

PLOTS 21 & 22 RAYTON 431, BLOEMFONTEIN

TOWNSHIP ESTABLISHMENT
TRAFFIC IMPACT STUDY


FEBRUARY 2019



Project: 7097.01

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REPORT SHEET

Property Description:	<i>Plot 21 & 22 Rayton 431, Bloemfontein</i>
Municipal Area:	<i>Mangaung Metro Municipality</i>
Application:	<i>Township Establishment</i>
Type of Report:	<i>Traffic Impact Study</i>
Project Number:	<i>7097.01</i>
Declaration	<i>I, Koot Marais, author of this study, hereby certify that I am a professional traffic engineer (registration No 920023) and that I have the required experience and training in the field of traffic and transportation engineering as required by the Engineering Council of South Africa (ECSA), to compile traffic impact studies and I take full responsibility for the content, including all calculations, conclusions and recommendations made herein.</i>
Compiled By:	<i>Koot Marais Pr Eng</i>
Signed:	
Date:	<i>February 2019</i>

PREPARED BY:



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1.3 Site Location

The site is located on the northwestern corner of the Floris Coetzee Street / Frans Kleynhans Road intersection in Rayton.

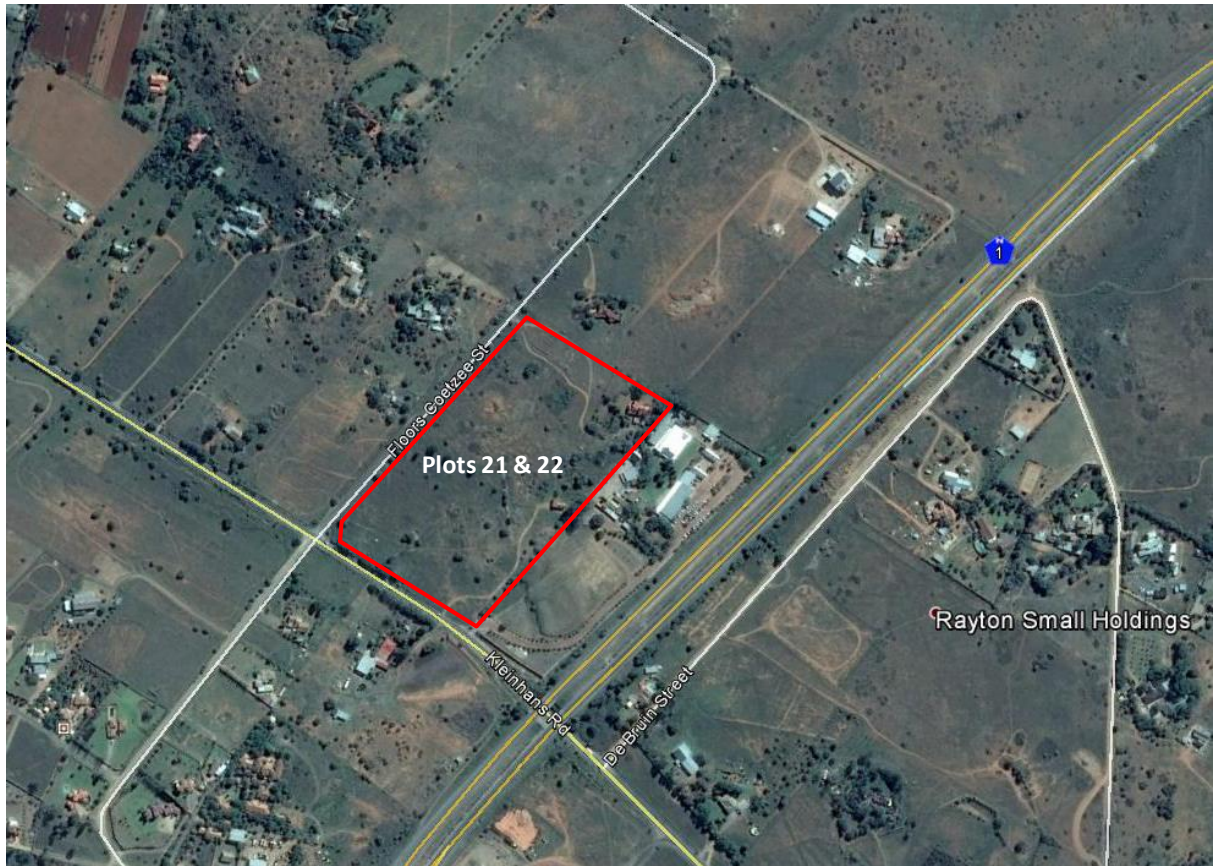


Figure 1.1: Locality Plan

1.4 Proposed Development

1.4.1 Previous Application

The previous study investigated a Special Use zoning restricting development to a Private University for 800 students. The intention was to provide 10 to 15 classes and to make provision for courses such as B Com, BSc and IT (National Certificates). The following zoning was planned.

BLOEMFONTEIN DOPRSAANLEGSKEMA NR 1 VAN 1954: AANSOEK OM HERSONERING BLOEMFONTEIN TOWN PLANNING SCHEME NO 1 OF 1954: APPLICATION FOR REZONING						
Item/Notice Kennisgewing		Beskrywing/ Description	Huidige Sonering Present Zoning	Voorgestelde Sonering Proposed Zoning	Redes/Reasons	Vordering Progress
No.	Datum Date					
	January 2017	Plot 27, Rayton Small Holdings	"Holdings"	"Educational"	In order to permit a tertiary education facility accommodating 800 pupils and on-site residences housing 200 students.	

1.4.2 New Application

The new application will be as shown in Annexure A. The following aspects are the most important:

Permitted uses:

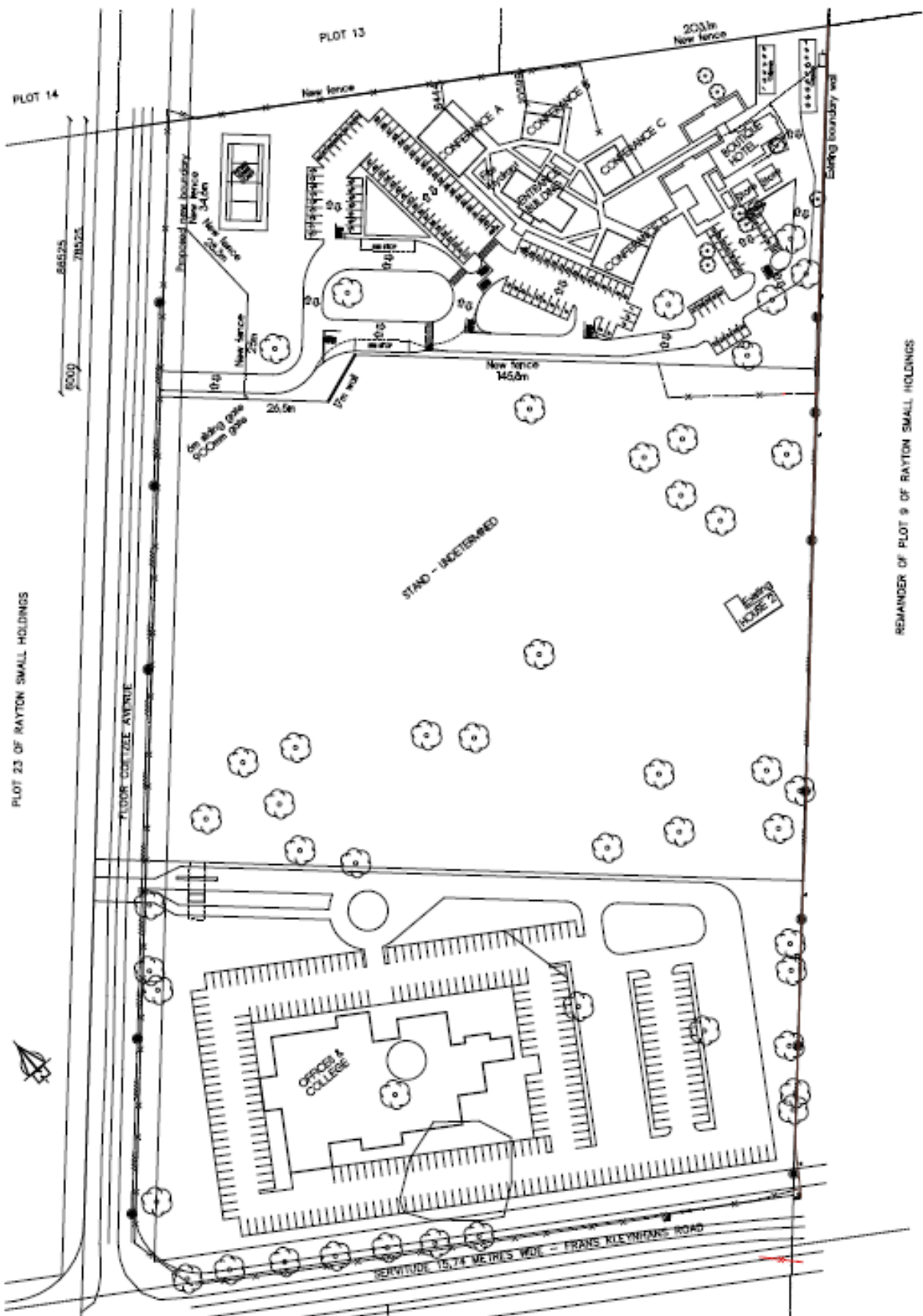
A Private Educational Facility accommodating a maximum of 1000 students with the following additional restrictions;

- (a) Lecture rooms with a maximum floor area of 1000 m²;
- (b) A Student Centre, including a Library, Student Services, Cafeteria, and Auxiliary Enterprises with a maximum gross leasable floor area of 1,000 m²;
- (c) Offices for academic and institutional support with a maximum gross leasable floor area of 2,000 m².
- (d) A Boutique Hotel consisting of 30 rooms and conference facilities making provision for a maximum number of 150 conference delegates;

From a traffic point of view the development will consist of the following:

- 1. University / College for 1000 students**
- 2. Hotel with 30 rooms**
- 3. Conference facilities for 150 delegates**

The plan below shows a concept master plan.



PLOT 23 OF RAYTON SMALL HOLDINGS

REMAINDER OF PLOT 9 OF RAYTON SMALL HOLDINGS

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 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 1.5 km of the development, should be analysed. Given the location of the development, the following intersections were investigated.

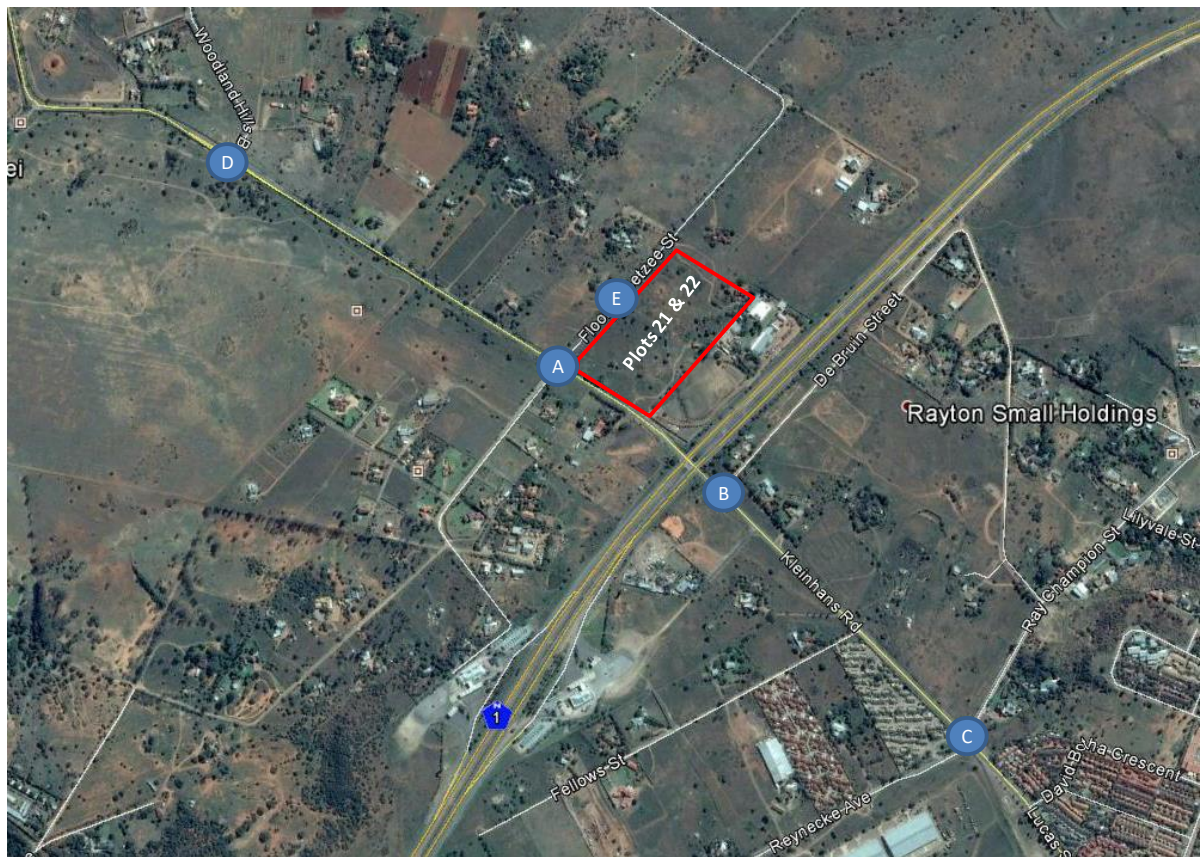


Figure 1.3: Intersections Analysed

- a) **Intersection A:** Floris Coetzee Street / Frans Kleynhans Road Intersection
- b) **Intersection B:** De Bruin Avenue / Frans Kleynhans Road Intersection
- c) **Intersection C:** Ray Champion Avenue / Frans Kleynhans Road Intersection
- d) **Intersection D:** Access to Woodland Hills / Frans Kleynhans Road Intersection
- e) **Intersection E:** Access in Floris Coetzee Street

Trips were however distributed over a bigger area for inclusion as a Latent Right.

1.5.4 Assessment Years

Current traffic volumes and a five year horizon were analysed. The base year was assumed to be 2020.

1.6 Available Information

1.6.1 Traffic Counts

The following traffic counts were used:

Intersection	Source	Date Counted	Growth Rate
Floris Coetzee Street / Frans Kleynhans Road	Counted by KMA for Musket	11/10/2018	1.5%
Ray Champion St / Frans Kleynhans Road	Counted by KMA for Por 3 of Plot 28 Rayton	17/5/2018	1.5%
Woodland Hills / Frans Kleynhans Road	Counted by KMA for Musket	10/10/2018	1.5%
De Bruin Avenue / S850	Counted by KMA for Remainder of Plot 4 Rayton	2/03/2017	1.5%
De Bruin St / Ray Champion St	Counted by KMA for Por 3 of Plot 28 Rayton	17/05/2018	1.5%

*Note: * All traffic counts undertaken by KMA are done by Koot Marais PR Eng personally or under his direct supervision*

1.6.2 Latent Rights

The following Latent Rights were considered:

No	Description	Project No	Impact in Study Area
1	Woodland Hills development	6017	Yes
2	Remainder of and Subdivision 3 of Musket 2718	6158	Yes
3	Shellyvale Extension 2 & 5	6154	No
4	Plot 13 Lilyvale	6176	No
5	Portion 2 of Western Spitskop	6185	No
6	Plot 4 Rayton	6188	Yes
7	Portion 4 of the Farm Newmarket 2946	6197	Yes
8	Portion 2 of the Farm Newmarket		Yes
9	Remainder of Plot 28, Po 1 of Plot 28 & Por 2 of Rayton 341	6194	Yes
10	Portion 1 of Plot 3 Rayton	6226	Yes
11	Portion 20 of Farm Lilyvale	6171	Yes
12	Portion 2 of Plot 28 Rayton	6319	Yes
13	Plot 9 & Remainder of 12, Lilyvale	6528	Yes
14	Rem Small Holding 29 Lilyvale	6598	No
15	Woodlands Erf 28563	6760	Yes
16	Rezoning to extend Curro School	6258	Yes
17	Erven 535 & 536 Shellyvale Extension 7	6154	Yes
18	Portion 45 of 2844, Groenmei:	6978	Yes
19	Plot 27 Rayton University	7097	Yes
20	Erf 538 Lilyvale		No
21	Farm Rooidam (Emoya)		Yes
22	Portion 1 of Plot 3, Lilyvale	6910	Yes
23	Farm Rossdale 2105 (Tuscan Rose)	7152	Yes
24	Remainder & Portion 1 of Charlton 1395,	7170	Yes
25	Lilyvale Farm 30/2313 & 33/2313	7069	Yes
26	Portion 3 of 28 Rayton	7214	No
27	Portion 13 and 15 Musket, Bloemfontein.	7208	Yes

The above list includes the previous application (Latent Right 19). This development was obviously removed as a latent right and the new trip generation of the application considered.

2 BACKGROUND INFORMATION

2.1 Existing Road Network

The most important roads in the area are the following:

Street / Road	Road No	Route No	Description	Geometry	Classification	Functional Classification	Jurisdiction
Frans Kleinbans Road	S850		This road becomes Lucas Steyn Road to the east. The road provides access to properties but also connects certain area with the city centre	Two lane undivided rural road geometry	Collector	Collector	Free State Province
Ray Champion Road			Serves a number of small holdings	Two lane undivided rural road geometry	Local Street	Major Residential Access Link	Mangaung Metro Municipality
Floris Coetzee Street			Serves a number of small holdings	Rural paved road-narrow and in poor condition	Local Street	Residential Access Loop 5(b)	
De Bruin Street	T4627		This road serves properties	Rural gravel road	Local Street	Major Residential Access Link	Free State Province / Mangaung Metro Municipality

2.2 Existing Land Use

The area to be developed and the surrounding area are mostly undeveloped or used as small holdings. Ilanga Estate is located to the east of the site.

2.3 Road Planning

To enable proper development of the western areas of the city, concept road reserves have been determined. This planning has no official status as yet, but as shown below the development will fit into this planning.

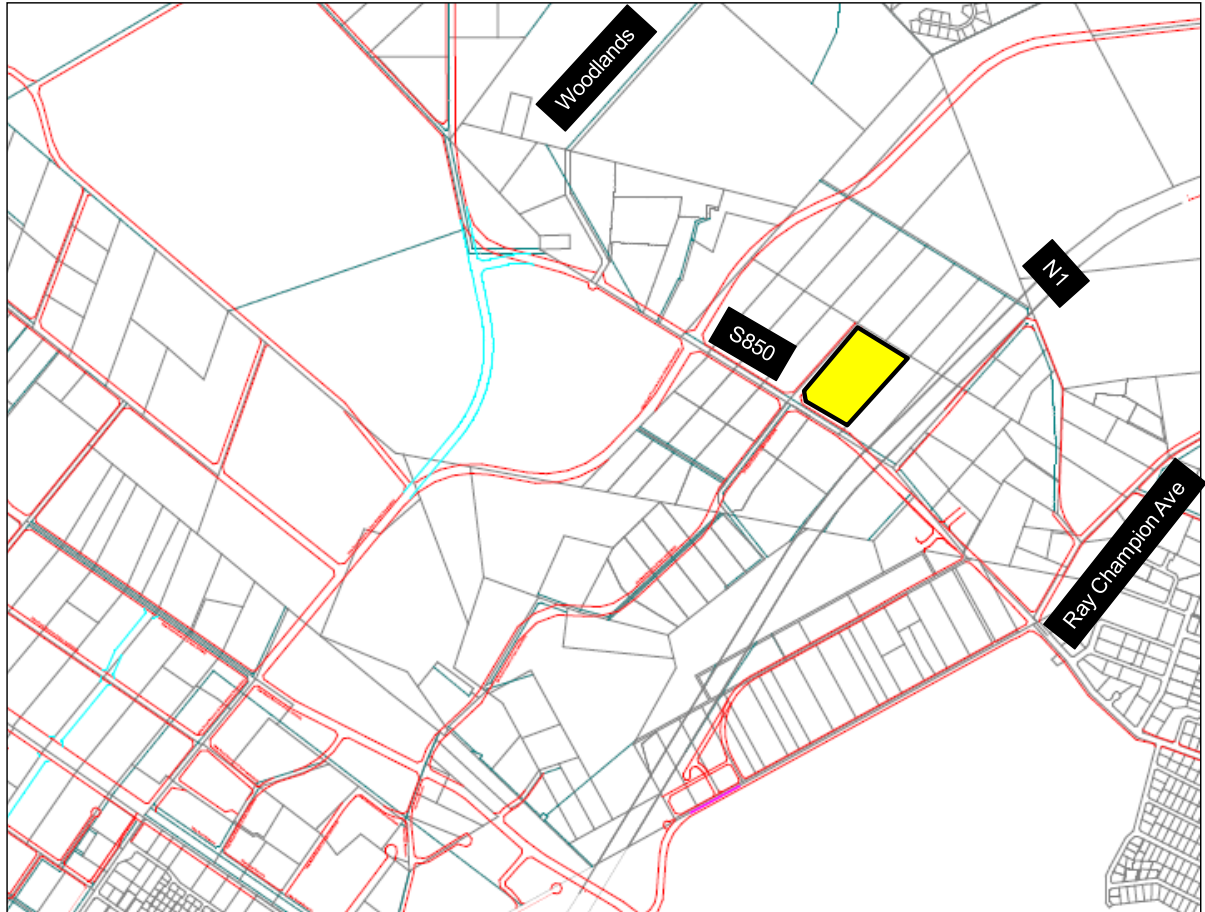


Figure 2.1: Possible Future Road Network

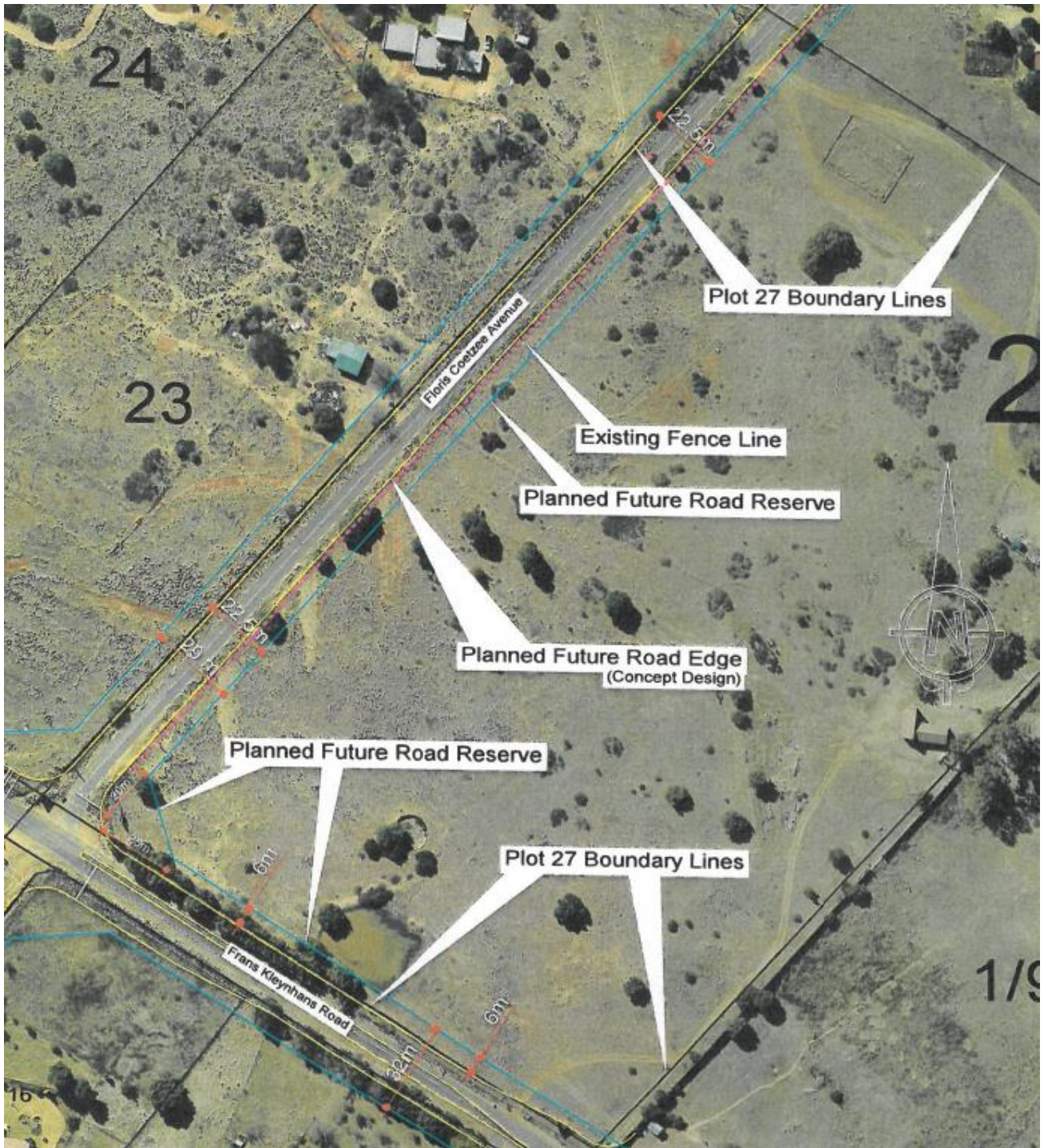


Figure 2.2: Required Widenings

3 TRIP GENERATION

3.1 Trip Generation Rates

Relevant land uses for this development as described in the TMH 17 are as follows:

3.1.1 Hotel 310

Hotels provide sleeping accommodation and supporting facilities such as the reception area and dining rooms. Facilities that are mostly provided for hotel users are included in the trip generation rates.

3.1.2 University / College 550

This land-use includes universities, technicons and colleges.

3.1.3 Conference Centre 780

A conference centre provides conference facilities. The land-use may include associated land uses, such a dining facilities, dining rooms, etc.

3.2 Trips Generated - TMH 17

Table 3.1: Expected trip generation based on TMH 17

No	Land Use	No	Unit	Reduction Factors					AM PEAK								PM PEAK										
				Pm	Pv	Pv	Pt	Pc	TGR	TGR	Split		PHF	AM	AM	In	Out	TGR	TGR	Split		PHF	PM	PM	In	Out	
				Mixed	Low	V Low	Trans			Reduc	In	Out			Reduc				Reduc					Reduc			
Lodging																											
310	Hotel Residential		Room	20%	20%	30%	15%		0.50		60%	40%						0.50		55%	45%						
310	Hotel Residential	30	Room					0	0.50	0.50	60%	40%		15	15	9	6	0.50	0.50	55%	45%		15	15	8	7	
Institutional																											
550	University/College		Student	20%	40%	60%	15%		0.20		80%	20%	0.65					0.20		30%	70%						
550	University/College	1 000	Student					0	0.20	0.20	80%	20%	0.65	308	308	246	62	0.20	0.20	30%	70%		200	200	60	140	
Offices																											
780	Conference Centre		Seat	10%	20%	30%	10%		0.50		90%	10%	0.75					0.50		10%	90%	0.75					
780	Conference Centre	150	Seat					0	0.50	0.50	90%	10%	0.75	100	100	90	10	0.50	0.50	10%	90%	0.75	100	100	10	90	
Total														423	423	345	78						315	315	78	237	

For reference purposes, the previously assumed trip generation was as follows:

Table 3.2: Previously assumed trip generation

No	Land Use	No	Unit	Reduction Factors					AM PEAK								PM PEAK										
				Pm	Pv	Pv	Pt	Pc	TGR	TGR	Split		PHF	AM	AM	In	Out	TGR	TGR	Split		PHF	PM	PM	In	Out	
				Mixed	Low	V Low	Transp			Reduc	In	Out			Reduc				Reduc					Reduc			
Institutional																											
550	University/College		Student	20%	40%	60%	15%		0.20		80%	20%	0.65					0.20		30%	70%						
550	University/College	800	Student					0	0.20	0.20	80%	20%	0.65	246	246	197	49	0.20	0.20	30%	70%		160	160	48	112	
Total														246	246	197	49						160	160	48	112	

As shown, trip generation with the new application will almost be double what was previously assumed.

4 TRIP DISTRIBUTION

The following figures show the trip distributions for the different peak periods. Trip distribution was based on the analogue method with consideration of gravitational distributions. In particular, in this instance strict following of the analogue method will result in excessive trip distribution to and from Woodland Hills, and a lack of trip generation to and from Kenilworth Road / R64. Please note that the Latent Rights will not necessarily balance due to land uses between intersections and especially the planned shopping centre on Remainder of Plot 28, Portion 1 of Plot 28, and Portion 2 of Rayton 341 (Rayton View)

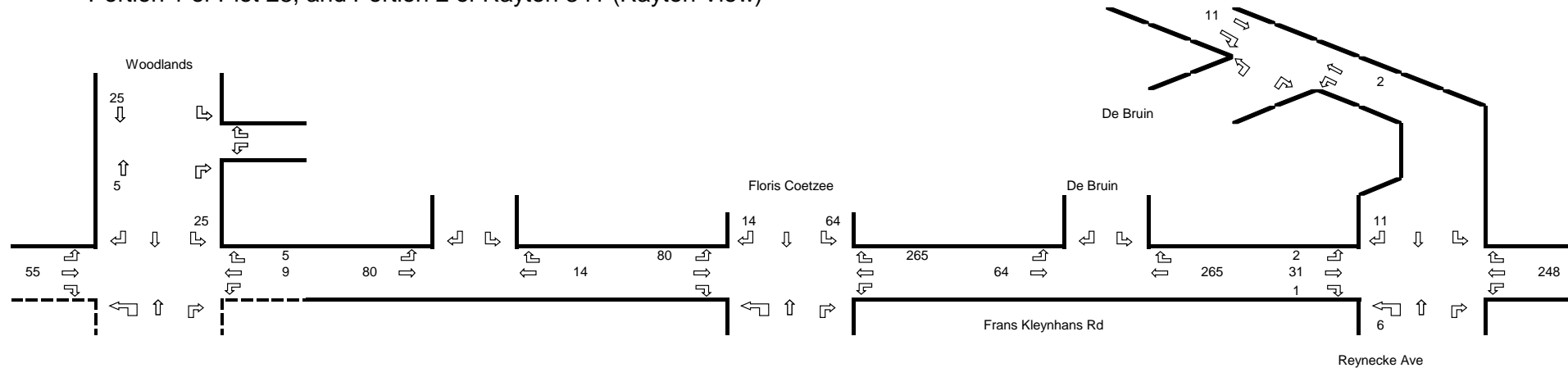


Figure 4.1a AM Trip Distribution

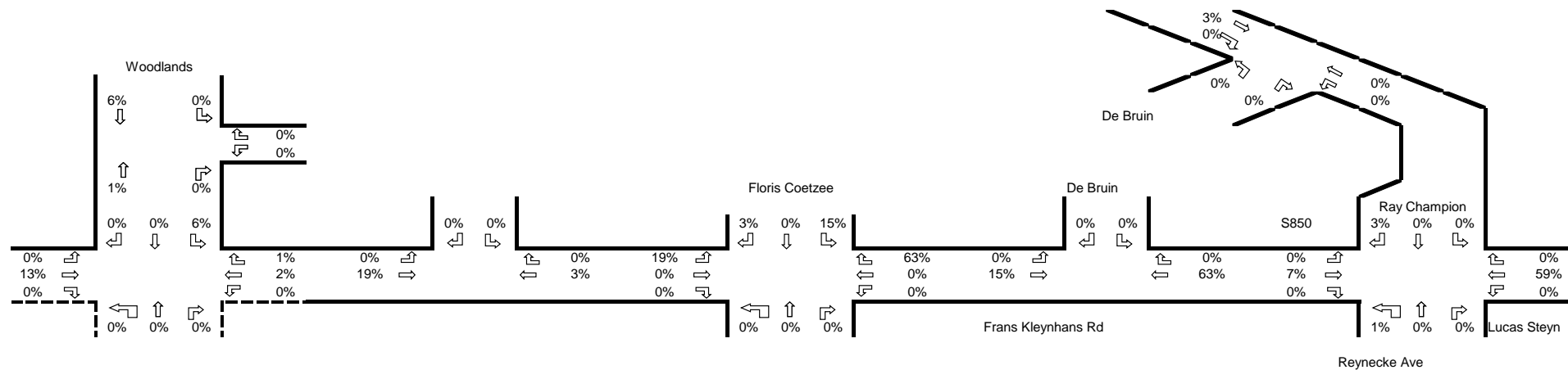


Figure 4.1b AM Trip Distribution

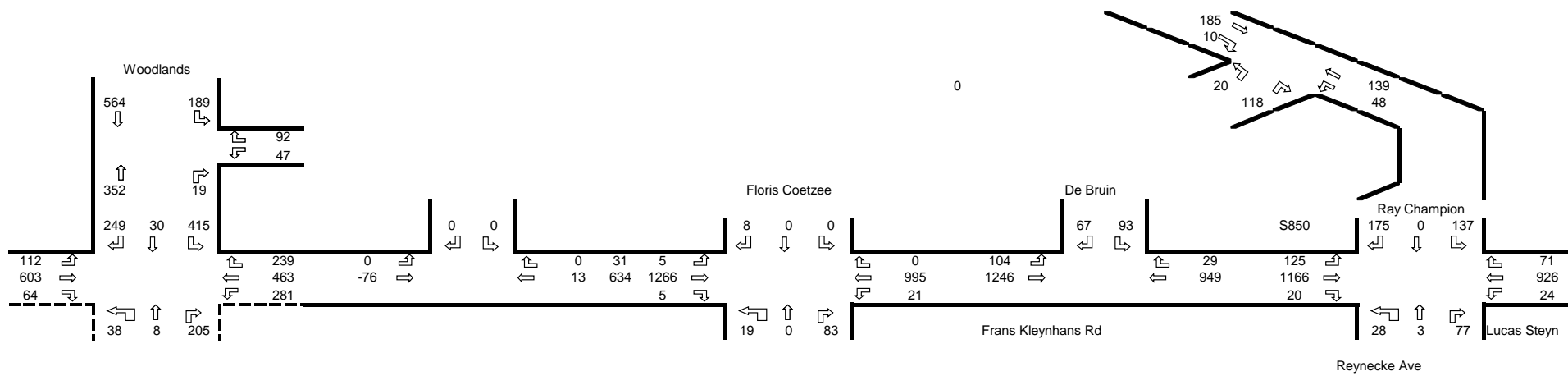


Figure 4.1c AM Latent Rights

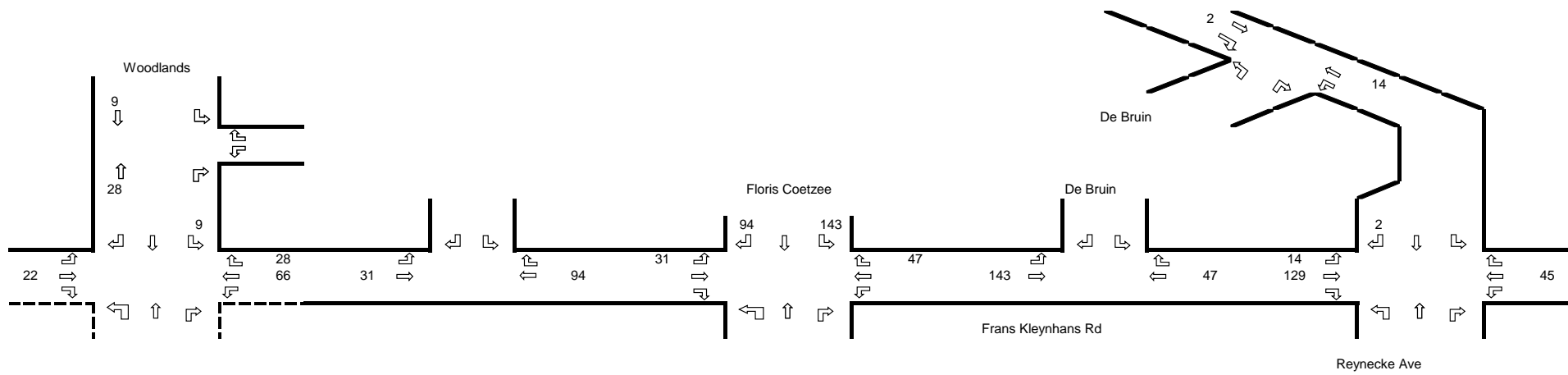


Figure 4.2a PM Trip Distribution

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.

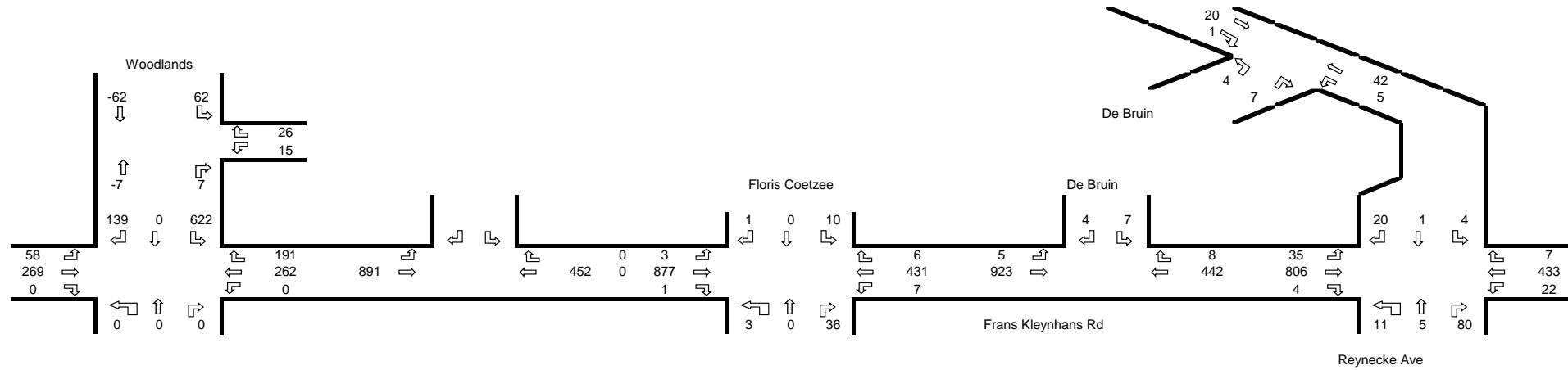


Figure 5.1a: 2019 AM Peak Volumes

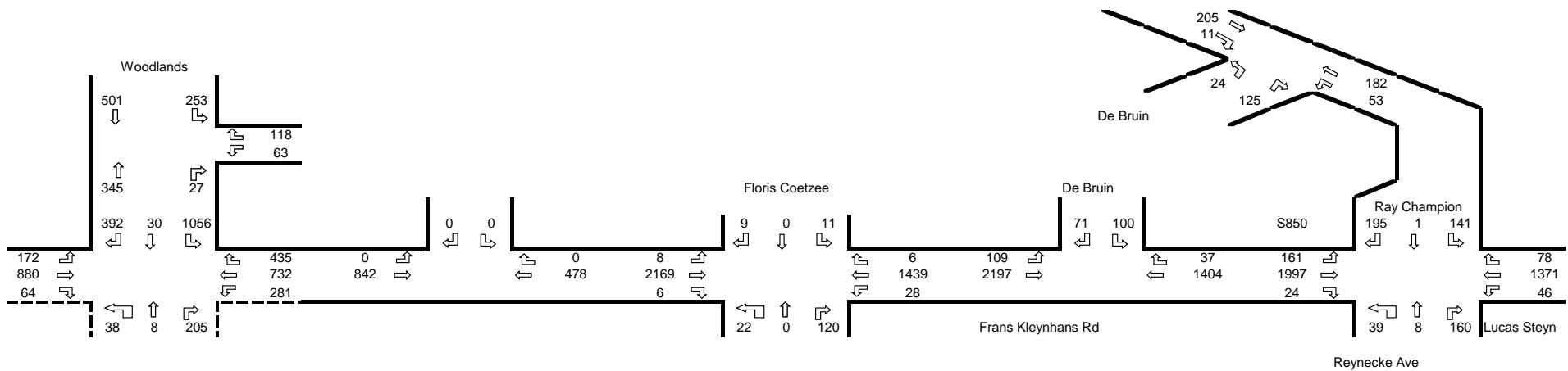


Figure 5.1b: 2020 AM Background Peak

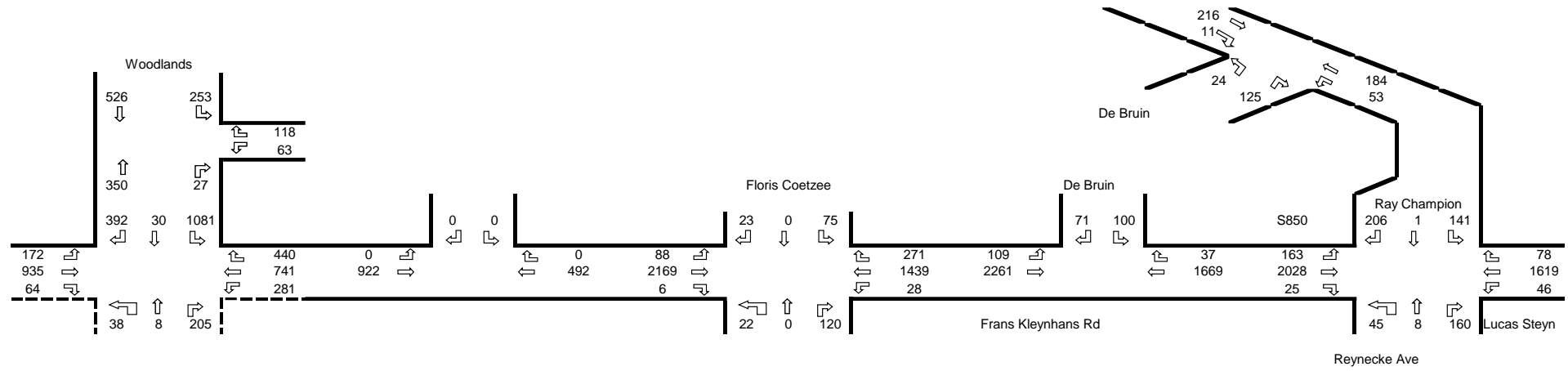


Figure 5.2: 2020 AM Peak with development

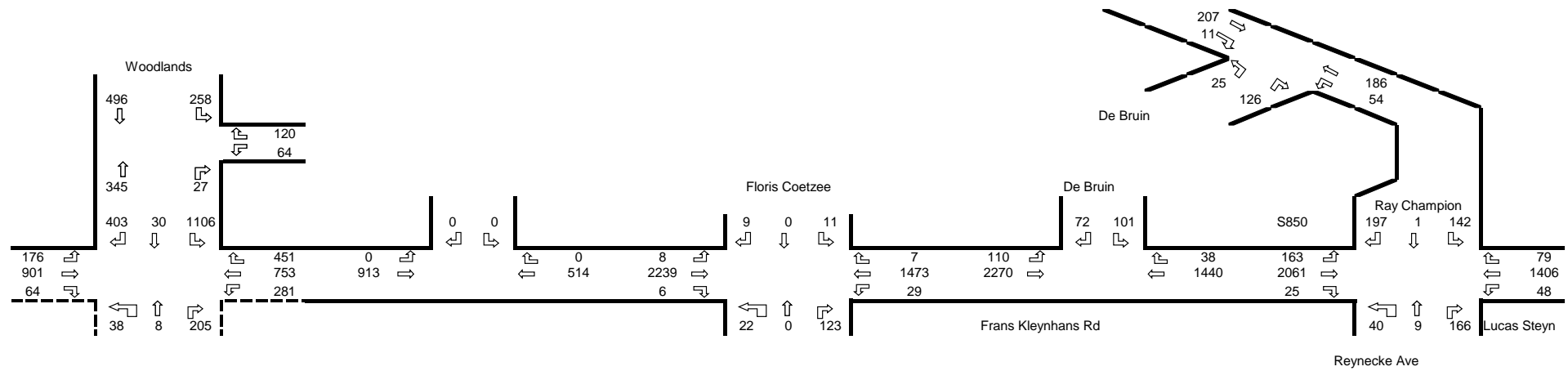


Figure 5.3: 2025 AM Background Peak

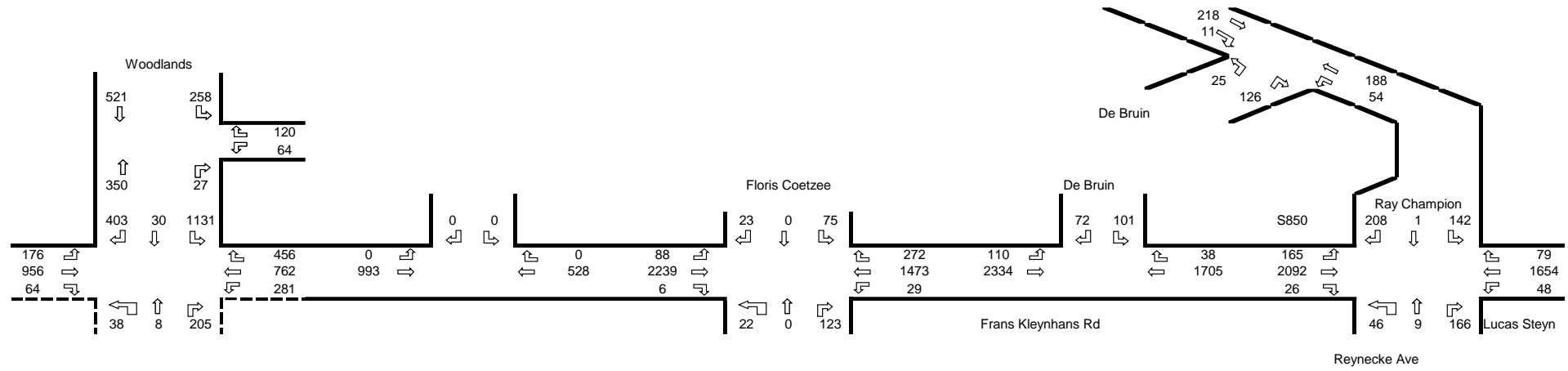


Figure 5.4: 2025 AM Background Peak with development

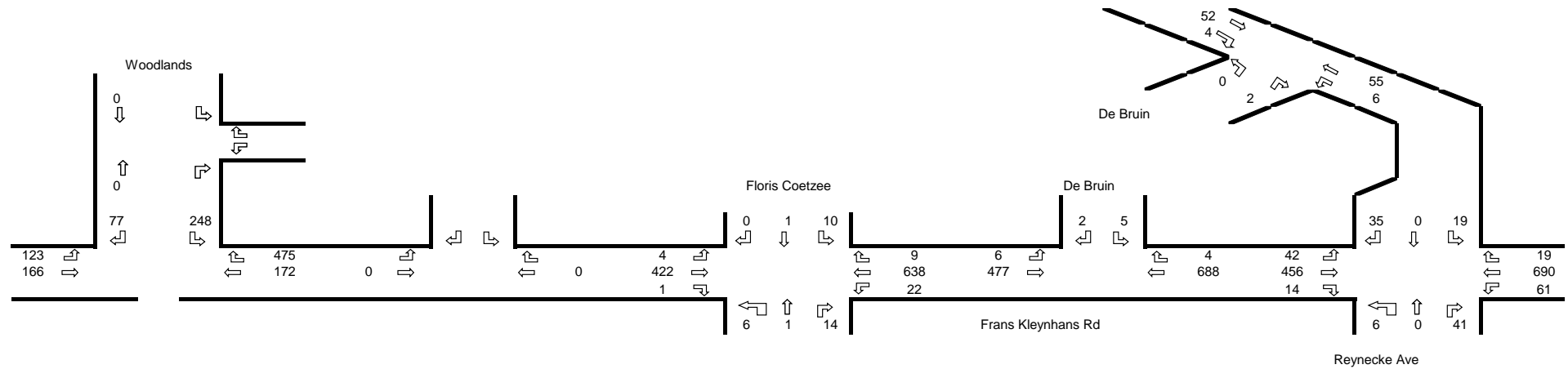


Figure 5.5a: 2019 PM Peak Volumes

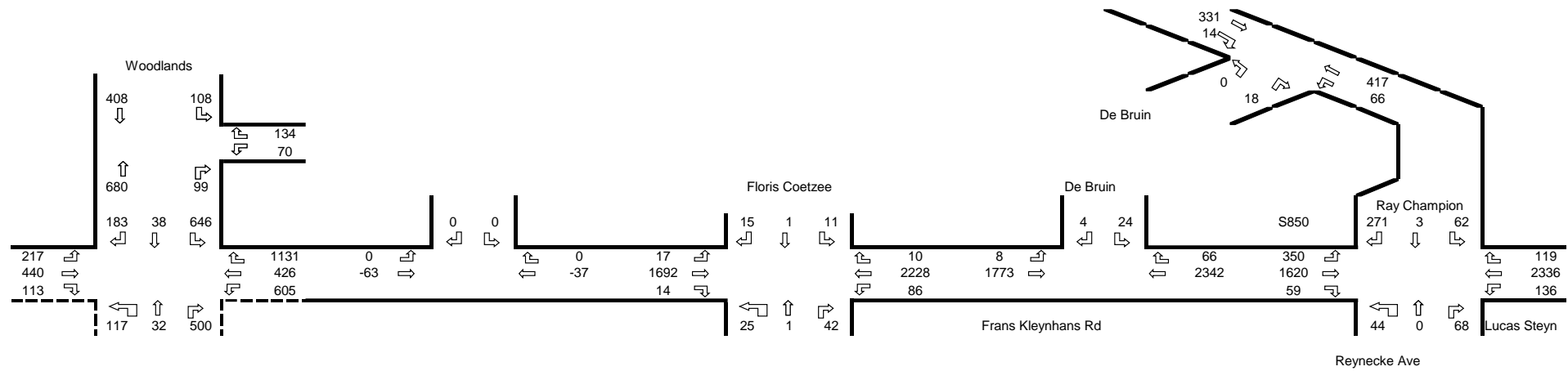


Figure 5.5b: 2020 PM Background Peak

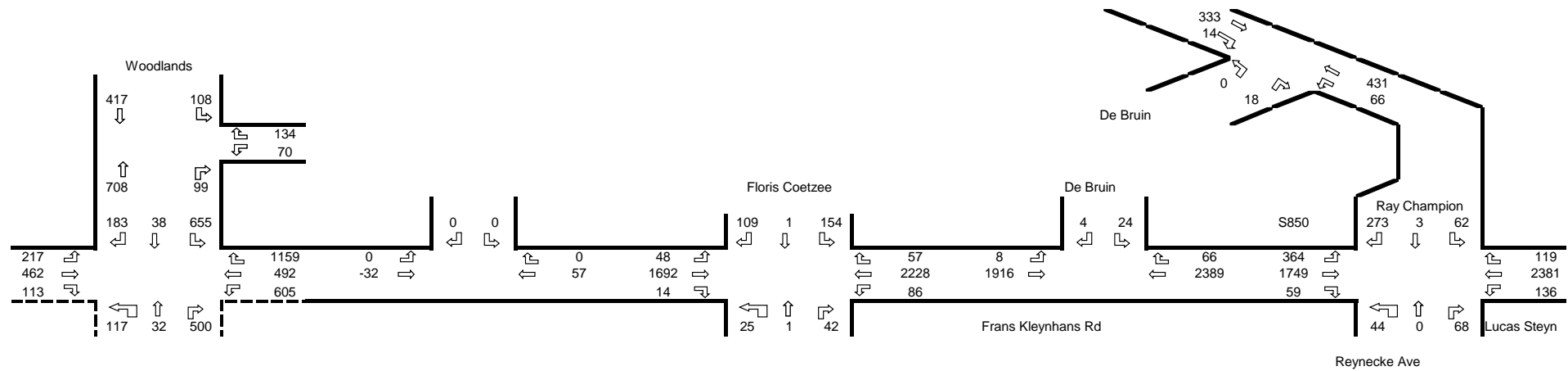


Figure 5.6: 2020 PM Peak with development

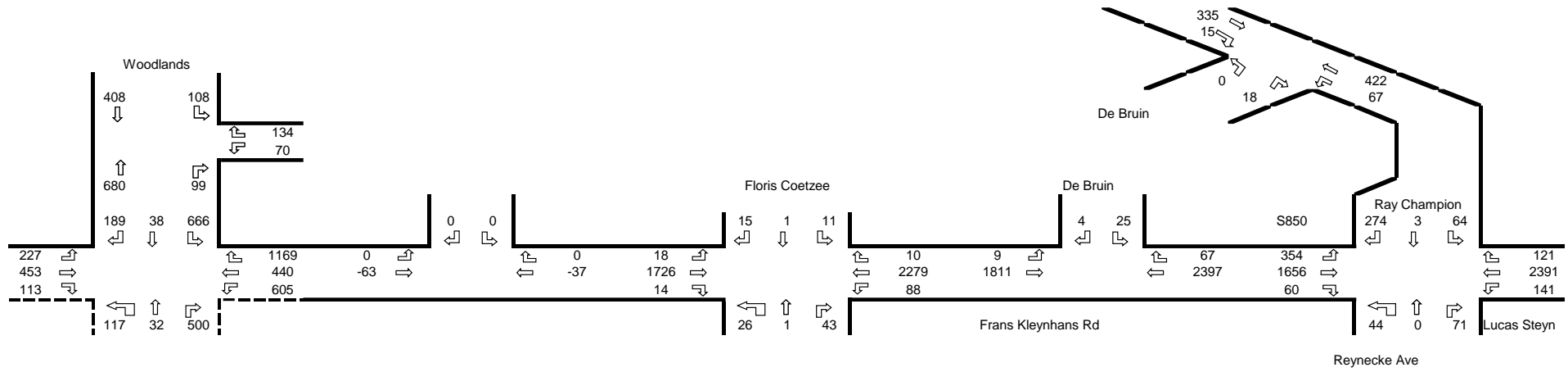


Figure 5.7: 2025 PM Background Peak

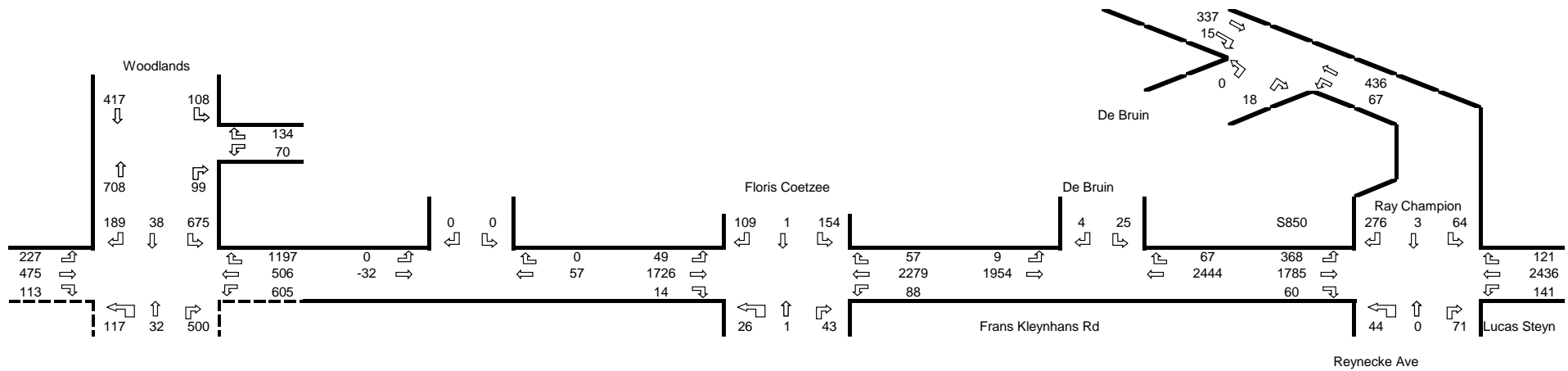


Figure 5.8: 2025 PM Background Peak with development

6 CAPACITY ANALYSIS

Capacity analyses were performed by means of the SIDRA program. The table below shows 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.

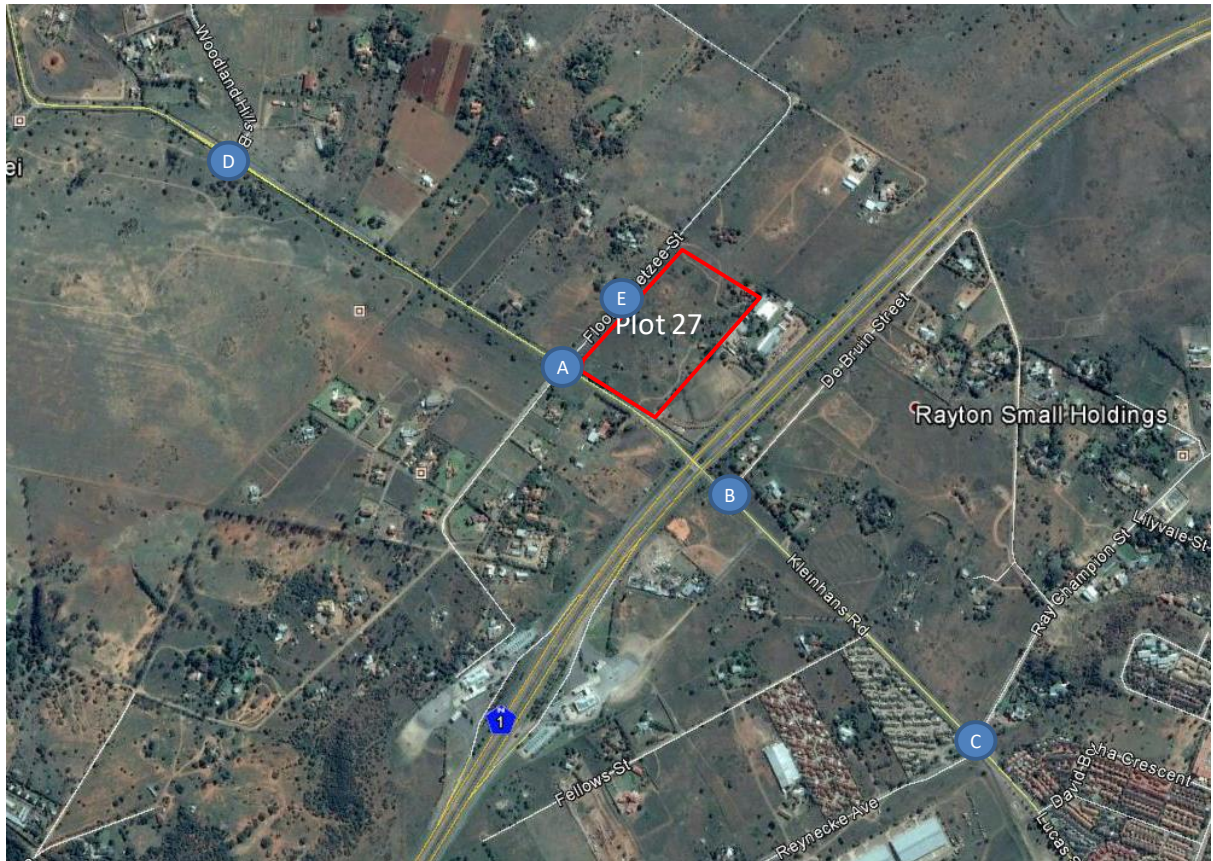
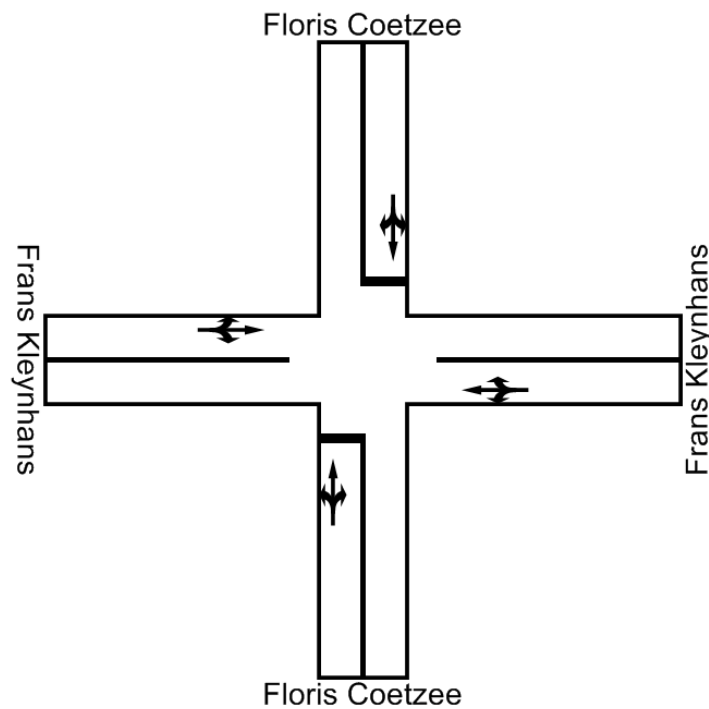


Figure 6.1: Intersections Analysed

- a) **Intersection A:** Floris Coetsee Street / Frans Kleynhans Road Intersection
- b) **Intersection B:** De Bruin Avenue / Frans Kleynhans Road Intersection
- c) **Intersection C:** Ray Champion Avenue / Frans Kleynhans Road Intersection
- d) **Intersection D:** Access to Woodland Hills / Frans Kleynhans Road Intersection
- e) **Intersection E:** Access in Floris Coetsee Street

6.1 Intersection A: Floris Coetzee Street / Frans Kleynhans Road

The current layout of the intersection is as follows:



Current Layout

Levels of service with this layout will be as follows:

Intersection: Floris Coetzee / Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
1a	2019 AM Peak	D	D	D	C	C	C	D	D	E	B	A	C
1b	2020 AM Background Peak	F	F	F	F	F	F	F	F	F	F	F	F
2	2020 AM Peak with development	F	F	F	F	F	F	F	F	F	F	F	F
5a	2019 PM Peak	C	C	C	B	A	B	C	C	C	C	A	C

Queues will be as follows

Intersection A		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
1a	2019 AM Peak	0.1	0.1	0.1	2.7	2.7	2.7	0.4	0.4	0.4	4.3	4.3	4.3
1b	2020 AM Background Peak	75.5	75.5	75.5	805.2	805.2	805.2	211.1	211.1	211.1	229.1	229.1	229.1
2	2020 AM Peak with development	752.1	752.1	752.1	461.4	461.4	464.1	874.5	874.5	874.5	251.4	251.4	251.4
5a	2019 PM Peak	0.0	0.0	0.0	2.3	2.3	2.3	0.1	0.1	0.1	1.5	1.5	1.5

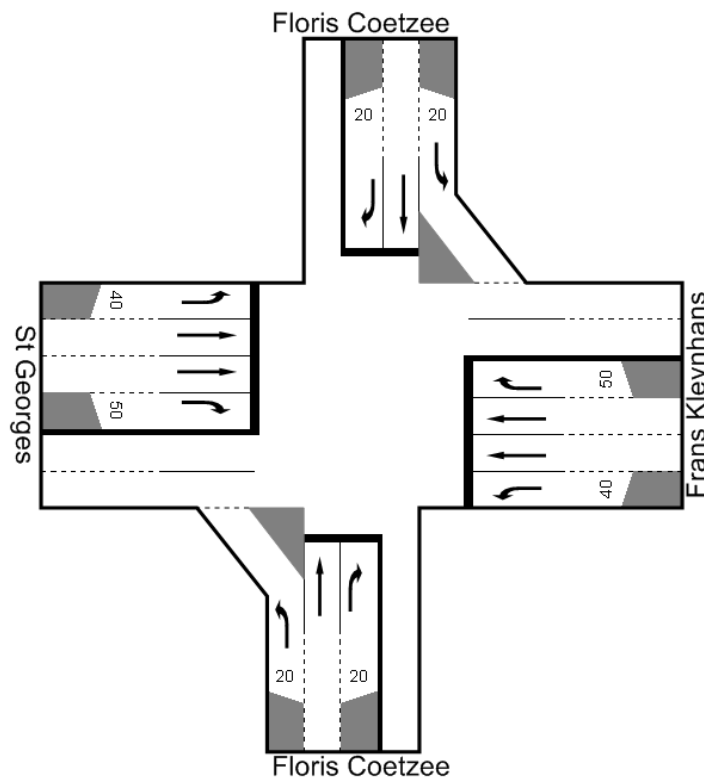
The analysis shows that the intersection is operating at acceptable levels of service but will experience serious capacity problems and long queues with latent rights. Calculated queues are considerably worse than during the 2016 study due to a significant increase in Latent Rights as well as a higher trip generation.

Queue lengths indicate that the intersection could possibly qualify for signalisation, although queues during traffic counting did not indicate this.

Considering the traffic volumes in Frans Kleynhans Road the road will have to be widened to two lanes per direction. This was also a requirement for the approval of the original Emoya development, but was not implemented at the time. With the layout determined for the Woodland Hills Boulevard / Frans Kleynhans Road intersection for the further extension of Emoya it can be accepted that this upgrading will now be undertaken.

Although queue lengths suggest that the intersection should be signalised, the intersection can probably continue to function as a priority controlled intersection due to the relatively low side road volumes, but with the development, side road volumes will probably increase to such an extent that the intersection will have to be signalised.

When the intersection qualifies for signalisation, the following layout should be considered.



Possible Signalisation

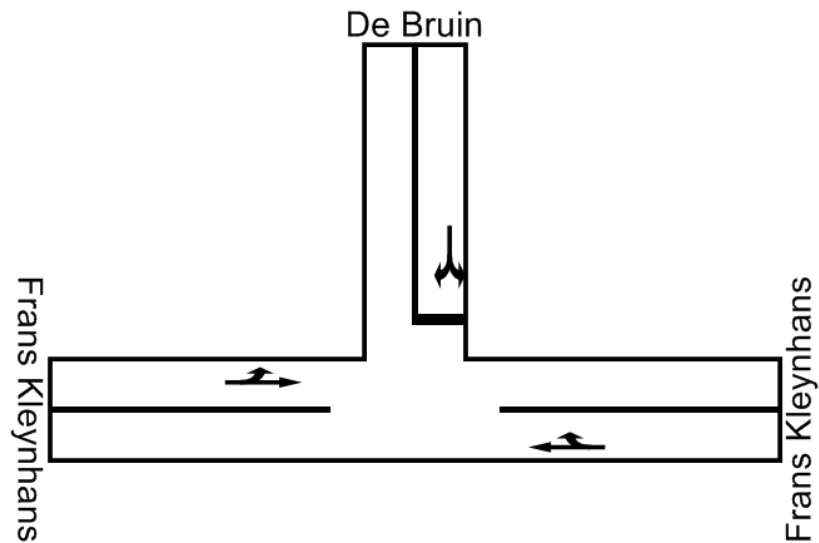
Worst case levels of service with this layout will be as follows:

Intersection: Floris Coetzee / Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development	A	D	D	B	A	B	A	D	D	B	A	B
8	2025 PM Peak with development	A	C	D	B	A	B	B	C	D	B	A	C

Note must also be taken of the possible future road network as discussed in Section 2.3. According to this planning the intersection might become a major intersection, which would require signalisation as shown above.

6.2 Intersection B: De Bruin Avenue / Frans Kleynhans Road

The current layout of the intersection is as follows:

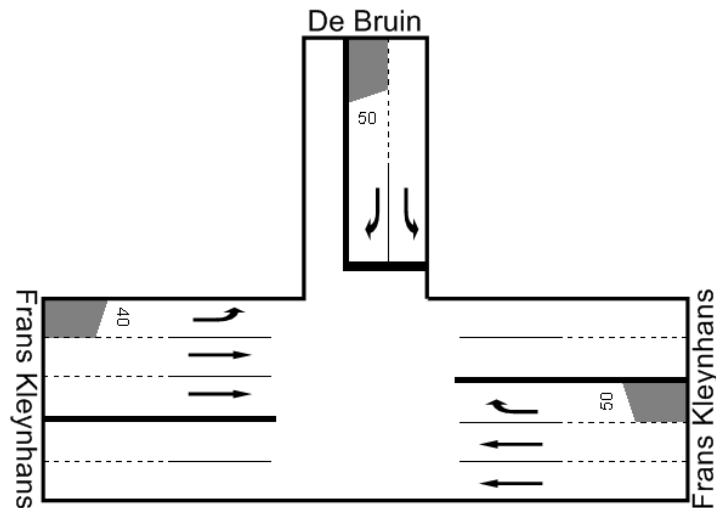


Current Layout

It was already shown that the current layout is not acceptable and the intersection will have to be upgraded with turning lanes.

It is however important to realise that it is not possible to retain Frans Kleynhans Road as a two-lane road with the latent rights as can be seen from the traffic volumes, and it was determined as part of most of the studies for the latent rights that the road should be widened to a four-lane road. Assumption of the latent rights also therefore implies assumption that the road will be widened.

The intersection can be improved by means of turning lanes and widening of the road as follows.



Layout with Four Lane Road

Levels of service and queues will be as follows for the worst case scenario.

Intersection: De Bruin/Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with Development	F		F		A	F				A	A	
8	2025 PM Peak with development	F		F		A	F				A	A	

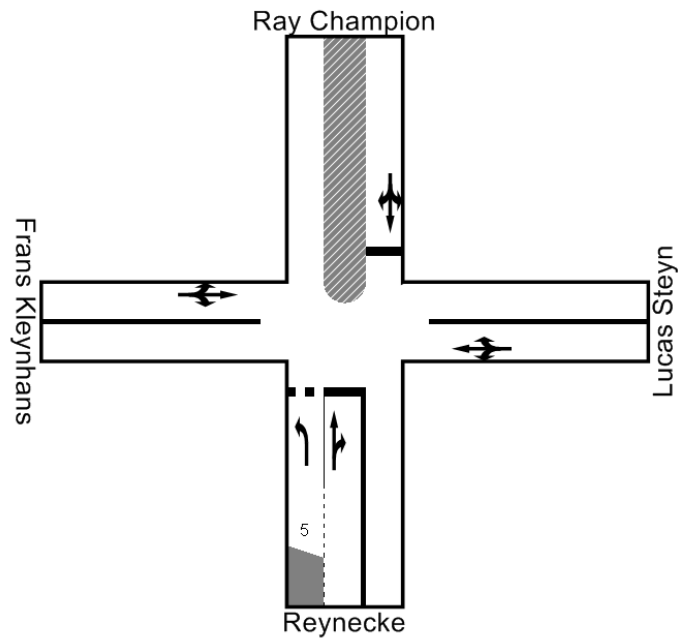
Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
4	2025 AM Peak with development	18.2		1.4		0.0	2.1				0.0	0.0	
8	2025 PM Peak with development	0.6		1.4		0.0	1.3				0.0	0.0	

Although some movements will still experience low levels of service, queues will be acceptable, apart from left turning from De Bruin Street during the morning peak.

Given the relatively low volumes of affected traffic, the intersection can continue as a priority controlled intersection, but considering the significant latent rights, the S850 must be widened and the intersection should be upgraded with turning lanes.

6.3 Intersection C: Ray Champion Avenue / Frans Kleynhans Road

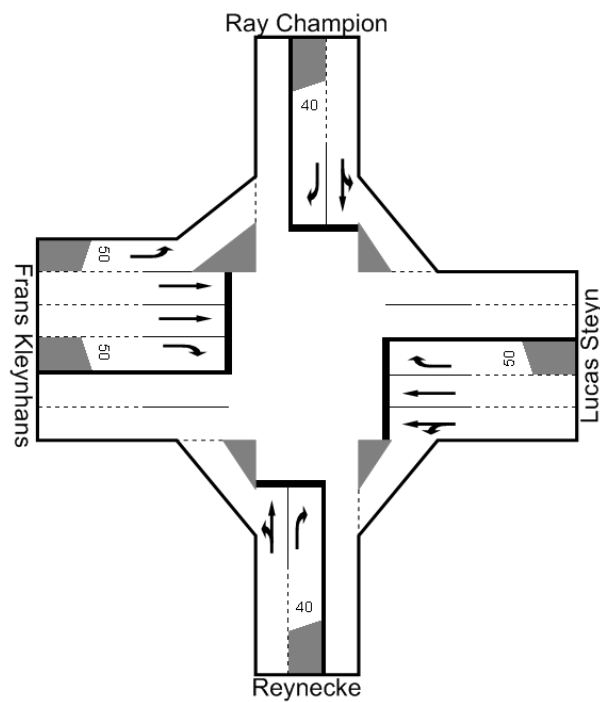
The current layout is as follows. (The stagger of the intersection was not considered)



Current Layout

It has on numerous occasions been shown that the intersection has to be upgraded and signalised.

The following layout was identified.

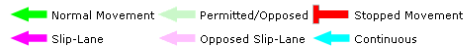
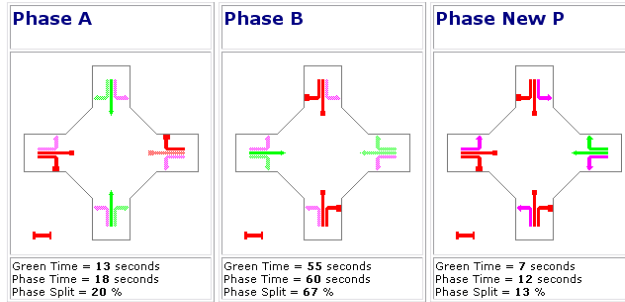


Phasing Summary

Ray Champion / Frans Kleynhans

2023 PM Peak with Dev

C = 90 seconds
Cycle Time Option: **User-specified cycle time**
Phase times determined by the program.



Previously Identified Layout

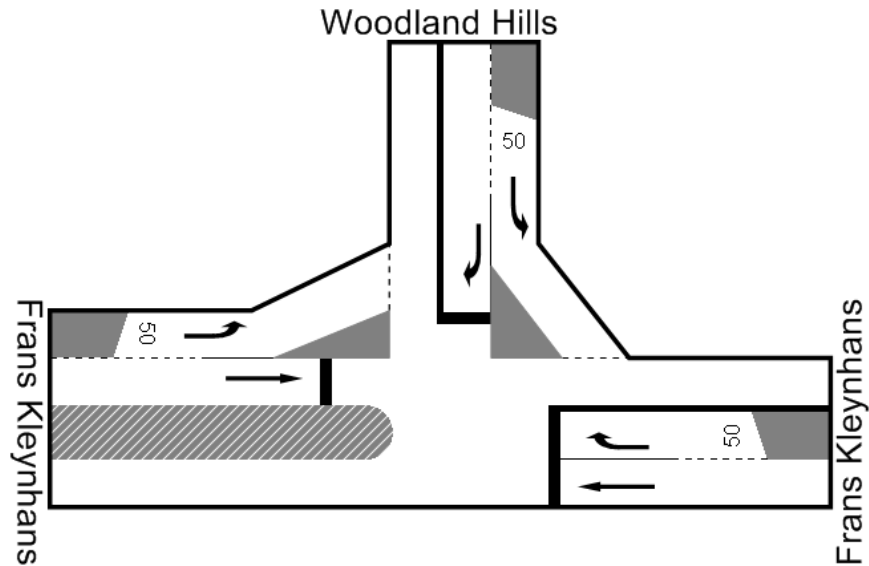
With this layout levels of service for the worst –case scenarios will be as follows:

Intersection: Ray Champion/Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development	B	B	D	B	A	D	B	A	D	A	A	C
8	2025 PM Peak with development	B	A	D	A	C	D	C	B	D	A	B	D

The intersection will thus still suffice.

6.4 Intersection D: Woodland Hills Access / Frans Kleynhans Road

It was previously determined that the current intersection will experience capacity problems once latent rights have been implemented. The following layout was identified.



Previously Identified Layout

With the relocation of the Emoya Access the following layout was identified by WSP Transport and Infrastructure, Africa.

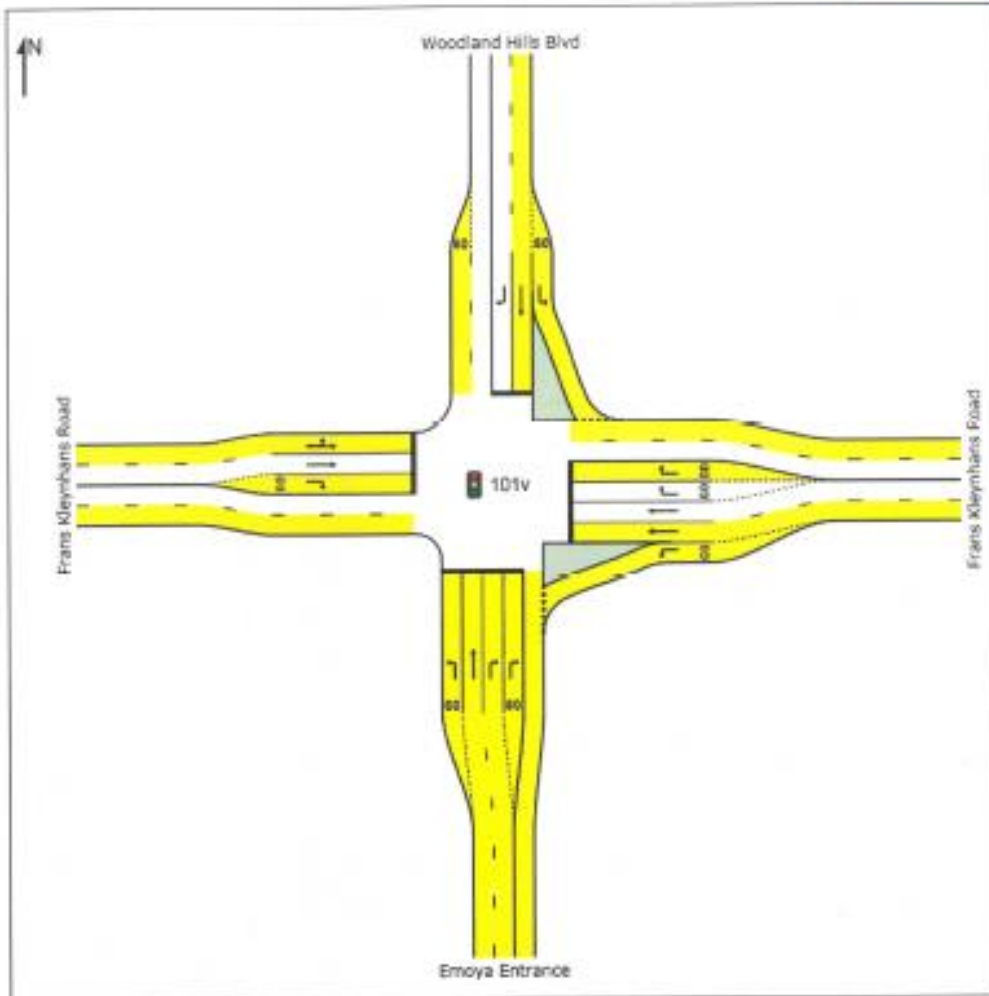


Figure 8: Proposed upgrade of Senario 2 of Frans Kleynhans Road / Woodland Hills Blvd / Emoya Entrance

PHASING SUMMARY

Site: 101v [SC2_2016 AM + dev - Copy - Conversion]

Frans Kleynhans Road and Woodland Hills Blvd
 2016 balanced traffic + development
 Weekday AM Peak Period
 Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Phase Times)

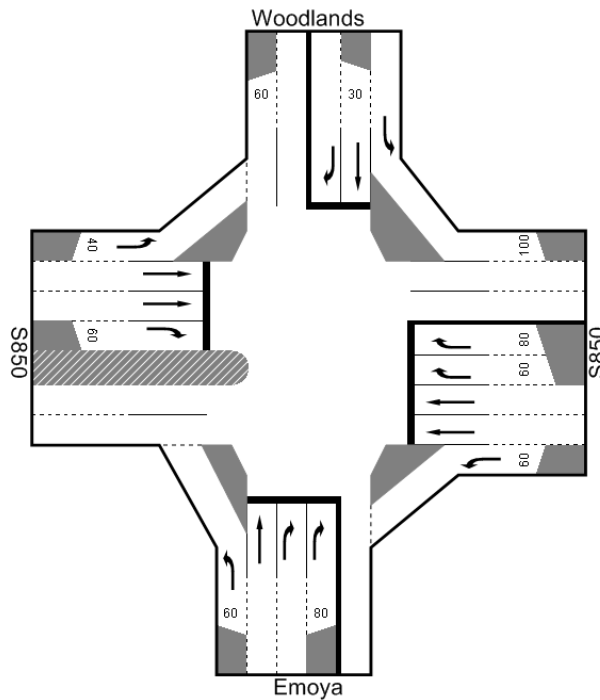
Phase Times specified by the user
 Phase Sequence: Opposed Turns
 Reference Phase: Phase C
 Input Phase Sequence: A, B, C, D
 Output Phase Sequence: A, B, C, D

With this layout levels of service for the horizon year (without the development) will be as follows:

Intersection: Woodlands/Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
3	2025 AM Background Peak	B	F	D	A	A	D	C	C	C	D	D	D
7	2025 PM Background Peak	B	C	D	A	A	C	D	C	E	F	F	F

The layout will thus not suffice, even without the development due to insufficient provision for movement to and from Woodlands.

To ensure acceptable levels of service the layout will have to be further upgraded as follows. This layout will result in the following levels of service.



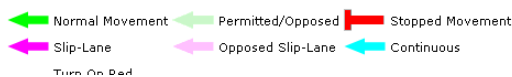
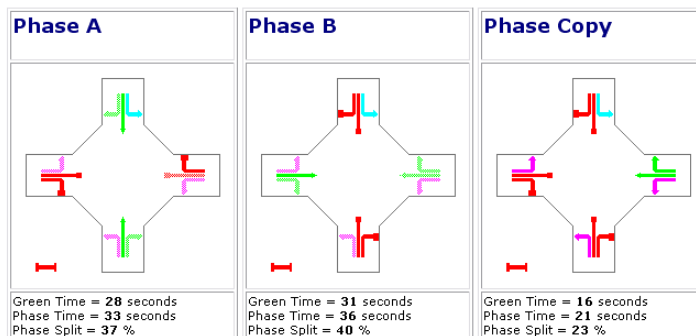
SIDRA
INTERSECTION

Phasing Summary

Woodlands / S850

2025 AM Background Peak with dev

C = 90 seconds
Cycle Time Option: User-specified cycle time
Phase times determined by the program.



Further Improvements Required

With this layout levels of service for the worst –case scenario will be as follows:

Intersection: Woodlands / Frans Kleynhans		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development	D	C	D	A	B	D	A	C	C	A	D	D
8	2025 PM Peak with development	C	C	D	A	A	C	A	C	D	B	C	D

6.5 Intersection D: Access in Floris Coetzee Street

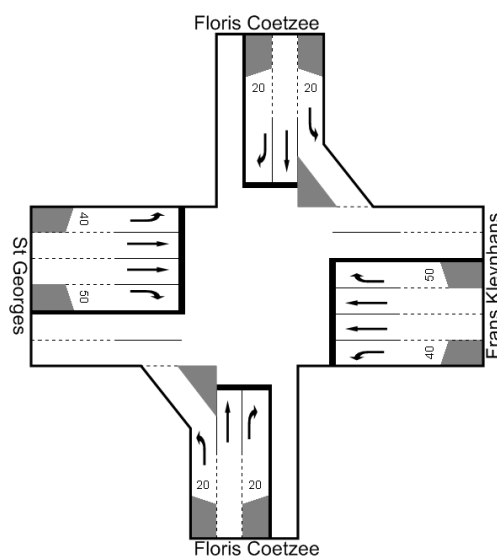
Given the low traffic volumes in this street priority controlled accesses should function at high levels of service.

6.6 Summary

The findings of the Capacity Analysis can be summarised as follows:

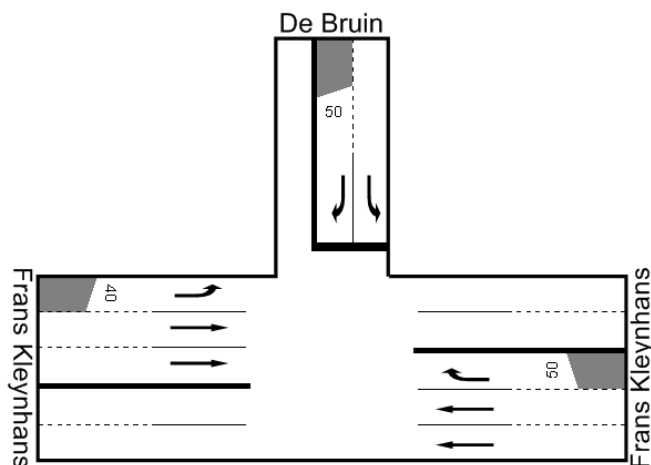
a) Floris Coetzee Street / Frans Kleynhans Road (S850) Intersection

The intersection will probably require signalisation as follows:



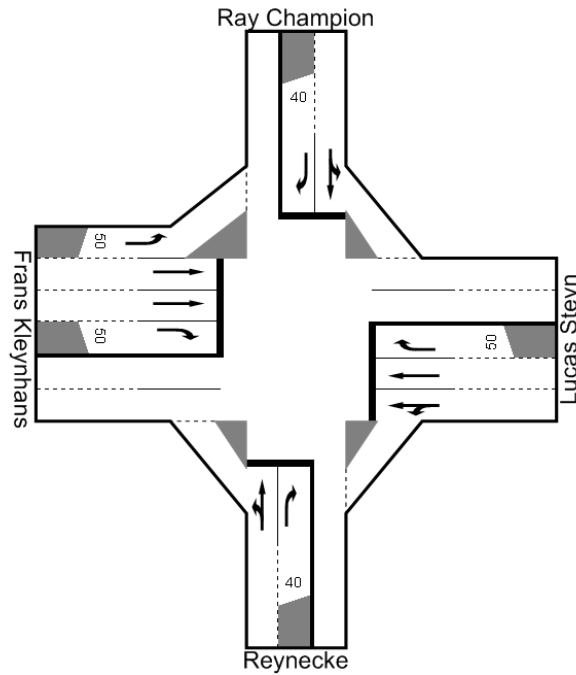
b) De Bruin Avenue / Frans Kleynhans Road (S850) Intersection

The intersection should be improved by means of turning lanes as follows.



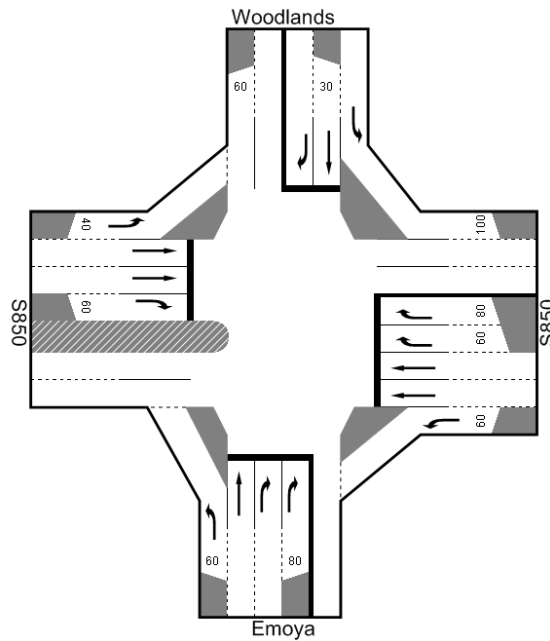
c) Ray Champion Avenue / Frans Kleynhans Road (S850) Intersection

The previously identified upgraded signalised intersection will operate at acceptable levels of service.



d) Woodland Hills Access / Frans Kleynhans Road (S850) Intersection

The layout identified to relocate the access to Emoya will not suffice for all the latent rights, irrespective of the development under consideration and will have to be further upgraded as follows:

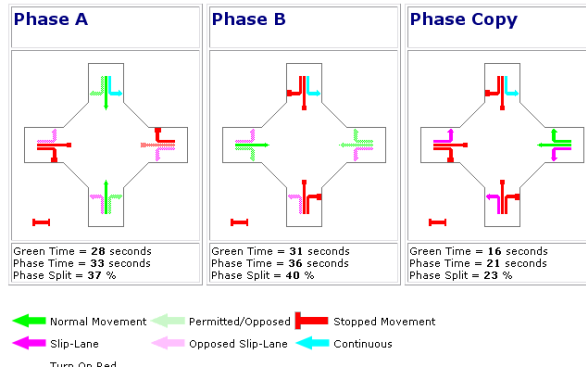


Phasing Summary

Woodlands / S850

2025 AM Background Peak with dev

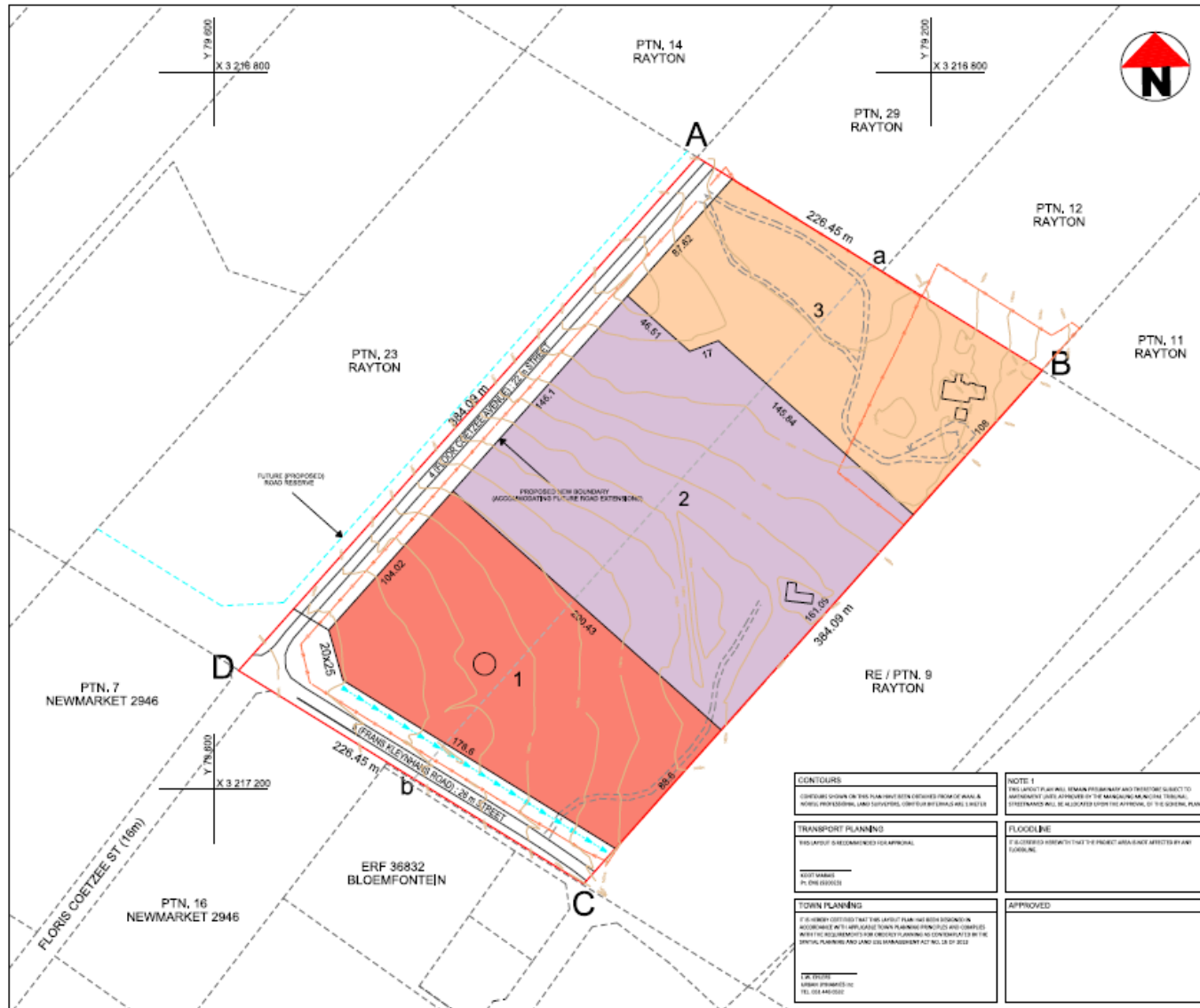
C = 90 seconds
Cycle Time Option: User-specified cycle time
Phase times determined by the program.



e) Access from Floris Coetzee Street

Given the low traffic volumes in this street priority controlled accesses should function at high levels of service.

7 SITE DEVELOPMENT PLAN



PROPOSED LAYOUT PLAN 4

PLOT 21 & 22, RAYTON SMALL HOLDINGS, BLOEMFONTEIN

LOCALITY

ZONING	ERF NO	NO OF ERVEN/UNITS	AREA IN HA	% OF AREA
RESIDENTIAL	1	1	0,11	0,11
INDUSTRIAL	2	1	3,18	30,26
STREET	3	1	0,08	0,78
STREET	4 & 5	2	0,43	4,03
TOTAL	7	5	3,70	100

GENERAL

1. THESE "NOTES" REPRESENTS PLOT 21 OF RAYTON SMALL HOLDINGS, MEASURING 4,027 HA.

2. THESE "NOTES" REPRESENTS PLOT 22 OF RAYTON SMALL HOLDINGS, MEASURING 4,027 HA.

3. THESE "NOTES" REPRESENTS THE PROPOSED TOWNSHIP, MEASURING 3,683 HA.

4. MAXIMUM GRADIENT OF STREETS = 20%

5. MAXIMUM GRADIENT OF STREETS = 10%

6. TOTAL LENGTH OF STREETS = 120%

7. ALL DIMENSIONS AND APPROXIMATIONS ARE SUBJECT TO FINAL SURVEYING.

LEGEND

SUBJECT PROPERTIES

SURROUNDING PROPERTIES

FENCES

LINE OF NO ACCESS

NO.	DESCRIPTION	BY	DATE

APPLICANT:

JENN TRAINING COLLEGE

DESIGN	DATE	BY
DESIGNED	15 JAN 2019	
CHECKED	15 JAN 2019	
APPROVED	15 JAN 2019	

SCALE: 1:2 000 (A3)

DATE: January 2019

DRAWING NO: LAYOUT PLAN 0278401

0 METER 100

URBAN DYNAMICS

PO Box 7702
117 Bloemfontein
5001

Tel: (051) 448 5552
Fax: (051) 448 7700
www.urban@urban.co.za

The following aspects are of importance:

No	Basic Aspects																																			
1	Intersections																																			
a	Number of intersections																																			
	<i>Discussion:</i>																																			
	No new intersections will be established. Three accesses (one per site) will be provided to the different erven.																																			
b	Spacing																																			
	<i>Discussion:</i>																																			
	<p>Sight distances were investigated at the accesses as the vertical alignment of Floris Coetzee Street affects sight distances.</p> <p>Ideally adequate shoulder sight distance must be provided at accesses to allow drivers to find a sufficiently large gap in the traffic stream to enter the road safely and with limited disruption to the traffic on the main road. The gap acceptance sight distance (shoulder sight distance) can be calculated as follows:</p> $\text{Sight distance} = \text{Design speed (km/h)} \times \text{Time gap (seconds)} / 3.6$ <p>The required gap times depend on the different combinations of vehicle types, turning movement and the width of the roadway to be crossed, with adjustment for gradient.</p> <p>Table 3.2: Gap acceptance time gaps (AASHTO 2004)</p> <table border="1"> <thead> <tr> <th rowspan="2">Design Vehicle</th> <th colspan="5">Time gaps (seconds) for different turning movements</th> </tr> <tr> <th>Left-turn from stop</th> <th>Straight through</th> <th>Right turn from stop</th> <th>Right-turn from major road</th> <th>Right-Turn at traffic signals</th> </tr> </thead> <tbody> <tr> <td>Passenger car/LDV</td> <td>6.5</td> <td>6.0 + 0.5 N</td> <td>7.0 + 0.5 N</td> <td>5.0 + 0.5 N</td> <td>7.5 + 0.5 N</td> </tr> <tr> <td>Bus/SU Truck</td> <td>8.5</td> <td>7.8 + 0.7 N</td> <td>8.8 + 0.7 N</td> <td>5.8 + 0.7 N</td> <td>9.3 + 0.7 N</td> </tr> <tr> <td>WB-15/WB-20</td> <td>10.5</td> <td>9.8 + 0.7 N</td> <td>10.8 + 0.7 N</td> <td>6.8 + 0.7 N</td> <td>11.3 + 0.7 N</td> </tr> <tr> <td>Gradient adjustment</td> <td>0.1 G</td> <td>0.1 G</td> <td>0.2 G</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>N = Equivalent number of lanes to cross G = Gradient in percentage. Gradient adjustment only applicable when G > 4%</p> <p><u>Access to Erf 1.</u></p> <p>In this instance left-turn from stop is the critical movement and provision should be made for buses. Based on this a sight distance of 142m is required</p> <p>The available distance from the S850 to a point where the vertical alignment prevents sight distance is approximately 290m. (Points 1 to 3) in the figure below. If the access is provided with a spacing of 60m at Point 2, a distance of 230m will be available. This exceeds the gap acceptance distance. To make provision for possible widening of the S850 and proper turning lanes, a recommended distance for access would be approximately 140m from the current centreline of the S850. Access will thus have to be on the northern boundary of the erf.</p>	Design Vehicle	Time gaps (seconds) for different turning movements					Left-turn from stop	Straight through	Right turn from stop	Right-turn from major road	Right-Turn at traffic signals	Passenger car/LDV	6.5	6.0 + 0.5 N	7.0 + 0.5 N	5.0 + 0.5 N	7.5 + 0.5 N	Bus/SU Truck	8.5	7.8 + 0.7 N	8.8 + 0.7 N	5.8 + 0.7 N	9.3 + 0.7 N	WB-15/WB-20	10.5	9.8 + 0.7 N	10.8 + 0.7 N	6.8 + 0.7 N	11.3 + 0.7 N	Gradient adjustment	0.1 G	0.1 G	0.2 G	-	-
Design Vehicle	Time gaps (seconds) for different turning movements																																			
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Bus/SU Truck	8.5	7.8 + 0.7 N	8.8 + 0.7 N	5.8 + 0.7 N	9.3 + 0.7 N																															
WB-15/WB-20	10.5	9.8 + 0.7 N	10.8 + 0.7 N	6.8 + 0.7 N	11.3 + 0.7 N																															
Gradient adjustment	0.1 G	0.1 G	0.2 G	-	-																															



Access to Erf 2.

With an erf boundary of 146m the access position is not of concern and can be determined at SDP stage.

Access to Erf 3.

Access to Erf 3 should be on the southern boundary of the erf (Point 4 above)

Sufficient distance will be available in both directions as shown below.



Sight distance to the North from Point 4



Sight distance to the South from Point 4

c	Traffic Control Measures
	<i>Discussion:</i>
	See Chapter 6
d	Traffic Capacity
	<i>Discussion:</i>
	Not relevant
e	Provision of deceleration lanes and turning lanes
	<i>Discussion:</i>
	See Chapter 6
f	Continuity of Road Reserve Boundaries
	<i>Discussion:</i>
	There are no steps in road reserve boundaries.
g	Required Improvements
	<i>Discussion:</i>
	No new streets will be established as part of the Township Establishment. See Chapter 6.
h	Phasing of Required Improvements
	<i>Discussion:</i>
	Not relevant
i	Vertical alignment of intersections
	Not relevant
2	Internal Roads
a	Road Classification
	<i>Discussion:</i>
	Floris Coetzee Street is currently a Local Street with a functional classification of a Residential Access Loop. With the development the functional classification will change to a Major Residential Access Link or possibly even a Commercial Local Street.
b	Width of Road Reserves
	<i>Discussion:</i>
	Provision is made for the planned widening of streets in the area. (See Section 2.3)

c	Splays
	<i>Discussion:</i>
	The only relevant splay is the 20m x 25m splay at the intersection of Floris Coetzee Street with the S850.
	Road widths
	<i>Discussion:</i>
	Not relevant
e	Road Curves
	<i>Discussion:</i>
	Not relevant
f	Super elevation
	<i>Discussion:</i>
	No super elevation would be required.
g	Gradient of Roads
	<i>Discussion:</i>
	Road gradients are acceptable and refer to Floris Coetzee Street 4. MINIMUM GRADIENT OF STREETS = 1:50 5. MAXIMUM GRADIENT OF STREETS = 1:16
	Traffic Circulation
	<i>Discussion:</i>
	There are no concerns.
i	Capacity of Road Links
	<i>Discussion:</i>
	No road link is expected to carry traffic volumes that would require more than one lane per direction.
j	General Sight Distances
	<i>Discussion:</i>
	Sight distances are in general acceptable. (See Point 1b)
k	Pedestrian Movements
	<i>Discussion:</i>
	Pedestrian movement is expected to mainly be restricted to on-site movement.
l	Illumination of Streets
	<i>Discussion:</i>
	Not relevant
m	Refuse Removal
	<i>Discussion:</i>
	Refuse vehicles will use the existing road network.
n	Public Transport
	<i>Discussion:</i>
	It is expected that the development will attract significant public transport, and facilities will have to be established on the sites for these modes of transport.
o	Emergency Vehicle Access
	<i>Discussion:</i>
	Emergency vehicles should be able to access all areas.

p	Potential Conflict Areas
	<i>Discussion:</i>
	There are no concerns.
q	Heavy Vehicle Usage
	<i>Discussion:</i>
	Relatively low heavy vehicle volumes in the form of delivery vehicles are expected. Buses are however expected.
r	Jurisdiction of Roads
	<i>Discussion:</i>
	Not relevant
s	Other Legal Considerations
	<i>Discussion:</i>
	Not relevant

8 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions can be made from the study:

- a) The development could result in 423 and 315 new trips during the morning and afternoon peak hours respectively.
- b) The extensive latent rights in this corridor will result in capacity problems at most of the analysed intersections, irrespective of whether the development is implemented or not and widening of Frans Kleynhans Road to a four-lane road is essential.
- c) The biggest impact of the development will be at the Floris Coetzee Street / Frans Kleynhans Road intersection. With the development and the extensive Latent Rights, the intersection will probably require signalisation.
- d) The site development plan is in principle acceptable.

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, 6th Edition**, Institute of Transportation Engineers, Washington, 1998
4. **Transportation and Land Development**, Institute of Transportation Engineers, Washington, 1988
5. **UTG 1, Guidelines for the Geometric Design of Urban Arterial Roads**, CSIR, Pretoria, 1986
6. **National Guidelines for Road Management in South Africa**, COTO
7. **Spacing of Accesses on Major Arterials**, Department of Transport, Pretoria, 1993
8. **UTG 7, Guidelines for the Geometric Design of Urban Local Residential Streets**, CSIR, Pretoria, 1989
9. **SANRAL Geometric Design Guidelines**, SANRAL, 2004
10. **TRH 26, South African Road Classification and Access Management Manual, Version 1.0**, COTO, 2012
11. **TMH 17. Volume 1. Trip Data Manual**, COTO, 2012

APPENDIX A

ANNEXURE D

AMENDMENT OF SCHEME SCHEDULES

SCHEDULE

Amend section 9, **Table “C”** of the Bainsvlei Town Planning Scheme, No. 1 of 1984 (as amended) by the addition of “Special Use ___”, and “Special Use ___”, that should read as follows:

Use zone	How indicated on map	Purposes for which land may be used	Purposes for which land in a use zone may be used with the approval of the Municipality
<p>“Special Use ___”</p> <p>Erf 1 Bloemfontein Ext. ___, located on Plot 27 Rayton Small Holdings</p>	Orange marked “S”	<p>Permitted uses:</p> <p>A Private Educational Facility accommodating a maximum of 1000 students with the following additional restrictions;</p> <p>(e) Lecture rooms with a maximum floor area of 1000 m²;</p> <p>(f) A Student Centre, including a Library, Student Services, Cafeteria, and Auxiliary Enterprises with a maximum gross leasable floor area of 1,000 m²;</p> <p>(g) Offices for academic and institutional support with a maximum gross leasable floor area of 2,000 m².</p> <p>Coverage: No Restriction</p> <p>Height: Three Storeys</p> <p>Parking:</p> <p>(a) Lecture rooms: 0,3 parking spaces per student.</p> <p>(b) Offices: 4 parking spaces per 100m² GLA.</p> <p>Building line: Subject to the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Access: To the satisfaction of the</p>	None

BYLAE

Wysig Artikel 9, **Tabel “C”** van die Bainsvlei Dorpsaanlegskema, No. 1 van 1984 (soosgewysig) deur die byvoeging van “SpesialeGebruik___” en “SpesialeGebruik___”, wat soosvolgmoet lees:

Gebruiksonne	Hoe op kaartaan-gewys	Doeleindeswaarvoorgrondgebruik mag word	Doeleindeswaarvoorgrond in 'n gebruiksonne metgoedkeuring van die MunisipaleRaadgebruik mag word
<p>“SpesialeGebruik ___”</p> <p>Erf 1 Bloemfontein Uitbr. ___, Plot 27 Rayton Kleinhoewes</p>	Oranjegemerkt “S”	<p>Toelaatbaregebruike:</p> <p>'n PrivaatOpvoedkundigeFasieliteitwat 'n maksimum van 1000 studenteakkommodeer met die volgendeaddisionelebeperkings;</p> <p>(a) Lesinglokale met 'n maksimumvloeroppervlakte van 1000 m²;</p> <p>(b) 'n Studentesentrum, ingesluit 'n Biblioteek, Studentedienste, Kafeteria, en Hulpondernemings met 'n maksimumbrutoverhuurbarevloeroppervlakte van 1,000 m²;</p> <p>(c) Kantore vir akademiese en institusioneleondersteuning met 'n maksimumbrutoverhuurbarevloeroppervlakte van 2,000 m².</p> <p>Dekking: Geenbeperking</p> <p>Hoogte: Drieverdiepings</p> <p>Parkering:</p> <p>(a) Lesinglokale: 0,3parkeer-ruimtes per student.</p> <p>(b) Kantore: 4 parkeerruimtesper 100m² BVO.</p> <p>Boulyn: Onderworpeaan die Bainsvlei Dorpsaanleg-skema No. 1 van 1984.</p> <p>Toegange: Tot bevestigingvan die Mangaung Metro Munisipaliteit.</p>	Geen
<p>“Spesialegebruik ___”</p> <p>Erf 3 Bloemfontein Uitbr. ___, Plot 27 Rayton Kleinhoewes</p>	Oranjegemerkt “S”	<p>Toelaatbaregebruike:</p> <p>'n Boutique Hotel bestaandeuit30kamers.en konferensielokale wat voorsieningmaak vir 'n maksimum van 150 konferensie-afgevaardigdes;</p> <p>Dekking: Geenbeperking.</p> <p>Hoogte: Drieverdiepings.</p> <p>Parkering:</p> <p>(a) Boutique Hotel: 1 ruimte per kamer.</p>	

		Mangaung Municipality.	Metro			(b) Konferensie: 0.3 ruimtes per sitplek.	
						<p>Boulyn: Onderworpeaan die Bainsvlei Dorpsaanleg-skema No. 1 van 1984.</p> <p>Toegange: Tot bevrediging van die Mangaung Metro Munisipaliteit.</p>	
<p>"Special Use —"</p> <p>Erf 3 Bloemfontein Ext. _____, located on Plot 27 Rayton Small Holdings</p>	Orange marked "S"	<p>Permitted uses:</p> <p>A Boutique Hotel consisting of 30 rooms and conference facilities making provision for a maximum number of 150 conference delegates;</p> <p>Coverage: No Restriction.</p> <p>Height: Three Storeys.</p> <p>Parking:</p> <p>(a) Boutique Hotel: 1 parking bay per room. (b) Conference: 0.3 parking bays per seat.</p> <p>Building line: Subject to the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Access: To the satisfaction of the Mangaung Metro Municipality.</p>					