



**CAMBRIDGE COLLEGE
C2594/01TIA**

**Proposed Boarding School Development to be Located on
Part of Portion 16 and Part of Portion 66 of the Farm
Knopjeslaagte 385-JR, Gerardsville Extension 2,
Centurion**

Traffic Impact Assessment (Item no: 29859)

February 2019

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ROADS

REPORT SHEET

PROJECT TITLE: PROPOSED BOARDING SCHOOL DEVELOPMENT (CAMBRIDGE COLLEGE) TO BE LOCATED ON PART OF PORTION 16 AND PART OF PORTION 66 OF THE FARM KNOPESLAAGTE 385-JR, GERARDSVILLE EXTENSION 2, CENTURION

TRAFFIC IMPACT ASSESSMENT (TIA)

PREPARED FOR: WFA CHRISTIAN BUSINESS SCHOOL

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DECLARATION

I certify that this study has been prepared under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

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EXECUTIVE SUMMARY

The proposed boarding school (Cambridge College) to be located on part of portion 16 and part of portion 66 of the farm Knopjeslaagte 385 J-R, Centurion.

This Traffic Impact Assessment (TIA) was prepared for the proposed development to determine the impact of the development trips on the surrounding road network. This study was done in accordance with the Committee of Transport Officials (COTO) TMH17 - Trip Data Manual, COTO TMH16 - Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, the Highway Capacity Manual (2010) and The Department of Transport's Manual for Traffic Impact Studies (Document RR 93/635).

The proposed school development will accommodate **2 000** pupils and may generate **1 600** trips during the weekday AM peak hour.

The base year (2019) and horizon year (2024) are analysed as part of this study.

A 3% annual growth rate was applied to account for, any latent rights not taken into consideration in this traffic study and an increase growth of traffic.

Access to the development site will be provided off a link road to the Mimosa Avenue / 2nd Avenue junction as a form of mini circle, approximately 530m west of the Mimosa Avenue / M26.

Upgrades were proposed at the problematic junctions to mitigate the effect of the anticipated traffic to be generated by the proposed development. The upgraded road network will be able to cater for the development trips.

All pick-ups and drop-offs will occur within the site.

Pedestrian and parking facilities have to be provided in consultation with the relevant departments of the City of Tshwane (CoT).

The pedestrian clearance times were checked for the background with development traffic scenarios at the signalised junctions and will all be sufficient.

Road safety has also been addressed in the report to ensure safety of all learners and road users.

M26 (K46) Road will in future be extended northwards to intersect with the existing K103, a class 2 road and intersect with planned class 1 roads, PWV6 and PWV7 respectively.

R511 (K27) Road will in future intersect with planned K44, K103, K38, and K20 class 2 roads and existing K16 class 2 road.

This Traffic Impact Assessment will be submitted to the City of Tshwane (CoT) and the Gauteng Province Department of Roads and Transport (GPDRT), for approval.

1. INTRODUCTION

1.1 Background

Civil Concepts (Pty) Ltd was appointed by WFA Christian Business School to prepare a Traffic Impact Assessment (TIA) in support of the proposed boarding school (Cambridge College) to be located on part of Portion 16 and part of Portion 66 of the farm Knopjeslaagte 385 J-R, Centurion.

The proposed school development will accommodate **2 000** boarding school pupils.

The extent of the study area was determined by identifying the junctions on which the traffic to be generated by the proposed residential development may have a significant impact. This was agreed with the CoT officials.

The objective of this TIA is to determine the impact of the traffic to be generated by the proposed development on the adjacent road network. The expected trip generation, distribution and assignment, as well as the required road upgrades to accommodate the proposed development trips will be discussed in the remainder of this report. The conclusions and recommendations are made at the end of the report.

The proposed school development is located in the south-western quadrant of the Mimosa Avenue / M26 junction and falls under the jurisdiction of City of Tshwane (CoT) as shown in [Figure 1.1](#).



FIGURE 1.1: LOCALITY PLAN

1.2 Definitions

The following definitions from the 2010 Highway Capacity Manual are applicable to this report:

1.2.1 Level of Service (LOS)

Level of Service is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. The levels of Service for junctions as defined in the 2010 Highway Capacity Manual are shown in Table 1.1 below.

TABLE 1.1: LEVEL OF SERVICE DEFINITIONS

Level of Service	Control delay per vehicle (s/veh)	
	Signalised junctions	Unsignalised junctions
A	< 10	< 10
B	10 to 20	10 to 15
C	20 to 35	15 to 25
D	35 to 55	25 to 35
E	55 to 80	35 to 50
F	> 80	> 50

1.2.2 Capacity

The maximum hourly rate at which vehicles can reasonably be expected to traverse a lane or roadway during a given period under prevailing roadway, traffic and control conditions.

1.2.3 Volume

The hourly rate (v/h), the actual flow rate for an approach or lane.

1.2.4 Volume to capacity ratio (V/C)

The ratio of flow to capacity.

1.3 Peak Hour Factor (PHF) and Base Saturation flow

1.3.1 Peak Hour Factor (PHF)

Peak rates of flow are related to hourly volumes using the Peak-Hour Factor (PHF). This factor is defined as the ratio of total hourly volume to the peak rate of flow within the hour:

$$\text{PHF} = \text{Total Hourly Volume} / (4 \times \text{Highest 15 min. volume})$$

The peak hour factors per approach were however calculated at the junctions analysed as shown in [Figures 3.2](#).

Model calibration is the adjustment of constants and other model parameters in estimated or asserted models to make the models replicate observed data for a base year or otherwise produce more reasonable results.

1.3.2 Basic Saturation Flow

The base saturation flow is a very important road traffic performance measure of the maximum rate of flow of traffic.

The base saturation flow rates considered in this traffic study are shown in [Table 1.2](#) below.

TABLE 1.2: BASE SATURATION FLOW RATES

Approach Lanes (per lane)	Base Saturation Flow Rates (PCU/hr/ln)
Through lanes	2050
Right-turn, left-turn and shared lanes	1600
Slip lanes (give-way/signalised)	1800

1.4 Time Horizon

The base year (2019) and the horizon year (2024) are analysed as part of this study.

A 5-year horizon (2024) was analysed as part of this Traffic Impact Assessment (TIA) to determine transportation improvements that are required to accommodate the proposed development as prescribed in in the Committee of Transport Officials' (COTO) TMH 16, Volume 1 – South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0 (dated August 2012).

1.5 Determination of Road Upgrading

The Department of Transport's Manual for Traffic Impact Studies (Document RR 93/635) states:

"The recommended criteria that should be used to measure the level of upgrading/improvement required, is the LOS and the v/c ratio.

In urban areas, it is recommended that either of the following two LOS be used to determine whether a junction should be upgraded, on condition that the contribution of the proposed development is at least 2% of the sum of the critical volume on a lane basis of the junction assessed:

All elements of a junction should operate at LOS D or better and a v/c ratio less than 0.95 during the peak hour of the roadway system.

In areas where the baseline LOS is E or worse, or the v/c ratio is greater than 0.95, this baseline (i.e. prior to development) LOS must be maintained or improved for the situation with the development included. The baseline LOS includes all committed (funded) road improvements and all non-site traffic (including existing site traffic) but exclude the additional traffic that will be generated by the proposed development.

It should, however, be debated whether an application should be approved if the baseline LOS is E or worse and it is not practical to upgrade the junction any further. Engineering judgement should further be used in the case of the LOS of specifically right turning movements across high opposing traffic volumes at signalised junctions, due to the number of vehicles that are turning during the intergreen period / typically between 1 to 4 vehicles per cycle, depending on the junction layout. It is not realistic to upgrade a junction if a small number of right turning vehicles experience a LOS E or F. The same is also true if a level of service E/F is experienced by a small number of vehicles entering a major road from a minor road.

The determination of the necessary upgrading and improvement to the road infrastructure needs to be determined for the "with" and "without-development" scenarios for the opening year and the horizon year(s). The following procedure should be followed to determine the necessary road upgrading:

Calculate the LOS, v/c ratios and the site traffic as a percentage of the critical flows at the junction for every scenario.

If the LOS is worse than LOS D for the with-development scenario but not for the without-development scenario, the developer is responsible for all the required road upgrading.

If the LOS is worse than D for the with- and without-development scenarios, the developer is only responsible for the incremental upgrading to obtain the same LOS and v/c ratio as for the without-development scenario.”

Although in many instances the professional judgement of the traffic engineer is needed to determine the required road upgrading by the developer, the basic principles as laid down above must be adhered to.

2. TRIP GENERATION AND ASSIGNMENT

2.1 Introduction

The proposed land-use rights of the site are described first. This is followed by the trip generation of the proposed rights. Trip distributions and assignments are then provided.

2.2 Proposed Land-Use Rights

The proposed land-use rights are shown in **Table 2.1** below.

TABLE 2.1: PROPOSED LAND USE RIGHTS

Part of portion	LAND USE	No. of Pupil
16 and 66 of the farm Knopjeslaagte	Private School	2 000

A copy of the Site layout plan is included in **ANNEXURE A**.

A Township Approval, Conditions of Establishment (COE) are included in **ANNEXURE B**.

2.3 Trip Generation

2.3.1 Introduction

The trip rate prescribed in the Committee of Transport Officials' (COTO) TMH 17 - Trip Data Manual, Version 1.0 (dated September 2013) was used to calculate the development trips.

It was agreed with the CoT that:

- the weekday AM peak hour only be analysed because it is the most critical peak hour for a proposed private school development. A trip rate of 0.80 per pupil was therefore used for the weekday AM peak hour trip calculation;
- a PHF of 0.55 as prescribed by the (COTO) TMH 17 - Trip Data Manual, Version 1.0, to be applied for the traffic entering and exiting the development.
- no trip reductions to be applied in this study.

2.3.2 Trip Generation

The weekday AM peak hour trip generation is shown in [Table 2.2](#) below.

TABLE 2.2: WEEKDAY AM PEAK HOUR TRIP GENERATION

Land Use	Extent	Trip Rate	Directional Split		Trips		
			In	Out	In	Out	Total
Private School	2 000 Pupils	0.80 / 1 Student	50%	50%	800	800	1 600

2.4 Trip Distribution and Assignments

The road network, trip distribution, assignment and the development framework information of the study area are shown on schematic diagrams as required in TMH 16 South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012.

M26 (K46) Road will in future be extended northwards to intersect with the existing K103, a class 2 road and intersect with planned class 1 roads, PWV6 and PWV7 respectively.

The proposed development trips were distributed and assigned to the adjacent road network, based on the expected origins and destinations to and from the proposed school development.

The weekday morning peak hour trip distributions and assignments are shown in [Figure 2.1](#).

3. TRAFFIC AND THE ROAD NETWORK

3.1 Traffic Counts

A weekday AM peak hour classified traffic count survey was done on 25 September 2018 by Traftsol Data Specialist at the following junctions:

- R114, Koedoe Street / R511 junction;
- M26 (K46) / R511 junction;
- Mimosa Avenue / M26 junction;

The classified traffic counts were converted to Passenger Car Units (PCUs) using the following factors:

- 1 for a car;
- 1.5 for a taxi; and
- 3 for heavies (buses and trucks).

The weekday AM peak hour traffic counts (PCUs) are shown in [Figure 3.1](#).

3.1.1 2018 Peak Flow Rate Traffic Volumes

The 2018 weekday AM peak hour traffic counts (PCUs) were adjusted according to the calculated peak hour factors per approach to obtain the 2018 peak flow rate traffic volumes.

The 2018 weekday AM peak hour flow rate traffic volumes are shown in [Figure 3.2](#).

3.1.2 2019 Peak Hour Traffic Volumes

The 2018 weekday AM peak hour flow rate traffic volumes were escalated at a 3% annual growth rate over 1 year to obtain the 2019 peak hour traffic volumes.

The 2019 weekday AM peak hour traffic volumes are shown in [Figure 3.3](#).

3.1.3 2024 Peak Hour Traffic Volumes

The 2018 weekday AM peak hour flow rate traffic volumes were escalated at a 3% annual growth rate over 6 years to obtain the 2024 peak hour traffic volumes.

The 2024 weekday AM peak hour traffic volumes are shown in [Figure 3.4](#).

3.1.4 Latent Rights

The following studies were considered latent rights:

- Peach Tree Extension 20 is a proposed township establishment on portion 72 and 73 of the farm Knopjeslaagte 385-JR, which will be located to the east of the M26 and north of the R511 done by Route 2 –Transport Strategies in November 2017.

The peak hour development trips for Peach Tree Extension 20 were obtained and distributed to the road network. Refer to [Figure 3.5](#) for the weekday AM peak hour latent development trips of Peach Tree Extension 20.

3.1.5 2019 Background Traffic Volumes

The weekday AM peak hour latent development trips were added to the 2019 weekday AM peak hour traffic volumes to obtain the 2019 peak hour background traffic volumes.

The 2019 weekday AM peak hour background traffic volumes are shown in [Figure 3.6](#).

3.1.6 2024 Background Traffic Volumes

The weekday AM peak hour latent development trips were added to the 2024 weekday AM peak hour traffic volumes to obtain the 2024 peak hour background traffic volumes.

The 2024 weekday AM peak hour background traffic volumes are shown in [Figure 3.7](#).

3.1.7 2019 Background and Development Traffic Volumes

The weekday AM peak hour development trips were added to the 2019 background peak hour traffic volumes to obtain the 2019 background and development peak hour traffic volumes.

The 2019 weekday AM peak hour background and development traffic volumes for are shown in [Figure 3.8](#).

3.1.8 2024 Background and Development Traffic Volumes

The weekday AM peak hour development trips were added to the 2024 background peak hour traffic volumes to obtain the 2024 background and development peak hour traffic volumes.

The 2024 weekday AM peak hour background and development traffic volumes are shown in [Figure 3.9](#).

3.2 Road Network

The existing and future road network according the City of Tshwane's 2015 Road Master Plan done by Tolplan are discussed below.

3.2.1 Existing Road Network

- M26 (K46) is a class 2 road that runs in a north-south direction. It is located to the east of the development site.
- R511 (K27) is a class 2 road that runs in a north-south direction. It is located to the west of the development site.
- R114 is a class 3 road that runs in an east-west direction. It is located to the south of the development site.

3.2.2 Future Road Network

According to the Gauteng Strategic Road Network Plan (August 2010), the M26 (K46) Road will in future be extended northwards to intersect with the existing K103, a class 2 road and intersect with planned class 1 roads, PWV6 and PWV7 respectively.

R511 (K27) Road will in future intersect with planned K44, K103, K38, and K20 class 2 roads and existing K16 class 2 road.

Refer to **ANNEXURE C** for an extract of the City of Tshwane Road Masterplan.

3.2.3 Proposed Upgrading of the Road Network

- R114 Koedoe Street / R511 (K27) junction will experience capacity and delay problems for the 2019 and 2024 peak hour background traffic scenarios (without development trips). This junction will be upgraded and signalised to accommodate the development traffic by the proposed school.
- The M26 (K46) / R511 (K27) junction will be upgraded and signalised to accommodate the development traffic by the proposed school.
- Proposed access

An access to the development site will be provided off a link road to the Mimosa Avenue / 2nd Avenue junction as a form of a mini circle, approximately 530m west of the Mimosa Avenue / M26.

Refer to Section 10 of this report for the existing and proposed junction configurations.

4. SITE INVESTIGATION

4.1 Introduction

A site visit was done on 25 September 2018 to obtain the existing lane configurations of the junctions to be analysed and observe the traffic operations within the subject area.

The information regarding the site investigation is provided below. The pedestrian and public transport facilities are addressed in **Section 7** of this traffic report.

4.2 Road Conditions

The road network within the vicinity of the proposed development are in a good condition.

4.3 Traffic Operations

Minor traffic queues were observed at the R114 Koedoe Street / R511 junction in an eastbound and a northbound direction only.

Minor traffic queues were observed at the M26 / R511 junction in a southbound direction only.

No Traffic queues were observed elsewhere on the road network.

Pictures from the site investigation are included in **ANNEXURE D**.

5. TRAFFIC OPERATIONS

5.1 Introduction

The SIDRA Intersection 5.0 software program was used for the capacity analysis calculations at the following junctions:

- R114 Koedoe Street / R511 junction;
- M26 (K46) / R511 junction; and
- Mimosa Avenue / M26 junction;

The average capacity results per junction are given in this section, however in accordance with Section 3.3.2 of the TMH16 Volume 2 – South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual (Version 1.0, August 2012) as published by the Committee of Transport Officials (COTO), detailed capacity analysis results for all individual movements of the junctions are provided in ANNEXURE E of this report.

Detailed capacity calculation results are included in **ANNEXURE E**.

Signal Phasings and Timings are included in **ANNEXURE F**.

5.2 Capacity analysis results comparison

The capacity analysis results per approach for the background and background with development traffic volumes are shown in [Table 5.1](#) below.

TABLE 5.1: BACKGROUND AND BACKGROUND WITH DEVELOPMENT CAPACITY ANALYSIS COMPARISON

JUNCTION	APPROACH	Traffic Operations	2019		2024	
			AM PEAK HOUR		AM PEAK HOUR	
			Background	Background + Development	Background	Background + Development
R114 Koedoe Street / R511	SOUTH	v/c ratio	1.048	1.019	1.079	1.031
		delay (sec)	32.0	31.4	31.4	32.3
		LOS	C	C	C	C
	EAST	v/c ratio	1.429	1.064	1.726	1.080
		delay (sec)	706.4	51.5	1172.2	55.8
		LOS	F	D	F	E
	NORTH	v/c ratio	0.728	0.934	0.836	1.000
		delay (sec)	13.1	36.1	20.6	61.0
		LOS	B	D	C	E
	WEST	v/c ratio	0.906	0.942	1.052	0.980
		delay (sec)	49.9	51.6	151.3	75.6
		LOS	D	D	F	E
M26 (K46) / R511 (K27)	SOUTH	v/c ratio	0.483	0.881	0.544	0.935
		delay (sec)	10.5	26.3	10.8	35.5
		LOS	B	C	B	D
	EAST	v/c ratio				
		delay (sec)				
		LOS				
	NORTH	v/c ratio	0.826	0.701	0.937	0.743
		delay (sec)	23.0	17.3	43.8	18.0
		LOS	C	B	D	B
	WEST	v/c ratio	1.024	0.931	1.184	1.058
		delay (sec)	108.2	61.5	303.2	137.5
		LOS	F	E	F	F
MIMOSA AVENUE / M26 (K46)	SOUTH	v/c ratio	0.170	0.670	0.197	0.659
		delay (sec)	0.5	20.5	0.5	19.8
		LOS	B	C	B	B
	EAST	v/c ratio	0.013	0.862	0.022	0.919
		delay (sec)	17.7	38.0	21.8	47.9
		LOS	C	D	C	D
	NORTH	v/c ratio	0.239	0.879	0.273	0.909
		delay (sec)	0.1	36.9	0.1	40.3
		LOS	A	D	B	D
	WEST	v/c ratio	0.219	0.894	0.316	0.949
		delay (sec)	22.5	25.7	28.6	34.8
		LOS	C	C	D	C

TABLE 5.1: CONTINUED

JUNCTION	APPROACH	Traffic Operations	2019		2024	
			AM PEAK HOUR		AM PEAK HOUR	
			Background	Background + Development	Background	Background + Development
Mimosa Avenue / 2 nd Avenue, Link Road to Access Road	SOUTH	v/c ratio		0.666		0.673
		delay (sec)		11.2		11.2
		LOS		B		B
	EAST	v/c ratio	0.031	0.768	0.036	0.772
		delay (sec)	15.1	7.3	15.2	7.3
		LOS	C	B	C	B
	NORTH	v/c ratio	0.049	0.040	0.058	0.050
		delay (sec)	20.6	16.6	20.4	16.9
		LOS	C	B	C	B
	WEST	v/c ratio	0.076	0.292	0.089	0.316
		delay (sec)	14.7	17.2	14.7	17.3
		LOS	C	B	C	C
Access Road / Link Road to Access Road	SOUTH	v/c ratio				
		delay (sec)				
		LOS				
	EAST	v/c ratio		0.849		0.849
		delay (sec)		10.5		10.5
		LOS		B		B
	NORTH	v/c ratio		0.849		0.849
		delay (sec)		8.2		8.2
		LOS		A		A
	WEST	v/c ratio				
		delay (sec)				
		LOS				

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A The average junction delay is not a good LOS measure for a priority control junction due to zero delays associated with major road movements.

The results indicate that the following junctions will experience capacity and delay problems during the 2019 and / or 2024 weekday AM background traffic scenarios:

- R114, Koedoe Street / R511 (K27); and
- M26 (K46) / R511 (K27)

Furthermore the results show that:

- R114 Koedoe Street / R511 (K27) will continue to experience capacity problems during the 2019 and 2024 weekday AM peak hour background and development traffic scenarios with the proposed road upgrades in place BUT will operate better than the WITHOUT Development scenario.
- M26 (K46) / R511 (K27) will continue to experience capacity and delay problems during the 2024 weekday AM peak hour background and development traffic scenario only with the proposed road upgrades in place BUT will operate better than the WITHOUT Development scenario.

6. ACCESS

6.1 Introduction

Only one access will be provided for the proposed school development. The access will be at least 500m away from the existing alignment of the M26 which is a provincial road.

6.2 Proposed link Road to the access

A Link road off Mimosa Avenue / 2nd Avenue junction will be approximately 100m to the south of the junction. The link road configuration is shown in [Figure 6.1](#) below.

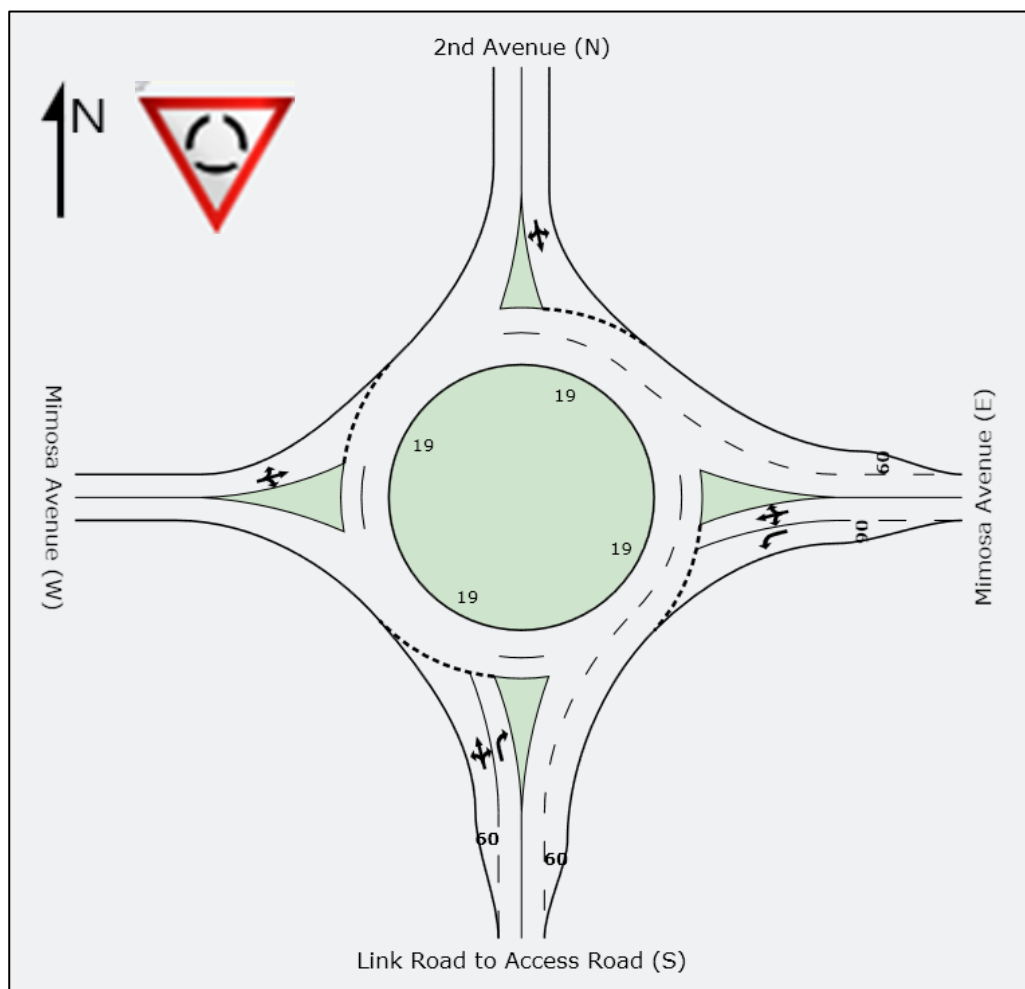


FIGURE 6.1: PROPOSED LINK ROAD TO ACCESS ROAD CONFIGURATION

6.3 Proposed Access

Access off a link road to the Mimosa Avenue / 2nd Avenue junction will be located at a distance of approximately 530m to the west of the Mimosa Avenue / M26 junction. The access configuration is shown in Figure 6.2 below.

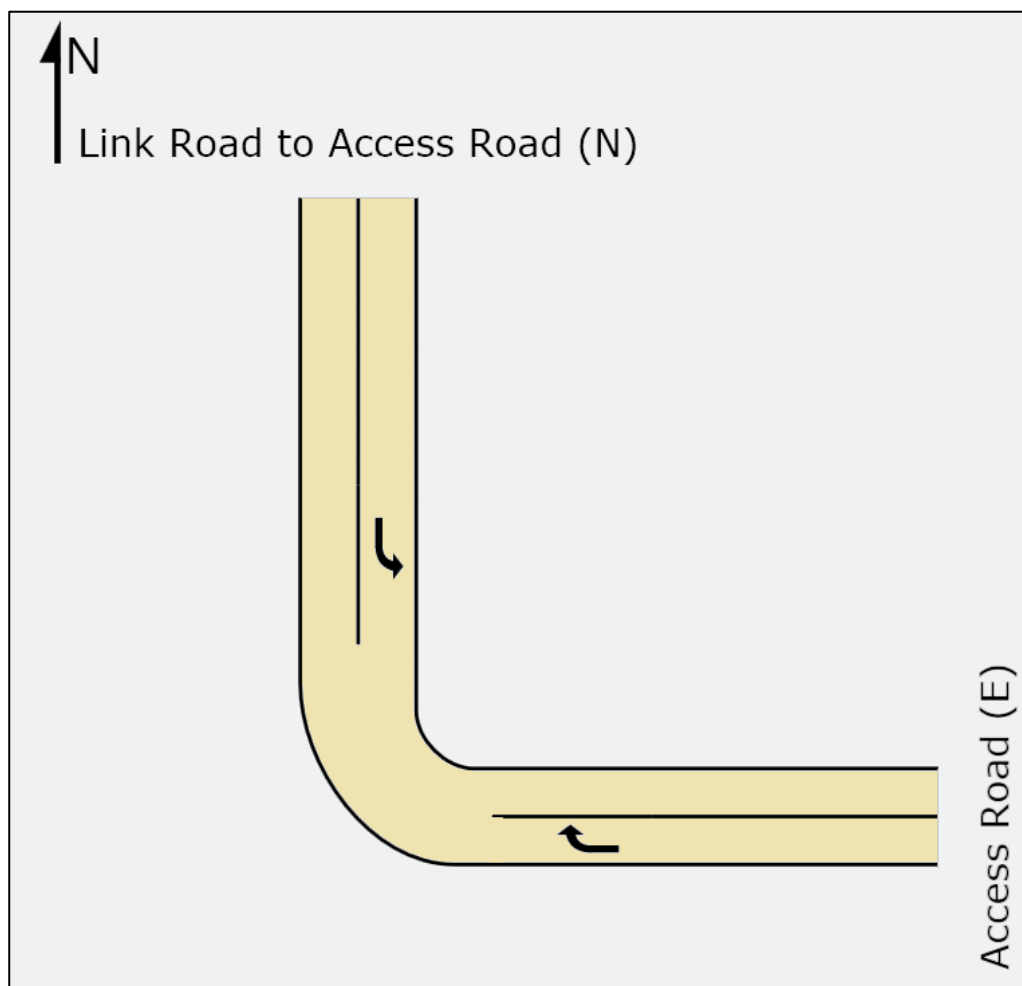


FIGURE 6.2: PROPOSED ACCESS ROAD CONFIGURATION

6.4 Access Control

The entrance will be access controlled by a boom gate operated by a security guard except during the peak hours where traffic entering the site will be free flowing for staff and parents, whilst visitors will be stopped and required to fill in a register, prior to accessing the school.

It is recommended as per COTO TMH16 - Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, Volume 2, page 28 a minimum ingress throat length of 15m be provided and the access lane widths must be at least 4.5m to accommodate an emergency vehicle.

7. PUBLIC TRANSPORT AND NON- MOTORISED TRANSPORT

7.1 Public Transport

Buses and taxis do not operate along Mimosa Avenue. However, bus stops are provided along the existing Mimosa Avenue / M26.

There are no existing public transport facilities located within the vicinity of the study area. Pupils attending the school via public transport will be allowed to be dropped off and picked up at a designated public transport lay-by within the school.

7.2 Non- Motorised Transport

There are no existing pedestrian walkways located along Mimosa Avenue.

It is recommended that pedestrian facilities be provided along the site frontage of the proposed development in consultation with the relevant departments of the City of Tshwane (CoT).

It is further recommended that pedestrian crossings with dropped kerbs and tactile paving be provided at all approaches of the signalised junctions.

8. PARKING, DROP-OFF AND PICK-UP AREA AND SWEPT PATH ANALYSIS

8.1 Parking

Parking will be provided in accordance with the City of Tshwane Town Planning Scheme, 2008 (revised November 2014).

8.2 Drop-off and Pick-up Area

All pick-ups and drop-offs will occur within the site.

A site plan will be submitted at the SDP stage to indicate how the pick-ups and drop-offs will operate.

8.3 Swept Path Analysis

A Site Traffic Assessment (STA) will be done at the SDP stage to demonstrate that the internal circulation (swept path analysis) within the school development and at the access to the development site will be adequate.

9. ROAD SAFETY

9.1 Introduction

The proposed school is currently being designed as a boarding school for all **2 000** learners with accommodation provided within the school grounds. All learners will be picked up and dropped off within the school. Road safety at and near the vicinity of the proposed school is addressed in this section

9.2 External Road Safety

An investigation has been done to highlight the potential road safety hazards on the external road network near the vicinity of the school. Mitigating measures to reduce these hazards are then discussed.

The following potential hazards were identified:

- No walkways along Mimosa Road;
- No walkways along M26;
- No street lighting along Mimosa Road;
- No pedestrian facilities at the M26/Mimosa Road junction;
- Lack of UA (universal access) facilities in vicinity of site;
- Poor condition of Mimosa Road pavement;
- Lack of signage along Mimosa Road;
- Geometry of the M26 south leg to the M26/Mimosa Road junction encourages speeding.

The following mitigating measures are proposed:

- Upgrade Mimosa Road from its intersection with the M26 up to 2nd Avenue and provide walkways
- Provide street lighting along Mimosa Road from its intersection with the M26 up to 2nd Avenue;
- Provide pedestrian facilities at the M26/Mimosa Road junction to connect with new walkways to be provided along Mimosa Road and the existing bus lay-bys at the junction;

- Install speed limit signs and school warning signs along Mimosa Road when upgraded;
- Provide UA facilities in vicinity of site;
- Install Optical Speed Bars (OSB) on the southern leg of the M26/Mimosa Road junction when the junction is signalised;
- Reduce speed along the M26 from 100 km/h to 80km/h between Mimosa Road in the north and the R511 in the south.

9.3 Internal Road Safety

An investigation has been done to highlight the potential road safety hazards within the school based on the proposed layout. Mitigating measures to reduce these hazards then discussed.

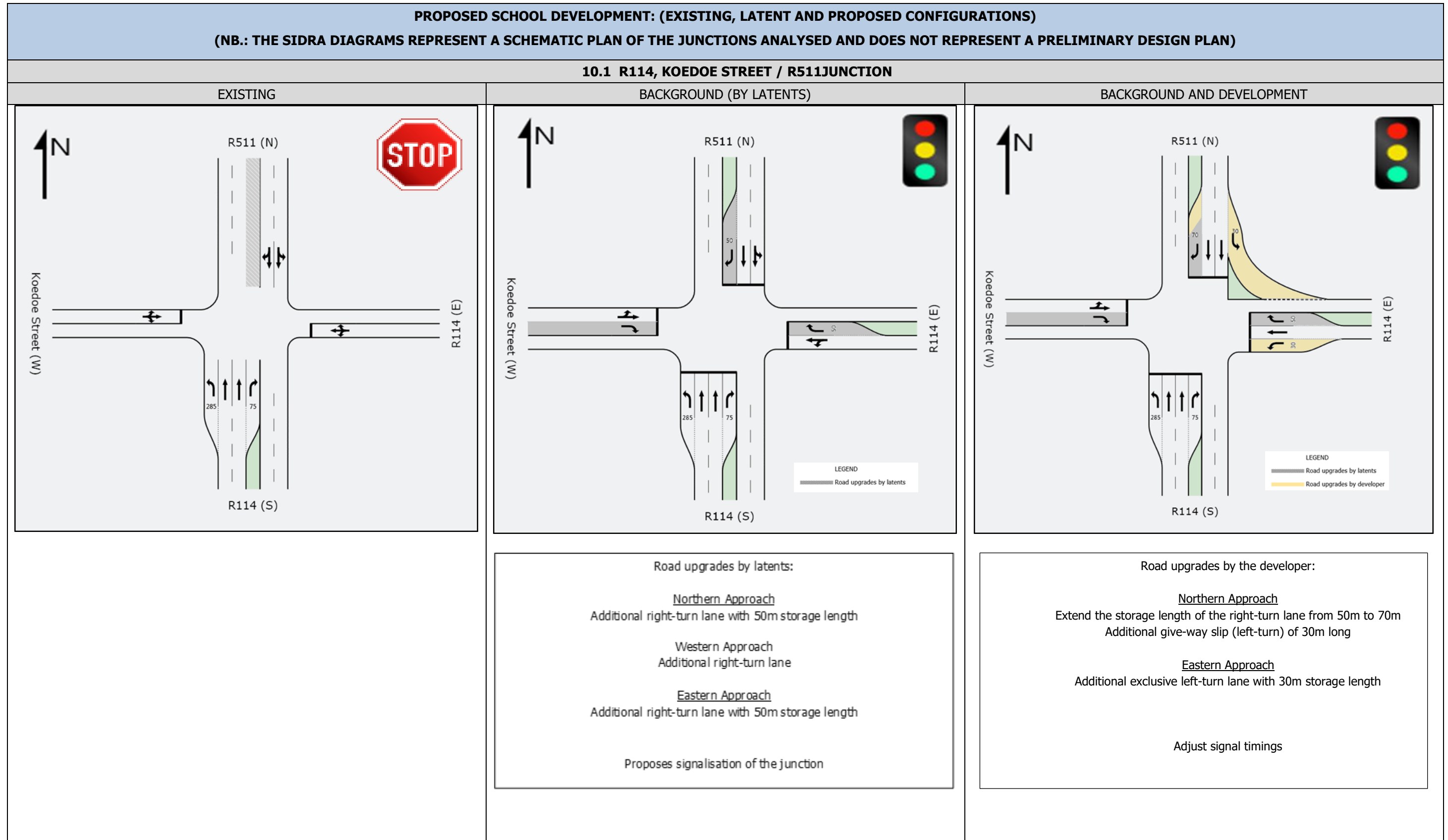
The following potential hazards were identified:

- Location of drop-off and pick-up area within school;
- Pedestrian movement from carpark and drop off, pick up area;
- Carpark layout;
- Internal road layout and circulation; and
- Pedestrian facilities.

The following mitigating measures are proposed:

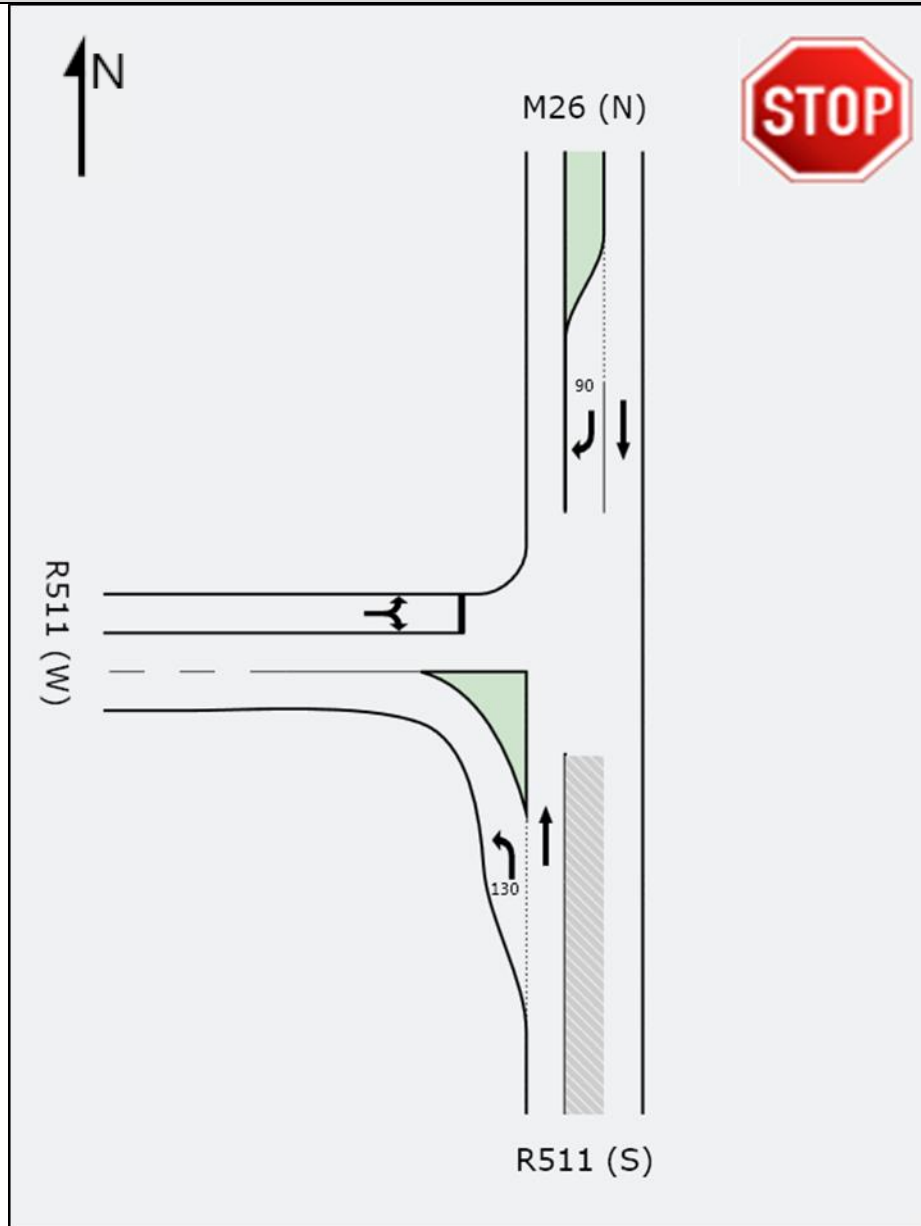
- Drop-off and pick up area to be located away from carpark with provision of a pass-by lane and walkway on the left hand side;
- Walkways to be provided from drop off, pick-up area, public transport area and carparks to link up to all entrances to the school buildings and the external walkways. Clearly marked safe crossing points will also be provided;
- The carpark will be designed to allow for minimum vehicle/pedestrian conflict and ease of movement into and out of parking bays; and
- The internal road network will be designed to minimise congestion and vehicle/pedestrian conflict.

10. EXISTING AND PROPOSED CONFIGURATIONS

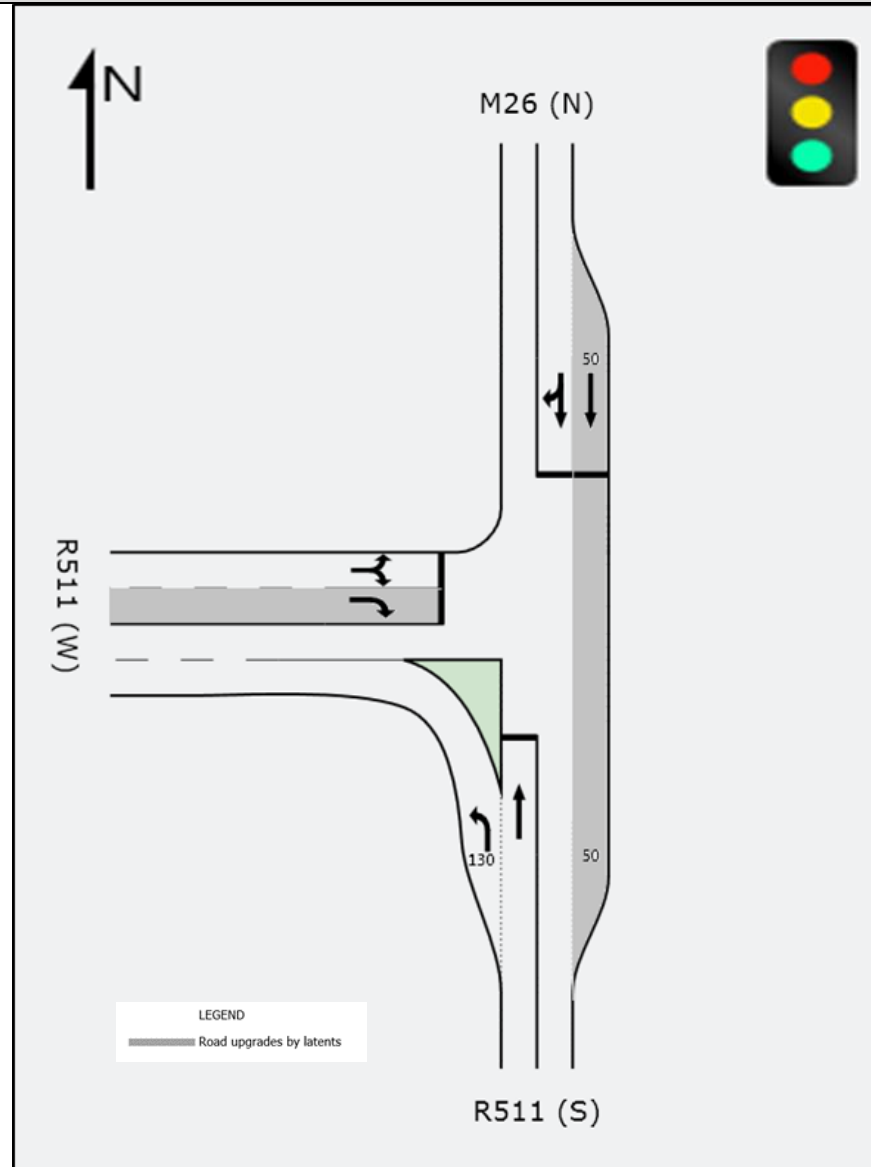


10.2 M26 (K46) / R511 (K27) JUNCTION

EXISTING



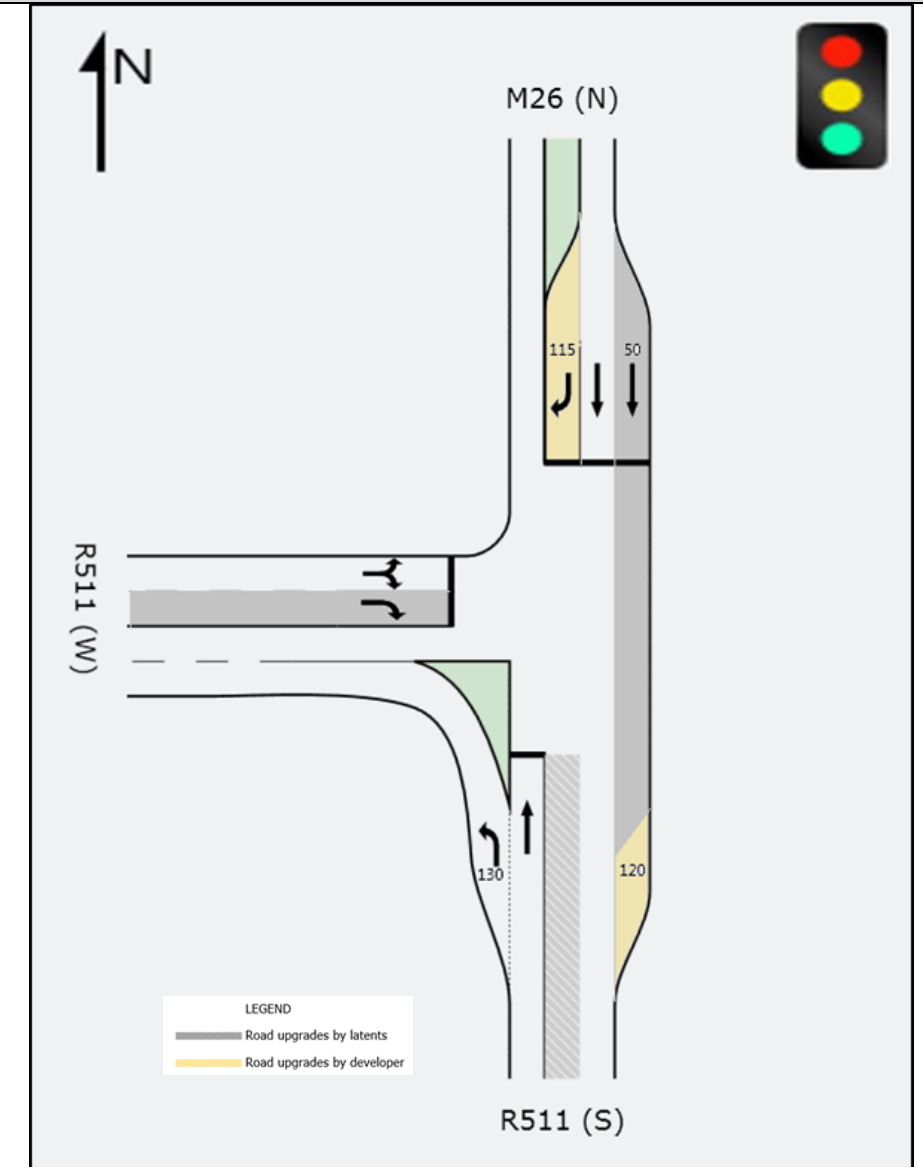
BACKGROUND (BY LATENTS)



Road upgrades by latents:

- Northern Approach
Additional through lane with 50m storage length
- Southern Approach
Additional exit lane with 50m storage length
- Western Approach
Additional right-turn lane
- Proposes signalisation of the junction

BACKGROUND AND DEVELOPMENT



Road upgrades by the developer:

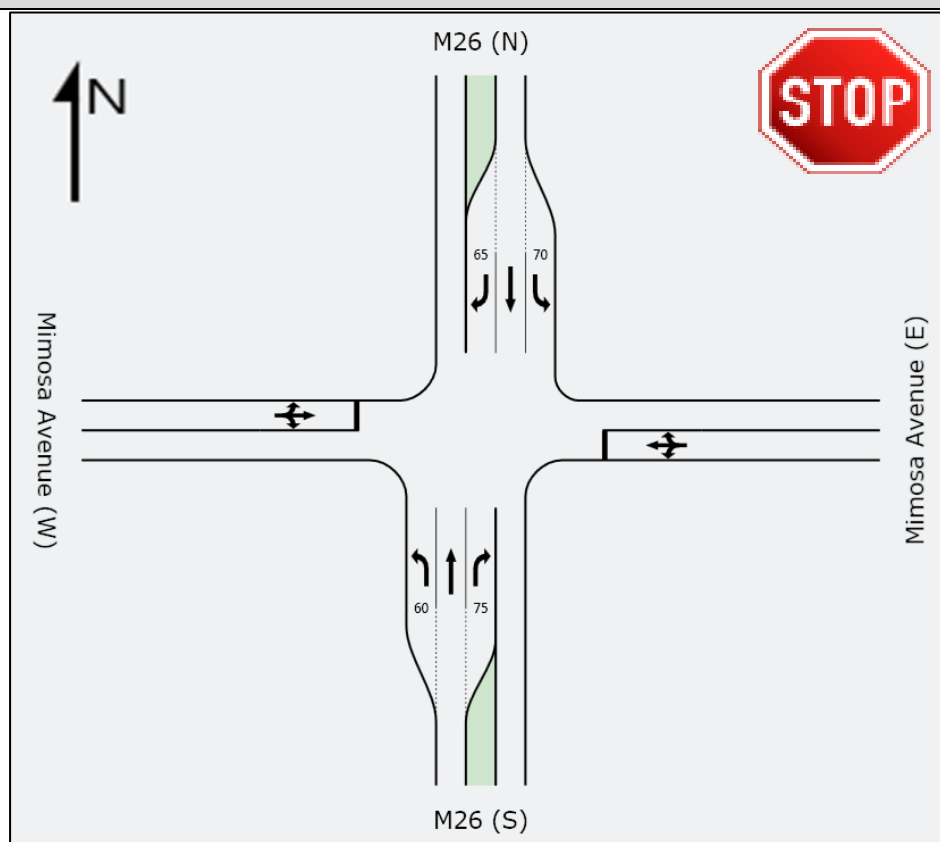
- Northern Approach
Add / retain the existing exclusive right-turn lane of 115m storage length
- Southern Approach
Extend the exit lane from 50m to 120m long
- Adjust signal timings

10.3 MIMOSA AVENUE / M26 (K46) JUNCTION

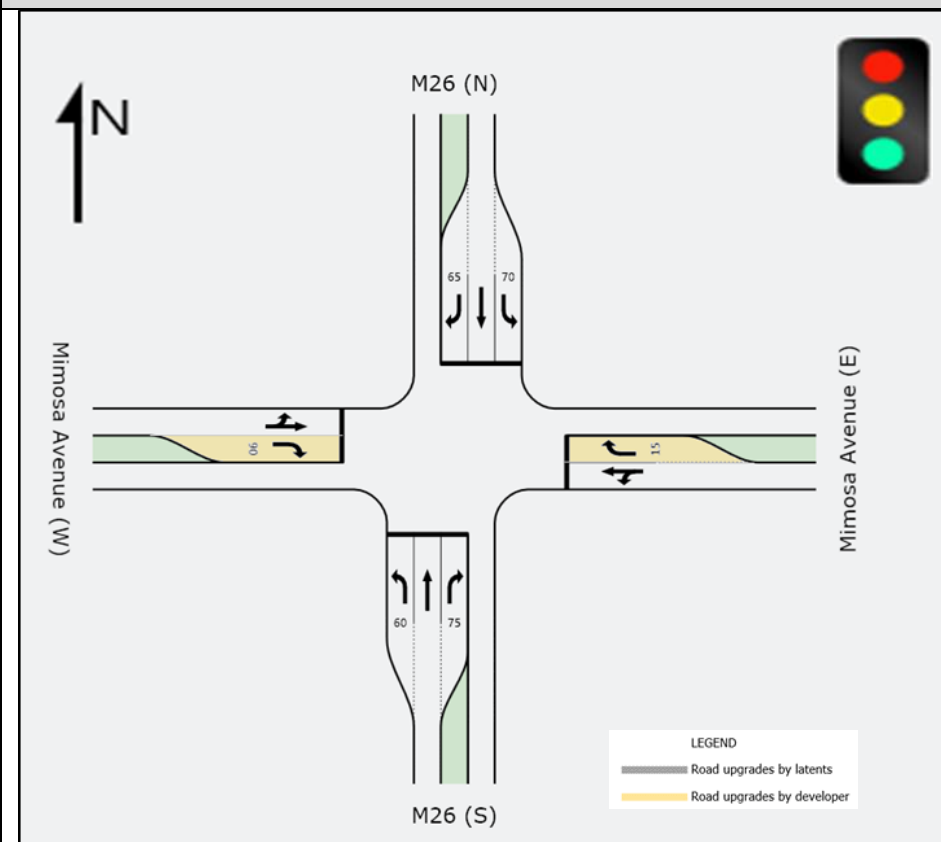
EXISTING

BACKGROUND

BACKGROUND AND DEVELOPMENT



N / A



Road upgrades by the developer:

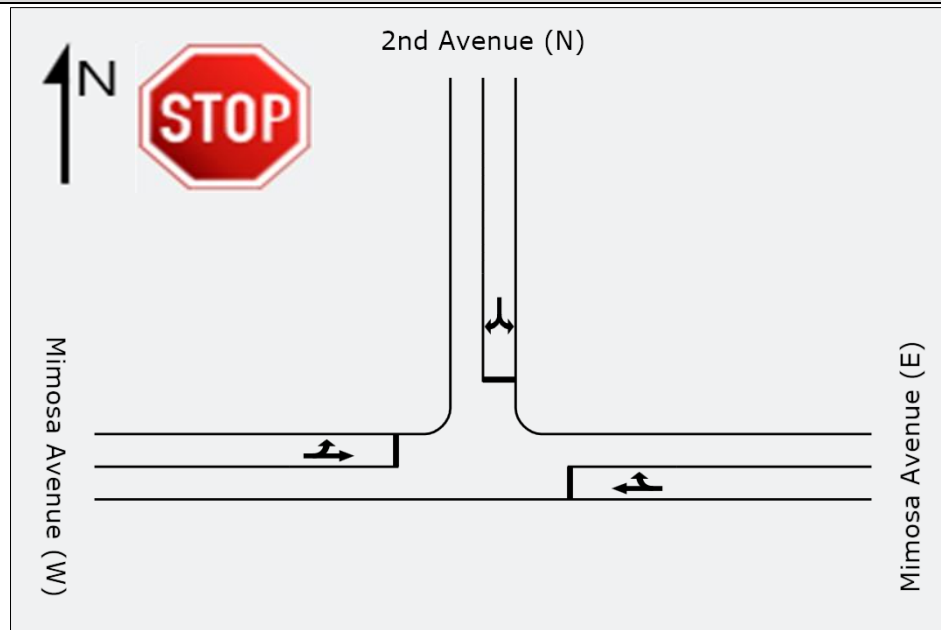
Eastern Approach
Additional right-turn lane with 15m storage length

Western Approach
Additional right-turn lane with 90m storage length

Signalise the junction

10.4 MIMOSA AVENUE / 2ND AVENUE, LINK ROAD TO ACCESS ROAD JUNCTION

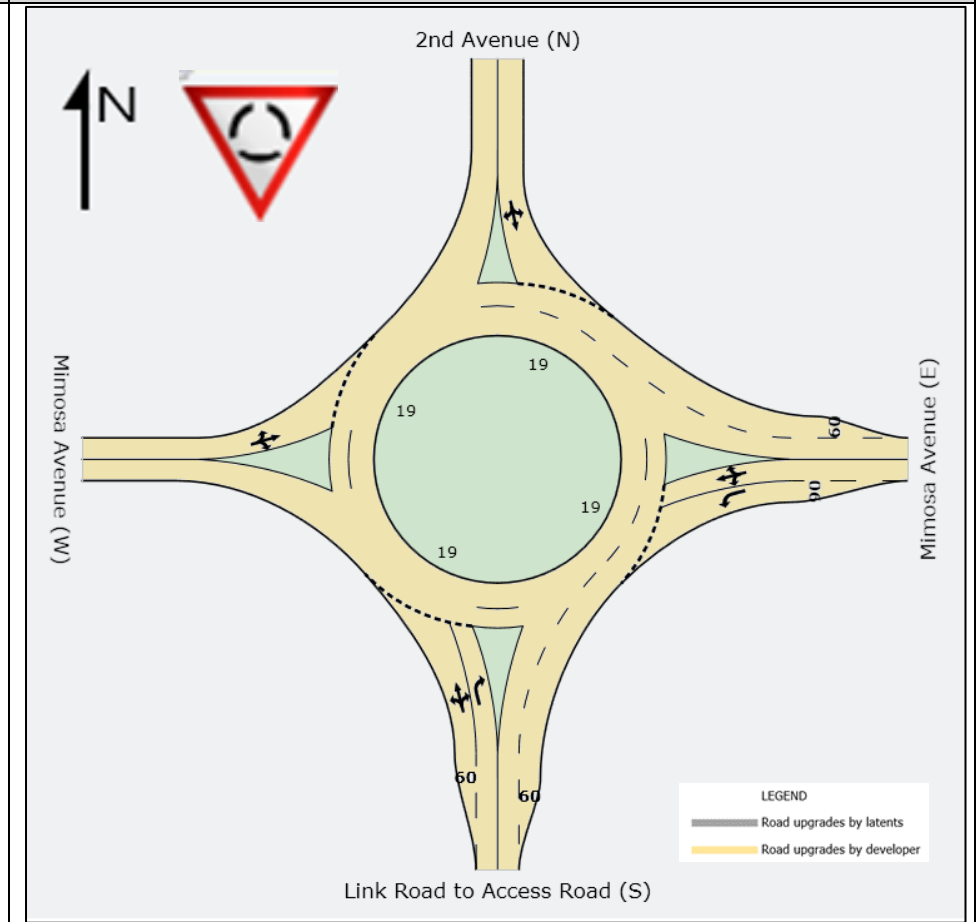
EXISTING



BACKGROUND

N / A

BACKGROUND AND DEVELOPMENT



Road upgrades by the developer:
Proposed mini circle

10.5 ACCESS ROAD / LINK ROAD TO ACCESS ROAD JUNCTION

EXISTING	BACKGROUND	BACKGROUND AND DEVELOPMENT
<p>N / A</p>	<p>N / A</p>	<div data-bbox="1961 487 2843 1325" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">LEGEND</p> <ul style="list-style-type: none"> Road upgrades by latents Road upgrades by developer </div> <div data-bbox="1961 1335 2843 1598" style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">Road upgrades by the developer: Proposed Access configuration</p> </div>

11. COST ESTIMATES

11.1 Introduction

The proposed road upgrades to accommodate the **background with development traffic** described in the previous section (**Section 10**) of the report are for the developer's account.

11.2 Improvement Costs

The estimated costs (excluding VAT) are shown below. These costs are only for the junction improvements.

External Road Upgrades

- R114, Koedoe Street / R511 (K27) junction - R 757 725
- M26 (K46) / R511 (K27) junction - R 8154 475
- Mimosa Avenue / M26 (K46) junction - R 664 875
- Mimosa Avenue / Link Road to Access Road, 2nd Avenue junction - R 2 367 660
- Access Road/ Link Road to Access Road junction - R 1 659 645

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

The proposed boarding school (Cambridge College) to be located on part of portion 16 and part of portion 66 of the farm Knopjeslaagte 385 J-R, Centurion.

The proposed boarding school development will accommodate **2 000 pupils** and may generate **1 600** trips during the weekday AM peak hours.

An access to the development site will be provided off a link road to the Mimosa Avenue / 2nd Avenue junction as a form of a mini circle, approximately 530m west of the Mimosa Avenue / M26.

Road upgrades were proposed at the problematic junctions to mitigate the effect of the anticipated traffic to be generated by proposed development.

The capacity analysis indicate all the junctions will operate satisfactorily.

All pick-ups and drop-offs will occur within the site. A plan will be submitted at the SDP stage.

The pedestrian and parking facilities have to be provided in consultation with the relevant departments of the CoT.

12.2 Recommendations

It is recommended that:

- the developer carry out the proposed road upgrades as mentioned in **Section 10** of this study to mitigate the impacts of the development traffic;
- the developer constructs the pedestrian and parking facilities in consultation with the relevant departments of CoT;
- that pedestrian walkways be provided along the site frontage of the proposed development;
- all pick-ups and drop-offs take place within the site; and
- this Traffic Impact Assessment (TIA) be approved.

REFERENCES

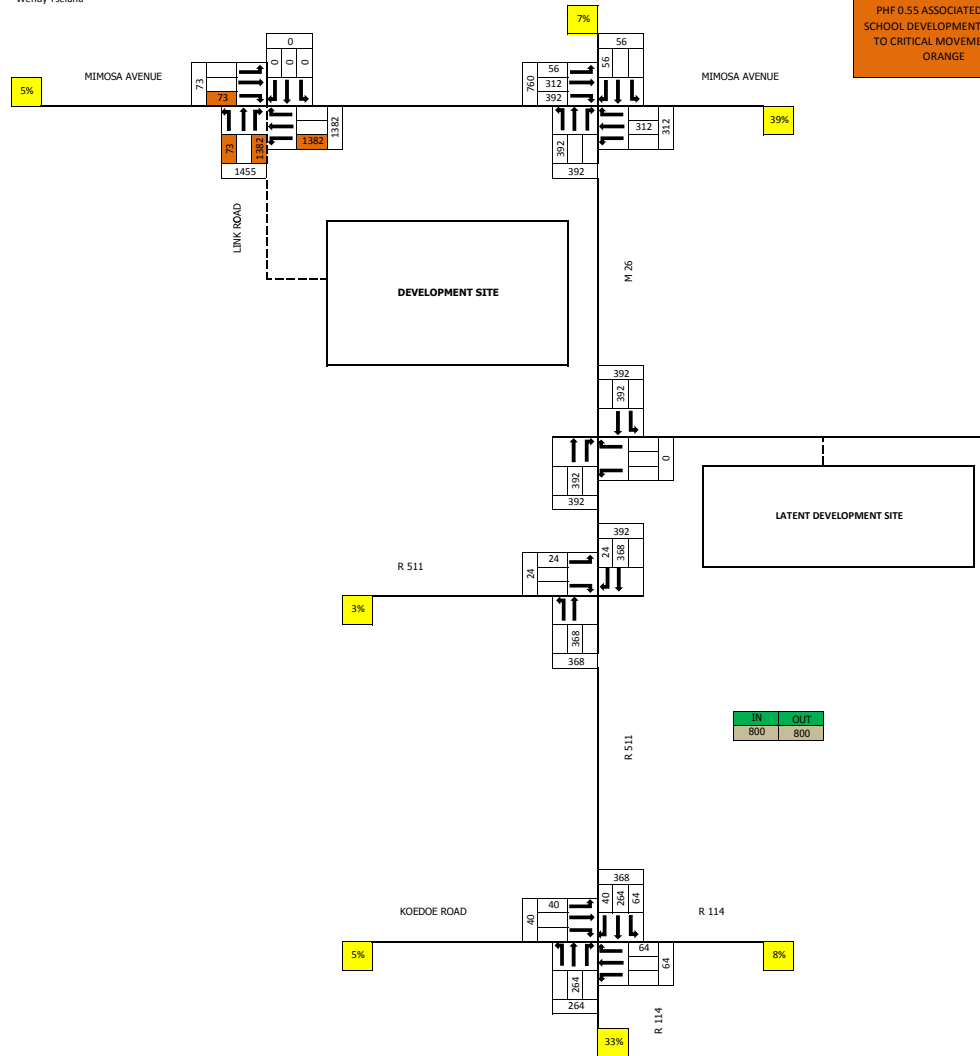
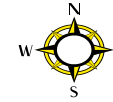
1. Akcelik & Associates Pty Ltd, (July 2010) **aaSIDRA 5.0**, Victoria, Australia.
2. Committee of Transport Officials, (September 2013) **TMH17 - South African Trip Data Manual**, Version 1.01, Pretoria, South Africa.
3. Committee of Transport Officials, (August 2012) **THM16 Volume 2 – South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual**, Version 1.0, Pretoria, South Africa.
4. Committee of Transport Officials (COTO), (August 2012) **TRH26 – South African Road Classification and Access Management Manual**, Version 1.0, SANRAL, South Africa.
5. BKS (Pty) Ltd, (July 1998) **Pretoria’s Policy for Traffic Impact Studies**, City Council of Pretoria, Pretoria, South Africa.
6. Transportation Research Board, (2010) **Highway Capacity Manual 2010**, Washington, D.C, USA.
7. Department of Transport, (October 1995) **Manual for Traffic Impact Studies (RR 93 / 635)**, Pretoria, South Africa.
8. Trafsol Data Specialist, (Ma 2017) **Cambridge College**, Centurion, South Africa.

FIGURES

Project Number
Job Description
Date
Done by

C2594
Copperleaf School
2018/11/29 16:28
Wendy Tselana

PHF 0.55 ASSOCIATED WITH SCHOOL DEVELOPMENT APPLIED TO CRITICAL MOVEMENTS IN ORANGE



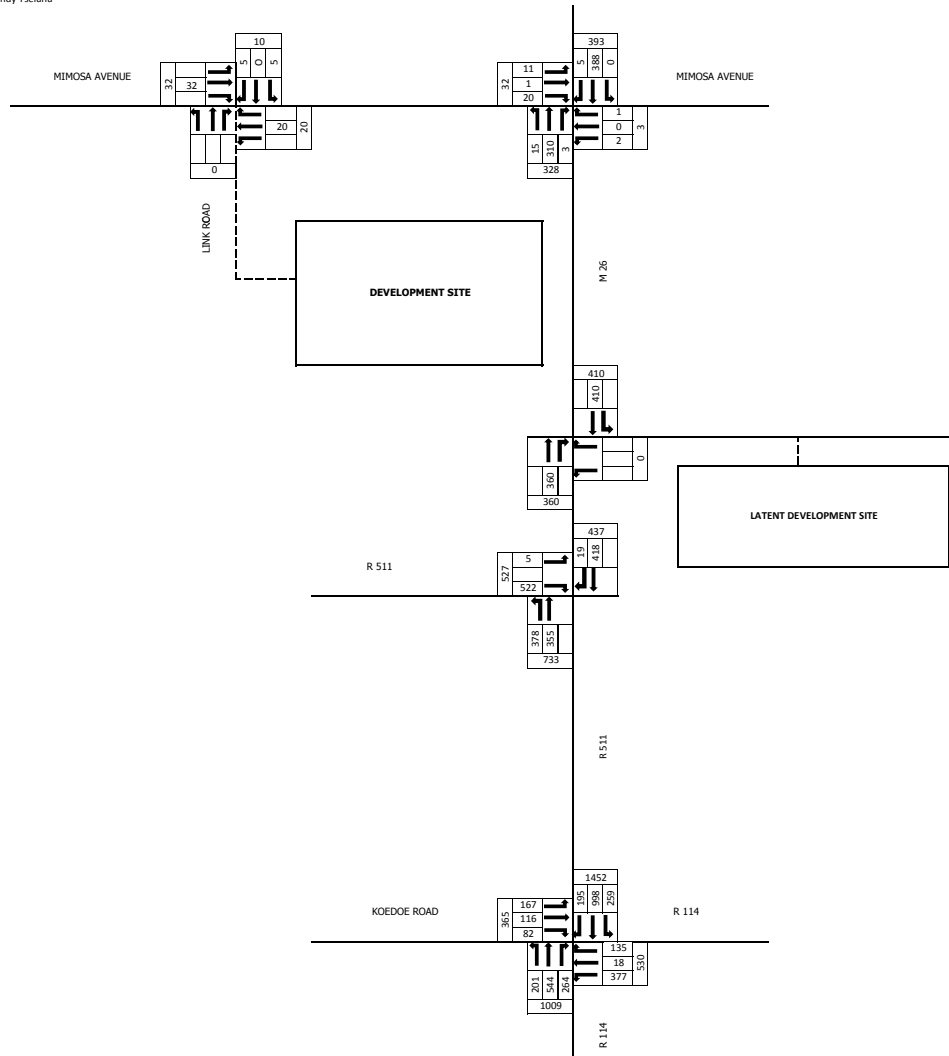
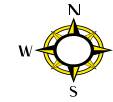
CIVIL CONCEPTS
Civil Concepts (Pty) Ltd, Reg No: 95/12428/07
50, 15th Street, Menlo Park (Cnr 17th Street & Justice Mahomed (Charles) Street)
PO Box 36148, Menlo Park, 0102
Office: +27 12 460 0008
Fax: +27 12 460 0005
www.civilconcepts.co.za

CESA

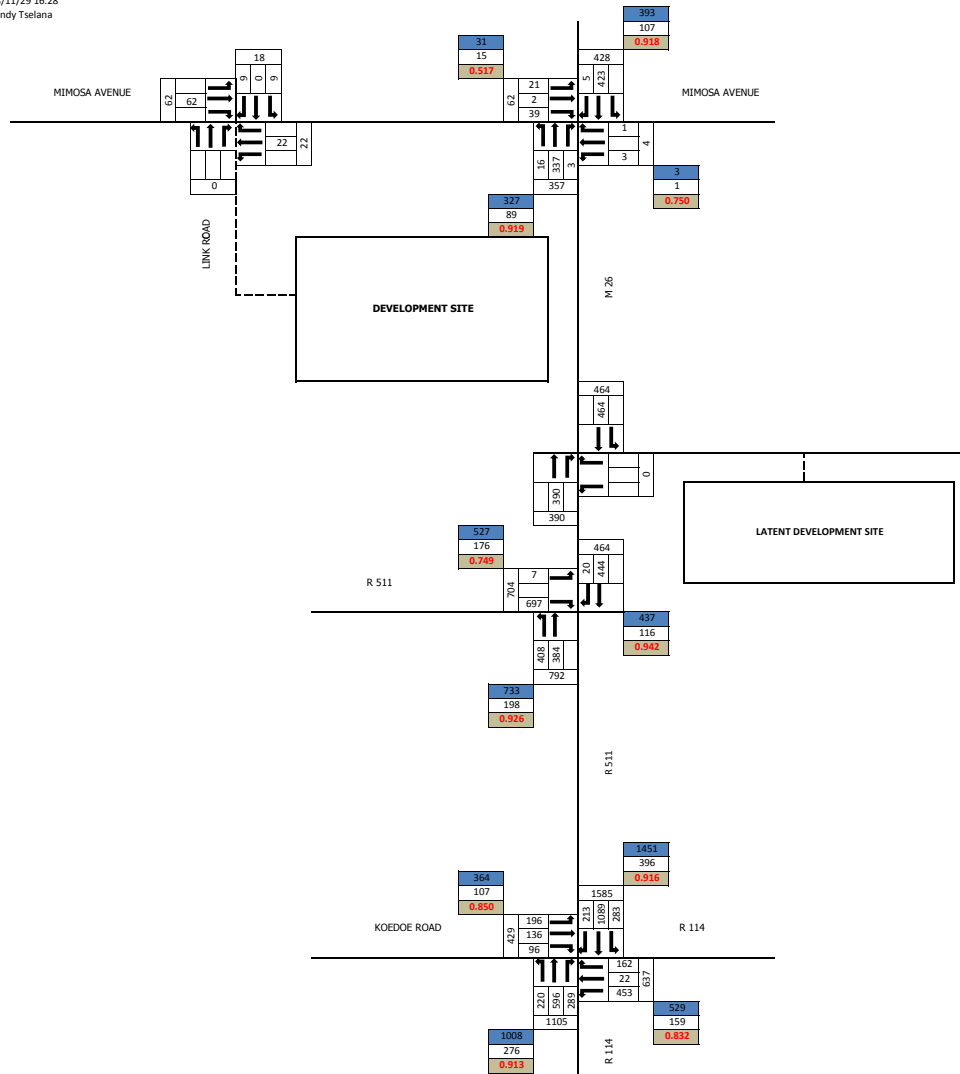
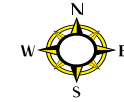
WEEKDAY MORNING PEAK HOUR DEVELOPMENT TRIPS

FIGURE 2.1

Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana



Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana



LEGEND	
1031	Total Hourly Volume
267	Highest 15 min. volume
0.965	PHF

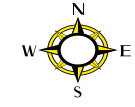
CIVIL CONCEPTS
 Civil Concepts (Pty) Ltd, Reg No: 9512428/07
 50, 15th Street, Menlo Park (Cnr 17th Street & Justice Mahomed (Charles) Street)
 PO Box 36148, Menlo Park, 0102
 Office: +27 12 460 0008
 Fax: +27 12 460 0005
 www.civilconcepts.co.za

CESA

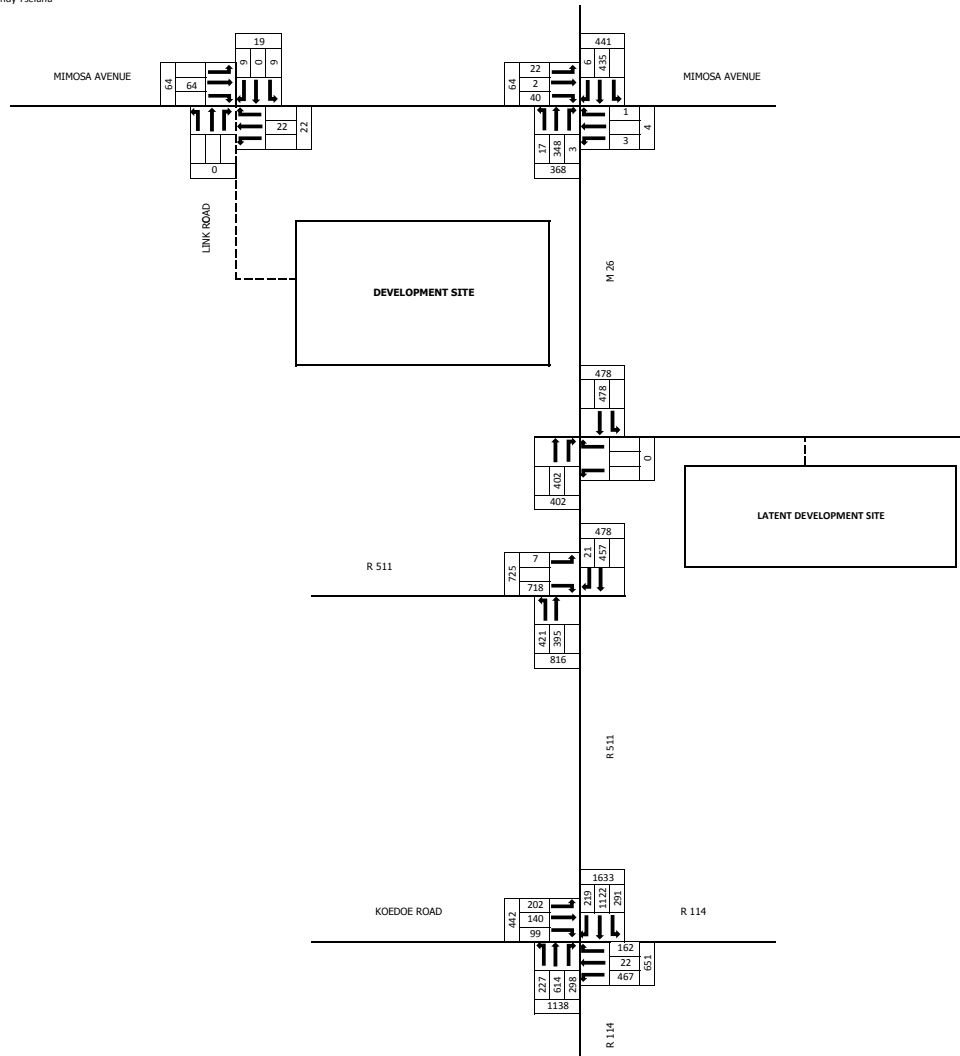
2018 WEEKDAY MORNING PEAK HOUR FLOW RATE TRAFFIC VOLUMES

FIGURE 3.2

Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana



ESCALATION RATIO	3%
YEAR(S)	1
ESCALATION FACTOR	1.03



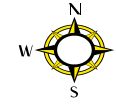
CIVIL CONCEPTS
 Civil Concepts (Pty) Ltd, Reg No: 95/12428/07
 50, 15th Street, Menlo Park (Cnr 17th Street & Justice Mahomed (Charles) Street)
 PO Box 36148, Menlo Park, 0102
 Office: +27 12 460 0008
 Fax: +27 12 460 0005
 www.civilconcepts.co.za

CESA

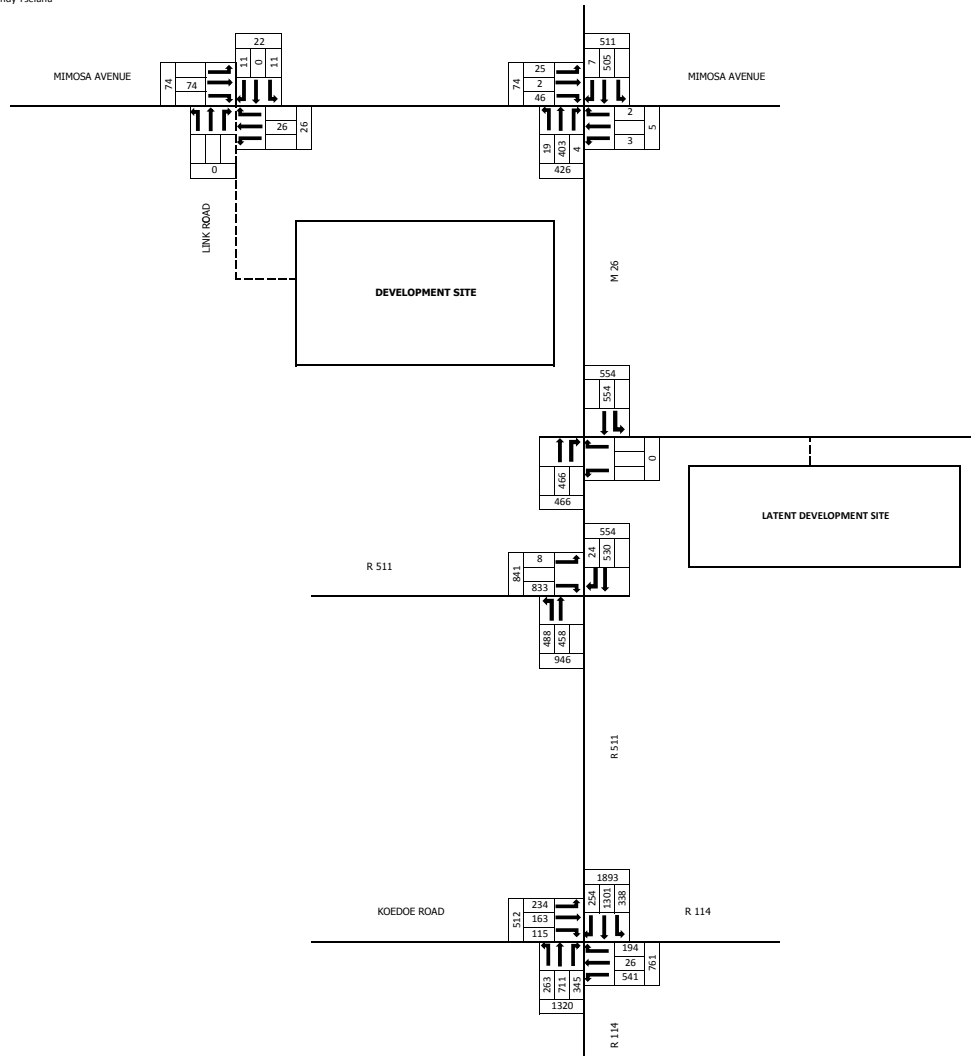
2019 WEEKDAY MORNING PEAK HOUR ESCALATED TRAFFIC VOLUMES

FIGURE 3.3

Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana



ESCALATION RATIO	3%
YEAR(S)	6
ESCALATION FACTOR	1.19



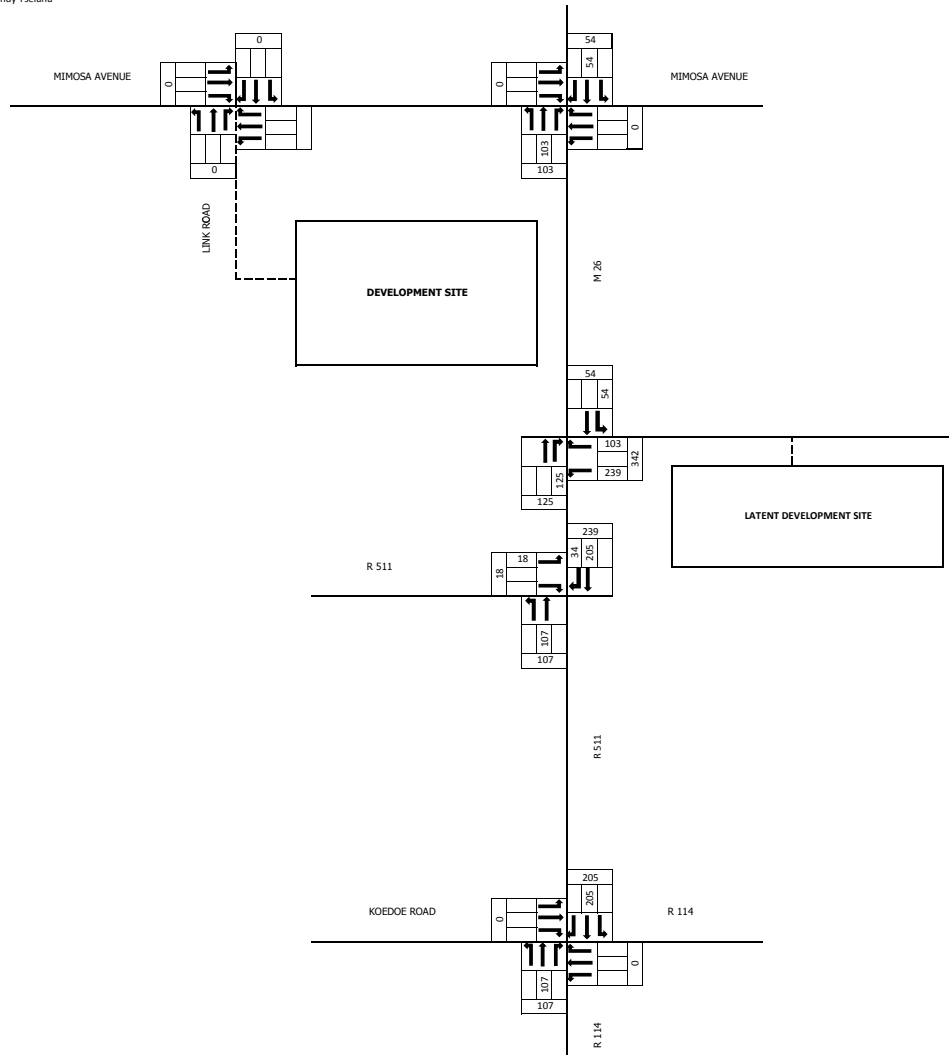
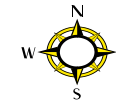
CIVIL CONCEPTS
 Consulting Engineers & Planners

Civil Concepts (Pty) Ltd, Reg No: 95/12428/07
 50, 15th Street, Menlo Park (Cnr 17th Street & Justice Mahomed (Charles) Street)
 PO Box 36148, Menlo Park, 0102
 Office: +27 12 460 0008
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CESA
 Consulting Engineers & Planners

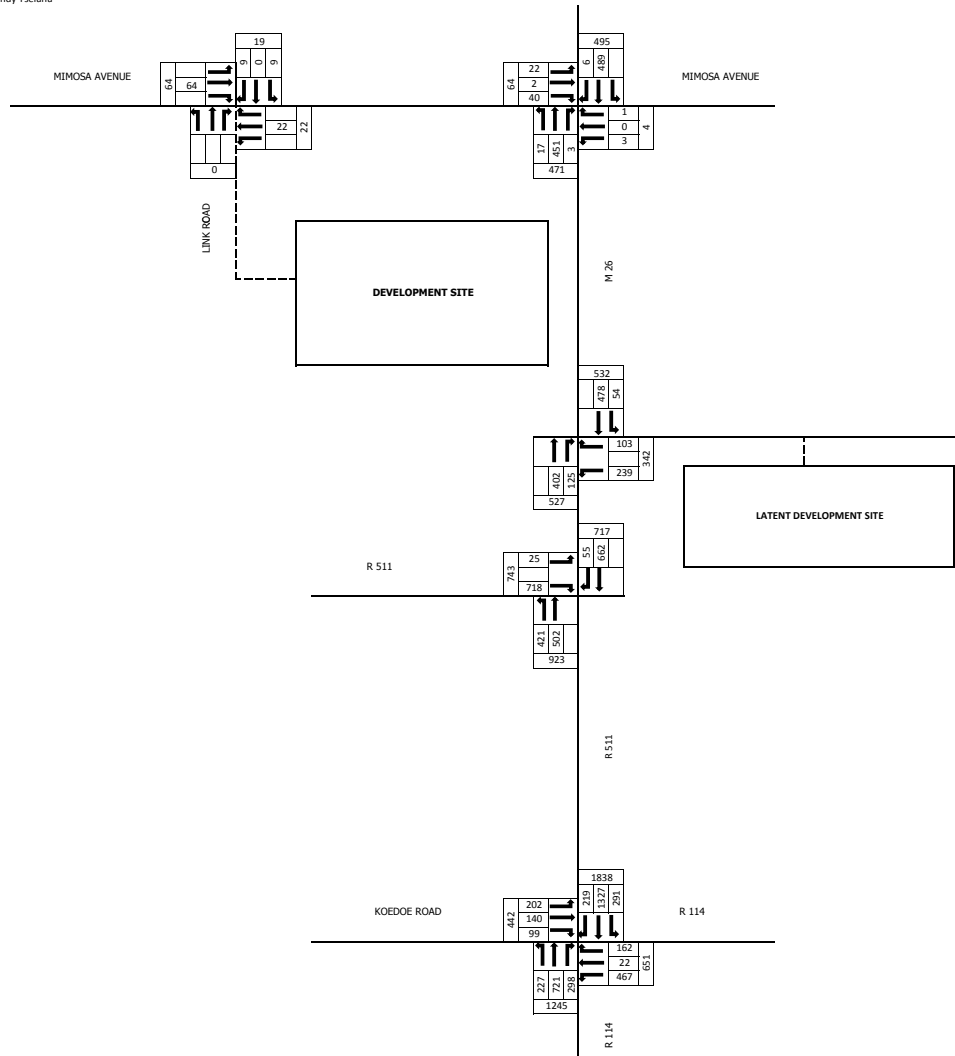
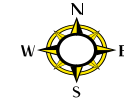
2024 WEEKDAY MORNING PEAK HOUR ESCALATED TRAFFIC VOLUMES

FIGURE 3.4

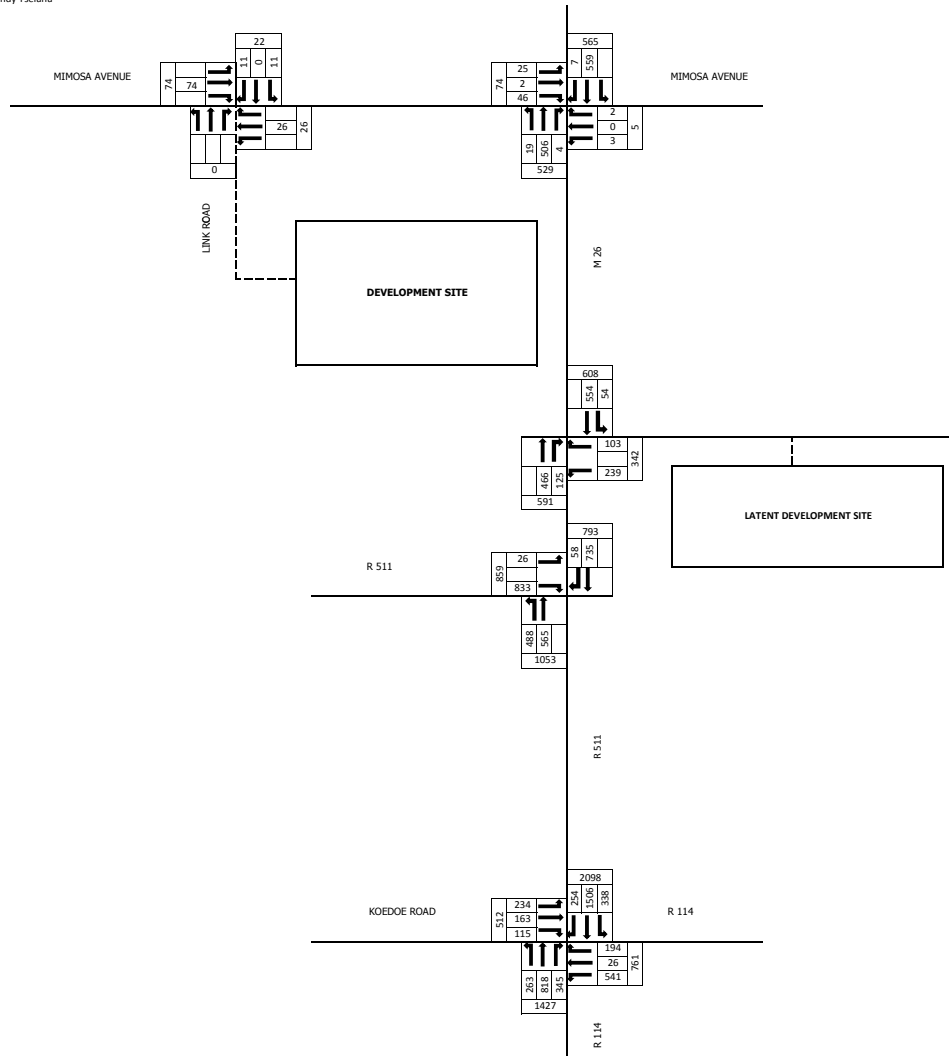
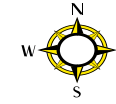


WEEKDAY MORNING PEAK HOUR LATENT DEVELOPMENT TRIPS

FIGURE 3.5

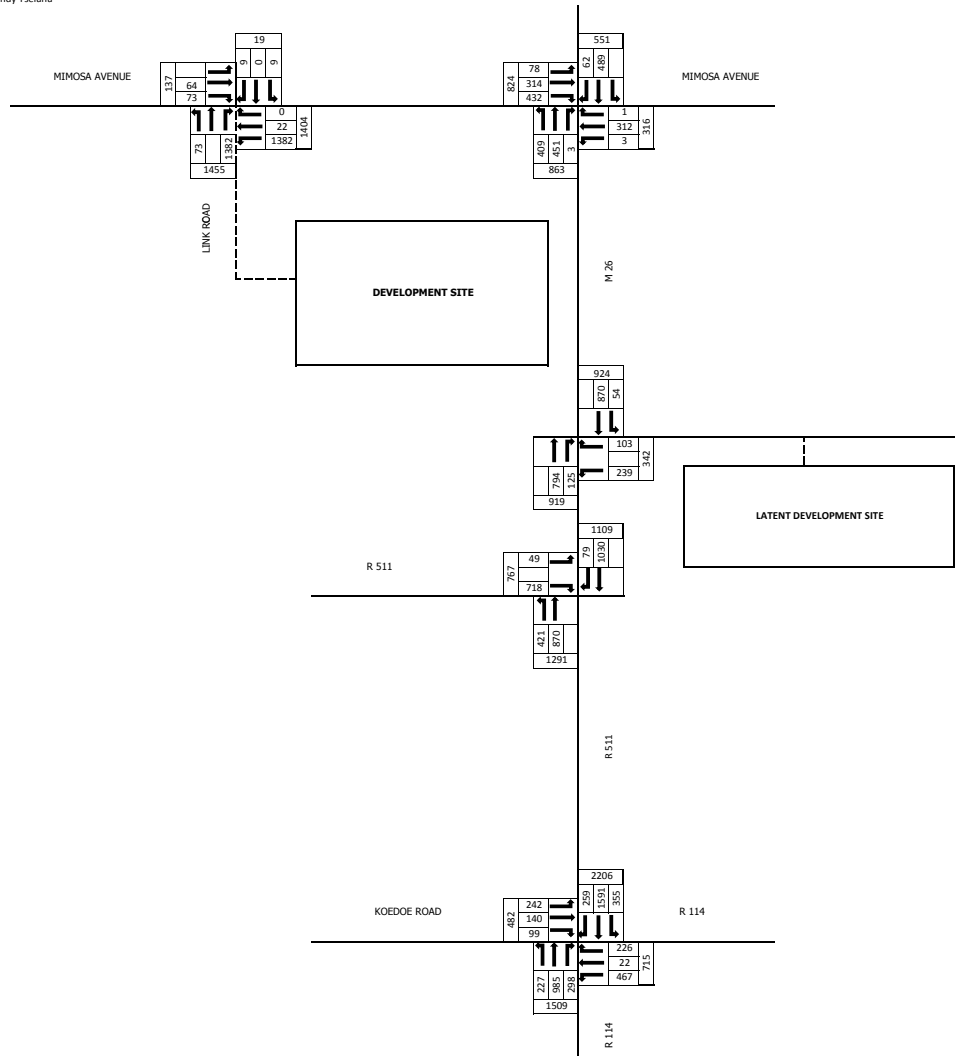
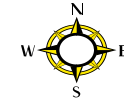


Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana

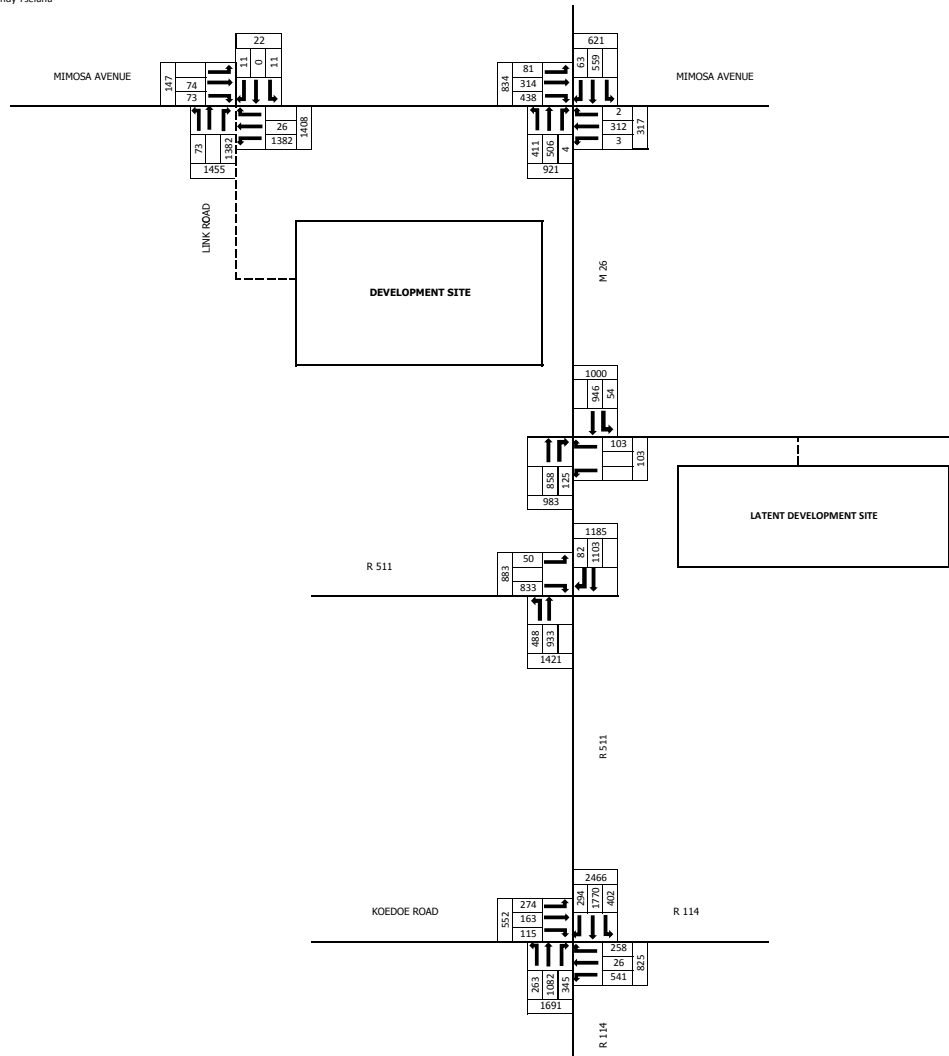
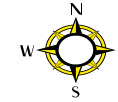


Project Number
Job Description
Date
Done by

C2594
Copperleaf School
2018/11/29 16:28
Wendy Tselana



Project Number C2594
 Job Description Copperleaf School
 Date 2018/11/29 16:28
 Done by Wendy Tselana



ANNEXURE A
SITE LAYOUT PLAN



NOTES AND SPECIFICATIONS

19-11-2018	A	ISSUED FOR APPROVAL
DATE	NO	REVISION

CLIENT

CONSULTANT

CIVIL CONCEPTS (Pty) Ltd
 Consulting Civil & Structural Engineers
 PO Box 36148, Menlo Park, 0102
 Office: +27 12 460 0008
 www.civilconcepts.co.za

PROJECT STATUS

<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CONCEPT DRAWING	TENDER DRAWING	CONSTRUCTION DRAWING	AS BUILT DRAWING

PROJECT ENGINEER (CONSULTANT)
 W. STANDER 20060017
 INITIALS AND SURNAME SIGNATURE AND P. No. DATE

INSPECTOR OF WORKS (MUNICIPAL):
 INITIALS AND SURNAME SIGNATURE AND P. No. DATE

"AS BUILT DRAWING"
 CC CONSULTING ENGINEER

INITIALS AND SURNAME SIGNATURE AND P. No. DATE

PROJECT

WFA CHRISTIAN SCHOOL

DRAWING TITLE

SITE LAYOUT PLAN

PROJECT NO	C2594-900	REV. NO.	A
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SCALE	1:2000	DESIGNED	W. STANDER
		DRAWN	L. SMUTS

DATE	NOVEMBER 2018	CHECKED	W. STANDER
------	---------------	---------	------------

ANNEXURE B

TOWNSHIP APPROVAL AND COE



Economic Development and Spatial Planning

Room 216 | 2nd Floor | Ou Raadsaal | Church Square | Pretoria | 0002
PO Box 6338 | Pretoria | 0001
Tel: 012 358 1354 / 012 358 1355 | Fax: 012 358 0310
Email: makgorometjem@tshwane.gov.za | www.tshwane.gov.za | www.facebook.com/CityOfTshwane

My ref: CPD/9/2/4/2-5102T (Item no:29859)
Your ref:
Contact person: Linda Zeelie
Section/Unit: Regional Spatial Planning

Tel: 012 358 3259
Fax:
Email: LindaZ@tshwane.gov.za

REGISTERED LETTER

SFP TOWN PLANNING

P O Box 908

GROENKLOOF

0027

Sir/Madam



APPLICATION FOR TOWNSHIP ESTABLISHMENT ON PART OF PORTION 16 AND PART OF PORTION 66 OF THE FARM KNOPJESLAAGTE No 385-JR IN TERMS OF SECTION 16(4) OF THE CITY OF TSHWANE LAND USE MANAGEMENT BY-LAW, 2016 (the "LUM" By-law):

PROPOSED TOWNSHIP: GERARDSVILLE EXTENSION 2

Receipt of your above-mentioned land development application on 14 December 2018 as well as additional information submitted is hereby acknowledged.

You are hereby directed to proceed with the public participation as contemplated in section 16(1)(f) and Schedule 13 to the LUM By-law within 28 days after the date of receipt of this notification.

Your attention is drawn to Section 1 of the LUM By-law in particular to the following definition:
"date of notice or date of notification" means the date on which a notice is served or delivered on a person or body as contemplated in the provisions of this By-law or published in the media or Provincial Gazette as the case may be and which date of notice and appearance shall not be between 10 December to 10 January of any year or as may be determined by the Municipality

In order for the applicants and the Municipality to comply with the provisions of the LUM By-law for purposes of calculation of days in relation to the submission of advertisements and confirmation of completeness of your application by the Municipality the period of 10 December until 10 January shall be excluded for the placement of the advertisements within 28 days of notification in terms of this notification, and must be done within 28 days of the expiry of the mentioned period

Please ensure that you indicate that the application can be viewed at the Room E10, cnr Basden and Rabie Streets, Centurion Municipal Offices, in your public participation process notices.

A 5 | Ack By-law appl - proceed with ads FESTIVE SEASON

Notwithstanding the above please note the provisions of Regulation 16(9) of the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013):

You are directed in terms of Section 16(1)(l) to forward copies of the application to the National and Provincial Departments as agreed to.

Proof of the above mentioned public participation must be submitted at Room E10, cnr Basden and Rabie Streets, Centurion **within 7 days after the closing date of objections, failing which the application may be regarded as incomplete.**

Please note that enquiries **within 90 days** from the date of this letter regarding the progress of your application cannot be dealt with, as the comments on your application from the relevant departments may not be available within the said period.

The Municipality reserves the right to, at any given time after submission of the application, request any additional information/documentation required to further process and evaluate the application.

"If at any time during the administrative phase the applicant fails to act or provide the necessary information within the timeframe required by the municipality, the application is deemed to be refused by the Municipal Planning Tribunal or Authorised Official".

All correspondence via e-mail must be sent to CityP_Registration@tshwane.gov.za or to the address as contained in the letterhead.

Note: any correspondence sent to a different address might not be received by the Department and cannot be attended to.

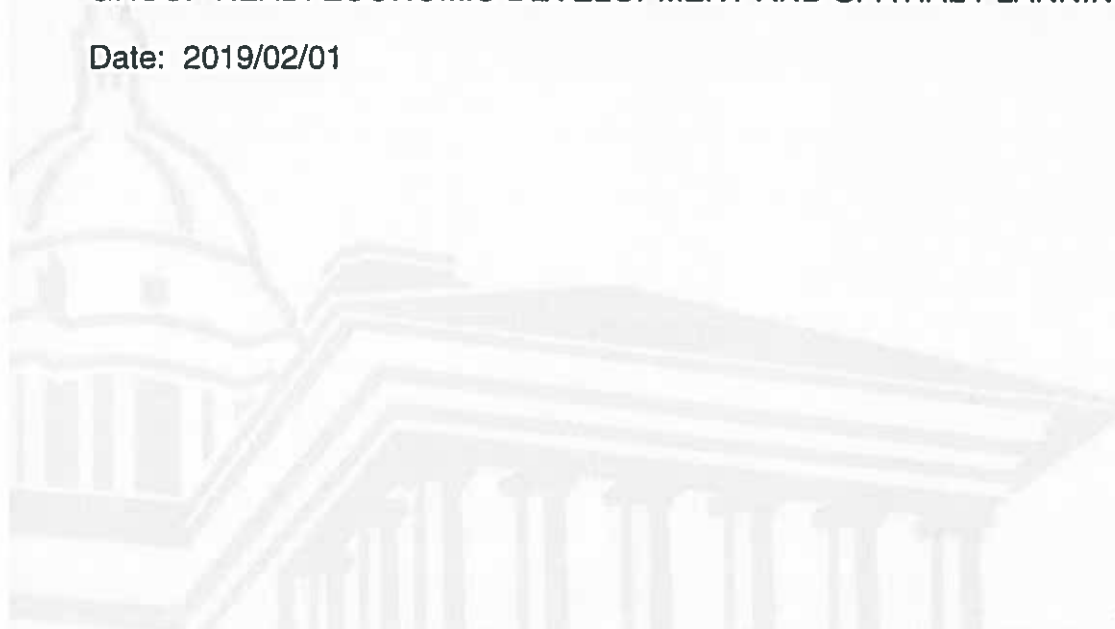
PLEASE NOTE: Should this letter be received after the 28 days allowable for the Municipality to respond to the completeness or not of your application, the applicant may proceed to advertise and the timeframes above shall apply in so far it is incumbent on the applicant to submit proof of advertising within **7 days** after the closing date of advertisements.

Regards

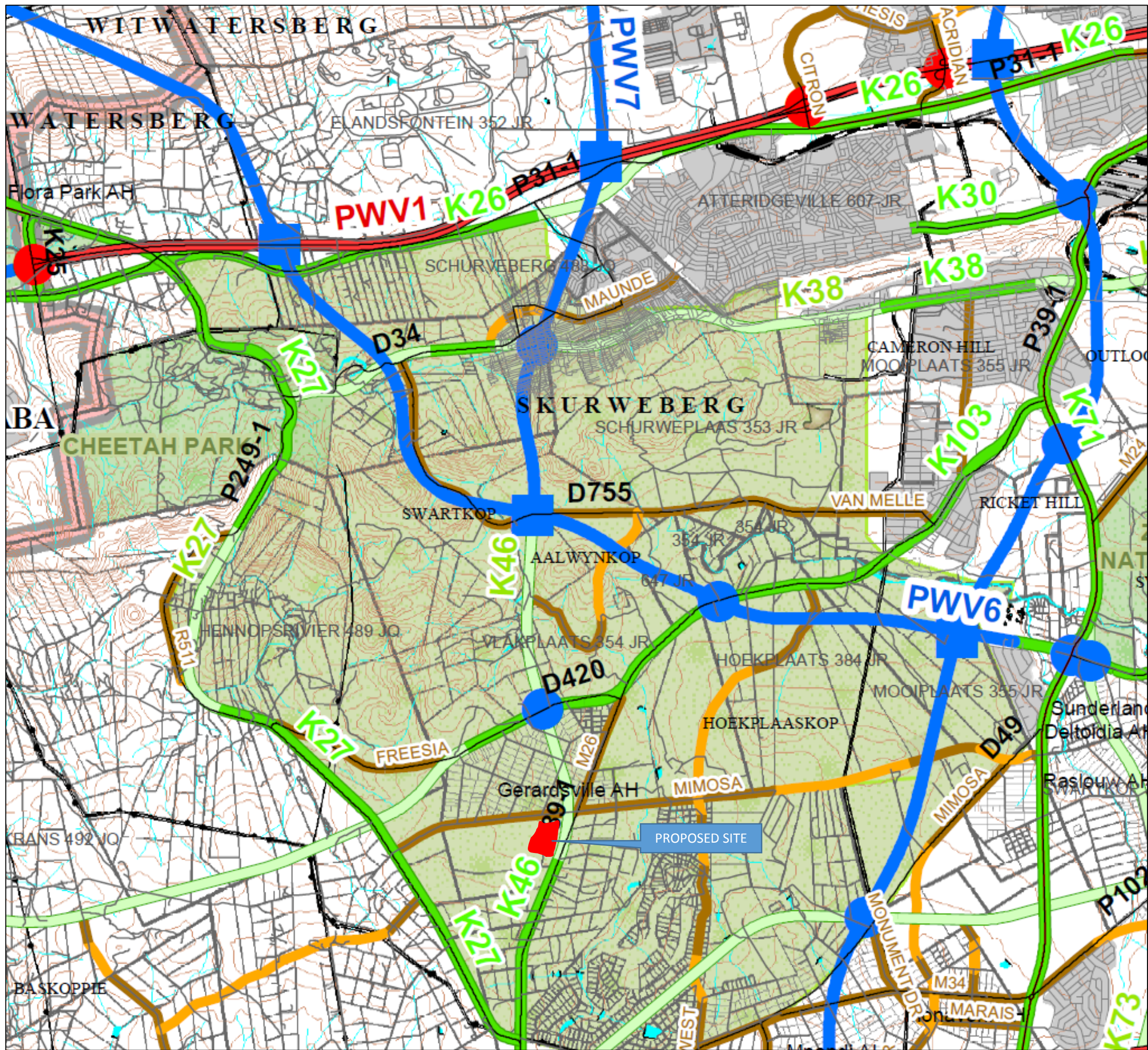


MA Makgata Pr.PlIn (A1243/2002), IsoCaRP 1384
GROUP HEAD: ECONOMIC DEVELOPMENT AND SPATIAL PLANNING

Date: 2019/02/01



ANNEXURE C
FUTURE ROAD NETWORK



ANNEXURE D

SITE INVESTIGATION PICTURES







































ANNEXURE E
CAPACITY CALCULATIONS RESULTS

MOVEMENT SUMMARY

Site: 2019 AM BG

R114, Koedoe Street / R511 Junction
 2019 AM Morning Peak Hour Background Traffic Volumes
 Latent Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R114 (S)											
1	L	227	0.0	0.242	14.8	LOS B	4.9	34.0	0.48	0.76	42.6
2	T	856	0.0	0.342	7.1	LOS A	8.9	62.0	0.52	0.46	47.8
3	R	163	0.0	1.047	186.9	LOS F	18.5	129.2	1.00	1.84	9.7
Approach		1246	0.0	1.048	32.0	LOS C	18.5	129.2	0.58	0.69	31.2
East: R114 (E)											
4	L	467	0.0	1.430	826.5	LOS F	152.4	1066.8	1.00	4.29	2.5
5	T	63	0.0	1.426	818.4	LOS F	152.4	1066.8	1.00	4.29	2.5
6	R	121	0.0	1.069	184.5	LOS F	13.2	92.4	1.00	1.66	9.9
Approach		651	0.0	1.429	706.4	LOS F	152.4	1066.8	1.00	3.80	2.9
North: R511 (N)											
7	L	291	0.0	0.728	18.7	LOS B	18.2	127.1	0.75	0.90	41.0
8	T	1327	0.0	0.728	10.2	LOS B	22.6	158.1	0.75	0.69	43.9
9	R	219	0.0	0.623	22.7	LOS C	7.4	52.1	0.76	0.84	36.9
Approach		1837	0.0	0.728	13.1	LOS B	22.6	158.1	0.76	0.74	42.4
West: Koedoe Street (W)											
10	L	202	0.0	0.906	52.8	LOS D	16.6	116.4	1.00	1.17	24.9
11	T	140	0.0	0.906	44.6	LOS D	16.6	116.4	1.00	1.17	25.0
12	R	99	0.0	0.875	51.6	LOS D	5.4	37.6	1.00	0.98	24.8
Approach		441	0.0	0.906	49.9	LOS D	16.6	116.4	1.00	1.13	24.9
All Vehicles		4175	0.0	1.429	130.7	LOS F	152.4	1066.8	0.77	1.24	12.9

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

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

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

Processed: 27 November 2018 10:53:41 AM

SIDRA INTERSECTION 5.0.5.1510

Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\01 R114, Koedoe Street-R511 -REV3 (C)\BG\R114, Koedoe Street-R511.sip

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INTERSECTION

MOVEMENT SUMMARY

Site: 2019 AM BG+D

R114, Koedoe Street / R511 Junction
 2019 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R114 (S)											
1	L	227	0.0	0.359	22.5	LOS C	6.6	46.4	0.73	0.80	37.0
2	T	1016	0.0	0.597	16.1	LOS B	14.2	99.1	0.83	0.73	39.3
3	R	267	0.0	1.019	97.2	LOS F	18.4	129.0	1.00	1.43	16.3
Approach		1510	0.0	1.019	31.4	LOS C	18.4	129.0	0.85	0.86	31.2
East: R114 (E)											
4	L	304	0.0	1.000 ³	26.7	LOS C	8.7	60.9	0.97	0.84	34.6
5	T	282	0.0	0.549	22.9	LOS C	9.6	67.5	0.91	0.77	33.0
6	R	130	0.0	1.064	172.0	LOS F	13.2	92.4	1.00	1.68	10.5
Approach		715	0.0	1.064	51.5	LOS D	13.2	92.4	0.95	0.96	24.1
North: R511 (N)											
7	L	355	0.0	0.644	11.0	LOS B	5.3	37.0	0.44	0.72	46.1
8	T	1591	0.0	0.934	41.7	LOS D	36.6	256.2	1.00	1.28	26.7
9	R	259	0.0	0.794	36.1	LOS D	10.5	73.3	1.00	1.01	30.1
Approach		2205	0.0	0.934	36.1	LOS D	36.6	256.2	0.91	1.15	29.1
West: Koedoe Street (W)											
10	L	242	0.0	0.942	60.3	LOS E	19.5	136.3	1.00	1.32	22.9
11	T	140	0.0	0.942	52.1	LOS D	19.5	136.3	1.00	1.32	23.0
12	R	99	0.0	0.300	29.7	LOS C	3.8	26.4	0.84	0.78	33.1
Approach		481	0.0	0.942	51.6	LOS D	19.5	136.3	0.97	1.21	24.5
All Vehicles		4911	0.0	1.064	38.4	LOS D	36.6	256.2	0.90	1.04	28.3

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

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

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

³ x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2024 AM BG

R114, Koedoe Street / R511 Junction
 2024 AM Morning Peak Hour Background Traffic Volumes
 Latent Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R114 (S)											
1	L	263	0.0	0.281	15.0	LOS B	5.7	39.7	0.50	0.76	42.5
2	T	1013	0.0	0.406	7.4	LOS A	10.6	74.3	0.55	0.49	47.2
3	R	150	0.0	1.080	223.0	LOS F	18.6	130.0	1.00	1.93	8.4
Approach		1426	0.0	1.079	31.4	LOS C	18.6	130.0	0.59	0.69	31.4
East: R114 (E)											
4	L	541	0.0	1.726	1360.2	LOS F	246.0	1722.2	1.00	5.58	1.6
5	T	99	0.0	1.727	1352.0	LOS F	246.0	1722.2	1.00	5.58	1.6
6	R	121	0.0	1.069	184.6	LOS F	13.2	92.4	1.00	1.66	9.9
Approach		761	0.0	1.726	1172.2	LOS F	246.0	1722.2	1.00	4.95	1.8
North: R511 (N)											
7	L	338	0.0	0.830	25.8	LOS C	26.3	183.9	0.85	0.99	36.3
8	T	1506	0.0	0.830	15.9	LOS B	31.8	222.3	0.85	0.85	39.1
9	R	254	0.0	0.837	41.4	LOS D	12.4	86.7	0.92	1.05	28.0
Approach		2098	0.0	0.836	20.6	LOS C	31.8	222.3	0.86	0.90	36.9
West: Koedoe Street (W)											
10	L	234	0.0	1.052	168.8	LOS F	38.4	268.7	1.00	2.06	10.7
11	T	163	0.0	1.052	160.6	LOS F	38.4	268.7	1.00	2.06	10.7
12	R	115	0.0	1.016	102.6	LOS F	9.0	62.8	1.00	1.40	15.7
Approach		512	0.0	1.052	151.3	LOS F	38.4	268.7	1.00	1.91	11.5
All Vehicles		4797	0.0	1.727	220.5	LOS F	246.0	1722.2	0.82	1.59	8.4

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

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

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

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SIDRA INTERSECTION 5.0.5.1510

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Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\01 R114, Koedoe Street-R511 -REV3 (C)\BG\R114, Koedoe Street-R511.sip

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MOVEMENT SUMMARY

Site: 2024 AM BG+D

R114, Koedoe Street / R511 Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R114 (S)											
1	L	263	0.0	0.383	24.1	LOS C	8.6	60.1	0.71	0.80	36.1
2	T	1207	0.0	0.658	18.5	LOS B	19.5	136.7	0.84	0.75	37.4
3	R	220	0.0	1.031	117.5	LOS F	18.5	129.8	1.00	1.39	14.2
Approach		1690	0.0	1.031	32.3	LOS C	19.5	136.7	0.84	0.84	30.7
East: R114 (E)											
4	L	256	0.0	1.000 ³	31.2	LOS C	8.7	60.9	0.98	0.83	32.3
5	T	462	0.0	0.820	33.9	LOS C	19.9	139.1	1.00	0.94	28.0
6	R	107	0.0	1.080	209.2	LOS F	13.2	92.4	1.00	1.62	8.9
Approach		825	0.0	1.080	55.8	LOS E	19.9	139.1	0.99	0.99	22.6
North: R511 (N)											
7	L	402	0.0	0.812	16.9	LOS B	8.7	60.9	0.45	0.76	41.2
8	T	1796	0.0	0.974	67.2	LOS E	59.2	414.6	1.00	1.45	20.4
9	R	268	0.0	1.000 ³	86.2	LOS F	17.5	122.5	1.00	1.27	17.8
Approach		2466	0.0	1.000	61.0	LOS E	59.2	414.6	0.91	1.32	21.8
West: Koedoe Street (W)											
10	L	274	0.0	0.979	89.9	LOS F	30.4	213.1	1.00	1.44	17.4
11	T	163	0.0	0.979	81.7	LOS F	30.4	213.1	1.00	1.44	17.5
12	R	115	0.0	0.328	33.0	LOS C	5.0	35.2	0.83	0.79	31.5
Approach		552	0.0	0.980	75.6	LOS E	30.4	213.1	0.96	1.31	19.3
All Vehicles		5533	0.0	1.080	52.9	LOS D	59.2	414.6	0.91	1.12	23.7

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

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

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

³ x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2019 AM BG

M26 (K46) / R511 (K27) Junction
 2019 AM Morning Peak Hour Background Traffic Volumes
 Latent Proposed Signalised Traffic Controlled Junction Configuration

Signals - Fixed Time Cycle Time = 75 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R511 (S)											
1	L	421	0.0	0.246	7.6	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.60	49.7
2	T	502	0.0	0.483	13.0	LOS B	13.5	94.5	0.70	0.62	42.1
Approach		923	0.0	0.483	10.5	LOS B	13.5	94.5	0.38	0.61	45.3
North: M26 (N)											
8	T	662	0.0	0.826	22.1	LOS C	22.7	158.6	0.85	0.85	35.3
9	R	55	0.0	0.826	33.4	LOS C	22.7	158.6	0.93	1.03	33.0
Approach		717	0.0	0.826	23.0	LOS C	22.7	158.6	0.86	0.86	35.1
West: R511 (W)											
10	L	25	0.0	0.331	27.3	LOS C	6.5	45.3	0.77	0.79	34.2
12	R	718	0.0	1.024	111.0	LOS F	49.5	346.7	0.95	1.37	14.8
Approach		743	0.0	1.024	108.2	LOS F	49.5	346.7	0.94	1.35	15.1
All Vehicles		2383	0.0	1.024	44.7	LOS D	49.5	346.7	0.70	0.92	26.5

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

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

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

⁹ Continuous movement

M26 (K46) / R511 (K27) Junction
 2019 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration

Signals - Fixed Time Cycle Time = 110 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R511 (S)											
1	L	421	0.0	0.246	7.6	NA ⁹	NA ⁹	NA ⁹	0.00	0.60	49.7
2	T	870	0.0	0.881	35.4	LOS D	47.6	332.9	0.97	0.98	29.0
Approach		1291	0.0	0.881	26.3	LOS C	47.6	332.9	0.66	0.85	33.6
North: M26 (N)											
8	T	1030	0.0	0.701	16.1	LOS B	31.5	220.8	0.71	0.65	39.7
9	R	79	0.0	0.425	33.1	LOS C	3.1	21.9	0.94	0.77	31.3
Approach		1109	0.0	0.701	17.3	LOS B	31.5	220.8	0.73	0.65	39.0
West: R511 (W)											
10	L	49	0.0	0.606	41.9	LOS D	15.2	106.1	0.90	0.84	27.8
12	R	718	0.0	0.931	62.8	LOS E	33.3	232.8	0.96	0.99	22.0
Approach		767	0.0	0.931	61.5	LOS E	33.3	232.8	0.96	0.98	22.3
All Vehicles		3167	0.0	0.931	31.7	LOS C	47.6	332.9	0.76	0.81	31.3

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

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

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

⁹ Continuous movement

MOVEMENT SUMMARY

Site: 2024 AM BG

M26 (K46) / R511 (K27) Junction
 2024 AM Morning Peak Hour Background Traffic Volumes
 Latent Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 75 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R511 (S)											
1	L	488	0.0	0.285	7.6	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.60	49.7
2	T	565	0.0	0.544	13.6	LOS B	15.4	108.0	0.73	0.65	41.6
Approach		1053	0.0	0.544	10.8	LOS B	15.4	108.0	0.39	0.63	45.0
North: M26 (N)											
8	T	735	0.0	0.937	42.6	LOS D	35.8	250.4	0.91	1.13	26.4
9	R	58	0.0	0.939	59.2	LOS E	35.8	250.4	1.00	1.30	23.8
Approach		793	0.0	0.937	43.8	LOS D	35.8	250.4	0.92	1.14	26.2
West: R511 (W)											
10	L	26	0.0	0.382	27.7	LOS C	7.4	52.1	0.79	0.80	34.0
12	R	833	0.0	1.184	311.8	LOS F	115.8	810.9	0.95	2.19	6.2
Approach		859	0.0	1.184	303.2	LOS F	115.8	810.9	0.95	2.15	6.4
All Vehicles		2705	0.0	1.184	113.3	LOS F	115.8	810.9	0.72	1.26	14.5

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

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

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

⁹ Continuous movement

Processed: 02 November 2018 09:59:53 AM

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Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\02 M26(K46)-R511 - REV3 (C)\BG\M26(K46)-R511 (K27)_REV1(C).sip

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M26 (K46) / R511 (K27) Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 110 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R511 (S)											
1	L	488	0.0	0.282	7.6	NA ⁹	NA ⁹	NA ⁹	0.00	0.60	49.7
2	T	933	0.0	0.935	50.2	LOS D	61.8	432.6	1.00	1.12	24.2
Approach		1421	0.0	0.935	35.5	LOS D	61.8	432.6	0.66	0.94	29.5
North: M26 (N)											
8	T	1103	0.0	0.743	16.7	LOS B	35.1	245.8	0.74	0.67	39.2
9	R	82	0.0	0.491	35.3	LOS D	3.5	24.3	0.98	0.77	30.4
Approach		1185	0.0	0.743	18.0	LOS B	35.1	245.8	0.76	0.68	38.4
West: R511 (W)											
10	L	50	0.0	0.694	43.3	LOS D	17.7	124.0	0.93	0.86	27.4
12	R	833	0.0	1.058	143.1	LOS F	67.2	470.7	0.97	1.27	12.1
Approach		883	0.0	1.058	137.5	LOS F	67.2	470.7	0.97	1.25	12.5
All Vehicles		3489	0.0	1.058	55.4	LOS E	67.2	470.7	0.77	0.93	23.4

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

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

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

⁹ Continuous movement

MOVEMENT SUMMARY

Site: 2019 AM BG

Mimosa Avenue / M26 Junction
 2019 AM Morning Peak Hour Background Traffic Volumes
 Existing Two Way Stop Traffic Controlled Junction Configuration
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: M26 (S)											
1	L	17	0.0	0.011	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	348	0.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	3	0.0	0.003	10.5	LOS B	0.0	0.1	0.47	0.65	46.4
Approach		368	0.0	0.170	0.5	LOS B	0.0	0.1	0.00	0.04	59.2
East: Mimosa Avenue (E)											
4	L	3	0.0	0.013	17.7	LOS C	0.1	0.4	0.60	0.83	41.3
5	T	1	0.0	0.013	17.8	LOS C	0.1	0.4	0.60	0.94	41.2
6	R	1	0.0	0.013	17.7	LOS C	0.1	0.4	0.60	0.95	41.3
Approach		5	0.0	0.013	17.7	LOS C	0.1	0.4	0.60	0.88	41.3
North: M26 (N)											
7	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
8	T	489	0.0	0.239	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	6	0.0	0.006	9.9	LOS A	0.0	0.2	0.40	0.64	47.1
Approach		496	0.0	0.239	0.1	LOS A	0.0	0.2	0.00	0.01	59.8
West: Mimosa Avenue (W)											
10	L	22	0.0	0.220	22.5	LOS C	1.0	6.9	0.69	0.91	38.0
11	T	2	0.0	0.222	22.6	LOS C	1.0	6.9	0.69	1.01	37.9
12	R	40	0.0	0.219	22.5	LOS C	1.0	6.9	0.69	1.01	38.0
Approach		64	0.0	0.219	22.5	LOS C	1.0	6.9	0.69	0.97	38.0
All Vehicles		933	0.0	0.239	1.9	NA	1.0	6.9	0.05	0.09	57.2

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

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

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

MOVEMENT SUMMARY

Site: 2019 AM BG+D

Mimosa Avenue / 2nd Avenue, Access Road Junction
 2019 AM Peak Hour Background and Development Traffic Volumes
 Proposed Access Mini-Circle Traffic Controlled Junction Configuration
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Link access Road (S)											
1	L	73	0.0	0.363	6.7	LOS A	2.5	17.3	0.26	0.48	49.2
2	T	1	0.0	0.333	5.9	LOS A	2.5	17.3	0.26	0.40	49.8
3	R	1382	0.0	0.666	11.4	LOS B	9.1	64.0	0.27	0.62	45.5
Approach		1456	0.0	0.666	11.2	LOS B	9.1	64.0	0.27	0.61	45.6
East: Mimosa Avenue (E)											
4	L	1382	0.0	0.768	7.3	LOS A	13.2	92.3	0.54	0.52	47.9
5	T	22	0.0	0.759	6.4	LOS A	13.2	92.3	0.58	0.47	47.5
6	R	2	0.0	0.667	12.0	LOS B	13.2	92.3	0.58	0.63	45.2
Approach		1406	0.0	0.768	7.3	LOS B	13.2	92.3	0.54	0.52	47.9
North: 2nd Avenue (N)											
7	L	9	0.0	0.041	14.3	LOS B	0.2	1.7	0.77	0.81	42.7
8	T	1	0.0	0.040	13.6	LOS B	0.2	1.7	0.77	0.79	42.9
9	R	9	0.0	0.041	19.3	LOS B	0.2	1.7	0.77	0.87	40.3
Approach		19	0.0	0.040	16.6	LOS B	0.2	1.7	0.77	0.84	41.5
West: Mimosa Avenue (W)											
10	L	1	0.0	0.333	14.9	LOS B	1.9	13.4	0.82	0.91	42.4
11	T	64	0.0	0.292	14.2	LOS B	1.9	13.4	0.82	0.90	42.5
12	R	73	0.0	0.292	19.9	LOS B	1.9	13.4	0.82	0.97	40.1
Approach		138	0.0	0.292	17.2	LOS B	1.9	13.4	0.82	0.94	41.2
All Vehicles		3019	0.0	0.768	9.7	LOS A	13.2	92.3	0.42	0.58	46.3

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

MOVEMENT SUMMARY

Site: 2024 AM BG

Mimosa Avenue / M26 Junction
 2024 AM Morning Peak Hour Background Traffic Volumes
 Existing Two Way Stop Traffic Controlled Junction Configuration
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: M26 (S)											
1	L	19	0.0	0.012	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	403	0.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	4	0.0	0.005	11.0	LOS B	0.0	0.2	0.50	0.67	46.0
Approach		426	0.0	0.197	0.5	LOS B	0.0	0.2	0.00	0.04	59.2
East: Mimosa Avenue (E)											
4	L	3	0.0	0.022	21.8	LOS C	0.1	0.6	0.70	0.85	38.4
5	T	1	0.0	0.022	21.9	LOS C	0.1	0.6	0.70	0.99	38.4
6	R	2	0.0	0.022	21.8	LOS C	0.1	0.6	0.70	1.00	38.4
Approach		6	0.0	0.022	21.8	LOS C	0.1	0.6	0.70	0.92	38.4
North: M26 (N)											
7	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
8	T	559	0.0	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	7	0.0	0.007	10.2	LOS B	0.0	0.2	0.44	0.66	46.8
Approach		567	0.0	0.273	0.1	LOS B	0.0	0.2	0.01	0.01	59.8
West: Mimosa Avenue (W)											
10	L	25	0.0	0.316	28.6	LOS D	1.5	10.7	0.77	1.01	34.4
11	T	2	0.0	0.333	28.7	LOS D	1.5	10.7	0.77	1.05	34.4
12	R	46	0.0	0.315	28.6	LOS D	1.5	10.7	0.77	1.04	34.4
Approach		73	0.0	0.316	28.6	LOS D	1.5	10.7	0.77	1.03	34.4
All Vehicles		1072	0.0	0.333	2.3	NA	1.5	10.7	0.06	0.09	56.6

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

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

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

MOVEMENT SUMMARY

Site: 2024 AM BG+D

Mimosa Avenue / M26 Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: M26 (S)											
1	L	411	0.0	0.659	15.9	LOS B	9.2	64.1	0.57	0.78	41.7
2	T	403	0.0	0.655	23.4	LOS C	13.7	96.2	0.93	0.80	34.6
3	R	4	0.0	0.035	44.9	LOS D	0.2	1.5	0.98	0.62	26.8
Approach		818	0.0	0.659	19.8	LOS B	13.7	96.2	0.75	0.79	37.8
East: Mimosa Avenue (E)											
4	L	3	0.0	0.933	56.1	LOS E	15.9	111.2	1.00	1.21	24.7
5	T	312	0.0	0.919	47.9	LOS D	15.9	111.2	1.00	1.21	24.8
6	R	2	0.0	0.017	31.8	LOS C	0.1	0.6	0.80	0.63	32.0
Approach		317	0.0	0.919	47.9	LOS D	15.9	111.2	1.00	1.20	24.9
North: M26 (N)											
7	L	1	0.0	0.002	26.5	LOS C	0.0	0.3	0.71	0.62	34.7
8	T	559	0.0	0.909	40.3	LOS D	25.0	175.3	1.00	1.17	27.2
9	R	63	0.0	0.390	40.1	LOS D	3.1	21.7	0.95	0.77	28.4
Approach		623	0.0	0.909	40.3	LOS D	25.0	175.3	0.99	1.13	27.3
West: Mimosa Avenue (W)											
10	L	81	0.0	0.472	19.4	LOS B	10.2	71.7	0.67	0.90	40.7
11	T	314	0.0	0.472	11.3	LOS B	10.2	71.7	0.67	0.59	43.1
12	R	438	0.0	0.949	54.5	LOS D	20.0	140.1	1.00	1.19	24.0
Approach		833	0.0	0.949	34.8	LOS C	20.0	140.1	0.84	0.93	30.3
All Vehicles		2591	0.0	0.949	33.0	LOS C	25.0	175.3	0.87	0.97	30.6

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

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

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

Processed: 02 November 2018 10:21:22 AM

SIDRA INTERSECTION 5.0.5.1510

Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\03 Mimosa Ave-M26 -REV3 (C)\BG+DMimosa Avenue-M26_REV1(C).sip

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: 2019 AM BG

Mimosa Avenue / Link Road, 2nd Avenue Junction
 2019 AM Peak Hour Background Traffic Volumes
 Existing All-way Traffic Controlled Junction Configuration
 Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Mimosa Avenue (E)											
5	T	22	0.0	0.031	15.1	LOS C	0.1	0.6	0.65	1.14	43.4
6	R	1	0.0	0.030	15.3	LOS C	0.1	0.6	0.65	1.16	43.3
Approach		23	0.0	0.031	15.1	LOS C	0.1	0.6	0.65	1.14	43.4
North: 2nd Avenue (N)											
7	L	9	0.0	0.049	20.7	LOS C	0.2	1.2	0.88	1.14	39.3
9	R	9	0.0	0.049	20.5	LOS C	0.2	1.2	0.88	1.15	39.5
Approach		18	0.0	0.049	20.6	LOS C	0.2	1.2	0.88	1.14	39.4
West: Mimosa Avenue (W)											
10	L	1	0.0	0.077	15.1	LOS C	0.2	1.5	0.60	1.15	43.4
11	T	64	0.0	0.076	14.7	LOS B	0.2	1.5	0.60	1.15	43.7
Approach		65	0.0	0.076	14.7	LOS C	0.2	1.5	0.60	1.15	43.7
All Vehicles		106	0.0	0.076	15.8	LOS C	0.2	1.5	0.66	1.15	42.9

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
 Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM) & Degree of Saturation.
 Approach LOS values are based on the worst delay and degree of saturation (v/c ratio) for any vehicle movement.

MOVEMENT SUMMARY

Site: 2019 AM BG+D

Mimosa Avenue / Link Road, 2nd Avenue, Access Road Junction
 2019 AM Peak Hour Background and Development Traffic Volumes
 Proposed Access Mini-Circle Traffic Controlled Junction Configuration
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Link access Road (S)											
1	L	73	0.0	0.363	6.7	LOS A	2.5	17.3	0.26	0.48	49.2
2	T	1	0.0	0.333	5.9	LOS A	2.5	17.3	0.26	0.40	49.8
3	R	1382	0.0	0.666	11.4	LOS B	9.1	64.0	0.27	0.62	45.5
Approach		1456	0.0	0.666	11.2	LOS B	9.1	64.0	0.27	0.61	45.6
East: Mimosa Avenue (E)											
4	L	1382	0.0	0.768	7.3	LOS A	13.2	92.3	0.54	0.52	47.9
5	T	22	0.0	0.759	6.4	LOS A	13.2	92.3	0.58	0.47	47.5
6	R	2	0.0	0.667	12.0	LOS B	13.2	92.3	0.58	0.63	45.2
Approach		1406	0.0	0.768	7.3	LOS B	13.2	92.3	0.54	0.52	47.9
North: 2nd Avenue (N)											
7	L	9	0.0	0.041	14.3	LOS B	0.2	1.7	0.77	0.81	42.7
8	T	1	0.0	0.040	13.6	LOS B	0.2	1.7	0.77	0.79	42.9
9	R	9	0.0	0.041	19.3	LOS B	0.2	1.7	0.77	0.87	40.3
Approach		19	0.0	0.040	16.6	LOS B	0.2	1.7	0.77	0.84	41.5
West: Mimosa Avenue (W)											
10	L	1	0.0	0.333	14.9	LOS B	1.9	13.4	0.82	0.91	42.4
11	T	64	0.0	0.292	14.2	LOS B	1.9	13.4	0.82	0.90	42.5
12	R	73	0.0	0.292	19.9	LOS B	1.9	13.4	0.82	0.97	40.1
Approach		138	0.0	0.292	17.2	LOS B	1.9	13.4	0.82	0.94	41.2
All Vehicles		3019	0.0	0.768	9.7	LOS A	13.2	92.3	0.42	0.58	46.3

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

MOVEMENT SUMMARY

Site: 2024 AM BG

Mimosa Avenue / Link Road, 2nd Avenue Junction
 2024 AM Peak Hour Background Traffic Volumes
 Existing All-way Traffic Controlled Junction Configuration
 Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued sec	Effective Stop Rate per veh	Average Speed km/h
East: Mimosa Avenue (E)											
5	T	26	0.0	0.036	15.2	LOS C	0.1	0.7	0.66	1.14	43.4
6	R	1	0.0	0.036	15.4	LOS C	0.1	0.7	0.66	1.16	43.3
Approach		27	0.0	0.036	15.2	LOS C	0.1	0.7	0.66	1.14	43.4
North: 2nd Avenue (N)											
7	L	11	0.0	0.058	20.5	LOS C	0.2	1.4	0.88	1.14	39.4
9	R	11	0.0	0.058	20.3	LOS C	0.2	1.4	0.88	1.15	39.6
Approach		22	0.0	0.058	20.4	LOS C	0.2	1.4	0.88	1.14	39.5
West: Mimosa Avenue (W)											
10	L	1	0.0	0.091	15.2	LOS C	0.3	1.8	0.61	1.15	43.4
11	T	74	0.0	0.089	14.7	LOS B	0.3	1.8	0.61	1.15	43.7
Approach		75	0.0	0.089	14.7	LOS C	0.3	1.8	0.61	1.15	43.7
All Vehicles		124	0.0	0.089	15.8	LOS C	0.3	1.8	0.67	1.15	42.8

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

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

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

MOVEMENT SUMMARY

Site: 2024 AM BG+D

Mimosa Avenue / Link Road, 2nd Avenue, Access Road Junction
 2024 AM Peak Hour Background and Development Traffic Volumes
 Proposed Access Mini-Circle Traffic Controlled Junction Configuration
 Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Link access Road (S)											
1	L	73	0.0	0.367	6.8	LOS A	2.5	17.7	0.25	0.49	49.3
2	T	1	0.0	0.333	5.9	LOS A	2.5	17.7	0.25	0.40	49.9
3	R	1382	0.0	0.673	11.5	LOS B	9.3	65.3	0.29	0.62	45.4
Approach		1456	0.0	0.673	11.2	LOS B	9.3	65.3	0.29	0.61	45.6
East: Mimosa Avenue (E)											
4	L	1382	0.0	0.772	7.3	LOS A	13.3	93.2	0.55	0.52	47.8
5	T	26	0.0	0.765	6.4	LOS A	13.3	93.2	0.59	0.47	47.5
6	R	2	0.0	0.667	12.1	LOS B	13.3	93.2	0.59	0.63	45.2
Approach		1410	0.0	0.772	7.3	LOS B	13.3	93.2	0.55	0.52	47.8
North: 2nd Avenue (N)											
7	L	11	0.0	0.050	14.5	LOS B	0.3	2.2	0.78	0.83	42.5
8	T	1	0.0	0.050	13.9	LOS B	0.3	2.2	0.78	0.81	42.7
9	R	11	0.0	0.050	19.5	LOS B	0.3	2.2	0.78	0.88	40.1
Approach		23	0.0	0.050	16.9	LOS B	0.3	2.2	0.78	0.85	41.3
West: Mimosa Avenue (W)											
10	L	1	0.0	0.333	15.2	LOS B	2.1	14.8	0.83	0.93	42.2
11	T	74	0.0	0.316	14.5	LOS B	2.1	14.8	0.83	0.91	42.3
12	R	73	0.0	0.316	20.2	LOS C	2.1	14.8	0.83	0.98	39.9
Approach		148	0.0	0.316	17.3	LOS C	2.1	14.8	0.83	0.95	41.1
All Vehicles		3037	0.0	0.772	9.8	LOS A	13.3	93.2	0.44	0.59	46.3

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: 2024 AM BG+D

Mimosa Avenue / 2nd Avenue, Link Road to Access Road Junction
 2024 AM Peak Hour Background and Development Traffic Volumes
 Proposed Access Traffic Controlled Junction Configuration
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Access Road (E)											
6	R	1455	0.0	0.849	10.5	LOS B	0.0	0.0	0.00	1.00	46.5
Approach		1455	0.0	0.849	10.5	LOS B	0.0	0.0	0.00	1.00	46.5
North: Link Road to Access Road (N)											
7	L	1455	0.0	0.849	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
Approach		1455	0.0	0.849	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
All Vehicles		2910	0.0	0.849	9.3	NA	0.0	0.0	0.00	0.83	47.7

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

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

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

Processed: 28 November 2018 04:15:16 PM

SIDRA INTERSECTION 5.0.5.1510

Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\05 Access(C)\BG+D\Access -REV1(C).sip
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MOVEMENT SUMMARY

Site: 2019 AM BG+D

Mimosa Avenue / 2nd Avenue, Link Road to Access Road Junction
 2019 AM Peak Hour Background and Development Traffic Volumes
 Proposed Access Traffic Controlled Junction Configuration
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Access Road (E)											
6	R	1455	0.0	0.849	10.5	LOS B	0.0	0.0	0.00	1.00	46.5
Approach		1455	0.0	0.849	10.5	LOS B	0.0	0.0	0.00	1.00	46.5
North: Link Road to Access Road (N)											
7	L	1455	0.0	0.849	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
Approach		1455	0.0	0.849	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
All Vehicles		2910	0.0	0.849	9.3	NA	0.0	0.0	0.00	0.83	47.7

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

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

Approach LOS values are based on the worst delay and degree of saturation (v/c ratio) for any vehicle movement.

Processed: 28 November 2018 04:11:41 PM

SIDRA INTERSECTION 5.0.5.1510

Project: W:\CC-Projects\C PROJECTS\C2594 (WS) WFA CHRISTIAN SCHOOL (K2350)\1. Client and Related Bodies\1.13 TIS, Traffic Statements\05 Calculations\02 SIDRA\05 Access(C)\BG+D\Access -REV1(C).sip
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INTERSECTION

ANNEXURE F
SIGNAL PHASING AND TIMINGS

R114, Koedoe Street / R511 Junction
 2024 AM Morning Peak Hour Background Traffic Volumes
 Latent Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

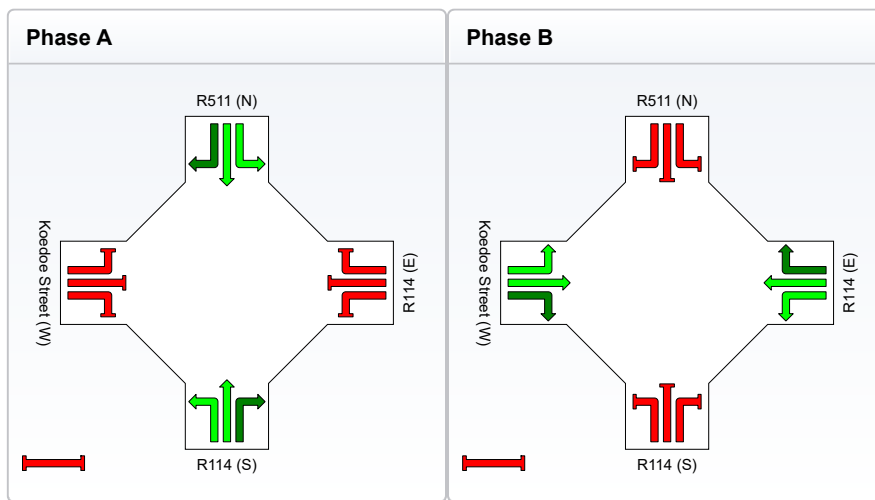
Sequence: Opposed Turns

Input Sequence: A, B

Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	43	17
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	48	22
Phase Split	69%	31%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

R114, Koedoe Street / R511 Junction
 2019 AM Morning Peak Hour Background Traffic Volumes
 Latent Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

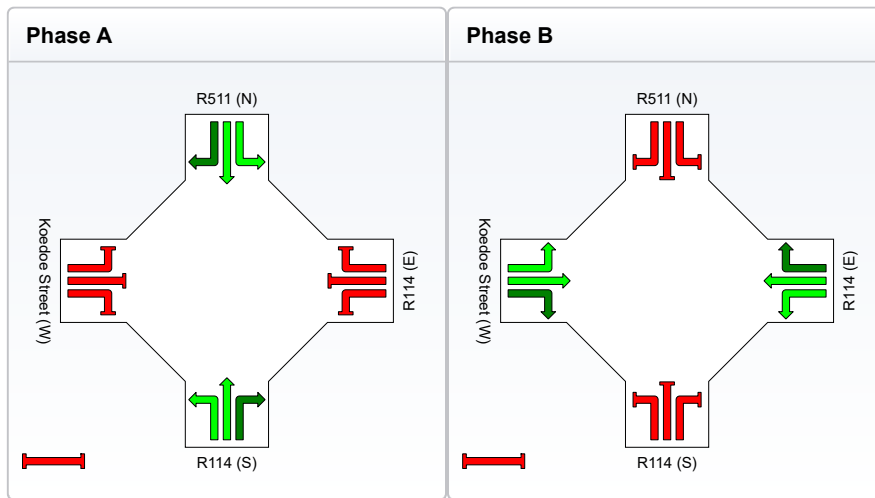
Sequence: Opposed Turns

Input Sequence: A, B

Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	43	17
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	48	22
Phase Split	69%	31%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

R114, Koedoe Street / R511 Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 80 seconds

Cycle Time Option: **Optimum Cycle Time (Minimum Delay)**

Phase times determined by the program

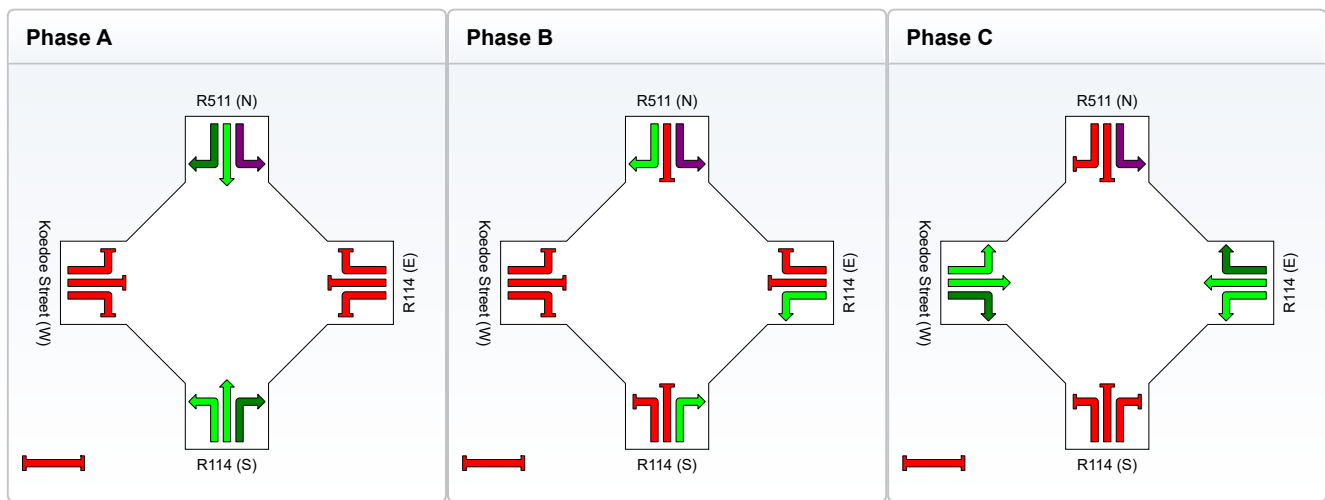
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	36	6	23
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	41	11	28
Phase Split	51%	14%	35%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

R114, Koedoe Street / R511 Junction
 2019 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Junction Configuration
 Signals - Fixed Time Cycle Time = 65 seconds

Cycle Time Option: **Optimum Cycle Time (Minimum Delay)**

Phase times determined by the program

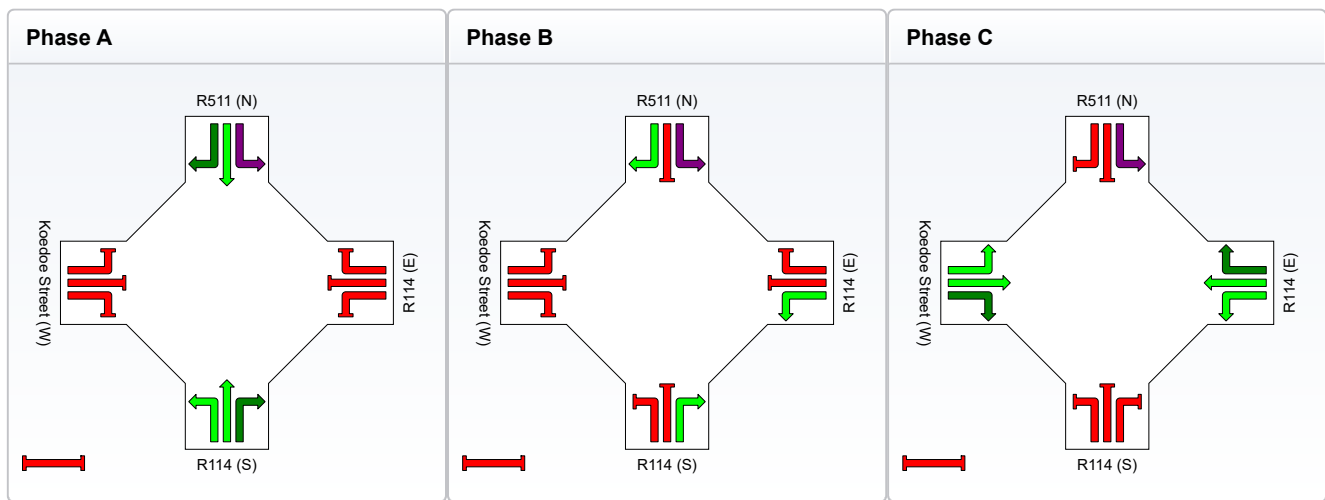
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	27	6	17
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	32	11	22
Phase Split	49%	17%	34%



Normal Movement	Permitted/Opposed
Slip-Lane Movement	Opposed Slip-Lane
Stopped Movement	Continuous Movement
Turn On Red	Undetected Movement
	Phase Transition Applied

M26 (K46) / R511 (K27) Junction
 2024 AM Morning Peak Hour Background Traffic Volumes
 Latent Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 75 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

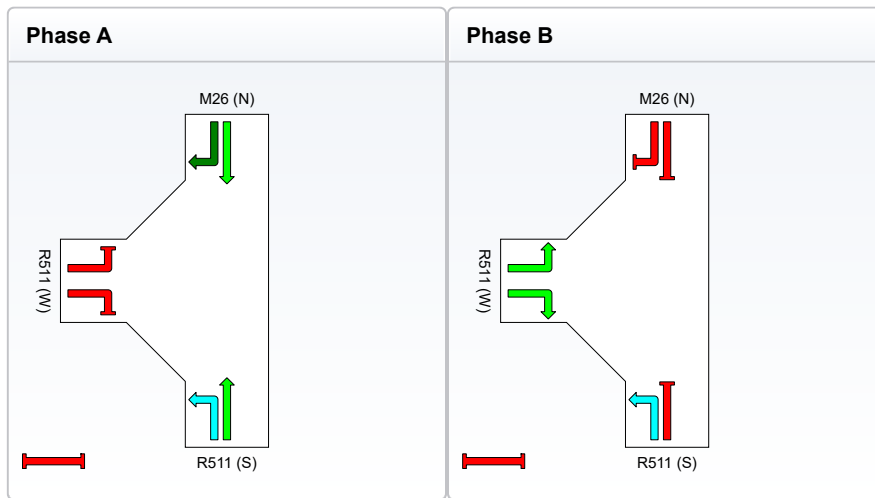
Sequence: Opposed Turns

Input Sequence: A, B

Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	38	27
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	43	32
Phase Split	57%	43%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

M26 (K46) / R511 (K27) Junction
 2019 AM Morning Peak Hour Background Traffic Volumes
 Latent Proposed Signalised Traffic Controlled Junction Configuration

Signals - Fixed Time Cycle Time = 75 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

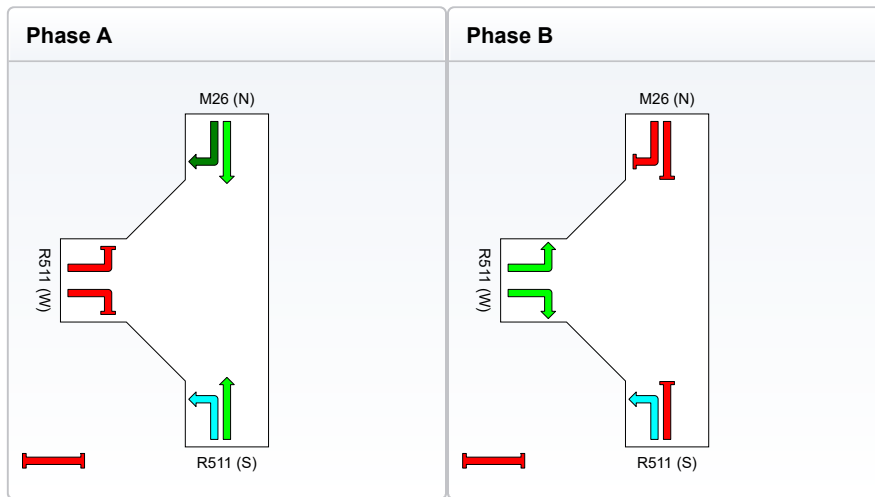
Sequence: Opposed Turns

Input Sequence: A, B

Output Sequence: A, B

Phase Timing Results

Phase	A	B
Green Time (sec)	38	27
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	43	32
Phase Split	57%	43%



Normal Movement	Permitted/Opposed
Slip-Lane Movement	Opposed Slip-Lane
Stopped Movement	Continuous Movement
Turn On Red	Undetected Movement
	Phase Transition Applied

M26 (K46) / R511 (K27) Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 110 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

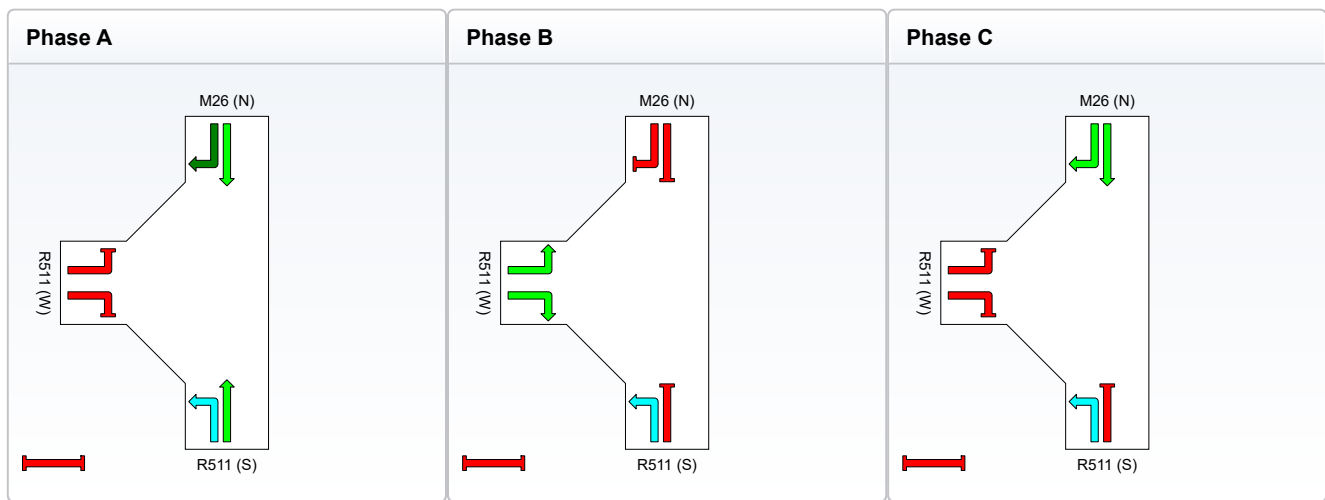
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	53	36	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	58	41	11
Phase Split	53%	37%	10%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

M26 (K46) / R511 (K27) Junction
 2019 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration

Signals - Fixed Time Cycle Time = 110 seconds

Cycle Time Option: **User-specified Cycle Time**

Phase times specified by the user

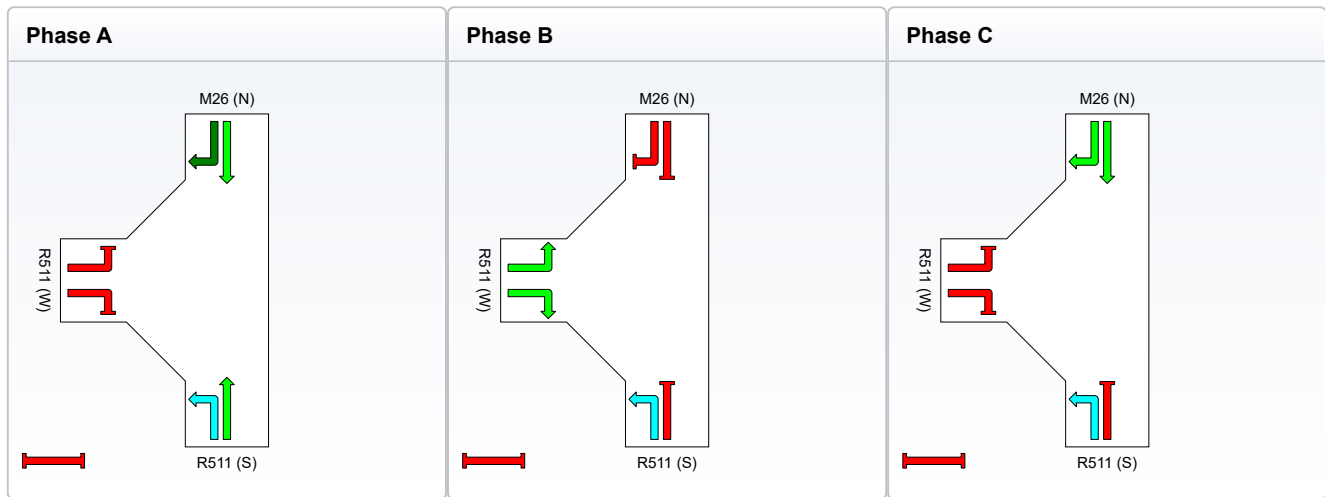
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	53	36	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	58	41	11
Phase Split	53%	37%	10%



Normal Movement	Permitted/Opposed
Slip-Lane Movement	Opposed Slip-Lane
Stopped Movement	Continuous Movement
Turn On Red	Undetected Movement
	Phase Transition Applied

Mimosa Avenue / M26 Junction
 2024 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **Optimum Cycle Time (Minimum Delay)**

Phase times determined by the program

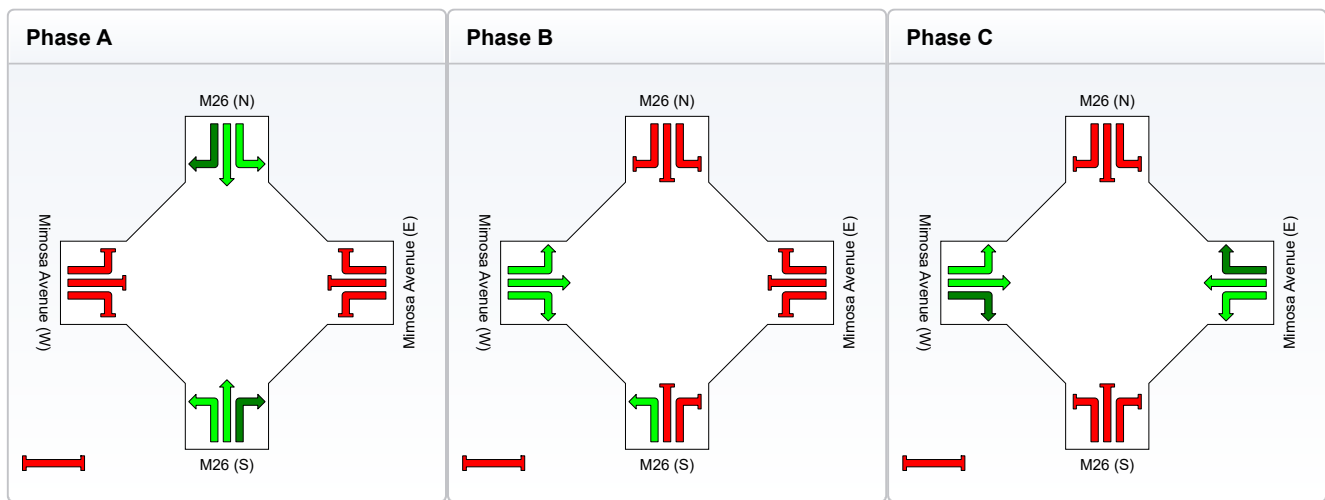
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	16	15
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	22	21
Phase Split	39%	31%	30%



	Normal Movement		Permitted/Opposed
	Slip-Lane Movement		Opposed Slip-Lane
	Stopped Movement		Continuous Movement
	Turn On Red		Undetected Movement
			Phase Transition Applied

Mimosa Avenue / M26 Junction
 2019 AM Morning Peak Hour Background and Development Traffic Volumes
 Proposed Signalised Traffic Controlled Junction Configuration
 Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **Optimum Cycle Time (Minimum Delay)**

Phase times determined by the program

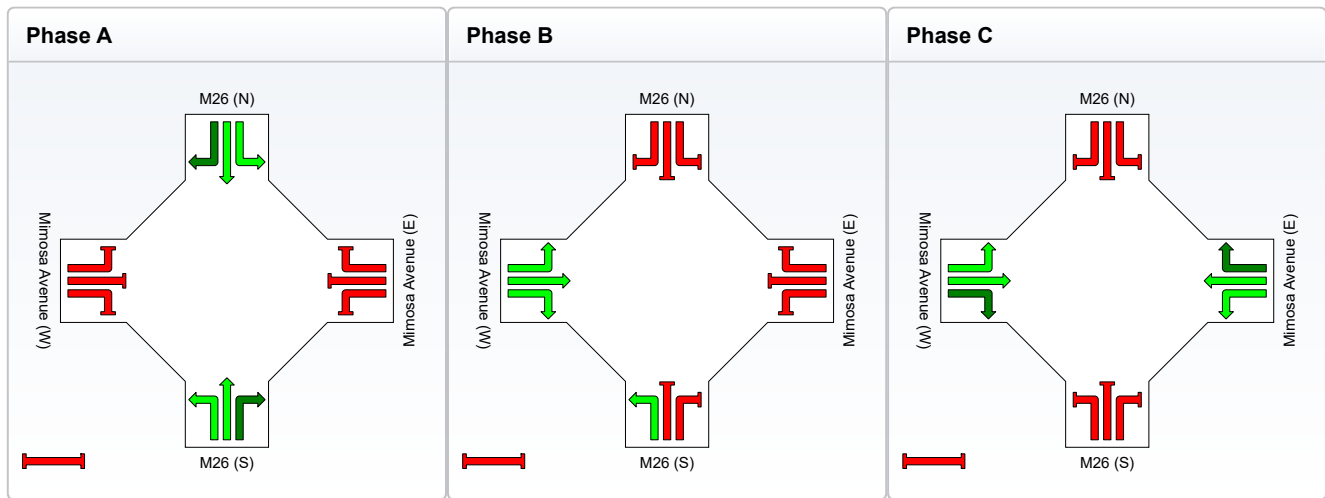
Sequence: **Opposed Turns**

Input Sequence: **A, B, C**

Output Sequence: **A, B, C**

Phase Timing Results

Phase	A	B	C
Green Time (sec)	19	17	16
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	25	23	22
Phase Split	36%	33%	31%



Normal Movement	Permitted/Opposed
Slip-Lane Movement	Opposed Slip-Lane
Stopped Movement	Continuous Movement
Turn On Red	Undetected Movement
	Phase Transition Applied

ANNEXURE G
CONCEPTUAL ROAD UPGRADE PLANS



89

86

RE/87

SECOND AVENUE

MIMOSA AVENUE

LEGEND:

- NEW SURFACED ROADWAY
- NEW ROAD EDGE
- EXISTING ROAD EDGE



83

MIMOSA AVENUE

M26

84/385

LEGEND:

- NEW SURFACED ROADWAY
- NEW ROAD EDGE
- EXISTING ROAD EDGE



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MIMOSA AVENUE AND M26 JUNCTION
PROPOSED ROAD UPGRADES

DATE	SCALE
DEC 2018	1:1000

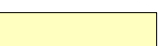


C1770-101-1



R511

M26

LEGEND:

-  NEW SURFACED ROADWAY
-  NEW ROAD EDGE
-  EXISTING ROAD EDGE



KOEDOE STREET

M26

M26

R114

LEGEND:

- NEW SURFACED ROADWAY
- NEW ROAD EDGE
- EXISTING ROAD EDGE