



**VRYBURG RETAIL DEVELOPMENT
ACCESS STUDY
MEMORANDUM**

K1471/1

FEBRUARY 2013



**CIVIL AND STRUCTURAL CONSULTING
ENGINEERS**

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1 INTRODUCTION

The site of the proposed development is located to the south of Vryburg as shown in Figure 1.1. This memorandum addresses the accesses to the proposed Vryburg Retail development.

The proposed development will consist of a 35000 m² retail centre and will generate 1 792 and 3 035 trips during the Friday afternoon and Saturday peak hours, respectively.



Figure 1.1: Locality Plan

2 LAND USE AND TRIP GENERATION

2.1 Land Use

The Vryburg Retail development will consist of the following land-use:

- 35000m² retail centre.

2.2 Trip Generation

The trip generation rates in the Department of Transport's "South African Trip Generation Rates, 2nd Edition, June 1995" are used as a basis for the calculation of the proposed development trips.

The retail trips will comprise of primary and pass-by trips only. Due to the location and the lack of retail centres of similar size in the vicinity of the proposed development it is assumed that there will not be any diverted trips generated. The diverted trips were considered as primary trips for this study.

Due to the low volume of traffic along the N14 the passer-by trips were reduced by 25% and the primary trips increased by 25%.

A trip reduction of 20% has been applied to account for:

- walking and public transport trips, and
- low vehicle ownership.

The Friday afternoon and Saturday peak hour trip generation for the proposed development are shown in Tables 2.1 and 2.2, respectively.

**TABLE 2.1: FRIDAY AFTERNOON PEAK HOUR TRIP GENERATION
(PROPOSED RETAIL DEVELOPMENT)**

Land Use	Area (m ²)/Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Retail	35000	100	6.40	20%	50%	50%	896	896	1792
PRIMARY					90%		806	806	1613
DIVERTED					0%		0	0	0
PASSER-BY					10%		90	90	179
TOTAL					TOTAL		896	896	1792

**TABLE 2.2: SATURDAY PEAK HOUR TRIP GENERATION
(PROPOSED RETAIL DEVELOPMENT)**

Land Use	Area (m ²)/Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Retail	35000	100	10.84	20%	50%	50%	1518	1518	3035
PRIMARY					90%		1366	1366	2732
DIVERTED					0%		0	0	0
PASSER-BY					10%		152	152	304
TOTAL							1518	1518	3035

Retail trips are not considered in the morning peak hour due to the fact that most shops within a retail centre normally open after 8:00, which is outside peak of the surrounding road network. Trips to a retail centre during the morning peak hour are therefore considered to be negligible.

There are two residential developments within the vicinity of the proposed retail development, namely:

- Fairview Estates (High Income Residential)
- Rosendal Estates (Low Income Residential)

Traffic studies for the above mentioned developments were not available and therefore the trips generated by these residential developments were estimated in order to determine the latent trips to be considered as part of this study.

The Saturday peak hour residential trips are assumed to be 50% of the normal weekday peak hour residential trips.

The Friday afternoon and Saturday peak hour trip generation for the Fairview Estates residential development are shown in Tables 2.3 and 2.4, respectively.

**TABLE 2.3: FRIDAY AFTERNOON PEAK HOUR TRIP GENERATION
(FAIRVIEW ESTATES)**

Land Use	Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
High Income Residential	42	units	1.50	0%	75%	25%	47	16	63
TOTAL							47	16	63

**TABLE 2.4: SATURDAY PEAK HOUR TRIP GENERATION
(FAIRVIEW ESTATES)**

Land Use	Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
High Income Residential	42	units	0.75	0%	50%	50%	16	16	32
TOTAL							16	16	32

The Friday afternoon and Saturday peak hour trip generation for the Rosendal Estates residential development are shown in Tables 2.5 and 2.6, respectively.

**TABLE 2.5: FRIDAY AFTERNOON PEAK HOUR TRIP GENERATION
(ROSENDAL ESTATES)**

Land Use	Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Low Income Residential	274	units	0.50	0%	65%	35%	89	48	137
TOTAL							89	48	137

**TABLE 2.6: SATURDAY PEAK HOUR TRIP GENERATION
(ROSENDAL ESTATES)**

Land Use	Units	Unit (m ²)	Rate	Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Low Income Residential	274	units	0.25	0%	50%	50%	34	34	69
TOTAL							34	34	69

3 THE EXISTING ROAD NETWORK

N14 is a class 2 road with one lane per direction and resorts under SANRAL. The SANRAL jurisdiction is 30 m south west of the developments boundary. The development is therefore situated along the Naledi Local Municipality jurisdiction and the N14 becomes a class 4a road along the site boundary, with closely spaced intersections.

4 TRIP DISTRIBUTION AND ASSIGNMENT

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

5 TRAFFIC COUNTS

5.1 Introduction

24 hour counts were conducted between 19 August 2009 and 15 September 2009 on the N14 between Kuruman and Vryburg. The Friday and Saturday peak hour traffic volumes were calculated from this data based on the assumption that 10%- 15% of the AADT occurs in the peak hour..

The 2009 weekday morning and afternoon and Saturday peak hour traffic counts are shown in Table 6.1.

TABLE 5.1: 2009 TRAFFIC COUNTS

	Friday Peak Hour	Saturday Peak Hour
To Vryburg	120	65
To Kuruman	110	70

5.2 Background Traffic Volumes

Base Year -2014

The 2009 weekday morning and afternoon peak hour traffic counts were escalated at a 3% annual growth rate over 5 years and added to the Fairview Estates and Rosendal Estates development trips to obtain the 2014 peak hour background traffic volumes.

Horizon Year– 2019 (5 year) and 2024 (10 year)

The proposed retail development will generate more than 2 000 trips in the peak hour therefore a 5 year and 10 year horizon period was considered.

The 2009 weekday morning and afternoon peak hour traffic counts were escalated at 3% annual growth rate over 10 and 15 years and added to the Fairview Estates' and Rosendal Estates' development trips obtain the 2019 and 2024 peak hour background traffic volumes respectively.

5.3 Background And Development Traffic Volumes

The Friday and Saturday peak hour total development trips were added to the 2014, 2019 and 2024 background traffic volumes to obtain the 2014, 2019 and 2024 background and development trips.

6 TRAFFIC OPERATIONS AND CAPACITY ANALYSIS

6.1 Introduction

Capacity analysis was performed at the proposed retail centre access points with the N14 using the SIDRA Intersection 5.0 software package.

The accesses to the development are addressed in this section. The two accesses to the site will be referred to as the eastern and western access respectively.

6.2 Proposed Accesses

The traffic control at the intersections are:

- Eastern Access – roundabout.
- Western Access – roundabout.

Tables 6.1, 6.2 and 6.3 below show the results of the capacity analysis for the base year and the horizon years. Detailed capacity calculations are included in **ANNEXURE A**.

TABLE 6.1: 2014 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS (BASE YEAR)

INTERSECTION		FRIDAY PEAK HOUR	SATURDAY PEAK HOUR	
ROUNDBABOUT	N14/ PROPOSED WESTERN ACCESS	V/C ratio	0.643	0.744
		LOS	A	B
		Delay (sec/veh)	9.4	11.5
	N14/ PROPOSED EASTERN ACCESS	V/C ratio	0.650	0.525
		LOS	B	B
		Delay (sec/veh)	10.3	10.2

TABLE 6.2: 2019 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS (5 YEAR HORIZON)

INTERSECTION		FRIDAY PEAK HOUR	SATURDAY PEAK HOUR	
ROUNDABOUT	N14/ PROPOSED WESTERN ACCESS	V/C ratio	0.659	0.755
		LOS	A	B
		Delay (sec/veh)	9.4	11.6
	N14/ PROPOSED EASTERN ACCESS	V/C ratio	0.665	0.535
		LOS	B	B
		Delay (sec/veh)	10.5	10.2

TABLE 6.3: 2024 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS (10 YEAR HORIZON)

INTERSECTION		FRIDAY PEAK HOUR	SATURDAY PEAK HOUR	
ROUNDABOUT	N14/ PROPOSED WESTERN ACCESS	V/C ratio	0.679	0.769
		LOS	A	B
		Delay (sec/veh)	9.5	11.7
	N14/ PROPOSED EASTERN ACCESS	V/C ratio	0.681	0.546
		LOS	B	B
		Delay (sec/veh)	10.8	10.3

7 ACCESS

7.1 Introduction

The proposed roundabout accesses are to be located along a section of the N14 under the jurisdiction of the Naledi Local Municipality.

7.2 Proposed Accesses

The configurations of the proposed eastern and western accesses are shown in the Figures 7.1 and 7.2 respectively.

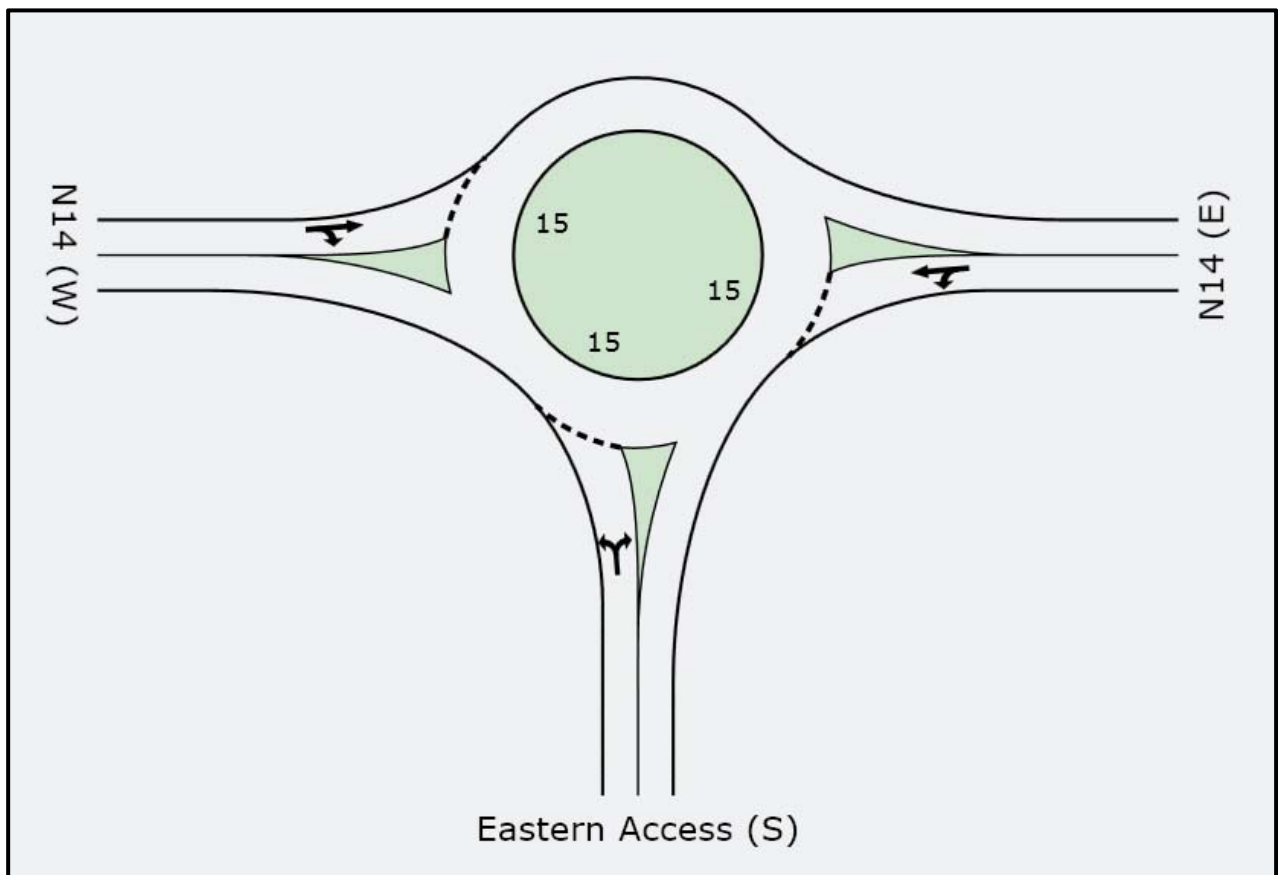


Figure 7.1: Proposed Eastern Access to Development

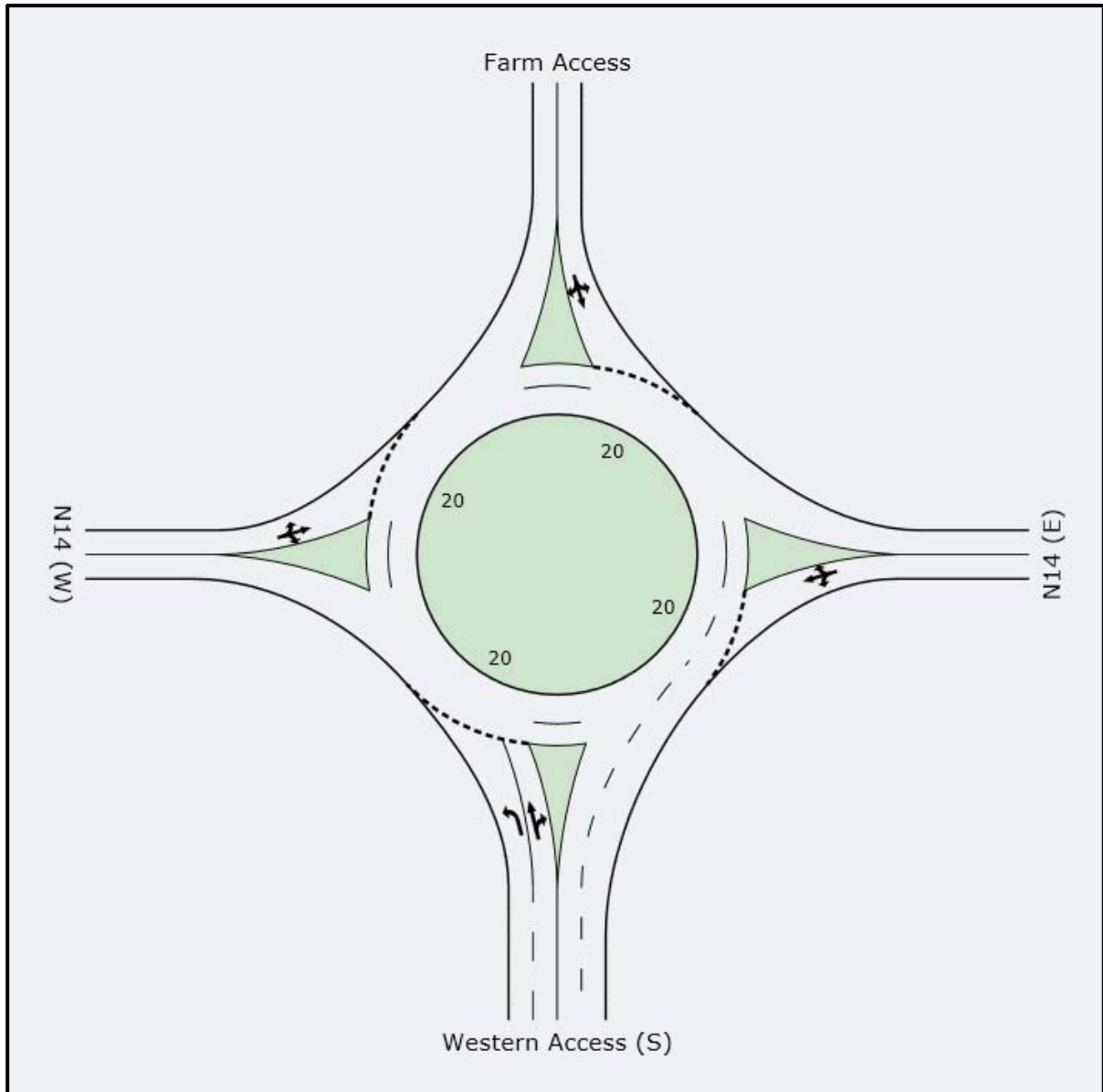


Figure 7.2: Proposed Western Access to Development

A detailed layout plan showing the access positions is included in **ANNEXURE B**.

7.3 Access Spacing

Proposed Development

The N14 leading into Vryburg can be classified as an urban class 4a commercial collector road in accordance with TRH26 'South African Road Classification and Access Management Manual' Version 1.0, December 2011.

For a class 4a commercial collector, a minimum spacing of 200m is required between intersection centre lines.

The spacing between the proposed accesses is 227m between centre lines and therefore meets the minimum requirements in accordance with the TRH26.

Existing Developments

Access to the existing Fairview Estate residential development is gained via a priority controlled access off the N14. Fairview Estate's access lies on a section of the N14 under the jurisdiction of SANRAL, but does not comply with the minimum access spacing requirements of SANRAL or TRH26. The access is approximately 375m away from the nearest access to the south.

During discussions with SANRAL they indicated that they will deal with Fairview access and substandard spacing.

8 CONCLUSION

The proposed development will consist of a 35 000 m² retail centre and will generate **1 792** and **3 035** trips during Friday and Saturday peak hours, respectively.

The proposed development will require two accesses off the N14. The accesses will be able to accommodate the base year traffic as well as the 2019 and 2024 horizon year traffic.

The two accesses to the development will be controlled by roundabouts.

The proposed retail development will not have a negative impact on the surrounding road network.

MM Gounden
For CIVIL CONCEPTS (PTY) LTD

February 2013



ANNEXURE A DETAILED CAPACITY CALCULATIONS

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MOVEMENT SUMMARY

Site: 2014 FRIDAY BG+DEV

N14 / Proposed East Access Roundabout
 2014 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Eastern Access (S)												
1	L	114	0.0	0.536	14.2	LOS B	5.9	41.0	0.89	0.96	42.6	
3	R	264	0.0	0.536	18.3	LOS B	5.9	41.0	0.89	0.98	40.5	
Approach		378	0.0	0.536	17.1	LOS B	5.9	41.0	0.89	0.97	41.1	
East: N14 (E)												
4	L	283	0.0	0.651	8.0	LOS A	9.7	67.9	0.58	0.56	47.6	
5	T	579	0.0	0.651	7.1	LOS A	9.7	67.9	0.58	0.52	47.7	
Approach		862	0.0	0.650	7.4	LOS A	9.7	67.9	0.58	0.53	47.7	
West: N14 (W)												
11	T	534	0.0	0.626	9.5	LOS A	8.1	56.5	0.81	0.74	46.4	
12	R	95	0.0	0.627	14.4	LOS B	8.1	56.5	0.81	0.81	44.3	
Approach		628	0.0	0.627	10.2	LOS B	8.1	56.5	0.81	0.75	46.0	
All Vehicles		1868	0.0	0.650	10.3	LOS B	9.7	67.9	0.72	0.69	45.6	

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2014 SATURDAY BG+DEV

N14 / Proposed East Access Roundabout
 2014 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	192	0.0	0.522	8.2	LOS A	6.0	42.0	0.54	0.57	47.2
3	R	447	0.0	0.521	12.3	LOS B	6.0	42.0	0.54	0.67	44.8
Approach		639	0.0	0.522	11.0	LOS B	6.0	42.0	0.54	0.64	45.4
East: N14 (E)											
4	L	479	0.0	0.525	8.4	LOS A	6.0	42.2	0.60	0.62	47.3
5	T	134	0.0	0.524	7.6	LOS A	6.0	42.2	0.60	0.58	47.4
Approach		613	0.0	0.525	8.2	LOS A	6.0	42.2	0.60	0.61	47.3
West: N14 (W)											
11	T	128	0.0	0.354	9.8	LOS A	3.1	21.4	0.73	0.75	46.3
12	R	160	0.0	0.354	14.7	LOS B	3.1	21.4	0.73	0.84	43.6
Approach		288	0.0	0.354	12.5	LOS B	3.1	21.4	0.73	0.80	44.7
All Vehicles		1540	0.0	0.525	10.2	LOS B	6.0	42.2	0.60	0.66	46.0

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2019 FRIDAY BG+DEV

N14 / Proposed East Access Roundabout
 2019 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	114	0.0	0.549	14.8	LOS B	6.1	43.0	0.90	0.98	42.1
3	R	264	0.0	0.549	18.9	LOS B	6.1	43.0	0.90	1.00	40.1
Approach		378	0.0	0.549	17.7	LOS B	6.1	43.0	0.90	1.00	40.6
East: N14 (E)											
4	L	283	0.0	0.665	8.0	LOS A	10.2	71.3	0.60	0.56	47.6
5	T	599	0.0	0.665	7.2	LOS A	10.2	71.3	0.60	0.52	47.6
Approach		882	0.0	0.665	7.5	LOS A	10.2	71.3	0.60	0.53	47.6
West: N14 (W)											
11	T	555	0.0	0.647	9.8	LOS A	8.7	61.2	0.83	0.75	46.3
12	R	95	0.0	0.649	14.7	LOS B	8.7	61.2	0.83	0.82	44.1
Approach		649	0.0	0.647	10.5	LOS B	8.7	61.2	0.83	0.76	45.9
All Vehicles		1909	0.0	0.665	10.5	LOS B	10.2	71.3	0.74	0.70	45.5

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2019 SATURDAY BG+DEV

N14 / Proposed East Access Roundabout
 2019 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	192	0.0	0.532	8.3	LOS A	6.1	42.9	0.57	0.59	47.0
3	R	447	0.0	0.532	12.4	LOS B	6.1	42.9	0.57	0.68	44.7
Approach		639	0.0	0.532	11.2	LOS B	6.1	42.9	0.57	0.65	45.3
East: N14 (E)											
4	L	479	0.0	0.535	8.5	LOS A	6.2	43.6	0.61	0.62	47.3
5	T	146	0.0	0.534	7.6	LOS A	6.2	43.6	0.61	0.58	47.3
Approach		625	0.0	0.535	8.3	LOS A	6.2	43.6	0.61	0.61	47.3
West: N14 (W)											
11	T	140	0.0	0.369	9.8	LOS A	3.2	22.7	0.74	0.75	46.3
12	R	160	0.0	0.370	14.7	LOS B	3.2	22.7	0.74	0.84	43.6
Approach		300	0.0	0.370	12.4	LOS B	3.2	22.7	0.74	0.80	44.8
All Vehicles		1564	0.0	0.535	10.2	LOS B	6.2	43.6	0.62	0.66	46.0

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2024 FRIDAY BG+DEV

N14 / Proposed East Access Roundabout
 2024 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	114	0.0	0.566	15.6	LOS B	6.5	45.6	0.92	1.01	41.5
3	R	264	0.0	0.567	19.7	LOS B	6.5	45.6	0.92	1.03	39.5
Approach		378	0.0	0.567	18.5	LOS B	6.5	45.6	0.92	1.02	40.1
East: N14 (E)											
4	L	283	0.0	0.681	8.1	LOS A	10.8	75.5	0.62	0.56	47.5
5	T	622	0.0	0.681	7.2	LOS A	10.8	75.5	0.62	0.52	47.5
Approach		905	0.0	0.681	7.5	LOS A	10.8	75.5	0.62	0.53	47.5
West: N14 (W)											
11	T	579	0.0	0.670	10.2	LOS B	9.6	67.0	0.85	0.77	46.1
12	R	95	0.0	0.672	15.1	LOS B	9.6	67.0	0.85	0.83	43.8
Approach		674	0.0	0.670	10.9	LOS B	9.6	67.0	0.85	0.78	45.8
All Vehicles		1957	0.0	0.681	10.8	LOS B	10.8	75.5	0.76	0.71	45.3

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2024 SATURDAY BG+DEV

N14 / Proposed East Access Roundabout
 2024 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	192	0.0	0.543	8.5	LOS A	6.3	43.9	0.60	0.60	46.8
3	R	447	0.0	0.543	12.6	LOS B	6.3	43.9	0.60	0.68	44.6
Approach		639	0.0	0.543	11.3	LOS B	6.3	43.9	0.60	0.66	45.2
East: N14 (E)											
4	L	479	0.0	0.546	8.5	LOS A	6.5	45.2	0.62	0.62	47.3
5	T	160	0.0	0.546	7.6	LOS A	6.5	45.2	0.62	0.58	47.3
Approach		639	0.0	0.546	8.3	LOS A	6.5	45.2	0.62	0.61	47.3
West: N14 (W)											
11	T	153	0.0	0.386	9.8	LOS A	3.4	24.0	0.75	0.76	46.2
12	R	160	0.0	0.386	14.8	LOS B	3.4	24.0	0.75	0.85	43.6
Approach		313	0.0	0.387	12.4	LOS B	3.4	24.0	0.75	0.80	44.8
All Vehicles		1591	0.0	0.546	10.3	LOS B	6.5	45.2	0.64	0.67	45.9

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2014 FRIDAY BG+DEV

N14 / Proposed West Access Roundabout
 2014 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Western Access (S)												
1	L	207	0.0	0.239	8.7	LOS A	1.7	11.9	0.54	0.67	47.7	
2	T	1	0.0	0.351	7.2	LOS A	2.8	19.7	0.57	0.60	47.2	
3	R	359	0.0	0.350	12.9	LOS B	2.8	19.7	0.57	0.74	44.3	
Approach		567	0.0	0.350	11.4	LOS B	2.8	19.7	0.56	0.72	45.4	
East: N14 (E)												
4	L	377	0.0	0.643	8.1	LOS A	5.8	40.6	0.58	0.64	47.8	
5	T	306	0.0	0.642	6.8	LOS A	5.8	40.6	0.58	0.57	47.9	
6	R	1	0.0	0.002	12.8	LOS B	0.0	0.1	0.41	0.61	44.9	
Approach		684	0.0	0.643	7.5	LOS B	5.8	40.6	0.57	0.61	47.9	
North: Farm Access												
7	L	1	0.0	0.003	9.7	LOS A	0.0	0.1	0.63	0.60	47.6	
8	T	1	0.0	0.003	8.5	LOS A	0.0	0.1	0.63	0.54	47.6	
9	R	1	0.0	0.002	15.3	LOS B	0.0	0.1	0.64	0.65	42.8	
Approach		3	0.0	0.003	11.1	LOS B	0.0	0.1	0.63	0.60	45.9	
West: N14 (W)												
10	L	1	0.0	0.263	8.7	LOS A	2.0	14.1	0.57	0.71	48.2	
11	T	260	0.0	0.265	7.4	LOS A	2.0	14.1	0.57	0.64	48.3	
12	R	188	0.0	0.213	13.3	LOS B	1.5	10.6	0.56	0.75	44.3	
Approach		449	0.0	0.265	9.9	LOS B	2.0	14.1	0.57	0.69	46.5	
All Vehicles		1704	0.0	0.643	9.4	LOS A	5.8	40.6	0.57	0.66	46.7	

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2014 SATURDAY BG+DEV

N14 / Proposed West Access Roundabout
 2014 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Western Access (S)												
1	L	352	0.0	0.318	7.4	LOS A	2.8	19.6	0.39	0.56	48.5	
2	T	1	0.0	0.526	6.0	LOS A	4.9	34.3	0.43	0.46	48.4	
3	R	607	0.0	0.458	11.7	LOS B	4.9	34.3	0.43	0.64	44.8	
Approach		960	0.0	0.458	10.1	LOS B	4.9	34.3	0.41	0.61	46.1	
East: N14 (E)												
4	L	639	0.0	0.745	11.9	LOS B	10.7	74.9	0.84	0.86	45.3	
5	T	102	0.0	0.745	10.6	LOS B	10.7	74.9	0.84	0.84	45.6	
6	R	1	0.0	0.002	13.9	LOS B	0.0	0.1	0.53	0.62	44.0	
Approach		742	0.0	0.744	11.7	LOS B	10.7	74.9	0.84	0.85	45.4	
North: Farm Access												
7	L	1	0.0	0.003	12.0	LOS B	0.0	0.2	0.75	0.62	45.5	
8	T	1	0.0	0.003	10.7	LOS B	0.0	0.2	0.75	0.58	45.9	
9	R	1	0.0	0.002	18.0	LOS B	0.0	0.1	0.74	0.66	40.7	
Approach		3	0.0	0.003	13.6	LOS B	0.0	0.2	0.75	0.62	43.9	
West: N14 (W)												
10	L	1	0.0	0.211	12.5	LOS B	1.2	8.7	0.70	0.85	45.3	
11	T	96	0.0	0.193	11.3	LOS B	1.2	8.7	0.70	0.80	45.8	
12	R	320	0.0	0.397	15.2	LOS B	3.3	22.9	0.76	0.86	42.9	
Approach		417	0.0	0.396	14.3	LOS B	3.3	22.9	0.75	0.85	43.5	
All Vehicles		2122	0.0	0.744	11.5	LOS B	10.7	74.9	0.63	0.74	45.3	

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2019 FRIDAY BG+DEV

N14 / Proposed West Access Roundabout
 2019 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Western Access (S)											
1	L	207	0.0	0.243	8.9	LOS A	1.7	12.1	0.56	0.68	47.6
2	T	1	0.0	0.351	7.3	LOS A	2.9	20.1	0.59	0.62	47.0
3	R	359	0.0	0.356	13.0	LOS B	2.9	20.1	0.59	0.75	44.2
Approach		567	0.0	0.356	11.5	LOS B	2.9	20.1	0.58	0.73	45.4
East: N14 (E)											
4	L	377	0.0	0.659	8.1	LOS A	6.1	42.5	0.59	0.64	47.8
5	T	325	0.0	0.660	6.8	LOS A	6.1	42.5	0.59	0.58	47.9
6	R	1	0.0	0.002	12.8	LOS B	0.0	0.1	0.41	0.61	44.9
Approach		703	0.0	0.659	7.5	LOS B	6.1	42.5	0.59	0.61	47.8
North: Farm Access											
7	L	1	0.0	0.003	9.8	LOS A	0.0	0.1	0.64	0.60	47.6
8	T	1	0.0	0.003	8.6	LOS A	0.0	0.1	0.64	0.55	47.6
9	R	1	0.0	0.002	15.4	LOS B	0.0	0.1	0.65	0.65	42.7
Approach		3	0.0	0.003	11.3	LOS B	0.0	0.1	0.64	0.60	45.8
West: N14 (W)											
10	L	1	0.0	0.263	8.7	LOS A	2.2	15.5	0.59	0.71	48.2
11	T	281	0.0	0.287	7.4	LOS A	2.2	15.5	0.59	0.65	48.3
12	R	188	0.0	0.218	13.4	LOS B	1.6	10.9	0.57	0.75	44.3
Approach		471	0.0	0.287	9.8	LOS B	2.2	15.5	0.58	0.69	46.6
All Vehicles		1744	0.0	0.659	9.4	LOS A	6.1	42.5	0.58	0.67	46.6

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2019 SATURDAY BG+DEV

N14 / Proposed West Access Roundabout
 2019 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Western Access (S)												
1	L	352	0.0	0.323	7.5	LOS A	2.8	19.9	0.41	0.57	48.4	
2	T	1	0.0	0.526	6.1	LOS A	5.0	34.9	0.46	0.47	48.1	
3	R	607	0.0	0.466	11.8	LOS B	5.0	34.9	0.46	0.64	44.7	
Approach		960	0.0	0.466	10.2	LOS B	5.0	34.9	0.44	0.61	46.0	
East: N14 (E)												
4	L	639	0.0	0.755	12.1	LOS B	11.2	78.2	0.86	0.87	45.1	
5	T	114	0.0	0.753	10.9	LOS B	11.2	78.2	0.86	0.85	45.4	
6	R	1	0.0	0.002	13.9	LOS B	0.0	0.1	0.53	0.62	44.0	
Approach		754	0.0	0.755	11.9	LOS B	11.2	78.2	0.85	0.86	45.1	
North: Farm Access												
7	L	1	0.0	0.003	12.0	LOS B	0.0	0.2	0.75	0.62	45.5	
8	T	1	0.0	0.003	10.8	LOS B	0.0	0.2	0.75	0.59	45.9	
9	R	1	0.0	0.002	18.1	LOS B	0.0	0.1	0.75	0.66	40.7	
Approach		3	0.0	0.003	13.6	LOS B	0.0	0.2	0.75	0.62	43.8	
West: N14 (W)												
10	L	1	0.0	0.211	12.2	LOS B	1.4	9.5	0.71	0.85	45.6	
11	T	107	0.0	0.205	10.9	LOS B	1.4	9.5	0.71	0.80	46.1	
12	R	320	0.0	0.399	15.2	LOS B	3.3	23.1	0.77	0.86	42.9	
Approach		428	0.0	0.398	14.1	LOS B	3.3	23.1	0.75	0.85	43.6	
All Vehicles		2145	0.0	0.755	11.6	LOS B	11.2	78.2	0.65	0.75	45.2	

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2024 FRIDAY BG+DEV

N14 / Proposed West Access Roundabout
 2024 Friday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Western Access (S)											
1	L	207	0.0	0.249	9.0	LOS A	1.8	12.4	0.58	0.70	47.5
2	T	1	0.0	0.351	7.5	LOS A	2.9	20.6	0.61	0.64	46.9
3	R	359	0.0	0.363	13.2	LOS B	2.9	20.6	0.61	0.76	44.1
Approach		567	0.0	0.363	11.7	LOS B	2.9	20.6	0.60	0.74	45.3
East: N14 (E)											
4	L	377	0.0	0.679	8.2	LOS A	6.4	44.9	0.60	0.64	47.7
5	T	348	0.0	0.679	6.9	LOS A	6.4	44.9	0.60	0.58	47.8
6	R	1	0.0	0.002	12.8	LOS B	0.0	0.1	0.41	0.61	44.9
Approach		726	0.0	0.679	7.6	LOS B	6.4	44.9	0.60	0.61	47.7
North: Farm Access											
7	L	1	0.0	0.003	10.0	LOS A	0.0	0.1	0.65	0.60	47.4
8	T	1	0.0	0.003	8.7	LOS A	0.0	0.1	0.65	0.55	47.5
9	R	1	0.0	0.002	15.6	LOS B	0.0	0.1	0.66	0.65	42.6
Approach		3	0.0	0.003	11.4	LOS B	0.0	0.1	0.65	0.60	45.7
West: N14 (W)											
10	L	1	0.0	0.351	8.8	LOS A	2.5	17.3	0.60	0.72	48.1
11	T	306	0.0	0.313	7.5	LOS A	2.5	17.3	0.60	0.66	48.2
12	R	188	0.0	0.224	13.5	LOS B	1.6	11.2	0.58	0.76	44.3
Approach		496	0.0	0.313	9.8	LOS B	2.5	17.3	0.59	0.69	46.6
All Vehicles		1793	0.0	0.679	9.5	LOS A	6.4	44.9	0.60	0.67	46.6

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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MOVEMENT SUMMARY

Site: 2024 SATURDAY BG+DEV

N14 / Proposed West Access Roundabout
 2024 Saturday Peak Hour
 Background and Development Traffic
 Option 2 Proposed 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	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access (S)											
1	L	352	0.0	0.331	7.6	LOS A	2.9	20.4	0.44	0.58	48.2
2	T	1	0.0	0.526	6.2	LOS A	5.1	35.7	0.49	0.49	47.9
3	R	607	0.0	0.477	11.9	LOS B	5.1	35.7	0.49	0.65	44.6
Approach		960	0.0	0.477	10.3	LOS B	5.1	35.7	0.47	0.62	45.8
East: N14 (E)											
4	L	639	0.0	0.769	12.5	LOS B	11.8	82.6	0.87	0.88	44.8
5	T	128	0.0	0.769	11.2	LOS B	11.8	82.6	0.87	0.86	45.1
6	R	1	0.0	0.002	13.9	LOS B	0.0	0.1	0.53	0.62	44.0
Approach		768	0.0	0.769	12.2	LOS B	11.8	82.6	0.87	0.88	44.9
North: Farm Access											
7	L	1	0.0	0.003	12.1	LOS B	0.0	0.2	0.75	0.62	45.4
8	T	1	0.0	0.003	10.8	LOS B	0.0	0.2	0.75	0.59	45.9
9	R	1	0.0	0.002	18.1	LOS B	0.0	0.1	0.75	0.67	40.7
Approach		3	0.0	0.003	13.6	LOS B	0.0	0.2	0.75	0.63	43.8
West: N14 (W)											
10	L	1	0.0	0.211	11.9	LOS B	1.5	10.5	0.71	0.84	45.9
11	T	121	0.0	0.219	10.7	LOS B	1.5	10.5	0.71	0.80	46.4
12	R	320	0.0	0.401	15.2	LOS B	3.3	23.4	0.77	0.86	42.9
Approach		442	0.0	0.401	13.9	LOS B	3.3	23.4	0.76	0.85	43.8
All Vehicles		2174	0.0	0.769	11.7	LOS B	11.8	82.6	0.67	0.76	45.0

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

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

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

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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**ANNEXURE B
DETAILED LAYOUT PLAN**

LEGEND:
 ADDITIONAL ROAD WIDENING

DATE	NO.	REVISION
01/02/13	0	ISSUED FOR INFORMATION

CLIENT



CONSULTING CIVIL AND STRUCTURAL ENGINEERS
 P.O. BOX 1227 PRETORIA 001
 012 365-1114
 012 365-1112
 Fax: 012 365-1112
 E-Mail: civil.concepts@shfha.com

PROJECT
VRYBURG RETAIL DEVELOPMENT
 35 000m²

DRAWING TITLE
GENERAL ACCESS LAYOUT

DRAWING NO
 K1471-900-001

REV. NO.	A	DESIGNED	W. STANDER
SCALE	1 : 1000	DRAWN	B. PIETERSE
DATE	FEBRUARY 2013	CHECKED	W. STANDER

