defined as developments in an area that consist of two or more single-use developments between which trips can be made by means of non-motorised modes of transport (such as walking). This has the net effect of reducing the vehicle trip generation in the area.

The mixed-use reduction factors provided in TMH 17 (Table 3.2) may be applied, subject to the following two conditions:

a) the mixed-use developments must be located within a reasonable walking distance from each other, and
b) the mixed-use reduction for a development may not exceed the available multiuse trips generated at the other adjacent or nearby developments.

This development is a multi-use development and therefore this reduction applies for this development.

Based on these factors trip reductions, as illustrated in Table C.1, were assumed. The recommended in/out split for the peak hours can be seen in Table C.1 which also shows details of trip generation calculations for the various peak hours.

Further, for business developments, the trip generation and assignment depends on whether the trips are primary, diverted, pass-by or transferred. Based on the current traffic volumes on the adjacent roads and road network, pass-by and transferred trips have been considered and the resultant volumes are regarded as new trips as reflected in Table C.1.

From Table C.1 it can be seen that the PM peak hour, in terms of trips generated, is greater than the AM peak hour for a regular week day. When the projected future traffic volumes and predicted traffic generated are added together, the combined effect does not change the critical peak period which remains the AM peak hour.

The following are the scenarios that were analysed, where necessary:

i. existing 2022 critical peak hour traffic,
ii. existing 2022 critical peak hour traffic **with development** traffic,
iii. projected 2027 critical peak hour **without development** traffic, and
iv. projected 2027 critical peak hour **with development** traffic.

4.2 Trip assignment/distribution

The generated trips, as identified in Section 4.1, have been distributed to the road network manually, based on the principles of the gravity model and taking into account knowledge of local conditions, Reference Five.

The resultant trip assignments are illustrated as network diagrams in Figures 4.1 to 4.5 for the various scenarios and time horizons tested.

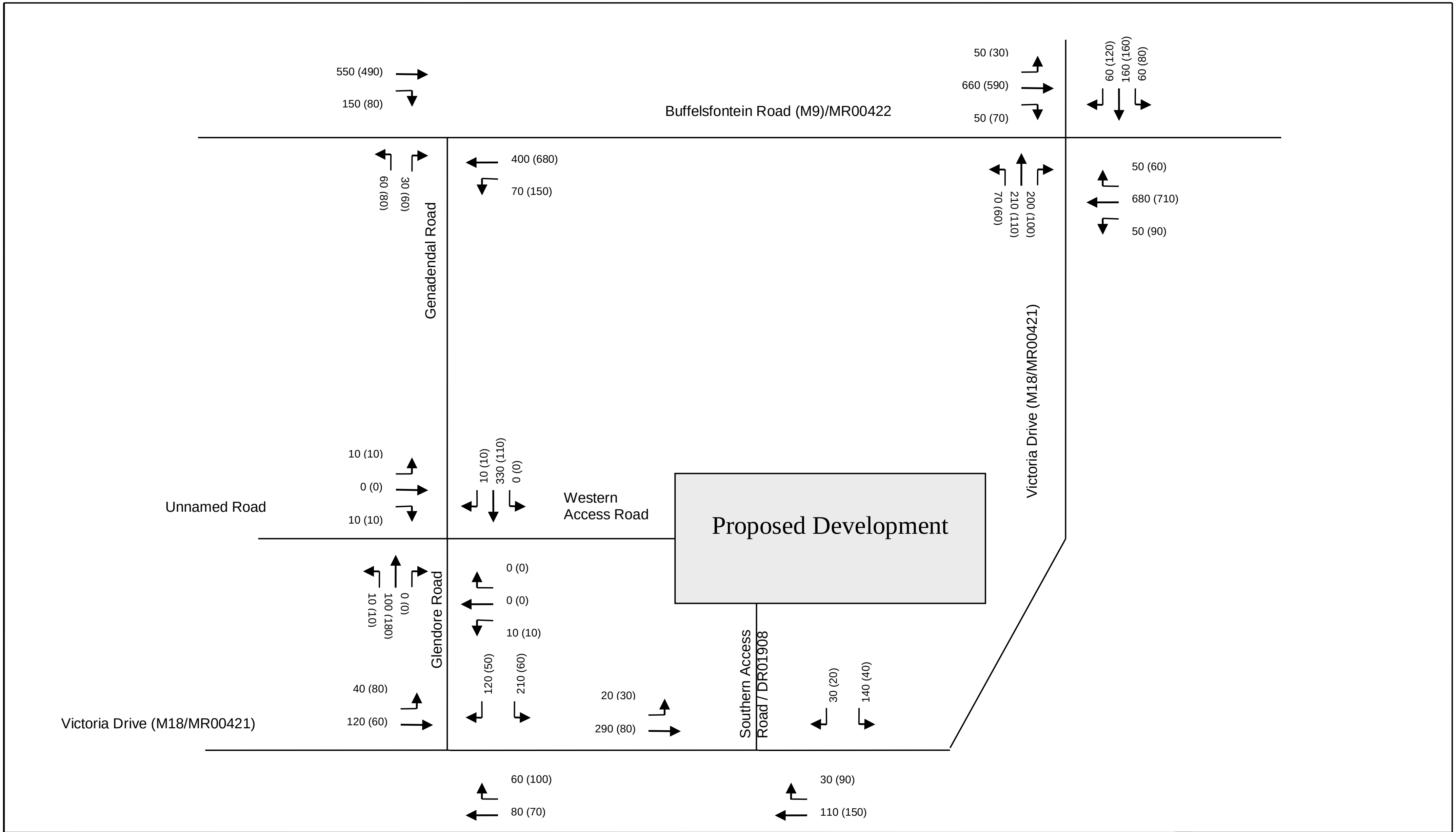


Figure 4.1: AM and PM 2022, without development trips.

Traffic Volume key:
AM (PM) = 1234 (1234) veh/h

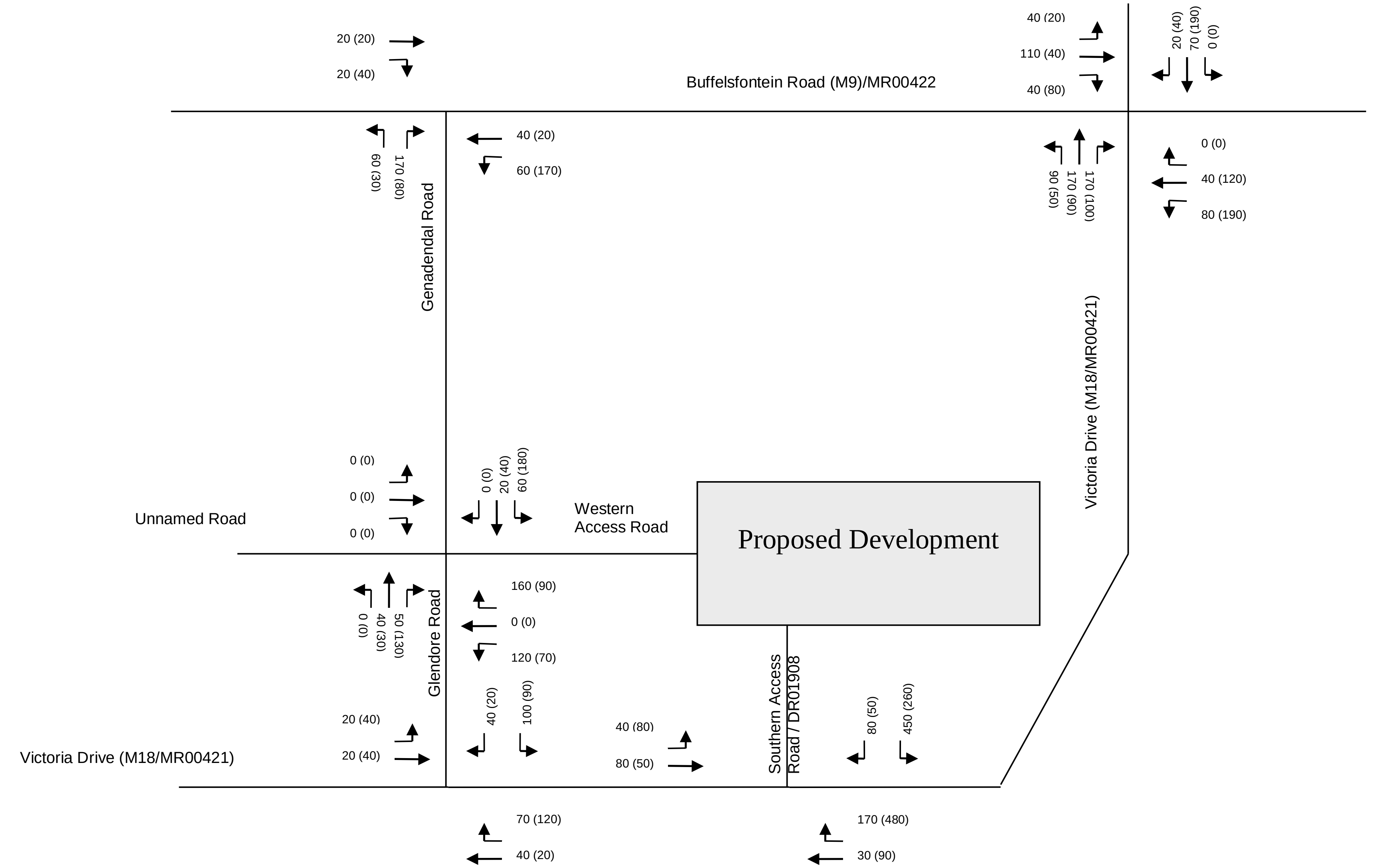


Figure 4.2: AM and PM 2022, development generated trips.

Traffic Volume key:
AM (PM) = 1234 (1234) veh/h

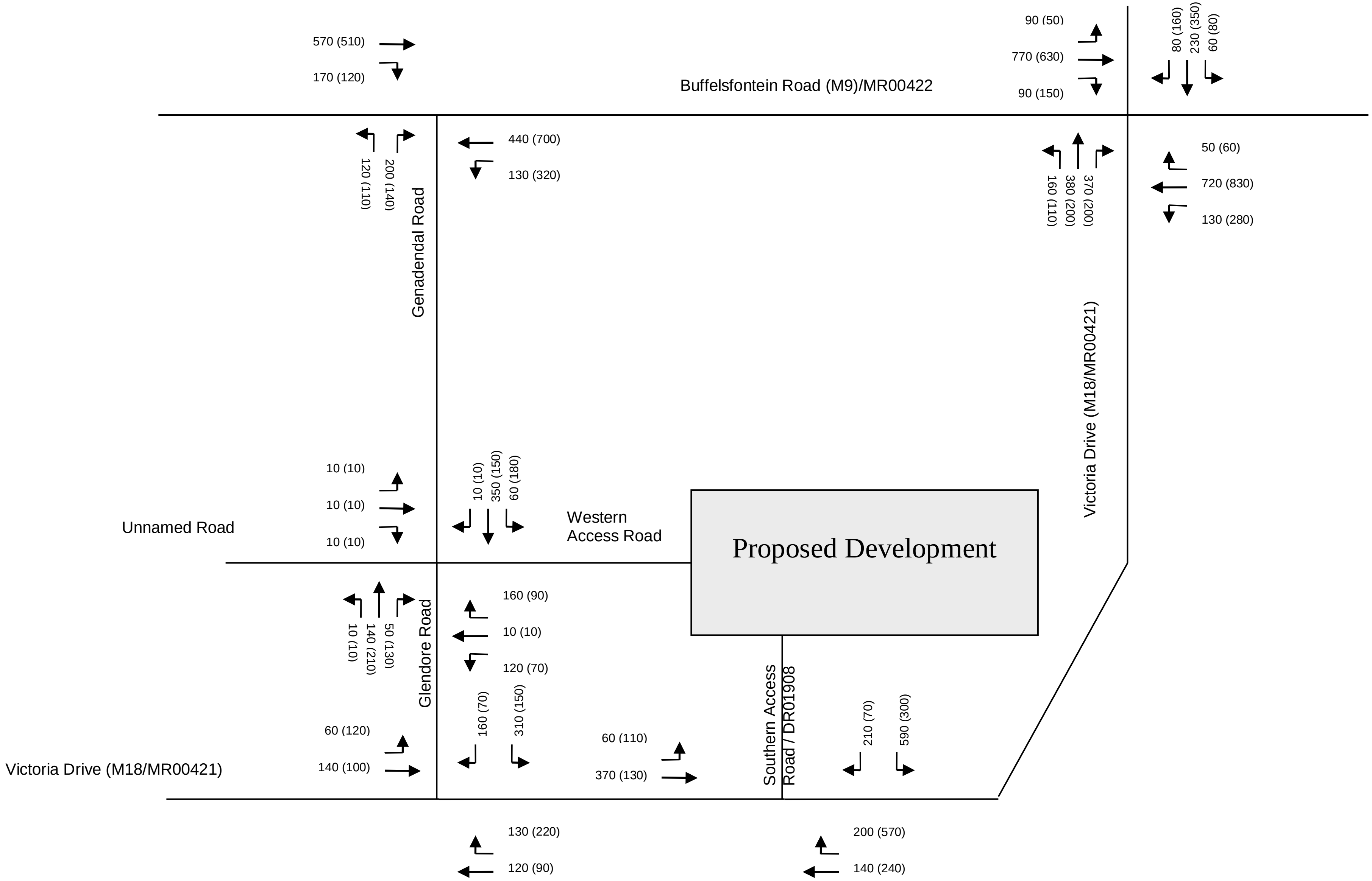


Figure 4.3: AM and PM 2022, development with generated trips.

Traffic Volume key:
AM (PM) = 1234 (1234) veh/h

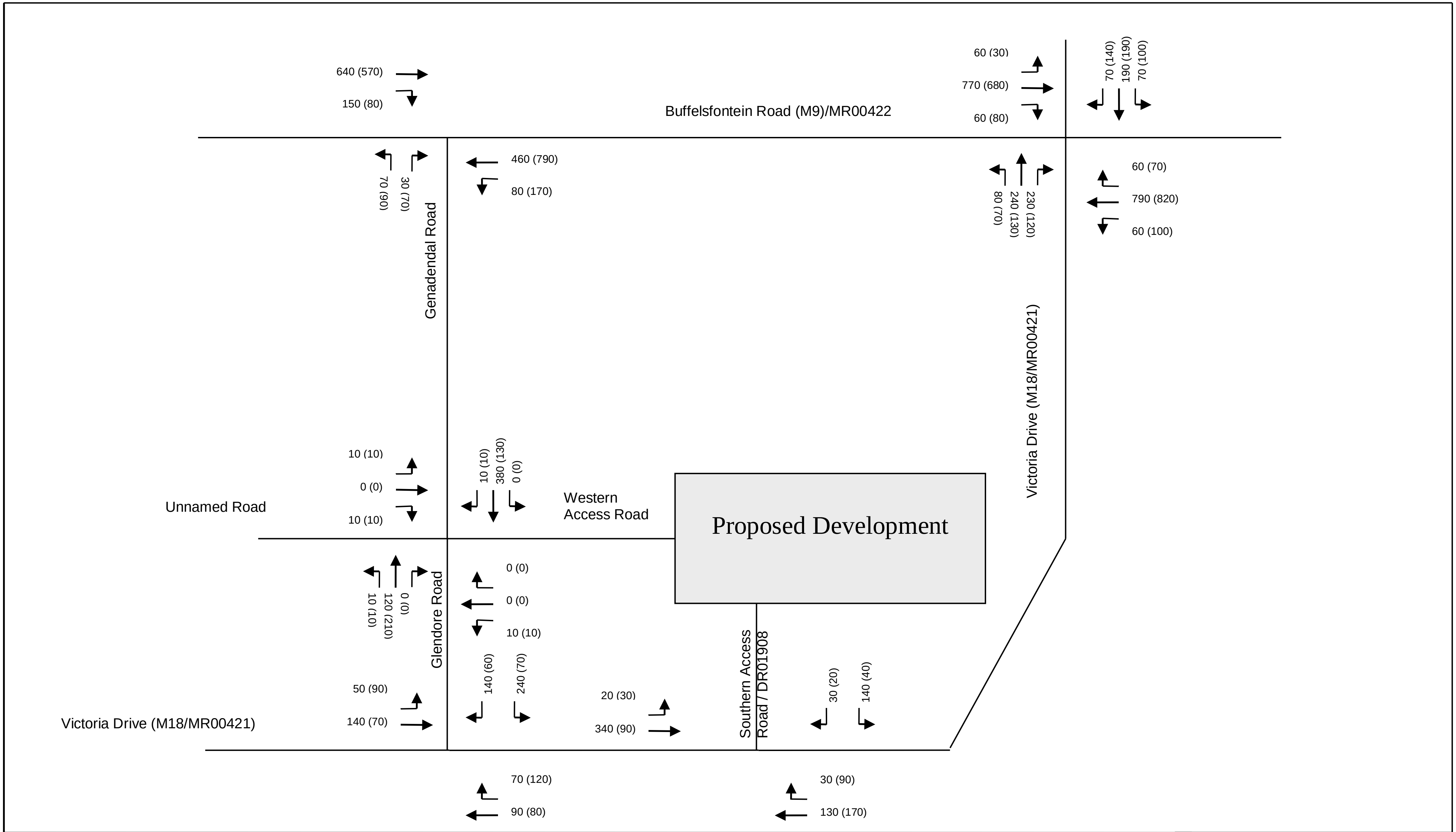


Figure 4.4: AM and PM 2027, without development trips.

Traffic Volume key:
AM (PM) = 1234 (1234) veh/h

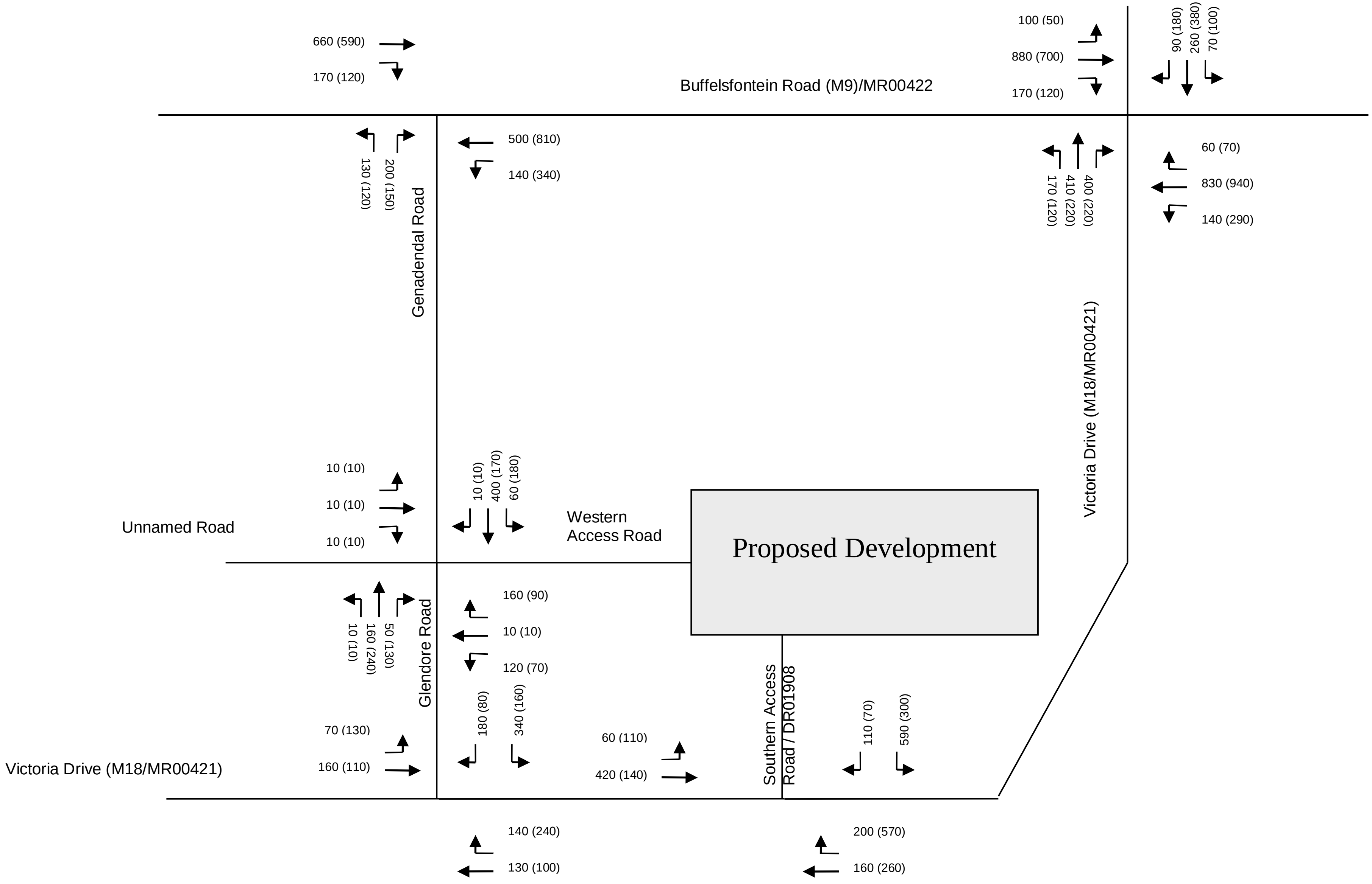


Figure 4.5: AM and PM 2027, development with generated trips.

Traffic Volume key:
AM (PM) = 1234 (1234) veh/h

5. INTERNAL CIRCULATION AND PARKING

5.1 Internal circulation

The internal circulating network proposed is shown in Figure 1.2 and the recommended layout in Figure 5.1. Minor changes to improve the overall efficiency of the development, as listed below, have been included in Figure 5.1.

i. public transport,
ii. disabled parking bays,
iii. loading bays,
iv. control strategy, and
v. traffic calming.

It would be advisable for the Developer to plan, design and build the internal layout to a standard acceptable by the municipality in order to allow for accessibility of service and emergency vehicles, etc. The layout, as recommended in Figure 5.1, should meet these requirements and provides acceptable internal circulation.

5.2 Parking and loading facilities

Refuse loading will occur near the main accesses to the development and other loading associated with deliveries, removals etc. will occur from the dedicated load bays indicated. All parking and loading requirements are to be catered for on the individual sites.

In terms of the Port Elizabeth Zoning Scheme Regulations (Reference Eight), the required minimum parking and loading bays are as set out in Table C.1. It is expected that the area will be serviced by a large percentage of public transport vehicles.

It is therefore proposed that the parking requirements be reduced as follows:

Size of flat	Parking requirement	Proposed departure	Actual parking provided
1 and 2 habitable rooms	1,0 bays + 0,5 visitors	1,0 bays + 0,2 visitors	1,0 bays + 0,43 visitors
3 habitable rooms	1,25 bays + 0,5 visitors	1,25 bays + 0,2 visitors	1,25 bays + 0,43 visitors
4 habitable rooms	1,5 bays + 0,5 visitors	1,5 bays + 0,2 visitors	1,5 bays + 0,43 visitors,

i.e. reducing the visitors bays from 0,5 to 0,2 per flat in each instance. This is similar to other Social Housing Complexes, e.g. Walmer Link, Fairview Link and Willowdene. This proposed reduction will require the necessary departures to be formalised. This formal application for a parking reduction is being undertaken as a separate process by the Town Planner for the proposed development. Should this departure application not be successful, then the developer will amend the SDP to reflect the required number of parking bays as per Reference Eight. Note that the actual visitors bays provided equates to 0.43 per unit (see Table C.1).

It is also requested that the parking provision for the commercial components of the development be adjusted for the provision of public transport, the percentage of patrons expected to walk between the residential and commercial sections, and the mixed use nature of the development. Based on the above the Developer should approach the Municipality, via the same parking departure application process, to reduce the required number of parking bays for the commercial components as indicated in Table C.1 by providing bicycle bays and taxi bays (with one taxi bay being equivalent to 6 standard bays) in lieu of some standard parking bays.

6. ACCESS PROPOSALS

6.1 Vehicular access

The proposed primary access (western access) to the site is onto Glendore Road, with a proposed secondary access (southern access) onto Victoria Drive via the DR01908. The positions of the proposed primary and secondary accesses to the site are shown in the photographs below.

Proposed primary access onto Glendore Road *Proposed secondary access onto the DR01908*

The intersection sight distance for turning manoeuvres associated with the specific posted speed limit of 60 km/h and the site gradients experienced are approximately 150m. Both approaches on Glendore Road and Victoria Drive at the proposed primary and secondary accesses respectively, meet this minimum requirement.

It is important to ensure that the western access be located directly opposite the Unnamed Road.

6.2 Pedestrian and bicycle access

Pedestrian and bicycle access to the site is via the proposed accesses.

Due to the location and nature of the development it is expected to generate local pedestrian traffic and the appropriate pedestrian facilities have been recommended as listed below:

i. surfaced pedestrian sidewalk along the internal roads within the development,
ii. surfaced pedestrian sidewalk along the western side of the DR01908 between end of the existing sidewalk and the southern access, and
iii. strategically located raised pedestrian table along the internal road network and at the internal and external proposed traffic circles.

6.3 Access control

The development indicates that the internal roads will be zoned private. The proposed access controls are illustrated in Figure 1.2. The proposed positions of the access controls should provide security to the development while keeping the relevant road network open to traffic. The proposed positions have been determined assuming the use of a swipe magnetic card and manual recording system for residents and visitors respectively, with one entry lane and one exit lane, Reference Five. Table 6.1 was used to calculate the positions of the access controls.

Table 6.1: Access control stacking distance and number of lanes

Zones	Service flow rates, Sf, (veh/h) for different control types		In, Res. only				Out, Res. + Vis.				Visitors access lane (in only) (assume 10% of total traffic) — In, Vis. Only				Combines 1 lane in		Note: A total of two entry lanes and one exit lane required.			
	Control type	Service flow, Sf (veh/h)	Traffic raio, Tr = (Total volume/ PHF/Sf)x100	Number of lanes*	Queue length (veh)**	Minimum Queue length (m)	Traffic raio, Tr = (Total volume/ PHF/Sf)x100	Number of lanes*	Queue length (veh)**	Minimum Queue length (m)	Traffic raio, Tr = (Total volume/ PHF/Sf)x100	Number of lanes*	Queue length (veh)**	Minimum Queue length (m)	Queue length (veh)**	Minimum Queue length (m)	Lanes for	Res. Only	Res. + Vis.	Vis. Only
8, 9, 10	Option 1 for residents - Swipe magnetic card	480	23	1	1	6	27	1	2	12					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	73	1	10	60	86	2	2	12					11	66	Volumes	98	116	11
	Manual recording, visitor completes form	80									15	1	1	6			Phf	0,9	0,9	0,9
11	Option 1 for residents - Swipe magnetic card	480	6	1	1	6	7	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	20	1	1	6	24	1	2	12					2	12	Volumes	27	32	3
	Manual recording, visitor completes form	80									4	1	1	6			Phf	0,9	0,9	0,9
12	Option 1 for residents - Swipe magnetic card	480	10	1	1	6	12	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	31	1	2	12	37	1	2	12					3	18	Volumes	42	50	5
	Manual recording, visitor completes form	80									7	1	1	6			Phf	0,9	0,9	0,9
13	Option 1 for residents - Swipe magnetic card	480	5	1	1	6	6	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	15	1	1	6	18	1	1	6					2	12	Volumes	20	24	2
	Manual recording, visitor completes form	80									3	1	1	6			Phf	0,9	0,9	0,9
14, 15	Option 1 for residents - Swipe magnetic card	480	22	1	1	6	25	1	2	12					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	69	1	8	48	81	2	2	12					9	54	Volumes	93	110	10
	Manual recording, visitor completes form	80									14	1	1	6			Phf	0,9	0,9	0,9
16	Option 1 for residents - Swipe magnetic card	480	12	1	1	6	15	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	39	1	2	12	47	1	3	18					3	18	Volumes	53	63	6
	Manual recording, visitor completes form	80									8	1	1	6			Phf	0,9	0,9	0,9
17, 18, 19	Option 1 for residents - Swipe magnetic card	480	32	1	2	12	39	1	2	12					3	18	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	104	2	3	18	124	2	4	24					4	24	Volumes	140	167	16
	Manual recording, visitor completes form	80									22	1	1	6			Phf	0,9	0,9	0,9
20	Option 1 for residents - Swipe magnetic card	480	16	1	1	6	19	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	53	1	4	24	62	1	6	36					5	30	Volumes	71	84	8
	Manual recording, visitor completes form	80									11	1	1	6			Phf	0,9	0,9	0,9
21	Option 1 for residents - Swipe magnetic card	480	7	1	1	6	8	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	23	1	1	6	27	1	2	12					2	12	Volumes	31	36	3
	Manual recording, visitor completes form	80									4	1	1	6			Phf	0,9	0,9	0,9
22	Option 1 for residents - Swipe magnetic card	480	6	1	1	6	7	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	19	1	1	6	22	1	1	6					2	12	Volumes	25	30	3
	Manual recording, visitor completes form	80									4	1	1	6			Phf	0,9	0,9	0,9
23	Option 1 for residents - Swipe magnetic card	480	5	1	1	6	6	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	15	1	1	6	18	1	1	6					2	12	Volumes	20	24	2
	Manual recording, visitor completes form	80									3	1	1	6			Phf	0,9	0,9	0,9
24	Option 1 for residents - Swipe magnetic card	480	4	1	1	6	5	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	14	1	1	6	16	1	1	6					2	12	Volumes	19	22	2
	Manual recording, visitor completes form	80									3	1	1	6			Phf	0,9	0,9	0,9
25	Option 1 for residents - Swipe magnetic card	480	5	1	1	6	6	1	1	6					2	12	Direction	In	Out	In
	Option 2 for residents - Pin number operated gates	150	15	1	1	6	18	1	1	6					2	12	Volumes	20	24	2
	Manual recording, visitor completes form	80									3	1	1	6			Phf	0,9	0,9	0,9

Note: Purple is recommended

No access control is proposed for the commercial components of the development.

7. ANALYSIS RESULTS

Tables 7.3.1 to 7.3.3 contain a summary of the SIDRA analysis results. More detail may be viewed in Appendix B. This includes all aspects of the input data used in the analyses including items such as lane configuration, control strategy, etc. The colour coding used in the graphic representations found in Appendix B is explained in Table 7.1.

Table 7.1: SIDRA LOS colour codes

Colour	Rating	Level of Service
Used in displays		Control delay, LOS
Green	Excellent	LOS A
Light blue	Very good	LOS B
Dark blue	Good	LOS C
Magenta	Acceptable	LOS D
Orange	Poor	LOS E
Red	Very poor	LOS F

The presented Level of Service (LOS) results are based on control delay and are illustrated in Table 7.2.

Table 7.2: Level of service definitions - HCM Method

Level of Service	Control delay per vehicle in seconds (d) (*including geometric delay*)	
	Signals and roundabouts	Stop and yield
A	d <=10	d <= 10
B	10 < d <= 20	10 < d <= 15
C	20 < d <= 35	15 < d <= 25
D	35 < d <= 55	25 < d <= 35
E	55 < d <= 80	35 < d <= 50
F	80 < d	50 < d

Note: Above Tables 7.1 and 7.2 and explanation courtesy of Reference Three.

Tables 7.3.1 to 7.3.2 contain a summary of the SIDRA analysis results as undertaken at the various intersections, where Table 7.3.3 shows the control types assumed for the analysis for the various scenarios.

From the results it is clear that while the two peak periods test similarly, the current critical peak hour is the AM peak hour. On completion of the development the AM peak hour remains the more critical in terms of volume and LOS at intersections.

The anticipated impact of the proposed development varies depending on the road segment under review. From the SIDRA analyses results, together with on-site observations, the following road segments require mentioning and are displayed in Figure 7.1. Note that due to the size of the site, a separate A1 sized SDP is herewith attached to provide more details to the proposals as indicated in Figures 5.1 and 7.1.

Table 7.3.1 Intersection Level of Service (AM) peak

KEY: A-C | D | E | F | NA

No.	Intersections	Level of Service									
		2022 AM status quo		2022 AM develop.		2027 AM option 1		2027 AM option 2		2027 AM option 3	
		APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.
1	Genadendal Road/Buffelsfontein Road	C	B	NA	NA	F	D	B	A	C	B
2	Glendore Road/Unnamed Road/Access Road	NA	NA	NA	NA	C	B	A	A	NA	NA
3	Victoria Drive/Glendore Road	NA	NA	NA	NA	B	A	B	A	A	A
4	Victoria Drive/DR01908	NA	NA	NA	NA	C	A	NA	NA	NA	NA
5	Buffelsfontein Road/Victoria Drive	F	F	NA	NA	F	E	D	C	NA	NA

Table 7.3.2: Intersection Level of Service (PM peak)

KEY: A-C | D | E | F | NA

No.	Intersections	Level of Service									
		2022 PM status quo		2022 PM develop.		2027 PM option 1		22027 PM option 2		2027 PM option 3	
		APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.	APPR.	INTERS.
1	Genadendal Road/Buffelsfontein Road	E	D	NA	NA	F	E	C	B	C	B
2	Glendore Road/Unnamed Road/Access Road	NA	NA	NA	NA	B	B	A	A	NA	NA
3	Victoria Drive/Glendore Road	NA	NA	NA	NA	A	A	A	A	A	A
4	Victoria Drive/DR01908	NA	NA	NA	NA	A	A	NA	NA	NA	NA
5	Buffelsfontein Road/Victoria Drive	F	E	NA	NA	F	E	D	D	NA	NA

Table 7.3.3: Intersection control type

No.	Intersections	Intersection control type				
		2022 status quo	2022 develop.	2027 option 1	2027 option 2	2027 option 3
1	Genadendal Road/Buffelsfontein Road	Priority/stop	NA	Priority/stop	Traffic circle	Traffic signals
2	Glendore Road/Unnamed Road/Access Road	NA	NA	Priority/stop	Extra lanes	Traffic circle
3	Victoria Drive/Glendore Road	NA	NA	Priority/stop	Traffic circle	NA
4	Victoria Drive/DR01908	Traffic circle	NA	Traffic circle	NA	NA
5	Buffelsfontein Road/Victoria Drive	Traffic signals	NA	Traffic signals	Extra lanes	NA

Note: LOS is indicated per approach and per intersection. Movement LOS are reflected in Appendix B.

According to Reference Four, the primary study area is the area from which transportation elements are selected for the TIA.

The elements to be included in the primary study area shall be selected as follows:

i. Accesses to the site. All accesses (vehicle, pedestrian and cyclist) to the site. Such accesses are also included in the study area of Site Traffic Assessments.

ii. External roads. These roads shall be restricted to Class 4 and 5 roads in the vicinity of the development up to the first Class 1 to 3 roads that can be reached by the Class 4 and 5 road network from the development, up to and including the first connection(s) on the Class 1 to 3 roads.

The elements shall be restricted to those within a maximum distance of 1.5 km from the accesses to the site, measured along the shortest routes to the accesses, provided that there is at least one intersection within this distance. Where there is no such intersection, the distance will be extended to include at least one intersection.

Currently the Buffelsfontein Road/Victoria Drive intersection and the Genadendal Road/ Buffelsfontein Road intersection are 2.4km and 3.5km respectively away from the accesses to the development, with a number of intersections between the development accesses and these intersections. Under normal circumstances these two intersections would be excluded from the impact of traffic generated by this development. However, these two intersections will be used by traffic from the development to gain access to the broader road network. They have therefore been analysed in this report.

Victoria Drive/DR01908 intersection

Based on traffic volumes this intersection does not require any upgrading.

Glendore Road/Unnamed Road/Access Road intersection

This intersection currently operates at an acceptable LOS as a priority/stop controlled intersection. However, from a safety perspective, it is advisable to introduce a traffic circle at this intersection.

Further, it is important that the intersection be located directly opposite the Unnamed Road to the west of Glendore Road.

Victoria Drive/Glendore Road intersection

Similarly to the Glendore Road/Unnamed Road/Access Road intersection, this intersection currently operates at an acceptable LOS. The introduction of a traffic circle will be beneficial for traffic safety at this intersection.

Genadendal Road/Buffelsfontein Road intersection

This intersection currently operates at an acceptable LOS. However with the increase in traffic from the development an alternative form of control is recommended. Three alternatives were considered here, i.e. priority/stop control with extra lanes, traffic signals with extra lanes and a traffic circle.

The stop/priority control did not operate at an acceptable LOS. However, both the traffic signals and traffic circle options produced acceptable improvements to the LOS. As most of the intersections along Buffelsfontein Road are currently traffic signal controlled, it is recommended that traffic signals, with additional auxiliary turning lanes, be introduced.

Victoria Drive/Buffelsfontein Road intersection

This intersection currently operates at a poor LOS and requires changes in order to improve the LOS. The situation worsens when the traffic generated by the development is added to the intersection.

Here additional lanes are to be introduced in conjunction with traffic signal phasing and timing changes.

Public transport bays

Due to the location and nature of the development it is expected to generate public transport. It is essential for public transport bays to be introduced, together with the associated pedestrian facilities. It is therefore recommended that two public transport bays be constructed, one on both of the exits to the Glendore Road/Unnamed Road/Access Road intersections, as well along Victoria Drive at the Victoria Drive/Glendore Road intersection. Internal public transport embayments and parking bays are also proposed as illustrated in Figure 5.1.

Traffic calming

Currently the Victoria Drive/DR01908 intersection has raised pedestrian tables on all approaches to the traffic circle. These raised tables improve the safety for both the vehicles and pedestrians making use of the traffic circles. It is therefore recommended that raised pedestrian tables be introduced on all the approaches to the proposed traffic circles. This applies to traffic circles both internally and externally to the site.

Limited access

It is essential to ensure that no vehicular, bicycle or pedestrian accesses are permitted onto Glendore Road other than at the proposed access. It is therefore recommended that a suitable barrier be erected to prohibit such access. In this regard, an adequate pedestrian and vehicle proof fence/wall is to be erected along the property boundary with Glendore Road.

8. CONCLUSIONS

Following the investigation and analysis it is concluded that:

i. The current operating conditions on the road network within the study area are found to be acceptable with no LOS or capacity failures, except for the Victoria Drive/Buffelsfontein Road intersection.
ii. The posted speed limit of 60 km/h along both Victoria Drive and Glendore Road, in the vicinity of the site accesses, is appropriate for the current and expected future traffic conditions.
iii. The existing critical peak, in terms of traffic volume, was found to be the AM peak hour while the PM peak hour tested similarly but with marginally lower demands.
iv. Once developed and fully occupied, the proposed development may be expected to generate in the order of 1130 and 1310 new vehicle trips in AM and PM commuter peak hours respectively. This is considerably higher than the estimated 880 new trips in the SAT peak.
v. The combined critical peak hour of existing and development trips is found to be the AM peak hour.
vi. The network is not overloaded when development trips are assigned for any of the given tested peak hours, subject to the recommended road network improvements being undertaken.
vii. The proposed changes to the layout and road network, as shown in Figures 5.1 and 7.1 respectively, adequately serve the proposed development.
viii. The development is of a magnitude that suggests that a pavement assessment be conducted to determine the structural integrity of the existing roads.

9. RECOMMENDATIONS

Based on the investigation and conclusions it is recommended that:

i. This Traffic Impact Assessment (TIA) be submitted to the Nelson Mandela Bay Municipality (NMBM) and the Eastern Cape Department of Transport (ECDOT) for their perusal.

ii. The development proposal, that is the proposed rezoning, consolidation and subdivision of the following properties: Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Gqebera, as submitted and reflected herein, being approved in principle from a traffic impact perspective by the NMBM and the ECDOT. Once the comments are received from the ECDOT, these comments will be forwarded to NMBM for consideration.

iii. The site layout changes, as shown in Figure 5.1, being made a condition of approval. The required internal road network improvements to be made by the development are as follows:
   a. parking layout,
   b. disabled parking bays,
   c. loading bays,
   d. control strategy, and
   e. traffic calming.

iv. The road network improvements, as listed below and shown in Figure 7.1, to being made a condition of approval. It should however be noted that these improvements may change subject to subsequent investigations in consultation with the road authority. The required public road network improvements to be made to accommodate the development are as follows:
   a. The construction of a traffic circle at the Glendore Road/Unnamed Road/Access Road and Victoria Drive/Glendore Road intersections.
   b. Traffic signals, with additional turning auxiliary lanes, being introduced at the Genadendal Road/Buffelsfontein Road intersection.
   c. The construction of additional lanes, together with changes to the traffic signal phasing and timing, being implemented at the Victoria Drive/Buffelsfontein Road intersection.
   d. The construction of two public transport bays, one on both of the exits to the Glendore Road/Unnamed Road/Access Road intersections, as well along Victoria Drive at the Victoria Drive/Glendore Road intersection.
   e. Construction of raised pedestrian tables on all the approaches to the proposed traffic circles.
   f. An adequate pedestrian and vehicle proof fence/wall being erected along the property boundary with Glendore Road.
   g. Construction of surfaced pedestrian sidewalk along the internal roads within the development.
   h. Construction of surfaced pedestrian sidewalk along the western side of the DR01908 between end of the existing sidewalk and the southern access.
   i. Construction of strategically located raised pedestrian table along the internal road network and at the internal and external traffic circles.

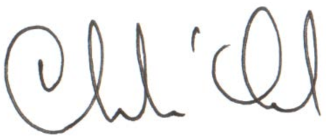
v. Parking and loading bays being provided as per Table C.1. This is subject to a successful parking departure application. Should the parking departure application not be successful, then the parking is to be provided as per Reference Eight, i.e. Port Elizabeth Zoning Scheme Regulations. This will require the SDP to be amended accordingly.

vi. The developers civil engineer responsible for the roads, undertake the necessary pavement assessment on the surrounding road network. The findings of the assessment must be forwarded to the NMBM for consideration.

vii. All costs associated with the internal roads, as indicated in Figure 5.1, being solely to the Developer's account.

viii. All costs associated with the recommendations, as listed in "iv", being solely to the Developer's account. *It is however suggested that the Developer approach the NMBM to determine whether they would consider a contribution towards the cost of improvements to the Victoria Drive/Buffelsfontein Road intersection as this intersection is currently operating at a poor LOS without the development trips being taken into consideration.*

<u>It should be noted that all figures represented in this Traffic Impact Assessment are concept drawings only and are not to be used for construction purposes. These concept drawings are to be developed into engineering drawings by the Developer's appointed civil engineer. The engineering drawings are then to be approved by the relevant road authority officials prior to construction.</u>



D M McQUIRK Pr. Eng.

MSc. Transportation & Traffic Eng., BSc Civil Eng, Dipl Traffic Safety Management
Registered with [redacted] member of IMESA

10. REFERENCES

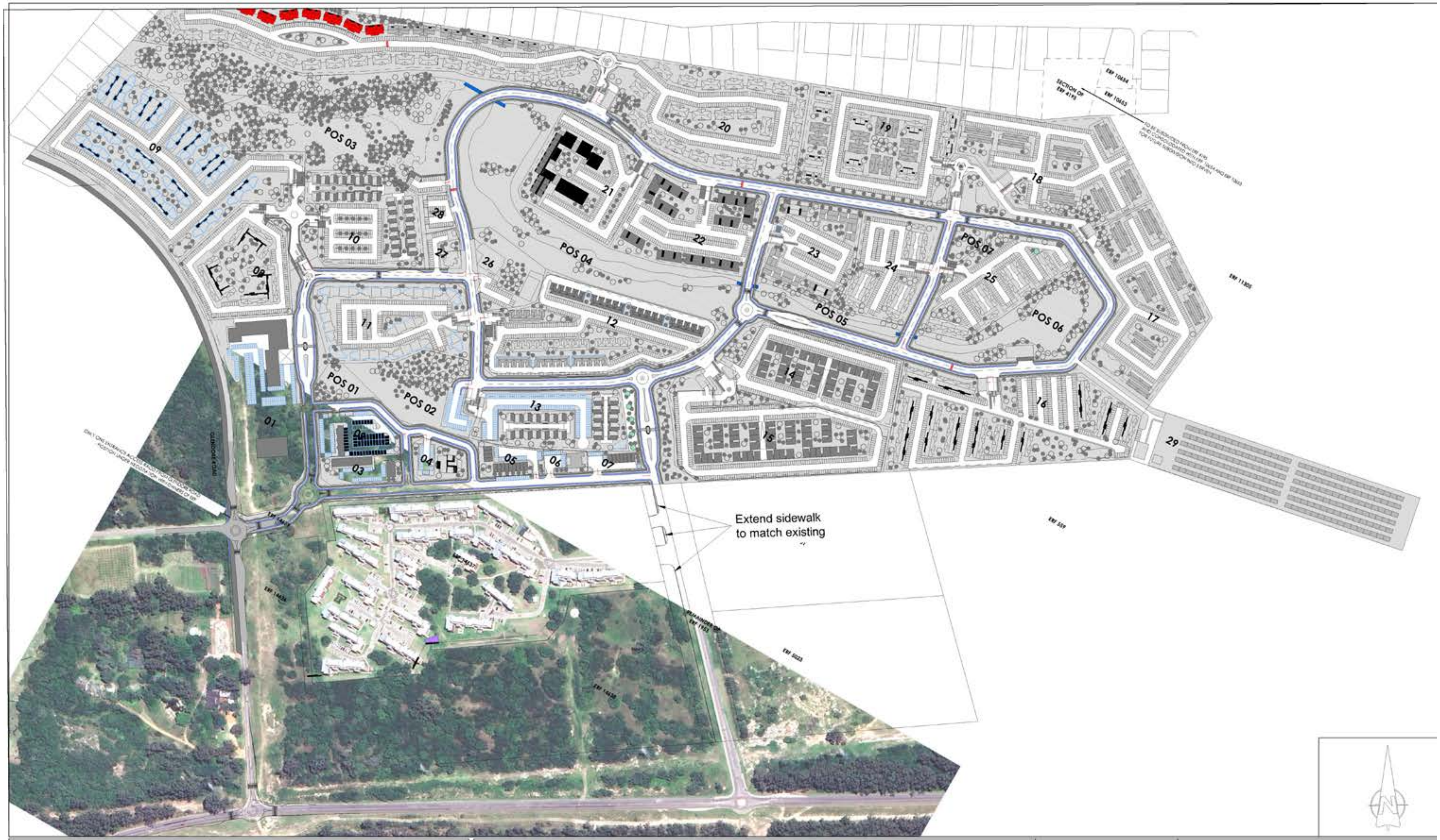
Reference 1	South African Trip Generation Rates. 2nd Edition, June 1995.
Reference 2	Manual for Traffic Impact Studies RR93/635, October 1995.
Reference 3	SIDRA operators manual.
Reference 4	South African Traffic Impact and Site Traffic Assessment Manual, Volumes 1 and 2 (TMH16) August 2012.
Reference 5	South African Trip Data Manual, Volume 1 (TMH 17), September 2012.
Reference 6	Department of Transport Parking Standards, November 1985.
Reference 7	Western Suburbs Contract Area: Operations Plan for Starter Services 6 May 2021.
Reference 8	Port Elizabeth Zoning Scheme Regulations, May 1993.

APPENDIX A

FIGURES

EMONTI CONSULTING Engineers cc 31 Galway Road Nahoon East London 5241 Tel: 043-7350890 Cell: 0834651558 e-mail: deonmcquirk@telkomsa.net	Project / Drawing Title: Traffic Impact Assessment for Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Port Elizabeth SITE LOCALITY PLAN	Scale: 1:5 000 Drawn By: P Farrant Drawing No: Figure 1.1	CONCEPT DRAWING Project No:

EMONTI CONSULTING Engineers cc	31 Galway Road Nahoon East London 5241 Tel: 043-7350890 Cell: 0834651558 e-mail: deonmcquirk@telkomsa.net	Project / Drawing Title: Traffic Impact Assessment for Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Port Elizabeth PROPOSED SITE LAYOUT	Scale: 1:4 000 Drawn By: P Farrant Drawing No: Figure 1.2	CONCEPT DRAWING Project No:



EMONTI CONSULTING Engineers cc 31 Galway Road Nahoon East London 5241 Tel: 043-7350890 Cell: 0834651558 e-mail: deonmcquirk@telkomsa.net	Project / Drawing Title: Traffic Impact Assessment for Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Port Elizabeth RECOMMENDED LAYOUT	Scale: 1:4 000 Drawn By: P Farrant Drawing No: Figure 5.1	CONCEPT DRAWING Project No:

EMONTI CONSULTING Engineers cc
31 Galway Road Tel: 043-7350890
Nahoon Cell: 0834651558
East London
5241
e-mail:
deonmcquirk@telkomsa.net

Project / Drawing Title:

Traffic Impact Assessment for Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Port Elizabeth

RECOMMENDED ROAD IMPROVEMENTS

Scale: 1:2 500	CONCEPT DRAWING
Drawn By: P Farrant	Project No:
Drawing No: Figure 7.1 A	

EMONTI CONSULTING Engineers cc

31 Galway Road
Nahoon
East London
5241
Tel: 043-7350890
Cell: 0834651558
e-mail:
deonmcquirk@telkomsa.net

Project / Drawing Title:

Traffic Impact Assessment for Erven 10653/4, 3988, 6991 and Remainder of Erf 4195, Port Elizabeth

RECOMMENDED ROAD IMPROVEMENTS

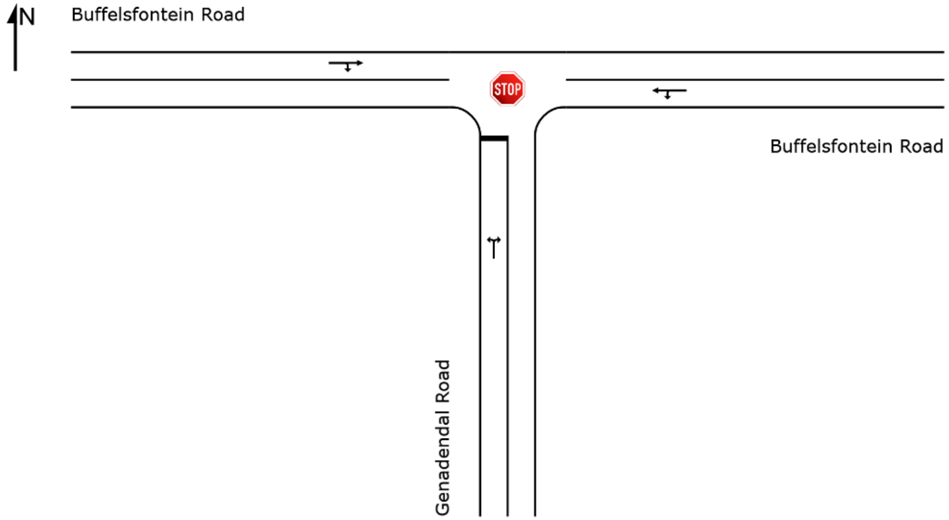
Scale: 1:2 500	CONCEPT DRAWING
Drawn By: P Farrant	Project No:
Drawing No: Figure 7.1 B	

APPENDIX B

SIDRA INTERSECTION LOS RESULTS

Figure B.1.A: Level of Service (LOS)

Intersection:	Genadendal Road/Buffelsfontein Road
Without improvements	



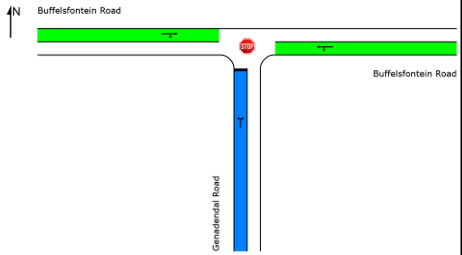
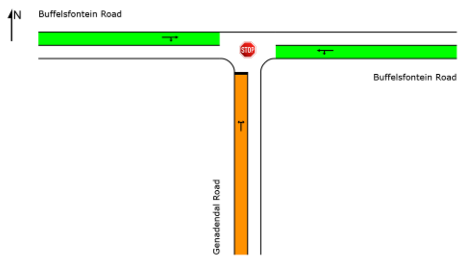
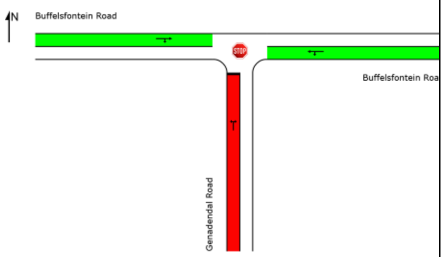
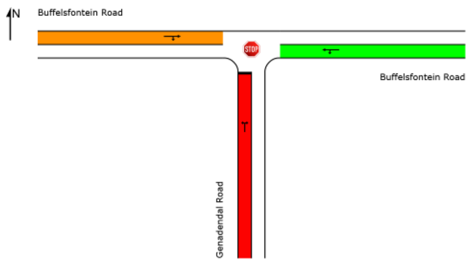
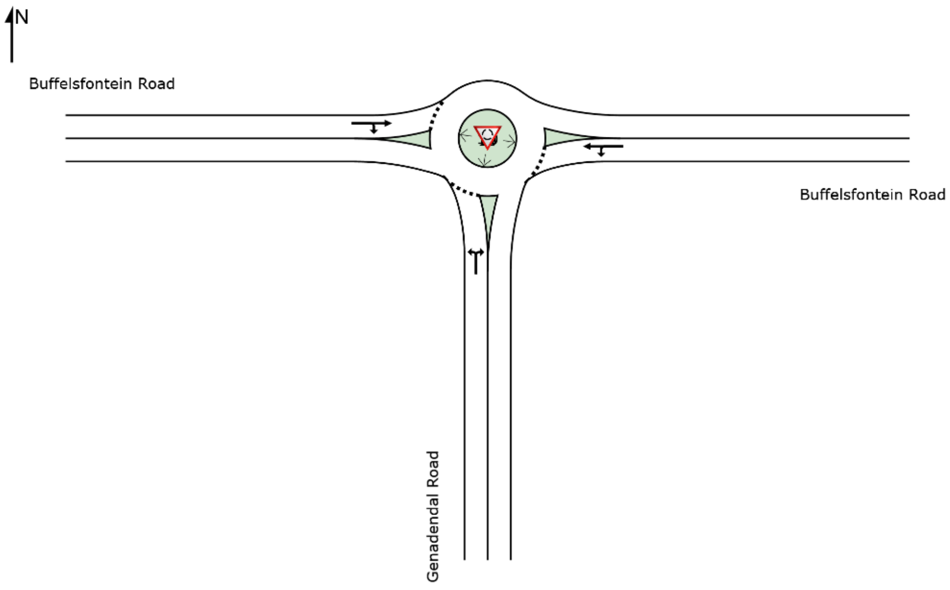
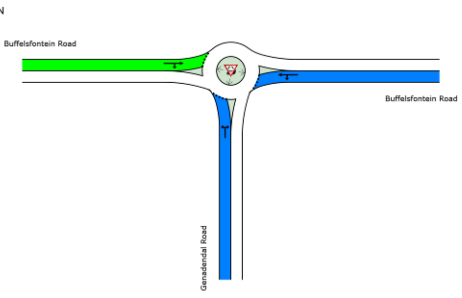
Peak	Design year 2022	Design year 2027
AM (without development trips)		NA
PM (without development trips)		NA
AM (with development trips)	NA	
PM (with development trips)	NA	

Figure B.1.B: Level of Service (LOS)

Intersection:	Genadendal Road/Buffelsfontein Road
With improvements – traffic circle	



Peak	Design year 2022	Design year 2027
AM (without development trips)	NA	NA
PM (without development trips)	NA	NA
PM (with development trips)	NA	

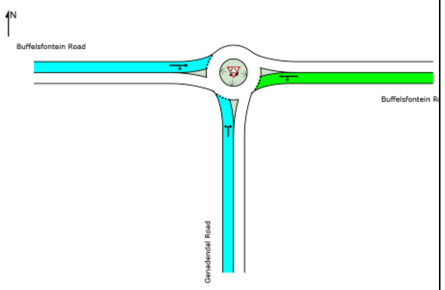
Peak	Design year 2022	Design year 2027
AM (with development trips)	NA	

Figure B.1.C: Level of Service (LOS)

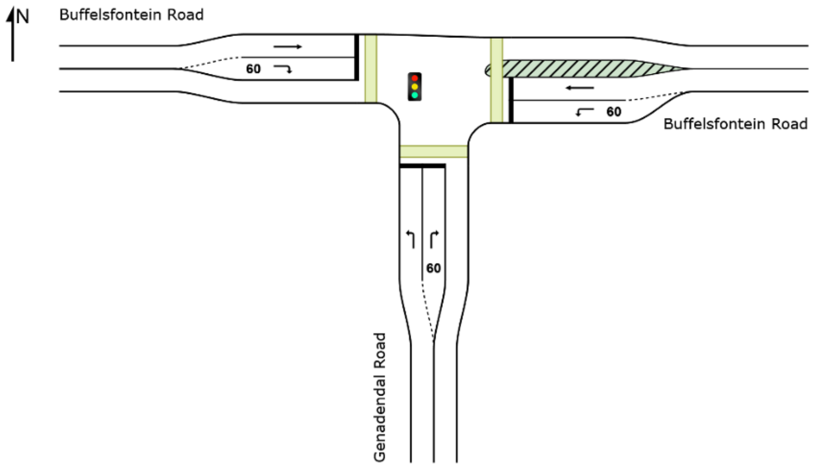
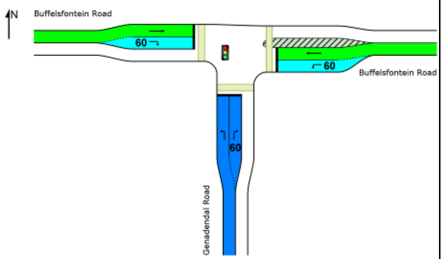
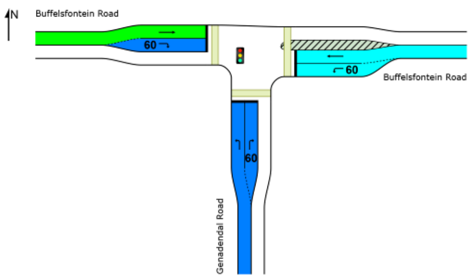
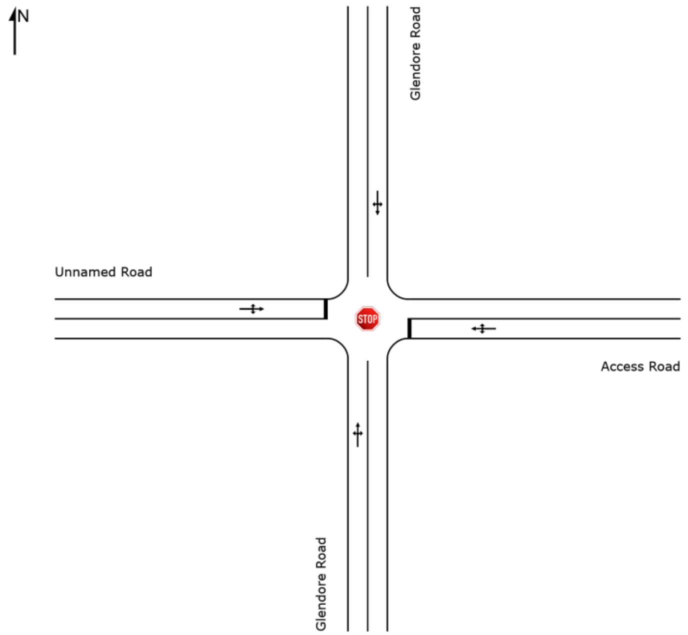
<table>
<tr><td>Intersection:</td><td>Genadendal Road/Buffelsfontein Road</td><td rowspan="2">Peak</td><td colspan="2">Design year</td></tr>
<tr><td colspan="2">With improvements – traffic signals with additional lanes</td><td>2022</td><td>2027</td></tr>
<tr><td colspan="2" rowspan="2">
</td><td>AM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td>PM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="2">Design year</td><td></td><td></td><td></td></tr>
<tr><td>2022</td><td>2027</td><td></td><td></td><td></td></tr>
<tr><td>AM (with development trips) NA</td><td>
</td><td>PM (with development trips)</td><td>NA</td><td>
</td></tr>
</table>

Figure B.2.A: Level of Service (LOS)

Intersection:	Glendore Rd/Unnamed Rd/Access Rd
Without improvements	



Peak	Design year 2022	Design year 2027
AM (without development trips)	NA	NA
PM (without development trips)	NA	NA

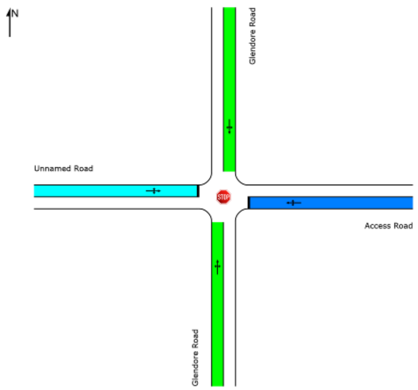
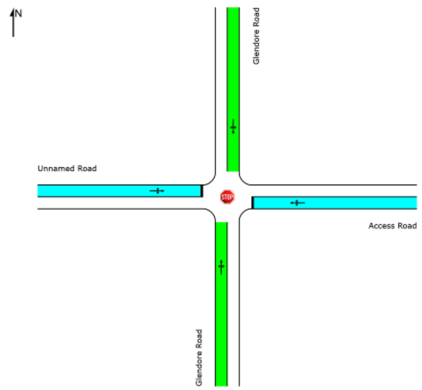
	Design year 2022	Design year 2027
AM (with development trips)	NA	
PM (with development trips)	NA	

Figure B.2.B: Level of Service (LOS)

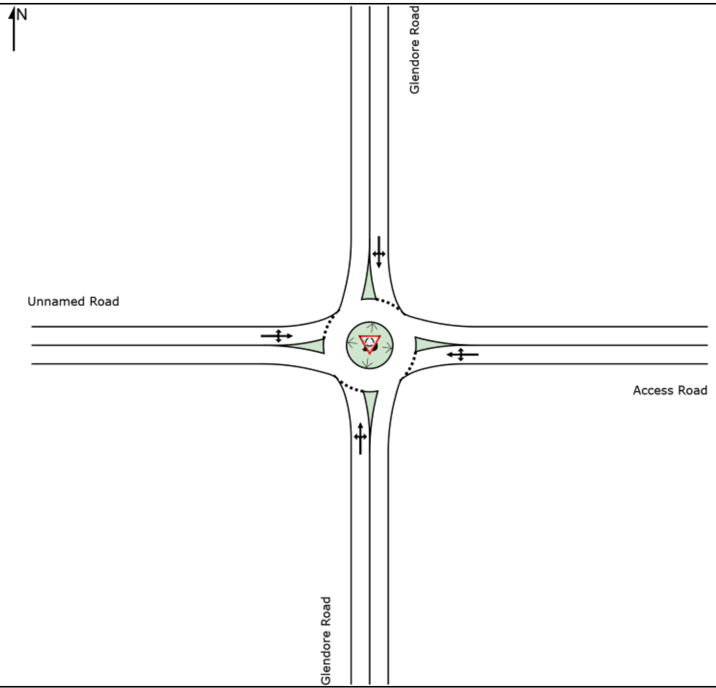
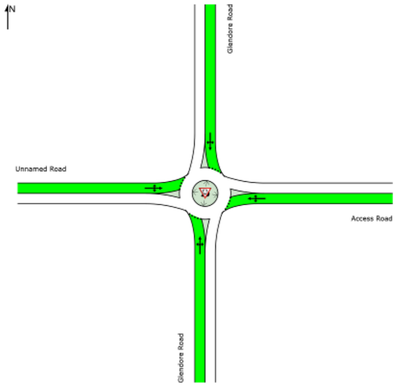
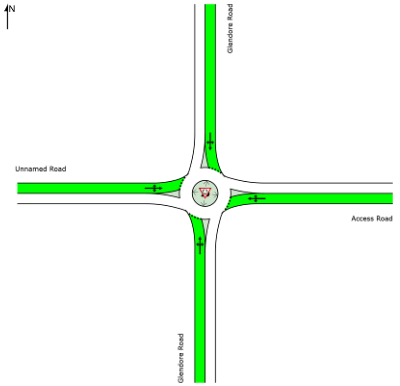
<table>
<tr><td>Intersection:</td><td colspan="2">Glendore Rd/Unnamed Rd/Access Rd</td><td rowspan="2">Peak</td><td colspan="2">Design year</td></tr>
<tr><td colspan="3">With improvements – traffic circle</td><td>2022</td><td>2027</td></tr>
<tr><td colspan="3" rowspan="2">
</td><td>AM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">PM (without development trips)</td><td rowspan="2">NA</td><td rowspan="2">NA</td></tr>
<tr><td colspan="3">Design year</td></tr>
<tr><td colspan="2">2022</td><td>2027</td><td></td><td></td><td></td></tr>
<tr><td>AM (with development trips)</td><td>NA</td><td></td><td>PM (with development trips)</td><td>NA</td><td></td></tr>
</table>

Figure B.3.A: Level of Service (LOS)

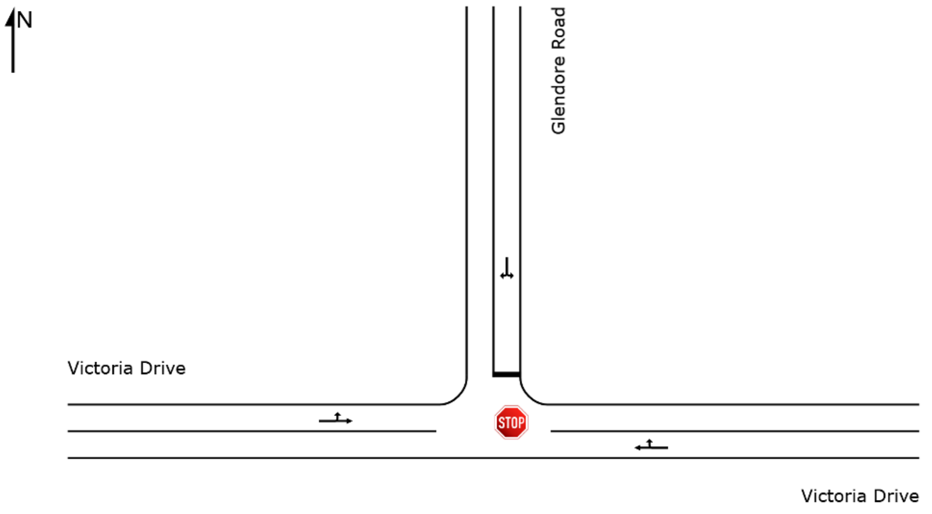
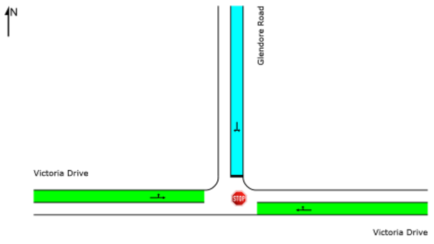
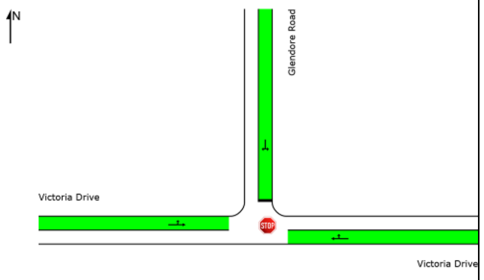
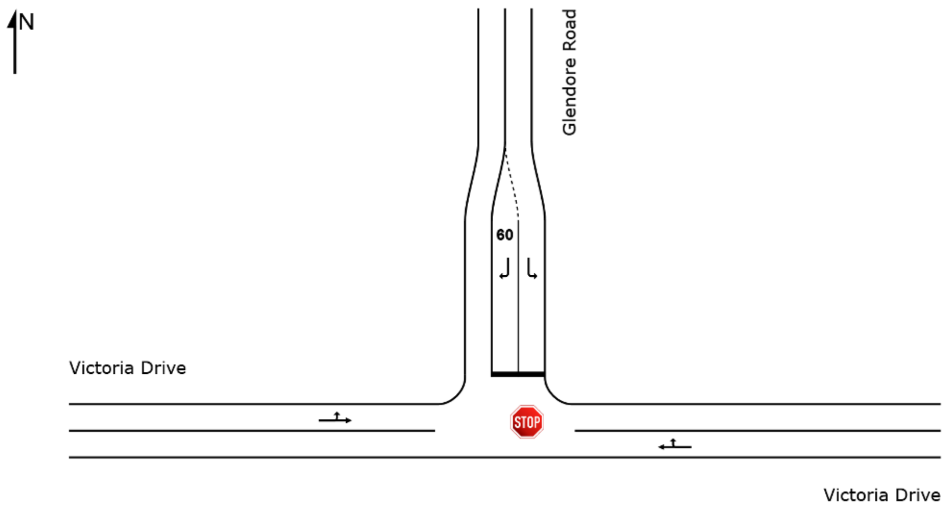
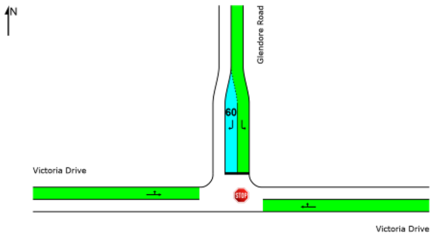
<table>
<tr><td>Intersection:</td><td colspan="2">Victoria Drive/Glendore Road</td><td rowspan="2">Peak</td><td colspan="2">Design year</td></tr>
<tr><td colspan="3">Without improvements</td><td>2022</td><td>2027</td></tr>
<tr><td colspan="3" rowspan="4">
</td><td>AM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="3">PM (without development trips)</td><td rowspan="3">NA</td><td rowspan="3">NA</td></tr>
<tr></tr>
<tr></tr>
<tr><td colspan="3">Design year</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">2022</td><td>2027</td><td></td><td></td><td></td></tr>
<tr><td>AM (with development trips)</td><td>NA</td><td>
</td><td>PM (with development trips)</td><td>NA</td><td>
</td></tr>
</table>

Figure B.3.B: Level of Service (LOS)

Intersection:	Victoria Drive/Glendore Road
With improvements	



Peak	Design year 2022	Design year 2027
AM (without development trips)	NA	NA
PM (without development trips)	NA	NA
PM (with development trips)	NA	

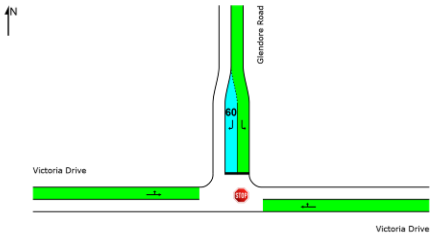
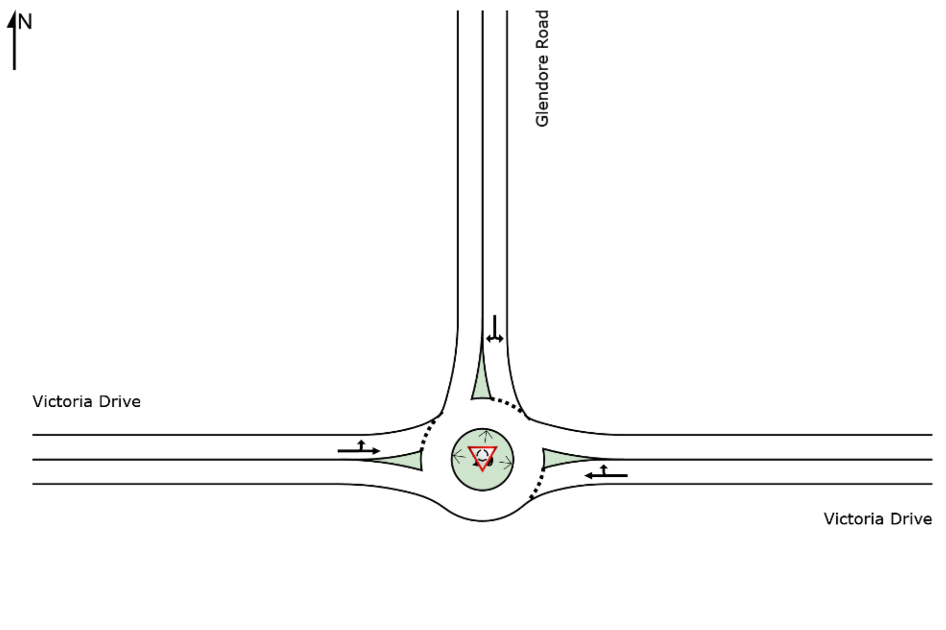
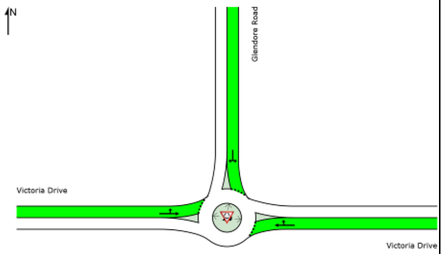
	Design year 2022	Design year 2027
AM (with development trips)	NA	

Figure B.3.C: Level of Service (LOS)

Intersection:	Victoria Drive/Glendore Road
With improvements	



Peak	Design year 2022	Design year 2027
AM (with development trips)	NA	

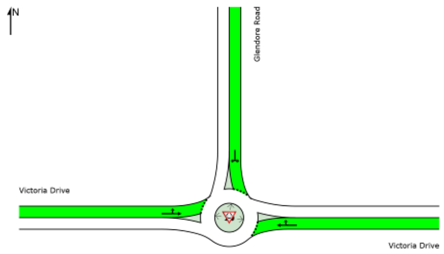
Peak	Design year 2022	Design year 2027
AM (without development trips)	NA	NA
PM (without development trips)	NA	NA
PM (with development trips)	NA	

Figure B.4.A: Level of Service (LOS)

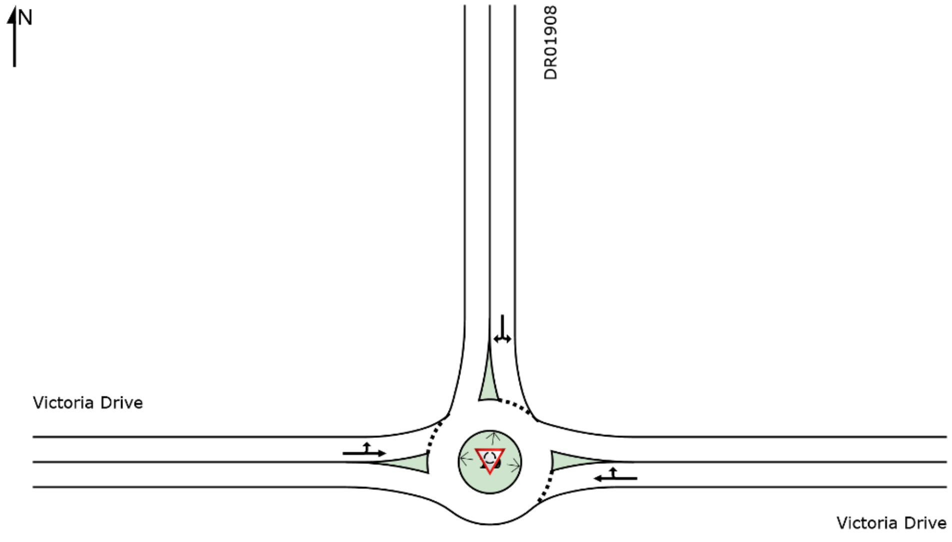
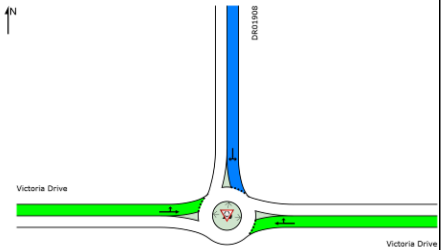
<table>
<tr><td>Intersection:</td><td colspan="2">Victoria Drive/DR01908</td><td rowspan="2">Peak</td><td colspan="2">Design year</td></tr>
<tr><td colspan="3">Without improvements</td><td>2022</td><td>2027</td></tr>
<tr><td colspan="3" rowspan="2">
</td><td>AM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td>PM (without development trips)</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="3">Design year</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">2022</td><td>2027</td><td></td><td></td><td></td></tr>
<tr><td>AM (with development trips)</td><td>NA</td><td>
</td><td>PM (with development trips)</td><td>NA</td><td>
</td></tr>
</table>

Figure B.5.A: Level of Service (LOS)

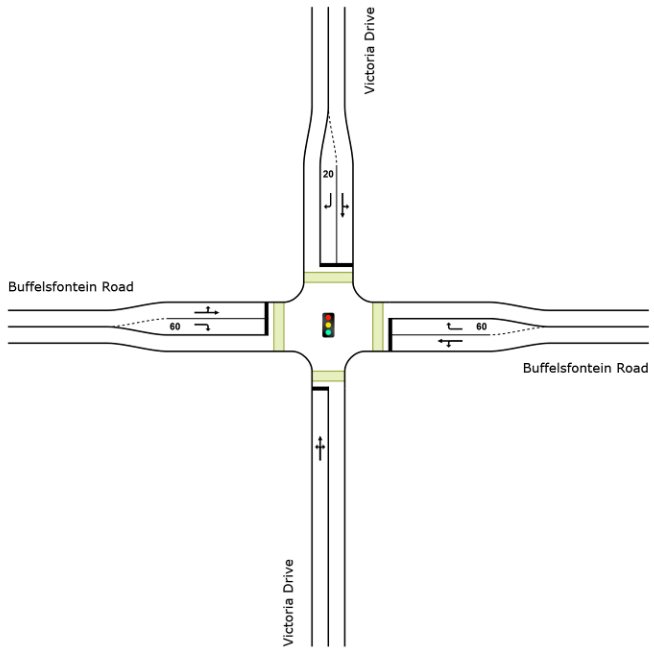
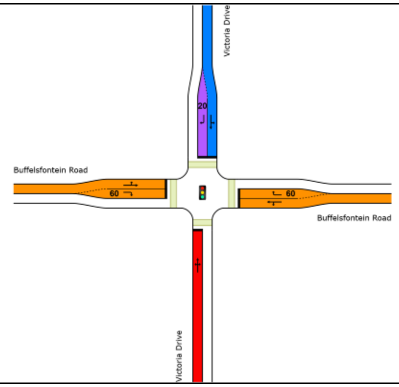
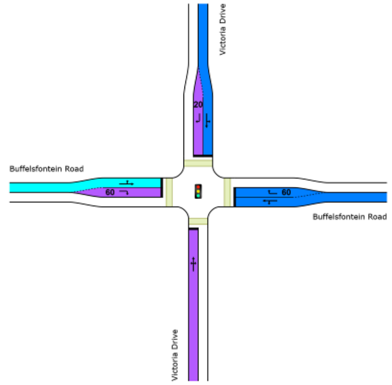
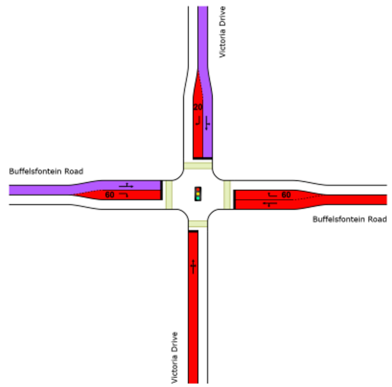
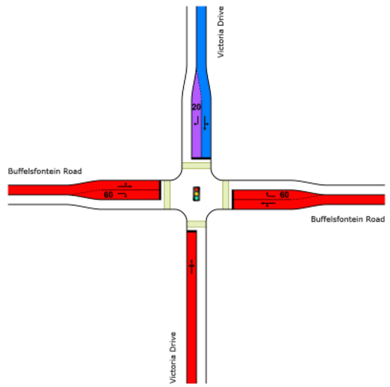
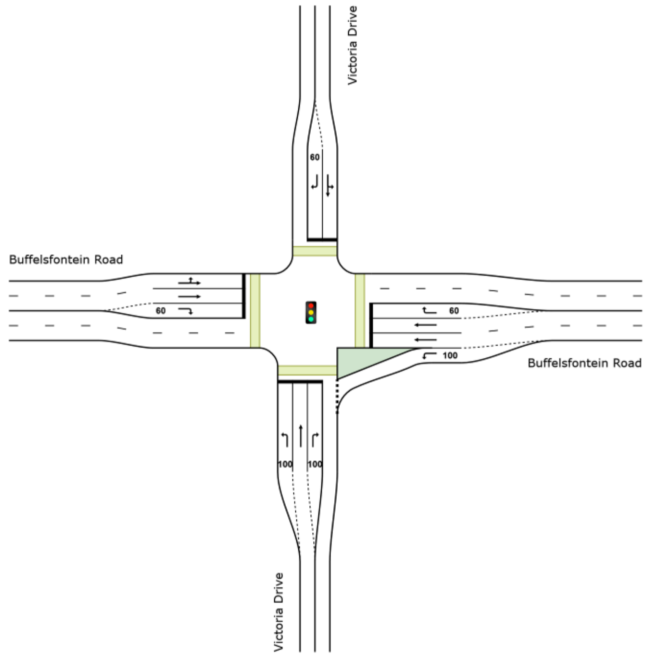
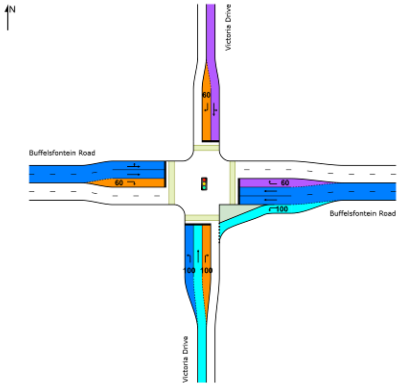
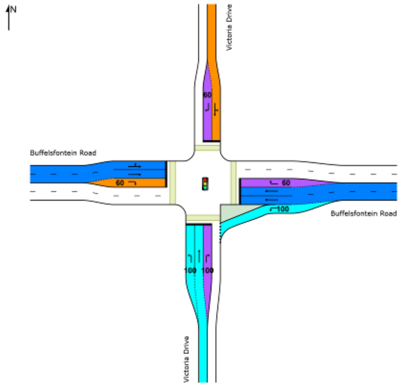
<table>
<tr><td colspan="2">Intersection:</td><td colspan="2">Buffelsfontein Road/Victoria Drive</td><td rowspan="2">Peak</td><td colspan="2">Design year</td></tr>
<tr><td colspan="4">Without improvements</td><td>2022</td><td>2027</td></tr>
<tr><td colspan="4" rowspan="2">
</td><td>AM (without development trips)</td><td>
</td><td>NA</td></tr>
<tr><td>PM (without development trips)</td><td>
</td><td>NA</td></tr>
<tr><td colspan="4">Design year</td><td rowspan="3">PM (with development trips)</td><td rowspan="3">NA</td><td rowspan="3">
</td></tr>
<tr><td colspan="3">2022</td><td>2027</td></tr>
<tr><td>AM (with development trips)</td><td colspan="2">NA</td><td>
</td></tr>
</table>

Figure B.5.B: Level of Service (LOS)

Intersection:	**Buffelsfontein Road/Victoria Drive**
With improvements – additional lanes and timing changes	



	Design year	
	2022	**2027**
AM (with development trips)	**NA**	

Peak	**Design year**	
	2022	**2027**
AM (without development trips)	**NA**	**NA**
PM (without development trips)	**NA**	**NA**
PM (with development trips)	**NA**	

APPENDIX C

LAND USE, TRIP GENERATION, PARKING AND LOADING

Table C.1: Land use, trip generation, parking and loading

Land use	Size*	Size units	Units	Trip rates: AM peak	Trip rates: PM peak	Split (%) AM peak: In	Split (%) AM peak: Out	Split (%) PM peak: In	Split (%) PM peak: Out	Split (%) Saturday: In	Split (%) Saturday: Out	Percentage reduction for developments in areas with, Pc**: Mixed use developments, Pm	Low vehicle Ownership, Pv	Public transport nodes or corridors, Pt	Trip factor***	Trips AM peak: In	Trips AM peak: Out	Trips PM peak: In	Trips PM peak: Out	Trips Saturday: In	Trips Saturday: Out
Service Industry	550	100	m² GLA	0,90	0,90	75	25	25	75			5%	20%	15%	0,65	2	1	1	2	0	0
Mini-Warehousing	1920	100	m² GLA	0,15	0,25	60	40	50	50	50	50	5%	20%	15%	0,65	1	1	2	2	2	2
Apartments and Flats	3173	1	D/Unit	0,65	0,65	25	75	70	30	50	50	15%	30%	15%	0,51	261	782	730	313	281	281
Pre-School (Day Care Centre)	60	1	Student	1,00	0,80	50	50	50	50			5%	50%	15%	0,40	12	12	10	10	0	0
Medical Clinic	650	100	m² GLA	6,00	6,00	60	40	40	60	45	55	0%	50%	15%	0,43	10	7	7	10	10	12
Offices	300	100	m² GLA	2,10	2,10	85	15	20	80	55	45	20%	20%	15%	0,54	3	1	1	3	0	0
Shopping Centre*	3480	100	m² GLA	2,41	*13,63*	65	35	50	50	50	50	10%	30%	15%	0,54	29	16	127	127	168	168

Trip generation	AM peak: In	AM peak: Out	PM peak: In	PM peak: Out	Saturday: In	Saturday: Out
Total	1137		1343		924	
Total split	318	819	877	466	461	463
Percentage split (%)	28	72	65	35	50	50
Split existing trips	0	0	0	0	0	0
Total new trips	1131		1310		881	
Split new trips	315	817	860	450	439	441

Land use	Size*	Size units	Units	Parking per unit/ GLA	Parking required in terms of Guidelines (Reference Eight)	Parking required in terms of Guidelines (without reductions based on departure)	Parking bay reduction for: Proximity to public transport (0%)	On-site taxi bays (10)	On-site bus bays (0)	On-street taxi bays (2)	On-street bus bays (0)	On-site bicycle bays (0)	Hourly/daily distribution (0)	Other (specify) (0%)	Total recommended	Loading bays: Light	Medium	Heavy	Total
Service Industry	550	100	m² GLA	1	6	6										0	1	0	1
Mini-Warehousing	1920	100	m² GLA	1	19	19										0	0	0	0
Apartments and Flats	3173	1	D/Unit	****	5471	4519													
Pre-School (Day Care Centre)	*5*	1	Teacher	1	5	5													
Medical Clinic	650	100	m² GLA	6	39	39													
Offices	300	100	m² GLA	2,5	8	8										1	0	0	1
Shopping Centre*	3480	100	m² GLA	6	209	209										2	3	0	5
Total parking/loading required in terms of guidelines					**5756**	**4804**										3	4	0	7
Parking reductions permitted as per guidelines/standards							**0**	**60**	**0**	**12**	**0**	**0**	**0**	**0**	**72**				
Maximum reduction permitted based on area and car ownership =							10 %, i.e.								480				
Total parking/loading required in terms of guidelines (including reductions)															**4732**				
Parking bays required including reductions and bays provided to achieve reductions								**10**	**0**	**2**	**0**	**0**	**0**		**4744**	**3**	**4**	**0**	**7**
				Percentage of rate (Reference Eight)	Percentage of reduced rate (as per departure)	Standard on-site parking bays	Disabled parking bays	On-site taxi bays	On-site bus bays	On-street taxi bays	On-street bus bays	On-site bicycle bays	Standard on-street parking bays	Other (specify)	Total	Light	Medium	Heavy	Total
Actual parking/loading bays provided				97%	116%	**5522**	**54**	**10**	**0**	**2**	**0**	**0**	**0**	**0**	**5588**	**3**	**4**	**0**	**7**

Note * Size adjustment factor already applied.

** Values in *italics* are estimated.

***Trip factor includes accumulative reduction Pc = 1-(1-Pm/100).(1-Pv/100).(1-Pt/100)

**** parking based on Departure application, i.e.

1 and 2 habitable rooms = 1 bay plus 0,2 for visitors

3 habitable rooms = 1,25 bay plus 0,2 for visitors
4 or more habitable rooms = 1,5 bay plus 0,2 for visitors

APPENDIX D

TRAFFIC VOLUMES

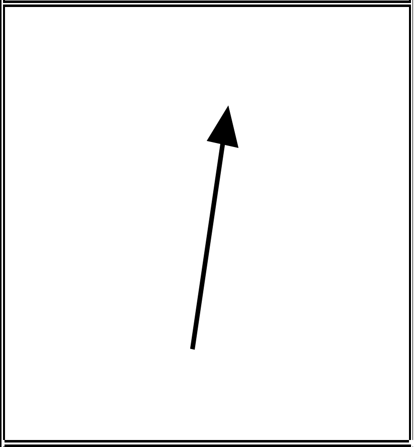
Project :	TIA for Arlington Social Housing		Date :	21/07/2022
Intersection :	Buffelsfontein Rd and Genadendal Rd	No.: 1	Time period:	6:00- 18:00
			Day :	Thursday

All vehicles

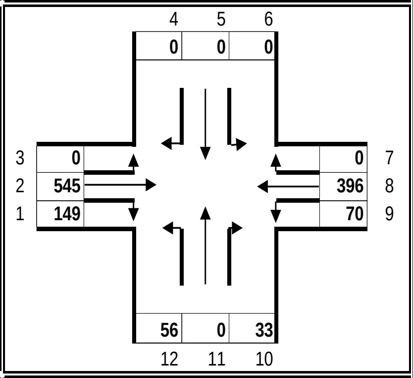
ENDING TIME	Buffelsfontein Rd Eastbound				Genadendal Rd Southbound				Buffelsfontein Rd Westbound				Genadendal Rd Northbound				INTER-SECTION	
	1	2	3		4	5	6		7	8	9		10	11	12			
	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Total	Hour
06:15	18	145		163				0		27	7	34	10		4	14	211	211
06:30	19	150		169				0		29	6	35	13		6	19	223	434
06:45	22	152		174				0		34	7	41	22		5	27	242	676
07:00	22	214		236				0		62	15	77	7		5	12	325	1001
07:15	35	184		219				0		67	27	94	10		12	22	335	1125
07:30	54	138		192				0		100	14	114	11		12	23	329	1231
07:45	39	109		148				0		102	4	106	4		16	20	274	1263
08:00	21	114		135				0		127	25	152	8		16	24	311	1249
08:15	6	123		129				0		128	27	155	12		10	22	306	1220
08:30	4	120		124				0		93	20	113	14		10	24	261	1152
08:45	7	99		106				0		106	25	131	15		8	23	260	1138
09:00	4	109		113				0		91	21	112	16		9	25	250	1077
09:15	1	119		120				0		76	17	93	18		10	28	241	1012
09:30	16	128		144				0		71	18	89	14		13	27	260	1011
09:45	3	111		114				0		91	20	111	14		8	22	247	998
10:00	13	109		122				0		86	22	108	13		9	22	252	1000
10:15	9	99		108				0		94	26	120	17		12	29	257	1016
10:30	10	125		135				0		96	22	118	24		16	40	293	1049
10:45	9	107		116				0		109	21	130	15		3	18	264	1066
11:00	7	119		126				0		102	26	128	14		18	32	286	1100
11:15	10	107		117				0		109	29	138	22		13	35	290	1133
11:30	14	102		116				0		106	31	137	15		12	27	280	1120
11:45	15	106		121				0		115	32	147	17		16	33	301	1157
12:00	17	110		127				0		124	32	156	19		19	38	321	1192
12:15	15	125		140				0		117	35	152	13		15	28	320	320
12:30	25	121		146				0		129	38	167	9		12	21	334	654
12:45	21	115		136				0		130	47	177	19		19	38	351	1005
13:00	16	131		147				0		111	33	144	19		21	40	331	1336
13:15	11	109		120				0		134	40	174	10		27	37	331	1347
13:30	14	83		97				0		167	38	205	12		23	35	337	1350
13:45	17	118		135				0		160	39	199	18		20	38	372	1371
14:00	18	120		138				0		158	38	196	20		25	45	379	1419
14:15	20	187		207				0		150	40	190	21		30	51	448	1536
14:30	16	89		105				0		164	28	192	11		26	37	334	1533
14:45	20	102		122				0		175	38	213	14		18	32	367	1528
15:00	24	114		138				0		186	48	234	17		10	27	399	1548
15:15	9	111		120				0		180	59	239	9		28	37	396	1496
15:30	6	98		104				0		116	27	143	12		12	24	271	1433
15:45	13	85		98				0		136	53	189	15		23	38	325	1391
16:00	7	111		118				0		126	41	167	12		13	25	310	1302
16:15	14	103		117				0		135	32	167	12		16	28	312	1218
16:30	20	91		111				0		120	30	150	8		27	35	296	1243
16:45	24	94		118				0		115	27	142	4		26	30	290	1208
17:00	14	89		103				0		130	26	156	10		44	54	313	1211
17:15	22	104		126				0		125	20	145	6		26	32	303	1202
17:30	17	78		95				0		129	29	158	6		30	36	289	1195
17:45	14	84		98				0		148	35	183	6		18	24	305	1210
18:00	13	80		93				0		145	32	177	5		17	22	292	1189
AM Peak (vehicles per hour)																		
Peak hour	149	545	0	694	0	0	0	0	0	396	70	466	33	0	56	89	1249	
PM Peak (vehicles per hour)																		
Peak hour	80	492	0	572	0	0	0	0	0	675	154	829	63	0	84	147	1548	
12 hour (06:00 to 18:00) total vehicles																		
Totals	765	5541	0	6306	0	0	0	0	0	5531	1367	6898	632	0	788	1420	14624	

EMONTI CONSULTING Engineers cc

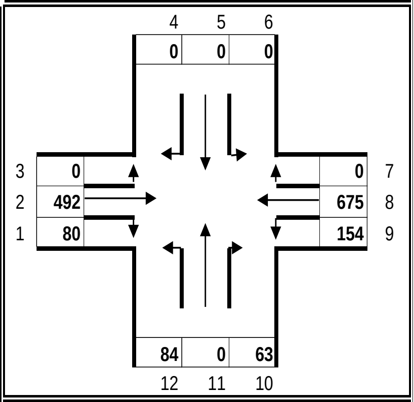
ORIENTATION



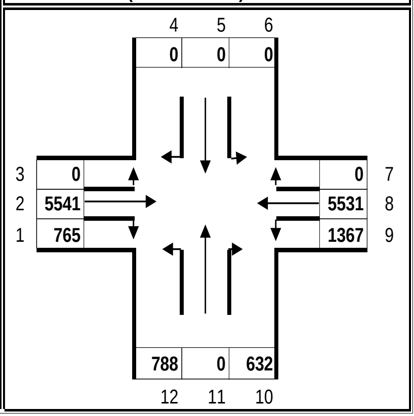
AM Peak (vehicles per hour)



PM Peak (vehicles per hour)



12 hour (06:00 to 18:00) total vehicles



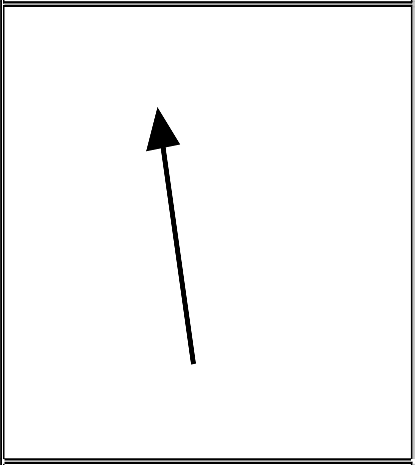
Project : TIA for Arlington Social Housing
Intersection : Buffelsfontein Rd and Victoria Drive
No.: 2
Date : 21/07/2022
Time period: 6:00- 18:00
Day : Thursday

All vehicles

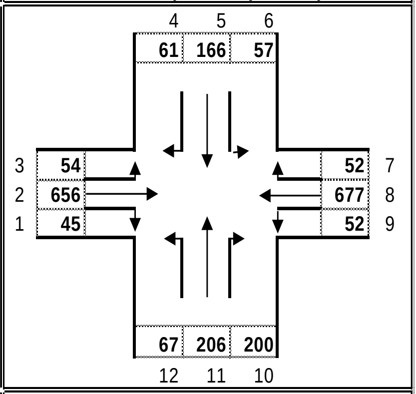
EMONTI CONSULTING Engineers cc

ENDING TIME	Buffelsfontein Rd Eastbound				Victoria Drive Southbound				Buffelsfontein Rd Westbound				Victoria Drive Northbound				INTER-SECTION	
	1	2	3		4	5	6		7	8	9		10	11	12			
	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Total	Hour
06:15	3	87	7	97	6	8	2	16	0	34	3	37	6	12	11	29	179	179
06:30	4	106	6	116	11	8	3	22	3	99	6	108	24	19	9	52	298	477
06:45	4	96	4	104	16	23	8	47	2	133	5	140	38	31	10	79	370	847
07:00	4	176	15	195	22	27	6	55	5	215	12	232	36	33	12	81	563	1410
07:15	4	134	8	146	14	21	12	47	5	146	5	156	32	42	12	116	465	1733
07:30	13	181	19	213	21	45	18	84	21	226	15	262	57	59	16	144	703	2131
07:45	7	159	11	177	15	42	15	72	9	158	12	179	49	51	17	129	557	2308
08:00	8	157	14	179	16	41	12	69	10	124	10	144	48	51	19	132	524	2249
08:15	17	159	10	186	9	38	12	59	12	169	15	196	46	45	15	108	549	2333
08:30	10	96	8	114	15	24	9	48	12	102	18	132	34	25	14	63	357	1987
08:45	4	97	4	105	4	5	6	15	3	94	9	106	24	16	15	55	281	1701
09:00	5	95	8	108	5	9	6	20	4	83	9	96	26	17	15	58	282	1449
09:15	3	94	11	108	6	12	6	24	5	72	9	86	17	10	11	38	256	1149
09:30	3	33	3	39	1	4	3	8	3	52	6	61	11	6	10	27	135	954
09:45	5	52	5	62	7	4	3	14	1	55	11	67	5	6	3	14	157	830
10:00	6	72	4	82	10	15	3	28	7	78	16	101	15	12	5	32	243	791
10:15	7	113	9	129	9	5	3	17	8	140	25	173	19	15	5	39	358	893
10:30	9	80	2	91	9	6	1	16	3	71	13	87	21	12	7	40	234	992
10:45	3	107	4	114	7	15	5	27	10	125	18	153	21	10	5	36	330	1165
11:00	12	128	4	144	10	14	3	27	3	99	15	117	22	7	7	36	324	1246
11:15	3	119	3	125	6	20	14	40	3	144	22	169	27	14	13	54	388	1276
11:30	7	113	5	125	8	15	6	29	5	150	24	179	18	11	13	42	375	1417
11:45	6	102	7	115	11	14	5	30	7	143	19	169	19	12	11	42	356	1443
12:00	4	90	8	102	14	12	4	30	9	135	14	158	20	13	9	42	332	1451
12:15	4	60	9	73	0	7	2	9	6	67	15	88	22	9	5	36	206	206
12:30	7	107	12	126	11	16	1	28	1	122	23	146	19	13	6	38	338	544
12:45	6	149	10	165	15	12	7	34	1	153	22	176	24	13	3	40	415	959
13:00	10	210	10	230	14	9	4	27	7	204	23	234	24	16	9	49	540	1499
13:15	6	153	6	165	23	18	3	44	10	156	19	185	21	13	4	38	432	1725
13:30	4	175	16	195	15	17	4	36	13	197	19	229	24	16	9	49	509	1896
13:45	6	85	3	94	12	6	0	18	5	130	6	141	23	17	7	47	300	1781
14:00	8	79	8	95	14	6	1	21	3	108	17	128	17	15	14	46	290	1531
14:15	10	73	12	95	16	6	2	24	0	89	28	117	11	12	21	44	280	1379
14:30	8	44	5	57	12	5	1	18	3	51	7	61	14	4	3	21	157	1027
14:45	9	50	7	66	11	5	2	18	2	52	9	63	14	10	4	28	175	902
15:00	10	55	9	74	9	4	3	16	1	52	10	63	13	16	5	34	187	799
15:15	10	63	9	82	7	6	4	17	4	50	14	68	10	6	4	20	187	706
15:30	15	55	6	76	7	9	3	19	4	83	16	103	14	12	9	35	233	782
15:45	16	93	3	112	6	14	2	22	5	81	11	97	21	16	2	39	270	877
16:00	11	71	1	83	14	8	4	26	5	89	17	111	13	6	2	21	241	931
16:15	6	80	5	91	11	17	2	30	6	87	13	106	14	12	10	36	263	1007
16:30	16	113	3	132	17	24	6	47	6	107	21	134	10	15	10	35	348	1122
16:45	15	94	8	117	16	31	3	50	6	132	17	155	13	15	12	40	362	1214
17:00	28	139	4	171	26	37	3	66	5	211	38	254	21	26	12	59	550	1523
17:15	14	162	5	181	40	32	5	77	4	180	16	200	26	27	16	69	527	1787
17:30	9	176	9	194	40	42	20	102	12	181	16	209	28	27	17	72	577	2016
17:45	21	111	10	142	18	48	47	113	37	140	15	192	29	27	16	72	519	2173
18:00	3	102	1	106	15	34	1	50	7	114	11	132	21	26	15	62	350	1973
AM Peak (vehicles per hour)																		
Peak hour	45	656	54	755	61	166	57	284	52	677	52	781	200	206	67	513	2333	
PM Peak (vehicles per hour)																		
Peak hour	72	588	28	688	124	159	75	358	58	712	85	855	104	107	61	272	2173	
12 hour (06:00 to 18:00) total vehicles																		
Totals	403	5145	350	5898	621	840	295	1756	303	5683	714	6700	1081	898	479	2524	16878	

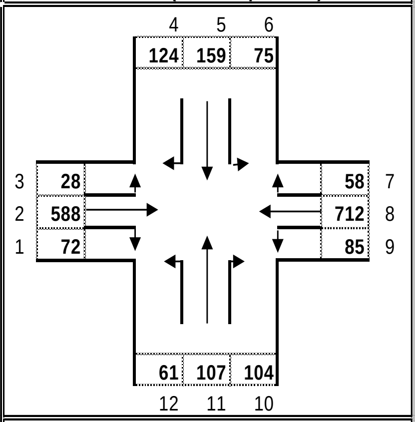
ORIENTATION



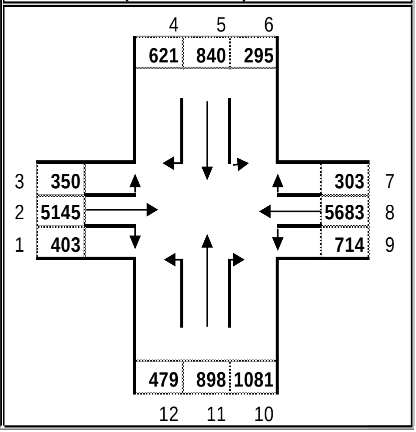
AM Peak (vehicles per hour)



PM Peak (vehicles per hour)



12 hour (06:00 to 18:00) total vehicles



Project : TIA for Arlington Social Housing
Intersection : Victoria Drive and Glendore Road No.: 3
Date : 21/07/2022
Time period: 6:00- 18:00
Day : Thursday

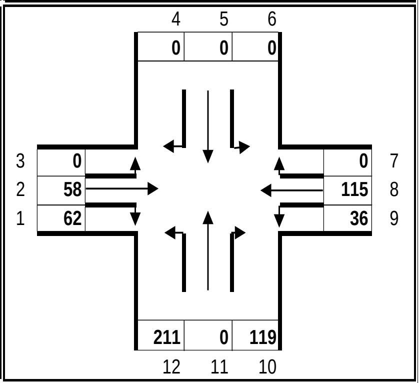
All vehicles

EMONTI CONSULTING Engineers cc

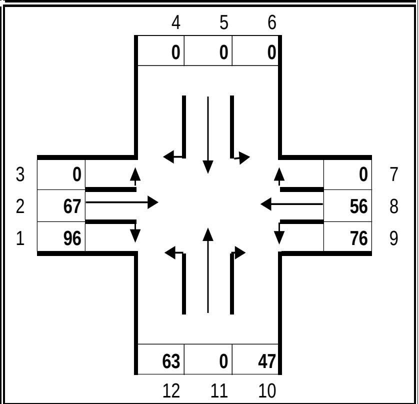
ENDING TIME	Victoria Drive Westbound				Glendore Road Northbound				Victoria Drive Eastbound				Glendore Road Southbound				INTER-SECTION	
	1	2	3		4	5	6		7	8	9		10	11	12			
	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Total	Hour
06:15	5	2		7				0		15	2	17	9		22	31	55	55
06:30	8	4		12				0		18	3	21	10		25	35	68	123
06:45	9	5		14				0		19	3	22	12		30	42	78	201
07:00	11	6		17				0		22	6	28	14		35	49	94	295
07:15	16	10		26				0		34	5	39	45		68	113	178	418
07:30	14	14		28				0		34	1	35	28		55	83	146	496
07:45	18	19		37				0		28	19	47	32		55	87	171	589
08:00	14	15		29				0		19	11	30	14		33	47	106	601
08:15	14	17		31				0		20	8	28	9		17	26	85	508
08:30	2	6		8				0		14	5	19	15		10	25	52	414
08:45	11	13		24				0		15	8	23	13		16	29	76	319
09:00	8	8		16				0		11	7	18	9		9	18	52	265
09:15	4	3		7				0		7	5	12	4		1	5	24	204
09:30	4	6		10				0		6	10	16	11		10	21	47	199
09:45	7	3		10				0		9	5	14	3		5	8	32	155
10:00	8	8		16				0		16	7	23	10		14	24	63	166
10:15	9	7		16				0		11	9	20	8		8	16	52	194
10:30	2	3		5				0		3	2	5	3		2	5	15	162
10:45	5	4		9				0		3	3	6	6		7	13	28	158
11:00	5	5		10				0		3	6	9	4		6	10	29	124
11:15	7	5		12				0		8	5	13	5		3	8	33	105
11:30	5	10		15				0		7	4	11	11		4	15	41	131
11:45	8	10		18				0		12	12	24	12		8	20	62	165
12:00	10	10		20				0		17	19	36	12		12	24	80	216
12:15	17	15		32				0		11	9	20	10		15	25	77	77
12:30	2	6		8				0		5	11	16	11		5	16	40	117
12:45	7	10		17				0		15	11	26	17		4	21	64	181
13:00	10	11		21				0		6	11	17	13		8	21	59	240
13:15	13	4		17				0		12	7	19	12		5	17	53	216
13:30	6	10		16				0		10	11	21	11		9	20	57	233
13:45	8	8		16				0		14	10	24	11		8	19	59	228
14:00	1	9		10				0		15	9	24	8		10	18	52	221
14:15	11	10		21				0		17	9	26	7		12	19	66	234
14:30	16	21		37				0		12	10	22	15		13	28	87	264
14:45	12	14		26				0		10	13	23	15		12	27	76	281
15:00	7	7		14				0		7	16	23	15		11	26	63	292
15:15	9	6		15				0		8	11	19	8		11	19	53	279
15:30	7	9		16				0		11	11	22	4		14	18	56	248
15:45	16	15		31				0		11	11	22	8		12	20	73	245
16:00	16	15		31				0		11	12	23	13		11	24	78	260
16:15	14	5		19				0		9	16	25	14		6	20	64	271
16:30	19	9		28				0		6	12	18	16		17	33	79	294
16:45	28	23		51				0		14	26	40	17		16	33	124	345
17:00	24	18		42				0		13	20	33	9		13	22	97	364
17:15	22	14		36				0		14	15	29	17		16	33	98	398
17:30	22	12		34				0		15	15	30	4		18	22	86	405
17:45	16	8		24				0		7	12	19	13		18	31	74	355
18:00	15	8		23				0		8	11	19	12		17	29	71	329
AM Peak (vehicles per hour)																		
Peak hour	62	58	0	120	0	0	0	0	0	115	36	151	119	0	211	330	601	
PM Peak (vehicles per hour)																		
Peak hour	96	67	0	163	0	0	0	0	0	56	76	132	47	0	63	110	405	
12 hour (06:00 to 18:00) total vehicles																		
Totals	522	460	0	982	0	0	0	0	0	612	464	1076	579	0	736	1315	3373	

ORIENTATION

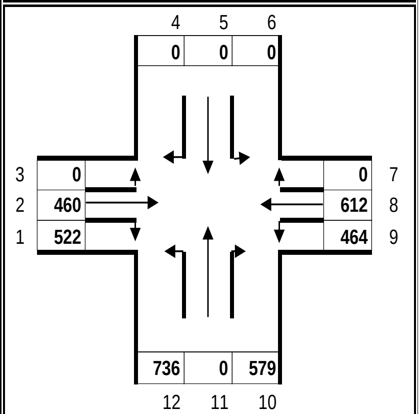
AM Peak (vehicles per hour)



PM Peak (vehicles per hour)



12 hour (06:00 to 18:00) total vehicles



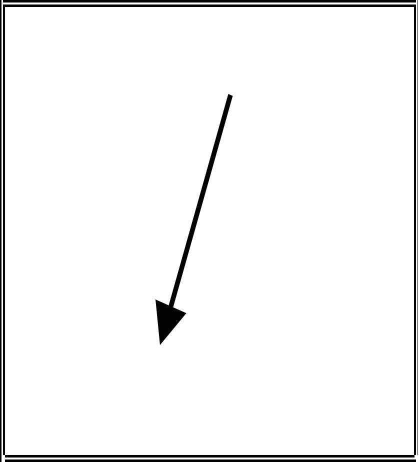
Project :	TIA for Arlington Social Housing	Date :	21/07/2022
Intersection :	Victoria Drive and DR01908 No.: 4	Time period:	6:00- 18:00
		Day :	Thursday

All vehicles

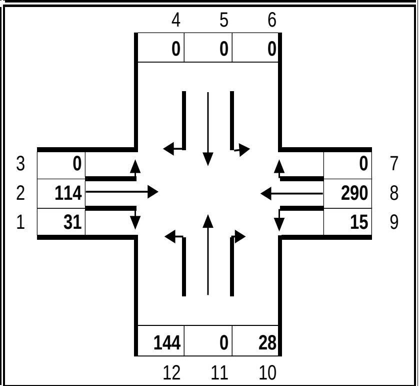
EMONTI CONSULTING Engineers cc

ENDING TIME	Victoria Drive Westbound				DR01908 Northbound				Victoria Drive Eastbound				DR01908 Southbound				INTER-SECTION	
	1	2	3		4	5	6		7	8	9		10	11	12			
	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Right	Through	Left	Total	Total	Hour
06:15	7	9		16				0		62	4	66	5		29	34	116	116
06:30	9	12		21				0		68	3	71	6		32	38	130	246
06:45	10	13		23				0		71	4	75	5		38	43	141	387
07:00	11	16		27				0		76	5	81	7		40	47	155	542
07:15	10	37		47				0		72	5	77	10		51	61	185	611
07:30	6	18		24				0		70	3	73	5		29	34	131	612
07:45	4	43		47				0		72	2	74	6		24	30	151	622
08:00	10	17		27				0		42	2	44	6		9	15	86	553
08:15	3	14		17				0		20	4	24	2		9	11	52	420
08:30	5	15		20				0		26	5	31	0		16	16	67	356
08:45	6	14		20				0		20	3	23	4		2	6	49	254
09:00	6	14		20				0		20	4	24	5		7	12	56	224
09:15	5	13		18				0		19	4	23	5		12	17	58	230
09:30	2	7		9				0		11	2	13	0		2	2	24	187
09:45	5	7		12				0		24	1	25	7		9	16	53	191
10:00	4	14		18				0		17	5	22	2		10	12	52	187
10:15	1	8		9				0		8	1	9	1		4	5	23	152
10:30	5	13		18				0		17	1	18	3		5	8	44	172
10:45	10	9		19				0		11	2	13	2		5	7	39	158
11:00	10	15		25				0		11	2	13	7		5	12	50	156
11:15	9	13		22				0		18	3	21	4		7	11	54	187
11:30	0	12		12				0		14	3	17	1		6	7	36	179
11:45	7	19		26				0		24	4	28	2		13	15	69	209
12:00	14	25		39				0		34	5	39	3		19	22	100	259
12:15	8	19		27				0		14	3	17	2		8	10	54	54
12:30	5	16		21				0		16	1	17	0		4	4	42	96
12:45	4	17		21				0		16	1	17	1		7	8	46	142
13:00	5	16		21				0		14	3	17	4		9	13	51	193
13:15	7	14		21				0		15	2	17	2		10	12	50	189
13:30	3	17		20				0		16	6	22	0		10	10	52	199
13:45	3	18		21				0		15	8	23	1		8	9	53	206
14:00	2	20		22				0		14	9	23	2		4	6	51	206
14:15	4	23		27				0		17	9	26	2		4	6	59	215
14:30	13	30		43				0		17	5	22	5		6	11	76	239
14:45	17	29		46				0		18	6	24	5		13	18	88	274
15:00	21	27		48				0		18	7	25	5		19	24	97	320
15:15	10	9		19				0		18	2	20	1		6	7	46	307
15:30	14	11		25				0		17	9	26	5		13	18	69	300
15:45	14	27		41				0		15	8	23	7		13	20	84	296
16:00	4	20		24				0		17	2	19	1		6	7	50	249
16:15	11	14		25				0		14	2	16	3		3	6	47	250
16:30	15	25		40				0		18	9	27	6		10	16	83	264
16:45	20	40		60				0		26	3	29	4		5	9	98	278
17:00	24	45		69				0		18	7	25	4		9	13	107	335
17:15	20	23		43				0		21	8	29	7		11	18	90	378
17:30	22	29		51				0		17	15	32	6		15	21	104	399
17:45	19	18		37				0		9	9	18	6		14	20	75	376
18:00	16	17		33				0		8	7	15	5		12	17	65	334
AM Peak (vehicles per hour)																		
Peak hour	31	114	0	145	0	0	0	0	0	290	15	305	28	0	144	172	622	
PM Peak (vehicles per hour)																		
Peak hour	86	137	0	223	0	0	0	0	0	82	33	115	21	0	40	61	399	
12 hour (06:00 to 18:00) total vehicles																		
Totals	440	901	0	1341	0	0	0	0	0	1215	218	1433	182	0	602	784	3558	

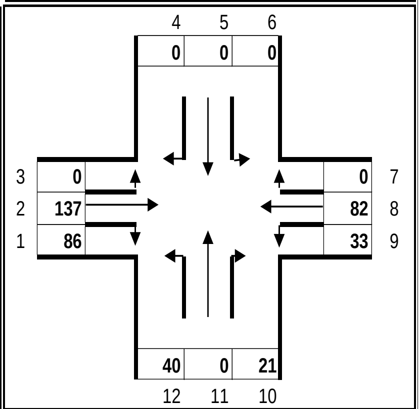
ORIENTATION



AM Peak (vehicles per hour)



PM Peak (vehicles per hour)



12 hour (06:00 to 18:00) total vehicles