

# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>3</b>
	1.1 Aim of the Study	3
	1.2 Background	3
	1.3 Study Area	3
	1.4 Proposed Development	3
	1.5 Scope of Analysis	5
	1.5.1 Period for Analysis	5
	1.5.2 Warrants for a Traffic Impact Study	5
	1.5.3 Extent of Analysis	5
	1.5.4 Assessment Years	5
	1.6 Available Information	5
	1.6.1 Traffic Counts	5
<b>2</b>	<b>BACKGROUND INFORMATION</b>	<b>6</b>
	2.1 Existing Road Network	6
	2.2 Existing Land Use	6
	2.3 Road Planning	6
	2.4 Other Features	6
<b>3</b>	<b>TRIP GENERATION</b>	<b>8</b>
	3.1 Trip Generation Rates	8
	3.2 Trips Generated	10
<b>4</b>	<b>TRIP DISTRIBUTION</b>	<b>14</b>
<b>5</b>	<b>TRIP ASSIGNMENT</b>	<b>15</b>
<b>6</b>	<b>CAPACITY ANALYSIS</b>	<b>16</b>
	6.1 Roodepan Road / Barkly Road Intersection	16
	6.2 New Access on the N12	17
	6.3 Roodepan Road / Eagle Street Intersection	17
	6.4 Access to the High Density Residential Area	18
	6.5 Northern Access on Roodepan Road	18
	6.6 Access to Shopping Centre	18
	6.7 Summary	19

6.7.1	To Accommodate Existing Traffic	19
6.7.2	To Accommodate Already Approved Developments	19
6.7.3	To Accommodate the Development under Consideration	19
<b>7</b>	<b>SITE DEVELOPMENT PLAN</b>	<b>24</b>
7.1	General Layout	24
7.2	Access	24
7.3	Layout Characteristics	25
<b>8</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	<b>28</b>
<b>9.</b>	<b>REFERENCES</b>	<b>29</b>
<b>10.</b>	<b>APPENDIX A – INTERSECTIONS ANALYSED</b>	<b>30</b>

# **1 INTRODUCTION**

---

## **1.1 Aim of the Study**

---

The aim of this study is to determine the traffic impact of an intended township establishment (Northgate Kimberley) on Portions 16, 42, 62, 30, 69 and 32 of the Farm Roodepan No 70 of the Sol Plaatje Local Municipality.

## **1.2 Background**

---

The development area is currently mostly vacant and this document investigates the traffic impact in support of the township establishment.

The developer is:

Group 1 (Pty) Ltd  
P/A MVD Kalahari  
P.O. Box 580  
Kimberley  
8300

## **1.3 Study Area**

---

The location of the development is shown in Figure 1.1 as well as the attached layout plan. The development is situated to the northwest of the Kamfersdam, between the Roodepan Road and the N12.

## **1.4 Proposed Development**

---

The development will consist of erven with a road network.

The Land Use Schedule is shown below. Not all of the land uses will generate traffic during the peak periods, or have an impact on the external network. This aspect is further dealt with in Chapter 3.

## LAND USE SCHEDULE

LAND USE	ERVEN	REMARKS
<u>Single Residential</u>		
? ± 700 m <sup>2</sup>	287	Higher income
? ± 380 m <sup>2</sup>	1615	Middle income
? ± 250 m <sup>2</sup>	1787	Middle to lower income
<u>General Residential</u>		
? High density	14	± 2400 units
? Town houses	5	± 80 units
<u>Business</u>		
? Garage	2	1 Situated at regional centre and 1 situated at neighbourhood
? Regional centre	1	GLA ± 4,5 ha
? Neighbourhood	2	GLA ± 0,7 ha
<u>Local Authority</u>		
? Bus and taxi	1	
? Community facility	1	
? Servitudes	3	
<u>Educational</u>		
? Secondary	2	
? Primary	4	
? Crèche	2	
<u>Open Space</u>		
? Parks	27	
? Sport	2	
<u>Commercial</u>	82	± 2500 m <sup>2</sup> /site
<u>Churches</u>	5	
<u>Other</u>		
? Tourist and training	1	Towards Flamingo Trust
? Undetermined	2	
? Transnet	1	
	3846	
<u>Roads</u>		
25 m	2993 m	
20 m	1350 m	
16 m	6509 m	
10 m	23351 m	
8 m	3596 m	

Total number of dwellings:

**Single residential:**

? Erven 700 m <sup>2</sup>	287
? Erven 350 m <sup>2</sup>	1615
? Erven 250 m <sup>2</sup>	1787

**General residential:**

? Flats	2400
? Town houses	80

## **1.5 Scope of Analysis**

---

### **1.5.1 Period for Analysis**

Based on the type of proposed development and the nature of traffic flow in the area, both the morning and afternoon peak periods need to be investigated.

### **1.5.2 Warrants for a Traffic Impact Study**

The development is expected to generate in excess of 150 peak hour trips and according to the "Manual for Traffic Impact Studies"<sup>1</sup>, a Traffic Impact Study is warranted.

### **1.5.3 Extent of Analysis**

All intersections where the increase in the critical lane volumes is expected to exceed 75, within 1,5km of the development, should normally be analysed. Given the road network in the area, from a practical point of view, the following intersections were analysed, even though the intersections do not necessarily fall within the 1.5km radius:

- a) Roodepan Road / Barkly Road Intersection
- b) Future Access on N12.
- c) Roodepan Road / Eagle Street Intersection
- d) Access to High Density Residential Area
- e) Northern Access on Roodepan Road
- f) Access to Shopping Centre

The layouts of the intersections as analysed are attached as Appendix A.

### **1.5.4 Assessment Years**

The development could generate in excess of 2000 trips during the peak hour, with the result that both the base year and ten years after the base year have been analysed.

## **1.6 Available Information**

---

### **1.6.1 Traffic Counts**

Traffic counts were undertaken on 22, 23 and 29 August 2007.

The expected trip generation of the planned development of Lerato Park and Lagaeng was also taken into consideration. A total of 5 700 housing units are expected to be developed in this area

Horizon year traffic counts were determined by using a generally accepted 3% growth rate.

## **2 BACKGROUND INFORMATION**

---

### **2.1 Existing Road Network**

---

The most important roads in the area are the following:

a) Roodepan Road

This two-lane undivided road provides mainly access to the Roodepan Area as well as the farming area to the north. The road has a south-north orientation.

b) Barkly Road

Barkly Road is the main access road from the north-western suburbs (Homevale, Boikhutsong, etc) to the CBD. The road is a four-lane undivided road in the area.

c) N12

The national road is the main access to Kimberley from the north and is a two-lane undivided road.

d) Other streets

All other streets are two-lane local streets.

### **2.2 Existing Land Use**

---

The area to be developed is currently mostly undeveloped. The area to the south of the development site is undeveloped with the Kamfersdam situated to the southeast of the site. The Roodepan residential area is located to the west of the site, while the site is bordered by farming areas to the north and east.

### **2.3 Road Planning**

---

No specific road upgrading is planned for the area.

### **2.4 Other Features**

---

An important element in the development of the area is the location of railway lines on both the eastern and western border of the site. The western railway line forms an at-grade crossing with the Roodepan Road as can be seen from the photo below.



***Photo 1: At-grade railway crossing on Roodepan Road***

The number of power lines in the area also affects the layout and road network.



***Photo 2: Power lines on the site.***

### 3 TRIP GENERATION

---

#### 3.1 Trip Generation Rates

---

The following trip generation rates are relevant:

##### 3.1.1 Middle Income Housing Units

According to the “The South African Trip Generation Rates”<sup>2</sup> the rates for middle income and cluster housing are as follows:

AM Peak	=	1.1 trips/unit	Directional Split 25:75
PM Peak	=	1.1 trips/unit	Directional Split 75:25

##### 3.1.2 Housing Units

Trip generation rates based on the document “The South African Trip Generation Rates”<sup>2</sup> for low-income housing are as follows:

AM Peak	=	0.5 trips/erf	Directional Split 35:65
PM Peak	=	0.5 trips/erf	Directional Split 65:35

##### 3.1.3 Shopping Centre

The trip generation rate according to the “South African Trip Generation Rates”<sup>2</sup> for a shopping centre is  $224.5 \cdot GLA^{-0.34}$  for the PM peak with a directional split of 50:50.

Trip generation during the morning peak is often disregarded and no rates for South African conditions are provided in the relevant documents. The 6<sup>th</sup> Edition of *Trip Generation* provides more information on the matter and proposes a rate of 1.1 trips / 100m<sup>2</sup> with a directional distribution of 61: 39.

##### 3.1.4 Industrial

Trip generation rates based on the document “The South African Trip Generation Rates”<sup>2</sup> for medium industrial facilities are as follows:

AM Peak	=	0.6 trips/100m <sup>2</sup>	Directional Split 80:20
PM Peak	=	0.6 trips/100m <sup>2</sup>	Directional Split 20:80

##### 3.1.5 Primary School

According to the “South African Trip Generation Rates”<sup>2</sup> document trip generation rates for a primary school during the morning peak hour are 0.9 trips per pupil with a directional split of 50:50. Negligible trip generation during the afternoon peak hour is expected.

##### 3.1.6 Secondary School

Trip generation rates for a secondary school during the morning peak hour are 0.8 trips per pupil with a directional split of 55:45. Trip generation during the afternoon peak hour is insignificant.

### **3.1.7 Church**

This land–use is expected to generate negligible trips during the peak periods and no trip generation is assumed for this land-use.

### **3.1.8 Filling Station**

A filling station is expected to attract 4% of passing traffic with 16% of the attracted traffic expected to be new trips.

### 3.2 Trips Generated

The proposed development is expected to have the following theoretical trip generation.

**Table 3.1: Total theoretic trip generation of proposed development**

NOTE	Land Use	Extent	Unit	AM PEAK					PM PEAK						
				TGR	Split	AM Trips	In	Out	TGR	Split	PM Trips	In		Out	
												Prim	Sec	Prim	Sec
1	Middle Income Residential	1982	units	1.10	75:25	2180	545	1635	1.1	75:25	2180	1635		545	
2	Lower Income Residential	4187	units	0.50	65:35	2094	733	1361	0.5	65:35	2094	1361		733	
3	Shopping Centre 1	20000	m <sup>2</sup>	1.10	61:39	220	134	86	224.5gla <sup>^-</sup> 0.34	50:50	1548	503	271	503	271
4	Shopping Centre 2	2600	m <sup>2</sup>	1.10	61:39	29	17	11	224.5gla <sup>^-</sup> 0.34	50:50	403	131	70	131	70
5	Filling Station	2		Depending on passing traffic											
6	School Primary	2000	pupils	0.90	50:50	1800	900	900	0	0	0	0		0	
7	Schools Secondary	1000	pupils	0.80	55:45	800	440	360	0	0	0	0		0	
8	Creche	2		Mainly serving immediate area											
9	Industrial	205000	m <sup>2</sup>	0.60	80:20	1230	984	246	0.6	80:20	1230	246		984	
10	Church														
11	Bus and taxi														
	Community facility														
	Parks														
	Sport														
	<b>Total</b>					<b>6322</b>	<b>2329</b>	<b>3993</b>			<b>6225</b>	<b>3630</b>	<b>341</b>	<b>1912</b>	<b>341</b>

- Notes:
- 1 - *The bigger erven and townhouses are expected to generate middle income housing trips*
  - 3 - *The smaller erven and high density residential are expected to have a lower trip generation.*
  - 4 - *The normally accepted 35% passer-by trip rate is applicable*
  - 5 - *The normally accepted 35% passer-by trip rate is applicable*
  - 6 - *The garages will mainly serve passing traffic, with the limited new trips mainly from the immediate area*
  - 7 - *Schools were assumed to have 500 pupils*
  - 8 - *Schools were assumed to have 500 pupils*
  - 9 - *The Crèches will serve the immediate area or passing traffic*
  - 10 - *Full development of all the erven was assumed, although it is not expected.*
  - 11 - *Churches will not generate any significant trips during the weekday peak hours.*
  - 12 - *These land uses are not expected to generate new trips during the peak hours*

As the development will basically consist of a complete town with all facilities, not all of the above trips will be on the external road network, with a large portion of trips to be expected between the different land uses within the development. Table 3.2 below shows the expected trip generation on the external network.

**Table 3.2: Division between internal and external trip generation**

NOTE	LAND USE	AM								PM							
		TOTAL			IN			OUT		TOTAL			IN			OUT	
		Total Trips	External Trips	% Ext	Total In	Ext Trips	% Ext	Total Out	Ext Trips	Total Trips	External Trips	% Ext	Total In	Ext Trips	% Ext	Total Out	Ext Trips
1	Middle Income Residential	2180	1581	50%	545	273	80%	1635	1308	2180	1581	80%	1635	1308	50%	545	273
2	Lower Income Residential	2094	1047	50%	733	366	50%	1361	680	2094	1047	50%	1361	680	50%	733	366
3	Shopping Centre 1	220	22	10%	134	13	10%	86	9	1548	302	30%	503	151	30%	503	151
4	Shopping Centre 2	29	3	10%	17	2	10%	11	1	403	26	10%	131	13	10%	131	13
5	Filling Station		0			0			0		0			0			0
6	School Primary	1800	0		900	0		900	0	0	0		0	0		0	0
7	Schools Secondary	800	160	20%	440	88	20%	360	72	0	0		0	0		0	0
8	Industrial	1230	615	50%	984	492	50%	246	123	1230	615	50%	246	123	50%	984	492
	<b>Total</b>	<b>6322</b>	<b>2652</b>		<b>2329</b>	<b>654</b>		<b>3993</b>	<b>1998</b>	<b>6225</b>	<b>2956</b>		<b>3630</b>	<b>2153</b>		<b>1912</b>	<b>803</b>

The assumptions on which the above calculations are based are as follows:

- Notes:*
- 1 - It is assumed that most of the middle income trips from the units during the AM peak and to the units during the PM peak will be external (i.e. to and from the CBD). The trips in the opposite directions will however mostly be to schools, etc during the AM peak and to shops during the PM peak. It is thus assumed that only 50% of these trips will be on the external network.
  - 2 - More of the lower income residents are expected to work within the area. The Industrial area will for instance be a major source of employment.

- 3- *It is assumed that only 10% of the trip generation of the shopping centre will be from outside the area during the AM peak, mostly employees. Although the bigger centre is also, due to the location relative to the bigger Kimberley area, expected to mainly serve the immediate area, a fair percentage of outside traffic can be expected during the PM peak, mainly from the Roodepan area.*
- 4- *The smaller centre will mainly serve the immediate area and it is assumed that 10% of the trip generation will be from outside the area.*
- 5- *The filling stations will mainly serve passing traffic, with the limited new trips. Any new trips will be from the immediate area*
- 6- *Primary Schools mainly serve the immediate area and no external trips are assumed.*
- 7- *Secondary Schools tend to serve a bigger area with choice of school becoming more important. Some external trips were thus assumed.*
- 8- *Given the assumption that a large portion of residents will work at the industries, a large portion of industrial trips are the same trips as shown in point 2*

## **4 TRIP DISTRIBUTION**

---

The trip distributions for the morning peak are shown in Figures 4.1 and for the afternoon peak period are shown in Figures 4.2.

Trip distribution was based on the analogue method with consideration of gravitational distributions.

## 5 TRIP ASSIGNMENT

---

The generated trips have been assigned to the background traffic volumes. The following figures show the traffic volumes for the different peak periods and scenarios.

- Figure 5.1: 2007 AM Peak
- Figure 5.2: 2007 AM Peak including approved developments not yet completed
- Figure 5.3: 2007 AM Peak with development
- Figure 5.4: 2017 AM Background Peak
- Figure 5.5: 2017 AM Background Peak with development
- Figure 5.6: 2007 PM Peak
- Figure 5.7: 2007 PM Peak including approved developments not yet completed
- Figure 5.8: 2007 PM Peak with development
- Figure 5.9: 2017 PM Background Peak
- Figure 5.10: 2017 PM Background Peak with development

## 6 CAPACITY ANALYSIS

Capacity analyses were performed by means of the SIDRA program. The tables below show the Levels of Service of the different traffic movements. Levels of Service (LOS) give an indication of operational characteristics in a traffic stream and their perception by motorists and passengers. Levels of service A to D are usually assumed to be acceptable, with LOS E regarded as the maximum flow rate, or capacity on the facility.

The geometric layouts of the intersections as analysed are shown in Appendix A.

### 6.1 Roodepan Road / Barkly Road Intersection

Intersection:		North			East			South			West		
Roodepan/Barkly		L	T	R	L	T	R	L	T	R	L	T	R
1	2007 AM Peak	C		C		A	B				A	A	
2	2007 AM with approved developments	F		F		A	F				A	A	
6	2007 PM Peak	B		B		A	B				A	A	
7	2007 PM with approved developments	F		F		A	B				A	A	

The analysis shows that the intersection is currently operating at acceptable levels of service, but capacity problems will be experienced once Lerato Park and Legaeng are developed (irrespective of whether the Northgate development takes place). To ensure acceptable levels of service the intersection will have to be signalised and upgraded as shown in Appendix A, mere signalisation of the existing layout will not suffice. This will result in the following acceptable levels of service:

Intersection:		North			East			South			West		
Roodepan/Barkly		L	T	R	L	T	R	L	T	R	L	T	R
2	2007 AM with approved developments	C		D		A	D				A	A	
7	2007 PM with approved developments	B		D		A	D				B	C	

This upgraded layout will however not ensure acceptable levels of service with the new development as can be seen from the table below:

Intersection:		North			East			South			West		
Roodepan/Barkly		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	F		F		A	D				A	A	
8	2007 PM with development	D		D		B	C				B	A	

The upgraded intersection will therefore not be able to accommodate the expected morning peak, and further upgrading as shown in Appendix A is required. This will result in the following:

Intersection:		North			East			South			West		
Roodepan/Barkly		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	D		D		A	D				A	A	
5	2017 AM with development	D		D		B	C				A	A	
8	2007 PM with development	D		D		B	C				B	A	
10	2017 PM with development	D		D		B	C				B	A	

## 6.2 New Access on the N12

A new priority controlled access on the N12 as shown in Appendix A will result in the following levels of service:

Intersection: N12 Access		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development		A	B				A	A		B		F
5	2017 AM with development		A	B				A	A		B		F
8	2007 PM with development		A	B				A	A		C		F
10	2007 PM with development		A	B				A	A		C		F

As to be expected, a high volume of right turning traffic from a priority controlled intersection on a major road, will experience capacity problems. Signalisation of the intersection will result in the following levels of service:

Intersection: N12 Access		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development		C	D				D	D		C		D
5	2017 AM with development		C	D				D	D		C		D
8	2007 PM with development		B	C				C	B		D		D
10	2007 PM with development		B	C				C	B		D		D

## 6.3 Roodepan Road / Eagle Street Intersection

Intersection: Roodepan/Eagle		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
1	2007 AM Peak		A	A				A	A		A		B
3	2007 AM with development	A	A	A	E	F	F	A	A	C	E	E	F
7	2007 PM Peak		A	A				A	A		A		B
8	2007 PM with development	A	A	A	B	F	F	A	A	D	F	F	F

The intersection is operating at high levels of service, but with the new development, capacity problems will be experienced with a priority controlled intersection. Upgrading and signalisation as shown in Appendix A would result in the following levels of service:

Intersection: Roodepan/Eagle		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	A	B	B	B	C	C	A	D	D	A	D	D
5	2017 AM with development	A	B	C	C	C	C	A	D	D	B	D	D
8	2007 PM with development	A	A	B	B	D	D	B	A	C	B	D	D
10	2007 PM with development	A	A	B	B	D	D	B	A	C	B	D	D

#### 6.4 Access to the High Density Residential Area

Intersection: Access to High Density		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	A	A		B		B		A	B			
5	2017 AM with development	A	A		B		B		A	B			
8	2007 PM with development	A	A		B		B		A	B			
10	2007 PM with development	A	A		B		B		A	B			

A priority controlled access in this position with a layout as shown in Appendix A would result in acceptable levels of service.

#### 6.5 Northern Access on Roodepan Road

Intersection: Northern Access		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	A	A		B		B		A	B			
5	2017 AM with development	A	A		B		B		A	B			
8	2007 PM with development	A	A		B		B		A	B			
10	2007 PM with development	A	A		B		B		A	B			

This priority controlled access should operate at acceptable levels of service

#### 6.6 Access to Shopping Centre

Given the recommended layout of the nearby Roodepan Road / Eagle Street intersection, a priority controlled access as shown in Appendix A is proposed and should result in the following levels of service:

Intersection: Access to Shopping Centre		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2007 AM with development	C		C		A	B				A	A	
5	2017 AM with development	C		C		A	B				A	A	
8	2007 PM with development	B		D		A	B				A	A	
10	2007 PM with development	B		D		A	B				A	A	

## 6.7 Summary

Road network upgrades can be summarised as follows:.

### 6.7.1 To Accommodate Existing Traffic

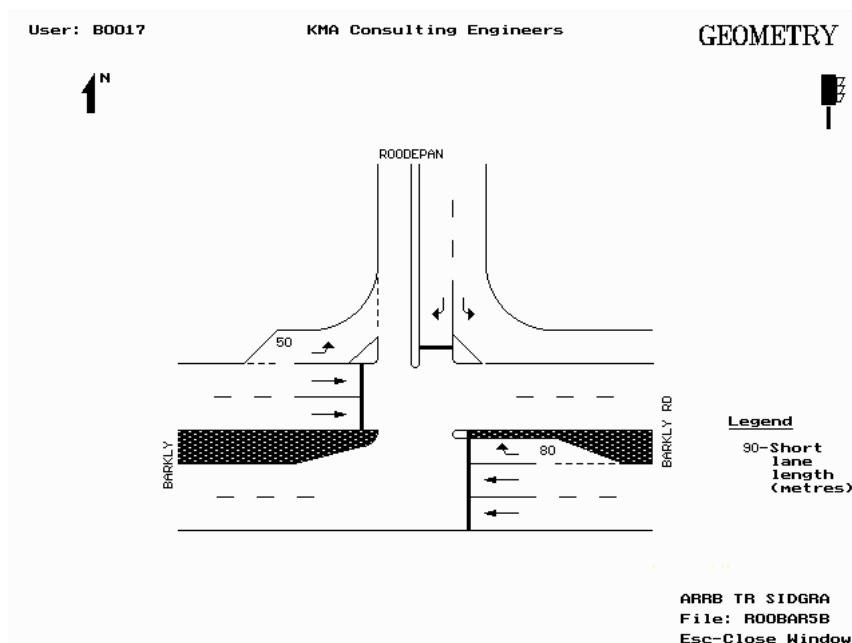
No specific upgrading is required

### 6.7.2 To Accommodate Already Approved Developments

The following improvements are required:

#### a. Roodepan Road / Barkly Road Intersection

This intersection has to be signalised and upgraded as follows:

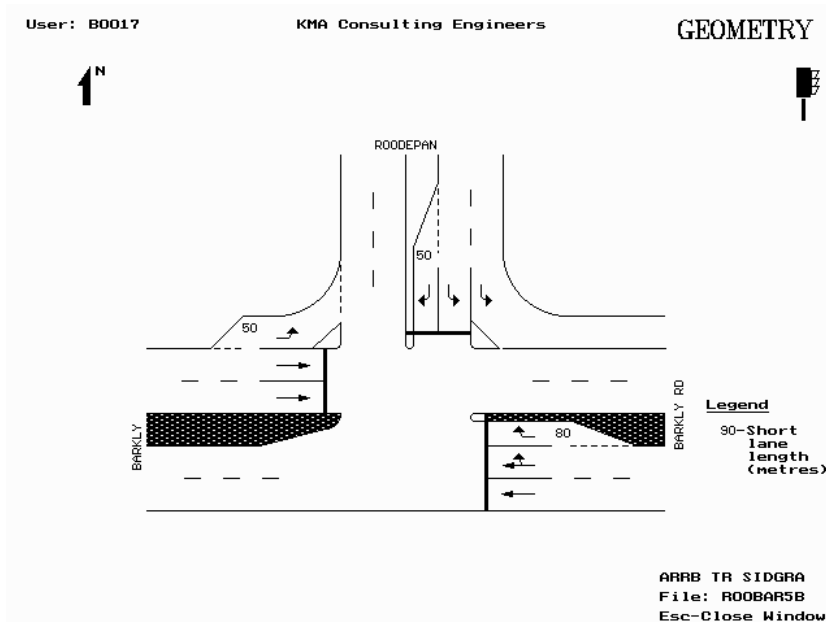


### 6.7.3 To Accommodate the Development under Consideration

The following improvements are required:

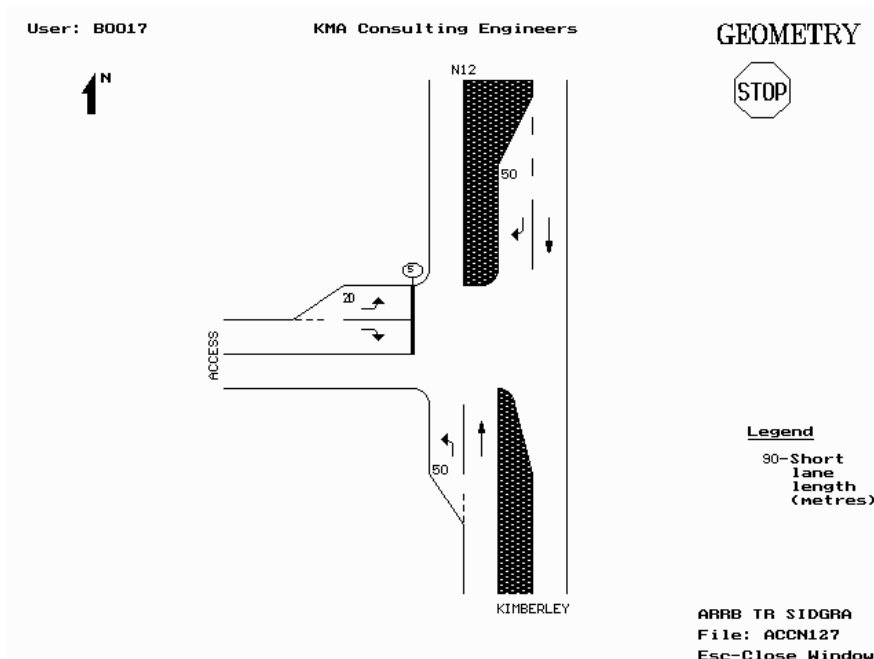
#### a. Roodepan Road / Barkly Road Intersection

This intersection has to be further upgraded:

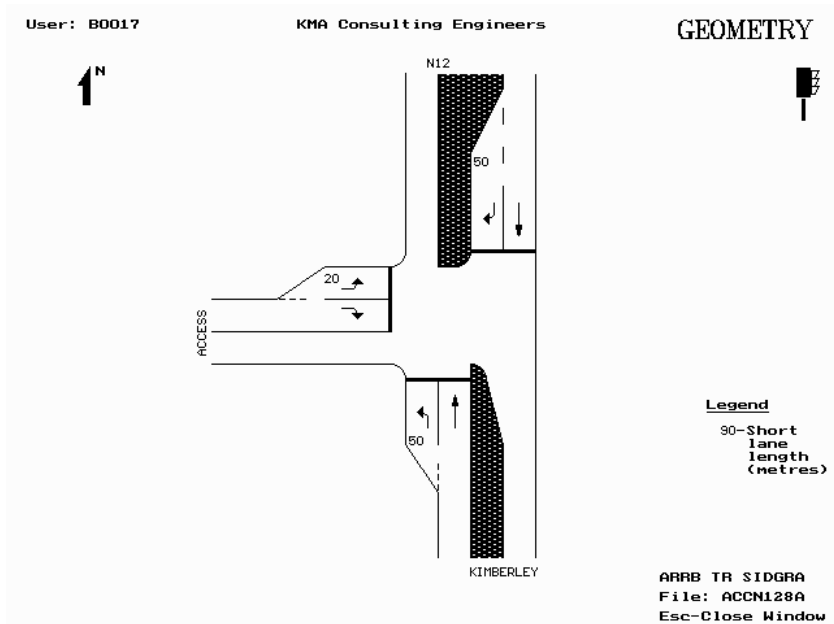


**b. Access on N12**

Given the location of the railway line, it might be viable from a geometric point of view to construct an interchange in this position. From a capacity point of view, as the exact distribution of traffic is not accurately known, a priority controlled intersection as shown below could possible initially be constructed.

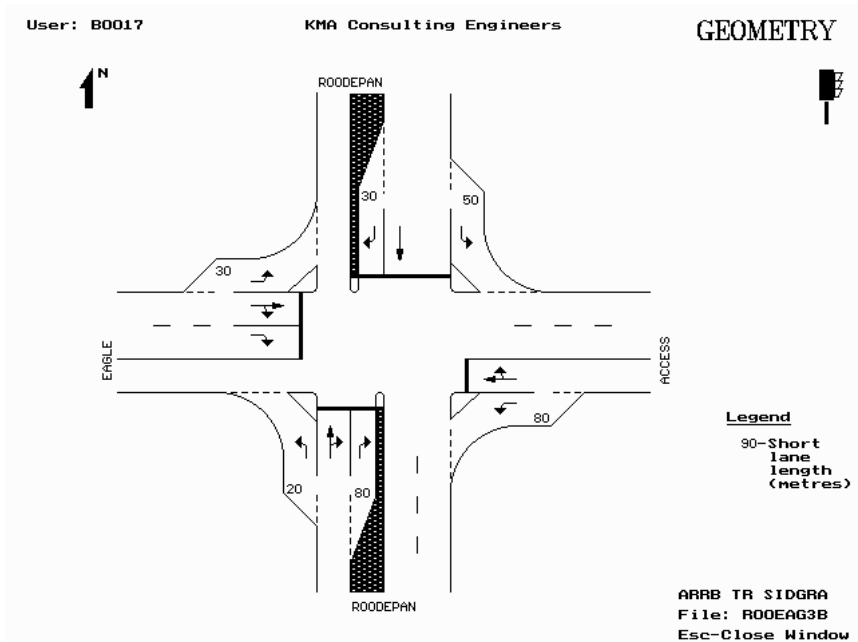


Based on the trip distribution as determined, it can however be expected that capacity considerations will require a signalised intersection as shown below:



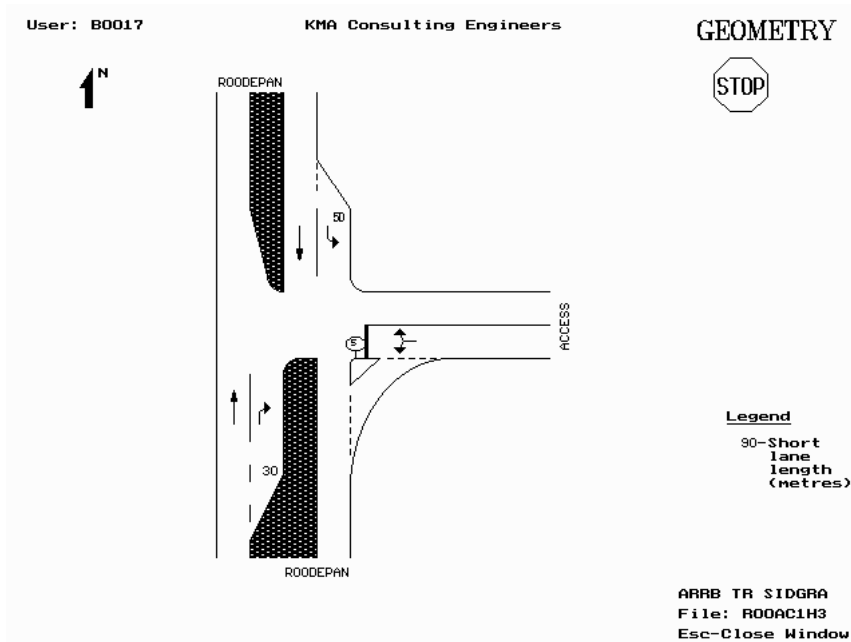
**c. Roodepan Road / Eagle Street Intersection**

As the main access to the development, the intersection will have to be signalised and upgraded as follows:



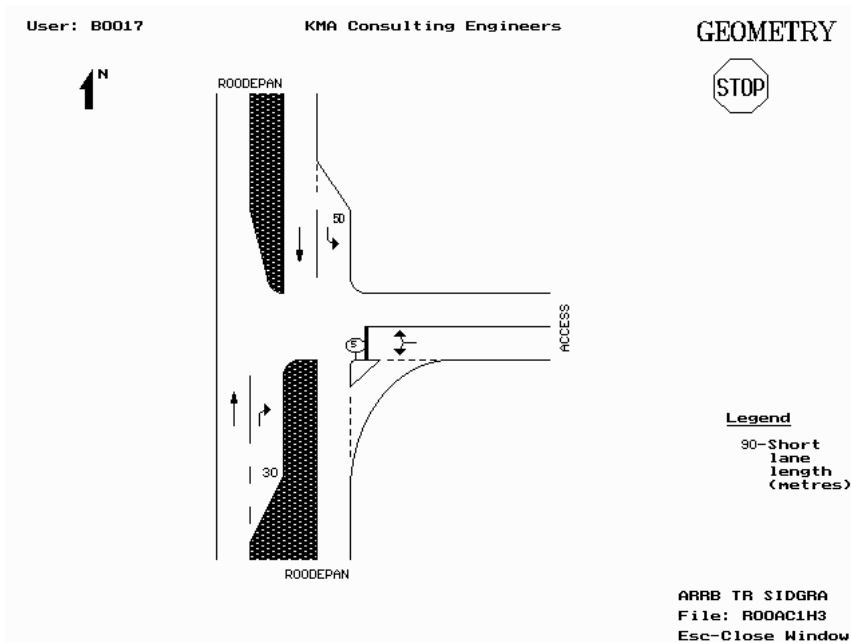
**d. Access to the High Density Residential Area**

This access on Roodepan Road should be developed as follows:



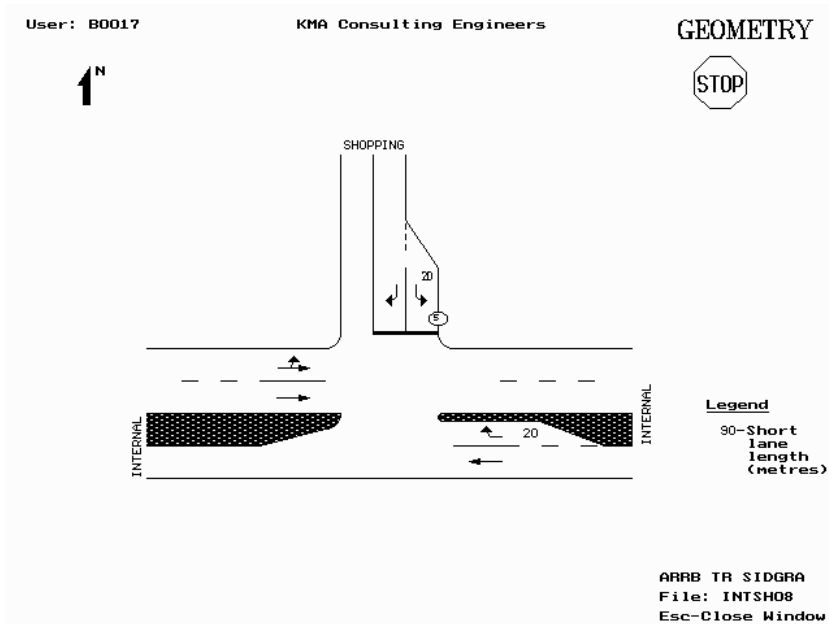
**e. Northern Access on Roodepan Road**

A priority intersection will suffice:



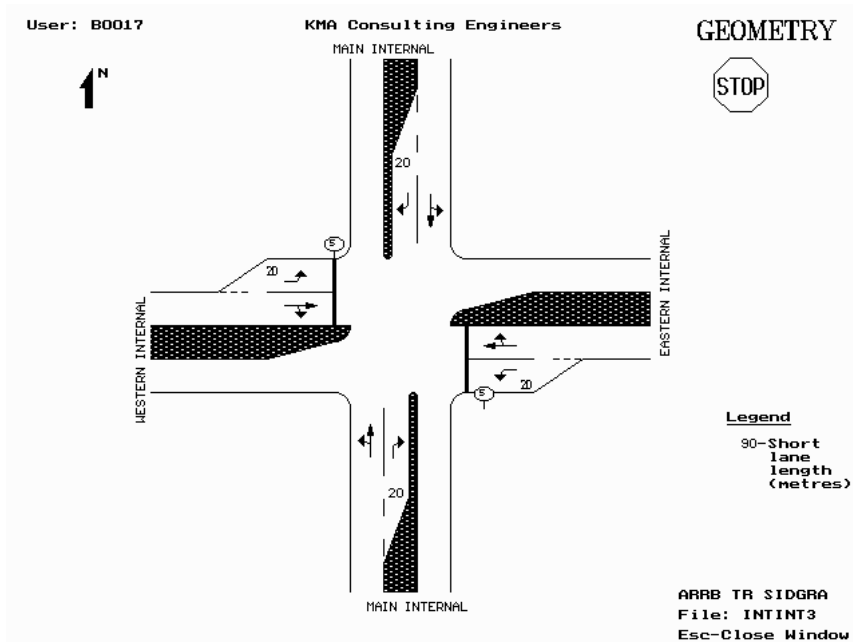
**f. Access to the Shopping Centre**

This access should be constructed as follows:



### g. Internal Main Intersections

Internal intersections of higher order local streets with the Collector (see Chapter 7 2a) should in principle be constructed as follows:



## 7 SITE DEVELOPMENT PLAN

---

The following aspects are of importance with regards to the site development plan:

### 7.1 General Layout

---

The development will consist of separate erven supported by a paved street network. The area to be developed is shown in the photograph below.



*Photo 3: Development Site*

### 7.2 Access

---


Access to the development will be as follows:

- ? The main, and initial access, to the development will be at the Roodepan Road / Eagle Street intersection, with a new eastern approach at this intersection.
- ? Access will also be provided from Roodepan Road to the higher density development (as well as the shopping centre) to the north of the mentioned intersection.
- ? An additional access on the Roodepan Road is being planned on the northern boundary of the layout. This access should be constructed as part of the construction of this part of the layout.
- ? As it would be difficult to accommodate all trips generated by the development through the Barkly Road corridor, an additional access to the N12 will have to be established. This access will have to be established once development of the residential erven and units exceeds 50%.

### 7.3 Layout Characteristics

No	Basic Aspects
<b>1</b>	<b>Intersections</b>
a	Number of intersections <i>Discussion:</i> Numerous intersections are being created as part of the development. The numbers of intersections on higher order streets and roads have as far as possible been limited.
b	Spacing <i>Discussion:</i> Intersections are generally located at acceptable spacings.
c	Provision of deceleration lanes and turning lanes <i>Discussion:</i> Given the nature of the internal streets, no deceleration or turning lanes are required at lower order intersections. It is however recommended that the intersections of the higher order local streets with the collector road (See 2a) be developed as shown below:  <div style="text-align: center;"> </div> <p>This will ensure proper safety at these higher order intersections and will allow signalisation if required in future.</p>
e	Continuity of Road Reserve Boundaries <i>Discussion:</i> Continuity of road reserve boundaries have been maintained throughout the layout.
<b>2</b>	<b>Internal Roads</b>
a	Road Classification <i>Discussion:</i> ? The main road serving the area is a street starting at the Roodepan Road / Eagle Street intersection with a south-north alignment through the centre of the development. This road has been planned to possibly operate as a collector with no direct access to residential erven

	<p>and minimum radii of 200m, which would allow an operating speed of 60 km / h.</p> <p>? Although all other roads in the layout will basically be local streets, a number will have a more important role. These roads intersect with the above mentioned street and also have a higher order alignment.</p> <p>? All other streets in the layout are local streets, with access as main function.</p> <p>The street network will, after completion, form part of the general street network of the area.</p>
b	Width of Road Reserves
	<i>Discussion:</i>
	<p>? The planned collector has a 25m road reserve</p> <p>? The reserves of higher order local streets are 20m</p> <p>? The minimum road reserves of other streets are 13m.</p> <p>These reserves should be adequate given the type of streets.</p>
c	Splays
	<i>Discussion:</i>
	Splays are of acceptable size.
d	Road widths
	<i>Discussion:</i>
	Road widths will be determined as part of the geometric design, but will comply with the minimum requirements.
e	Road Curves
	<i>Discussion:</i>
	As far as possible, road reserves only make provision for 90 degree bends or alignments that would accommodate radii of at least 200m.
f	Super elevation
	<i>Discussion:</i>
	No super elevation would be required.
g	Traffic Circulation
	<i>Discussion:</i>
	Normal traffic circulation is possible. A number of culs-de-sac will be provided. All cul-de-sacs are of limited length.
h	Capacity of Road Links
	<i>Discussion:</i>
	No internal road link is expected to carry traffic volumes that would require more than one lane per direction. It is however recommended that the multilane configuration as proposed for the Roodepan Road / Eagle Street intersection be retained up to the access of the shopping centre.
i	General Sight Distances
	<i>Discussion:</i>
	Sight distances are in general acceptable and there are no areas with specific sight distance problems.
j	Pedestrian Movements
	<i>Discussion:</i>
	Moderate pedestrian movement is expected and movement will be accommodated on sidewalks.
k	Illumination of Streets
	<i>Discussion:</i>
	Street illumination would be provided where necessary.
l	Refuse Removal

	<i>Discussion:</i>
	Normal refuse removal will take place and vehicles should be able to move throughout the area.
m	Public Transport
	<i>Discussion:</i>
	Some public transport is expected, and provision should be made in the final design of the network for lay-bys, especially at the facilities such as the shopping centres, industrial development and schools.
m	Emergency Vehicle Access
	<i>Discussion:</i>
	Emergency vehicles should be able to access all areas.
n	Potential Conflict Areas
	<i>Discussion:</i>
	The only potential conflict areas are the crossing of the railway lines. The main access to the development should be developed with a grade separated crossing, and a future access to the N12 should also be grade separated. The at-grade crossing on Roodepan Road, although not part of the layout, is of concern.
	
	<b>Photo 1: At-grade railway crossing on Roodepan Road</b>
o	Heavy Vehicle Usage
	<i>Discussion:</i>
	Low heavy vehicle volumes are expected.

## 8 CONCLUSIONS AND RECOMMENDATIONS

---

*The following conclusions can be made from the study:*

- a) The development can possibly generate 2652 and 2956 new trips on the external road network during the morning and afternoon peak hours respectively.
- b) A number of road improvements will be required to accommodate the trip generation of the development. Some improvement is also required to accommodate the already approved developments, which have not yet been implemented. These improvements are summarised in Section 6.7.
- c) The site development plan is in principle acceptable from a traffic point of view.

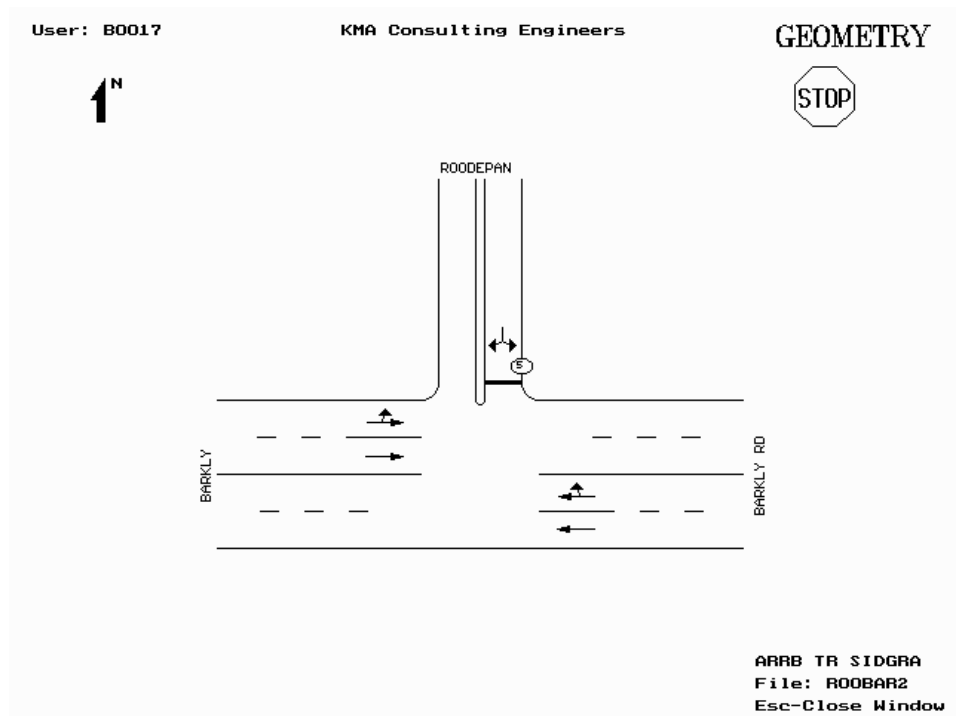
*Based on the conclusions it is recommended that the development be approved from a traffic point of view.*

## 9. REFERENCES

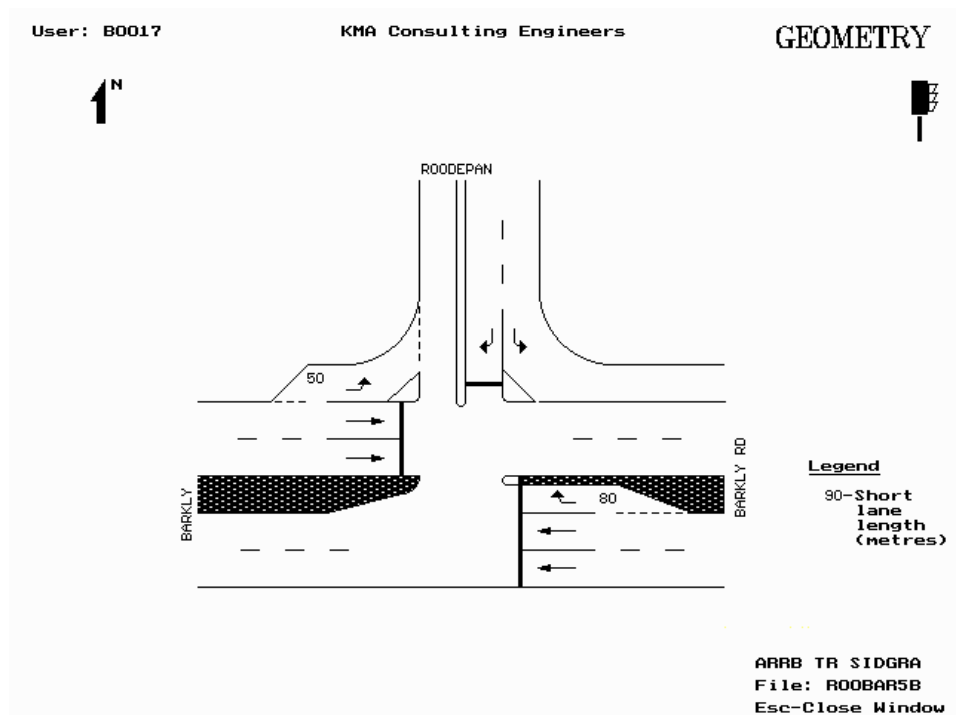
---

1. **Manual for Traffic Impact Studies**, Department of Transport, Pretoria, 1995
2. **South African Trip Generation Rates**, Department of Transport, Pretoria, 1995
3. **ITE Trip Generation Rates, 6<sup>th</sup> Edition**, Institute of Transportation Engineers, Washington, 1998

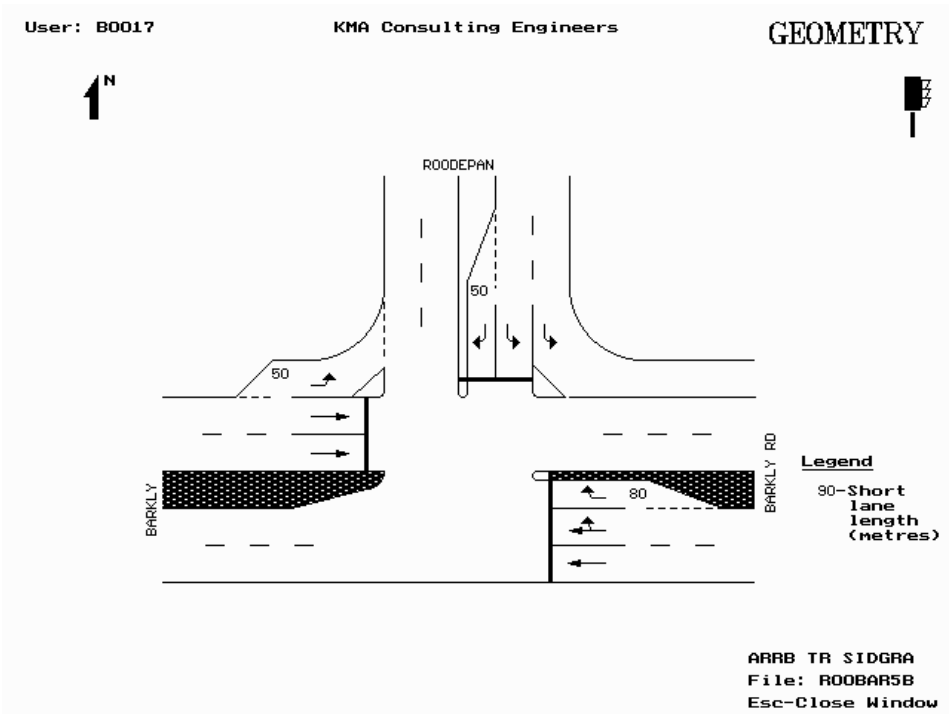
# 10. APPENDIX A – INTERSECTIONS ANALYSED



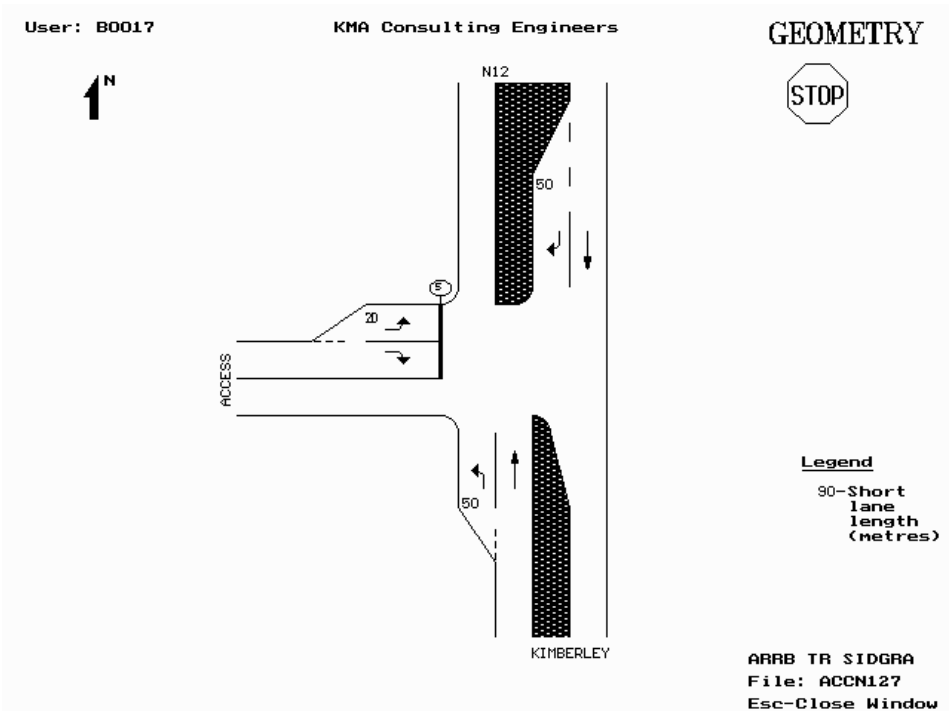
a) Roodepan Road / Barkly Road Intersection (Current layout)



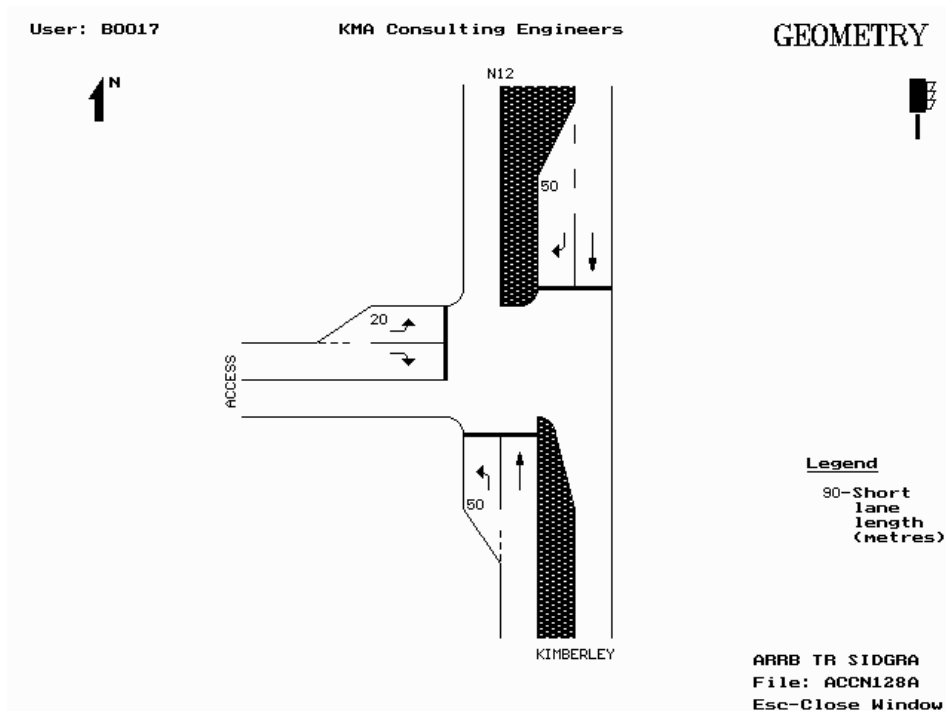
b) Roodepan Road / Barkly Road Intersection (Required to accommodate approved developments)



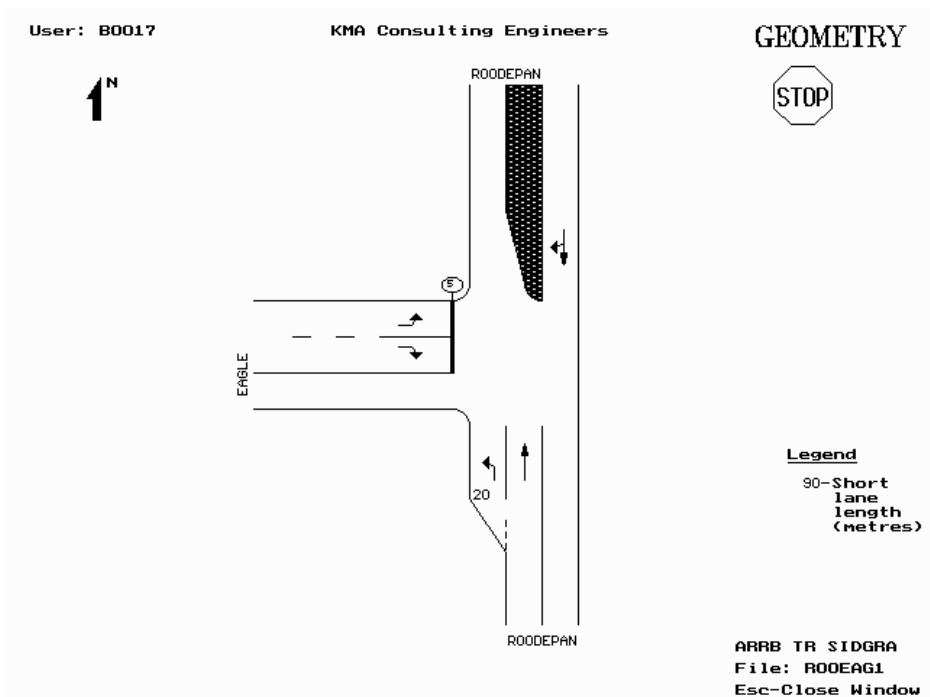
c) Roodepan Road / Barkly Road Intersection (Required to accommodate new development)



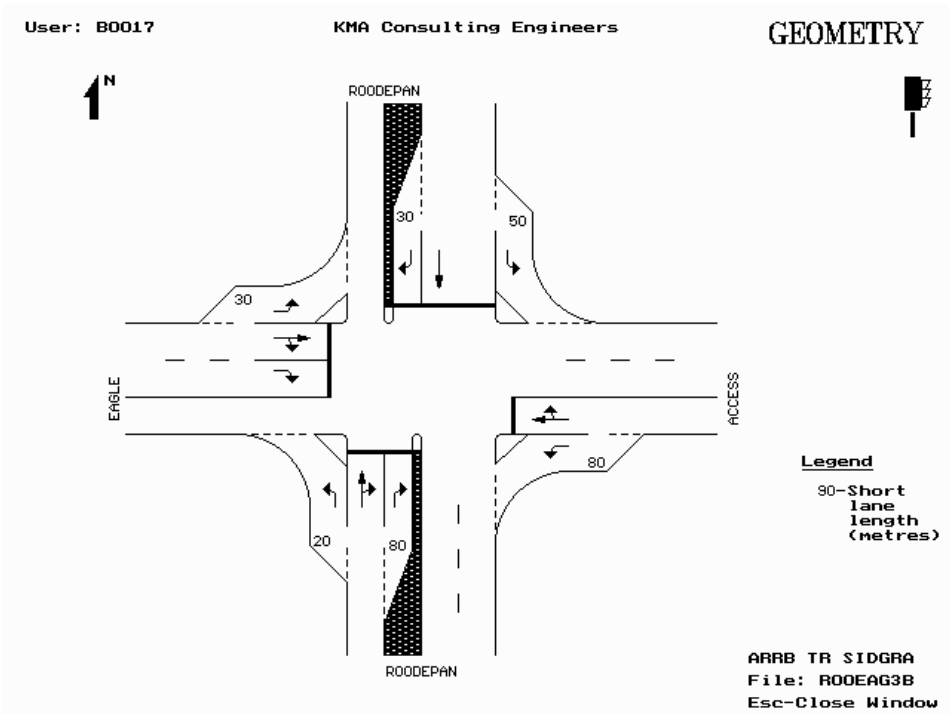
d) Access on N12 (Priority controlled)



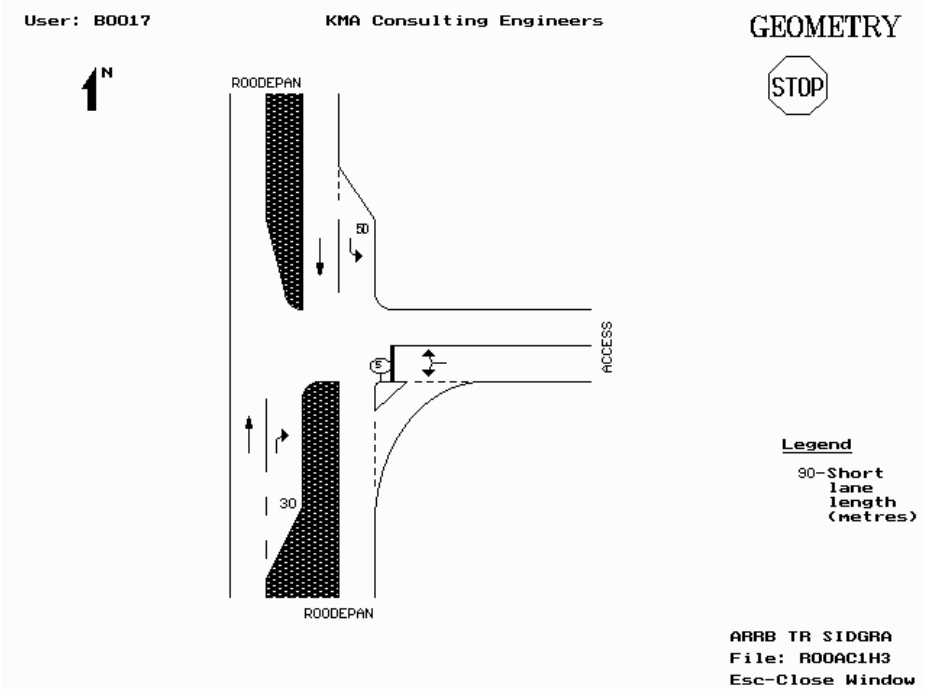
e) Access on N12 (Possible signalisation)



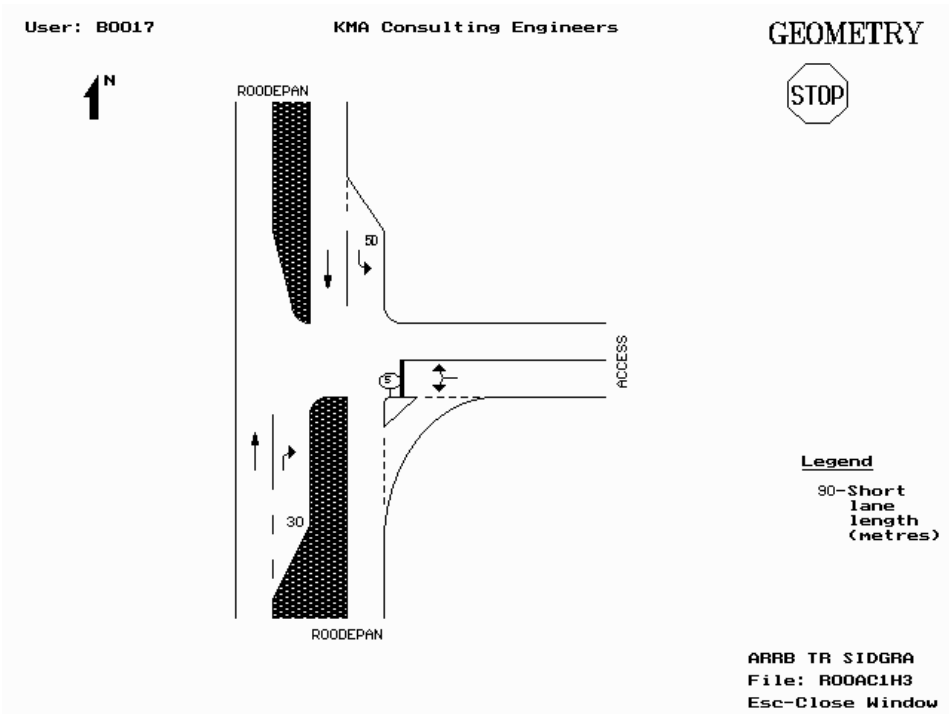
f) Roodepan Road / Eagle Street Intersection (Current layout)



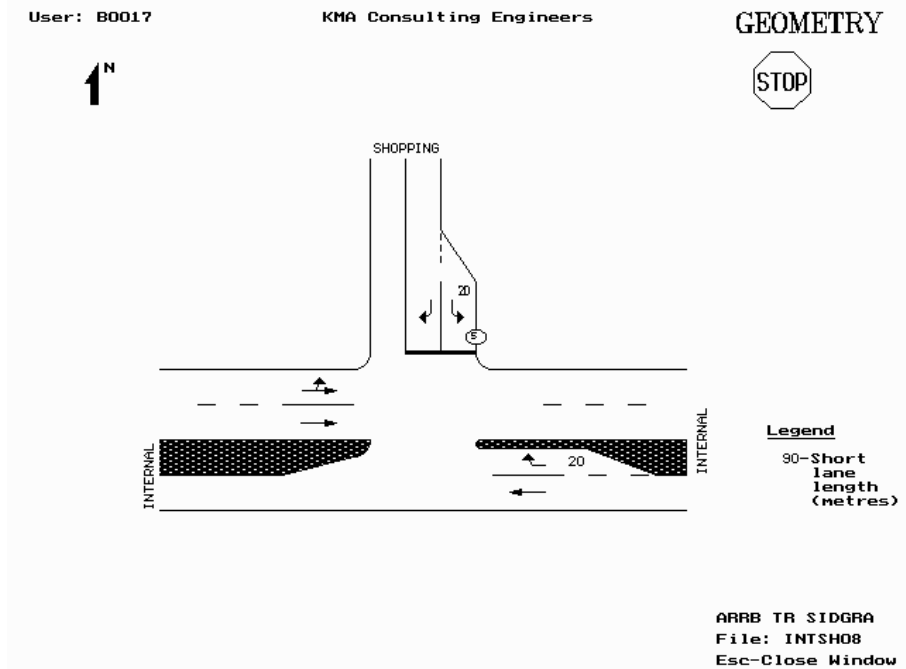
**g) Roodepan Road / Eagle Street Intersection (Required Upgrading)**



**h) Access to High Density Residential Area from Roodepan Road**



**i) Northern Access on Roodepan Road**



**j) Access to Shopping Centre**