TECHWORLD
consulting ENGINEERS

Traffic Engineering
Transportation Planning
Transport Economy
Project Management
Project Financing & Viability
director: PIETER KRUGER (PrEng)

Our Reference: REP01/TW1443/17Jul24/v1
Your Reference: V10/2/4/2 – S15(1305)

17 July 2024

CITY OF TSHWANE METROPOLITAN MUNICIPALITY
DEPUTY DIRECTOR: TRAFFIC IMPACT ASSESSMENT MANAGEMENT
Department Roads and Transport
P O Box 1409, Pretoria, 0001

For Attention: Caroline Msiza

Dear Madam

MEMORANDUM IN SUPPORT OF UPDATED TRAFFIC IMPACT ASSESSMENT FOR STUDENT HOUSING ON PORTIONS 2 – 120 OF ERF 1305, SOSHANGUVE-M, TSHWANE

INTRODUCTION

We refer to our e-mail of 6 June 2024 and your subsequent response of 2 July 2024 that supports our proposal to submit a Memorandum and not a new TIA to support an immaterial change in the approved land use for Erf 1305 in Soshanguve.

The Site Aerial View & Key Plan (*Appendix A*) is attached for your convenience.

BACKROUND

The Traffic Impact Assessment that was compiled by INFRATRANS, dated April 2019, for Student Housing in Soshanguve was approved by Tshwane on 14 May 2019.

The approved TIA was for 2468 beds in 504 units (rooms) which generated a maximum of 75 trips during the Week PM peak hour (COTO TMH17).

The developer now wants to increase the 2468 beds to 2600 beds which translates into 531 units (rooms) but only 4 extra peak hour trips.

This does not warrant a new TIA, but our predicament is that the approved TIA has just expired (after 5-years).

A new TIA will not be a productive undertaking – from both the viewpoints of the applicant and Tshwane – given that the previous TIA was done with pre-COVID counts which are now lower and the developer is already committed to “substantial” improvements.

The new Proposed Annexure T (*Appendix B*) is attached for your convenience.

APPROVAL BY TSHWANE OF PREVIOUS TIA

The April 2019 TIA by INFRATRANS (*Appendix C*) and the subsequent approval of May 2019 by Tshwane (*Appendix D*) are both attached for your information.

We recommend that the approval letter by Tshwane remains EXACTLY the same in terms of requirements and conditions with one change in the reference to approved land use, namely 2600 beds which is in line with the town planning (zoning) for the erf which is also stated in terms of beds (*Appendix B*), i.e. the Tshwane approval letter of May 2019 stated 504 units (which equates to the previous 2468 beds).

Please note that although the April 2019 TIA recommended that the required traffic signals at Commissioner St / Flower St is the responsibility of "others / background traffic" your approval letter has changed this to the responsibility of the applicant with which we agree.

Your written support, at your earliest convenience, of this application is hereby requested.

Please do not hesitate to contact us (Pieter Kruger – 083 447 9961) if you require any additional information.

Kind Regards

P Kruger

For TECHWORLD

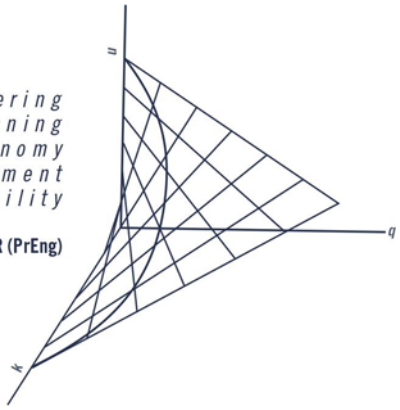
ATTACHMENTS:

Appendix A: Site Aerial View & Key Plan (Figure 4)

Appendix B: Proposed Annexure T- Jan 2024

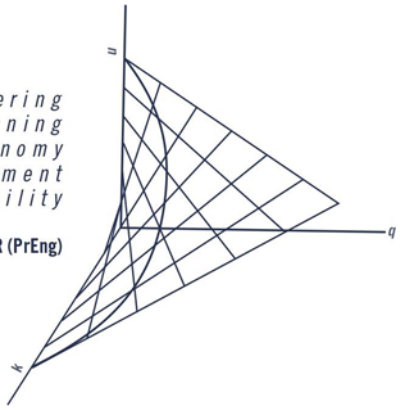
Appendix C: TIA, Soshanguve Student Housing, INFRATRANS, April 2019

Appendix D: City of Tshwane Comments, 14 May 2019



Appendix A: Site Aerial View & Key Plan (Figure 4)

INFRATRANS TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING	PROJECT: **ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT**	FIGURE NAME: **SITE AERIAL VIEW & KEY PLAN**	PROJECT No. P-167 FIGURE No. **4**



Appendix B: Proposed Annexure T- Jan 2024

TSHWANE TOWN-PLANNING SCHEME 2008

(Revised 2014)

ANNEXURE **T** AMENDMENT SCHEME **T** SHEET 1 OF 3 SHEETS

PORTION 2 TO 102 OF ERF 1305, SOSHANGUVE-M TOWNSHIP

1	Use Zone	**5: RESIDENTIAL 5**
2	Uses permitted	Residential Buildings (Student Accommodation)
3	Uses with consent	Table B, Column 4
4	Uses not permitted	Table B, Column 5
5	Definitions	1) For the purposes of this Amendment Scheme, Residential Buildings shall mean land and buildings used for the purpose of student accommodation. 2) For the purpose of this Amendment Scheme, Student Accommodation shall mean "an accommodation establishment which is a dwelling place (containing multiple dwelling units) for the student(s) who have registered to study with a tertiary institution within the area of jurisdiction of the Municipality and the accommodation establishment has been approved by the Municipality and accredited by the relevant tertiary institution". 3) Other: Clause 5
6	Density	Maximum of 2600 beds allowed
7	Coverage	30%
8	Height	4 Storeys
9	Floor area ratio	1.2
10	Site development plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the City of Tshwane Metropolitan Municipality, compiled by a person suitable qualified to the satisfaction of the Municipality, shall be submitted to the Municipality for approval prior to the submission of building plans.

APPROVED

PROMULGATED ON:

COMES INTO OPERATION ON:

……..

f. STRATEGIC EXECUTIVE DIRECTOR: CITY OF PLANNING

CITY OF TSHWANE METROPOLITAN MUNICIPALITY

PORTION 2 TO 102 OF ERF 1305, SOSHANGUVE-M TOWNSHIP

		(2) The landscaping, in terms of the landscape development plan, shall be completed by completion of the development or any phase thereof. The continued maintenance of the landscape development shall be to the satisfaction of the Municipality. (3) An approved site development plan may only be amended with the consent of the Municipality and no building plan which does not comply with the proposals and conditions as set out in the approved site development plan shall be approved by the Municipality.
11	Building lines	Clause 12, Table A
12	Parking requirements	1) Demarcated parking space (minimum 2,5m x 5m) with a permanent dust-free surface, together with the necessary maneuvering space, shall be provided and maintained on the erf to the satisfaction of the Municipality. 2) The owner shall take the necessary action to discourage possible overflow parking in the street reserve, to the satisfaction of the Municipality and such measures shall be indicated on the Site Development Plan. 3) For this Residential 5 to be used as Student Accommodation (Residential 5), parking required will be as follows: 1 parking bay for every 87m² of bedroom and bathroom accommodation.
13	Paving of traffic areas	All parts of the erf upon which motor vehicles are allowed to move or park, shall be provided with a permanent dust-free surface, which surface shall be paved, drained and maintained to the satisfaction of the Municipality.

APPROVED

PROMULGATED ON:

COMES INTO OPERATION ON:

…….

f. STRATEGIC EXECUTIVE DIRECTOR: CITY OF PLANNING

CITY OF TSHWANE METROPOLITAN MUNICIPALITY

TSHWANE TOWN-PLANNING SCHEME 2008

ANNEXURE T AMENDMENT SCHEME T SHEET 3 OF 3 SHEETS

PORTION 2 TO 102 OF ERF 1305, SOSHANGUVE-M TOWNSHIP

14	Access to the erf	Entrances to and exits from the erf shall be sited, constructed and maintained to the satisfaction of the Municipality.
15	Loading and off-loading facilities	Not required
16	Turning facilities	Not applicable
17	Physical barriers	A non-removal physical barrier which restricts pedestrian and vehicle movement shall be erected and maintained on all boundaries of the erf (approved entrances and exits excluded) to the satisfaction of the Municipality.
18	Health measures	(1) Any requirements for air pollution-, noise abatement- or health measures set by Municipality shall be complied with to the satisfaction of the Municipality without any costs to the Municipality. (2) Air-conditioning units or compressors shall not be mounted to the exterior walls of buildings without the prior consent of the Municipality.
19	Outdoor advertising	Advertisements and/or sign boards shall not be erected or displayed on the erf without the written consent of the Municipality first being obtained in terms of municipal by-laws of outdoor advertising.
20	Detrimental soil conditions	An engineer shall be appointed before the approval of building plans, which shall design, specify and supervise structural measures for the foundations of structures, according to the soil conditions prevalent on site. On completion of the structures, he/she shall certify that all his/her specifications have been met.
21	Open space	Not applicable
22	General 1) Bulk service contributions shall be paid in full prior to the submission/approval of the site development plan or building plans.	

APPROVED

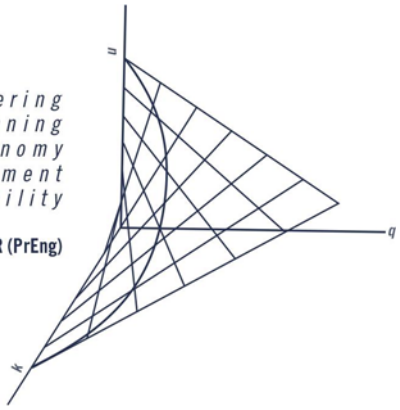
PROMULGATED ON:

COMES INTO OPERATION ON:

……..

f. STRATEGIC EXECUTIVE DIRECTOR: CITY OF PLANNING

CITY OF TSHWANE METROPOLITAN MUNICIPALITY



Appendix C: TIA, Soshanguve Student Housing, INFRATRANS, April 2019

INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

TRAFFIC IMPACT ASSESSMENT

SOSHANGUVE STUDENT ACCOMMODATION

Situated on Erf 1305 in Soshanguve-M,
City of Tshwane Metropolitan Municipality,
Gauteng Province

April 2019

REPORT INFORMATION SHEET

Title:	TRAFFIC IMPACT ASSESSMENT – SOSHANGUVE STUDENT ACCOMMODATION Situated on Erf 1305 in Soshanguve-M, City of Tshwane Metropolitan Municipality, Gauteng Province
Project no:	P-167
Date:	April 2019
Report status:	Final
Client:	Govhani Student Accommodation 541 Jorissen Street Sunnyside Pretoria Gauteng 0002 Contact person: Ms Ikaneng Moseme
Report prepared:	Infratrans (Pty) Ltd PO Box 50504 Moreleta Village 0097 Contact person: Mr Ryno van Wyk Cell: 083 327 7626 E-mail: ryno@infratrans.co.za
Project team:	Author — Pieter Jooste *B Eng (Civil Engineering)* Reviewer — Ryno van Wyk Pr Eng *B Eng Hons (Transportation)* *Pr Eng (ECSA Registration no. 20100399)*

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APPENDICES

1. INTRODUCTION

Infratrans (Pty) Ltd was appointed to undertake a Traffic Impact Assessment (TIA) for a proposed new student accommodation development to be located on Erf 1305 in Soshanguve Block M, City of Tshwane Metropolitan Municipality (CoT), Gauteng Province.

The location of the study site is shown in Figure 1 (all figures, appendices and drawings are attached at the end of this report).

The proposed development will be known as Student Village, and will be located approximately 3.0 km to the southwest of the Tshwane University of Technology's (TUT) Soshanguve main campus, and only 800 m to the northwest of TUT's Soshanguve south campus. The draft site layout plan is attached as Appendix A.

The aim of the study is to quantify the impact the above development will have on the surrounding road network, and to determine whether it is necessary to implement any road upgrades to mitigate such impact. The study also includes discussions on future roads planning, access to the development and public transport.

2. DEVELOPMENT DETAILS

This section describes the development property as well as the proposed development.

2.1 Property Information and Existing Rights

The property comprise of undeveloped portions of Erf 1305 in Soshanguve Block M. The exact zoning of these portions is not known, but is believed to be Residential 1(i.e. low density, single-dwelling residential stands), as per the Tshwane Town Planning Scheme 2008 (Revised 2014) [(1)] (TTPS). The site as a whole is approximately 4.2 hectares in extent.

2.2 Proposed Development

The proposal is to develop student accommodation providing for the following:

- 340 three (3) room / six (6) bed units;
- 33 three (3) room / three (3) bed paraplegic units;
- 99 three (3) room / three (3) bed units;
- 32 warden units; and
- Recreational centres, study centres and laundry rooms for the residents.

A total of 504 residential units are therefore proposed.

3. SURROUNDING ROAD NETWORK & ROADS PLANNING

This section presents the existing surrounding road network as well as the surrounding road network planning on a local, provincial and national level. The impact of the subject site on these existing road networks and roads master plans are assessed and discussed with the ultimate goal of achieving roads planning integration which is acceptable and feasible to all parties involved.

3.1 Local Road Network

The CoT is the relevant local roads authority applicable to the study area. Figure 2 presents the subject site in the context of the latest available functional roads master plan of the CoT. Municipal roads affected are listed in Table 3.1 overleaf along with their functional classifications and existing and planned road reserve widths.

Table 3.1 – Affected local road network characteristics

Road name	Classification	Road reserve width	
		Existing	Planned
Imphangele Street	Class 5(b) Local street (Residential)	16 m	16 m
Maplankeng Street	Class 5(b) Local street (Residential)	16 m	16 m
Flower Street	Class 4(a) Collector (Non-residential)	16 – 20 m	20 m
Buputju Street	Class 4(a) Collector (Non-residential)	20 m	20 m
Aubrey Matlala Street	Class 3 Minor Arterial Road (District distributor)	25 m	25 m
Buitekant Street	Class 3 Minor Arterial Road (District distributor)	16 – 40 m	40 m
Commissioner Street	Class 2 Major Arterial Road (metropolitan distributor)	45m	45m

3.2 Provincial Road Network

The Gauteng Department of Roads and Transport (Gautrans) is the relevant provincial roads authority applicable to the study area. Figure 3 presents the subject site in the context of the latest available Gautrans strategic road network.

From Figure 3 it is concluded that there are no provincial roads in close enough proximity to the subject site to be considered by this study.

3.3 National Road Network

From Figure 2 and Figure 3 it is concluded that there are no national roads in close enough proximity to the subject site to be considered by this study.

4. DEVELOPMENT ACCESS

The following two (2) accesses are proposed to the subject development:

- To the north of the site at the existing intersection between Imphangele Street and Maplankeng Street; and
- To the east of the site at the existing intersection between two unnamed class 5(b) roads.

The locations of these accesses are shown in Figure 4, and is also indicated on the draft site layout plan attached as Appendix A. Photos taken from the access locations are shown overleaf.

It can be confirmed that these access locations are in line with the *TRH 26, South African Road Classification and Access Management Manual* [2] document, and is therefore supported from a traffic engineering and transport planning viewpoint.

Current traffic volumes along the two class 5 roads the accesses are proposed off is very low. Even with the expected development traffic, and some growth in background traffic, peak traffic volumes along these two roads are still expected to be below 250 vehicles per hour. Providing priority stop control at these access intersections will yield good traffic operating conditions. It is however recommended that during the site development plan (SDP) submission stage, these access layouts be revisited as part of the site traffic assessment (discussed in Section 14 of this report), if deemed necessary at the time.

Photo 4.1 – Driver sight line (left) from proposed access position along Imphangele Street

Photo 4.2 – Driver sight line (right) from proposed access position along Imphangele Street

Photo 4.3 – View from proposed access approach at the intersection of the two unnamed roads

5. TRIP GENERATION

The expected trip generation of the proposed student accommodation is determined by making use of the guidelines contained in the *TMH 17 Volume 1, South African Trip Data Manual* [3] document.

The expected trip generation is presented in Table 5.1 below.

Table 5.1 – Expected trip generation

Land use	Extent	Trip generation rate category	Peak hour	Base trip generation rate	Directional split (in/out)	No. of trips IN	No. of trips OUT	Total trips
Student Accommodation	504 units	Student apartments and flats	Weekday AM	0.2 trips / unit	25%:75%	13	38	51
			Weekday PM	0.3 trips / unit	65%:35%	49	26	75
			Weekend	0.15 trips / unit	50%:50%	19	19	38

The calculated trips for each peak hour consider a trip reduction factor for low vehicle ownership, as allowed for in the *trip data manual*, and considered relevant to the study area. No reduction factors were applied for mixed-use developments and transit nodes or corridors.

From the above table it is clear that the development traffic expected to be generated during the weekends is minimal. The weekend peak traffic hours were therefore not considered by this study.

6. STUDY SCOPE

This section defines the scope of this traffic study in terms of the area it covers as well as the relevant years of assessment scenarios. The guidelines in the *TMH 16, Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual* [4] as well as discussions with the relevant CoT traffic engineering and roads planning officials were instrumental in defining the scope of this study.

6.1 Study Area

From Table 5.1 it is clear that the expected trip generation of the proposed development will be over 50 peak hour trips. Thus, according to the guidelines in the *South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual* a full TIA is required. This requirement coupled with extensive discussions with CoT officials yielded the study scope presented in Figure 5, which include the following 3 intersections:

- Aubrey Matlala Street / Flower Street;
- Commissioner Street / Flower Street; and
- Buitekant Street / Buputju Street.

6.2 Assessment Years

Analysis of the base year scenario as well as a five-year future horizon scenario is proposed. In the case of the subject proposed development the base year scenario is taken as 2019 and the horizon scenario is taken as 2024.

7. TRAFFIC SURVEYS

This section describes and discusses the traffic surveys conducted, some of the survey results as well as observations during site visits.

7.1 Surveys Conducted

Unclassified traffic surveys of all turning movements were carried out at all study intersections during the weekday AM (06:00-09:00) and PM peak periods (15:00-18:00) on Wednesday 3 April 2019.

7.2 Survey Results

Analysis of the above traffic surveys yielded the weekday AM and PM peak hours as 07:00 - 08:00 and 16:30 -17:30, respectively. It must also be noted that the PM peak hour is the critical peak. These peak hour traffic volumes are presented graphically in Figure 6a. The weighted average peak hour factor (PHF) for all surveyed intersections was calculated as 0.92.

7.3 Site Visits

A site visit to the study area was carried out during the weekday PM peak traffic hour in order to observe the operational conditions of the existing traffic within the study area. Aspects regarding public transportation and non-motorised transport services and infrastructure were also focussed on during the site visit.

8. TRIP ASSIGNMENT & DISTRIBUTION

Assumptions regarding the expected distribution of the study site trips were made based on site observations, likely trip origins/destinations and distribution characteristics of the existing traffic as per the traffic surveys.

The assumed distribution of the expected development traffic on the study area road network is shown in Figure 6b. The subsequent expected assignment of the development traffic is shown in Figure 6c.

9. LATENT RIGHTS

To account for any latent developments in the study area, an annual traffic growth rate of 4.0% was applied to the existing 2019 traffic volumes, over a period of 5 years.

This growth rate is considered above average for background traffic, and this approach can therefore be seen as conservative.

10. TRAFFIC ANALYSIS SCENARIOS

From the assessment years noted in Section 6, the following four analysis scenarios are relevant to this study. The purpose of each of these scenarios are also noted. Each traffic scenario consists of a traffic flow scenario and a road network layout scenario.

- 2019 Existing peak hour traffic (Scenario 1) – The purpose of this scenario is to provide an indication of the existing traffic operational conditions within the study area and, along with on-site observations during the applicable peak hours, provide a basis to calibrate the capacity analysis software for use in the future traffic flow scenarios;

- 2024 Background peak hour traffic (Scenario 2) – Analysis of this scenario provides a baseline against which incremental upgrades for the "with development" scenario 3 can be measured in order to enable fair allocation of road upgrade responsibilities in respect of the proposed development;
- 2024 Background plus development peak hour traffic (unmitigated network) (Scenario 3) – This scenario is intended to show the requirement (if any) for road upgrades due to the addition of the proposed development traffic, and
- 2024 Background plus development peak hour traffic (mitigated network) (Scenario 4) – This scenario is intended to quantify the required road upgrades (if any) due to the addition of the proposed development traffic and to prove the feasibility of such upgrades on the study area road network.

The process employed in order to yield the above traffic analysis scenarios is briefly explained in the subsections below.

10.1 2019 Existing Peak Hour Traffic (Scenario 1)

This analysis scenario represents the existing peak hour traffic volumes as per the traffic surveys shown in Figure 6a along with the existing 2019 road network and intersection layouts, as confirmed during the site visit.

10.2 2024 Background Peak Hour Traffic (Scenario 2)

This analysis scenario was developed by taking the 2019 existing peak hour traffic volumes, shown in Figure 6a, and applying an annual background traffic growth factor of 4.0% over five years. As discussed in Section 9 of this report, this rate also accounts for any latent developments in the study area. The results are shown in Figure 6d.

The road network layout used for this scenario is identical to Scenario 1, but include upgrades required in order to restore acceptable operational conditions to the network as a result of current or expected future traffic volumes, but not considering the proposed development.

10.3 2024 Background Plus Development Peak Hour Traffic - Unmitigated Network (Scenario 3)

This analysis scenario was developed by taking the 2024 background peak hour traffic volumes, shown in Figure 6d, and adding the expected assignment of the development traffic volumes shown in Figure 6c. The resultant traffic volumes are shown in Figure 6e.

The road network layout used for this scenario is identical to the layout used for Scenario 2.

10.4 2024 Background Plus Development Peak Hour Traffic - Mitigated Network (Scenario 4)

The traffic volumes used for this scenario is identical to Scenario 3 as shown in Figure 6e.

The road network layout used for this scenario is also identical to Scenario 3, but include upgrades required in order to restore acceptable operational conditions to the network as a result of the proposed development.

11. TRAFFIC FLOW ANALYSES

The SIDRA INTERSECTION 8 intersection capacity analysis computer programme was used to analyse the intersections falling within the study scope and for the scenarios described in Section 10. The outcomes of these analyses are presented and discussed in the following sections, with detailed information on these analyses included at the back of the report as Appendix B.

The capacity analysis standards as prescribed in *TMH 16, Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual*[4] will be applicable to this study.

The analyses utilised PHF's determined for each individual intersection from the traffic surveys carried out as part of this study. Considering the residential nature of the study area, as well as observations during the site visit, a low percentage of heavy vehicles (0.5%) was considered for class 4 and 5 roads, and a higher percentage (1-2%) for class 2 and 3 roads.

11.1 2019 Existing Peak Hour Traffic Volumes (Scenario 1)

For this traffic flow scenario, the SIDRA analyses show that all study intersections are currently operating below capacity, providing acceptable Levels of Service (LOS) for all road users.

Noteworthy analyses results include the through movement for the eastern approach at the Commissioner Street / Flower Street intersection, which is currently operating at almost 90% of its capacity during the PM peak hour. Current LOS for this movement is however still acceptable.

Table 11.1 overleaf presents a summary of the capacity analysis results for Scenario 1.

Table 11.1 – Capacity analysis results for 2019 existing peak hour traffic volumes (Scenario 1)

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results					
			Approach 1		Approach 2		Approach 3	
			L	T	T	R	L	R
Aubrey Matlala Street / Flower Street Approach 1: Aubrey S Approach 2: Aubrey N Approach 3: Flower W	Week AM	V/C	0.05	0.16	0.15	0.15	0.32	0.32
		Delay (s)	6	0	0	7	9	16
		LOS	A	A	A	A	A	C
	Week PM	V/C	0.10	0.22	0.22	0.22	0.42	0.42
		Delay (s)	6	0	1	9	11	23
		LOS	A	A	A	A	B	C
Commissioner Street / Flower Street Approach 1: Flower S Approach 2: Commissioner E Approach 3: Commissioner W	Week AM	V/C	0.08	0.11	0.05	0.63	0.64	0.17
		Delay (s)	8	9	8	13	15	9
		LOS	A	A	A	B	C	A
	Week PM	V/C	0.10	0.08	0.05	0.87	0.42	0.22
		Delay (s)	8	9	8	25	11	9
		LOS	A	A	A	C	B	A
Buitekant Road / Buputju Street Approach 1: Buitekant S Approach 2: Buputju E Approach 3: Buitekant N	Week AM	V/C	0.32	0.03	0.23	0.23	0.40	0.40
		Delay (s)	1	6	10	15	9	10
		LOS	A	A	B	C	A	A
	Week PM	V/C	0.29	0.01	0.07	0.07	0.29	0.29
		Delay (s)	1	6	9	12	8	9
		LOS	A	A	A	B	A	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

11.2 2024 Background Peak Hour Traffic Volumes (Scenario 2)

With the expected increase in background traffic over the next 5 years, the SIDRA analyses indicate that the through movement for the eastern approach at the Commissioner Street / Flower Street intersection, which is currently (i.e. Scenario 1) operating at almost 90% of its capacity, is expected to operate above capacity during the PM peak hour. Upgrading of this intersection is therefore required.

Other noteworthy analyses results include the right-turn movement for the western approach at the Aubrey Matlala Street / Flower Street intersection, which is expected to operate at a LOS E during the PM peak hour. This movement will however still operate below capacity, with no expected queueing problems. Upgrading of this intersection is therefore not recommended for this traffic flow scenario.

For all other traffic movements at the study intersections, the SIDRA analyses indicate acceptable operating conditions during the peak traffic hours without any road upgrades.

The road upgrades required to restore acceptable operational conditions to the network as a result of current or expected future traffic volumes, but excluding the proposed development, are listed in Table 11.2.1 overleaf.

Table 11.2.2 overleaf presents a summary of the capacity analysis results for the 2024 background peak hour traffic scenario without the required upgrades listed in Table 11.2.1. Table 11.2.3 presents the capacity analysis results corresponding to the implementation of these upgrades.

Table 11.2.1 – Road upgrades required to restore current or future operational conditions, excluding the proposed development.

Intersection	Control/ Approach	Required upgrades	Required due to	Responsible party
Aubrey Matlala Street / Flower Street	Control	None	-	-
	S	None	-	-
	N	None	-	-
	W	None	-	-
Commissioner Street / Flower Street	Control	New traffic signal	Background traffic growth	Municipality or future developments in the area
	S	None	-	-
	E	None	-	-
	W	None	-	-
Buitekant Road / Buputju Street	Control	None	-	-
	All Approaches	None	-	-

Table 11.2.2 – Capacity analysis results for 2024 background peak hour traffic volumes (without upgrades)

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results					
			Approach 1		Approach 2		Approach 3	
			L	T	T	R	L	R
Aubrey Matlala Street / Flower Street Approach 1: Aubrey S Approach 2: Aubrey N Approach 3: Flower W	Week AM	V/C	0.07	0.19	0.19	0.19	0.49	0.49
		Delay (s)	6	0	1	8	11	21
		LOS	A	A	A	A	B	C
	Week PM	V/C	0.11	0.27	0.27	0.27	0.75	0.75
		Delay (s)	6	0	1	9	25	46
		LOS	A	A	A	A	C	E
Commissioner Street / Flower Street Approach 1: Flower S Approach 2: Commissioner E Approach 3: Commissioner W	Week AM	V/C	0.10	0.13	0.07	0.76	0.78	0.21
		Delay (s)	8	9	8	17	21	9
		LOS	A	A	A	C	C	A
	Week PM	V/C	0.12	0.10	0.07	1.06	0.51	0.26
		Delay (s)	8	9	8	74	12	10
		LOS	A	A	A	F	B	A
Buitekant Road / Buputju Street Approach 1: Buitekant S Approach 2: Buputju E Approach 3: Buitekant N	Week AM	V/C	0.39	0.04	0.36	0.36	0.51	0.51
		Delay (s)	1	6	12	20	9	11
		LOS	A	A	B	C	A	B
	Week PM	V/C	0.35	0.02	0.10	0.10	0.37	0.37
		Delay (s)	1	6	10	14	8	9
		LOS	A	A	A	B	A	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

Table 11.2.3 – Capacity analysis results for 2024 background peak hour traffic volumes (with upgrades)

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results					
			Approach 1		Approach 2		Approach 3	
			L	T	T	R	L	R
Aubrey Matlala Street / Flower Street Approach 1: Aubrey S Approach 2: Aubrey N Approach 3: Flower W	Week AM	V/C	0.07	0.19	0.19	0.19	0.49	0.49
		Delay (s)	6	0	1	8	11	21
		LOS	A	A	A	A	B	C
	Week PM	V/C	0.11	0.27	0.27	0.27	0.75	0.75
		Delay (s)	6	0	1	9	25	46
		LOS	A	A	A	A	C	E
Commissioner Street / Flower Street Approach 1: Flower S Approach 2: Commissioner E Approach 3: Commissioner W	Week AM	V/C	0.09	0.53	0.06	0.40	0.57	0.53
		Delay (s)	6	30	6	5	6	15
		LOS	A	C	A	A	A	B
	Week PM	V/C	0.12	0.55	0.07	0.71	0.32	0.48
		Delay (s)	6	42	6	15	3	16
		LOS	A	D	A	B	A	B
Buitekant Road / Buputju Street Approach 1: Buitekant S Approach 2: Buputju E Approach 3: Buitekant N	Week AM	V/C	0.39	0.04	0.36	0.36	0.51	0.51
		Delay (s)	1	6	12	20	9	11
		LOS	A	A	B	C	A	B
	Week PM	V/C	0.35	0.02	0.10	0.10	0.37	0.37
		Delay (s)	1	6	10	14	8	9
		LOS	A	A	A	B	A	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

11.3 2024 Background Plus Development Peak Hour Traffic Volumes – Unmitigated Network (Scenario 3)

For this traffic flow scenario, the SIDRA analyses show that the additional development traffic will have an insignificant impact on all study intersections, except for the right-turn movement for the western approach at the Aubrey Matlala Street / Flower Street intersection. Additional development traffic is expected to result in an unacceptable LOS F for this turning movement during the PM peak traffic hour, and this intersection will therefore have to be upgraded to mitigate this impact by the development.

Table 11.3 overleaf presents a summary of the capacity analysis results for Scenario 3.

Table 11.3 – Capacity analysis results for 2024 background plus development peak hour traffic volumes: unmitigated network (Scenario 3)

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results					
			Approach 1		Approach 2		Approach 3	
			L	T	T	R	L	R
Aubrey Matlala Street / Flower Street Approach 1: Aubrey S Approach 2: Aubrey N Approach 3: Flower W	Week AM	V/C	0.07	0.19	0.19	0.19	0.54	0.54
		Delay (s)	6	0	1	8	12	23
		LOS	A	A	A	A	B	C
	Week PM	V/C	0.12	0.27	0.29	0.29	0.83	0.83
		Delay (s)	6	0	1	9	34	56
		LOS	A	A	A	A	D	F
Commissioner Street / Flower Street Approach 1: Flower S Approach 2: Commissioner E Approach 3: Commissioner W	Week AM	0.09	0.56	0.06	0.40	0.57	0.53	0.09
		6	30	6	5	6	15	6
		A	C	A	A	A	B	A
	Week PM	0.12	0.58	0.07	0.71	0.32	0.48	0.12
		6	42	6	15	3	16	6
		A	D	A	B	A	B	A
Buitekant Road / Buputju Street Approach 1: Buitekant S Approach 2: Buputju E Approach 3: Buitekant N	Week AM	V/C	0.39	0.04	0.38	0.38	0.51	0.51
		Delay (s)	1	6	12	21	9	11
		LOS	A	A	B	C	A	B
	Week PM	V/C	0.35	0.20	0.11	0.11	0.38	0.38
		Delay (s)	1	6	10	15	8	9
		LOS	A	A	A	B	A	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

11.4 2024 Background Plus Development Peak Hour Traffic Volumes – Mitigated Network (Scenario 4)

The mitigation measures required at the study intersections to accommodate the additional development traffic on the road network are listed in Table 11.4.1 below.

Table 11.4.2 overleaf presents a summary of the capacity analysis results after introduction of these mitigation measures.

Table 11.4.1 – Road upgrades required by addition of development traffic

Intersection	Control/ Approach	Required upgrades	Required due to	Responsible party
Aubrey Matlala Street / Flower Street	Control	3-way stop	Proposed Development	Developer
	S	None	-	-
	N	None	-	-
	W	None	-	-
Commissioner Street / Flower Street	Control	None	-	-
	S	None	-	-
	E	None	-	-
	W	None	-	-
Buitekant Road / Buputju Street	Control	None	-	-
	All Approaches	None	-	-

Table 11.4.2 – Capacity analysis results for 2024 background plus development peak hour traffic volumes: mitigated network (Scenario 4)

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results					
			Approach 1		Approach 2		Approach 3	
			L	T	T	R	L	R
Aubrey Matlala Street / Flower Street Approach 1: Aubrey S Approach 2: Aubrey N Approach 3: Flower W	Week AM	V/C	0.18	0.52	0.48	0.48	0.32	0.32
		Delay (s)	10	13	12	13	13	13
		LOS	A	B	B	B	B	B
	Week PM	V/C	0.30	0.71	0.67	0.67	0.26	0.26
		Delay (s)	11	20	16	18	13	13
		LOS	B	C	C	C	B	B
Commissioner Street / Flower Street Approach 1: Flower S Approach 2: Commissioner E Approach 3: Commissioner W	Week AM	V/C	0.09	0.56	0.06	0.40	0.57	0.53
		Delay (s)	6	30	6	5	6	15
		LOS	A	C	A	A	A	B
	Week PM	V/C	0.12	0.58	0.07	0.71	0.32	0.48
		Delay (s)	6	42	6	15	3	16
		LOS	A	D	A	B	A	B
Buitekant Road / Buputju Street Approach 1: Buitekant S Approach 2: Buputju E Approach 3: Buitekant N	Week AM	V/C	N/A (no mitigation required)					
		Delay (s)						
		LOS						
	Week PM	V/C	N/A (no mitigation required)					
		Delay (s)						
		LOS						

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

12. PROPOSED ROAD UPGRADES

Table 12.1 below summarises the proposed road upgrades identified through the analysis procedure in the foregoing sections. These road upgrades are shown in Drawing RUD001 attached at the end of this report.

Table 12.1 – Summary table of proposed road upgrades

Intersection	Control/ Approach	Required/proposed upgrades per analysis scenario	
		2024 Background	2024 Background plus development
Aubrey Matlala Street / Flower Street	Control	None	3-way stop
	S	None	None
	N	None	None
	W	None	None
Commissioner Street / Flower Street	Control	New traffic signal	None
	S	None	None
	E	None	None
	W	None	None
Buitekant Road / Buputju Street	Control	None	None
	S	None	None
	N	None	None
	E	None	None

As noted in the foregoing sections, upgrades necessitated by background traffic flow scenarios are, in theory, the responsibility of the applicable roads authorities. These upgrades may also be implemented by other future developments in close proximity to the subject proposed development. Furthermore, upgrades necessitated by the development traffic will be the responsibility of the Developer. Additionally, upgrades at the access intersections to the proposed development will also be the responsibility of the Developer.

It is accepted that the CoT may not have funding available to implement the upgrades attributable to background traffic flow scenarios. In such case, the CoT may want to transfer its responsibility for the relevant upgrades to the Developer of the subject proposed development who, in turn, will fund such upgrades from the bulk services contributions payable to the CoT due to the proposed development.

13. PUBLIC AND NON-MOTORISED TRANSPORT ASSESSMENT

A public transportation and non-motorised transport assessment was carried out as part of this study.

Public transport in the study area is mainly provided by minibus taxis and busses. Local taxis have been observed travelling on all roads within the study area, with longer distance taxis available along Aubrey Matlala Street, Commissioner Street and Buitekant Street. A number of bus stops are also located well within walking distance from the proposed site. The site is thus well exposed to public transport availability.

It is also expected that the proposed development will generate a considerable demand for non-motorised and public transport. Due to this, the following new facilities are proposed:

- Pedestrian sidewalks on at least one side of all roads along the site boundary; and
- Pick-Up and Drop-Off (PUDO) facilities on-site, at the access intersections to the development.

These proposed new public and non-motorised transport facilities are indicated on the draft site layout plan attached as Appendix A.

14. SITE TRAFFIC ASSESSMENT

An STA will be required for the proposed development at SDP approval stage in accordance with the *TMH 16, Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual* [4].

The primary purpose of the STA is to evaluate proposed accesses in terms of required throat lengths (stacking distances), on-site roads for suitability of all design vehicles, parking provision, functionality of loading facilities (if any), on-site public transport facilities (if any), pedestrian arrangements and other transportation facilities.

15. PARKING

In terms of on-site parking provision, the requirements of the TTPS [1] must be met.

From the TTPS the subject development's requirements for on-site parking are:

- One (1) paved parking space for each flat with three habitable rooms or less; or
- Two (2) paved parking spaces for each flat with four habitable rooms or more; and
- One (1) paved parking space per three flats for visitors;

As no SDP is available for the proposed development, this aspect will have to be dealt with in the STA.

For student accommodation a relaxation in these required parking provisions are often considered by CoT. Such a request must however be lodged by the applicant and thoroughly motivated, for which a parking study is often required. This does however not form part of the scope for this study.

16. CONCLUSIONS & RECOMMENDATIONS

The key conclusions and recommendations of this study are presented below:

- This TIA was undertaken in support of a proposed new student accommodation development to be located on Erf 1305 in Soshanguve Block M, City of Tshwane Metropolitan Municipality (CoT), Gauteng Province;
- A total of 504 residential units for students are proposed;
- It is estimated that the development will generate a total of 51 and 75 peak hour trips during the weekday AM and PM peak traffic hours, respectively;
- Two (2) accesses to the development are proposed; one to the north of the site at the existing intersection between Imphangele Street and Maplankeng Street, and the other access to the east of the site at the exiting intersection between two unnamed class 5(b) roads;
- The study scope for this TIA is shown in Figure 5, and years of assessment for this study were taken as 2019 and 2024;
- Traffic surveys were carried out at all study intersections during the weekday AM (06:00 - 09:00) and PM peak periods (15:00 - 18:00) on Wednesday 3 April 2019. Analysis of these survey results yielded the weekday AM and PM peak hours as 07:00-08:00 and 16:30-17:30, respectively, with the PM peak hour being the critical peak. A site visit to the study area was also carried out during the weekday PM peak traffic hour;
- To account for any latent developments in the study area, an annual traffic growth rate of 4.0% was applied to the existing 2019 traffic volumes, over a period of 5 years;
- Traffic flow analyses of all study intersections, and for all applicable traffic flow scenarios, concluded that the following road upgrades will be required:
  - Aubrey Matlala St / Flower St: Converting the current priority control stop to a 3-way stop. This upgrade is to mitigate the impact of the development's traffic on the road network, and is therefore the responsibility of the developer; and
  - Commissioner St / Flower St: Converting the current 4-way stop to a traffic signal controlled intersection. This upgrade is to mitigate the impact of the expected growth in background traffic over the next 5 years, and is therefore the responsibility of the CoT or future developments in the study area.
- The proposed development is expected to generate a considerable demand for non-motorised and public transport. Due to this, the following new facilities are proposed:
  - Pedestrian sidewalks on at least one side of all roads along the site boundary; and
  - Pick-Up and Drop-Off (PUDO) facilities on-site, at the access intersections to the development.
- As no site development plan (SDP) is available for the proposed development, on-site parking aspects will have to be dealt with in the Site Traffic Assessment (STA) at SDP approval stage. Similarly, site circulation and detailed access control analyses will be addressed in the STA.

The proposed new student accommodation development, to be located on Erf 1305 in Soshanguve Block M, is therefore support from a traffic engineering perspective provided that the recommendations made in this study are implemented.

17. REFERENCES

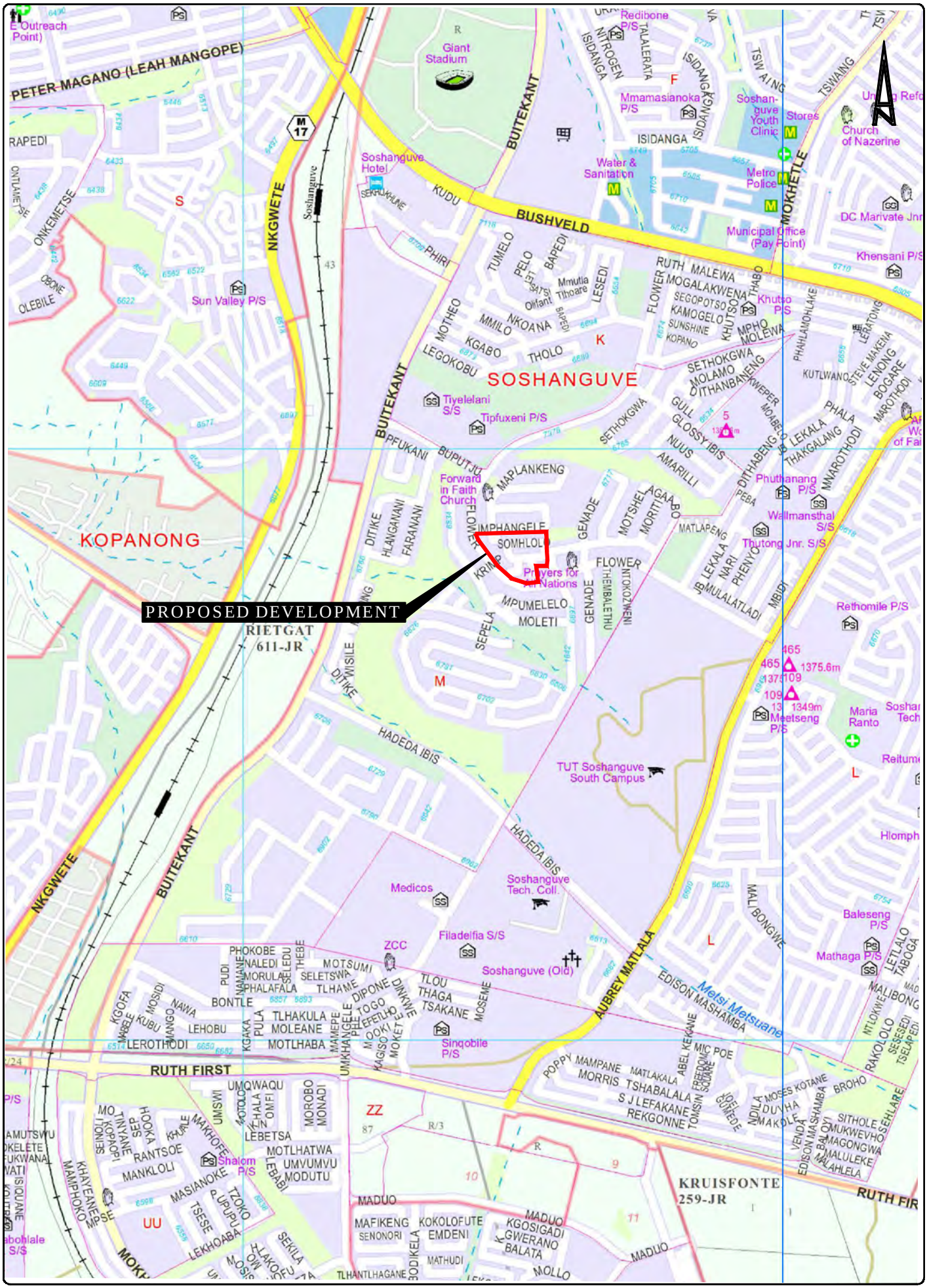
1. City Planning and Development Department, City of Tshwane Metropolitan Municipality. Tshwane Town Planning Scheme 2008, (Revised 2014). 13 November 2014.

2. Committee of Transport Officials. TRH 26, South African Road Classification and Access Management Manual. Version 1.0, August 2012.

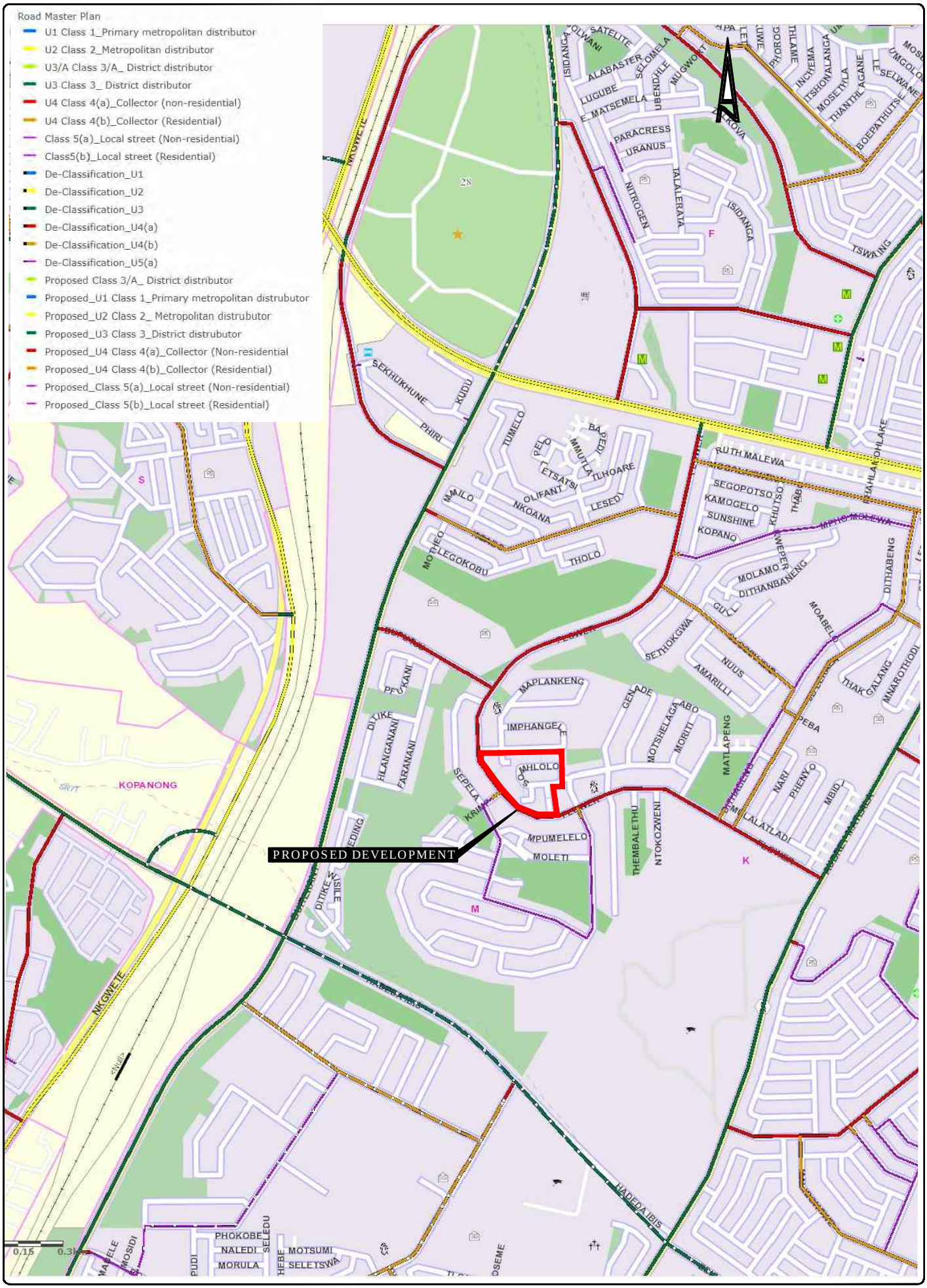
3. Committee of Transport Officials. TMH 17 Volume 1, South African Trip Data Manual. Version 1.0, September 2012.

4. Committee of Transport Officials. TMH 16 Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual. Version 1.0, August 2012.

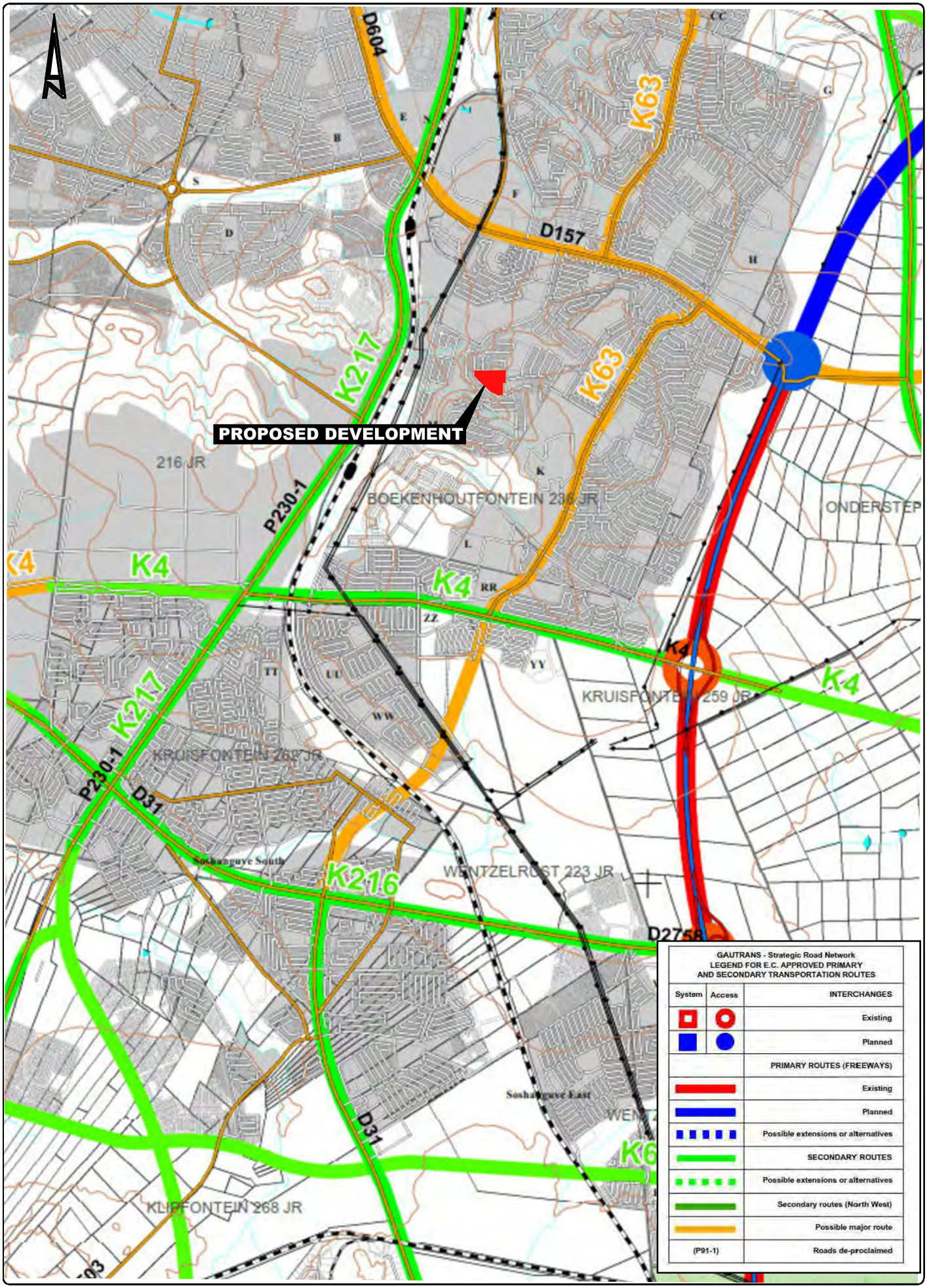
FIGURES



INFRATRANS	PROJECT: ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT	FIGURE NAME: LOCALITY MAP	PROJECT No. P-167 FIGURE No. 1

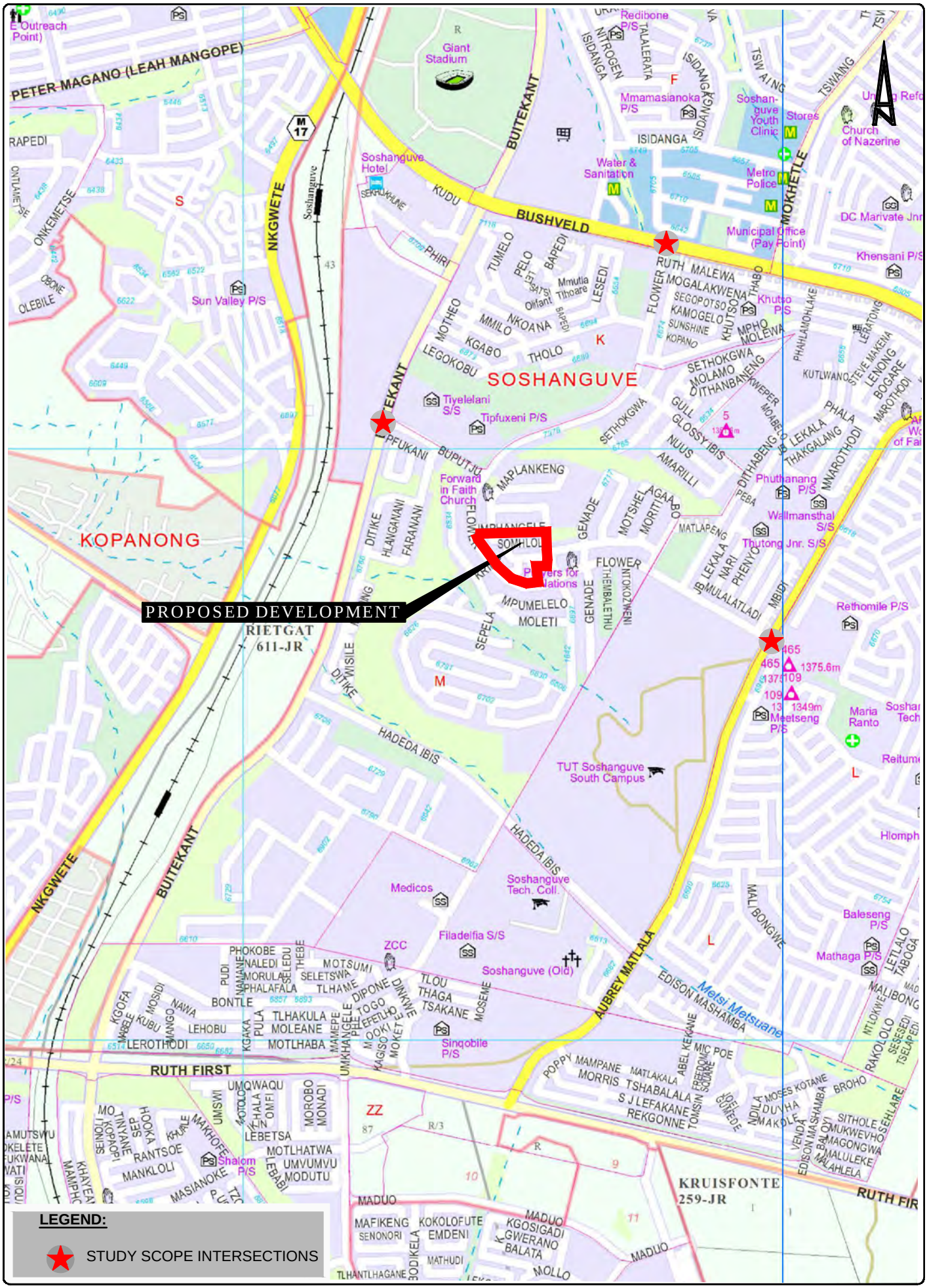


INFRATRANS	PROJECT: ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT	FIGURE NAME: LATEST ROAD MASTER PLAN OF THE CITY OF TSHWANE	PROJECT No. P-167 FIGURE No. 2

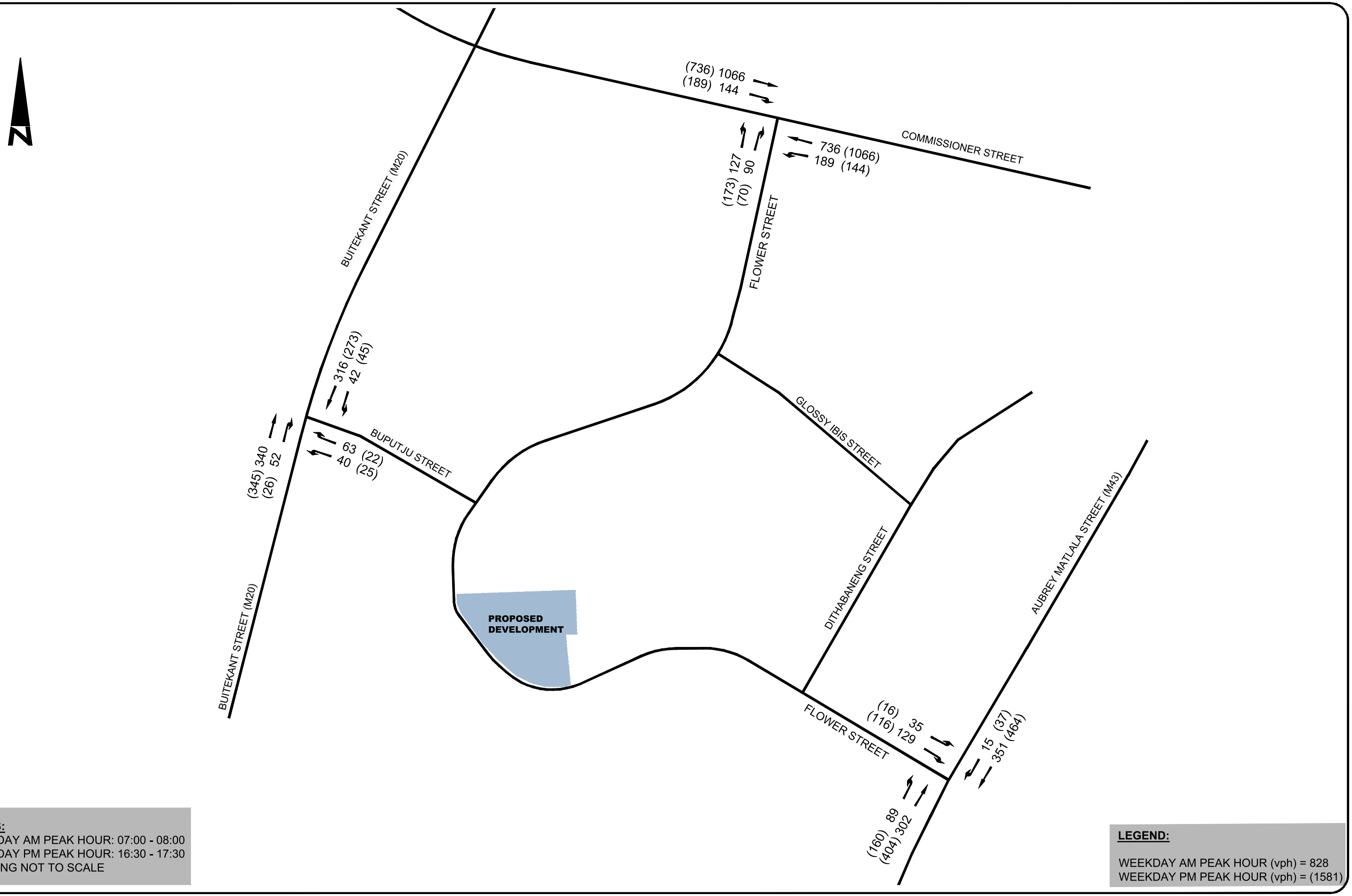


INFRATRANS	PROJECT: ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT	FIGURE NAME: GAUTRANS STRATEGIC ROAD NETWORK	PROJECT No. P-167
			FIGURE No. 3

INFRATRANS TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING	PROJECT: **ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT**	FIGURE NAME: **SITE AERIAL VIEW & KEY PLAN**	PROJECT No. P-167 FIGURE No. **4**



INFRATRANS	PROJECT: ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT	FIGURE NAME: STUDY SCOPE INTERSECTIONS	PROJECT No. P-167 FIGURE No. 5



NOTES:
WEEKDAY AM PEAK HOUR: 07:00 - 08:00
WEEKDAY PM PEAK HOUR: 16:30 - 17:30
DRAWING NOT TO SCALE

LEGEND:

WEEKDAY AM PEAK HOUR (vph) = 828
WEEKDAY PM PEAK HOUR (vph) = (1581)

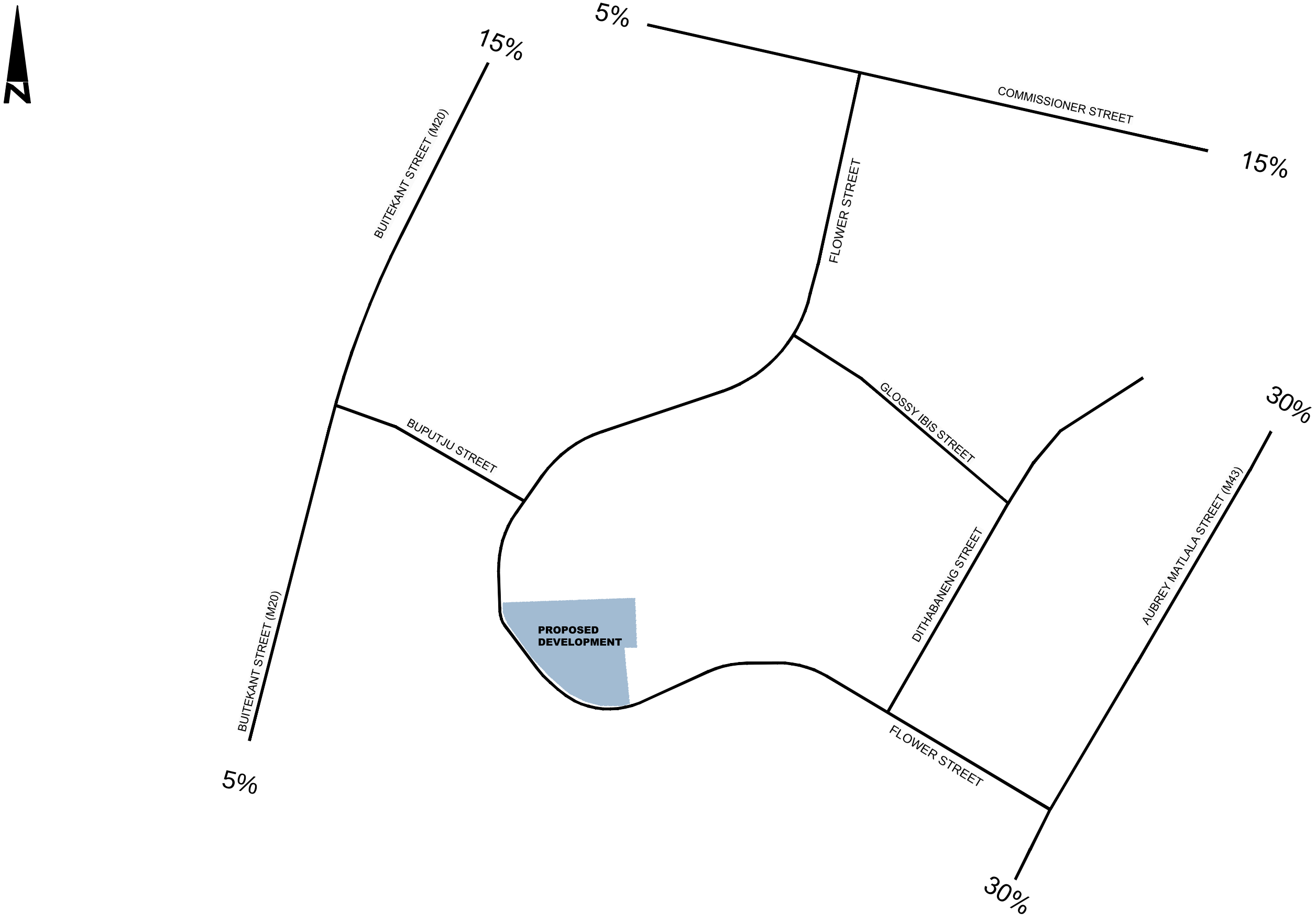
INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

PROJECT:
ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT

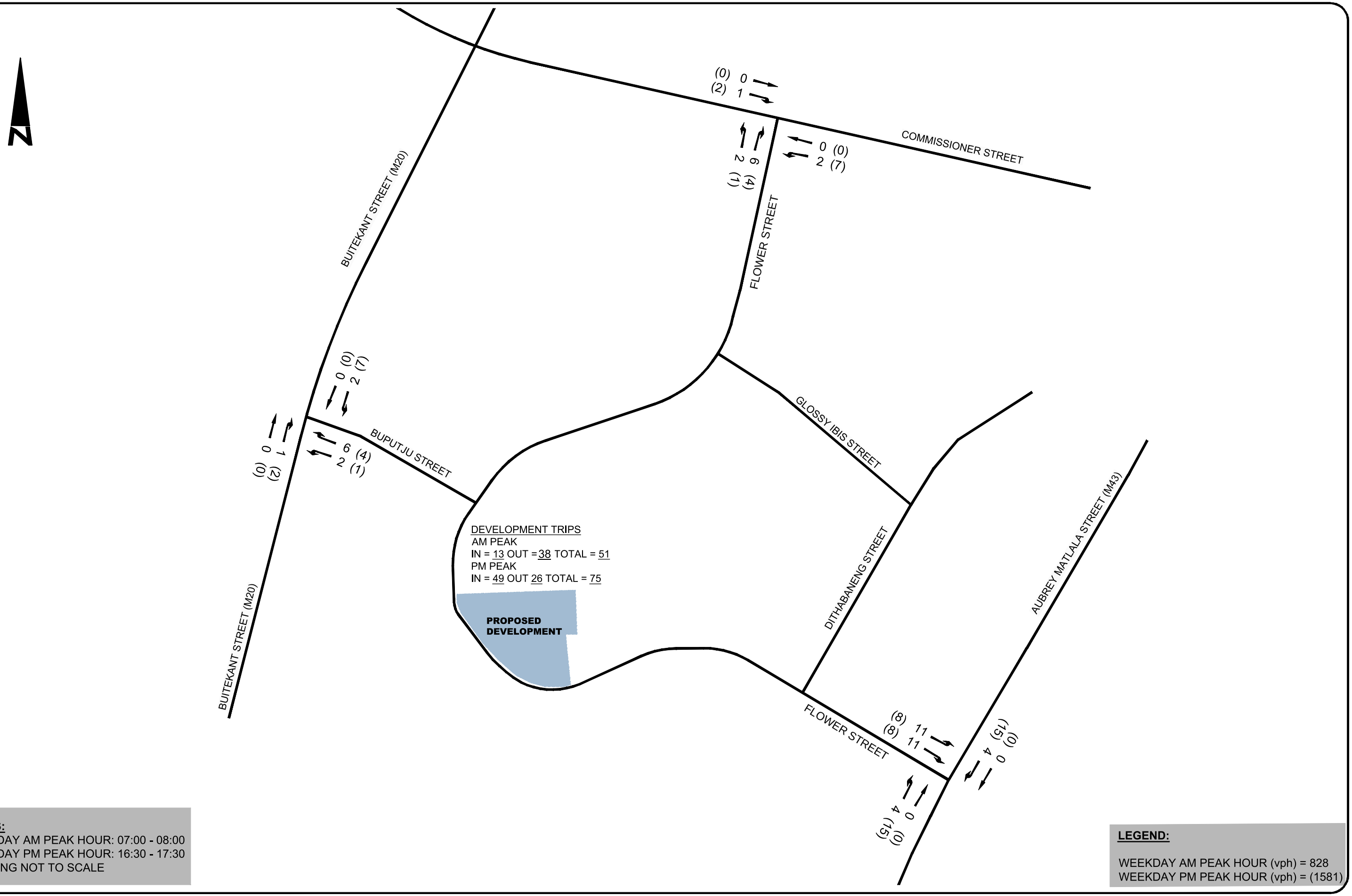
FIGURE NAME:
2019 EXISTING PEAK HOUR TRAFFIC VOLUMES

PROJECT No.
P-167

FIGURE No. **6A**



INFRATRANS TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING	PROJECT: **ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT**	FIGURE NAME: **EXPECTED DISTRIBUTION OF DEVELOPMENT TRAFFIC**	PROJECT No. P-167 FIGURE No. **6B**



NOTES:
WEEKDAY AM PEAK HOUR: 07:00 - 08:00
WEEKDAY PM PEAK HOUR: 16:30 - 17:30
DRAWING NOT TO SCALE

LEGEND:

WEEKDAY AM PEAK HOUR (vph) = 828
WEEKDAY PM PEAK HOUR (vph) = (1581)

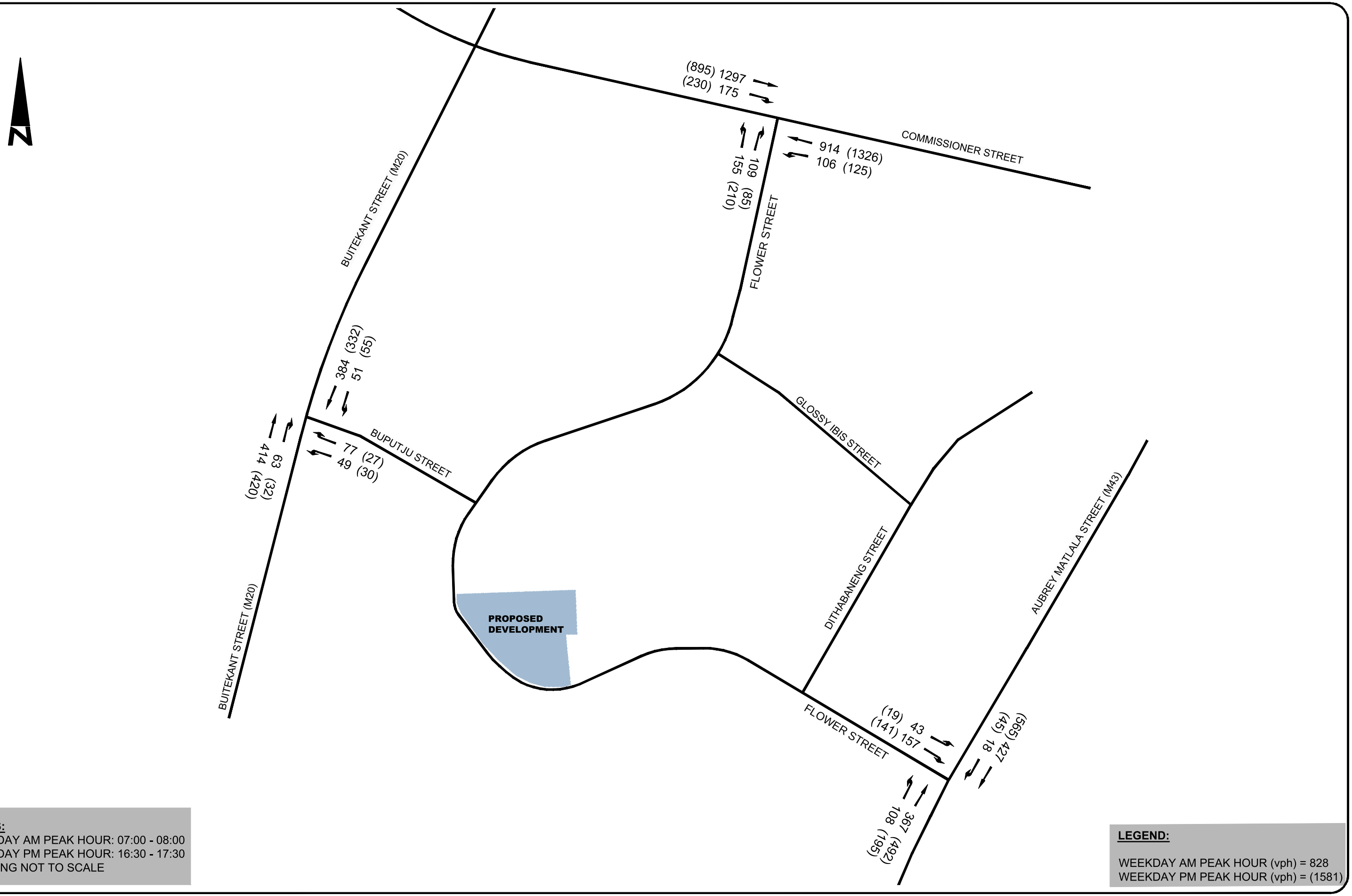
INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

PROJECT:
ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT

FIGURE NAME:
EXPECTED ASSIGNMENT OF DEVELOPMENT TRAFFIC

PROJECT No.
P-167

FIGURE No. **6C**



NOTES:
WEEKDAY AM PEAK HOUR: 07:00 - 08:00
WEEKDAY PM PEAK HOUR: 16:30 - 17:30
DRAWING NOT TO SCALE

LEGEND:

WEEKDAY AM PEAK HOUR (vph) = 828
WEEKDAY PM PEAK HOUR (vph) = (1581)

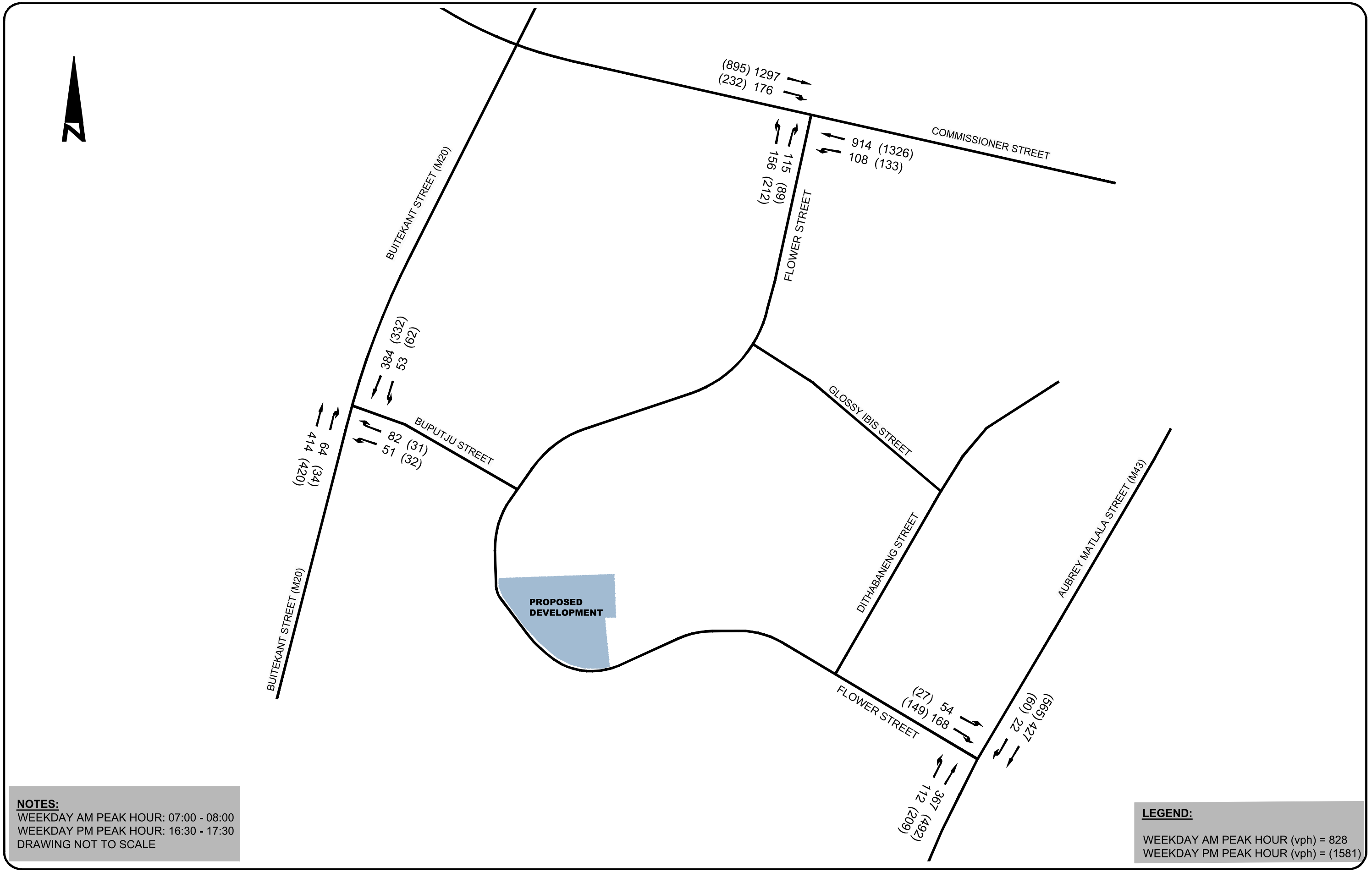
INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

PROJECT:
ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT

FIGURE NAME:
2024 BACKGROUND PEAK HOUR TRAFFIC VOLUMES

PROJECT No.
P-167

FIGURE No. **6D**



NOTES:
WEEKDAY AM PEAK HOUR: 07:00 - 08:00
WEEKDAY PM PEAK HOUR: 16:30 - 17:30
DRAWING NOT TO SCALE

LEGEND:

WEEKDAY AM PEAK HOUR (vph) = 828
WEEKDAY PM PEAK HOUR (vph) = (1581)

INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

PROJECT:
ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION DEVELOPMENT

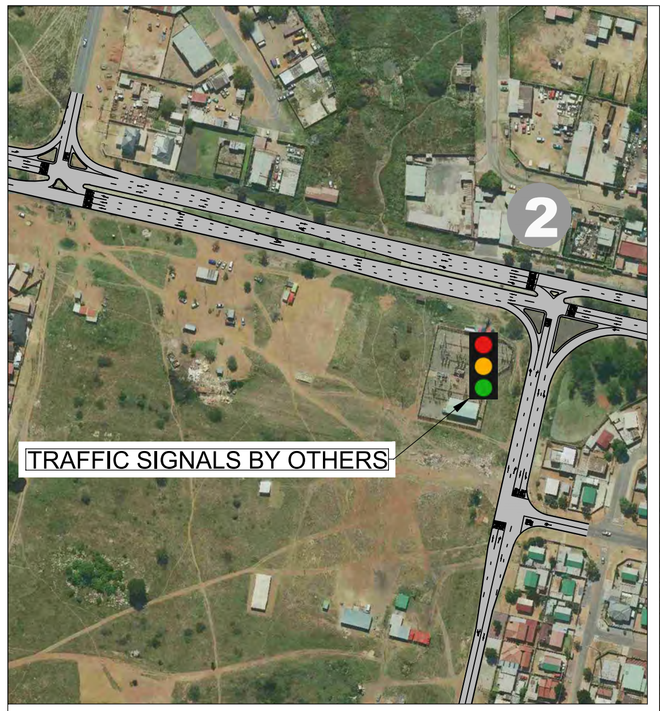
FIGURE NAME:
2024 BACKGROUND PLUS DEVELOPMENT PEAK HOUR TRAFFIC VOLUMES

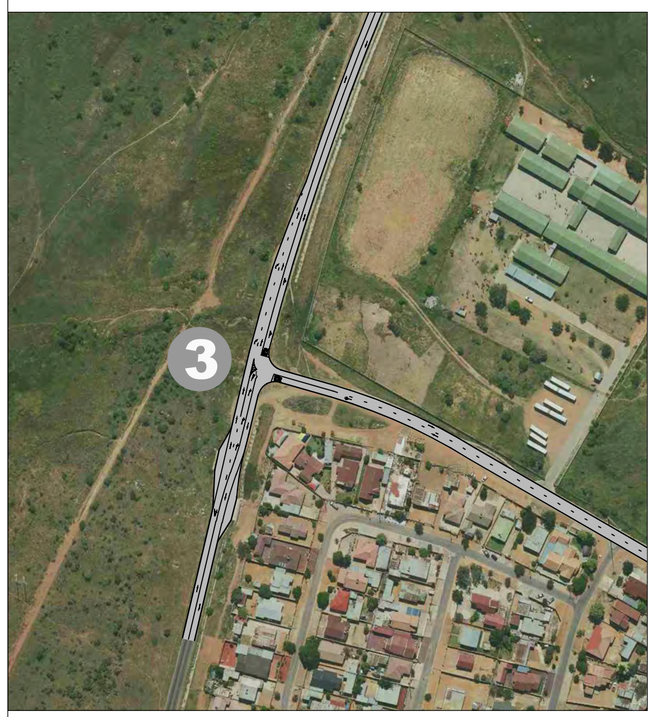
PROJECT No.
P-167

FIGURE No. **6E**

DRAWINGS

Drawing RUD001 Proposed Road Upgrades





REV	DATE	BY	DESCRIPTION	CHK	APD
A	2019-04-11	PJ	FOR APPROVAL	RvW	RvW

ARCHITECT: -

CLIENT:

DRAWING STATUS: PRELIMINARY

INFRATRANS
TRAFFIC AND TRANSPORTATION ENGINEERING CONSULTING

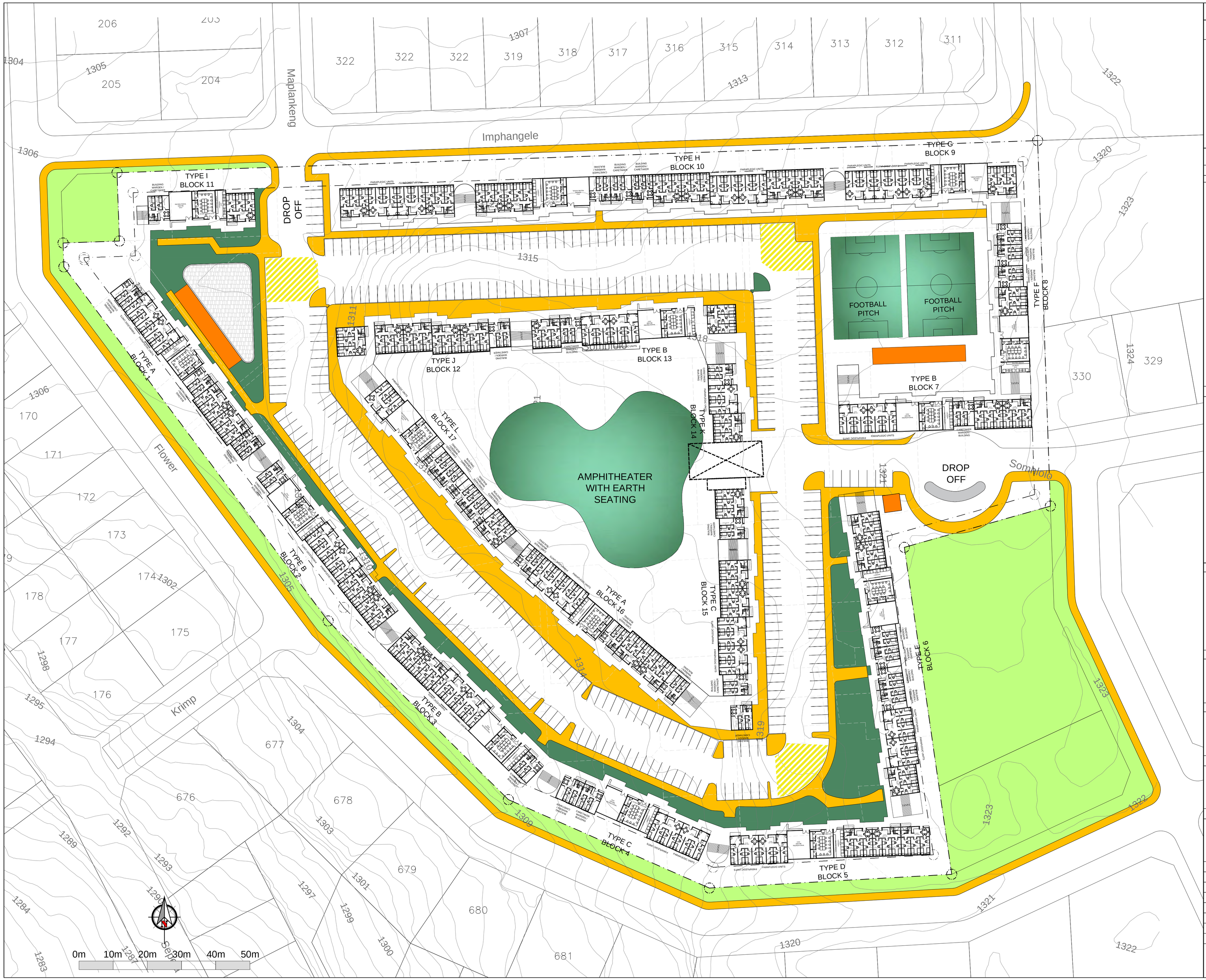
PROJECT: ERF 1305 SOSHANGUVE STUDENT ACCOMMODATION

TITLE: PROPOSED ROAD UPGRADES

SCALE @ A1:	CHECKED:	APPROVED:
NTS	PJ	RvW
DESIGN:	DRAWN:	DATE:
PJ	PJ	11/04/2019
PROJECT No:	DRAWING No:	REV:
P-167	RUD001	1

APPENDIX A

Draft site layout plan



GENERAL NOTES

1. The Contractor is responsible for the correct setting out of the buildings and all external and internal walls with particular reference to boundaries, building lines and setting out points.
2. The Contractor is to verify all levels, heights and dimensions on site and is to check these against the drawing before putting any work in hand.
3. The Contractor is to locate and identify existing services on the site and to protect these from damage throughout the duration of the contract
4. The Contractor is referred to the Standard Guidelines for Quality Control issued by this office for all minimum requirements for workmanship and materials. This document is to be used in conjunction with this drawing.
5. Any errors, discrepancies or omissions are to be reported to the Architect immediately
6. Contractor is to build in Approved D.P.C.'s, whether or not these are shown on drawings, to all external walls at each floor, beam or parapet level and to all windows, doors, grilles or other opening in external walls. Cavity walls to have stepped D.P.C.'s.
7. Any queries arising from all the above must be reported to the Architects for clarification before any work is put in hand.
8. Do not scale this drawing; refer to figured dimensions only

REVISIONS

REV:	NAME:	DATE:	DESCRIPTION:
G	GFD	2018.08.02	ISSUED FOR INFORMATION
H	M.OM	2018.11.30	ISSUED FOR INFORMATION

KEY MAP

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Company Reg: 2010/021203/07

JOHANNESBURG
DUBAI
JEDDAH
ABU DHABI

PROJECT TITLE

STUDENT VILLAGE: TUT SOSHANGUVE CAMPUS, CITY OF TSWANE

CLIENT

GOVHANI STUDENT ACCOMMODATION
"AFFORDABLE, DECENT ACCOMMODATION FOR ALL"

DRAWING TITLE

PROPOSED NEW STUDENT HOUSING

DRAWING DESCRIPTION

SITE LAYOUT – GROUND FLOOR

SCALE:	1:500 @ A1			
DATE:	2018.11.30			
DRAWN	INITIAL	GFD		
CHECKED	SIGNATURE	EB	DATE	2017.04.13
APPROVED	SIGNATURE	EB	DATE	2017.04.13
ISSUED	INITIAL	EB	DATE	2017.04.13

PROJECT NO	DRAWING NO.	REVISION
0334	00.0000	H

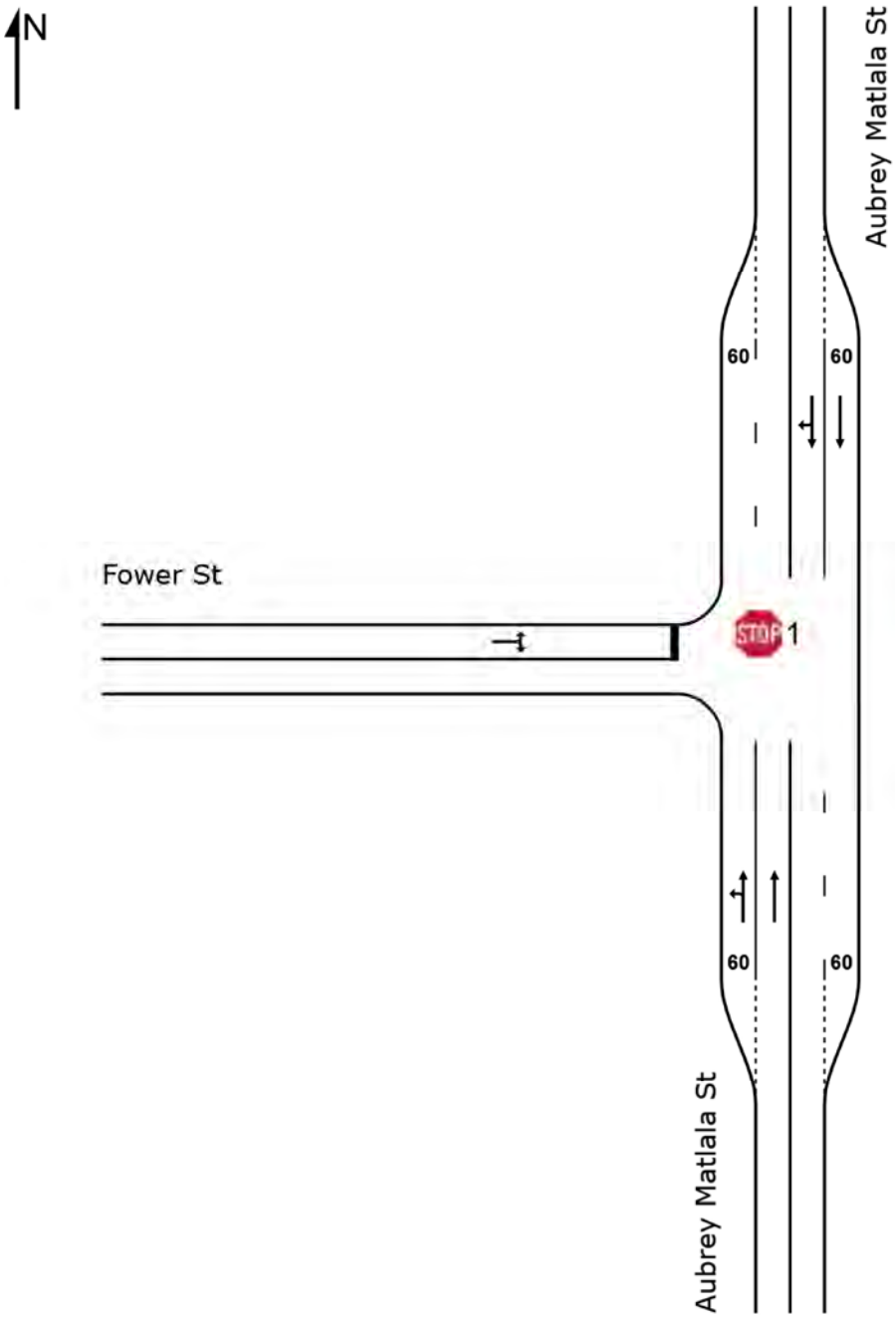
APPENDIX B

Output of SIDRA intersection capacity analyses

SITE LAYOUT

Site: 1 [Scenario 1 AM: 2019]

Aubrey Matlala St / Flower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 1 AM: 2019]

Aubrey Matlala St / Flower St Intersection
Site Category: -
Stop (Two-Way)

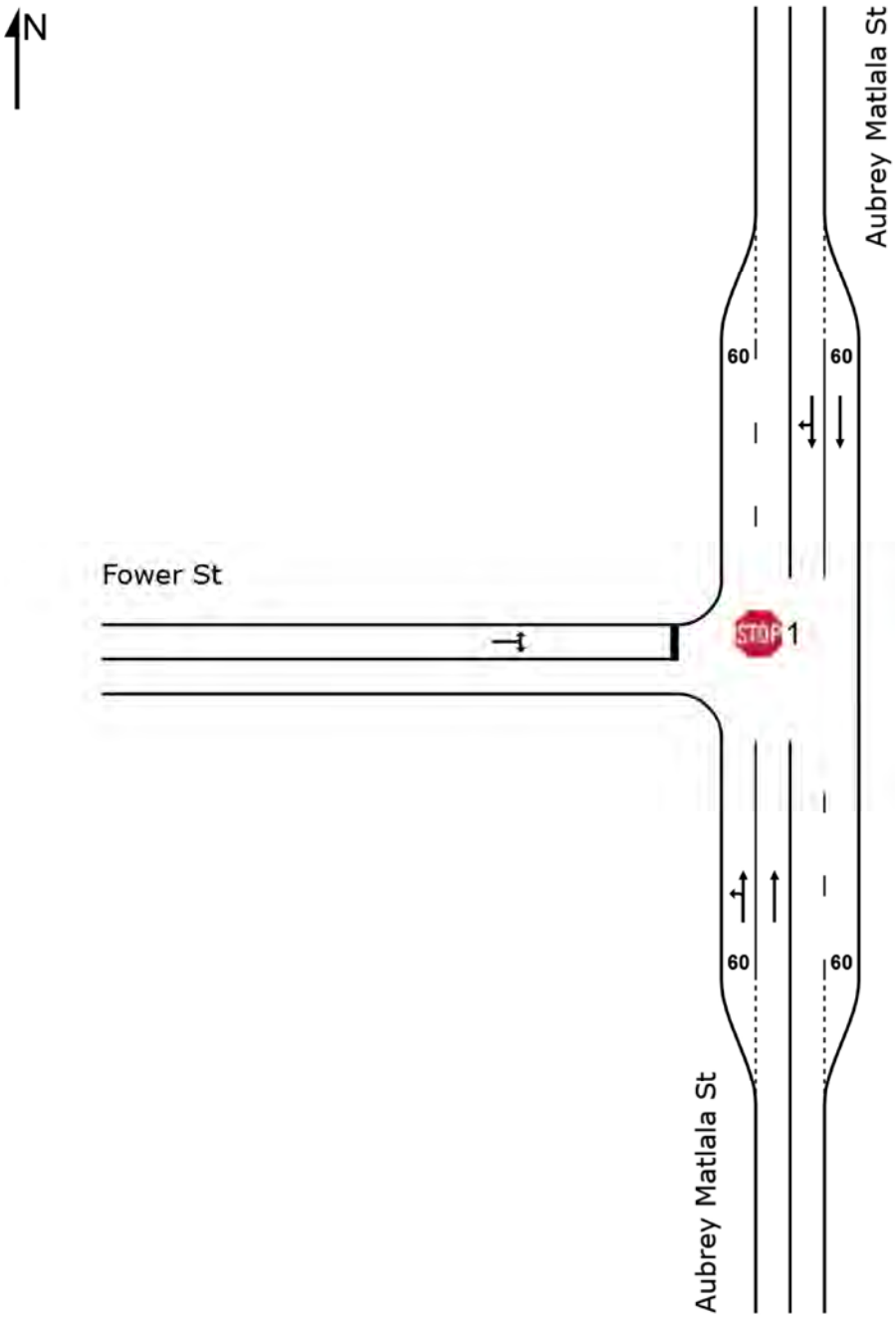
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	93	1,0	0,054	5,6	LOS A	0,0	0,0	0,00	0,54	0,00	53,9
2	T1	315	1,0	0,159	0,0	LOS A	0,0	0,0	0,00	0,01	0,00	59,9
Approach		407	1,0	0,159	1,3	NA	0,0	0,0	0,00	0,13	0,00	58,4
North: Aubrey Matlala St												
8	T1	366	1,0	0,153	0,1	LOS A	0,1	1,0	0,04	0,02	0,04	59,6
9	R2	16	1,0	0,153	7,2	LOS A	0,1	1,0	0,06	0,03	0,06	57,5
Approach		381	1,0	0,153	0,4	NA	0,1	1,0	0,04	0,03	0,04	59,5
West: Fower St												
10	L2	36	0,5	0,323	8,8	LOS A	1,5	10,2	0,08	0,99	0,10	47,6
12	R2	134	0,5	0,323	15,8	LOS C	1,5	10,2	0,08	0,99	0,10	47,4
Approach		171	0,5	0,323	14,3	LOS B	1,5	10,2	0,08	0,99	0,10	47,5
All Vehicles		959	0,9	0,323	3,2	NA	1,5	10,2	0,03	0,24	0,03	56,5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1 [Scenario 1 PM: 2019]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 1 PM: 2019]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)

Movement Performance - Vehicles

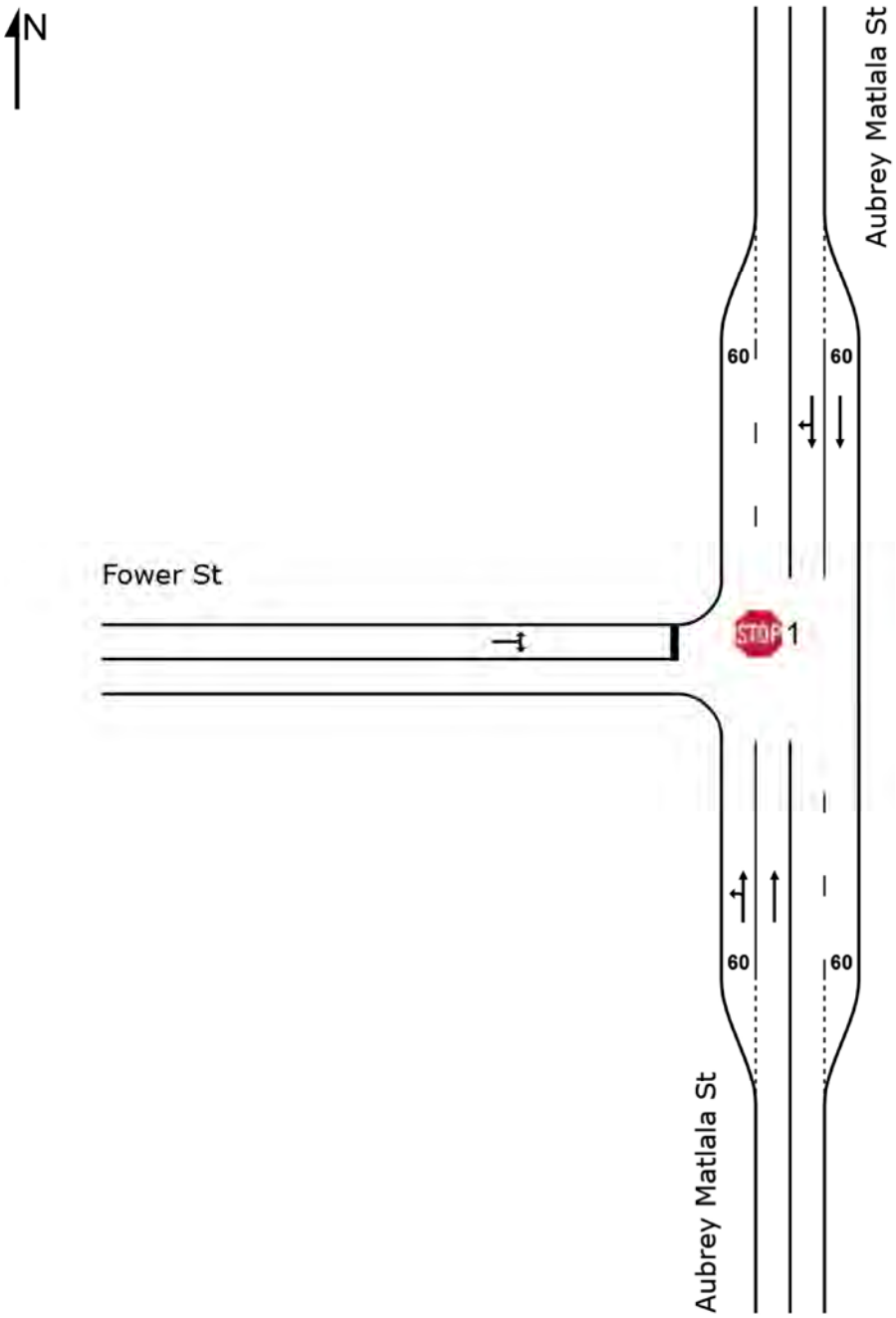
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	167	1,0	0,090	5,6	LOS A	0,0	0,0	0,00	0,58	0,00	53,6
2	T1	421	1,0	0,217	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	60,0
Approach		587	1,0	0,217	1,6	NA	0,0	0,0	0,00	0,16	0,00	58,0
North: Aubrey Matlala St												
8	T1	483	1,0	0,221	0,4	LOS A	0,5	3,3	0,10	0,05	0,10	59,1
9	R2	39	1,0	0,221	8,5	LOS A	0,5	3,3	0,15	0,07	0,15	56,8
Approach		522	1,0	0,221	1,0	NA	0,5	3,3	0,11	0,05	0,11	58,9
West: Fower St												
10	L2	17	0,5	0,424	10,8	LOS B	1,8	12,8	0,00	1,00	0,00	43,3
12	R2	121	0,5	0,424	23,3	LOS C	1,8	12,8	0,00	1,00	0,00	43,1
Approach		138	0,5	0,424	21,8	LOS C	1,8	12,8	0,00	1,00	0,00	43,1
All Vehicles		1247	0,9	0,424	3,6	NA	1,8	12,8	0,04	0,21	0,04	56,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1 [Scenario 2 AM: 2024]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 2 AM: 2024]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)

Movement Performance - Vehicles

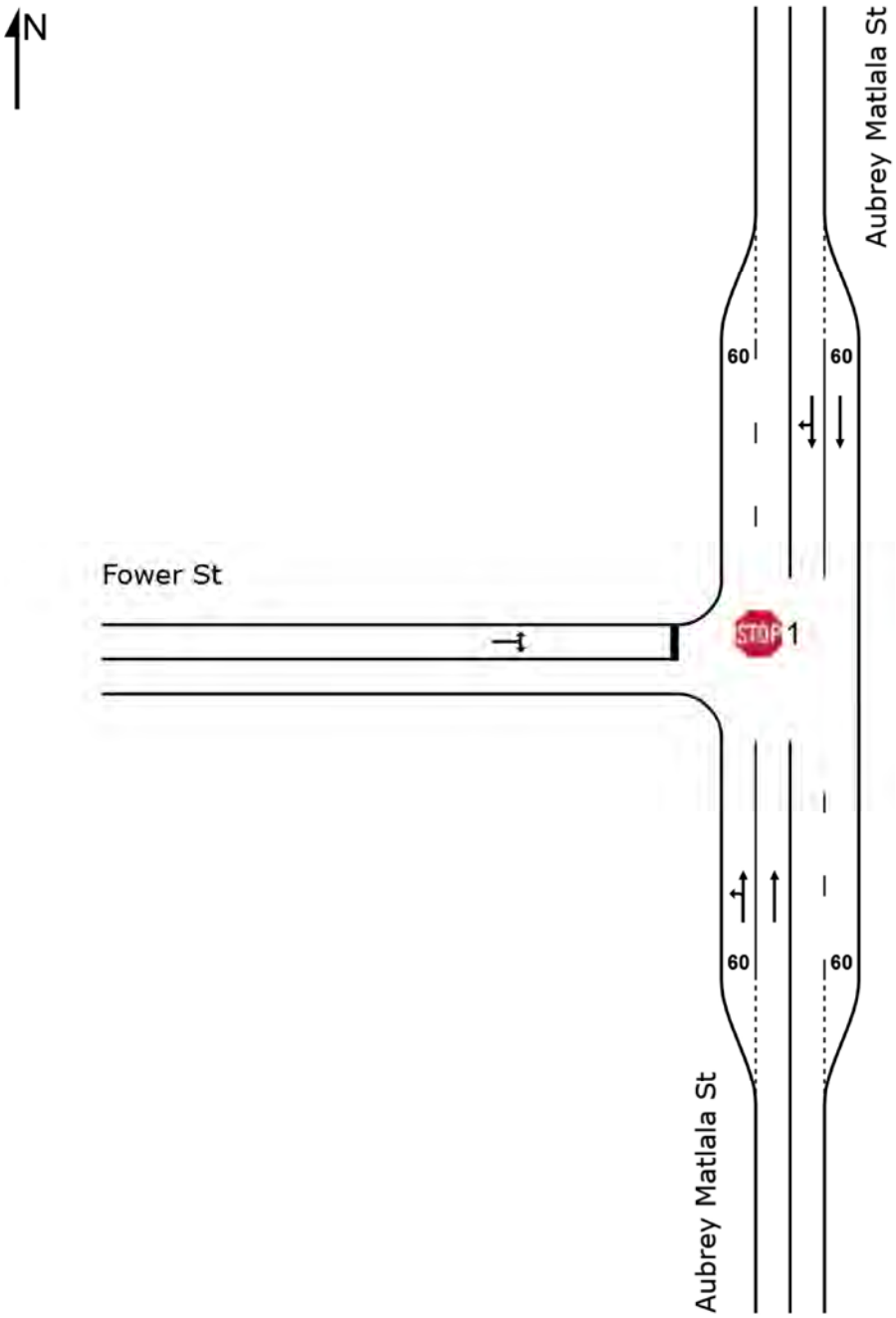
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	113	1,0	0,066	5,6	LOS A	0,0	0,0	0,00	0,54	0,00	53,9
2	T1	382	1,0	0,193	0,0	LOS A	0,0	0,0	0,00	0,01	0,00	59,8
Approach		495	1,0	0,193	1,3	NA	0,0	0,0	0,00	0,13	0,00	58,4
North: Aubrey Matlala St												
8	T1	445	1,0	0,187	0,2	LOS A	0,2	1,4	0,05	0,02	0,05	59,6
9	R2	19	1,0	0,187	7,8	LOS A	0,2	1,4	0,07	0,03	0,07	57,5
Approach		464	1,0	0,187	0,5	NA	0,2	1,4	0,05	0,03	0,05	59,5
West: Fower St												
10	L2	45	0,5	0,492	10,9	LOS B	2,6	18,5	0,12	1,00	0,18	44,8
12	R2	164	0,5	0,492	21,4	LOS C	2,6	18,5	0,12	1,00	0,18	44,6
Approach		208	0,5	0,492	19,2	LOS C	2,6	18,5	0,12	1,00	0,18	44,7
All Vehicles		1167	0,9	0,492	4,2	NA	2,6	18,5	0,04	0,24	0,05	55,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1 [Scenario 2 PM: 2024]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 2 PM: 2024]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)

Movement Performance - Vehicles

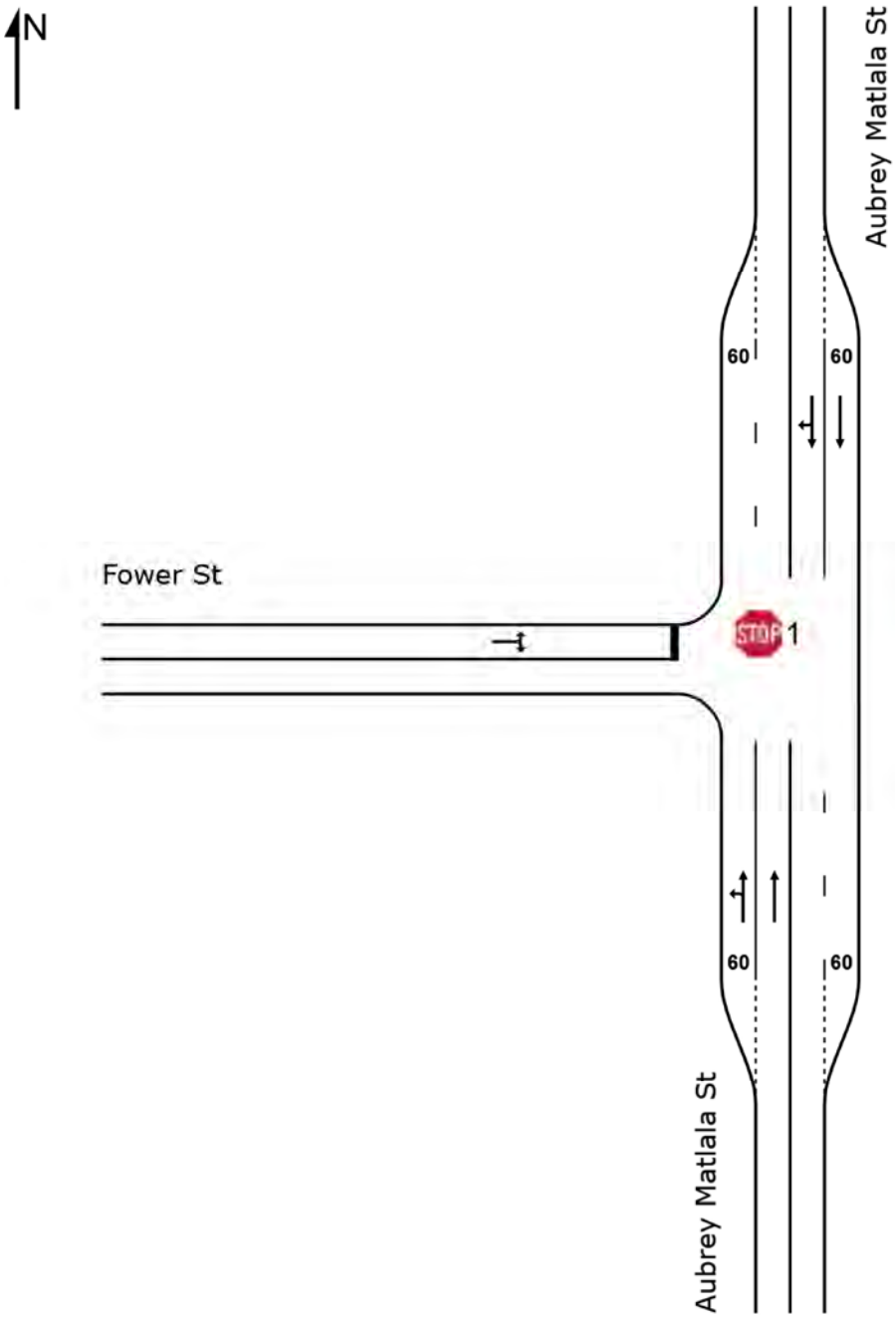
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	203	1,0	0,110	5,6	LOS A	0,0	0,0	0,00	0,58	0,00	53,6
2	T1	513	1,0	0,265	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
Approach		716	1,0	0,265	1,6	NA	0,0	0,0	0,00	0,16	0,00	58,0
North: Aubrey Matlala St												
8	T1	589	1,0	0,270	0,4	LOS A	0,5	3,8	0,10	0,05	0,12	59,0
9	R2	47	1,0	0,270	8,7	LOS A	0,5	3,8	0,15	0,07	0,17	56,8
Approach		635	1,0	0,270	1,0	NA	0,5	3,8	0,11	0,05	0,12	58,9
West: Fower St												
10	L2	20	0,5	0,752	24,9	LOS C	4,3	29,9	0,00	1,00	0,01	34,5
12	R2	147	0,5	0,752	45,6	LOS E	4,3	29,9	0,00	1,00	0,01	34,4
Approach		167	0,5	0,752	43,1	LOS E	4,3	29,9	0,00	1,00	0,01	34,4
All Vehicles		1518	0,9	0,752	5,9	NA	4,3	29,9	0,04	0,21	0,05	54,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1 [Scenario 3 AM: 2024 + Dev]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 3 AM: 2024 + Dev]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)

Movement Performance - Vehicles

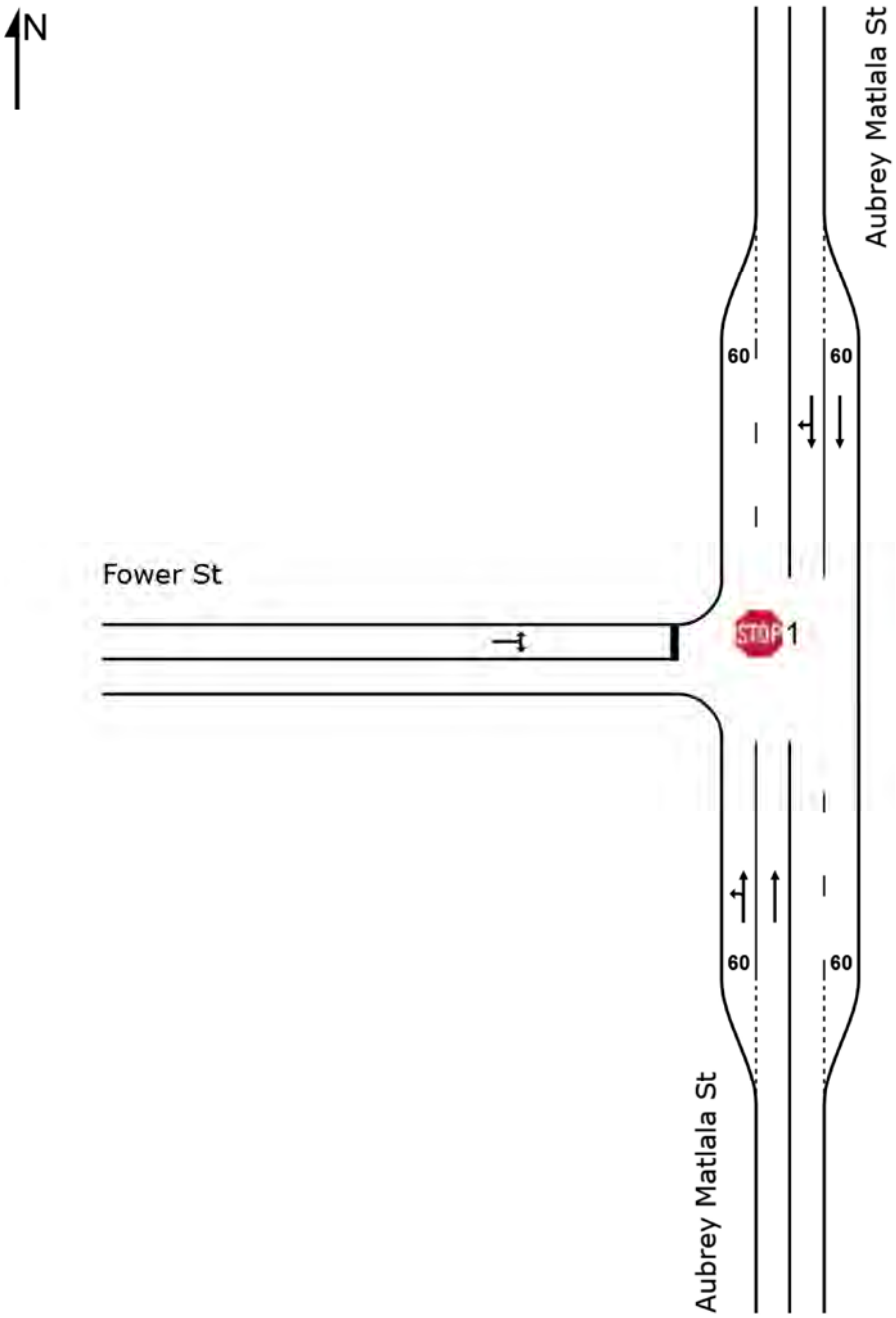
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	117	1,0	0,066	5,6	LOS A	0,0	0,0	0,00	0,55	0,00	53,8
2	T1	382	1,0	0,194	0,0	LOS A	0,0	0,0	0,00	0,01	0,00	59,9
Approach		499	1,0	0,194	1,3	NA	0,0	0,0	0,00	0,14	0,00	58,3
North: Aubrey Matlala St												
8	T1	445	1,0	0,190	0,2	LOS A	0,2	1,7	0,06	0,03	0,06	59,5
9	R2	23	1,0	0,190	7,9	LOS A	0,2	1,7	0,09	0,04	0,09	57,3
Approach		468	1,0	0,190	0,6	NA	0,2	1,7	0,06	0,03	0,06	59,3
West: Fower St												
10	L2	56	0,5	0,538	11,6	LOS B	3,1	21,9	0,07	1,00	0,12	44,4
12	R2	175	0,5	0,538	22,5	LOS C	3,1	21,9	0,07	1,00	0,12	44,2
Approach		231	0,5	0,538	19,9	LOS C	3,1	21,9	0,07	1,00	0,12	44,2
All Vehicles		1198	0,9	0,538	4,6	NA	3,1	21,9	0,04	0,26	0,05	55,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1 [Scenario 3 PM: 2024 + Dev]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [Scenario 3 PM: 2024 + Dev]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (Two-Way)

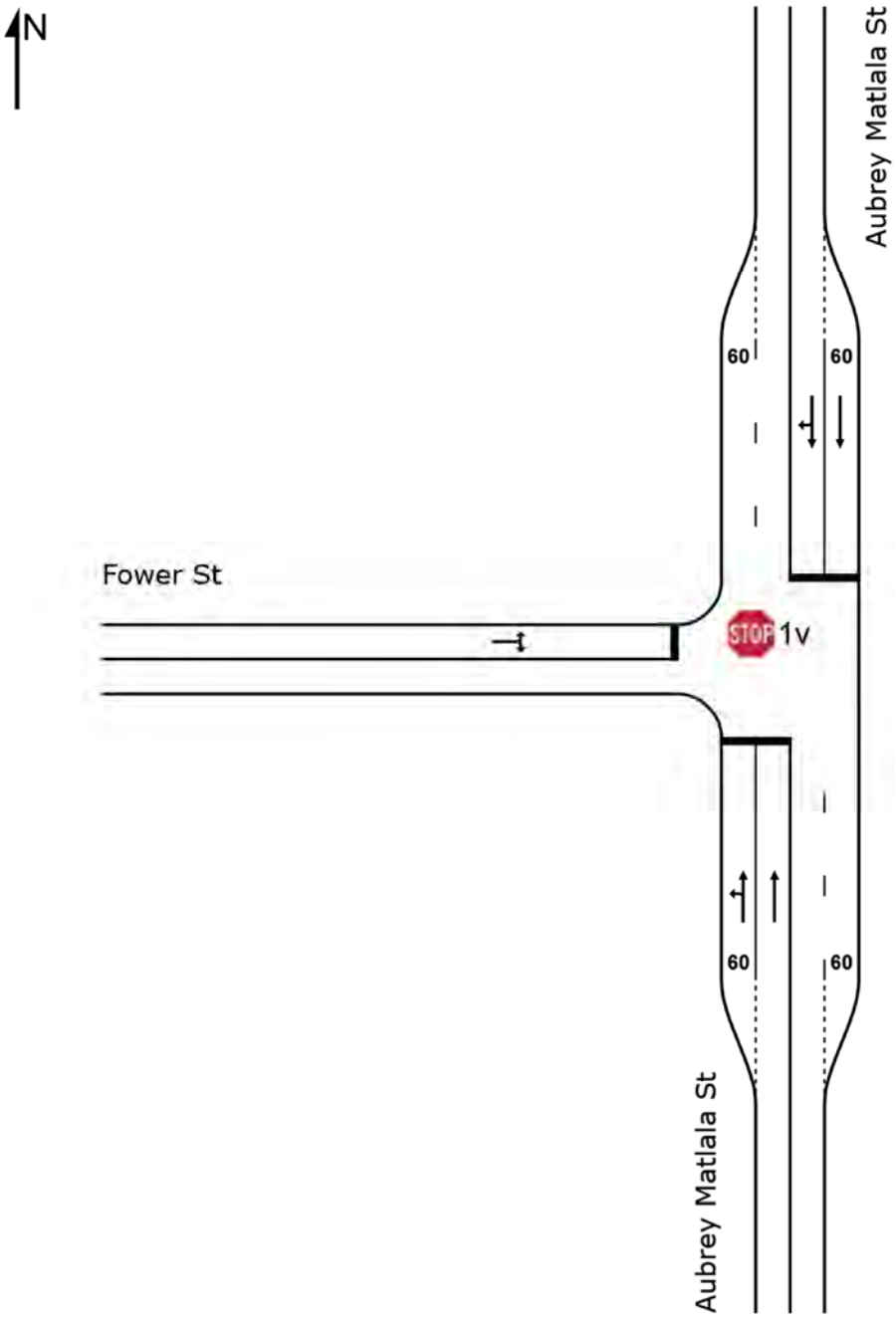
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	218	1,0	0,118	5,6	LOS A	0,0	0,0	0,00	0,58	0,00	53,6
2	T1	513	1,0	0,265	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
Approach		730	1,0	0,265	1,7	NA	0,0	0,0	0,00	0,17	0,00	57,9
North: Aubrey Matlala St												
8	T1	589	1,0	0,285	0,5	LOS A	0,7	5,3	0,13	0,06	0,15	58,8
9	R2	63	1,0	0,285	8,9	LOS A	0,7	5,3	0,20	0,09	0,23	56,3
Approach		651	1,0	0,285	1,3	NA	0,7	5,3	0,14	0,07	0,16	58,5
West: Fower St												
10	L2	28	0,5	0,831	33,9	LOS D	5,7	39,8	0,00	1,00	0,01	31,7
12	R2	155	0,5	0,831	55,8	LOS F	5,7	39,8	0,00	1,00	0,01	31,7
Approach		183	0,5	0,831	52,5	LOS F	5,7	39,8	0,00	1,00	0,01	31,7
All Vehicles		1565	0,9	0,831	7,5	NA	5,7	39,8	0,06	0,23	0,07	53,0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1v [Scenario 4 AM: 2024 + Dev: Upgraded]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (All-Way)



MOVEMENT SUMMARY

Site: 1v [Scenario 4 AM: 2024 + Dev: Upgraded]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (All-Way)

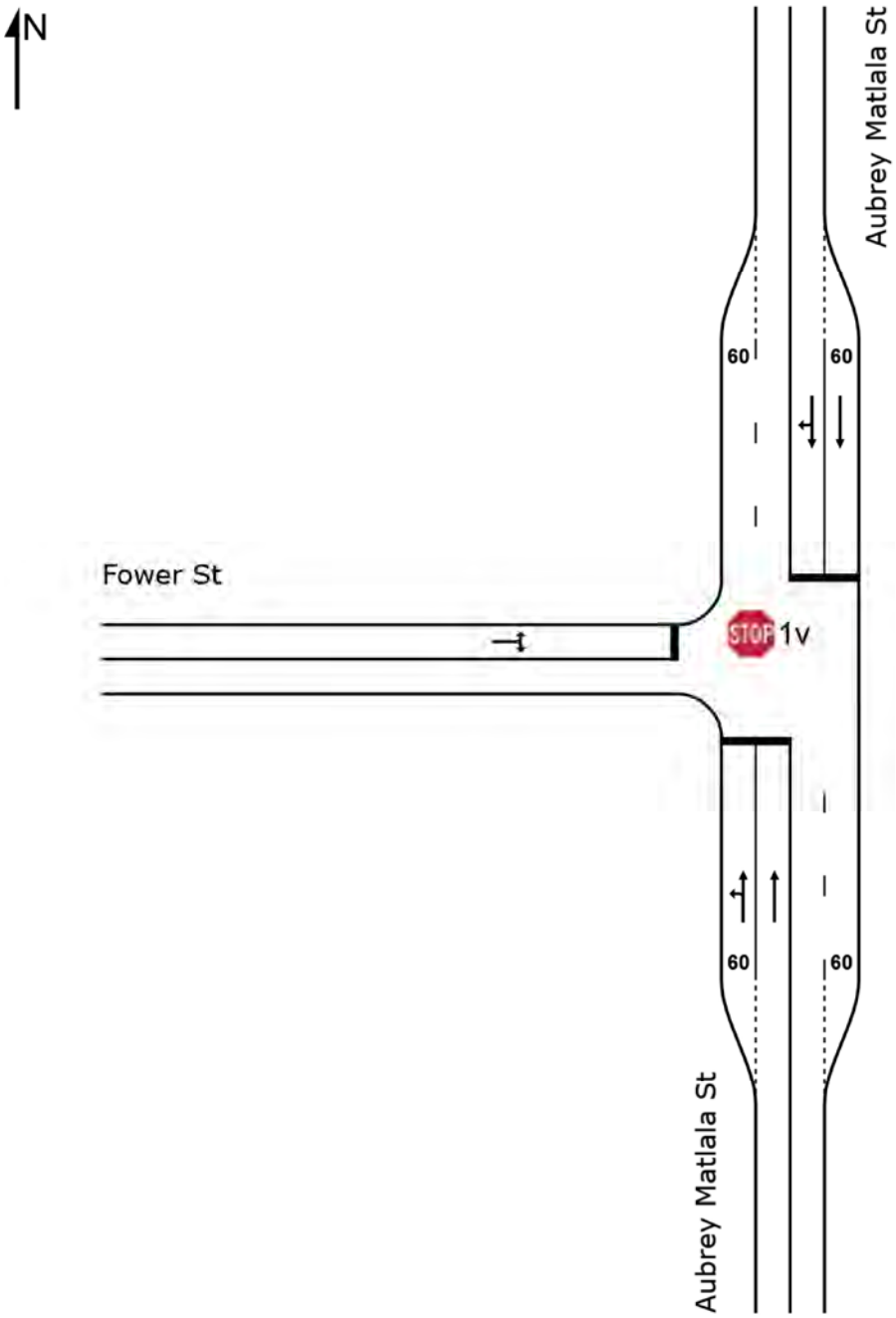
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	117	1,0	0,176	9,6	LOS A	0,6	4,0	0,71	1,28	1,92	51,7
2	T1	382	1,0	0,517	13,4	LOS B	2,5	17,5	0,83	1,48	2,85	49,1
Approach		499	1,0	0,517	12,5	LOS B	2,5	17,5	0,80	1,43	2,63	49,7
North: Aubrey Matlala St												
8	T1	445	1,0	0,484	11,9	LOS B	2,2	15,7	0,79	1,41	2,52	50,0
9	R2	23	1,0	0,484	13,0	LOS B	2,2	15,7	0,82	1,45	2,74	49,4
Approach		468	1,0	0,484	11,9	LOS B	2,2	15,7	0,79	1,41	2,53	50,0
West: Fower St												
10	L2	56	0,5	0,321	13,4	LOS B	1,2	8,4	0,76	1,33	2,22	49,2
12	R2	175	0,5	0,321	13,1	LOS B	1,2	8,4	0,76	1,33	2,22	49,0
Approach		231	0,5	0,321	13,2	LOS B	1,2	8,4	0,76	1,33	2,22	49,0
All Vehicles		1198	0,9	0,517	12,4	LOS B	2,5	17,5	0,79	1,41	2,51	49,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 1v [Scenario 4 PM: 2024 + Dev: Upgraded]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (All-Way)



MOVEMENT SUMMARY

Site: 1v [Scenario 4 PM: 2024 + Dev: Upgraded]

Aubrey Matlala St / Fower St Intersection
Site Category: -
Stop (All-Way)

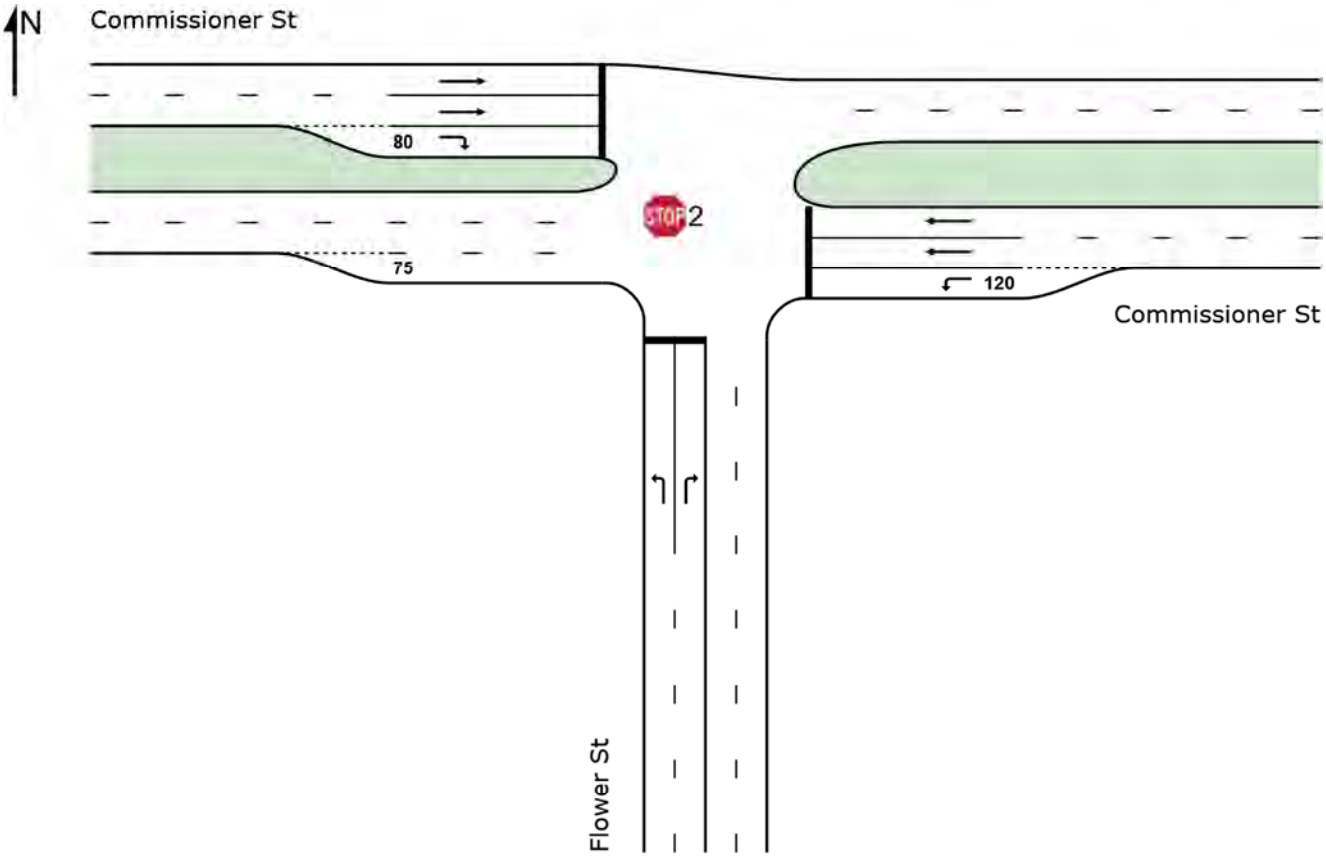
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Aubrey Matlala St												
1	L2	218	1,0	0,302	10,7	LOS B	1,1	7,8	0,75	1,33	2,18	50,9
2	T1	513	1,0	0,712	20,0	LOS C	5,0	35,6	0,92	1,76	4,24	45,2
Approach		730	1,0	0,712	17,3	LOS C	5,0	35,6	0,87	1,63	3,63	46,8
North: Aubrey Matlala St												
8	T1	589	1,0	0,674	15,8	LOS C	4,4	30,8	0,85	1,58	3,35	47,5
9	R2	63	1,0	0,674	18,3	LOS C	4,4	30,8	0,90	1,68	3,87	46,2
Approach		651	1,0	0,674	16,1	LOS C	4,4	30,8	0,86	1,59	3,40	47,4
West: Fower St												
10	L2	28	0,5	0,255	12,7	LOS B	0,9	6,2	0,73	1,30	2,07	49,6
12	R2	155	0,5	0,255	12,5	LOS B	0,9	6,2	0,73	1,30	2,07	49,4
Approach		183	0,5	0,255	12,5	LOS B	0,9	6,2	0,73	1,30	2,07	49,4
All Vehicles		1565	0,9	0,712	16,2	LOS C	5,0	35,6	0,85	1,58	3,35	47,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2 [Scenario 1 AM: 2019]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)



Organisation: INFRATRANS CIVIL AND TRAFFIC ENGINEERING | Created: Sunday, 14 April 2019 22:12:54
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MOVEMENT SUMMARY

Site: 2 [Scenario 1 AM: 2019]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)

Movement Performance - Vehicles

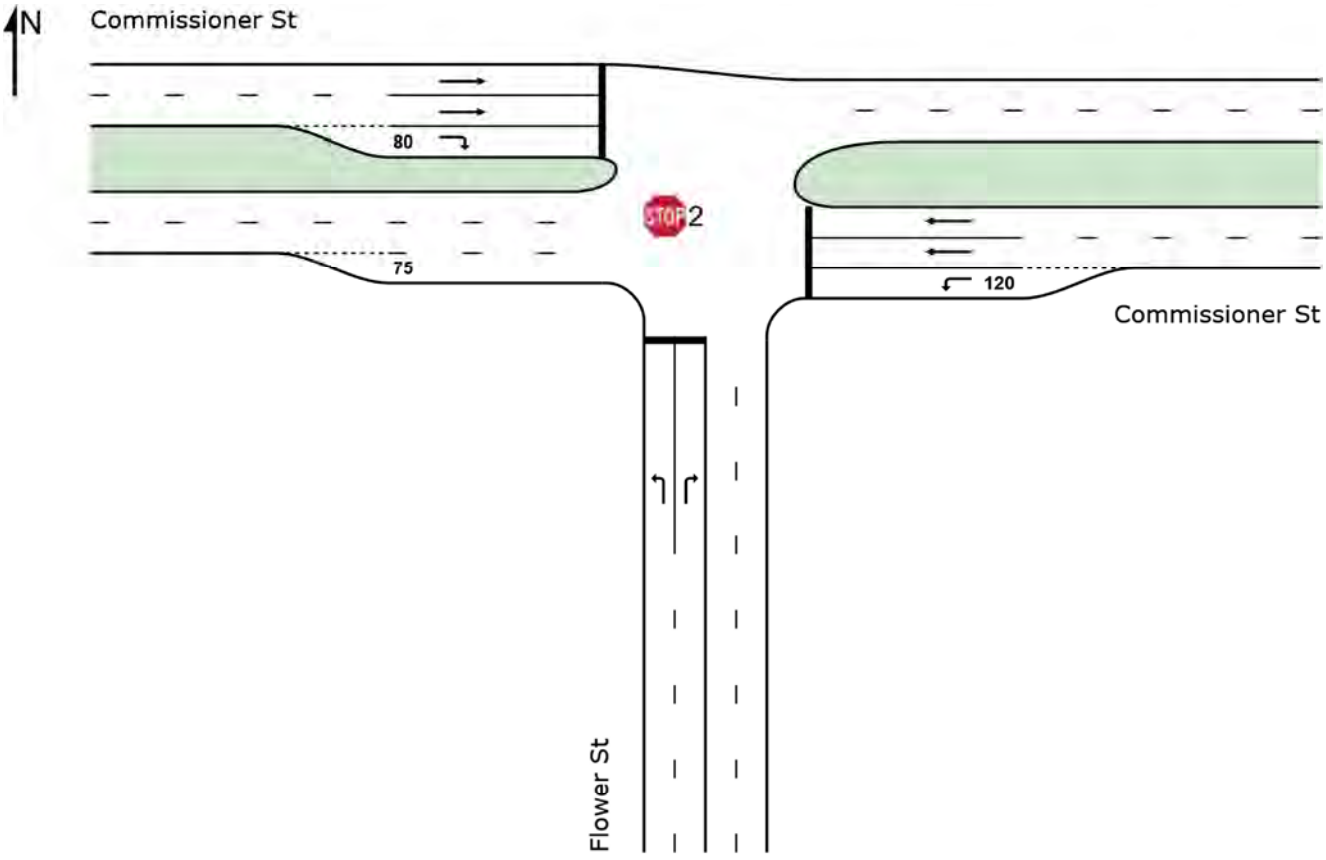
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	137	0,5	0,078	8,2	LOS A	0,3	2,1	0,60	0,99	1,15	51,7
3	R2	97	0,5	0,108	8,7	LOS A	0,3	2,1	0,58	1,16	1,70	51,8
Approach		233	0,5	0,108	8,4	LOS A	0,3	2,1	0,59	1,06	1,38	51,8
East: Commissioner St												
4	L2	94	0,5	0,053	8,2	LOS A	0,2	1,4	0,58	0,99	1,12	51,7
5	T1	808	2,0	0,625	13,2	LOS B	3,6	25,4	0,75	1,51	2,99	49,2
Approach		901	1,8	0,625	12,7	LOS B	3,6	25,4	0,73	1,46	2,79	49,5
West: Commissioner St												
11	T1	1146	2,0	0,637	15,1	LOS C	3,7	26,6	0,81	1,62	3,50	48,1
12	R2	155	0,5	0,172	9,1	LOS A	0,5	3,7	0,60	1,22	1,81	51,8
Approach		1301	1,8	0,637	14,4	LOS B	3,7	26,6	0,78	1,57	3,30	48,5
All Vehicles		2435	1,7	0,637	13,2	LOS B	3,7	26,6	0,75	1,48	2,93	49,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2 [Scenario 1 PM: 2019]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)



Organisation: INFRATRANS CIVIL AND TRAFFIC ENGINEERING | Created: Sunday, 14 April 2019 22:12:56
Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2 [Scenario 1 PM: 2019]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)

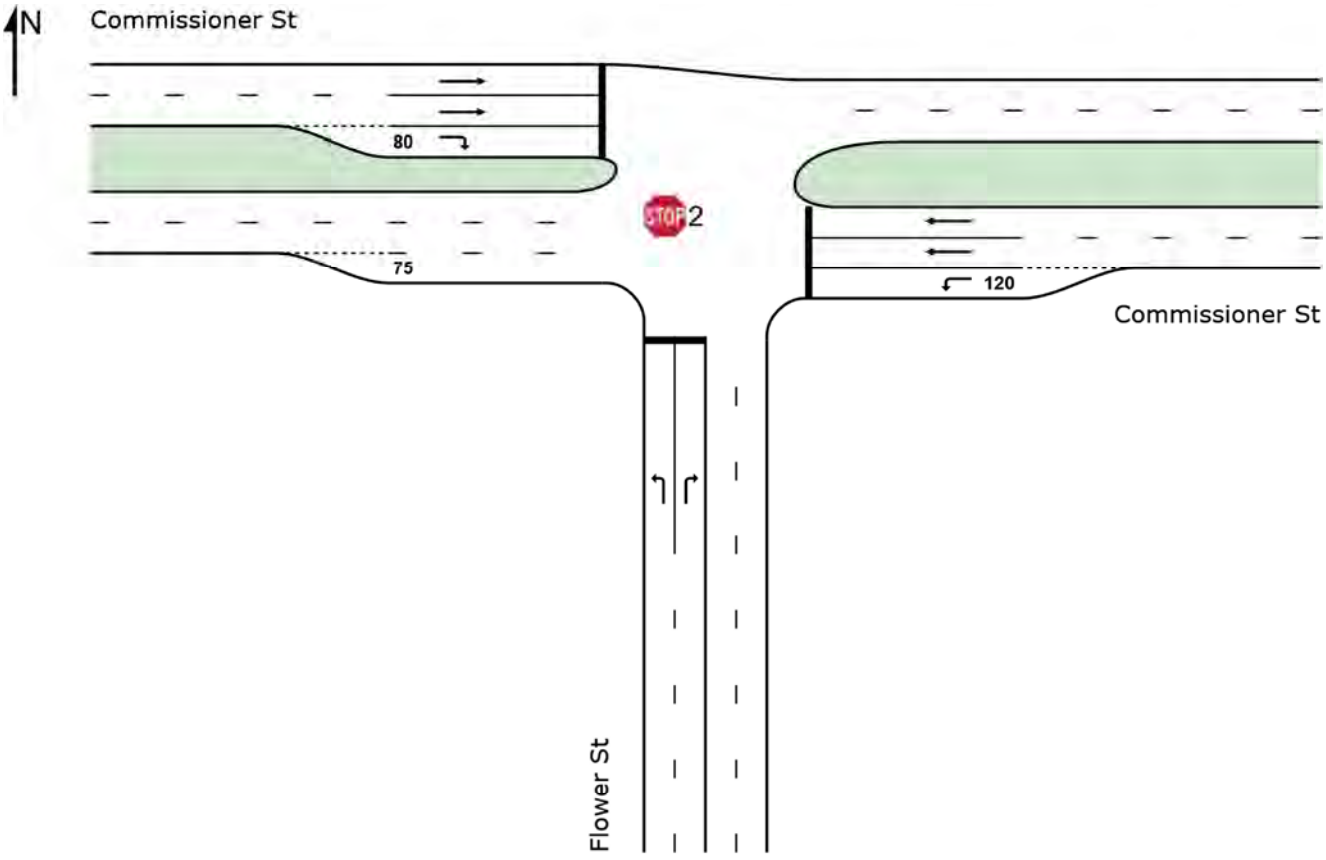
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	178	0,5	0,102	8,3	LOS A	0,4	2,8	0,61	1,00	1,18	51,7
3	R2	72	0,5	0,080	8,6	LOS A	0,2	1,6	0,57	1,14	1,66	51,8
Approach		251	0,5	0,102	8,4	LOS A	0,4	2,8	0,60	1,04	1,32	51,8
East: Commissioner St												
4	L2	90	0,5	0,051	8,1	LOS A	0,2	1,3	0,58	0,99	1,12	51,7
5	T1	1124	2,0	0,869	24,5	LOS C	10,8	76,6	0,88	2,14	5,85	42,9
Approach		1213	1,9	0,869	23,3	LOS C	10,8	76,6	0,86	2,05	5,50	43,4
West: Commissioner St												
11	T1	759	2,0	0,422	11,1	LOS B	1,7	12,1	0,70	1,39	2,42	50,6
12	R2	195	0,5	0,216	9,4	LOS A	0,7	4,8	0,62	1,26	1,89	51,8
Approach		954	1,7	0,422	10,7	LOS B	1,7	12,1	0,68	1,37	2,31	50,8
All Vehicles		2418	1,7	0,869	16,8	LOS C	10,8	76,6	0,76	1,68	3,81	46,9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2 [Scenario 2 AM: 2024]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)



Organisation: INFRATRANS CIVIL AND TRAFFIC ENGINEERING | Created: Sunday, 14 April 2019 22:12:58
Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2 [Scenario 2 AM: 2024]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)

Movement Performance - Vehicles

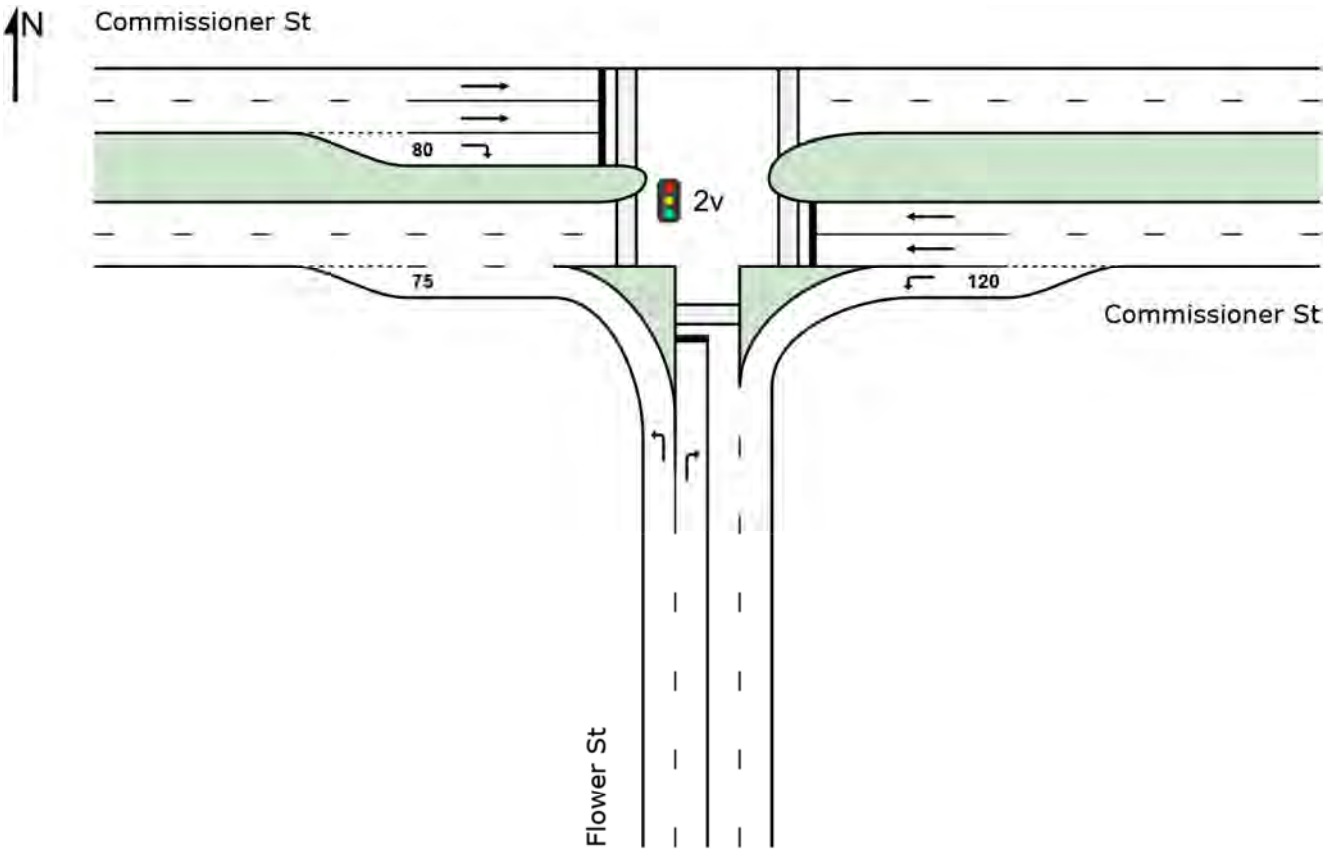
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	167	0,5	0,095	8,3	LOS A	0,4	2,6	0,61	1,00	1,17	51,7
3	R2	117	0,5	0,130	8,9	LOS A	0,4	2,7	0,59	1,18	1,74	51,8
Approach		284	0,5	0,130	8,5	LOS A	0,4	2,7	0,60	1,07	1,41	51,8
East: Commissioner St												
4	L2	114	0,5	0,065	8,2	LOS A	0,2	1,7	0,59	0,99	1,14	51,7
5	T1	983	2,0	0,760	17,2	LOS C	6,2	43,8	0,82	1,73	4,02	46,8
Approach		1097	1,8	0,760	16,2	LOS C	6,2	43,8	0,79	1,66	3,72	47,3
West: Commissioner St												
11	T1	1395	2,0	0,775	21,1	LOS C	6,6	46,8	0,90	1,96	5,07	44,6
12	R2	188	0,5	0,209	9,3	LOS A	0,7	4,6	0,61	1,25	1,88	51,8
Approach		1583	1,8	0,775	19,7	LOS C	6,6	46,8	0,86	1,87	4,69	45,4
All Vehicles		2963	1,7	0,775	17,4	LOS C	6,6	46,8	0,81	1,72	4,02	46,6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2v [Scenario 2 AM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated



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Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2v [Scenario 2 AM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total 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	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	167	0,5	0,090	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
3	R2	117	0,5	0,528	29,9	LOS C	2,9	20,6	0,98	0,78	1,01	39,7
Approach		284	0,5	0,528	15,6	LOS B	2,9	20,6	0,41	0,63	0,42	47,4
East: Commissioner St												
4	L2	114	0,5	0,062	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
5	T1	983	2,0	0,399	4,7	LOS A	5,8	41,6	0,52	0,45	0,52	55,7
Approach		1097	1,8	0,399	4,8	LOS A	5,8	41,6	0,46	0,46	0,46	55,6
West: Commissioner St												
11	T1	1395	2,0	0,566	5,5	LOS A	9,7	69,1	0,61	0,54	0,61	55,0
12	R2	188	0,5	0,528	14,8	LOS B	3,3	23,0	0,70	0,77	0,70	47,4
Approach		1583	1,8	0,566	6,6	LOS A	9,7	69,1	0,62	0,57	0,62	54,0
All Vehicles		2963	1,7	0,566	6,8	LOS A	9,7	69,1	0,54	0,54	0,54	53,9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	19,4	LOS B	0,1	0,1	0,88	0,88
P21	East Stage 1	53	19,4	LOS B	0,1	0,1	0,88	0,88
P22	East Stage 2	53	19,4	LOS B	0,1	0,1	0,88	0,88
P41	West Stage 1	53	19,4	LOS B	0,1	0,1	0,88	0,88
P42	West Stage 2	53	19,4	LOS B	0,1	0,1	0,88	0,88
All Pedestrians		263	19,4	LOS B			0,88	0,88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 2v [Scenario 2 AM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

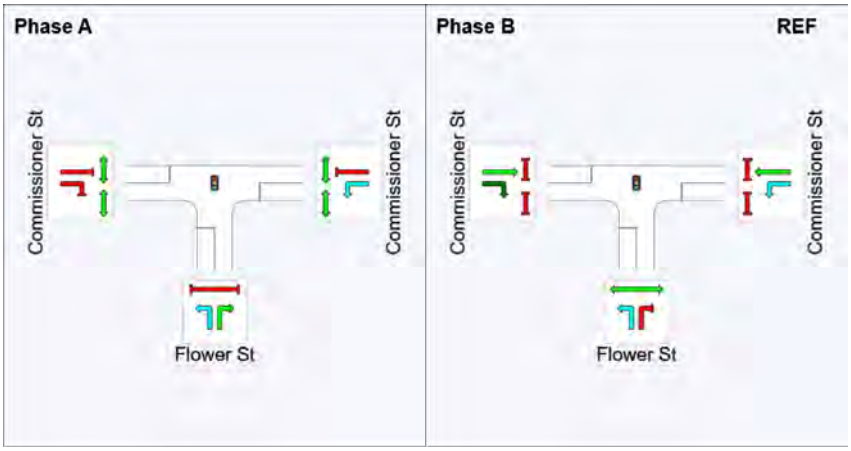
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	38	0
Green Time (sec)	6	32
Phase Time (sec)	12	38
Phase Split	24%	76%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



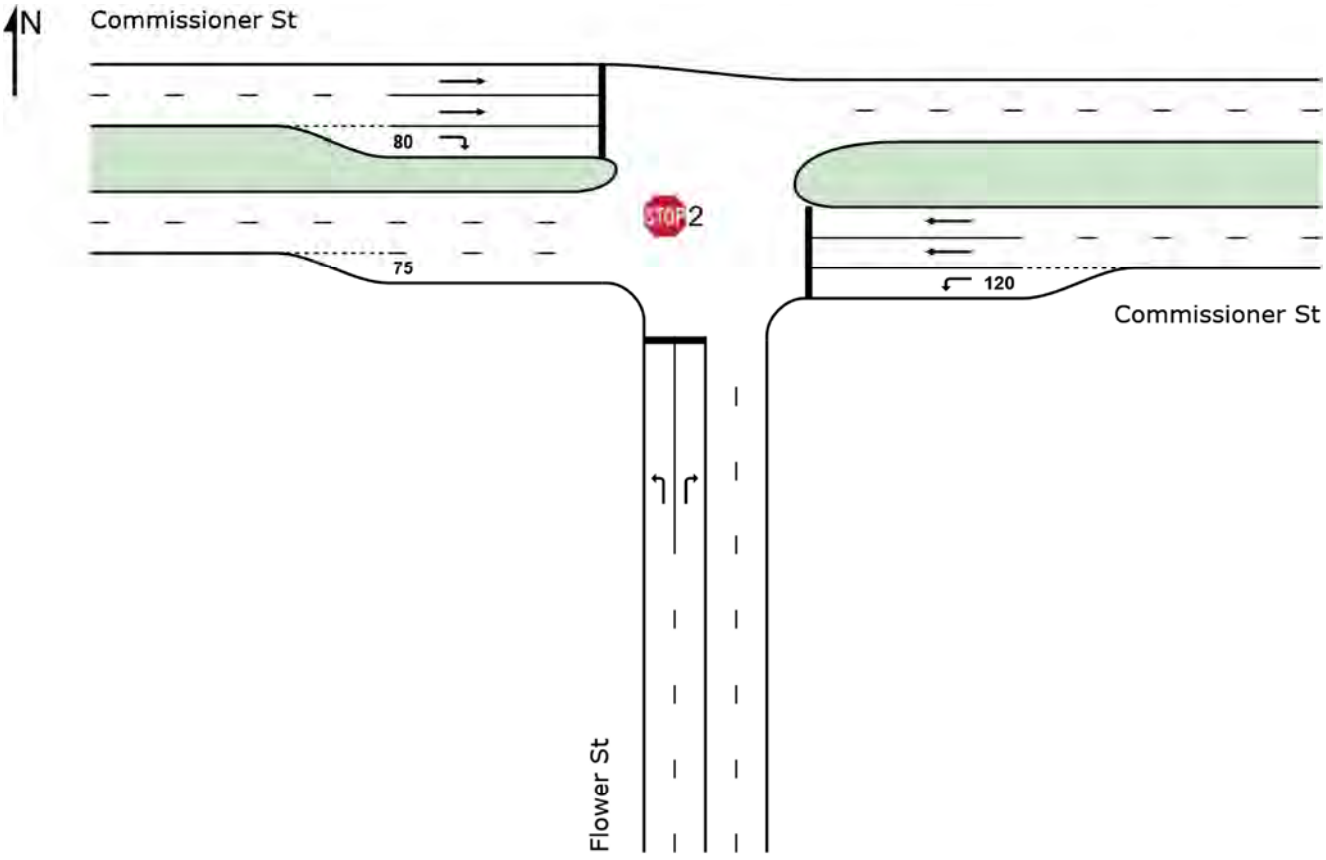
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

SITE LAYOUT

Site: 2 [Scenario 2 PM: 2024]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)



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Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2 [Scenario 2 PM: 2024]

Commissioner St / Flower St Intersection
Site Category: -
Stop (All-Way)

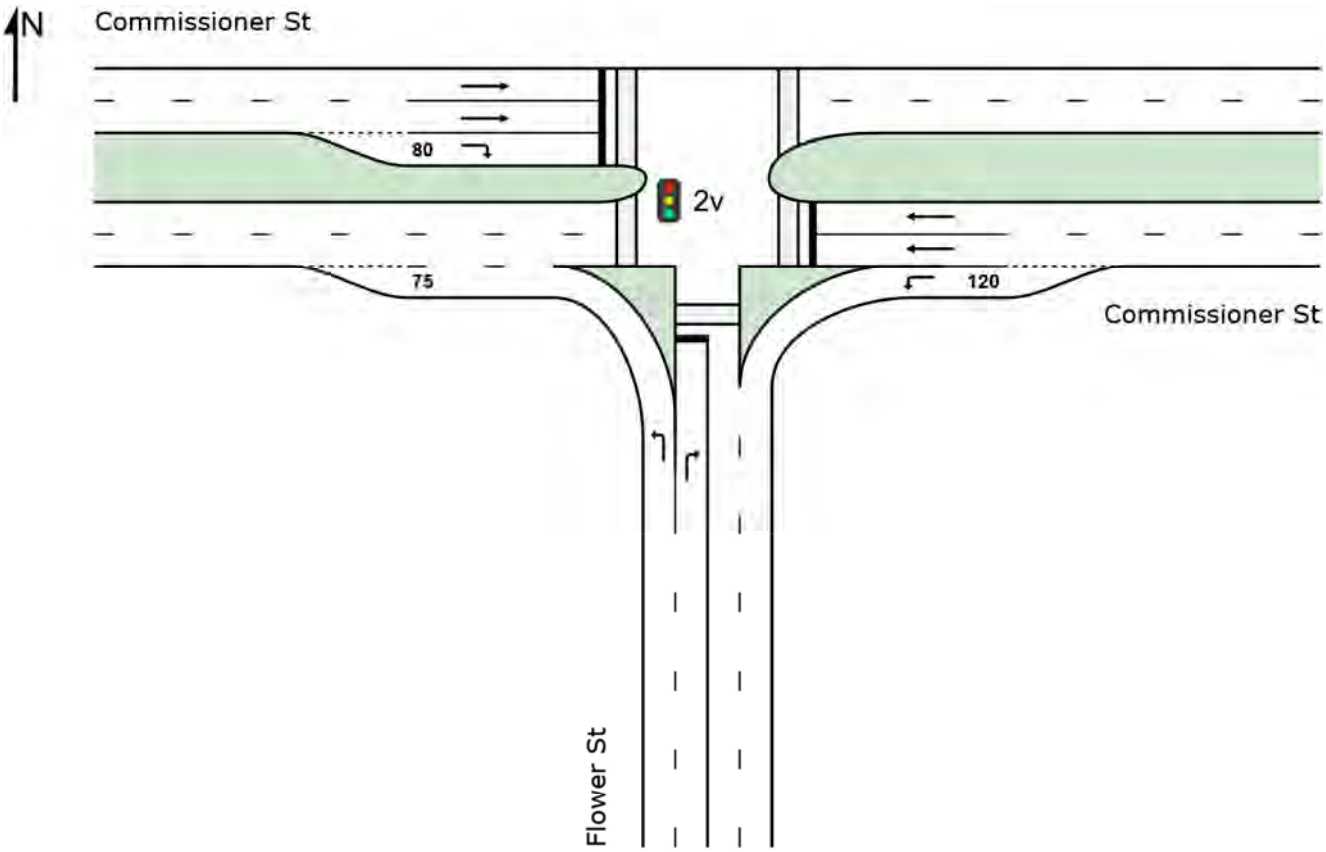
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	216	0,5	0,123	8,3	LOS A	0,5	3,4	0,63	1,01	1,21	51,7
3	R2	88	0,5	0,097	8,7	LOS A	0,3	1,9	0,58	1,15	1,69	51,8
Approach		304	0,5	0,123	8,4	LOS A	0,5	3,4	0,61	1,05	1,35	51,8
East: Commissioner St												
4	L2	129	0,5	0,073	8,2	LOS A	0,3	1,9	0,59	0,99	1,15	51,7
5	T1	1367	2,0	1,058	73,9	LOS F	40,8	290,2	0,91	4,62	16,76	27,2
Approach		1496	1,9	1,058	68,2	LOS F	40,8	290,2	0,89	4,31	15,41	28,3
West: Commissioner St												
11	T1	923	2,0	0,513	12,4	LOS B	2,4	16,9	0,74	1,47	2,77	49,8
12	R2	237	0,5	0,263	9,7	LOS A	0,9	6,2	0,63	1,31	1,99	51,8
Approach		1160	1,7	0,513	11,8	LOS B	2,4	16,9	0,72	1,43	2,61	50,2
All Vehicles		2960	1,7	1,058	40,0	LOS E	40,8	290,2	0,79	2,85	8,95	36,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2v [Scenario 2 PM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated



Organisation: INFRATRANS CIVIL AND TRAFFIC ENGINEERING | Created: Sunday, 14 April 2019 22:13:16
Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2v [Scenario 2 PM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total 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	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	216	0,5	0,117	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
3	R2	88	0,5	0,552	41,6	LOS D	3,1	22,0	1,00	0,78	1,04	35,2
Approach		304	0,5	0,552	16,0	LOS B	3,1	22,0	0,29	0,60	0,30	47,3
East: Commissioner St												
4	L2	129	0,5	0,070	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
5	T1	1367	2,0	0,710	14,7	LOS B	18,2	129,7	0,83	0,75	0,83	48,3
Approach		1496	1,9	0,710	13,9	LOS B	18,2	129,7	0,76	0,73	0,76	48,9
West: Commissioner St												
11	T1	923	2,0	0,323	3,2	LOS A	5,3	37,6	0,36	0,32	0,36	57,0
12	R2	237	0,5	0,476	15,6	LOS B	4,6	32,4	0,85	0,81	0,85	46,9
Approach		1160	1,7	0,476	5,8	LOS A	5,3	37,6	0,46	0,42	0,46	54,6
All Vehicles		2960	1,7	0,710	10,9	LOS B	18,2	129,7	0,60	0,60	0,60	50,8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	29,3	LOS C	0,1	0,1	0,92	0,92
P21	East Stage 1	53	29,3	LOS C	0,1	0,1	0,92	0,92
P22	East Stage 2	53	29,3	LOS C	0,1	0,1	0,92	0,92
P41	West Stage 1	53	29,3	LOS C	0,1	0,1	0,92	0,92
P42	West Stage 2	53	29,3	LOS C	0,1	0,1	0,92	0,92
All Pedestrians		263	29,3	LOS C			0,92	0,92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 2v [Scenario 2 PM: 2024 - Upgraded]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

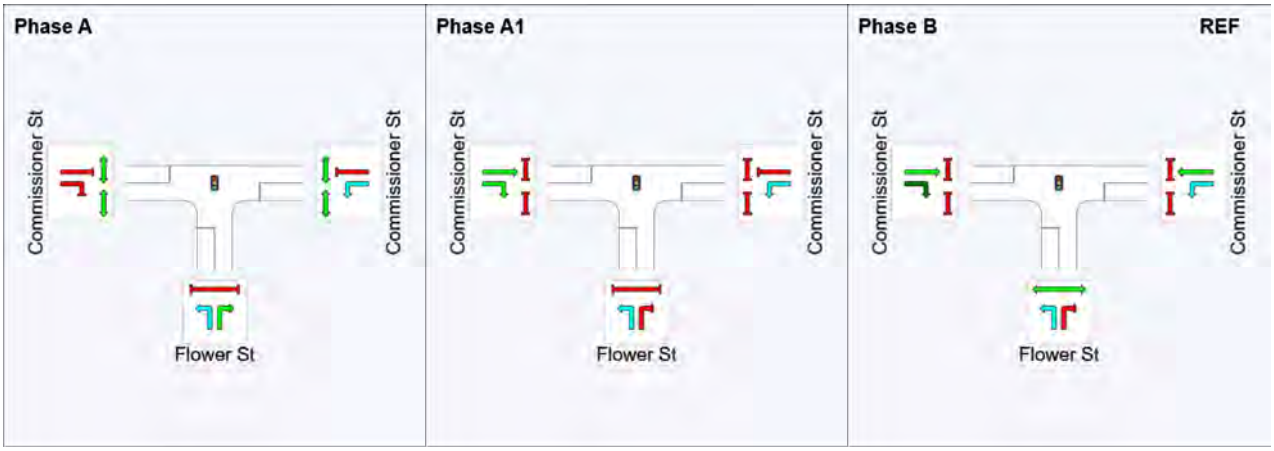
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, A1, B
Output Phase Sequence: A, A1, B

Phase Timing Summary

Phase	A	A1	B
Phase Change Time (sec)	39	51	0
Green Time (sec)	6	13	35
Phase Time (sec)	12	17	41
Phase Split	17%	24%	59%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



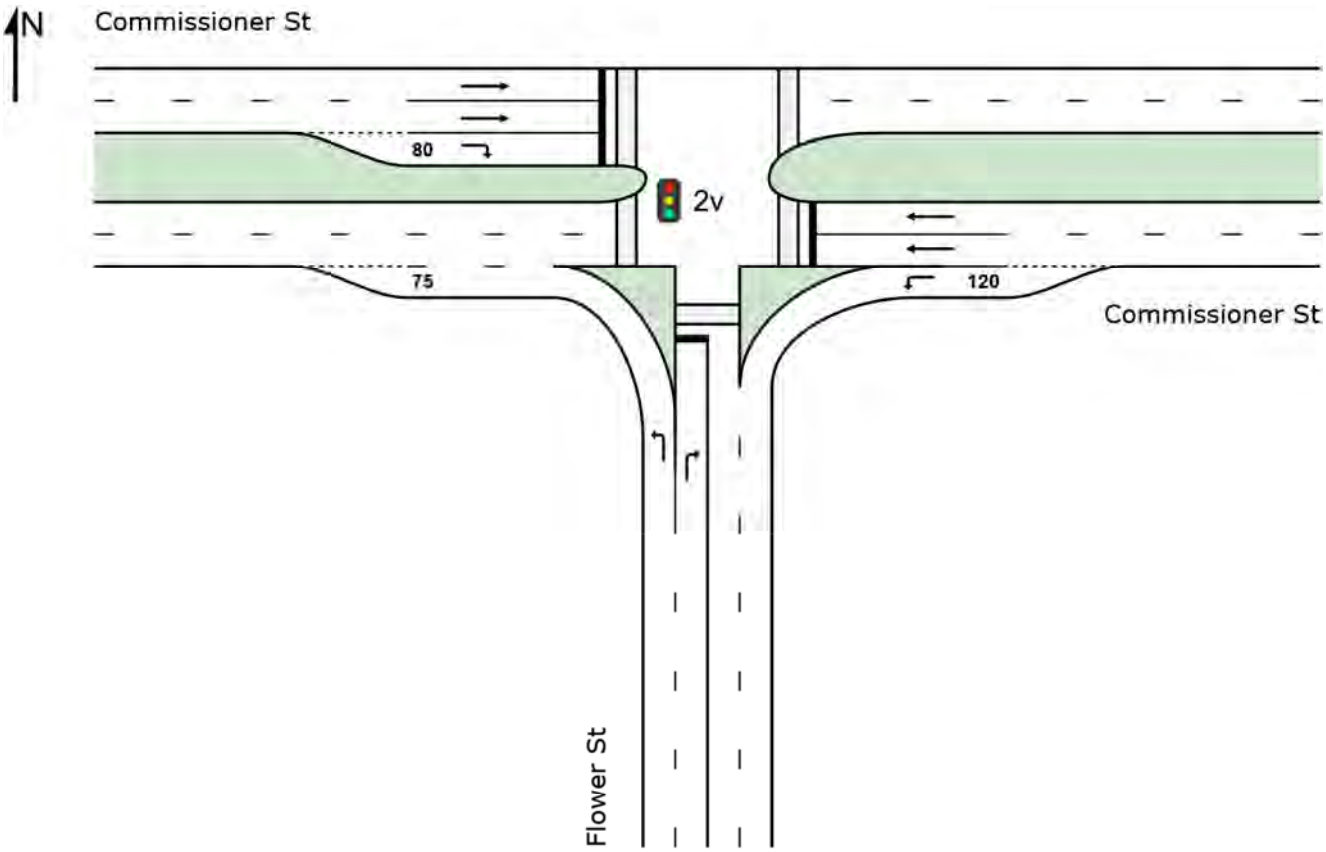
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

SITE LAYOUT

Site: 2v [Scenario 3 & 4 AM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated



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Project: C:\Users\piete\Desktop\P-167 Erf 1305 Soshanguve student accom TIA\7 Analyses & Calculations\2_Commissioner St_Flower St.sip8

MOVEMENT SUMMARY

Site: 2v [Scenario 3 & 4 AM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total 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	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	168	0,5	0,091	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
3	R2	124	0,5	0,557	30,1	LOS C	3,1	22,0	0,99	0,80	1,04	39,6
Approach		291	0,5	0,557	16,0	LOS B	3,1	22,0	0,42	0,64	0,44	47,2
East: Commissioner St												
4	L2	116	0,5	0,063	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
5	T1	983	2,0	0,399	4,7	LOS A	5,8	41,6	0,52	0,45	0,52	55,7
Approach		1099	1,8	0,399	4,8	LOS A	5,8	41,6	0,46	0,46	0,46	55,6
West: Commissioner St												
11	T1	1395	2,0	0,566	5,5	LOS A	9,7	69,1	0,61	0,54	0,61	55,0
12	R2	189	0,5	0,531	14,8	LOS B	3,3	23,2	0,71	0,77	0,71	47,4
Approach		1584	1,8	0,566	6,6	LOS A	9,7	69,1	0,62	0,57	0,62	54,0
All Vehicles		2974	1,7	0,566	6,9	LOS A	9,7	69,1	0,54	0,54	0,54	53,8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	19,4	LOS B	0,1	0,1	0,88	0,88
P21	East Stage 1	53	19,4	LOS B	0,1	0,1	0,88	0,88
P22	East Stage 2	53	19,4	LOS B	0,1	0,1	0,88	0,88
P41	West Stage 1	53	19,4	LOS B	0,1	0,1	0,88	0,88
P42	West Stage 2	53	19,4	LOS B	0,1	0,1	0,88	0,88
All Pedestrians		263	19,4	LOS B			0,88	0,88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 2v [Scenario 3 & 4 AM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

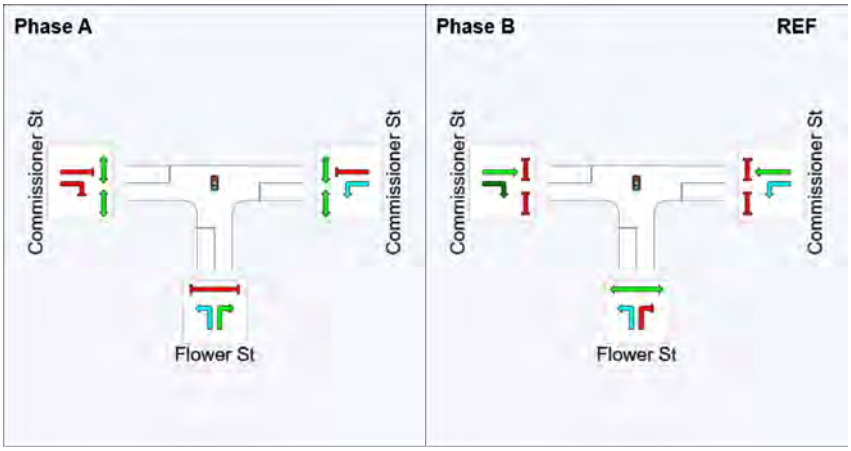
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	38	0
Green Time (sec)	6	32
Phase Time (sec)	12	38
Phase Split	24%	76%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



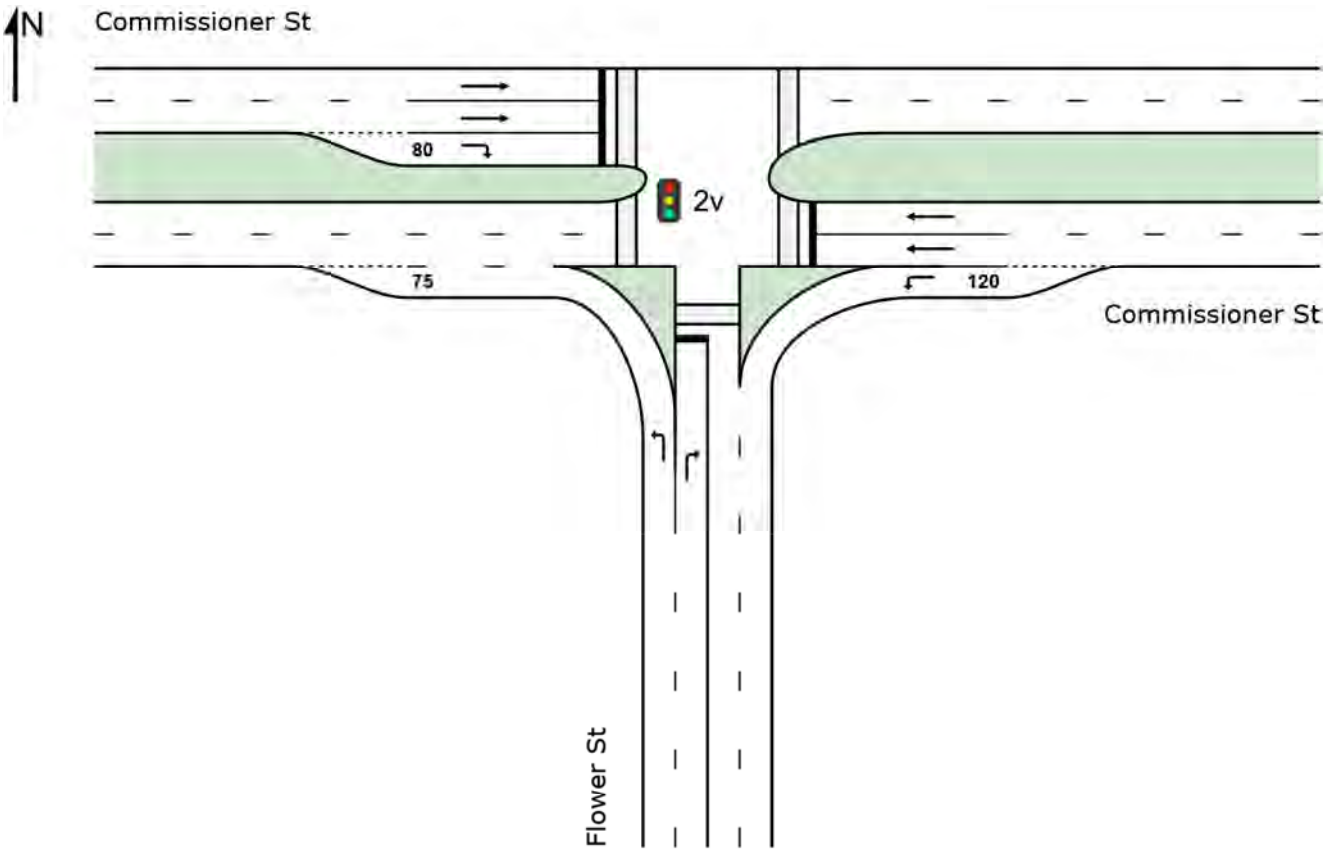
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

SITE LAYOUT

Site: 2v [Scenario 3 & 4 PM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated



Organisation: INFRATRANS CIVIL AND TRAFFIC ENGINEERING | Created: Sunday, 14 April 2019 22:13:08
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MOVEMENT SUMMARY

Site: 2v [Scenario 3 & 4 PM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total 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	Aver. No. Cycles	Average Speed km/h
South: Flower St												
1	L2	219	0,5	0,118	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
3	R2	92	0,5	0,578	41,8	LOS D	3,3	23,2	1,00	0,79	1,07	35,1
Approach		310	0,5	0,578	16,3	LOS B	3,3	23,2	0,30	0,61	0,32	47,1
East: Commissioner St												
4	L2	137	0,5	0,074	5,6	LOS A	0,0	0,0	0,00	0,53	0,00	54,9
5	T1	1367	2,0	0,710	14,7	LOS B	18,2	129,7	0,83	0,75	0,83	48,3
Approach		1504	1,9	0,710	13,9	LOS B	18,2	129,7	0,76	0,73	0,76	48,9
West: Commissioner St												
11	T1	923	2,0	0,323	3,2	LOS A	5,3	37,6	0,36	0,32	0,36	57,0
12	R2	239	0,5	0,481	15,7	LOS B	4,7	32,8	0,85	0,81	0,85	46,9
Approach		1162	1,7	0,481	5,8	LOS A	5,3	37,6	0,46	0,42	0,46	54,6
All Vehicles		2976	1,7	0,710	11,0	LOS B	18,2	129,7	0,60	0,60	0,60	50,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	29,3	LOS C	0,1	0,1	0,92	0,92
P21	East Stage 1	53	29,3	LOS C	0,1	0,1	0,92	0,92
P22	East Stage 2	53	29,3	LOS C	0,1	0,1	0,92	0,92
P41	West Stage 1	53	29,3	LOS C	0,1	0,1	0,92	0,92
P42	West Stage 2	53	29,3	LOS C	0,1	0,1	0,92	0,92
All Pedestrians		263	29,3	LOS C			0,92	0,92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 2v [Scenario 3 & 4 PM: 2024 + Dev]

Commissioner St / Flower St Intersection
Site Category: -
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

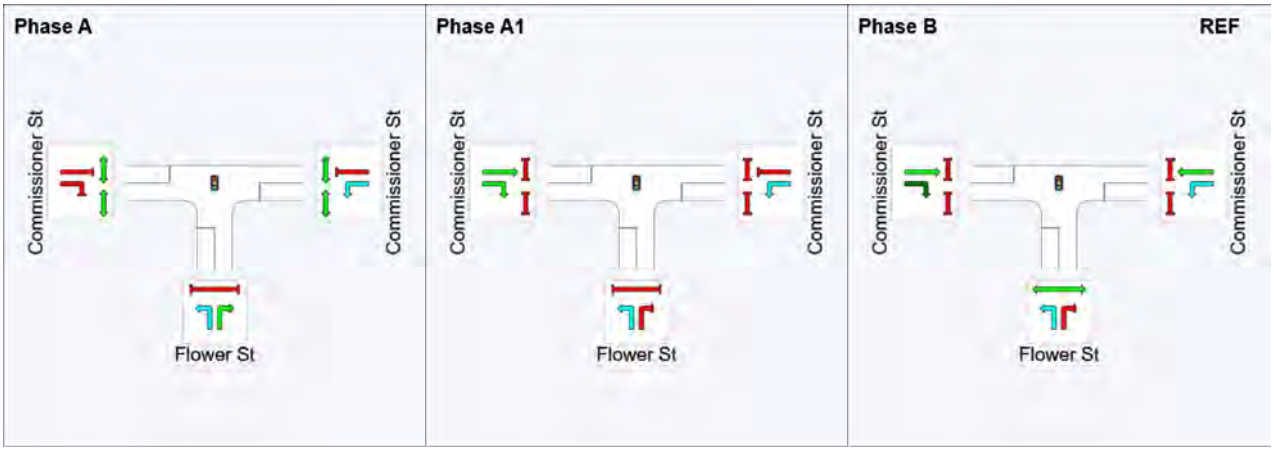
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, A1, B
Output Phase Sequence: A, A1, B

Phase Timing Summary

Phase	A	A1	B
Phase Change Time (sec)	39	51	0
Green Time (sec)	6	13	35
Phase Time (sec)	12	17	41
Phase Split	17%	24%	59%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



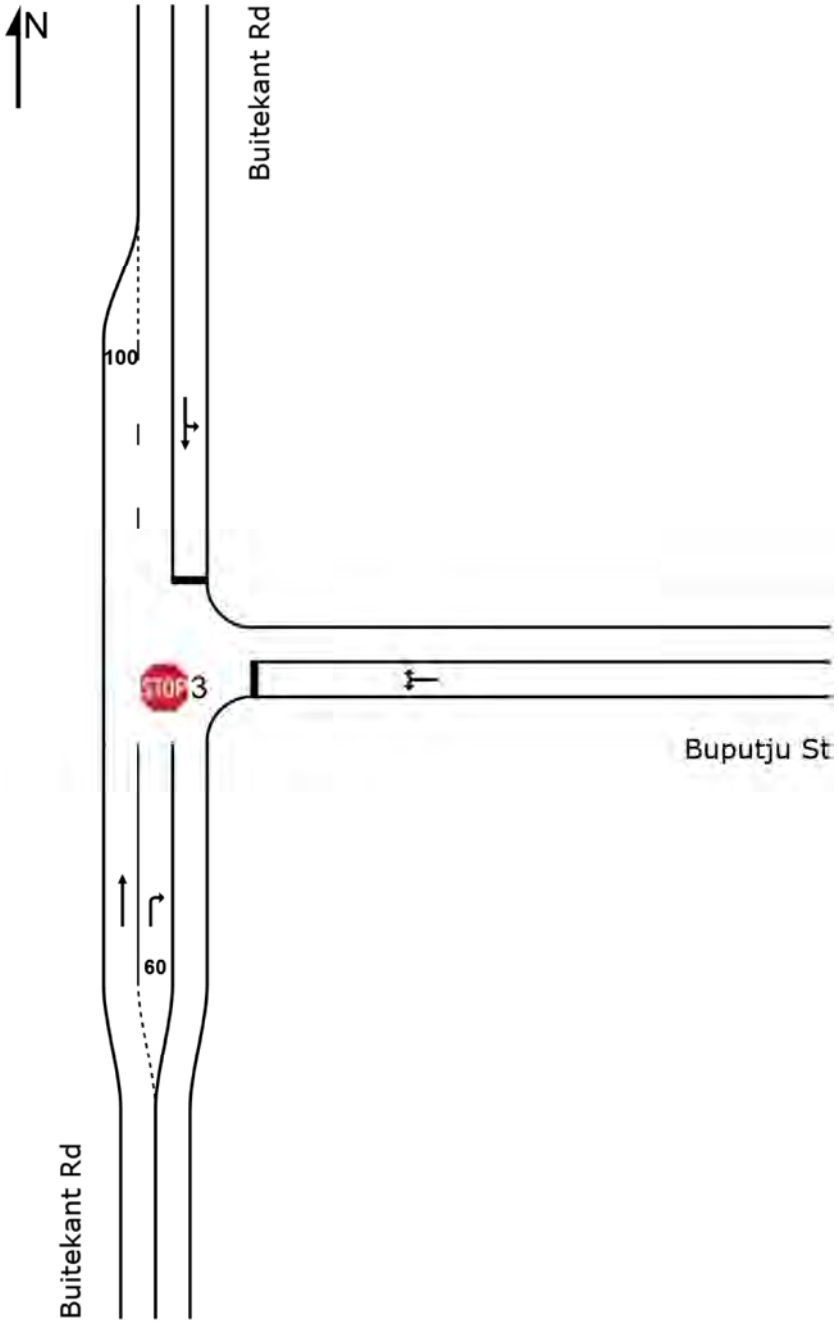
REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

SITE LAYOUT

Site: 3 [Scenario 1 AM: 2019]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 3 [Scenario 1 AM: 2019]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

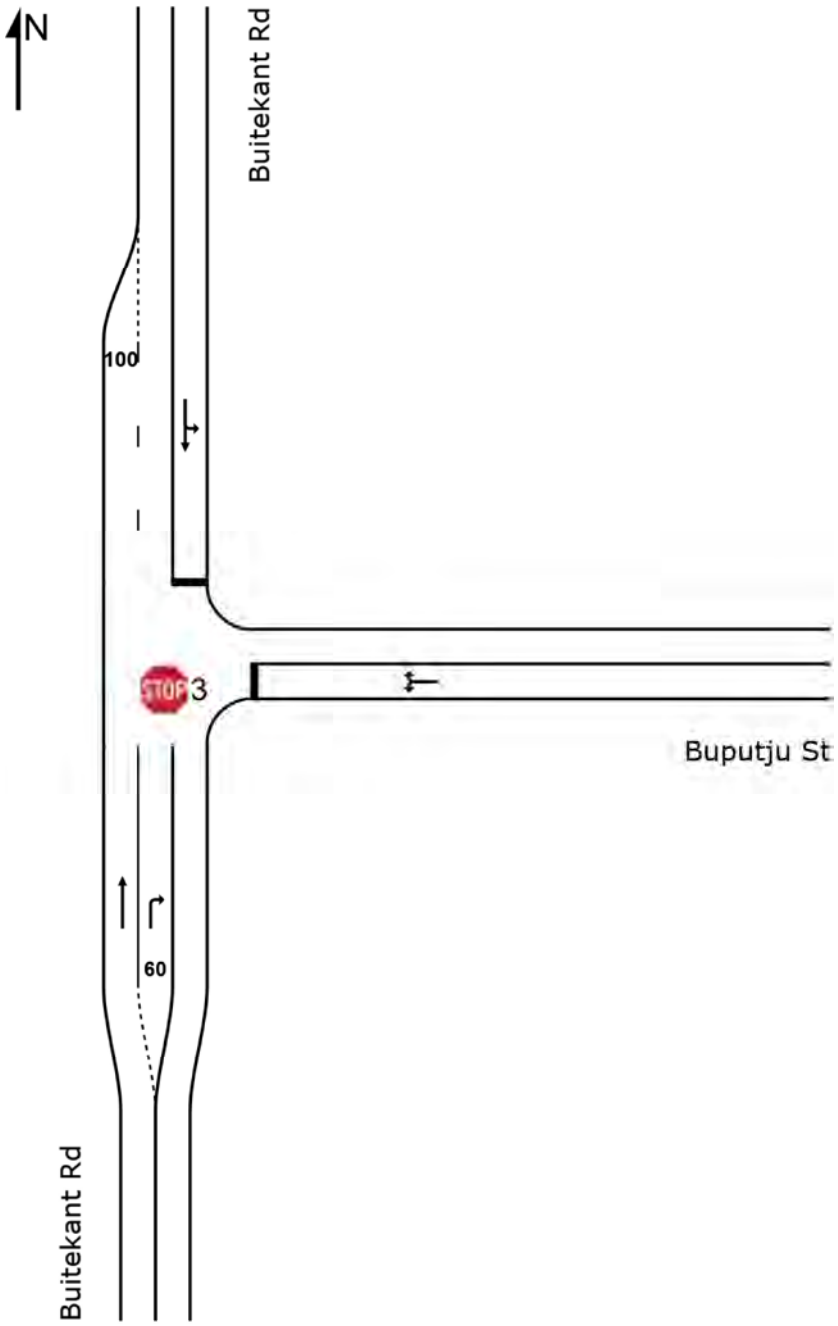
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	400	1,0	0,322	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
3	R2	61	0,5	0,033	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		461	0,9	0,322	0,8	NA	0,0	0,0	0,00	0,08	0,00	58,9
East: Buputju St												
4	L2	47	0,5	0,231	10,0	LOS B	0,8	5,9	0,58	0,97	0,60	48,9
6	R2	74	0,5	0,231	15,2	LOS C	0,8	5,9	0,58	0,97	0,60	48,4
Approach		121	0,5	0,231	13,2	LOS B	0,8	5,9	0,58	0,97	0,60	48,6
North: Buitekant Rd												
7	L2	49	0,5	0,397	8,5	LOS A	2,1	14,8	0,35	0,97	0,37	51,4
8	T1	372	1,0	0,397	9,5	LOS A	2,1	14,8	0,35	0,97	0,37	51,1
Approach		421	0,9	0,397	9,3	LOS A	2,1	14,8	0,35	0,97	0,37	51,1
All Vehicles		1004	0,9	0,397	5,9	NA	2,1	14,8	0,22	0,56	0,23	54,1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Scenario 1 PM: 2019]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 3 [Scenario 1 PM: 2019]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

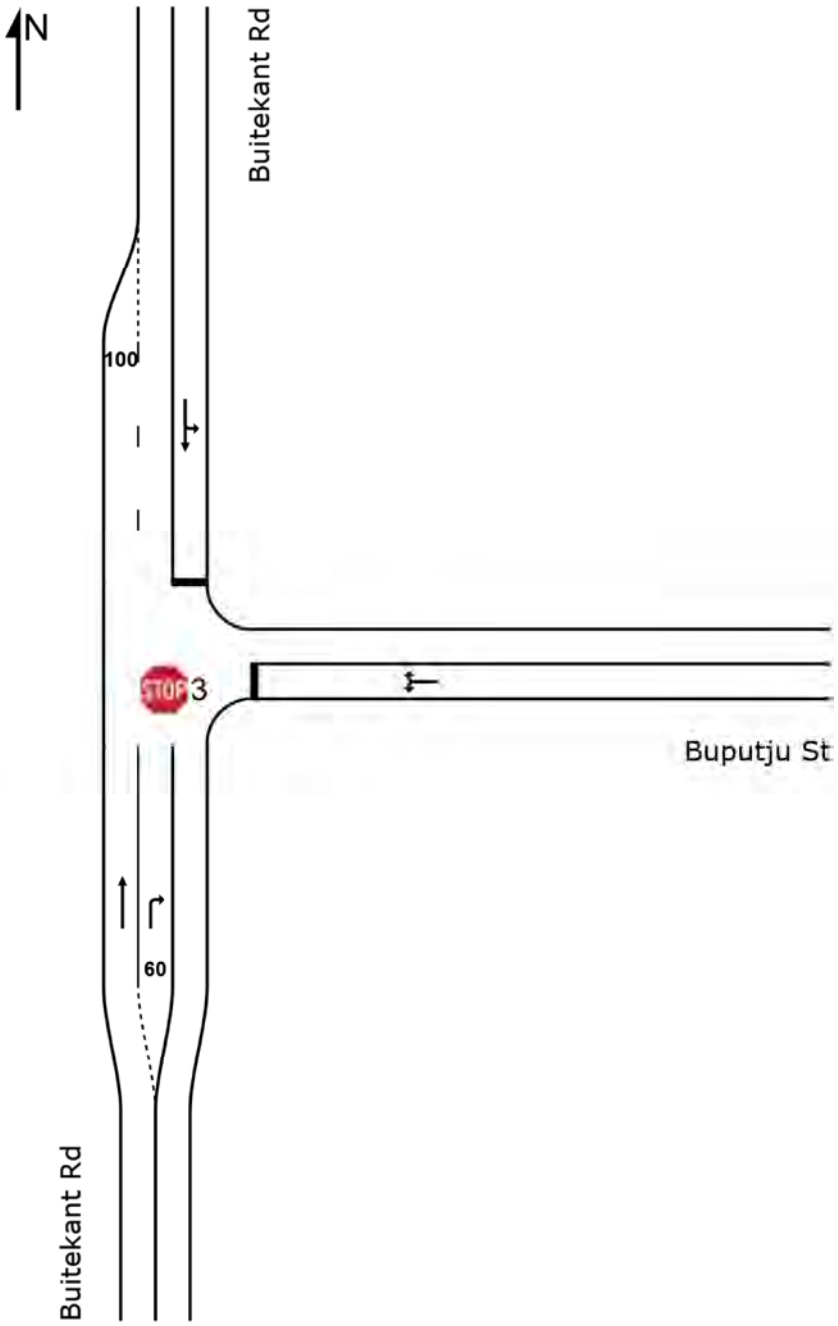
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	356	1,0	0,286	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
3	R2	27	0,5	0,014	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		382	1,0	0,286	0,4	NA	0,0	0,0	0,00	0,04	0,00	59,4
East: Buputju St												
4	L2	26	0,5	0,068	9,2	LOS A	0,2	1,7	0,44	0,91	0,44	50,5
6	R2	23	0,5	0,068	12,3	LOS B	0,2	1,7	0,44	0,91	0,44	50,0
Approach		48	0,5	0,068	10,7	LOS B	0,2	1,7	0,44	0,91	0,44	50,2
North: Buitekant Rd												
7	L2	46	0,5	0,291	8,2	LOS A	1,3	9,2	0,21	0,99	0,21	51,6
8	T1	281	1,0	0,291	8,8	LOS A	1,3	9,2	0,21	0,99	0,21	51,3
Approach		328	0,9	0,291	8,7	LOS A	1,3	9,2	0,21	0,99	0,21	51,3
All Vehicles		759	0,9	0,291	4,7	NA	1,3	9,2	0,12	0,51	0,12	55,0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Scenario 2 AM: 2024]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 3 [Scenario 2 AM: 2024]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

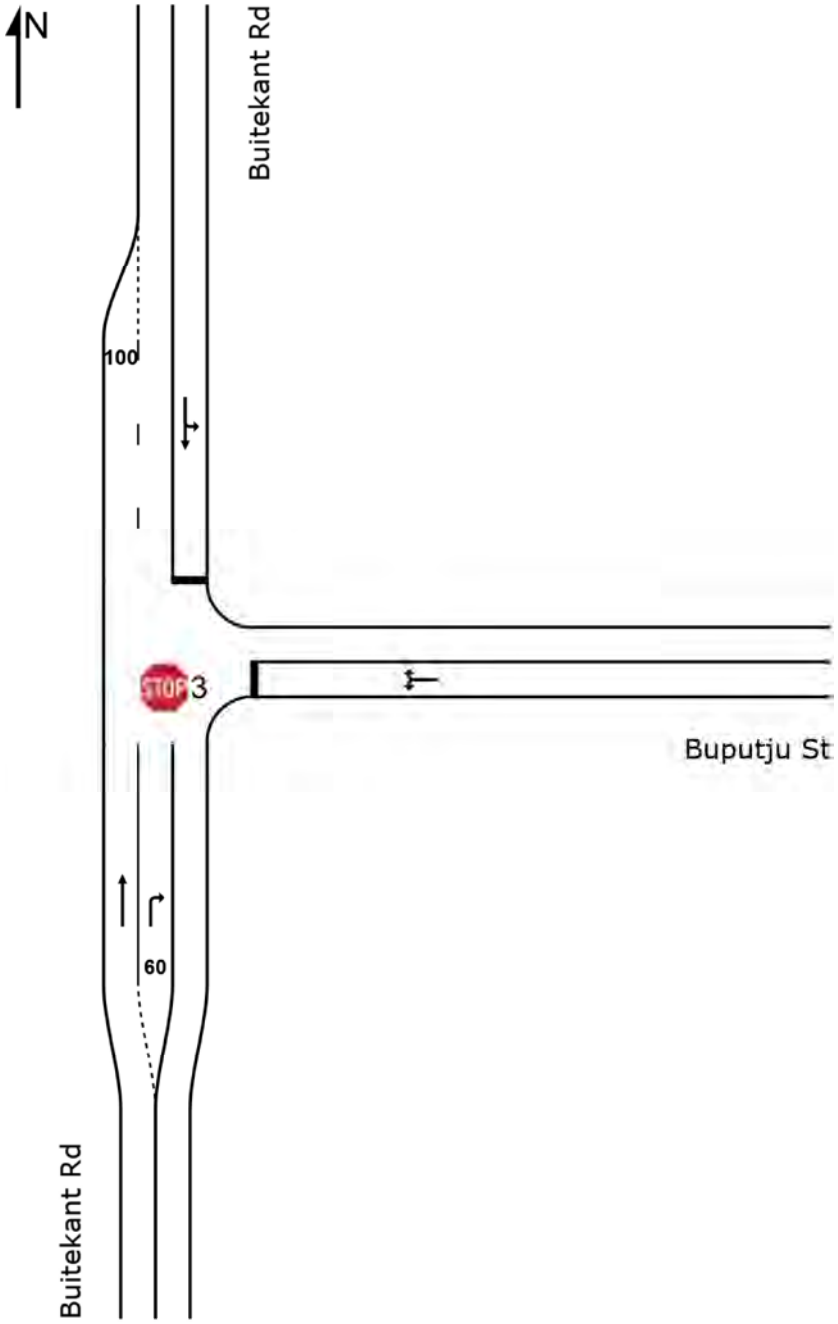
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	487	1,0	0,392	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,8
3	R2	74	0,5	0,040	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		561	0,9	0,392	0,8	NA	0,0	0,0	0,00	0,08	0,00	58,9
East: Buputju St												
4	L2	58	0,5	0,360	11,9	LOS B	1,5	10,4	0,70	1,05	0,90	46,6
6	R2	91	0,5	0,360	20,3	LOS C	1,5	10,4	0,70	1,05	0,90	46,2
Approach		148	0,5	0,360	17,0	LOS C	1,5	10,4	0,70	1,05	0,90	46,4
North: Buitekant Rd												
7	L2	60	0,5	0,510	9,3	LOS A	3,8	26,5	0,44	1,02	0,57	50,6
8	T1	452	1,0	0,510	10,8	LOS B	3,8	26,5	0,44	1,02	0,57	50,3
Approach		512	0,9	0,510	10,6	LOS B	3,8	26,5	0,44	1,02	0,57	50,4
All Vehicles		1221	0,9	0,510	6,9	NA	3,8	26,5	0,27	0,59	0,35	53,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Scenario 2 PM: 2024]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 3 [Scenario 2 PM: 2024]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

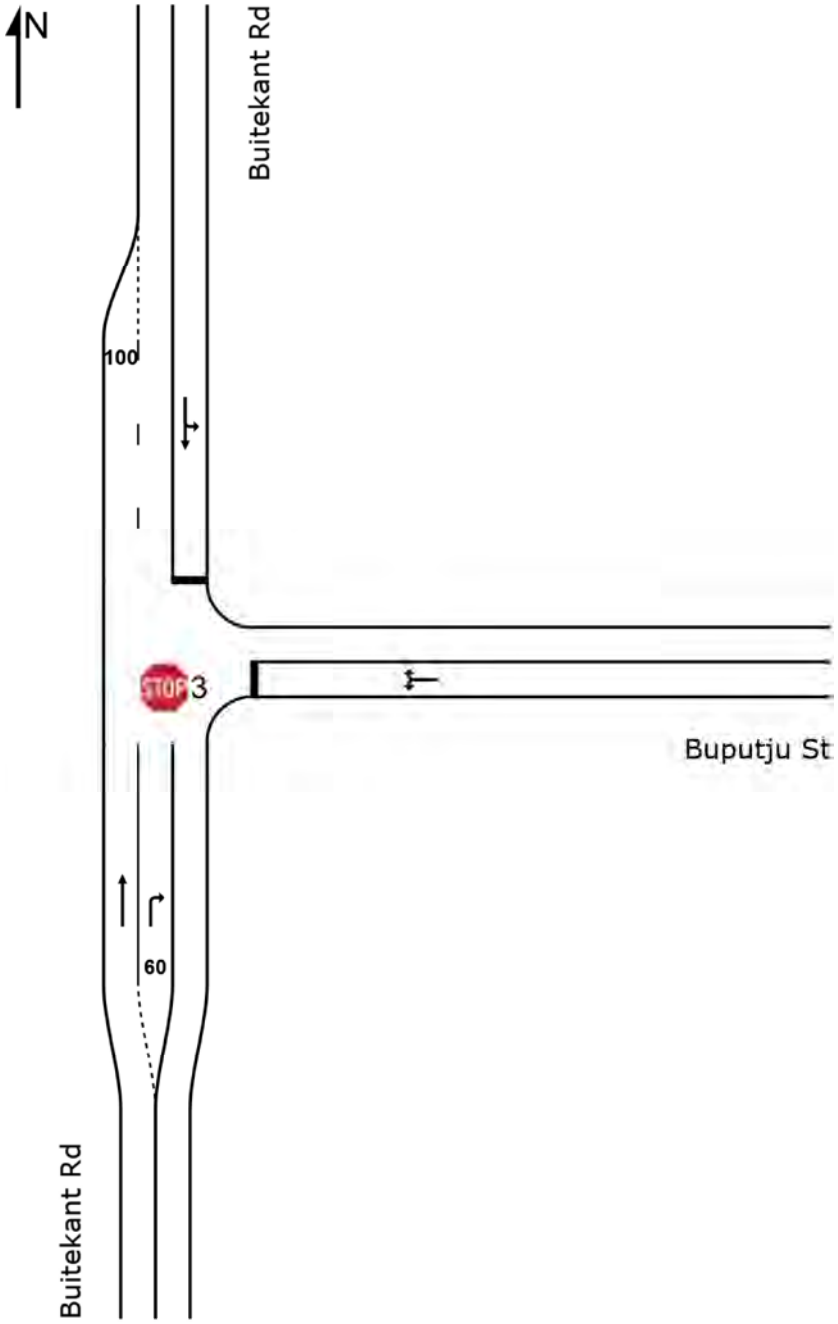
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	433	1,0	0,349	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
3	R2	33	0,5	0,018	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		466	1,0	0,349	0,5	NA	0,0	0,0	0,00	0,04	0,00	59,3
East: Buputju St												
4	L2	31	0,5	0,098	9,6	LOS A	0,3	2,4	0,50	0,93	0,50	49,7
6	R2	28	0,5	0,098	14,3	LOS B	0,3	2,4	0,50	0,93	0,50	49,3
Approach		59	0,5	0,098	11,8	LOS B	0,3	2,4	0,50	0,93	0,50	49,5
North: Buitekant Rd												
7	L2	57	0,5	0,369	8,2	LOS A	1,8	12,4	0,26	0,98	0,26	51,4
8	T1	342	1,0	0,369	9,2	LOS A	1,8	12,4	0,26	0,98	0,26	51,1
Approach		399	0,9	0,369	9,1	LOS A	1,8	12,4	0,26	0,98	0,26	51,2
All Vehicles		924	0,9	0,369	4,9	NA	1,8	12,4	0,14	0,51	0,14	54,9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Scenario 3 AM: 2024 + Dev]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 3 [Scenario 3 AM: 2024 + Dev]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

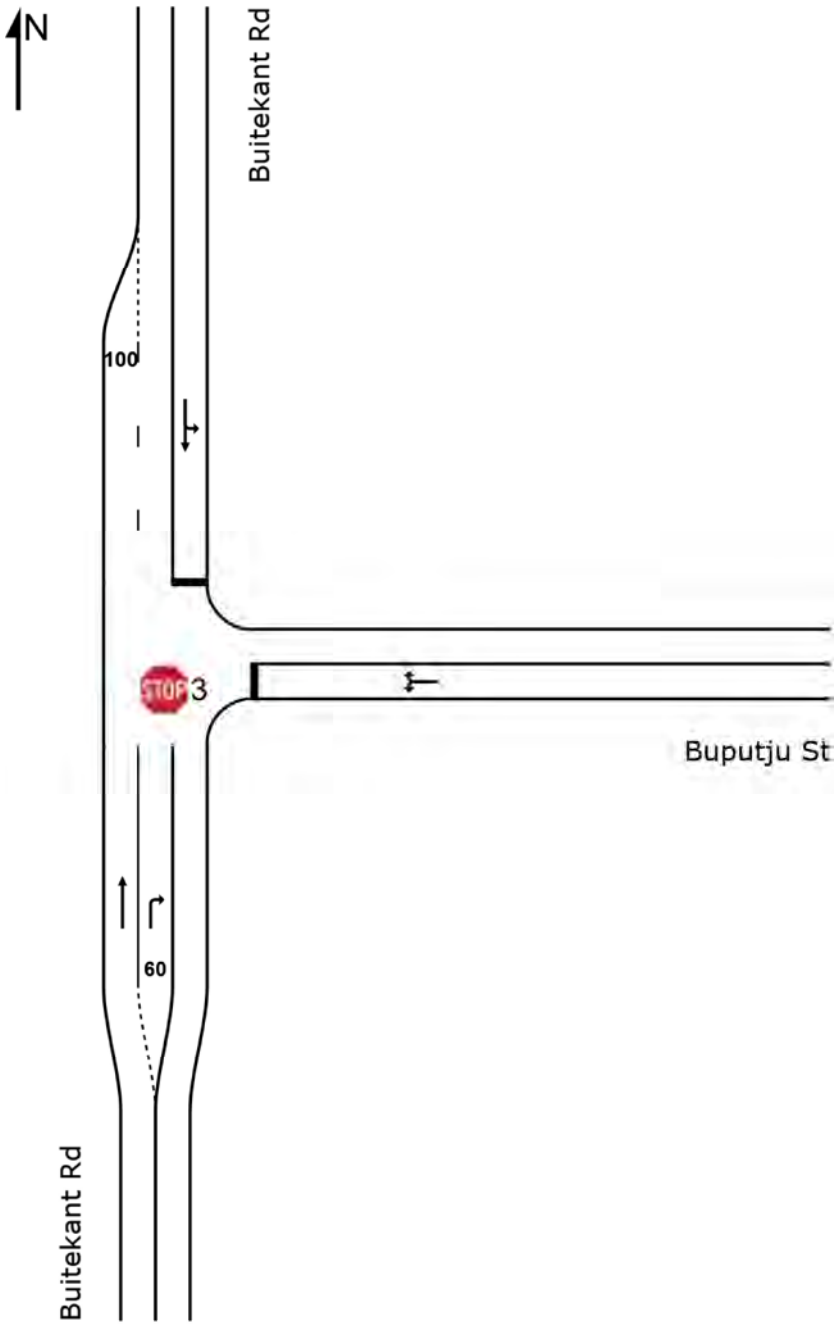
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	487	1,0	0,392	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,8
3	R2	75	0,5	0,041	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		562	0,9	0,392	0,8	NA	0,0	0,0	0,00	0,08	0,00	58,8
East: Buputju St												
4	L2	60	0,5	0,383	12,2	LOS B	1,6	11,4	0,71	1,06	0,94	46,4
6	R2	96	0,5	0,383	20,7	LOS C	1,6	11,4	0,71	1,06	0,94	46,0
Approach		156	0,5	0,383	17,4	LOS C	1,6	11,4	0,71	1,06	0,94	46,2
North: Buitekant Rd												
7	L2	62	0,5	0,512	9,3	LOS A	3,8	26,8	0,44	1,02	0,57	50,6
8	T1	452	1,0	0,512	10,8	LOS B	3,8	26,8	0,44	1,02	0,57	50,3
Approach		514	0,9	0,512	10,6	LOS B	3,8	26,8	0,44	1,02	0,57	50,4
All Vehicles		1233	0,9	0,512	7,0	NA	3,8	26,8	0,27	0,60	0,36	53,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Scenario 3 PM: 2024 + Dev]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)



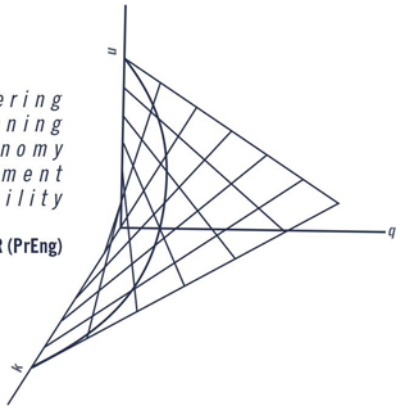
MOVEMENT SUMMARY

Site: 3 [Scenario 3 PM: 2024 + Dev]

Buitekant Rd / Buputju St
Site Category: -
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total 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	Aver. No. Cycles	Average Speed km/h
South: Buitekant Rd												
2	T1	433	1,0	0,349	0,1	LOS A	0,0	0,0	0,00	0,00	0,00	59,9
3	R2	35	0,5	0,019	5,5	LOS A	0,0	0,0	0,00	0,60	0,00	53,1
Approach		468	1,0	0,349	0,5	NA	0,0	0,0	0,00	0,05	0,00	59,3
East: Buputju St												
4	L2	33	0,5	0,111	9,6	LOS A	0,4	2,7	0,51	0,94	0,51	49,6
6	R2	32	0,5	0,111	14,5	LOS B	0,4	2,7	0,51	0,94	0,51	49,2
Approach		65	0,5	0,111	12,0	LOS B	0,4	2,7	0,51	0,94	0,51	49,4
North: Buitekant Rd												
7	L2	64	0,5	0,375	8,2	LOS A	1,8	12,7	0,26	0,98	0,26	51,4
8	T1	342	1,0	0,375	9,2	LOS A	1,8	12,7	0,26	0,98	0,26	51,1
Approach		406	0,9	0,375	9,1	LOS A	1,8	12,7	0,26	0,98	0,26	51,2
All Vehicles		939	0,9	0,375	5,0	NA	1,8	12,7	0,15	0,51	0,15	54,8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Appendix D: City of Tshwane Comments, 14 May 2019

CITY OF TSHWANE
IGNITING EXCELLENCE

Roads and Transport
Transportation Planning Division

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Section/Unit:	Intelligent Transport System and Traffic Engineering		

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14 May 2019

ATTENTION SIR

TRAFFIC IMPACT ASSESSMENT: SOSHANGUVE STUDENT ACCOMMODATION SITUATED ON ERF 1305 IN SOSHANGUVE-M

The response to the Traffic Impact Assessment prepared by Infratrans (Pty) Ltd dated April 2019 and received April 2019 refers.

A. TRAFFIC IMPACT ASSESSMENT MANAGEMENT

This traffic impact assessment is acceptable to this section and therefore approved on the following conditions:

1. SPECIFIC CONDITIONS OF APPROVAL FOR ZONING RIGHTS

1.1. The land use rights must be limited to the following:

- Student Accommodation 504 student units

2. CONDITIONS TO BE COMPLIED WITH PRIOR TO PROMULGATION

2.1. Road Upgrades

2.1.1 The proposed roads improvements as stated in your report and listed below, must be implemented at the applicant's own cost.

Proposed Road upgrades:

- Aubrey Matlala St / Flower St:
  - Converting the current priority control stop to a 3-way stop.
- Commissioner St / Flower St:
  - Converting the current 4-way stop to a traffic signal controlled intersection.

2.1.2 All road infrastructure upgrades to roads under the jurisdiction of the CoT must be according to relevant, approved municipal standards.
2.1.3 The applicant will be responsible to obtain any additional land to increase existing road reserve width that may be required for the provision of new roads or transportation infrastructure applicable to this development.
2.1.4 Road upgrades identified must be designed and constructed to the requirements and specifications of the relevant roads authority under which jurisdiction the specific route resorts.

2.2. Way Leaves

2.2.1 Before any construction work of whatever nature will be allowed, the following is to be obtained by the Developer:

a) Way-leave approval from the metropolitan (CoT) and provincial (GAUTRANS) roads authorities for work within the relevant road reserves.
b) For roads under the jurisdiction of the CoT, all detail design of all geometric aspects related to the access arrangements and external road improvements must be according to approved UTG and CoT standards. Approval of such detail designs must be obtained in writing from the CoT before construction can commence.
c) For roads under the jurisdiction of GAUTRANS, all detail design of all geometric aspects related to the access arrangements and external road improvements must be according to approved GAUTRANS standards. Approval of such detail designs must be obtained in writing from GAUTRANS before construction can commence.

3. CONDITIONS TO BE COMPLIED WITH PRIOR TO THE APPROVAL OF ANY SITE DEVELOPMENT PLAN(S)

3.1. Access Aspects

3.1.1. Access to the site/development must be to the satisfaction of the City of Tshwane (CoT).
3.1.2. The access layout is to comply with the minimum guidelines as set out on standard details drawing STD021 of the CoT Transport and Roads Department.
3.1.3. When a security gate is used at the access point this point should be located in such a way that ample storage area be provided in order that traffic shall not congest the adjacent road. The access control gate should provide the following:

- Separate inbound and outbound traffic lanes at access control gates, plus sufficient parking bays for visitors to park while access to the township is confirmed.
- U-turn space if access to the town ship is denied.
- One of the in lanes at the security gate must be at least 4.5 meters wide to accommodate emergency vehicles.
- Stacking space/throat length calculations for inbound traffic must be performed in accordance with Section 10.5 of the South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual (TMH 16, Volume 2, Version 1.0, August 2012) as published by the Committee of Transport Officials (COTO).

3.1.4. Two accesses to be provided. One from the north of the site (between Imphangele Street and Maplankeng Street) and two from the east site (between two unnamed Streets)

3.2. Public Transport and Non-motorised Transport

3.2.1 Existing public and non-motorised transport infrastructure, e.g. cycle and pedestrian facilities, must be retained or replaced where affected by the proposed road upgrades.
3.2.2 The walkways should be taken into consideration in the planning and design of the access to the development as well as the design of the road infrastructure.
3.2.3 A sidewalk, minimum 1.8m, along the length of the property boundary must be provided at the cost of the applicant.

3.3. Conditions for Land Use Applications

3.3.1 In addition to any other applicable road and transport infrastructure upgrades, the following facilities must be provided:

- All loading and off-loading activities must take place on site.
- Turning facilities for delivery vehicles must be provided on site.
- On-site parking, with sufficient manoeuvring space must be provided at the ratios as per Tshwane Town Planning Scheme, 2008, and it remains the responsibility of the applicant / land owners to ensure that sufficient parking is available on site. Should insufficient parking be available, additional parking must be provided or if not possible the land use must be restricted.
- All parts of the erf upon which motor vehicles are allowed to move or park must be provided with a permanent dust free surface.

3.3.2 A complete Site Development Plan must be submitted at the cost of the applicant, for approval by this Division, before any building construction may commence. Details regarding access, parking layout, site circulation, loading areas and stormwater drainage must be clearly shown on the Site Development Plan.
3.3.3 No building plans may be approved before a site development plan has been approved by this Division.
3.3.4 A non-removable physical barrier, preventing vehicular and pedestrian movement, must be erected on all the street erf boundaries, the approved accesses excluded.

3.4. General

3.4.1 The traffic impact assessment only evaluates the traffic operations and does not evaluate neither the exact access positions nor the geometric designs. Approval of these aspects must be discussed separately with this Division. The approval of the Traffic Impact Assessment also does not imply that the alignment of any of the proposed roads is approved nor does this letter imply any conditions relating to the change in land-use process.
3.4.2 All internal road works, provision of sidewalks and provision of on-site parking as well as any costs associated with the proposed access to the site will all be for the account of the developer.
3.4.3 The applicant must comply with the access arrangements, parking demand and road upgrades as it will be agreed upon in further engagements between the Council and the developer.
3.4.4 Copy of this letter must be included in the service report.

B. TRAFFIC SIGNALS SYSTEM MANAGEMENT

- The traffic signals subsection supports the proposals of the above mentioned study.
- It should be noted that the developer will have to carry out the costs of the all the intersections improvements mentioned on the study including the new proposed traffic signal at “Commissioner Str and Flower Str”.

C. INTEGRATED ROADS PLANNING

- No Objection

D. INTEGRATED TRANSPORT PLANNING

- The recommendations of the TIA are supported.
- The area is well served by minibus taxis and busses, there are lay byes that must the provided as proposed at the two access points.
- The proposed sidewalks must be provided as indicated on the site layout drawing with a minimum width of 1.8m.

I trust you will find the above in order.

Kind regards

Bavusile Ramekane
For DIVISIONAL HEAD: TRANSPORTATION PLANNING DIVISION

On request, this document can be provided in another official language.