URBAN ENGINEERING CONSULTANTS
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

TRAFFIC IMPACT ASSESSMENT

PROPOSED REZONING AND SUBDIVISION: REMAINDER OF ERF 2833 GREAT BRAK RIVER, MOSSEL BAY

Report Number 23-041_TIA

Date: January 2024 Revision (2)

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

COVER LETTER

It is herewith certified that this Traffic Impact Investigation has been prepared according to requirements of the TMH 16 (Committee Draft 2.0 – May 2018) South African Traffic Impact and Site Traffic Assessment Manual.

This Traffic Assessment was undertaken by:

Name:	Frans Rudolf van Aardt
Telephone number:	044 204 6834
Address:	18 Varing Avenue, Dormehlsdrift George 6529
ECSA registration:	Professional Engineer (Pr.Eng)
ECSA Registration Number:	20090271
Academic Qualifications:	B. Ing (RAU 2002) M. Ing (UJ 2011)

QUALITY ASSURANCE DATA

Report Title:	PROPOSED REZONING AND SUBDIVISION: REMAINDER OF ERF 2833 GREAT BRAK RIVER, MOSSEL BAY
Client:	New Care Innovations (Pty) Ltd
Report Number:	23-041_TIA
Revision Number	Revision (2)

Revision History

Date	Rev	Written By	Issued to		Distribution	Format
			Name	Institution		
10 June 2023	0	Frans v Aardt	Joe Bezuidenhout	New Care Innovations (Pty) Ltd	Email	.pdf
			Jan Vrolijk	Jan Vrolijk Town Planners	Email	.pdf
04 Oct 2023	1	Frans v Aardt	Joe Bezuidenhout	New Care Innovations (Pty) Ltd	Email	.pdf
			Jan Vrolijk	Jan Vrolijk Town Planners	Email	.pdf
			Mariska Nicholson	Cape EAPrac	Email	.pdf
Jan 2024	2	Frans v Aardt	Joe Bezuidenhout	New Care Innovations (Pty) Ltd	Email	.pdf
			Jan Vrolijk	Jan Vrolijk Town Planners	Email	.pdf
			Mariska Nicholson	Cape EAPrac	Email	.pdf

Prepared by:

Digitally signed by
Frans v Aardt
Date: 2024.01.25
09:47:41 +02'00'

Frans Rudolf van Aardt (B.Ing, M.Ing, Pr.Eng)
(on behalf of Urban Engineering (Pty) Ltd)

TABLE OF CONTENTS

LIST OF ANNEXURES

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

TIA	Traffic Impact Assessment
SANRAL	South African National Roads Agency SOC Limited
RNIS	Road Networks Information System
PGWC	Provincial Government of the Western Cape
AMP	Access Management Plan
AMG	Access Management Guidelines (2016)
RAG	Road Access Guidelines (2002)
RDE	Roadside Development Environment
GLA	Gross Leasable Area
SATGRM	South African Trip Generation Rates Manual
LOS	Level of Service
DoT	Department of Transport
RDE	Roadside Development Environment
MR	Main Road
DR	Divisional Road
RNIS	Road Network Information System
GRZ1	General Residential Zone 1
SRZ1	Single Residential Zone 1
BZIII	Business Zone 3

1 INTRODUCTION

Urban Engineering (Pty) Ltd was appointed by New Care Innovations (Pty) Ltd to undertake a Transportation Investigation pertaining to the proposed rezoning and subdivision of Remainder Erf 2833, Great Brak River in Mossel Bay, Western Cape.

1.1 PROJECT BENEFIT AND CONTEXT

New Care Innovations (Pty) Ltd want to rezone and subdivide REM 2833, Great Brak River in Mossel Bay to create a residential development with Residential zoned erven. This is to satisfy the demand / opportunity that the client has recognized for this type of development in the Great Brak River area.

1.2 TERMS OF REFERENCE

Transportation investigations essentially need to be undertaken in accordance with the following guidelines:

- National Land Transport Act, 2009 (Government Gazette No. 32110)
- South African Traffic Impact & Site Traffic Assessment Manual (TMH 16 Volume 1, COTO)
- Access Management Guidelines (WCG Dept. Transport and Public Works, 2020)
- Manual for Traffic Impact Studies RR 93/635 (DoT, 1995)

To better align with the recommendations of the TMH16, the Access Management Guidelines recommends that when a development is likely to generate a minimum of 50 additional vehicular trips in a highest hour of its traffic generation, (including passer-by trips) a TIA is required.

1.3 PRIMARY OBJECTIVES OF THIS REPORT

This study will look at the effect of the additional traffic generated by the proposed operation on the surrounding road network. Where necessary, the report will aim to introduce mitigation measures to reduce this impact at the site, as well as on the surrounding transportation network.

1.4 STUDY OBJECTIVES

The study objectives are:

i. Assess the traffic conditions on the existing road network.
ii. Assess the traffic generation effects of the proposal (if any)
iii. Assess the interface conditions between the road network and the proposed development
iv. Highlight any traffic concerns resulting from the proposed development (including parking and non-motorised transport)
v. Make recommendations.

1.5 SITE INVESTIGATION

The site was visited by Frans van Aardt of Urban Engineering (Pty) Ltd on 23 May 2023. Relevant measures and inspections were taken during the site visit. A record of some of the photos taken during the site visit has been attached as **ANNEXURE A** to this report.

2 LOCALITY

RE2833 is approximately 6ha in extent. The site is situated north of National Road 2 (N2) along Provincial road DR1583 (Sandhoogte). Access to the site is via DR1583. The site centre has approximate WGS 84 coordinates of 34° 3'17.88"S and 22°12'10.22"E. A basic locality plan has been included as Figure 2-1.

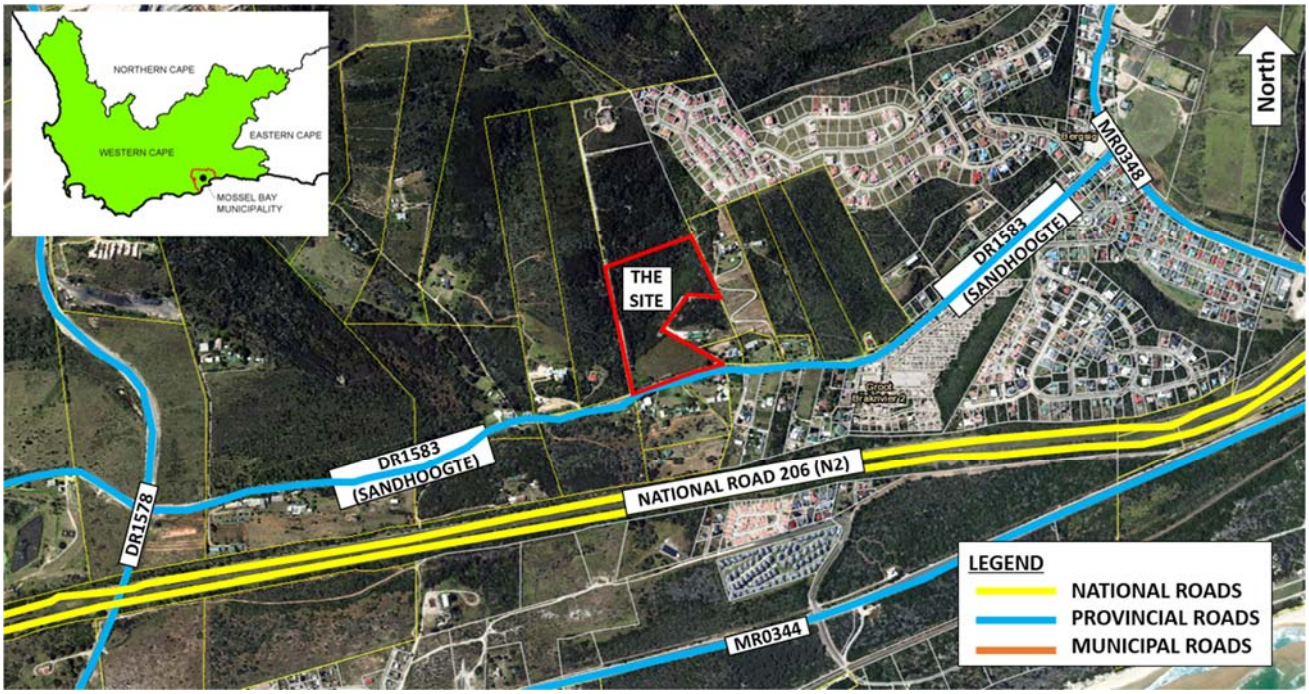


Figure 2-1 - Basic Locality Plan

3 STATUS QUO

RE2833 is currently undeveloped and covered in vegetation as indicated in the photo below.

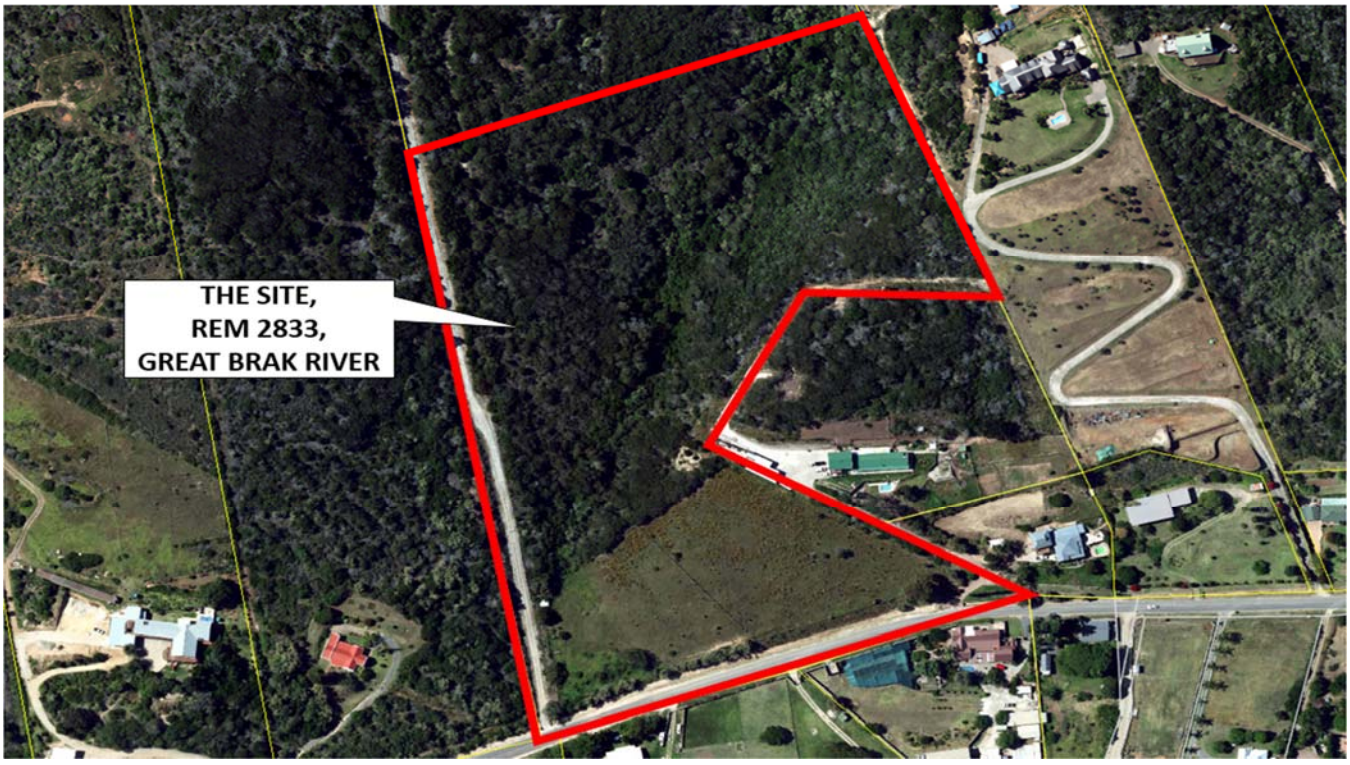


Figure 3-1 - Status Quo Photo

The site is currently zoned Agriculture Zone I as indicated in the extract of Mossel Bay Municipality's GIS database.

Figure 3-2 - Current Zoning

Site is positioned within the Urban Edge with the latest SDF (2022) identifying the site for "Urban Expansion" (refer to Figure 3-3)

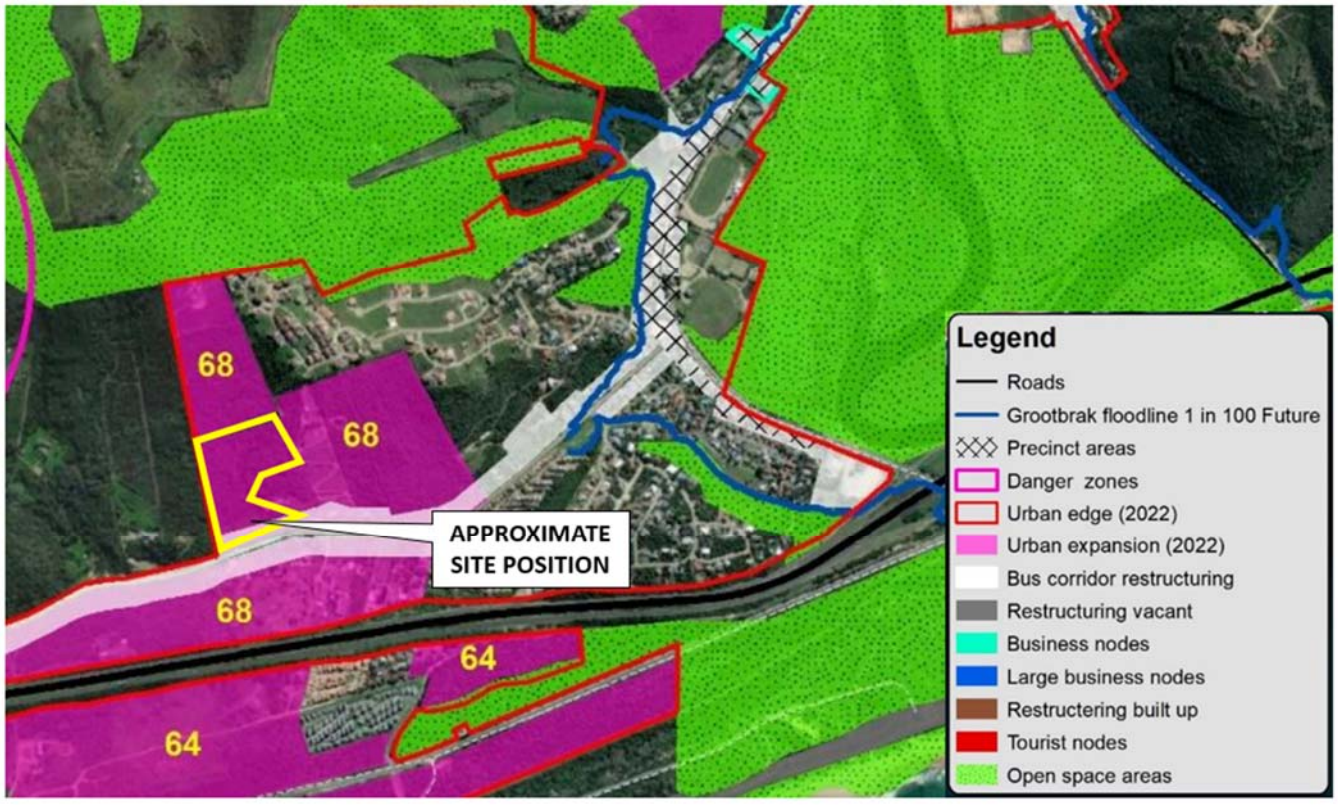


Figure 3-3 – Extract of Local Spatial Development Framework (2022)

4 PROPOSED DEVELOPMENT PARTICULARS

It is the intention of the landowner to sub-divide the land portion into the following residential erven:

- 32 x General Residential Zone I erven
- 12 x Single Residential Zone I erven

A subdivision plan was prepared by Jan Vrolijk Town Planners and has been attached as **ANNEXURE B** to this report. For ease of reference, an extract of the SDP has been included as Figure 4-1 below.

Figure 4-1 - Proposed Site Development Plan

5 SURROUNDING ROAD NETWORK

Depending on which guidelines is being used, the nomenclature used in road classification varies slightly. The differences between the terms used in the 2006 Department of Transport (DoT) Guidelines and those specified in the South African Road Classification and Access Management Manual (COTO TRH 26, May 2018), are listed below:

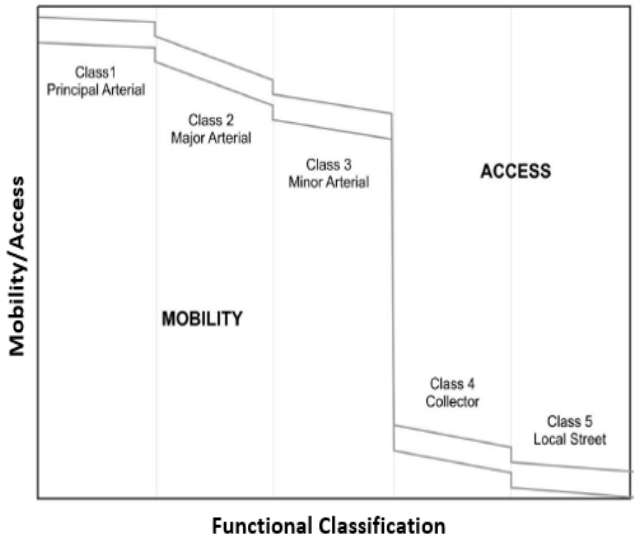
Road Class	Function	DoT 2006 Guidelines	COTO 2012 (TRH 26 Manual)
Class 1	Mobility	Primary Distributor	Principal Arterial
Class 2		Regional Distributor	Major Arterial
Class 3		District Distributor	Minor Arterial
Class 4	Access	District Collector	Collector
Class 5		Access Road	Local Street
Class 6		Non-motorised access way	Walkway

Table 5-1 - Road Classification Nomenclature

Roadways are classified by function on the basis of the priority given to land access versus through-traffic movement. Class 1 and 2 arterial roads provide a predominantly “mobility” function and Classes 4 and 5 roads perform a collector and local “access” function.

The functions of “mobility” and “access” overlap on minor arterials (Class 3 roads). This relationship between access and mobility has been indicated schematically in Figure 5-1.

Access Management is particularly important along Principal, Major and Minor Arterials and other primary roads that are expected to provide safe and efficient movement of traffic as well as limited access to property. However, Access Management is also necessary on lower-order roadways, such as Collector Streets and Local Streets, to address safety considerations, such as sight distance and corner clearance.



Class	Function	Description
Class 1	Mobility	Principal Arterial
Class 2		Major Arterial
Class 3	Mobility/Access	Minor Arterial
Class 4		Collector
Class 5	Access	Local

Figure 5-1 - Relationship Between Access and Mobility

5.1 DR1583 (SANDHOOGTE ROAD)

DR1583 is a provincial road that runs predominantly east/west. It acts as transportation link between DR1578 in the West and MR348 in the east.

The relevant section of DR1583 consists of a 7m wide asphalt surfaced road which was recently upgraded as part of the MR344/DR1578 upgrade. It has a posted speed limit of 60km/h.

Figure 5-2 - DR1578 Characteristics

According to the RNIS website, DR1583 has the following attributes:

- Road Reserve width = 20m
- Length = 6.95km
- Road Classification = Residential Access Collector
- Functional Classification = Level 4 (Tertiary) road
- RCAM classification = Rural Class 4 (a)

Western Cape Government

Western Cape Provincial Administration
Road Log Report

SUMMARY PAGES

Road Number : **DR01583 (DR1583)** Start Description: **Jct. MR348 Groot Brak River** End Description: **Jct. DR1578 Klip Heuvel**

ROAD CATEGORY

Start Km	End Km	Category
1.60	6.95	RESIDENTIAL ACCESS COLLECTORS

FUNCTIONAL CLASS

Start Km	End Km	Class
1.60	6.95	LEVEL4 (TERTIARY)

RCAM CLASSIFICATION

Start Km	End Km	Class
1.60	6.95	R4a

STATUTORY WIDTH

Start Km	End Km	Width
1.60	6.95	20.00

ROAD NAME

Start Km	End Km	Road Name
1.60	6.95	SANDHOOGTE

Figure 5-3 - Extract of DR1583 Road Log (RNIS)

As indicated in Figure 5-3 above, the PGWC's authority over DR1583 start at +-1.60km. This means that Mossel Bay Municipality is the road authority for the section of DR1583 situated between +-

0km and +-1,.60km. The position of the relevant kilometer markers are indicated schematically in figure xx below

Figure 5-4 - Provincial vs Municipal Authority

The TRH 26 manual makes a clear distinction between rural and urban areas. Roads in rural and urban areas have the same six functional classes but at different scales and standards. Rural roads have longer reaches of connectivity and therefore require higher levels of mobility than urban roads. The TRH26 classification system therefore differentiates between rural and urban areas.

The TRH 26 continues to specify that when a rural road enters an urban area, it automatically becomes an urban road, preferably of the same class. If the urban area is on one side of the road only, it should be classified as urban if vehicle or pedestrian access is possible. If not, the rural road continues until the first access point. Hence a Throughway or Bypass remains rural in function if it does not provide convenient access to an urban area.

Where an urban road leaves the urban area, it automatically becomes a rural road, preferably with a class not lower than that of the urban area. Short sections of "rural" roads between urban areas can sensibly be treated as urban.

The urban/rural road classification changes at the boundary of the urban area but the road design should be adjusted some distance in advance of the urban area to provide a transition area and to give motorists time to slow down.

The TRH 26 defines Class R4 (Rural) collector roads as follows:

These roads form the link to local destinations. They do not carry through traffic but only traffic with an origin or destination along or near the road. A collector road must never be quicker to use to pass through an area than the alternative mobility road.

These roads would typically give access to smaller rural settlements, tourist areas, mines, game and nature parks and heritage sites. The roads can also provide direct access to large farms. Collector roads can also be provided within larger rural settlements to provide a collector function in such settlements.

The length of these roads would mostly be shorter than 10 km. Traffic volumes should not be more than about 1 000 vehicles per day.

The TRH 26 defines Class U4 (Urban) collector roads as follows:

Collector streets are used to penetrate local neighbourhoods with the purpose of collecting (and distributing) traffic between local streets and the arterial system. The streets are mainly intended to serve an access function with limited mobility and traffic volumes; trip lengths and continuity must be limited.

They should ideally not carry any through traffic but only traffic with an origin or destination along or near to the street. The majority of the traffic using the collector street will have a destination in the street itself or in a local street leading off the collector. A collector street must not be quicker to use to pass through an area than a mobility road although it is recognized that in the absence of a mobility route, collectors must allow for some through traffic, albeit at low speeds.

Class 4a major collectors may also be used in preference to arterials when "mixed" through and local traffic is unavoidable, such as when arterials pass commercial centres with no alternative access. In this case, the local access traffic must be favoured at the expense of the mobility function.

From the TRH26 guidelines, it follows that the position of the urban edge is critical in road classification. Based on the 2022 Spatial Development Framework, (see Figure 5-5), the urban edge has recently moved out to include Erf 2833. The section of DR1583 next to Erf2833 is therefore situated with the urban area.

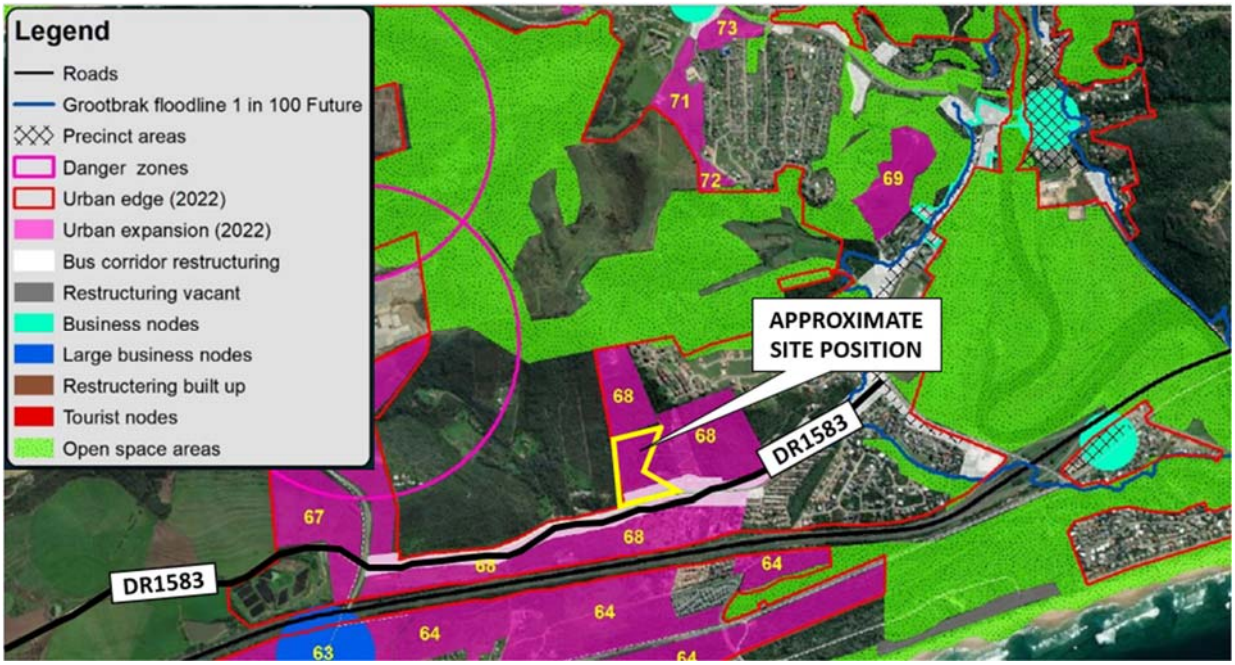


Figure 5-5 - Updated Urban Edge Position on 2022 SDF

5.2 EXISTING TRAFFIC VOLUMES

To determine the existing (background) traffic volumes in the vicinity of the site, classified traffic counts were recorded at three positions along DR1583 on Wednesday 05 May 2023. Counts were recorded over a 12-hour (06:00 to 18:00) period and vehicles were classified as either light or heavy. The counts took place at the following positions:

- Count 1 – Intersection of DR1578 and DR1583.
- Count 2 – On DR1583, in front of the site.
- Count 3 – Intersection of DR1583 and MR0348.

The traffic count intersections are indicated in Figure 5-6 below:

Figure 5-6 - Traffic Count Positions

The raw traffic count data has been attached as **ANNEXURE C** to this report. The data was analysed and the flow profiles extracted for the various approaches as indicated in the following graphs.

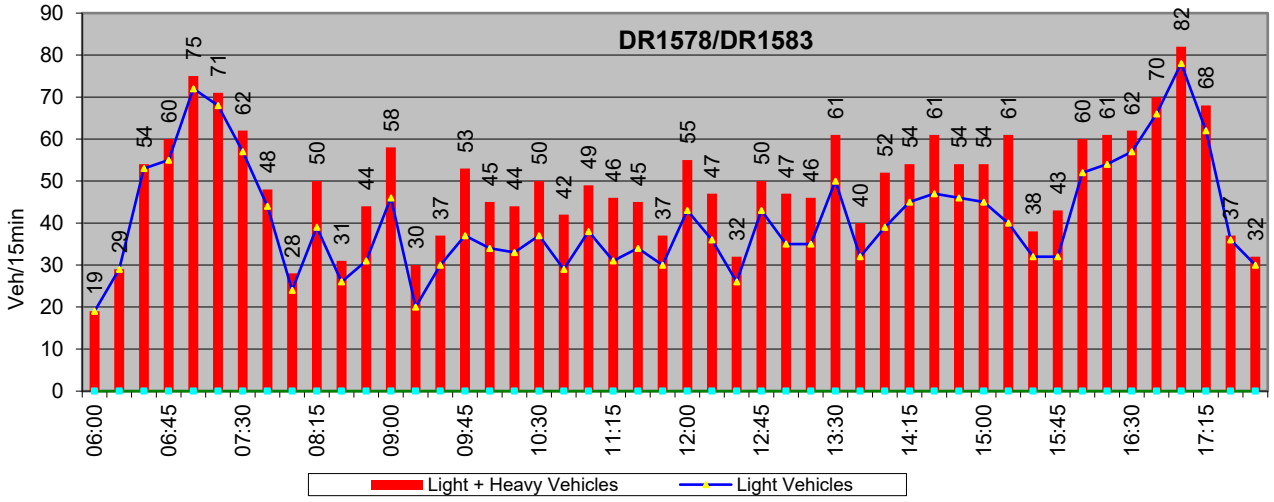


Figure 5-7 - Traffic Flow Analysis - DR1578/DR1583 Intersection

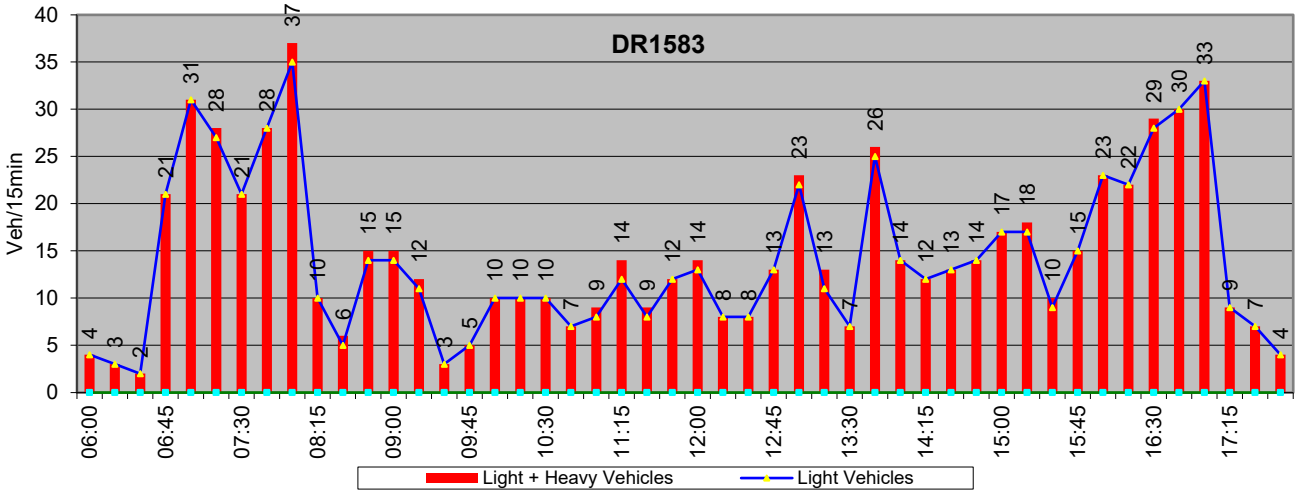


Figure 5-8 - Traffic Flow Analysis - DR1583 at Site Position

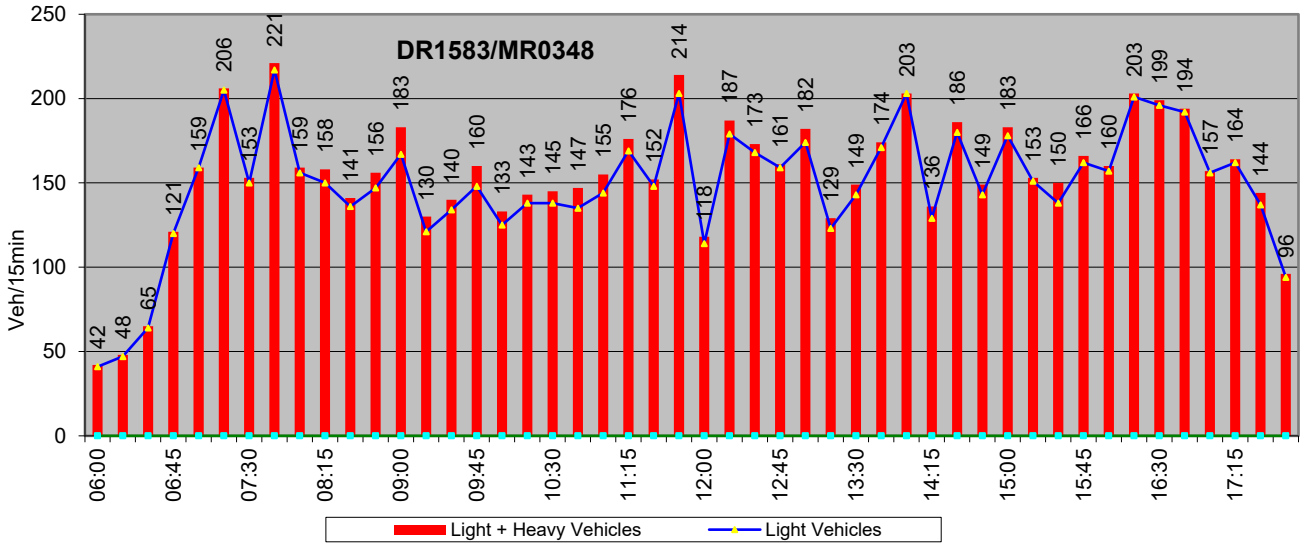


Figure 5-9 - Traffic Flow Analysis - DR1583/MR0348 Intersection

The traffic count revealed the following at the three intersections:

	DR1578/DR1583	DR1583 (at the Site)	DR1583/MR0349
Total vehicles Counted	2374	704	7423
Light Vehicles (% of total)	1977 (83%)	685 (97%)	7172 (97%)
Heavy Vehicles (% of total)	397 (17%)	19 (3%)	251 (3%)

Table 5-2 - Summary of Traffic Volumes

6 TRIP GENERATION POTENTIAL

Based on the SDP attached as ANNEXURE B, the development proposal consists of a mixture of Single Residential Zone I (SRZI) and General Residential Zone I (GRZI) erven.

6.1 TRIP GENERATION

The trip generation potential of the site has been calculated based on the guidelines published in TMH 17 (South African Trip Data Manual, COTO May 2018).

Single Residential Zone I

Based on the Mossel Bay Municipality Integrated Zoning Scheme By-Law, Single Zoneing is mainly used for **dwelling houses** and is defined as follows:

The objective of this zone is to provide for residential development where the predominant type of accommodation is a dwelling house for a single family, where each dwelling has its own land unit, and adequate outdoor space. Limited employment and additional accommodation opportunities are possible as primary or consent uses, provided that the dominant use of the property remains residential, and impacts of employment and additional accommodation uses do not adversely affect the quality and character of the surrounding residential environment.

The TMH land-uses that best fit the ethos of the proposed development is that of "single Dwelling House". The relevant TMH 17 definition of the land use is listed below:

210 Single Dwelling Unit Dwelling Units

Single dwelling units are detached houses on individual erven. The units usually have individual access to streets.

The trip generation potential has been indicated in the table below.

210 Single Dwelling Unit					**1D/Unit**
Description	AM Peak	PM Peak	Friday PM	Saturday	Sunday
Trip Rate	1.0	1.0	0	0.5	0.5
IN/OUT	25:75	70:30	0	50:50	50:50

General Residential Zone I

Based on the Mossel Bay Municipality Integrated Zoning Scheme By-Law, General Residential Zoning is mainly used for **town housing developments** and is defined as follows:

"The objective of this zone is to encourage residential development of a greater density than for General Residential Zone II, while retaining the emphasis on design coordination and a modest scale in terms of height. This zone has particular location requirements, including proximity to transport and amenities, and should not be randomly located without due consideration of the availability of open space and community facilities. Town housing may be located in and around central business areas, near high density nodes and along activity axis including railway lines and main traffic routes, where flats are often found."

The TMH land-uses that best fit the ethos of the proposed development is that of "Townhouses". The relevant TMH 17 definition of the land use is listed below:

231 Townhouses (Simplexes and Duplexes) Dwelling Units

Dwelling Units typically provided in clusters or in complexes. Units can be detached or provided within one building structure. Parking is often provided within a communal area.

The trip generation potential of townhouses are indicated in the table below.

231 Townhouses					**1D/Unit**
Description	AM Peak	PM Peak	Friday PM	Saturday	Sunday
Trip Rate	0.85	0.85	0	0.45	0.45
IN/OUT	25:75	70:30	0	50:50	50:50

The trip generation potential of the total development can therefore be estimated as indicated in Table 6-1.

Description	**Size**	**Weekday AM**		**Weekday PM**		**Saturday**	
		In	**Out**	**In**	**Out**	**In**	**Out**
SRZI Erven	12 Units	3	9	8	4	3	3
GRZI Erven	32 Units	7	20	8	19	7	7
Sub Total		10	29	16	23	10	10
Total		39		39		20	

Table 6-1 - Trip Generation Values

6.2 TRAFFIC DISTRIBUTION

Traffic distribution has been determined based on the actual traffic volumes counted at the various intersections. The AM and PM peak hour distributions and volume calculations have been indicated schematically in Figure A and Figure B in **ANNEXURE D**

7 INTERSECTION OPERATIONAL ANALYSES

The operational analysis was done with the "SIDRA INTERSECTION 9.1" (version 9.1.3) computer aided software that is developed specifically for traffic engineering capacity analysis. When elements of a road network such as intersections are analysed, their operating conditions are described in terms of Level of Service (LOS). The six letters from A to F are used to indicate different LOS. LOS A indicates very low traffic flows with correspondingly low delays. LOS E reflects capacity conditions, with high delays and unstable flow. LOS F reflects conditions where traffic demand exceeds capacity and traffic experiences congestion and delays. Generally, LOS A to D is considered acceptable in accordance with international standards. LOS E and F on the other hand are considered to be unacceptable.

The Average Delay is the delay (in seconds) that a motorist is likely to experience on an approach to the junction, while waiting for the junction to clear or other vehicles to maneuver. A further measure of the operating conditions at any point in a road network is the volume to capacity ratio (v/c). As the name implies it is the traffic demand volume divided by the available capacity of the road element. Generally, ratios of up to approximately 0.9 are internationally considered acceptable. Values exceeding 1.0 implies saturation of the facility.

It is important to note that trip reduction or SIDRA calibration factors were not applied to help improve the LOS of any of the analysed intersections. Vehicle Movement Data for heavy and light vehicles were left as per the default SDIRA default setting indicated in Figure 7-1 below.

From South to Exit:	W	N	E
	L2	T1	R2
Queue Space	7,0 m	7,0 m	7,0 m
Vehicle Length	4,5 m	4,5 m	4,5 m
Vehicle Occupancy (pers/veh)	1,2	1,2	1,2
Extra Midblock Delay			
Turning Vehicle Effect	Factor	Factor	Factor
Turning Vehicle Factor	1,05	1,0	1,05
Turn Radius			
Gap Acceptance Factor	1,0	1,0	1,0
Opposing Vehicle Factor	1,0	1,0	1,0
Prac. Deg. of Saturation	Program	Program	Program

CALIBRATION FACTORS - LIGHT VEHICLES

From South to Exit:	W	N	E
	L2	T1	R2
Queue Space	13,0 m	13,0 m	13,0 m
Vehicle Length	10,0 m	10,0 m	10,0 m
Vehicle Occupancy (pers/veh)	1,2	1,2	1,2
Extra Midblock Delay			
Turning Vehicle Effect	Factor	Factor	Factor
Turning Vehicle Factor	1,09	1,0	1,09
Turn Radius			
Gap Acceptance Factor	1,5	1,5	1,5
Opposing Vehicle Factor	1,5	1,5	1,5
Prac. Deg. of Saturation	Program	Program	Program

CALIBRATION FACTORS - HEAVY VEHICLES

Figure 7-1 - SDIRA Default Calibration Settings

The SIDRA analysis was performed for the following scenarios:

- **Status Quo:** The background traffic volumes were determined by means of manual traffic counting. These represent the actual volumes that are present on the road network.

- **No-Go Scenario:** A growth factor was applied to account for regional growth and the volumes were escalated up to the year 2028. This analysis indicates the traffic situation 5 years from now, but without the inclusion of the proposed development.
- **Operational Traffic** were estimated for the proposed development. The operational traffic volumes were added to the 2028 future traffic volumes to form the basis of the analysis, should the development be allowed to continue. Three (3) additional trips were included in the total operational traffic volumes.

The intersections were linked in SIDRA to create a network layout as indicated in Figure 7-2.

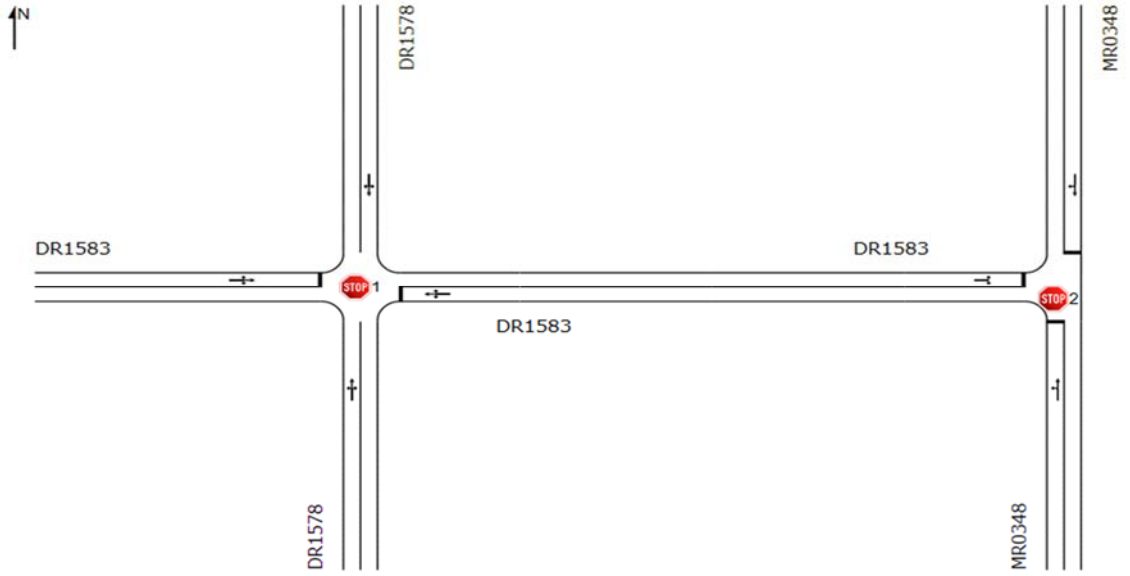


Figure 7-2 - Schematic Network Layout

7.1 STATUS QUO

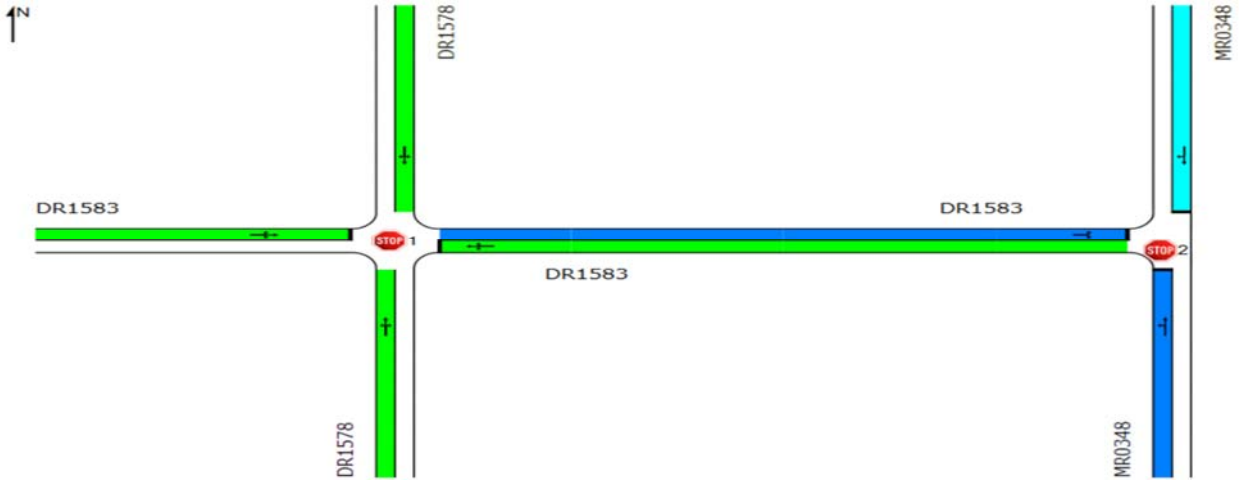
The current Weekday AM and PM Peak hour traffic volumes were used to calculate the Status Quo operational analysis. The results of the SIDRA Analysis have been attached as **ANNEXURE E** to this report, but has been summarised in the tables below:

INTERSECTION	APPROACH	MOVEMENT	2023 WEEKDAY AM				2023 WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1578/DR1583	DR1578 (Southern Approach)	Left	A	6.1	0.070	0.2	A	5.5	0.081	0.2
		Through	A	0.0			A	0.0		
		Right	A	6.2			A	6.4		
	DR1583 (Eastern Approach)	Left	A	8.3	0.023	0.1	A	8.4	0.029	0.1
		Through	A	8.7			A	9.0		
		Right	A	8.8			A	9.0		
	DR1578 (Northern Approach)	Left	A	5.5	0.053	0.0	A	5.5	0.063	0.0
		Through	A	0.0			A	0.0		
		Right	A	5.7			A	6.0		
	DR1583 (Western Approach)	Left	A	8.3	0.008	0.0	A	9.0	0.089	0.3
		Through	A	8.7			A	9.0		
		Right	A	8.8			A	9.2		

Table 7-1 - DR1578/DR1583 LOS (Status Quo)

INTERSECTION	APPROACH	MOVEMENT	2023 WEEKDAY AM				2023 WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1583/MR0348	MR0348 (Southern Approach)	Left	C	18.1	0.468	2.1	C	16.2	0.471	2.1
		Through	C	17.7			C	15.9		
	MR0348 (Northern Approach)	Through	B	14.2	0.399	1.6	B	12.4	0.345	1.3
		Right	B	13.9			B	12.5		
	DR1583 (Western Approach)	Left	C	19.9	0.449	2.0	C	19.8	0.387	1.6
		Right	C	19.2			C	19.2		

Table 7-2 - DR1583/MR0348 LOS (Status Quo)



7.2 NO GO SCENARIO (ESCALATED 2028 TRAFFIC VOLUMES)

In order to estimate the future (2028) traffic volumes for the No-Go Scenario, the 2023 Status Quo Peak Hour traffic volumes were further increased with an annual growth factor. Reference is made to the South African Department of Transport's Manual for Traffic Impact Studies (DoT, October 1995) which provides a table with typical growth rates. This document recognises that the method for determining traffic growth is important, but also states that there are a number of factors which influence the traffic growth rate. The approach is therefore to classify the study area with a low, average, high or extremely high growth rate. The typical growth rates are indicated in Table 7-3.

Category	Yearly Growth Rate (%)
Low	0-2.5
Average	2.5-3.5
High	3.5-6
Exceptionally high	>6

Table 7-3 - Typical Traffic Growth Rates

Based on the growth within the Western Cape region, it was decided to apply a fairly conservative 3% annual growth rate to the Status Quo traffic volumes.

The estimated 2028 traffic volumes (for the No-Go Scenario) were calculated according to the equation below:

$$F = P \times (1 + i)^n$$

Where: F = Future Trips
P = Present Trips
n = 5 years
i = 3% Growth

The escalated (2028) background traffic volumes have been attached as **Figure C** in **ANNEXURE D**. This scenario was tested and analyzed in SIDRA to determine the Level of Service (both AM and PM peak hour periods) of the various intersections, should the proposed development not take place. The results of the analyses have been attached as **ANNEXURE E**, but a summary of the findings has been included in Table 7-4 and Table 7-5.

INTERSECTION	APPROACH	MOVEMENT	2028 WEEKDAY AM				2028 WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1578/DR1583	DR1578 (Southern Approach)	Left	A	6.1	0.091	0.2	A	5.5	0.095	0.2
		Through	A	0.0			A	0.0		
		Right	A	6.4			A	6.5		
	DR1583 (Eastern Approach)	Left	A	8.4	0.030	0.1	A	8.5	0.036	0.1
		Through	A	9.1			A	9.2		
		Right	A	9.3			A	9.3		
	DR1578 (Northern Approach)	Left	A	5.5	0.067	0.0	A	5.5	0.079	0.0
		Through	A	0.0			A	0.0		
		Right	A	5.8			A	6.3		
	DR1583 (Western Approach)	Left	A	8.4	0.010	0.0	A	9.1	0.109	0.4
		Through	A	9.1			A	9.3		
		Right	A	8.9			A	9.6		

Table 7-4 - DR1578/DR1583 LOS (2028 NO-GO)

INTERSECTION	APPROACH	MOVEMENT	2028 WEEKDAY AM				2028 WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1583/MR0348	MR0348 (Southern Approach)	Left	C	20.0	0.542	2.8	C	17.7	0.543	2.7
		Through	C	19.6			C	17.5		
	MR0348 (Northern Approach)	Through	C	15.2	0.461	2.0	B	13.1	0.399	1.6
		Right	B	14.8			B	13.1		
	DR1583 (Western Approach)	Left	C	21.9	0.520	2.6	C	21.1	0.447	2.0
		Right	C	21.1			C	20.6		

Table 7-5 - DR1583/MR0348 LOS (2028 NO-GO)

The above results have been represented schematically in the network LOS Lane Display for the (AM peak hour period) in Figure 7-3.

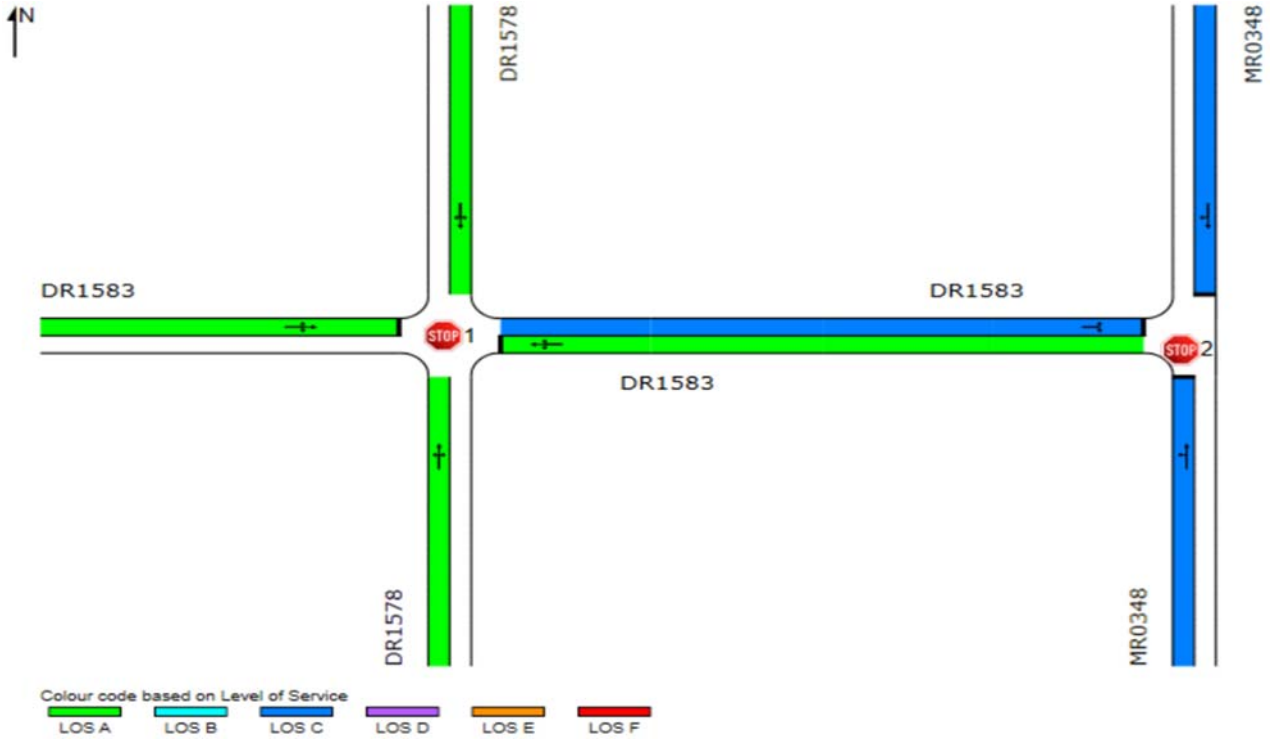


Figure 7-3 - Lane LOS Display for 2028 AM Scenario

7.3 OPERATIONAL PHASE TRAFFIC

In order to determine the impact of the proposed development on the surrounding road network, the trip generation potential of the proposed development was added to the future 2028 background traffic volumes. The final traffic volumes can be seen in **Figure E** in **ANNEXURE D**. The results of the SIDRA analysis have been summarized below.

INTERSECTION	APPROACH	MOVEMENT	2028 + DEV WEEKDAY AM				2028 + DEV WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1578/DR1583	**DR1578** (Southern Approach)	Left	A	6.1	0.092	0.2	A	5.5	0.098	0.3
		Through	A	0.0			A	0.0		
		Right	A	6.4			A	6.5		
	DR1583 (Eastern Approach)	Left	A	8.4	0.035	0.1	A	8.5	0.038	0.1
		Through	A	9.1			A	9.3		
		Right	A	9.3			A	9.3		
	DR1578 (Northern Approach)	Left	A	5.5	0.068	0.0	A	5.5	0.074	0.0
		Through	A	0.0			A	0.0		
		Right	A	5.8			A	6.3		
	DR1583 (Western Approach)	Left	A	8.4	0.010	0.0	A	9.1	0.110	0.4
		Through	A	9.1			A	9.4		
		Right	A	9.3			A	9.7		

Table 7-6 - DR1578/DR1583 LOS (Development + Escalated 2028 Volumes)

INTERSECTION	APPROACH	MOVEMENT	2023 WEEKDAY AM				2023 WEEKDAY PM			
			LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)	LEVEL OF SERVICE (LOS)	AVE DELAY (seconds)	V / C RATIO	AVE QUEUE (veh)
DR1583/MR0348	**MR0348** (Southern Approach)	Left	C	21.3	0.568	3.0	C	18.6	0.568	3.0
		Through	C	20.9			C	18.3		
	MR0348 (Northern Approach)	Through	C	15.6	0.476	2.2	B	13.2	0.412	1.7
		Right	C	15.3			B	13.2		
	DR1583 (Western Approach)	Left	C	22.4	0.551	2.9	C	21.6	0.465	2.2
		Right	C	21.6			C	21.0		

Table 7-7 - DR1583/MR03483 LOS (Development + Escalated 2028 Volumes)

7.4 SUMMARY OF ANALYSIS

Status Quo

Intersection analysis based on the status quo traffic count revealed that both intersections operate at acceptable Level of Service during both the AM and PM Peak Hour Periods. The worst LOS is experienced at the MR348/DR1583 intersection where delays of 19.9s are experienced on the DR1578 approach to the intersection.

No Go

The No-Go Scenario was simulated by increasing the Status Quo volumes with a fairly conservative 3% growth rate over a 5-year period. Analysis of the scenario indicates LOS of both intersections remain at an acceptable LOS, but once again the worst LOS is experienced at the MR348/DR1583 intersection where delays increased from 19.9s to 21.9s on the DR1578 approach to the intersection.

Operational Phase

The operational phase analysis made provision for the increase in traffic volumes generated by the proposed development. Since the proposed development is seen as a fairly low trip generator (42 trips during the peak hour period), the addition of the new generated traffic to the future background volumes, does not have a major impact on the LOS of the affected intersection. The worst LOS remains on the DR1578 approach to the MR0348 intersection, where delays are expected to increase from 21.9s to 22.4s. is expected for the right turn movement of the DR1578 Northern approach to the intersection.

Comparing the 2028 No-Go to the 2028 Operational (2028 background + development traffic), it is easy to see from Figure 7-4 that the additional traffic expected to the generated by the development is not expected to have a noticeable impact on the Level of Service of either of the two intersections.

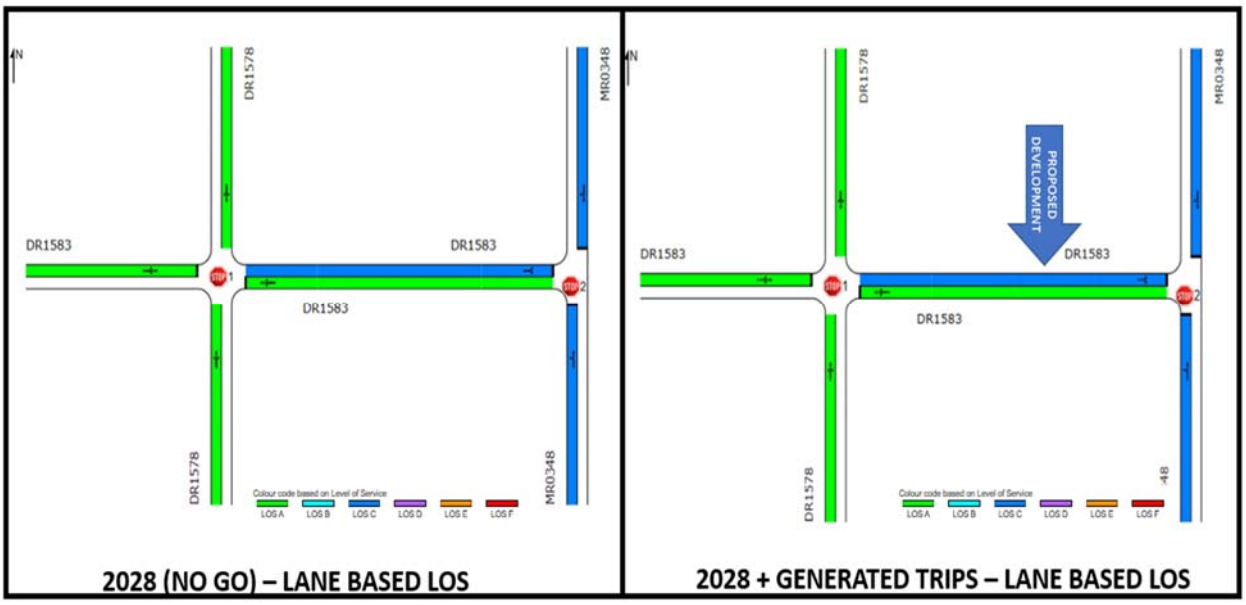


Figure 7-4 - Comparison between NO-GO and Operational LOS

8 GEOMETRIC CONSTRAINTS

8.1 DRIVEWAY CLASSIFICATION

According to the PGWC's Road Access Guidelines (2020), "the term "driveway" describes the intersecting roadway giving direct access to a privately-owned property adjacent to the road where such intersecting roadway is not a public road or street.

A driveway is usually the only access point to the property, although it is possible that connections could be made between adjacent properties through connecting roads provided by agreement between property owners or via a servitude registered for a road access. Larger developments may take access through more than one driveway from more than one road.

*"**Conventional driveways**" are defined in these Guidelines as domestic equivalent driveways, low-volume driveways and high-volume driveways, with high-volume driveways being regarded as having an equivalent status to a Class 5 road".*

*"**Equivalent driveways**" of a higher order than high-volume driveways may be equivalent to Classes 2, 3 or 4 public road intersections"*

The 2020 AMG lists the three categories of "conventional driveways", defined by the number of vehicular trips generated per hour that use or are projected to use a driveway, as follows:

***"Domestic equivalent driveways** are driveways giving vehicular access to private homes, micro businesses and farms which attract very small traffic volumes. In residential areas with small plot sizes the vehicle using the driveway may have to back into the through road when leaving the property.*

Domestic equivalent driveways have a small impact on the through road but can result in conflicts where reversing manoeuvres take place into the through road. For this reason, domestic equivalent driveways are acceptable on Class 5 roads, but should be discouraged on Class 4 roads except where special provision is made for access to properties within the road reserve. This requires that there is sufficient space clear of the through traffic lanes for

a vehicle reversing out of a property to manoeuvre within the road reserve so as to enter the traffic stream safely.

In rural areas, low-volume farm driveways generating less than five vehicles per day are regarded as domestic equivalent driveways.

***Low-volume driveways** may carry larger traffic volumes than domestic equivalent driveways and are expected to serve larger developments. The lower volume driveway categories (domestic equivalent driveways and low-volume driveways) have no class equivalent as they generally carry lower volumes than the traffic volume carried by any class of public road."*

In rural areas, farm accesses combined with small-scale developments such as farm stalls or stand-alone retail outlets may be low-volume driveways depending on the traffic volumes generated.

***High-volume driveways** are equivalent to Class 5 local roads and are expected to carry larger traffic volumes than low-volume driveways.*

Based on the expected trip generation (refer to Section 6.1), the proposed site access classifies as a **High Volumes** driveway, as indicated in Figure 8-1.

Driveway category	Class equivalent	Roadside development environment				
		CBD	Intermediate	Suburban	Semi-rural	Rural
		Vehicles per hour				v.p.day
Domestic equivalent		< 5	< 5	< 5	< 5	< 5
Low-volume		5–30	5–30	5–30	5–30	5–30
High-volume	5	30–150	30–100	30–60	30–50	30–50
Equivalent collector	4	150–750	100–625	60–500	50–250	50–500

Figure 8-1 - Driveway Classification

The WCG Access Management Guidelines (2020) provides guidelines on where driveways should be allowed for a given combination of road class and roadside development environment. The table shows that both high and low volume driveways are permitted on Class 4 roads.

Roadside development environment	Class 2 Major	Class 3 Minor			Class 4 Collector			Class 5 Local		
	LVD+HVD	DED	LVD	HVD	DED	LVD	HVD	DED	LVD	HVD
CBD										
Intermediate										
Suburban										
Semi-rural										
Rural										

Figure 8-2 - AMG Guidelines for Allowing Driveways

8.2 MOSSEL BAY MUNICIPALITY SPECIFICATIONS REGARDING VEHICLE ENTRANCES

The Mossel Bay Municipality Integrated Zoning Scheme By-Law specifies the following with regards to vehicle entrance and exit ways to and from a property:

a) motor vehicle carriageway crossings must be limited to one per site per public street or road abutting the site;

b) despite paragraph *(a)*, where the total length of any street boundary of a site exceeds 30 metres in length, one additional carriageway crossing may be permitted,

c) provided that no two carriageway crossings are closer than 12 metres to each other;

d) the minimum and maximum widths of motor vehicle carriageway crossings must be in accordance with the table, titled "Width of motor vehicle carriageway crossings"; and

e) the minimum width of a panhandle access may not be less than 3 metres wide.

Width of vehicle Carriageway Crossings		
Type of Carriageway Crossing	**Minimum Width**	**Maximum Width**
Single entrance or exit way	2,7meters	4,0 meters
Combined entrance and exit way	5,0meters	8,0 meters

8.3 DRIVEWAY GRADE AND SPEED DIFFERENTIAL

Along older urban arterial streets, it is common to find steep driveways with grades (or slopes) of 5–10% or more. Driveways with steep grades were often constructed to allow the driveway and connecting parking lots to drain more efficiently and to save earth-moving costs. On the other hand, more recently constructed arterials typically feature very gentle driveway grades. Driveway grade is an important, yet often overlooked, safety consideration.

The maximum practical grade for driveways varies between 8–14 % for low-volume driveways and five percent for high-volume driveways. Furthermore, the maximum practical change in grade is about 10%. Above this value, many vehicles will scrape their bumpers or other low-hanging parts on the driveway, potentially causing damage to the vehicle and driveway or roadway surface. The PGWC's book of standard geometric road plans specifies the following with regards to the slope of two intersecting roads:

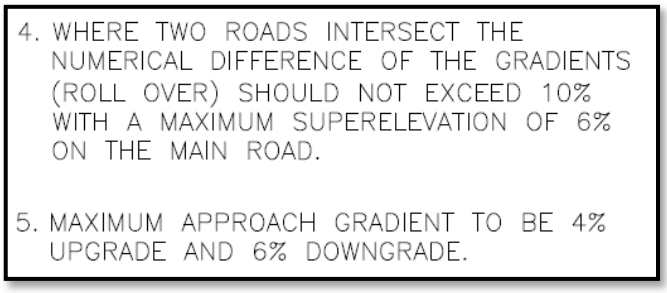


Figure 8-3 - PGWC Standard Plan book

Why is driveway grade important?

Driveway grade is important because it affects *speed differential*. Turning vehicles must slow appreciably to enter a driveway. The steeper the driveway, the greater the reduction in speed required to prevent "bottoming out." The following table shows typical driveway entry speeds for varying degrees of driveway grade.

Driveway Grade Change	Typical Driveway Entry Speed
Greater than 15%	Less than 13km/h
14-15%	13km/h
12-13%	15km/h
10-11%	16km/h
8-9%	18km/h
6-7%	19km/h

Table 8-1 - Driveway entry Speeds (Oregon State University)

Speed differential is the difference between the speed of vehicles that are continuing along the main roadway versus that of those that are turning into or out of the driveway. For instance, if through traffic generally moves at 60 km per hour and cars have to slow to 20 km per hour to enter a driveway, the speed differential at that driveway is 40 km per hour. A speed differential above 30 km per hour begins to present safety concerns. When the speed differential becomes greater than 50 to 60 km per hour, the likelihood of crashes involving fast moving through vehicles and turning vehicles increases very quickly. Rear-end collisions are very common on roads and streets with large driveway speed differentials and a high density of commercial driveways. When the speed differential is high, it is also more likely that crashes will be more severe, cause greater property damage, and have a greater chance of injury or fatalities. Keeping the speed differential low is very important for safety reasons.

8.4 EXISTING 20M WIDE ROAD SERVITUDE

An existing 20m wide road servitude provides access to Erf4650, Erf 2833 and Remainder of 2832 as indicated in Figure 8-4.

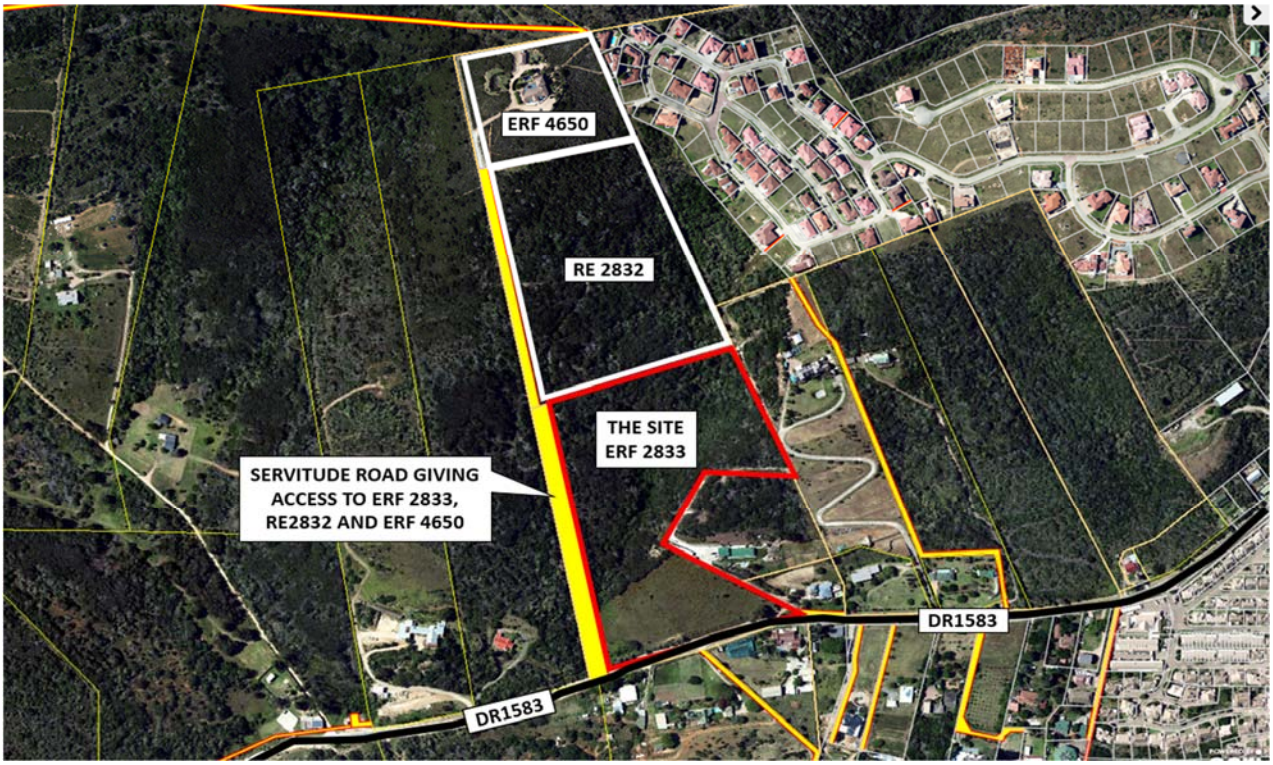


Figure 8-4 - 20m Wide Road Servitude

A 3m wide, interlocking block paving road is currently situated within the 20m wide road reserve. This road is used on a daily basis by the resident staying on Erf 4650 at the end of the road.

Figure 8-5 - Existing Servitude Road

Based on the proposed SDP, the existing servitude road will be used to provide access to all erven.

8.4.1 SIGHT LINES FOR EXISTING SERVITUDE ROAD.

Based on the 60km/h posted speed limit (refer to Section 5.1 of this report), a Shoulder Sight Distance of 125m is required for passenger vehicles entering a 7.5m wide road.

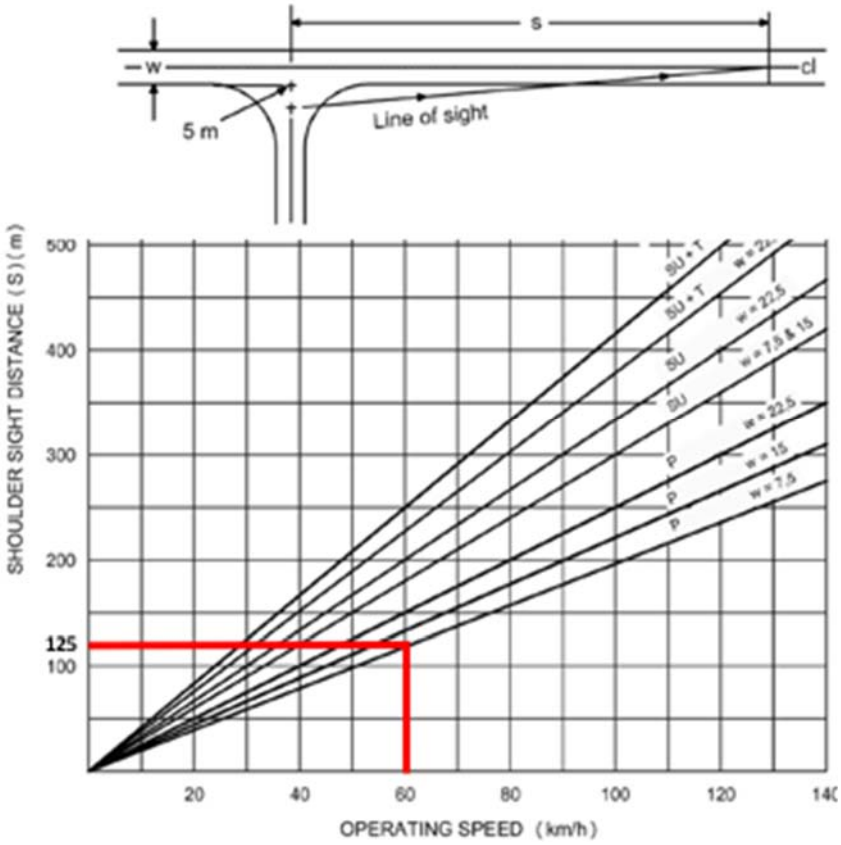


Figure 8-6 - Shoulder Sight Distance for Stop Condition

From Figure 8-7 and Figure 8-8, it follows that SSD in excess of 125m was measured in both directions from the existing servitude road. (Note the minor timber structure currently obscuring sight lines towards the DR1578)

Figure 8-7 - SSD towards DR1578

Figure 8-8 - SSD towards MR0348

9 THROAT LENGTHS

The proposed SDP does not make provision for access control and hence throat length calculations are not applicable. The position of the secondary road parallel to Sandhoogte Road, is however situated approximately 40m away from Sandhoogte road edge, ensuring that the two intersections are not situated within each other's envelope.

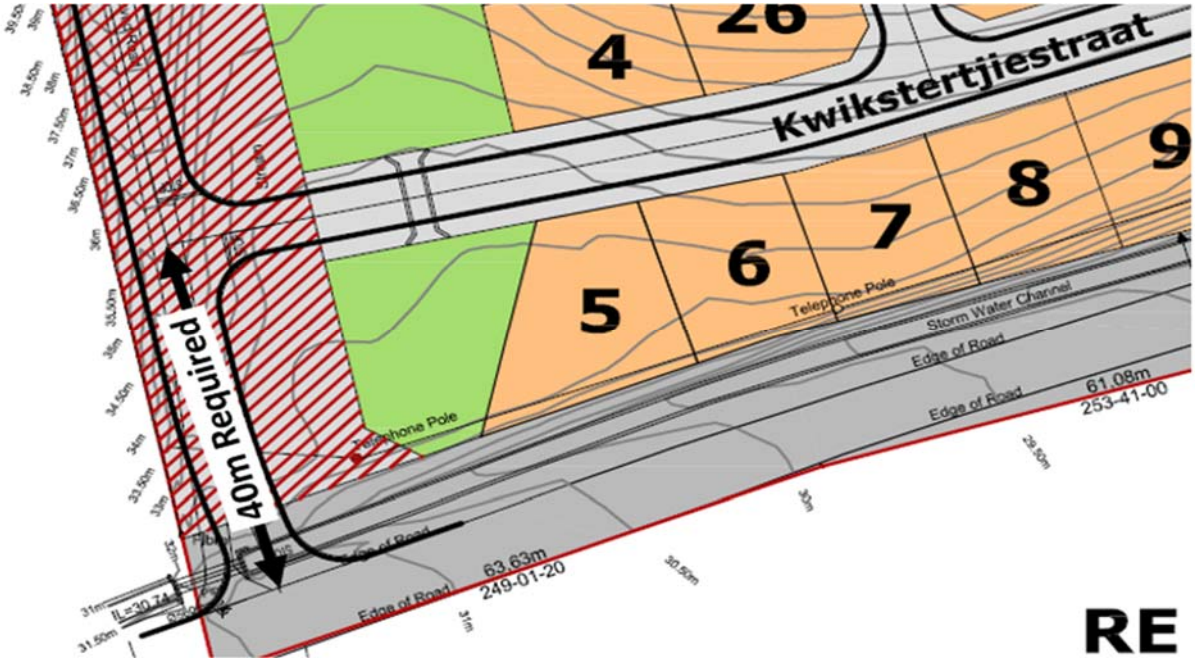


Figure 9-1 - Throat Length Requirement

10 SUMMARY

The various components of this Transportation Investigation can be summarised as follows:

1. It is the client's intention to subdivide erf 2833, Great Brak River in order to create a new residential development consisting of the following land uses:
    - 32 x General Residential Zone I erven
    - 12 x Single Residential Zone I erven
2. The latest SDF (2022) made provision for the moving of the Urban Edge to include the proposed site.
3. The site is situated next to DR1583/Sandhoogte Road. However, the portion of DR1583/Sandhoogte between +-0km and +-1.6km falls under the authority of Mossel Bay Municipality, and PGWC authority only starts at +-1.6km onwards. DR1583 is classified as a Class4 Rural Collector on the PGWC's RNIS Website.
4. SDP makes provision for site accesses via an existing servitude road along the western property boundary.
5. The combined estimated trip generation potential of the site has been calculated as follows:
    a. Weekday AM = 39 Trips (IN and OUT)
    b. Weekday PM = 39 Trips (IN and OUT)
6. 12 Hour traffic counts recorded at three positions along DR1583 on Wednesday 05 May 2023. The total volumes counted at the three intersections are summarised below:

	DR1578/DR1583	**DR1583 (at the Site)**	**DR1583/MR0349**
Total Vehicles Counted	2374	704	7423
Light Vehicles (% of total)	1977 (83%)	685 (97%)	7172 (97%)
Heavy Vehicles (% of total)	397 (17%)	19 (3%)	251 (3%)

7. Based on operating speed, road width and type of vehicle, a minimum Shoulder Sight Distance of 125m is required. SSD in excess of 125m were measured in both directions at the existing servitude road intersection.
8. Both the DR1578/DR1583 and DR1583/MR0348 intersections were analysed in SDIRA. Analysis revealed acceptable LOS for both the Status Quo and Future (2028) "*NO-GO*" Scenarios.
9. SIDRA analysis of the future operational (2028 Background + Generated Traffic) scenario, indicated that the inclusion of the additional trips, are not expected to have a noticeable impact on the overall LOS of the affected intersections.
10. The proposed site access is classified as a high-volume driveway.
11. The proposed SDP does not make provision for any type of access control.

11 RECOMMENDATIONS

Based on the findings of this report, the proposed rezoning and subdivision of Erf 2833, Great Brak River is supported from a traffic and transportation point of view, subject to the following conditions:

1.1. The minor timber structure obscuring SSD at the current Servitude Road/DR1583 junction (refer to Paragraph 8.4.1), should be moved to a new position where it does not affect SSD.

1.2. Road Widths :

1.2.1. Tarentaal Street (the existing servitude road) should be widened from 3m to 6.4m, in order to accommodate two clearly defined 3,4m wide lanes.

1.2.2. Due to the small number of vehicles expected to make use of them, the road width of Kwikstertjie Street, Geelvink Street, Mossie Slot and Laksman Street can be reduced to a absolute minimum of 5.5m (2x2.75m wide lanes).

1.3. Vegetation and shrubbery within the road reserve that could have a negative future impact on the SSD (towards DR1578) should be kept in a neat and trimmed condition by the developer.

1.4. To protect mobility at the DR1583/Servitude Road intersection, it is proposed that the ingress movement along Tarentaal Street receives priority, by implementing the road marking configuration indicated schematically in Figure 11-1 below.

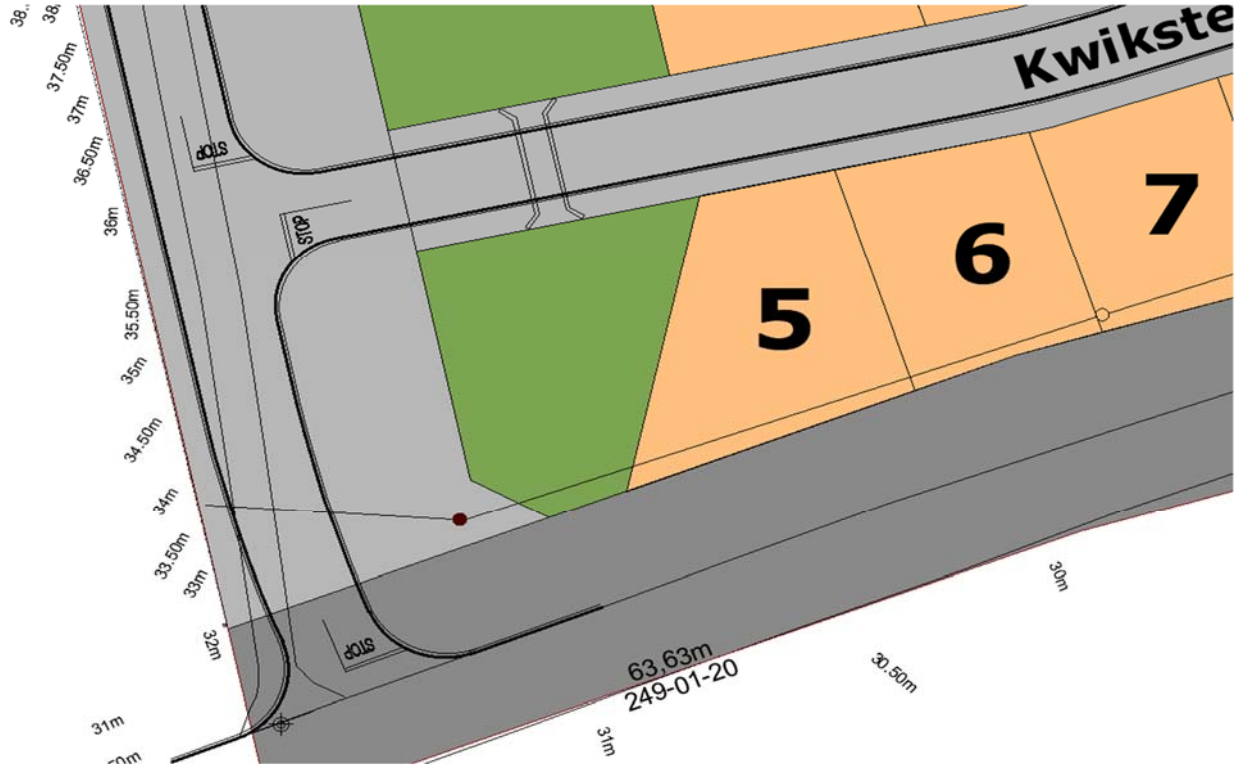


Figure 11-1 - Road Marking Layout

1.5. Due to the steep gradient along Tarentaal Street, it is recommended that the weight of construction vehicles be limited to 8 tonne per axle and that no articulated trucks be allowed.

1.6. The proposed SDP does not make provision for any type of access control. Should this be retrofitted at a later stage, the exact position must be determined in order to allow for sufficient stacking distance between the ingress gate and Tarentaal Street.

1.7. All Geometric and Pavement designs within the Road reserve should be according to the standards of the road authority and must be undertaken by a professionally registered Civil Engineer.

ANNEXURE A

SITE PHOTOGRAPHS

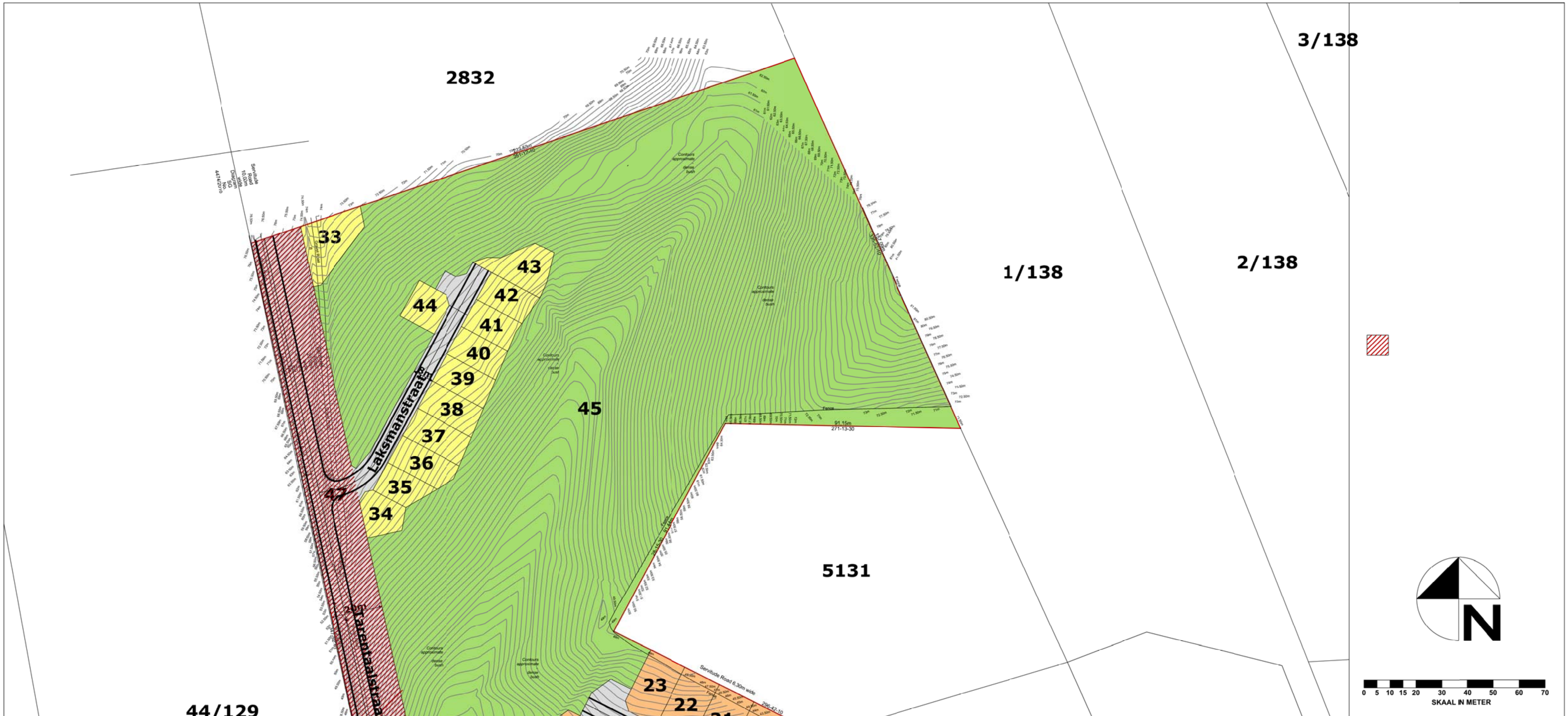

METERS
cm
0 1 3 1


METERS
cm
0 0 0 7


SANDHOOGTE

ANNEXURE B

SITE DEVELOPMENT PLAN



cell: 082 464 7871 | email: janvrulijk@vodmail.co.za

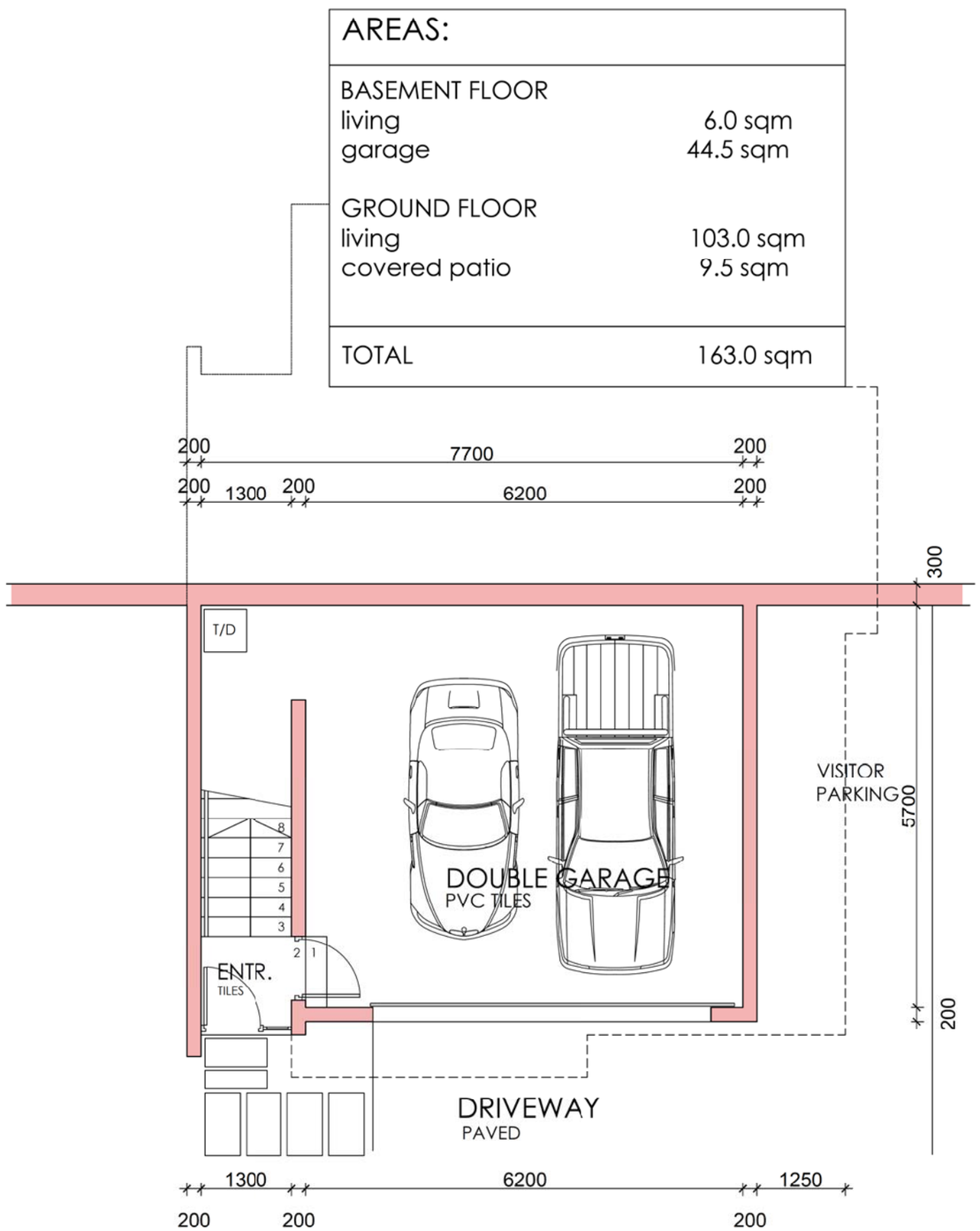
PROJECT

DRAWING TITLE

PROJECT No.	DWG No.	REVISION No.	DATE OF PRINT
ERF 2833 G BRAK	P.2	3	08.09.2023
SCALE	PROJECT DATE	DRAWN BY	CHECKED BY
NTS	SEPT 2023	AA	JV

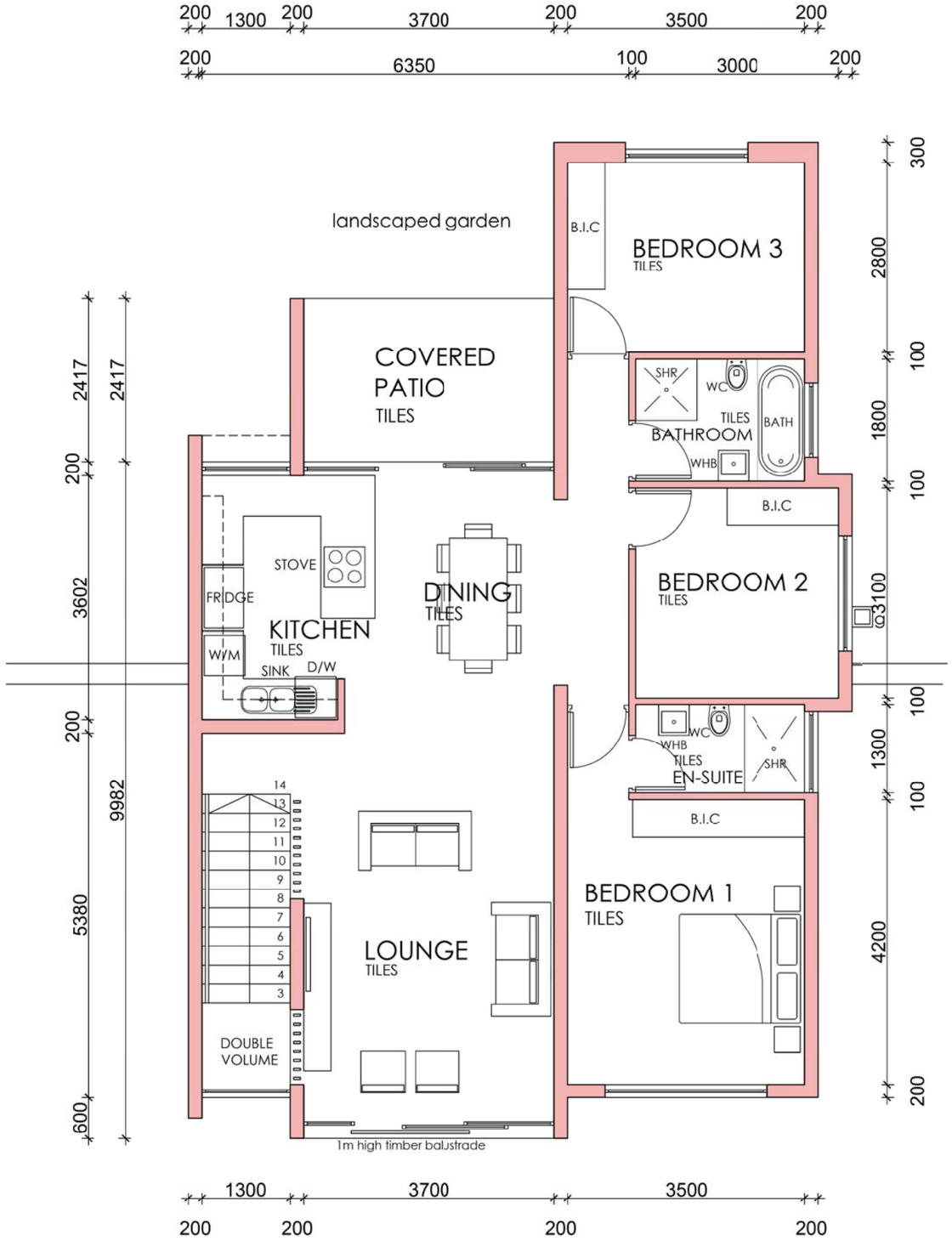
TYPICAL 3 BEDROOM UNIT

AREAS:	
BASEMENT FLOOR	
living	6.0 sqm
garage	44.5 sqm
GROUND FLOOR	
living	103.0 sqm
covered patio	9.5 sqm
TOTAL	163.0 sqm



Lower Ground Floor Plan

SCALE 1:100



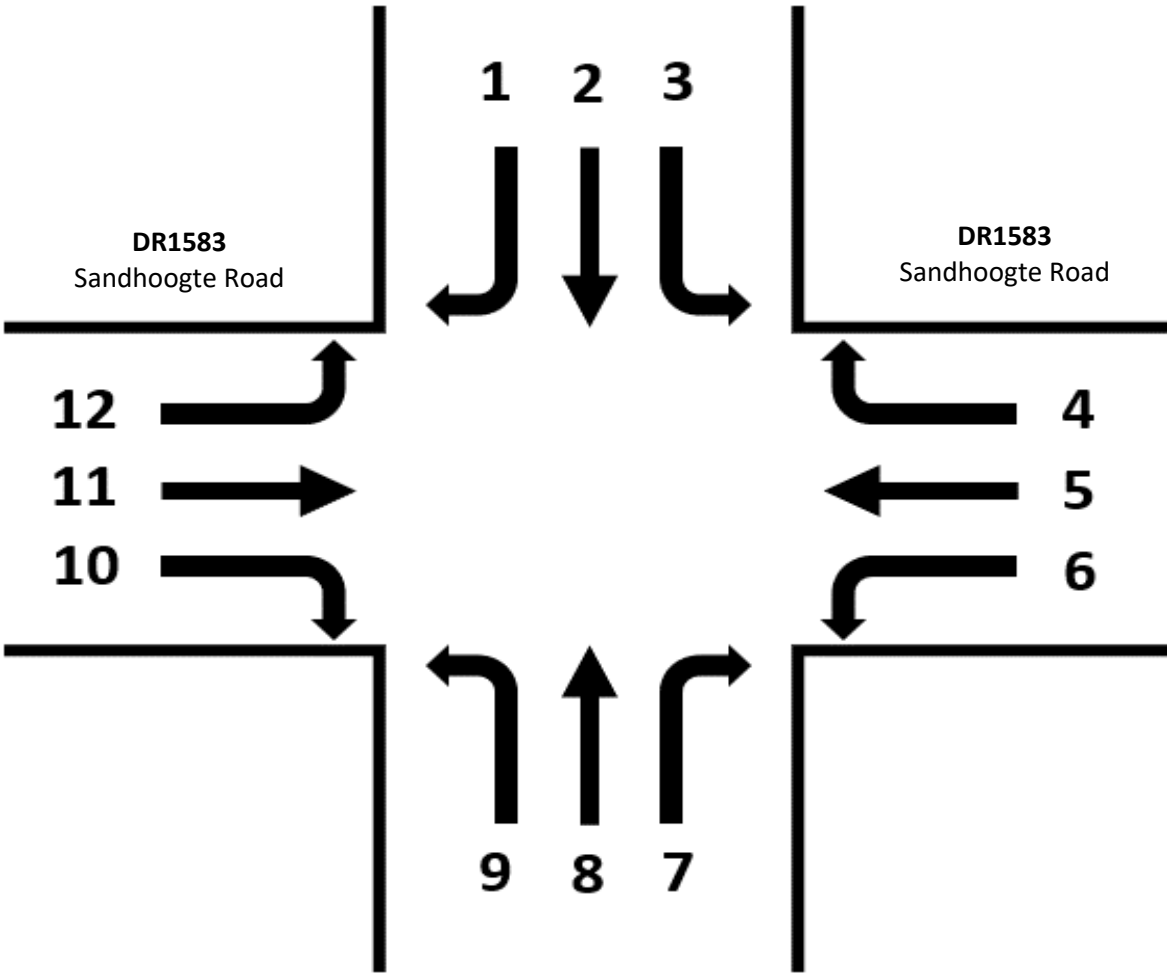
Ground Floor Plan

SCALE 1:100

ANNEXURE C

TRAFFIC VOLUMES

DR1578 from Friemersheim



DR1578 from Tergniet

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

URBAN ENGINEERING

Tyd	DR1578 (From Friemersheim)						DR1583 (from Great Brak River)					
	1		2		3		4		5		6	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	0	0	13	0	1	0	0	0	0	0	1	0
06:15 - 06:30	0	0	29	0	1	0	0	0	1	0	1	0
06:30 - 06:45	3	0	58	1	1	0	3	0	1	0	1	0
06:45 - 07:00	3	0	80	5	5	0	6	0	2	0	2	0
07:00 - 07:15	4	0	107	6	5	0	8	0	3	0	5	0
07:15 - 07:30	4	0	132	7	6	0	8	0	3	0	9	0
07:30 - 07:45	5	0	150	9	9	0	10	0	4	0	15	0
07:45 - 08:00	5	0	165	10	10	1	11	0	4	0	19	0
08:00 - 08:15	6	0	173	11	10	1	12	0	4	0	21	0
08:15 - 08:30	6	0	187	13	11	1	12	0	4	0	24	0
08:30 - 08:45	6	0	196	14	11	1	13	0	4	0	25	0
08:45 - 09:00	9	1	207	18	13	1	13	0	4	0	27	0
09:00 - 09:15	9	2	219	22	17	1	14	0	5	0	30	1
09:15 - 09:30	10	2	227	29	17	1	14	0	5	1	33	1
09:30 - 09:45	10	2	240	30	17	1	15	0	5	1	35	1
09:45 - 10:00	10	2	250	34	17	1	16	0	5	1	39	1
10:00 - 10:15	11	2	262	38	17	1	16	0	5	1	41	1
10:15 - 10:30	14	2	271	43	19	1	17	0	8	1	43	1
10:30 - 10:45	15	2	281	49	20	1	20	0	9	1	46	1
10:45 - 11:00	15	2	295	53	20	1	21	0	9	2	46	1
11:00 - 11:15	16	2	307	56	20	1	22	0	9	3	56	1
11:15 - 11:30	18	2	320	62	20	1	23	0	9	3	57	1
11:30 - 11:45	18	3	330	67	21	1	24	0	9	4	58	2
11:45 - 12:00	19	3	343	72	23	1	24	0	9	4	60	2
12:00 - 12:15	20	3	360	74	26	1	24	0	10	4	63	2
12:15 - 12:30	24	3	375	78	26	1	24	0	10	4	63	2
12:30 - 12:45	25	3	380	80	26	1	25	0	11	4	66	2
12:45 - 13:00	27	3	400	84	26	1	27	0	11	4	69	2
13:00 - 13:15	28	4	413	85	26	1	28	0	12	5	72	2

13:15 - 13:30	28	5	430	86	26	1	28	0	12	5	74	2
13:30 - 13:45	28	5	451	91	26	1	30	0	16	6	76	2
13:45 - 14:00	29	5	460	96	26	1	31	0	17	6	77	2
14:00 - 14:15	29	5	477	102	27	2	31	0	18	6	80	2
14:15 - 14:30	30	5	494	105	27	2	33	0	18	6	81	2
14:30 - 14:45	31	5	508	113	29	2	34	0	19	6	81	2
14:45 - 15:00	33	5	525	117	30	2	35	0	19	6	87	2
15:00 - 15:15	33	5	539	121	31	2	35	0	19	6	88	2
15:15 - 15:30	34	5	549	130	33	2	36	0	21	7	89	2
15:30 - 15:45	35	5	563	132	33	2	37	0	22	7	93	2
15:45 - 16:00	36	5	567	138	35	2	37	0	23	7	94	2
16:00 - 16:15	36	5	581	143	36	2	37	0	23	7	103	2
16:15 - 16:30	36	5	598	146	36	2	40	0	24	7	110	2
16:30 - 16:45	38	5	619	151	39	2	44	0	26	7	115	2
16:45 - 17:00	38	5	635	151	40	2	45	0	27	7	123	2
17:00 - 17:15	39	5	669	154	44	2	45	0	28	7	129	2
17:15 - 17:30	40	5	691	155	45	2	46	0	28	7	132	2
17:30 - 17:45	40	5	706	156	47	2	46	0	28	7	137	2
17:45 - 18:00	40	5	710	157	47	2	47	0	28	7	140	2

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

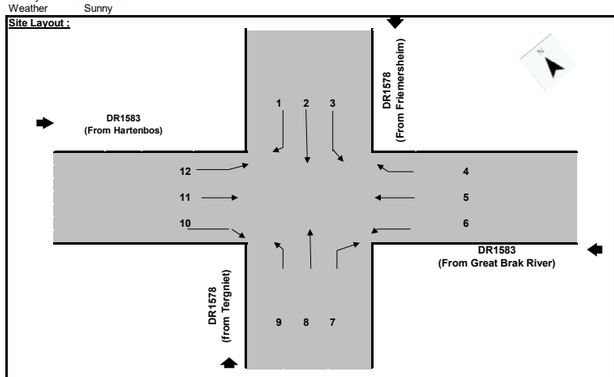
URBAN ENGINEERING

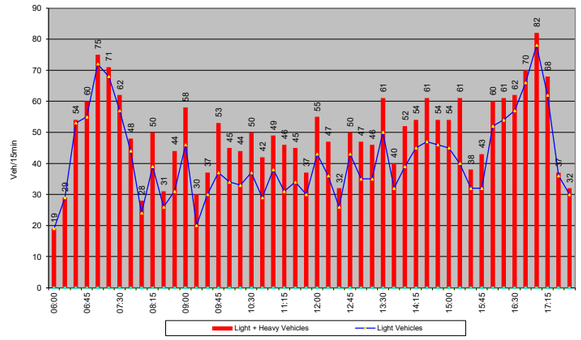
Tyd	DR1578 (From Tergniet)						DR1583 (From Hartenbos)					
	7		8		9		10		11		12	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	0	0	3	0	0	0	0	0	1	0	0	0
06:15 - 06:30	1	0	14	0	0	0	0	0	1	0	0	0
06:30 - 06:45	2	0	31	0	0	0	0	0	1	0	0	0
06:45 - 07:00	5	0	49	1	0	0	1	0	2	0	1	0
07:00 - 07:15	13	1	78	2	0	0	1	0	3	0	1	0
07:15 - 07:30	24	1	101	3	1	1	1	0	5	0	2	0
07:30 - 07:45	31	1	119	6	1	1	1	0	5	0	3	0
07:45 - 08:00	35	1	135	6	1	1	1	1	5	0	6	1
08:00 - 08:15	36	2	146	8	1	1	1	1	5	0	6	1
08:15 - 08:30	37	2	166	15	1	3	1	1	5	0	6	1
08:30 - 08:45	39	2	178	17	2	3	1	2	5	1	6	1
08:45 - 09:00	42	3	185	23	2	3	2	2	5	1	8	2
09:00 - 09:15	46	3	205	28	2	3	2	3	6	1	8	2
09:15 - 09:30	48	3	210	28	2	5	3	3	6	1	8	2
09:30 - 09:45	52	3	216	31	3	6	3	5	6	1	11	2
09:45 - 10:00	56	3	231	39	4	7	3	6	6	2	13	3
10:00 - 10:15	59	3	245	44	4	8	3	7	6	2	15	3
10:15 - 10:30	60	3	255	48	4	9	3	8	7	2	16	3
10:30 - 10:45	62	3	269	52	5	11	3	9	8	2	16	3
10:45 - 11:00	65	3	278	58	5	11	3	10	10	2	16	4
11:00 - 11:15	68	3	289	65	5	11	3	10	10	2	16	4
11:15 - 11:30	71	4	298	69	5	12	4	11	10	3	17	5
11:30 - 11:45	72	4	314	70	6	12	4	13	10	3	20	5
11:45 - 12:00	74	4	320	72	6	12	4	13	11	3	23	5
12:00 - 12:15	77	4	333	78	6	15	5	13	11	4	24	5
12:15 - 12:30	77	4	349	82	6	16	5	15	12	4	24	5

12:30 - 12:45	81	4	357	85	6	16	6	16	12	4	26	5
12:45 - 13:00	83	4	369	87	6	17	6	16	13	4	27	5
13:00 - 13:15	89	4	379	91	6	19	6	17	13	5	27	6
13:15 - 13:30	92	4	391	98	6	19	6	18	13	6	28	6
13:30 - 13:45	95	4	406	101	7	19	6	19	13	6	30	7
13:45 - 14:00	102	4	416	104	8	19	6	19	14	6	30	7
14:00 - 14:15	106	4	428	109	8	19	6	20	14	6	31	7
14:15 - 14:30	111	4	444	114	8	20	8	20	14	6	32	7
14:30 - 14:45	115	4	467	118	8	20	8	21	15	6	32	8
14:45 - 15:00	119	4	480	122	8	20	8	21	16	6	33	8
15:00 - 15:15	124	4	500	125	10	21	8	21	17	6	34	9
15:15 - 15:30	126	4	520	135	10	21	8	22	18	6	34	9
15:30 - 15:45	129	4	526	139	10	21	9	22	18	6	35	9
15:45 - 16:00	133	4	543	144	10	21	10	22	18	6	36	9
16:00 - 16:15	139	4	565	147	10	21	10	22	18	6	36	9
16:15 - 16:30	144	4	585	151	10	21	10	22	18	6	37	9
16:30 - 16:45	151	4	596	151	10	21	10	22	19	6	38	9
16:45 - 17:00	159	4	625	154	10	21	10	22	21	6	38	10
17:00 - 17:15	165	4	647	155	10	21	10	22	21	6	42	10
17:15 - 17:30	170	4	674	160	10	21	10	22	21	6	44	10
17:30 - 17:45	172	4	687	160	10	21	10	22	21	6	45	10
17:45 - 18:00	174	4	707	161	10	21	10	22	21	6	45	10

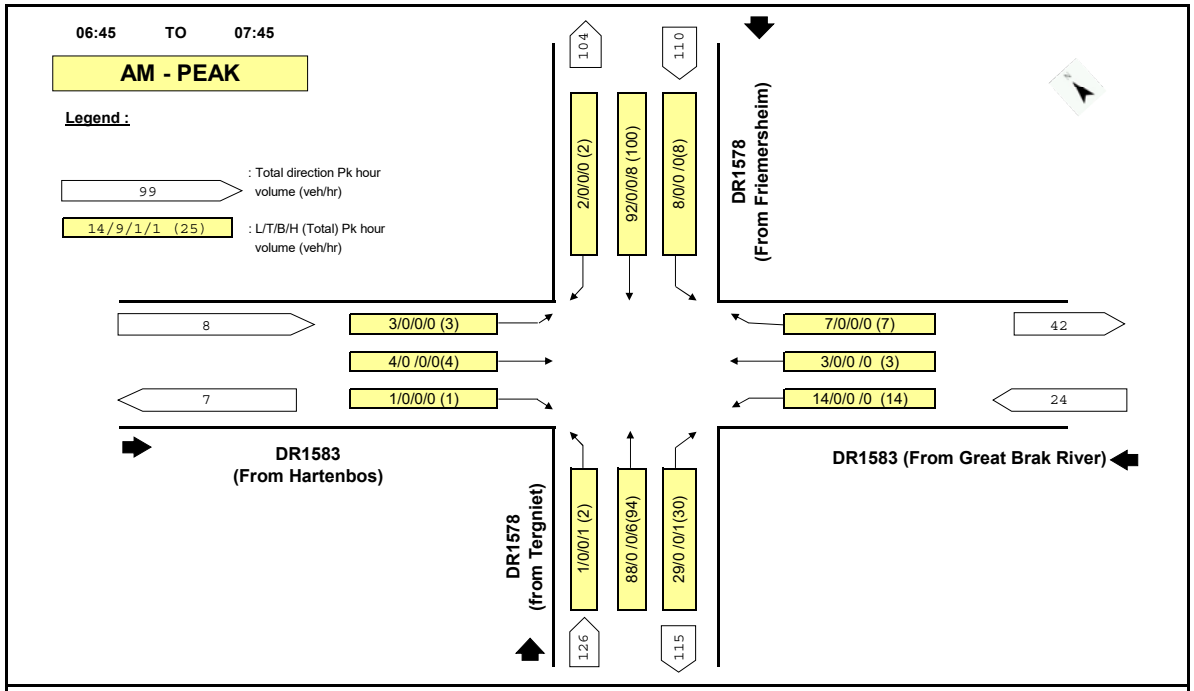
Site Grootbrak River: Sandhoogte Rd
Date 10/05/2023
Surveyor JE Giewelaar
Weather Sunny

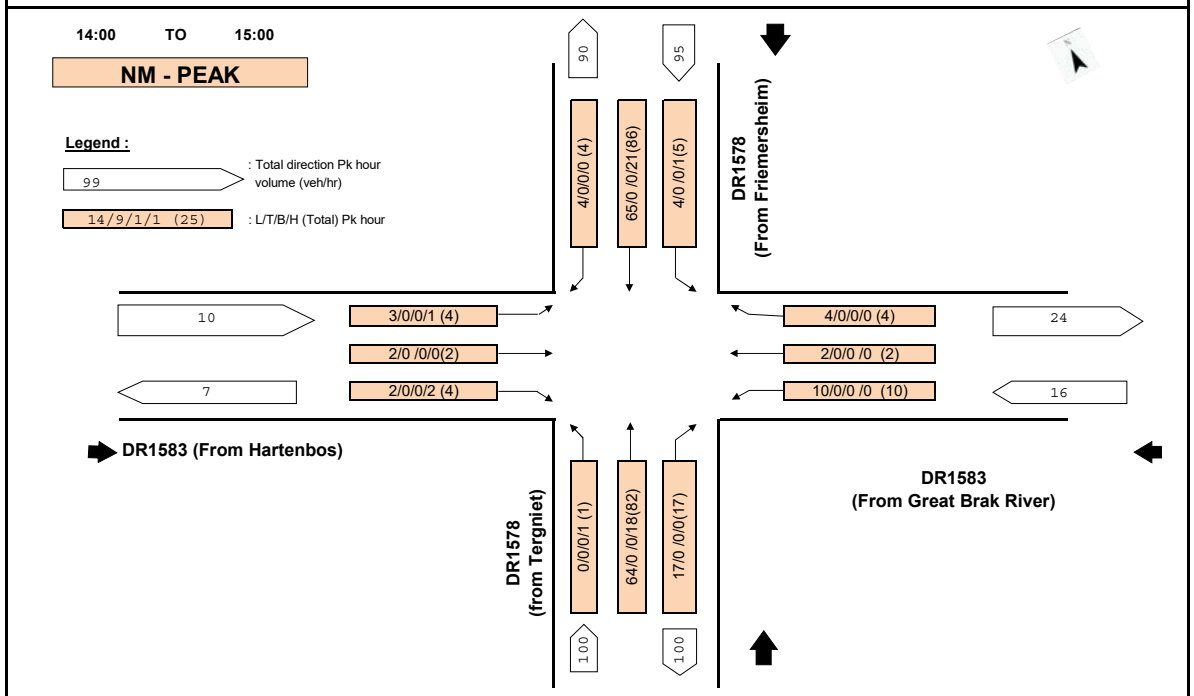
Site Layout :

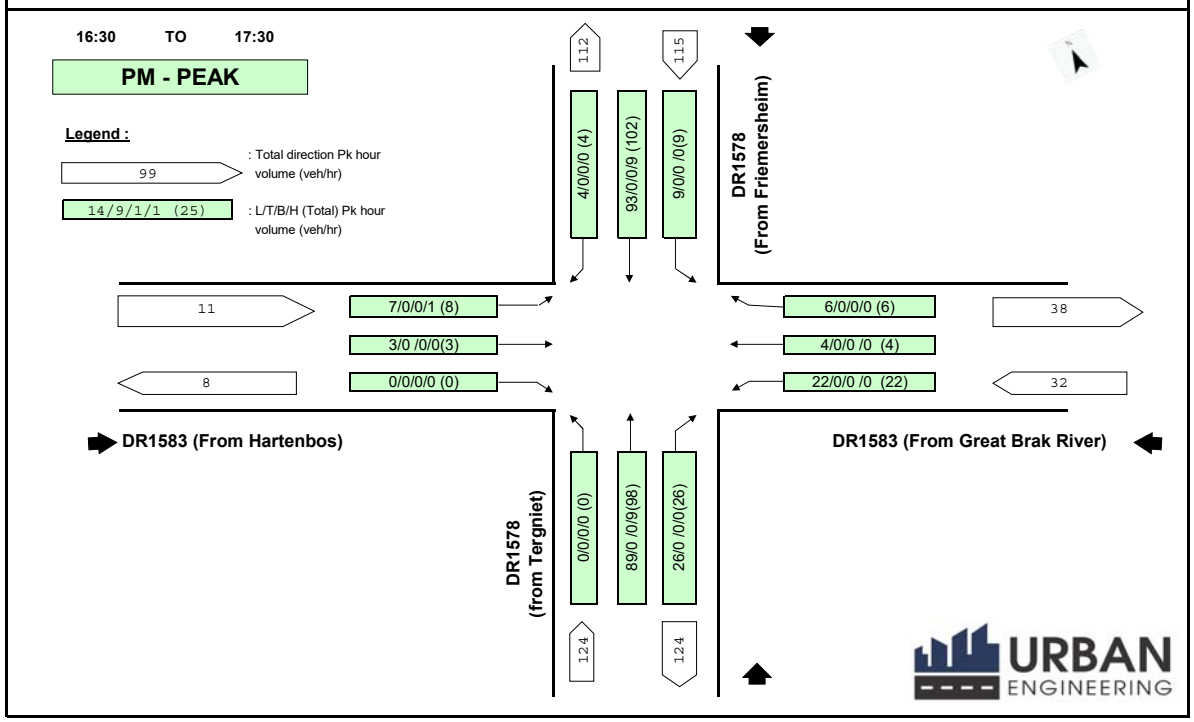


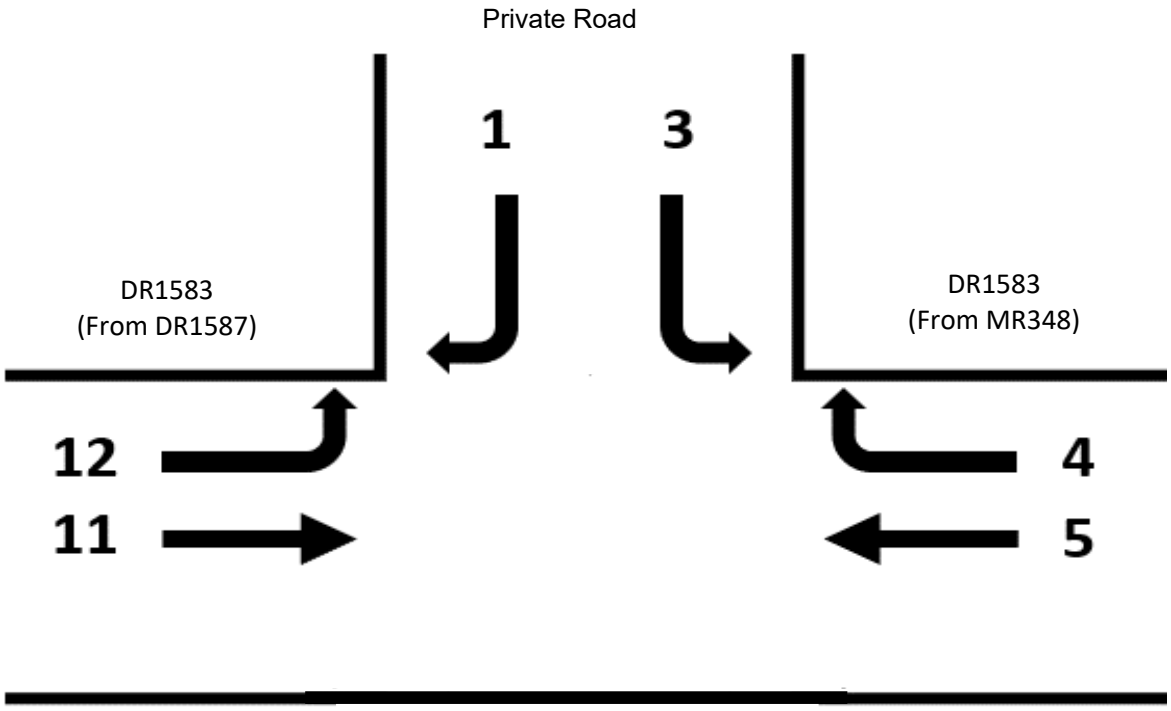


Time Period			Light Vehicles													Taxis/Minibus-taxis													Bus													Heavy Vehicles												
Start	End	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total
06:00	06:15	**19**	0	13	1	0	0	1	0	3	0	0	1	0	**19**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15	06:30	**29**	0	16	0	0	1	0	1	11	0	0	0	0	**29**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30	06:45	**54**	3	29	0	3	0	0	1	17	0	0	0	0	**53**													**0**													**0**	0	1	0	0	0	0	0	0	0	0	0	0	**1**
06:45	07:00	**60**	0	22	4	3	1	1	3	18	0	1	1	1	**55**													**0**													**0**	0	4	0	0	0	0	0	1	0	0	0	0	**5**
07:00	07:15	**75**	1	27	0	2	1	3	8	29	0	0	1	0	**72**													**0**													**0**	0	1	0	0	0	0	1	1	0	0	0	0	**3**
07:15	07:30	**71**	0	25	1	0	0	4	11	23	1	0	2	1	**68**													**0**													**0**	0	1	0	0	0	0	0	1	1	0	0	0	**3**
07:30	07:45	**62**	1	18	3	2	1	6	7	18	0	0	0	1	**57**													**0**													**0**	0	2	0	0	0	0	0	3	0	0	0	0	**5**
07:45	08:00	**48**	0	15	1	1	0	4	4	16	0	0	0	3	**44**													**0**													**0**	0	1	1	0	0	0	0	0	0	1	0	1	**4**
08:00	08:15	**28**	1	8	0	1	0	2	1	11	0	0	0	0	**24**													**0**													**0**	0	1	0	0	0	0	1	2	0	0	0	0	**4**
08:15	08:30	**50**	0	14	1	0	0	3	1	20	0	0	0	0	**39**													**0**													**0**	0	2	0	0	0	0	0	7	2	0	0	0	**11**
08:30	08:45	**31**	0	9	0	1	0	1	2	12	1	0	0	0	**26**													**0**													**0**	0	1	0	0	0	0	0	2	0	1	1	0	**5**
08:45	09:00	**44**	3	11	2	0	0	2	3	7	0	1	0	2	**31**													**0**													**0**	1	4	0	0	0	0	1	6	0	0	0	1	**13**
09:00	09:15	**58**	0	12	4	1	1	3	4	20	0	0	1	0	**46**													**0**													**0**	1	4	0	0	0	1	0	5	0	1	0	0	**12**
09:15	09:30	**30**	1	8	0	0	0	3	2	5	0	1	0	0	**20**													**0**													**0**	0	7	0	0	1	0	0	0	2	0	0	0	**10**
09:30	09:45	**37**	0	13	0	1	0	2	4	6	1	0	0	3	**30**													**0**													**0**	0	1	0	0	0	0	0	3	1	2	0	0	**7**
09:45	10:00	**53**	0	10	0	1	0	4	4	15	1	0	0	2	**37**													**0**													**0**	0	4	0	0	0	0	0	8	1	1	1	1	**16**
10:00	10:15	**45**	1	12	0	0	0	2	3	14	0	0	0	2	**34**													**0**													**0**	0	4	0	0	0	0	0	5	1	1	0	0	**11**
10:15	10:30	**44**	3	9	2	1	3	2	1	10	0	0	1	1	**33**													**0**													**0**	0	5	0	0	0	0	0	4	1	1	0	0	**11**
10:30	10:45	**50**	1	10	1	3	1	3	2	14	1	0	1	0	**37**													**0**													**0**	0	6	0	0	0	0	0	4	2	1	0	0	**13**
10:45	11:00	**42**	0	14	0	1	0	0	3	9	0	0	2	0	**29**													**0**													**0**	0	4	0	0	1	0	0	6	0	1	0	1	**13**
11:00	11:15	**49**	1	12	0	1	0	10	3	11	0	0	0	0	**38**													**0**													**0**	0	3	0	0	1	0	0	7	0	0	0	0	**11**
11:15	11:30	**46**	2	13	0	1	0	1	3	9	0	1	0	1	**31**													**0**													**0**	0	6	0	0	0	0	1	4	1	1	1	1	**15**
11:30	11:45	**45**	0	10	1	1	0	1	1	16	1	0	0	3	**34**													**0**													**0**	1	5	0	0	1	1	0	1	0	2	0	0	**11**
11:45	12:00	**37**	1	13	2	0	0	2	2	6	0	0	1	3	**30**													**0**													**0**	0	5	0	0	0	0	0	2	0	0	0	0	**7**
12:00	12:15	**55**	1	17	3	0	1	3	3	13	0	1	0	1	**43**													**0**													**0**	0	2	0	0	0	0	0	6	3	0	1	0	**12**
12:15	12:30	**47**	4	15	0	0	0	0	0	16	0	0	1	0	**36**													**0**													**0**	0	4	0	0	0	0	0	4	1	2	0	0	**11**
12:30	12:45	**32**	1	5	0	1	1	3	4	8	0	1	0	2	**26**													**0**													**0**	0	2	0	0	0	0	0	3	0	1	0	0	**6**
12:45	13:00	**50**	2	20	0	2	0	3	2	12	0	0	1	1	**43**													**0**													**0**	0	4	0	0	0	0	0	2	1	0	0	0	**7**
13:00	13:15	**47**	1	13	0	1	1	3	6	10	0	0	0	0	**35**													**0**													**0**	1	1	0	0	1	0	0	4	2	1	1	1	**12**
13:15	13:30	**46**	0	17	0	0	0	2	3	12	0	0	0	1	**35**													**0**													**0**	1	1	0	0	0	0	0	7	0	1	1	0	**11**
13:30	13:45	**61**	0	21	0	2	4	2	3	15	1	0	0	2	**50**													**0**													**0**	0	5	0	0	1	0	0	3	0	1	0	1	**11**
13:45	14:00	**40**	1	9	0	1	1	1	7	10	1	0	1	0	**32**													**0**													**0**	0	5	0	0	0	0	0	3	0	0	0	0	**8**
14:00	14:15	**52**	0	17	1	0	1	3	4	12	0	0	0	1	**39**													**0**													**0**	0	6	1	0	0	0	0	5	0	1	0	0	**13**
14:15	14:30	**54**	1	17	0	2	0	1	5	16	0	2	0	1	**45**													**0**													**0**	0	3	0	0	0	0	0	5	1	0	0	0	**9**
14:30	14:45	**61**	1	14	2	1	1	0	4	23	0	0	1	0	**47**													**0**													**0**	0	8	0	0	0	0	0	4	0	1	0	1	**14**
14:45	15:00	**54**	2	17	1	1	0	6	4	13	0	0	1	1	**46**													**0**													**0**	0	4	0	0	0	0	0	4	0	0	0	0	**8**
15:00	15:15	**54**	0	14	1	0	0	1	5	20	2	0	1	1	**45**													**0**													**0**	0	4	0	0	0	0	0	3	1	0	0	1	**9**
15:15	15:30	**61**	1	10	2	1	2	1	2	20	0	0	1	0	**40**													**0**													**0**	0	9	0	0	1	0	0	10	0	1	0	0	**21**
15:30	15:45	**38**	1	14	0	1	1	4	3	6	0	1	0	1	**32**													**0**													**0**	0	2	0	0	0	0	0	4	0	0	0	0	**6**
15:45	16:00	**43**	1	4	2	0	1	1	4	17	0	1	0	1	**32**													**0**													**0**	0	6	0	0	0	0	0	5	0	0	0	0	**11**
16:00	16:15	**60**	0	14	1	0	0	9	6	22	0	0	0	0	**52**													**0**													**0**	0	5	0	0	0	0	0	3	0	0	0	0	**8**
16:15	16:30	**61**	0	17	0	3	1	7	5	20	0	0	0	1	**54**													**0**													**0**	0	3	0	0	0	0	0	4	0	0	0	0	**7**
16:30	16:45	**62**	2	21	3	4	2	5	7	11	0	0	1	1	**57**													**0**													**0**	0	5	0	0	0	0	0	0	0	0	0	0	**5**
16:45	17:00	**70**	0	16	1	1	1	8	8	29	0	0	2	0	**66**													**0**													**0**	0	0	0	0	0	0	0	3	0	0	0	1	**4**
17:00	17:15	**82**	1	34	4	0	1	6	6	22	0	0	0	4	**78**													**0**													**0**	0	3	0	0	0	0	0	1	0	0	0	0	**4**
17:15	17:30	**68**	1	22	1	1	0	3	5	27	0	0	0	2	**62**													**0**													**0**	0	1	0	0	0	0	0	5	0	0	0	0	**6**
17:30	17:45	**37**	0	15	0	0	0	5	2	13	0	0	0	1	**36**													**0**													**0**	0	1	0	0	0	0	0	0	0	0	0	0	**1**
17:45	18:00	**32**	0	4	0	1	0	3	2	20	0	0	0	0	**30**													**0**													**0**	0	1	0	0	0	0	0	1	0	0	0	0	**2**
Total (5-19)		**2374**	**40**	**710**	**45**	**47**	**28**	**140**	**174**	**707**	**10**	**10**	**21**	**45**	**1977**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**157**	**2**	**0**	**7**	**2**	**4**	**161**	**21**	**22**	**6**	**10**	**397**
AM Pk hour vol		268	2	92	8	7	3	14	29	88	1	1	4	3	252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	1	6	1	0	0	0	16
06:45	to 07:45													**Total AM Pk hour vol (Light + Heavy)**		**2**	**92**	**8**	**7**	**3**	**14**	**29**	**88**	**1**	**1**	**4**	**3**	**252**	**2**	**92**	**8**	**7**	**3**	**14**	**29**	**88**	**1**	**1**	**4**	**3**	**252**	**2**	**100**	**8**	**7**	**3**	**14**	**30**	**94**	**2**	**1**	**4**	**3**	**268**
NM Pk hour vol		221	4	65	4	4	2	10	17	64	0	2	2	3	177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	1	0	0	0	0	18	1	2	0	1	44
14:00	to 15:00													**Typical NM Pk hour vol (Light + Heavy)**		**4**	**65**	**4**	**4**	**2**	**10**	**17**	**64**	**0**	**2**	**2**	**3**	**177**	**4**	**65**	**4**	**4**	**2**	**10**	**17**	**64**	**0**	**2**	**2**	**3**	**177**	**4**	**86**	**5**	**4**	**2**	**10**	**17**	**82**	**1**	**4**	**2**	**4**	**221**
PM Pk hour vol		282	4	93	9	6	4	22	26	89	0	0	3	7	263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9	0	0	0	1	19
16:30	to 17:30													**Total PM Pk hour vol (Light + Heavy)**		**4**	**93**	**9**	**6**	**4**	**22**	**26**	**89**	**0**	**0**	**3**	**7**	**263**	**4**	**93**	**9**	**6**	**4**	**22**	**26**	**89**	**0**	**0**	**3**	**8**	**282**	**4**	**102**	**9**	**6**	**4**	**22**	**26**	**98**	**0**	**0**	**3**	**8**	**282**


06:45 TO 07:45
AM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour volume (veh/hr)
104
110
2/0/0/0 (2)
92/0/0/8 (100)
8/0/0 /0(8)
DR1578 (From Friemersheim)
8
3/0/0/0 (3)
4/0 /0/0(4)
7
1/0/0/0 (1)
7/0/0/0 (7)
3/0/0 /0 (3)
14/0/0 /0 (14)
42
24
DR1583 (From Hartenbos)
DR1583 (From Great Brak River)
DR1578 (from Tergniet)
1/0/0/1 (2)
88/0 /0/6(94)
29/0 /0/1(30)
126
115


14:00 TO 15:00
NM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour
90
95
4/0/0/0 (4)
65/0 /0/21(86)
4/0 /0/1(5)
DR1578 (From Friemersheim)
10
3/0/0/1 (4)
2/0 /0/0(2)
7
2/0/0/2 (4)
4/0/0/0 (4)
2/0/0 /0 (2)
10/0/0 /0 (10)
24
16
DR1583 (From Hartenbos)
DR1583 (From Great Brak River)
DR1578 (from Tergniet)
0/0/0/1 (1)
64/0 /0/18(82)
17/0 /0/0(17)
100
100


16:30 TO 17:30
PM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour volume (veh/hr)
112
115
4/0/0/0 (4)
93/0/0/9 (102)
9/0/0 /0(9)
DR1578 (From Friemersheim)
11
7/0/0/1 (8)
3/0 /0/0(3)
8
0/0/0/0 (0)
6/0/0/0 (6)
4/0/0 /0 (4)
22/0/0 /0 (22)
38
32
DR1583 (From Hartenbos)
DR1583 (From Great Brak River)
DR1578 (from Tergniet)
0/0/0/0 (0)
89/0 /0/9(98)
26/0 /0/0(26)
124
124
URBAN ENGINEERING


Private Road
1
3
DR1583
(From DR1587)
DR1583
(From MR348)
12
11
4
5

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd / Private Rd
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

URBAN ENGINEERING

Tyd	Private Road						DR1583 (from MR348)					
	1		2		3		4		5		6	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	0	0	0	0	0	0	0	0	2	0	0	0
06:15 - 06:30	0	0	0	0	0	0	0	0	3	0	0	0
06:30 - 06:45	0	0	0	0	0	0	0	0	5	0	0	0
06:45 - 07:00	0	0	0	0	0	0	0	0	17	0	0	0
07:00 - 07:15	0	0	0	0	0	0	0	0	30	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	0	39	0	0	0
07:30 - 07:45	0	0	0	0	0	0	0	0	48	0	0	0
07:45 - 08:00	0	0	0	0	0	0	0	0	62	0	0	0
08:00 - 08:15	0	0	0	0	1	0	1	0	76	0	0	0
08:15 - 08:30	0	0	0	0	1	0	1	0	80	0	0	0
08:30 - 08:45	0	0	0	0	2	0	1	0	82	0	0	0
08:45 - 09:00	0	0	0	0	2	0	1	0	89	0	0	0
09:00 - 09:15	0	0	0	0	2	0	1	0	94	1	0	0
09:15 - 09:30	0	0	0	0	2	0	1	0	100	2	0	0
09:30 - 09:45	0	0	0	0	2	0	1	0	101	2	0	0
09:45 - 10:00	0	0	0	0	2	0	1	0	104	2	0	0
10:00 - 10:15	0	0	0	0	2	0	1	0	109	2	0	0
10:15 - 10:30	0	0	0	0	2	0	1	0	115	2	0	0
10:30 - 10:45	0	0	0	0	2	0	1	0	118	2	0	0
10:45 - 11:00	0	0	0	0	2	0	1	0	120	2	0	0
11:00 - 11:15	0	0	0	0	2	0	1	0	128	3	0	0
11:15 - 11:30	0	0	0	0	2	0	1	0	135	3	0	0
11:30 - 11:45	0	0	0	0	2	0	1	0	138	4	0	0
11:45 - 12:00	0	0	0	0	2	0	2	0	142	4	0	0
12:00 - 12:15	0	0	0	0	2	0	2	0	147	4	0	0
12:15 - 12:30	0	0	0	0	2	0	2	0	151	4	0	0
12:30 - 12:45	0	0	0	0	2	0	2	0	154	4	0	0
12:45 - 13:00	0	0	0	0	2	0	3	0	164	4	0	0
13:00 - 13:15	0	0	0	0	3	0	3	0	177	5	0	0

13:15 - 13:30	0	0	0	0	3	0	3	0	181	6	0	0
13:30 - 13:45	0	0	0	0	3	0	4	0	184	6	0	0
13:45 - 14:00	0	0	0	0	4	0	4	0	195	6	0	0
14:00 - 14:15	0	0	0	0	4	0	4	0	203	6	0	0
14:15 - 14:30	0	0	0	0	4	0	4	0	207	6	0	0
14:30 - 14:45	0	0	0	0	4	0	4	0	211	6	0	0
14:45 - 15:00	0	0	0	0	4	0	4	0	220	6	0	0
15:00 - 15:15	0	0	0	0	4	0	4	0	226	6	0	0
15:15 - 15:30	0	0	0	0	4	0	4	0	234	7	0	0
15:30 - 15:45	0	0	0	0	4	0	4	0	240	8	0	0
15:45 - 16:00	0	0	0	0	4	0	4	0	248	8	0	0
16:00 - 16:15	0	0	0	0	4	0	4	0	260	8	0	0
16:15 - 16:30	0	0	0	0	4	0	4	0	273	8	0	0
16:30 - 16:45	0	0	0	0	4	0	4	0	287	8	0	0
16:45 - 17:00	0	0	0	0	4	0	4	0	303	8	0	0
17:00 - 17:15	0	0	0	0	4	0	4	0	316	8	0	0
17:15 - 17:30	0	0	0	0	4	0	4	0	320	8	0	0
17:30 - 17:45	0	0	0	0	4	0	4	0	324	8	0	0
17:45 - 18:00	0	0	0	0	4	0	4	0	328	8	0	0

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd / Private Rd
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

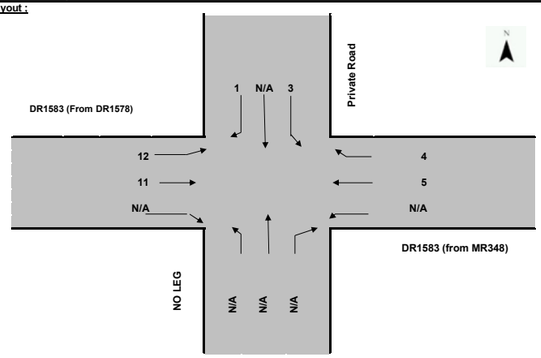
URBAN ENGINEERING

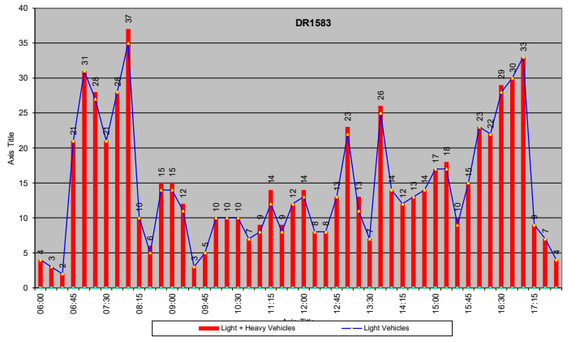
Tyd							DR1583 (from DR1578)					
	7		8		9		10		11		12	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	0	0	0	0	0	0	0	0	2	0	0	0
06:15 - 06:30	0	0	0	0	0	0	0	0	4	0	0	0
06:30 - 06:45	0	0	0	0	0	0	0	0	4	0	0	0
06:45 - 07:00	0	0	0	0	0	0	0	0	13	0	0	0
07:00 - 07:15	0	0	0	0	0	0	0	0	31	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	0	49	1	0	0
07:30 - 07:45	0	0	0	0	0	0	0	0	61	1	0	0
07:45 - 08:00	0	0	0	0	0	0	0	0	75	1	0	0
08:00 - 08:15	0	0	0	0	0	0	0	0	94	3	0	0
08:15 - 08:30	0	0	0	0	0	0	0	0	100	3	0	0
08:30 - 08:45	0	0	0	0	0	0	0	0	102	4	0	0
08:45 - 09:00	0	0	0	0	0	0	0	0	109	5	0	0
09:00 - 09:15	0	0	0	0	0	0	0	0	118	5	0	0
09:15 - 09:30	0	0	0	0	0	0	0	0	123	5	0	0
09:30 - 09:45	0	0	0	0	0	0	0	0	125	5	0	0
09:45 - 10:00	0	0	0	0	0	0	0	0	127	5	0	0
10:00 - 10:15	0	0	0	0	0	0	0	0	132	5	0	0
10:15 - 10:30	0	0	0	0	0	0	0	0	136	5	0	0
10:30 - 10:45	0	0	0	0	0	0	0	0	143	5	0	0
10:45 - 11:00	0	0	0	0	0	0	0	0	148	5	0	0
11:00 - 11:15	0	0	0	0	0	0	0	0	148	5	0	0
11:15 - 11:30	0	0	0	0	0	0	0	0	153	7	0	0
11:30 - 11:45	0	0	0	0	0	0	0	0	157	7	1	0
11:45 - 12:00	0	0	0	0	0	0	0	0	164	7	1	0
12:00 - 12:15	0	0	0	0	0	0	0	0	172	8	1	0
12:15 - 12:30	0	0	0	0	0	0	0	0	176	8	1	0

12:30 - 12:45	0	0	0	0	0	0	0	0	181	8	1	0
12:45 - 13:00	0	0	0	0	0	0	0	0	183	8	1	0
13:00 - 13:15	0	0	0	0	0	0	0	0	191	8	1	0
13:15 - 13:30	0	0	0	0	0	0	0	0	198	9	1	0
13:30 - 13:45	0	0	0	0	0	0	0	0	201	9	1	0
13:45 - 14:00	0	0	0	0	0	0	0	0	214	10	1	0
14:00 - 14:15	0	0	0	0	0	0	0	0	220	10	1	0
14:15 - 14:30	0	0	0	0	0	0	0	0	228	10	1	0
14:30 - 14:45	0	0	0	0	0	0	0	0	237	10	1	0
14:45 - 15:00	0	0	0	0	0	0	0	0	241	10	2	0
15:00 - 15:15	0	0	0	0	0	0	0	0	252	10	2	0
15:15 - 15:30	0	0	0	0	0	0	0	0	261	10	2	0
15:30 - 15:45	0	0	0	0	0	0	0	0	264	10	2	0
15:45 - 16:00	0	0	0	0	0	0	0	0	271	10	2	0
16:00 - 16:15	0	0	0	0	0	0	0	0	282	10	2	0
16:15 - 16:30	0	0	0	0	0	0	0	0	291	10	2	0
16:30 - 16:45	0	0	0	0	0	0	0	0	305	11	2	0
16:45 - 17:00	0	0	0	0	0	0	0	0	319	11	2	0
17:00 - 17:15	0	0	0	0	0	0	0	0	339	11	2	0
17:15 - 17:30	0	0	0	0	0	0	0	0	344	11	2	0
17:30 - 17:45	0	0	0	0	0	0	0	0	347	11	2	0
17:45 - 18:00	0	0	0	0	0	0	0	0	347	11	2	0

Site Brootbrak River: Sandhoogte Rd / Private R
Date 10/05/2023
Surveyor JE Giewelaar
Weather Sunny

Site Layout :





URBAN ENGINEERING

Time Period			Light Vehicles													Taxis/Minibus-taxis													Bus													Heavy Vehicles												
Start	End	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total
06:00	06:15	**4**	0	0	0	0	2	0	0	0	0	0	2	0	**4**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
06:15	06:30	**3**	0	0	0	0	1	0	0	0	0	0	2	0	**3**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
06:30	06:45	**2**	0	0	0	0	2	0	0	0	0	0	0	0	**2**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
06:45	07:00	**21**	0	0	0	0	12	0	0	0	0	0	9	0	**21**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
07:00	07:15	**31**	0	0	0	0	13	0	0	0	0	0	18	0	**31**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15	07:30	**28**	0	0	0	0	9	0	0	0	0	0	18	0	**27**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
07:30	07:45	**21**	0	0	0	0	9	0	0	0	0	0	12	0	**21**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
07:45	08:00	**28**	0	0	0	0	14	0	0	0	0	0	14	0	**28**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
08:00	08:15	**37**	0	0	1	1	14	0	0	0	0	0	19	0	**35**													**0**													**0**	0	0	0	0	0	0	0	0	0	2	0	**2**
08:15	08:30	**10**	0	0	0	0	4	0	0	0	0	0	6	0	**10**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
08:30	08:45	**6**	0	0	1	0	2	0	0	0	0	0	2	0	**5**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
08:45	09:00	**15**	0	0	0	0	7	0	0	0	0	0	7	0	**14**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
09:00	09:15	**15**	0	0	0	0	5	0	0	0	0	0	9	0	**14**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
09:15	09:30	**12**	0	0	0	0	6	0	0	0	0	0	5	0	**11**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
09:30	09:45	**3**	0	0	0	0	1	0	0	0	0	0	2	0	**3**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
09:45	10:00	**5**	0	0	0	0	3	0	0	0	0	0	2	0	**5**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
10:00	10:15	**10**	0	0	0	0	5	0	0	0	0	0	5	0	**10**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
10:15	10:30	**10**	0	0	0	0	6	0	0	0	0	0	4	0	**10**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
10:30	10:45	**10**	0	0	0	0	3	0	0	0	0	0	7	0	**10**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
10:45	11:00	**7**	0	0	0	0	2	0	0	0	0	0	5	0	**7**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
11:00	11:15	**9**	0	0	0	0	8	0	0	0	0	0	0	0	**8**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
11:15	11:30	**14**	0	0	0	0	7	0	0	0	0	0	5	0	**12**													**0**													**0**	0	0	0	0	0	0	0	0	0	2	0	**2**
11:30	11:45	**9**	0	0	0	0	3	0	0	0	0	0	4	1	**8**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
11:45	12:00	**12**	0	0	0	1	4	0	0	0	0	0	7	0	**12**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
12:00	12:15	**14**	0	0	0	0	5	0	0	0	0	0	8	0	**13**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
12:15	12:30	**8**	0	0	0	0	4	0	0	0	0	0	4	0	**8**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
12:30	12:45	**8**	0	0	0	0	3	0	0	0	0	0	5	0	**8**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
12:45	13:00	**13**	0	0	0	1	10	0	0	0	0	0	2	0	**13**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
13:00	13:15	**23**	0	0	1	0	13	0	0	0	0	0	8	0	**22**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
13:15	13:30	**13**	0	0	0	0	4	0	0	0	0	0	7	0	**11**													**0**													**0**	0	0	0	0	1	0	0	0	0	1	0	**2**
13:30	13:45	**7**	0	0	0	1	3	0	0	0	0	0	3	0	**7**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
13:45	14:00	**26**	0	0	1	0	11	0	0	0	0	0	13	0	**25**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
14:00	14:15	**14**	0	0	0	0	8	0	0	0	0	0	6	0	**14**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
14:15	14:30	**12**	0	0	0	0	4	0	0	0	0	0	8	0	**12**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
14:30	14:45	**13**	0	0	0	0	4	0	0	0	0	0	9	0	**13**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
14:45	15:00	**14**	0	0	0	0	9	0	0	0	0	0	4	1	**14**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
15:00	15:15	**17**	0	0	0	0	6	0	0	0	0	0	11	0	**17**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
15:15	15:30	**18**	0	0	0	0	8	0	0	0	0	0	9	0	**17**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
15:30	15:45	**10**	0	0	0	0	6	0	0	0	0	0	3	0	**9**													**0**													**0**	0	0	0	0	1	0	0	0	0	0	0	**1**
15:45	16:00	**15**	0	0	0	0	8	0	0	0	0	0	7	0	**15**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
16:00	16:15	**23**	0	0	0	0	12	0	0	0	0	0	11	0	**23**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
16:15	16:30	**22**	0	0	0	0	13	0	0	0	0	0	9	0	**22**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
16:30	16:45	**29**	0	0	0	0	14	0	0	0	0	0	14	0	**28**													**0**													**0**	0	0	0	0	0	0	0	0	0	1	0	**1**
16:45	17:00	**30**	0	0	0	0	16	0	0	0	0	0	14	0	**30**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
17:00	17:15	**33**	0	0	0	0	13	0	0	0	0	0	20	0	**33**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
17:15	17:30	**9**	0	0	0	0	4	0	0	0	0	0	5	0	**9**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
17:30	17:45	**7**	0	0	0	0	4	0	0	0	0	0	3	0	**7**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
17:45	18:00	**4**	0	0	0	0	4	0	0	0	0	0	0	0	**4**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	**0**
Total (5-19)		**704**	**0**	**0**	**4**	**4**	**328**	**0**	**0**	**0**	**0**	**0**	**347**	**2**	**685**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**19**
AM Pk hour vol		114	0	0	1	1	46	0	0	0	0	0	63	0	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
07:15	to 08:15		**Total AM Pk hour vol (Light + Heavy)**												**0**	**0**	**1**	**1**	**46**	**0**	**0**	**0**	**0**	**0**	**63**	**0**	**111**	**0**	**0**	**1**	**1**	**46**	**0**	**0**	**0**	**0**	**0**	**63**	**0**	**111**	**0**	**0**	**1**	**1**	**46**	**0**	**0**	**0**	**0**	**0**	**66**	**0**	**114**
NM Pk hour vol		69	0	0	2	1	31	0	0	0	0	0	31	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	4
13:00	to 14:00		**Typical NM Pk hour vol (Light + Heavy)**												**0**	**0**	**2**	**1**	**31**	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**65**	**0**	**0**	**2**	**1**	**31**	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**65**	**0**	**0**	**2**	**1**	**33**	**0**	**0**	**0**	**0**	**0**	**33**	**0**	**69**
PM Pk hour vol		114	0	0	0	0	56	0	0	0	0	0	57	0	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
16:15	to 17:15		**Total PM Pk hour vol (Light + Heavy)**												**0**	**0**	**0**	**0**	**56**	**0**	**0**	**0**	**0**	**0**	**57**	**0**	**113**	**0**	**0**	**0**	**0**	**56**	**0**	**0**	**0**	**0**	**0**	**57**	**0**	**113**	**0**	**0**	**0**	**0**	**56**	**0**	**0**	**0**	**0**	**0**	**58**	**0**	**114**

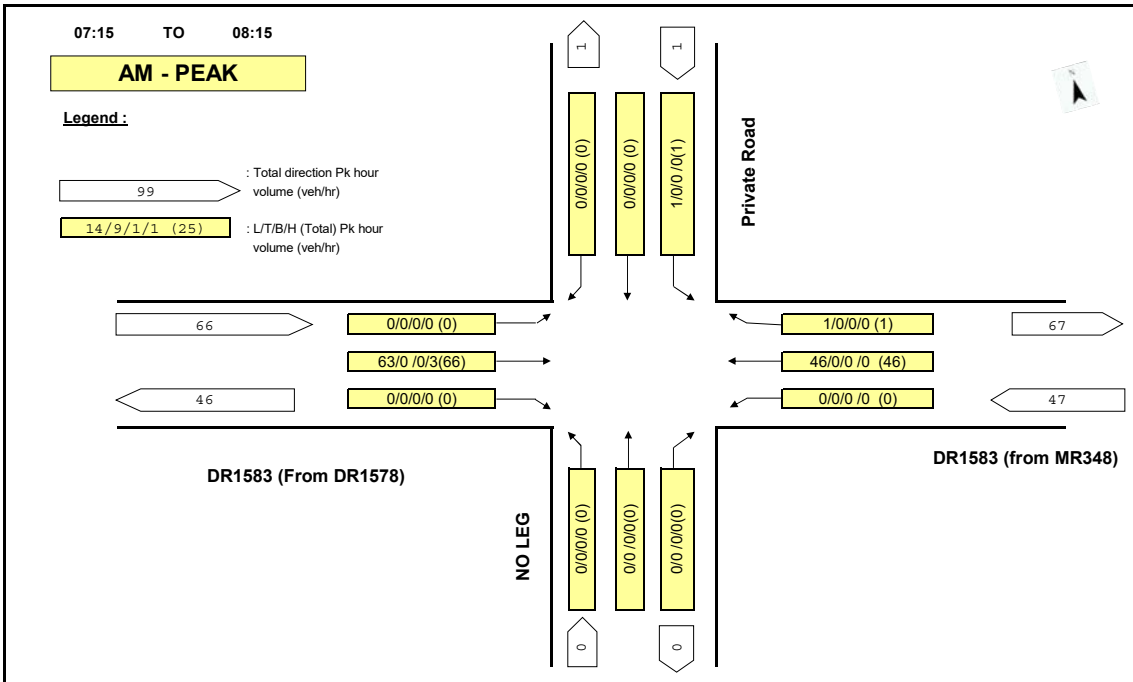
07:15 TO 08:15

AM - PEAK

Legend :

99 : Total direction Pk hour volume (veh/hr)

14/9/1/1 (25) : L/T/B/H (Total) Pk hour volume (veh/hr)



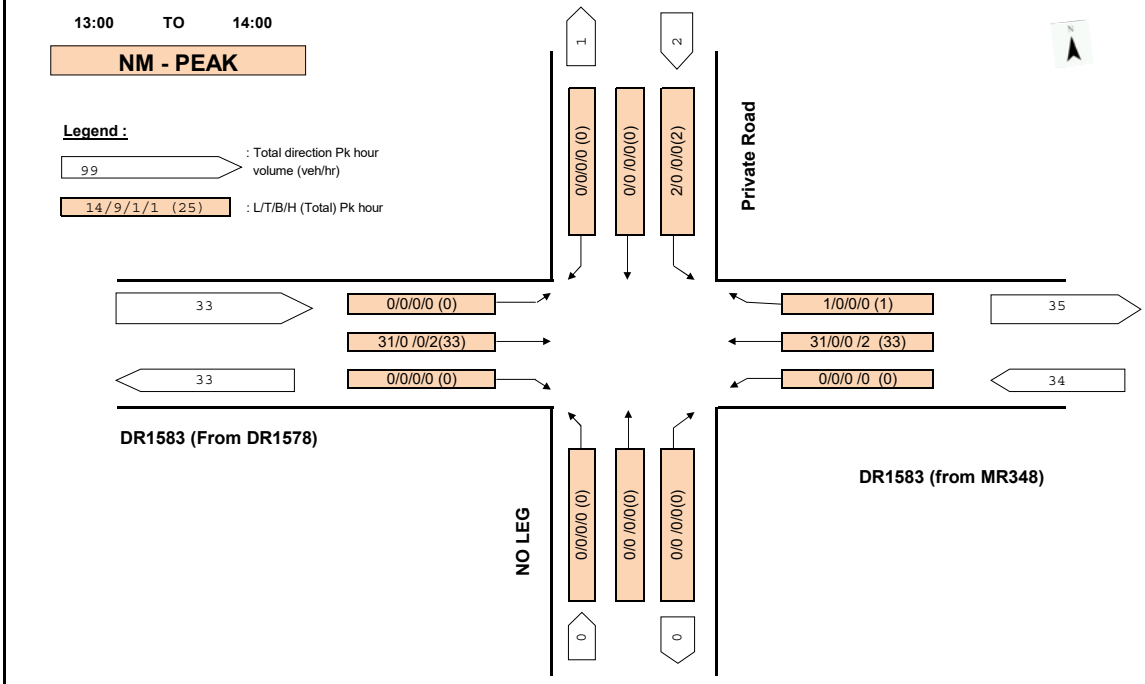
13:00 TO 14:00

NM - PEAK

Legend :

99 : Total direction Pk hour volume (veh/hr)

14/9/1/1 (25) : L/T/B/H (Total) Pk hour



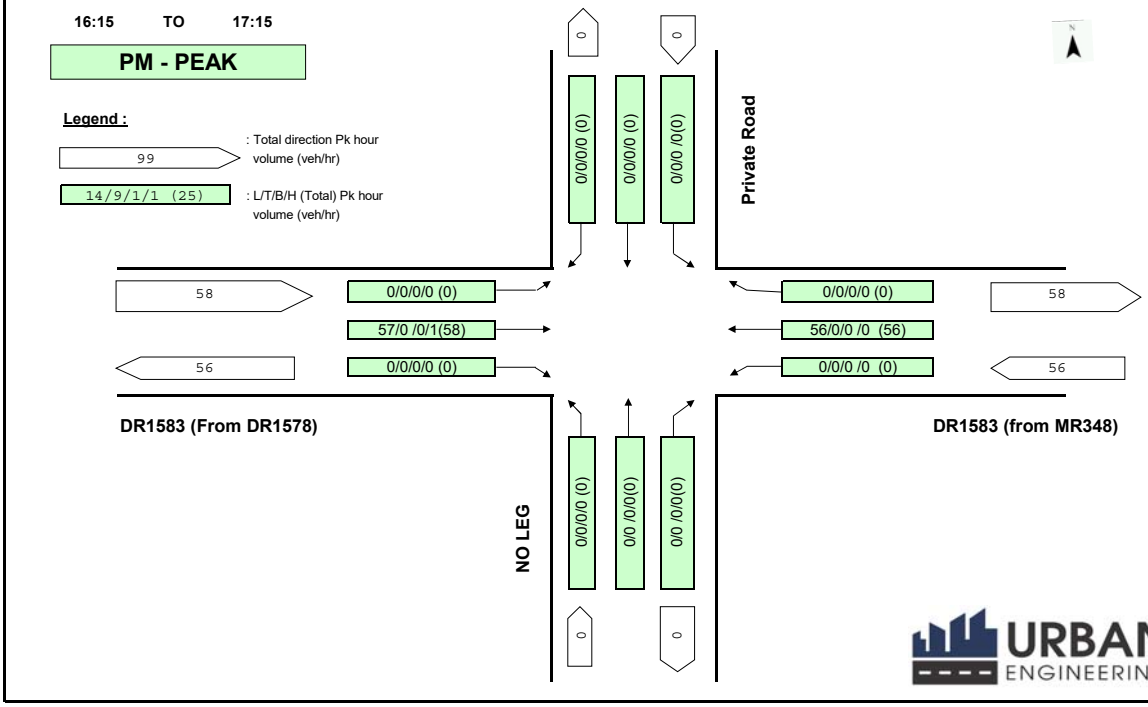
16:15 TO 17:15

PM - PEAK

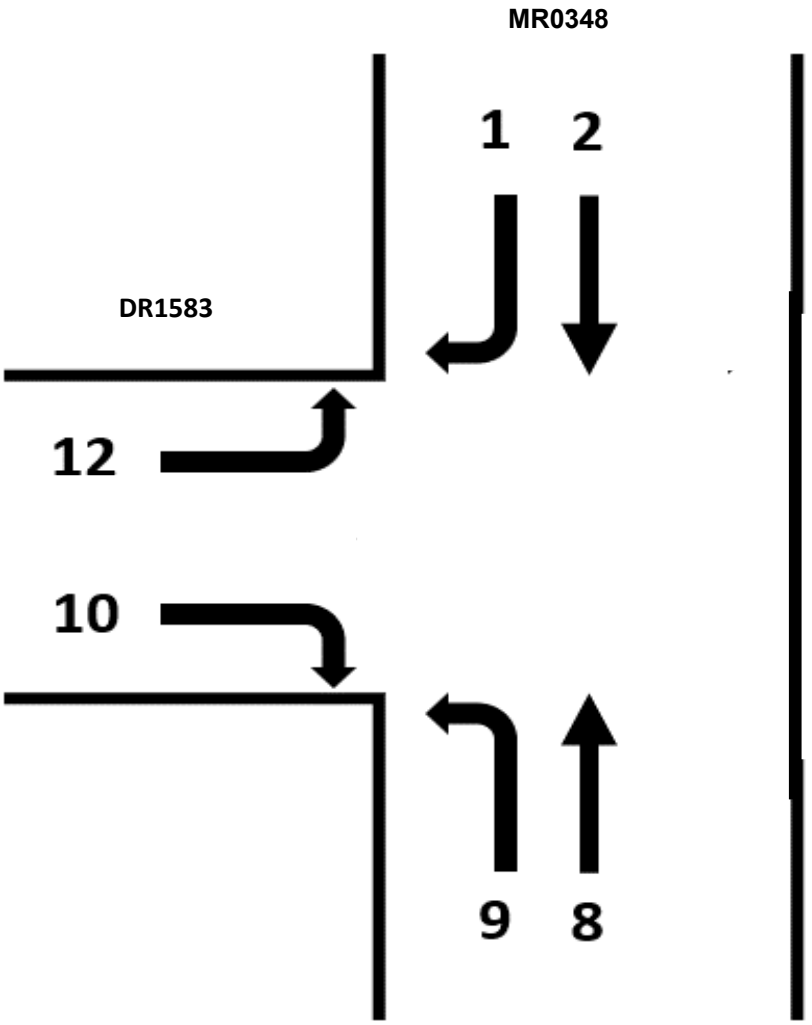
Legend :

99 : Total direction Pk hour volume (veh/hr)

14/9/1/1 (25) : L/T/B/H (Total) Pk hour volume (veh/hr)



URBAN ENGINEERING


MR0348
1
2
DR1583
12
10
9
8
MR0348

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd / Lang St
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

Tyd	MR0348											
	1		2		3		4		5		6	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	1	0	19	0	0	0	0	0	0	0	0	0
06:15 - 06:30	3	0	34	0	0	0	0	0	0	0	0	0
06:30 - 06:45	7	0	54	0	0	0	0	0	0	0	0	0
06:45 - 07:00	23	0	87	0	0	0	0	0	0	0	0	0
07:00 - 07:15	37	0	130	0	0	0	0	0	0	0	0	0
07:15 - 07:30	54	0	188	0	0	0	0	0	0	0	0	0
07:30 - 07:45	68	0	240	0	0	0	0	0	0	0	0	0
07:45 - 08:00	99	0	288	2	0	0	0	0	0	0	0	0
08:00 - 08:15	115	0	327	3	0	0	0	0	0	0	0	0
08:15 - 08:30	127	0	360	5	0	0	0	0	0	0	0	0
08:30 - 08:45	140	0	400	5	0	0	0	0	0	0	0	0
08:45 - 09:00	154	0	436	7	0	0	0	0	0	0	0	0
09:00 - 09:15	164	2	484	11	0	0	0	0	0	0	0	0
09:15 - 09:30	176	3	517	14	0	0	0	0	0	0	0	0
09:30 - 09:45	184	3	553	16	0	0	0	0	0	0	0	0
09:45 - 10:00	195	4	598	20	0	0	0	0	0	0	0	0
10:00 - 10:15	203	4	632	21	0	0	0	0	0	0	0	0
10:15 - 10:30	222	5	680	22	0	0	0	0	0	0	0	0
10:30 - 10:45	231	6	729	24	0	0	0	0	0	0	0	0
10:45 - 11:00	240	6	767	30	0	0	0	0	0	0	0	0
11:00 - 11:15	249	7	807	34	0	0	0	0	0	0	0	0
11:15 - 11:30	262	7	864	34	0	0	0	0	0	0	0	0
11:30 - 11:45	272	8	926	35	0	0	0	0	0	0	0	0
11:45 - 12:00	288	9	988	38	0	0	0	0	0	0	0	0
12:00 - 12:15	300	9	1017	40	0	0	0	0	0	0	0	0
12:15 - 12:30	312	10	1069	43	0	0	0	0	0	0	0	0
12:30 - 12:45	327	10	1111	43	0	0	0	0	0	0	0	0
12:45 - 13:00	338	10	1160	43	0	0	0	0	0	0	0	0
13:00 - 13:15	359	11	1223	47	0	0	0	0	0	0	0	0

13:15 - 13:30	362	12	1272	50	0	0	0	0	0	0	0	0
13:30 - 13:45	380	13	1319	53	0	0	0	0	0	0	0	0
13:45 - 14:00	393	14	1368	55	0	0	0	0	0	0	0	0
14:00 - 14:15	409	14	1437	55	0	0	0	0	0	0	0	0
14:15 - 14:30	419	14	1474	57	0	0	0	0	0	0	0	0
14:30 - 14:45	429	14	1525	58	0	0	0	0	0	0	0	0
14:45 - 15:00	452	14	1574	60	0	0	0	0	0	0	0	0
15:00 - 15:15	462	15	1628	62	0	0	0	0	0	0	0	0
15:15 - 15:30	472	16	1672	63	0	0	0	0	0	0	0	0
15:30 - 15:45	485	18	1707	69	0	0	0	0	0	0	0	0
15:45 - 16:00	501	18	1753	69	0	0	0	0	0	0	0	0
16:00 - 16:15	512	18	1794	69	0	0	0	0	0	0	0	0
16:15 - 16:30	534	18	1854	69	0	0	0	0	0	0	0	0
16:30 - 16:45	557	18	1902	70	0	0	0	0	0	0	0	0
16:45 - 17:00	579	18	1950	72	0	0	0	0	0	0	0	0
17:00 - 17:15	596	18	2005	72	0	0	0	0	0	0	0	0
17:15 - 17:30	615	18	2042	73	0	0	0	0	0	0	0	0
17:30 - 17:45	629	18	2079	78	0	0	0	0	0	0	0	0
17:45 - 18:00	637	19	2100	78	0	0	0	0	0	0	0	0

Verkeerstelling/Traffic Count

Projek Naam: TIA Transand
Plek/Location: Grootbrak River: Sandhoogte Rd / Lang St
Datum/Date: 10/05/2023
Teller/Counter: JE Giewelaar

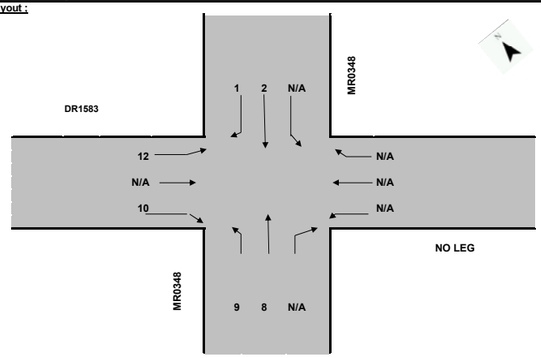
URBAN ENGINEERING

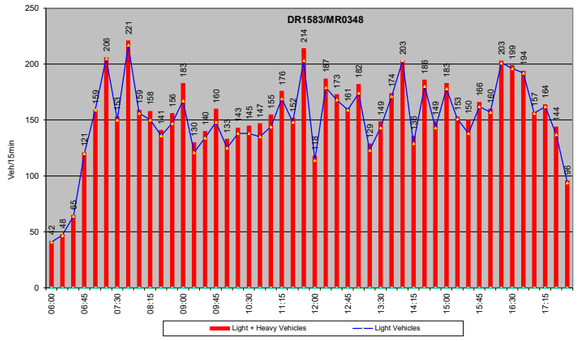
Tyd	MR0348						DR1583					
	7		8		9		10		11		12	
	L	S	L	S	L	S	L	S	L	S	L	S
06:00 - 06:15	0	0	7	1	3	0	8	0	0	0	3	0
06:15 - 06:30	0	0	18	2	7	0	18	0	0	0	8	0
06:30 - 06:45	0	0	31	3	11	0	36	0	0	0	13	0
06:45 - 07:00	0	0	60	4	20	0	62	0	0	0	20	0
07:00 - 07:15	0	0	109	4	34	0	86	0	0	0	35	0
07:15 - 07:30	0	0	160	4	47	0	129	0	0	0	58	1
07:30 - 07:45	0	0	190	5	59	1	156	0	0	0	73	2
07:45 - 08:00	0	0	251	7	79	1	184	0	0	0	102	2
08:00 - 08:15	0	0	286	8	100	2	213	0	0	0	118	2
08:15 - 08:30	0	0	337	10	119	3	227	3	0	0	139	2
08:30 - 08:45	0	0	378	12	130	4	250	4	0	0	147	3
08:45 - 09:00	0	0	420	15	147	6	272	6	0	0	163	3
09:00 - 09:15	0	0	456	21	167	7	300	7	0	0	188	5
09:15 - 09:30	0	0	495	22	181	8	313	9	0	0	198	6
09:30 - 09:45	0	0	539	24	198	10	336	9	0	0	204	6
09:45 - 10:00	0	0	579	26	212	11	363	10	0	0	215	9
10:00 - 10:15	0	0	625	30	230	12	373	12	0	0	224	9
10:15 - 10:30	0	0	657	32	241	12	392	12	0	0	233	10
10:30 - 10:45	0	0	691	34	257	13	412	13	0	0	243	10
10:45 - 11:00	0	0	727	37	274	14	429	15	0	0	261	10
11:00 - 11:15	0	0	778	40	287	17	452	15	0	0	269	10
11:15 - 11:30	0	0	831	44	306	17	468	17	0	0	280	11
11:30 - 11:45	0	0	868	45	325	18	481	17	0	0	287	11
11:45 - 12:00	0	0	931	49	351	18	507	20	0	0	297	11
12:00 - 12:15	0	0	963	51	363	18	526	20	0	0	307	11
12:15 - 12:30	0	0	1014	53	393	19	545	20	0	0	322	12

12:30 - 12:45	0	0	1065	55	416	19	569	21	0	0	335	14
12:45 - 13:00	0	0	1115	56	433	19	588	22	0	0	348	14
13:00 - 13:15	0	0	1156	57	455	20	598	22	0	0	365	15
13:15 - 13:30	0	0	1187	58	466	20	616	22	0	0	376	16
13:30 - 13:45	0	0	1227	59	482	20	625	23	0	0	389	16
13:45 - 14:00	0	0	1278	59	505	20	649	23	0	0	400	16
14:00 - 14:15	0	0	1338	59	526	20	671	23	0	0	415	16
14:15 - 14:30	0	0	1377	63	543	21	685	23	0	0	427	16
14:30 - 14:45	0	0	1430	67	567	22	711	23	0	0	443	16
14:45 - 15:00	0	0	1463	70	582	22	724	24	0	0	453	16
15:00 - 15:15	0	0	1507	71	613	22	750	24	0	0	466	17
15:15 - 15:30	0	0	1542	71	641	22	769	24	0	0	481	17
15:30 - 15:45	0	0	1577	74	661	23	787	24	0	0	498	17
15:45 - 16:00	0	0	1615	75	684	23	810	25	0	0	514	19
16:00 - 16:15	0	0	1660	77	705	23	828	25	0	0	535	20
16:15 - 16:30	0	0	1713	78	726	23	851	26	0	0	557	20
16:30 - 16:45	0	0	1773	79	756	24	873	26	0	0	570	20
16:45 - 17:00	0	0	1820	79	787	24	895	26	0	0	592	20
17:00 - 17:15	0	0	1843	80	815	24	917	26	0	0	603	20
17:15 - 17:30	0	0	1886	81	850	24	933	26	0	0	615	20
17:30 - 17:45	0	0	1930	82	872	24	949	27	0	0	619	20
17:45 - 18:00	0	0	1961	83	891	24	960	27	0	0	623	20

Site Grootbrak River: Sandhoogte Rd / Lang St
Date 10/05/2023
Surveyor JE Giewelaar
Weather Sunny

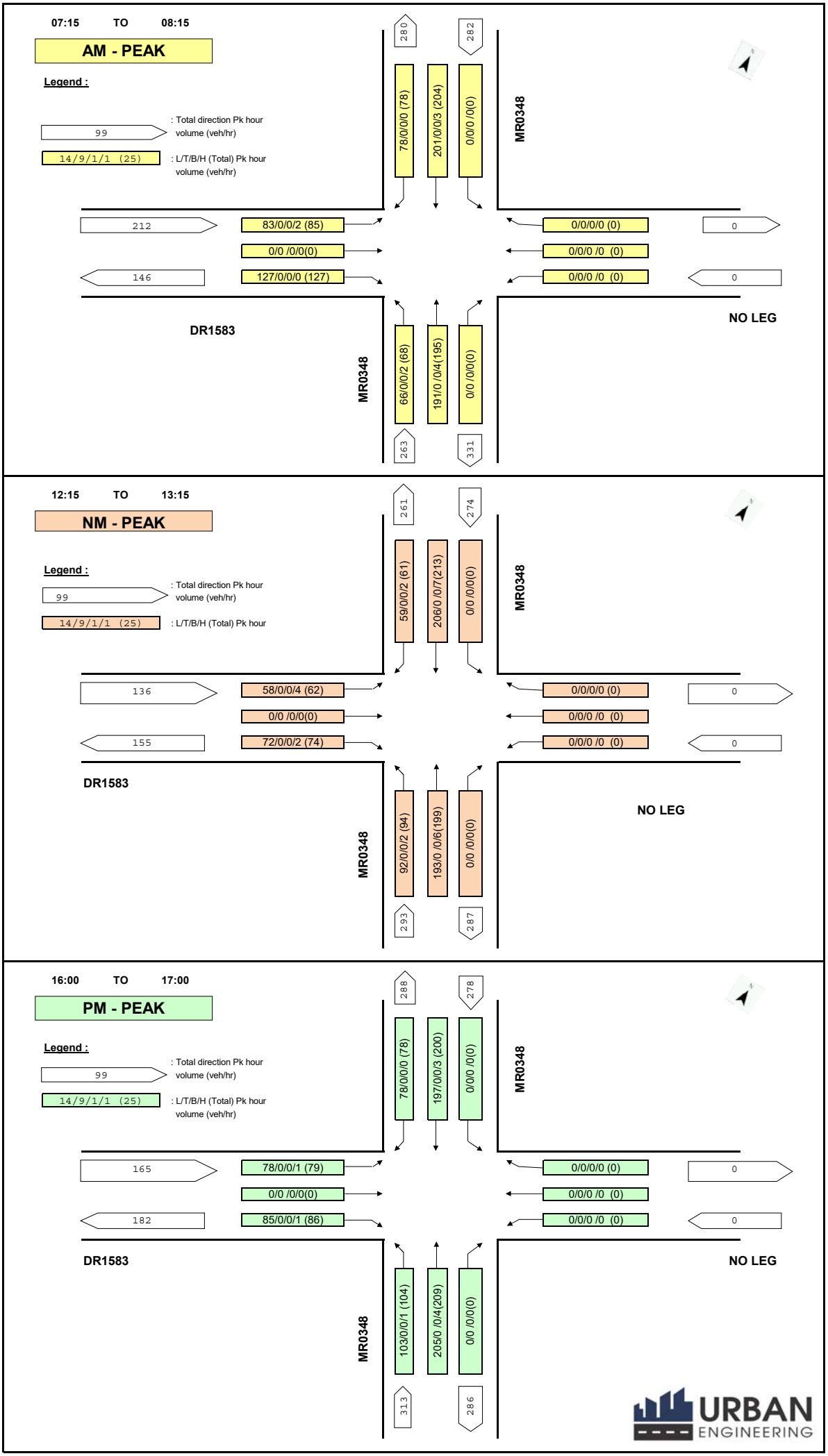
Site Layout :





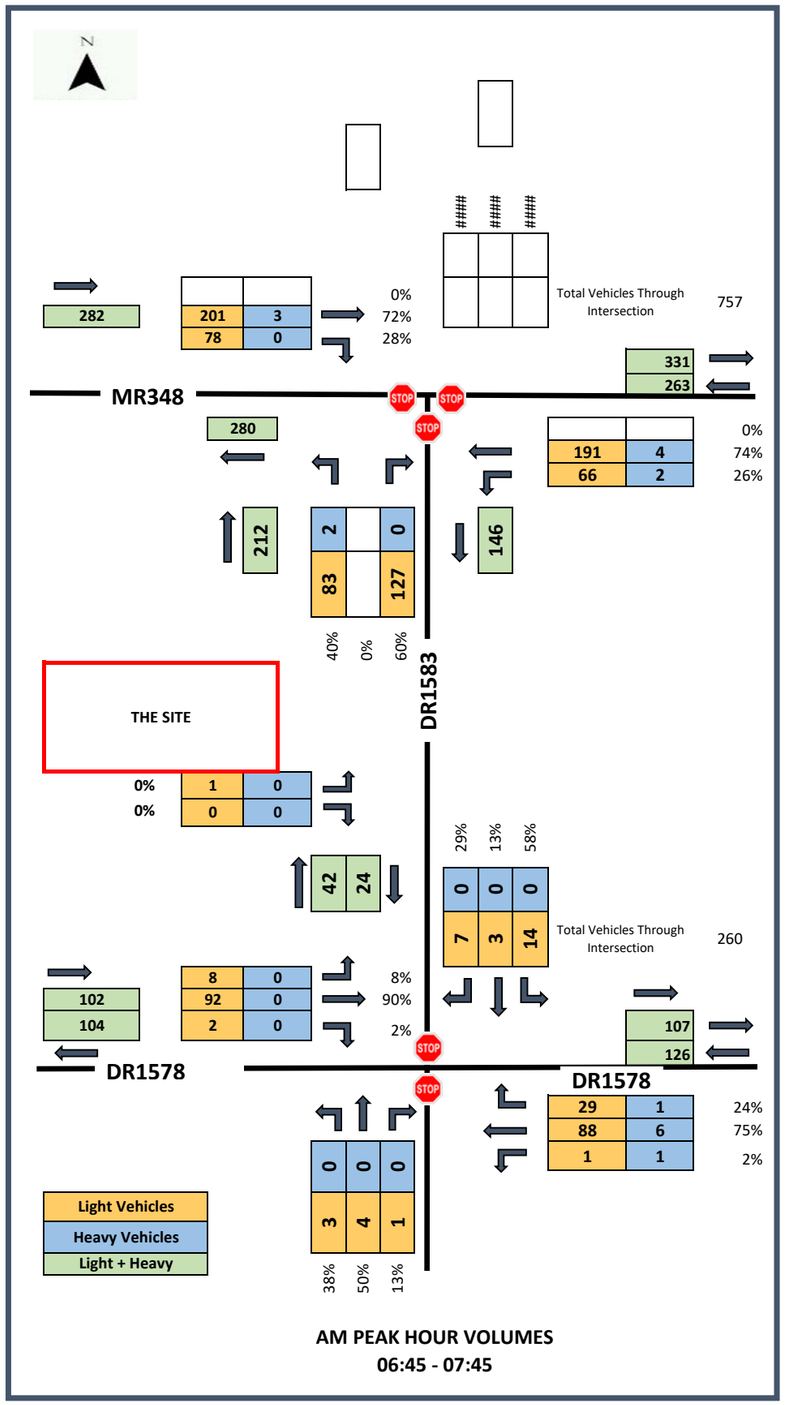
URBAN ENGINEERING

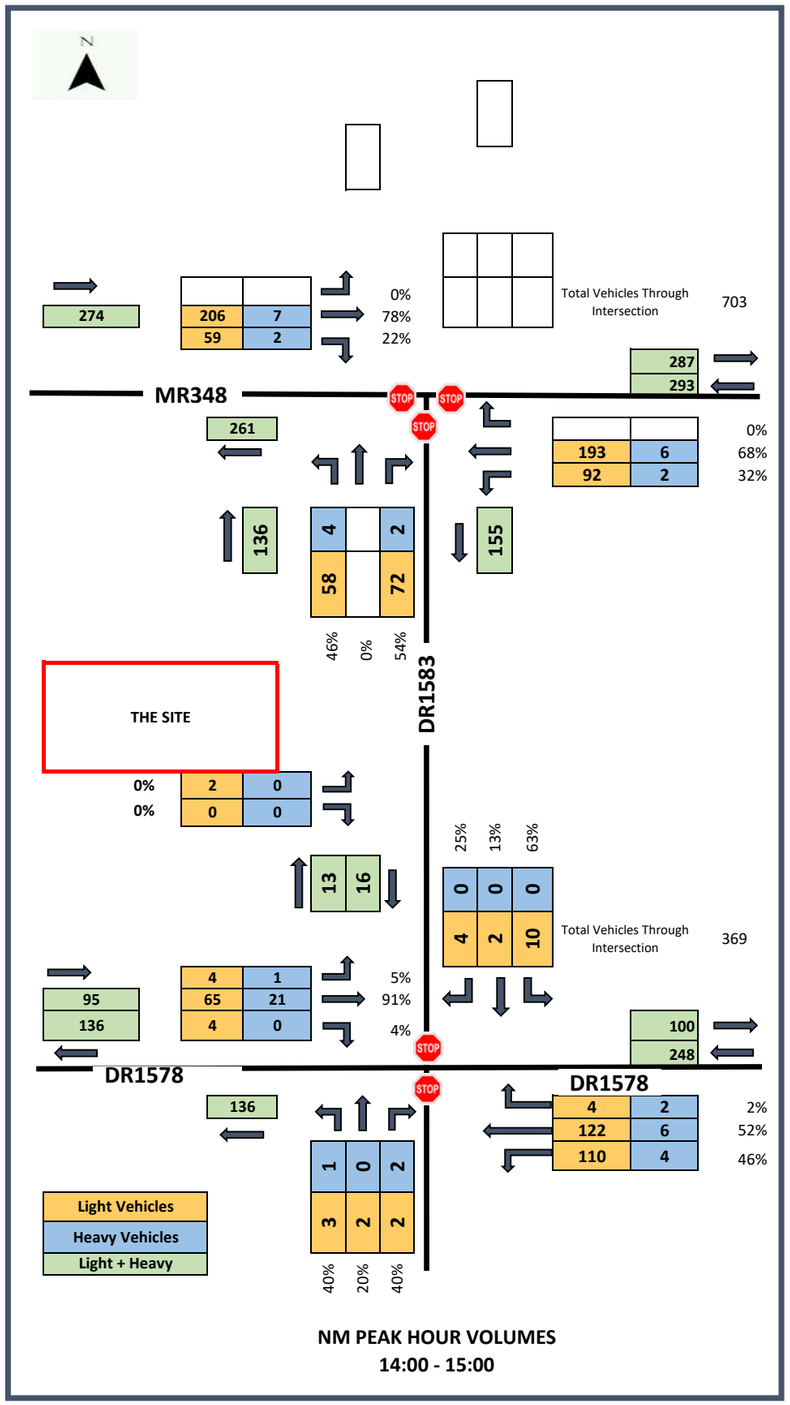
Time Period			Light Vehicles													Taxis/Minibus-taxis													Bus													Heavy Vehicles												
Start	End	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total
06:00	06:15	**42**	1	19	0	0	0	0	0	7	3	8	0	3	**41**													**0**													**0**	0	0	0	0	0	0	0	1	0	0	0	0	**1**
06:15	06:30	**48**	2	15	0	0	0	0	0	11	4	10	0	5	**47**													**0**													**0**	0	0	0	0	0	0	0	1	0	0	0	0	**1**
06:30	06:45	**65**	4	20	0	0	0	0	0	13	4	18	0	5	**64**													**0**													**0**	0	0	0	0	0	0	0	1	0	0	0	0	**1**
06:45	07:00	**121**	16	33	0	0	0	0	0	29	9	26	0	7	**120**													**0**													**0**	0	0	0	0	0	0	0	1	0	0	0	0	**1**
07:00	07:15	**159**	14	43	0	0	0	0	0	49	14	24	0	15	**159**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	0	**0**
07:15	07:30	**206**	17	58	0	0	0	0	0	51	13	43	0	23	**205**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	1	**1**
07:30	07:45	**153**	14	52	0	0	0	0	0	30	12	27	0	15	**150**													**0**													**0**	0	0	0	0	0	0	0	1	1	0	0	1	**3**
07:45	08:00	**221**	31	48	0	0	0	0	0	61	20	28	0	29	**217**													**0**													**0**	0	2	0	0	0	0	0	2	0	0	0	0	**4**
08:00	08:15	**159**	16	39	0	0	0	0	0	35	21	29	0	16	**156**													**0**													**0**	0	1	0	0	0	0	0	1	1	0	0	0	**3**
08:15	08:30	**158**	12	33	0	0	0	0	0	51	19	14	0	21	**150**													**0**													**0**	0	2	0	0	0	0	0	2	1	3	0	0	**8**
08:30	08:45	**141**	13	40	0	0	0	0	0	41	11	23	0	8	**136**													**0**													**0**	0	0	0	0	0	0	0	2	1	1	0	1	**5**
08:45	09:00	**156**	14	36	0	0	0	0	0	42	17	22	0	16	**147**													**0**													**0**	0	2	0	0	0	0	0	3	2	2	0	0	**9**
09:00	09:15	**183**	10	48	0	0	0	0	0	36	20	28	0	25	**167**													**0**													**0**	2	4	0	0	0	0	0	6	1	1	0	2	**16**
09:15	09:30	**130**	12	33	0	0	0	0	0	39	14	13	0	10	**121**													**0**													**0**	1	3	0	0	0	0	0	1	1	2	0	1	**9**
09:30	09:45	**140**	8	36	0	0	0	0	0	44	17	23	0	6	**134**													**0**													**0**	0	2	0	0	0	0	0	2	2	0	0	0	**6**
09:45	10:00	**160**	11	45	0	0	0	0	0	40	14	27	0	11	**148**													**0**													**0**	1	4	0	0	0	0	0	2	1	1	0	3	**12**
10:00	10:15	**133**	8	34	0	0	0	0	0	46	18	10	0	9	**125**													**0**													**0**	0	1	0	0	0	0	0	4	1	2	0	0	**8**
10:15	10:30	**143**	19	48	0	0	0	0	0	32	11	19	0	9	**138**													**0**													**0**	1	1	0	0	0	0	0	2	0	0	0	1	**5**
10:30	10:45	**145**	9	49	0	0	0	0	0	34	16	20	0	10	**138**													**0**													**0**	1	2	0	0	0	0	0	2	1	1	0	0	**7**
10:45	11:00	**147**	9	38	0	0	0	0	0	36	17	17	0	18	**135**													**0**													**0**	0	6	0	0	0	0	0	3	1	2	0	0	**12**
11:00	11:15	**155**	9	40	0	0	0	0	0	51	13	23	0	8	**144**													**0**													**0**	1	4	0	0	0	0	0	3	3	0	0	0	**11**
11:15	11:30	**176**	13	57	0	0	0	0	0	53	19	16	0	11	**169**													**0**													**0**	0	0	0	0	0	0	0	4	0	2	0	1	**7**
11:30	11:45	**152**	10	62	0	0	0	0	0	37	19	13	0	7	**148**													**0**													**0**	1	1	0	0	0	0	0	1	1	0	0	0	**4**
11:45	12:00	**214**	16	62	0	0	0	0	0	63	26	26	0	10	**203**													**0**													**0**	1	3	0	0	0	0	0	4	0	3	0	0	**11**
12:00	12:15	**118**	12	29	0	0	0	0	0	32	12	19	0	10	**114**													**0**													**0**	0	2	0	0	0	0	0	2	0	0	0	0	**4**
12:15	12:30	**187**	12	52	0	0	0	0	0	51	30	19	0	15	**179**													**0**													**0**	1	3	0	0	0	0	0	2	1	0	0	1	**8**
12:30	12:45	**173**	15	42	0	0	0	0	0	51	23	24	0	13	**168**													**0**													**0**	0	0	0	0	0	0	0	2	0	1	0	2	**5**
12:45	13:00	**161**	11	49	0	0	0	0	0	50	17	19	0	13	**159**													**0**													**0**	0	0	0	0	0	0	0	1	0	1	0	0	**2**
13:00	13:15	**182**	21	63	0	0	0	0	0	41	22	10	0	17	**174**													**0**													**0**	1	4	0	0	0	0	0	1	1	0	0	1	**8**
13:15	13:30	**129**	3	49	0	0	0	0	0	31	11	18	0	11	**123**													**0**													**0**	1	3	0	0	0	0	0	1	0	0	0	1	**6**
13:30	13:45	**149**	18	47	0	0	0	0	0	40	16	9	0	13	**143**													**0**													**0**	1	3	0	0	0	0	0	1	0	1	0	0	**6**
13:45	14:00	**174**	13	49	0	0	0	0	0	51	23	24	0	11	**171**													**0**													**0**	1	2	0	0	0	0	0	0	0	0	0	0	**3**
14:00	14:15	**203**	16	69	0	0	0	0	0	60	21	22	0	15	**203**													**0**													**0**	0	0	0	0	0	0	0	0	0	0	0	0	**0**
14:15	14:30	**136**	10	37	0	0	0	0	0	39	17	14	0	12	**129**													**0**													**0**	0	2	0	0	0	0	0	4	1	0	0	0	**7**
14:30	14:45	**186**	10	51	0	0	0	0	0	53	24	26	0	16	**180**													**0**													**0**	0	1	0	0	0	0	0	4	1	0	0	0	**6**
14:45	15:00	**149**	23	49	0	0	0	0	0	33	15	13	0	10	**143**													**0**													**0**	0	2	0	0	0	0	0	3	0	1	0	0	**6**
15:00	15:15	**183**	10	54	0	0	0	0	0	44	31	26	0	13	**178**													**0**													**0**	1	2	0	0	0	0	0	1	0	0	0	1	**5**
15:15	15:30	**153**	10	44	0	0	0	0	0	35	28	19	0	15	**151**													**0**													**0**	1	1	0	0	0	0	0	0	0	0	0	0	**2**
15:30	15:45	**150**	13	35	0	0	0	0	0	35	20	18	0	17	**138**													**0**													**0**	2	6	0	0	0	0	0	3	1	0	0	0	**12**
15:45	16:00	**166**	16	46	0	0	0	0	0	38	23	23	0	16	**162**													**0**													**0**	0	0	0	0	0	0	0	1	0	1	0	2	**4**
16:00	16:15	**160**	11	41	0	0	0	0	0	45	21	18	0	21	**157**													**0**													**0**	0	0	0	0	0	0	0	2	0	0	0	1	**3**
16:15	16:30	**203**	22	60	0	0	0	0	0	53	21	23	0	22	**201**													**0**													**0**	0	0	0	0	0	0	0	1	0	1	0	0	**2**
16:30	16:45	**199**	23	48	0	0	0	0	0	60	30	22	0	13	**196**													**0**													**0**	0	1	0	0	0	0	0	1	1	0	0	0	**3**
16:45	17:00	**194**	22	48	0	0	0	0	0	47	31	22	0	22	**192**													**0**													**0**	0	2	0	0	0	0	0	0	0	0	0	0	**2**
17:00	17:15	**157**	17	55	0	0	0	0	0	23	28	22	0	11	**156**													**0**													**0**	0	0	0	0	0	0	0	1	0	0	0	0	**1**
17:15	17:30	**164**	19	37	0	0	0	0	0	43	35	16	0	12	**162**													**0**													**0**	0	1	0	0	0	0	0	1	0	0	0	0	**2**
17:30	17:45	**144**	14	37	0	0	0	0	0	44	22	16	0	4	**137**													**0**													**0**	0	5	0	0	0	0	0	1	0	1	0	0	**7**
17:45	18:00	**96**	8	21	0	0	0	0	0	31	19	11	0	4	**94**													**0**													**0**	1	0	0	0	0	0	0	1	0	0	0	0	**2**
Total (5-19)		**7423**	**637**	**2100**	**0**	**0**	**0**	**0**	**0**	**1961**	**891**	**960**	**0**	**623**	**7172**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**78**	**0**	**0**	**0**	**0**	**0**	**83**	**24**	**27**	**0**	**20**	**251**
AM Pk hour vol		757	78	201	0	0	0	0	0	191	66	127	0	83	746	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	4	2	0	0	2	11
07:15	to 08:15		**Total AM Pk hour vol (Light + Heavy)**												**746**	**78**	**201**	**0**	**0**	**0**	**0**	**0**	**191**	**66**	**127**	**0**	**83**	**746**	**78**	**201**	**0**	**0**	**0**	**0**	**0**	**191**	**66**	**127**	**0**	**83**	**746**	**78**	**204**	**0**	**0**	**0**	**0**	**0**	**195**	**68**	**127**	**0**	**85**	**757**
NM Pk hour vol		703	59	206	0	0	0	0	0	193	92	72	0	58	680	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	0	0	0	0	0	6	2	2	0	4	23
12:15	to 13:15		**Typical NM Pk hour vol (Light + Heavy)**												**680**	**59**	**206**	**0**	**0**	**0**	**0**	**0**	**193**	**92**	**72**	**0**	**58**	**680**	**59**	**206**	**0**	**0**	**0**	**0**	**0**	**193**	**92**	**72**	**0**	**58**	**680**	**61**	**213**	**0**	**0**	**0**	**0**	**0**	**199**	**94**	**74**	**0**	**62**	**703**
PM Pk hour vol		756	78	197	0	0	0	0	0	205	103	85	0	78	746	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	4	1	1	0	1	10
16:00	to 17:00		**Total PM Pk hour vol (Light + Heavy)**												**746**	**78**	**197**	**0**	**0**	**0**	**0**	**0**	**205**	**103**	**85**	**0**	**78**	**746**	**78**	**197**	**0**	**0**	**0**	**0**	**0**	**205**	**103**	**85**	**0**	**78**	**746**	**78**	**200**	**0**	**0**	**0**	**0**	**0**	**209**	**104**	**86**	**0**	**79**	**756**

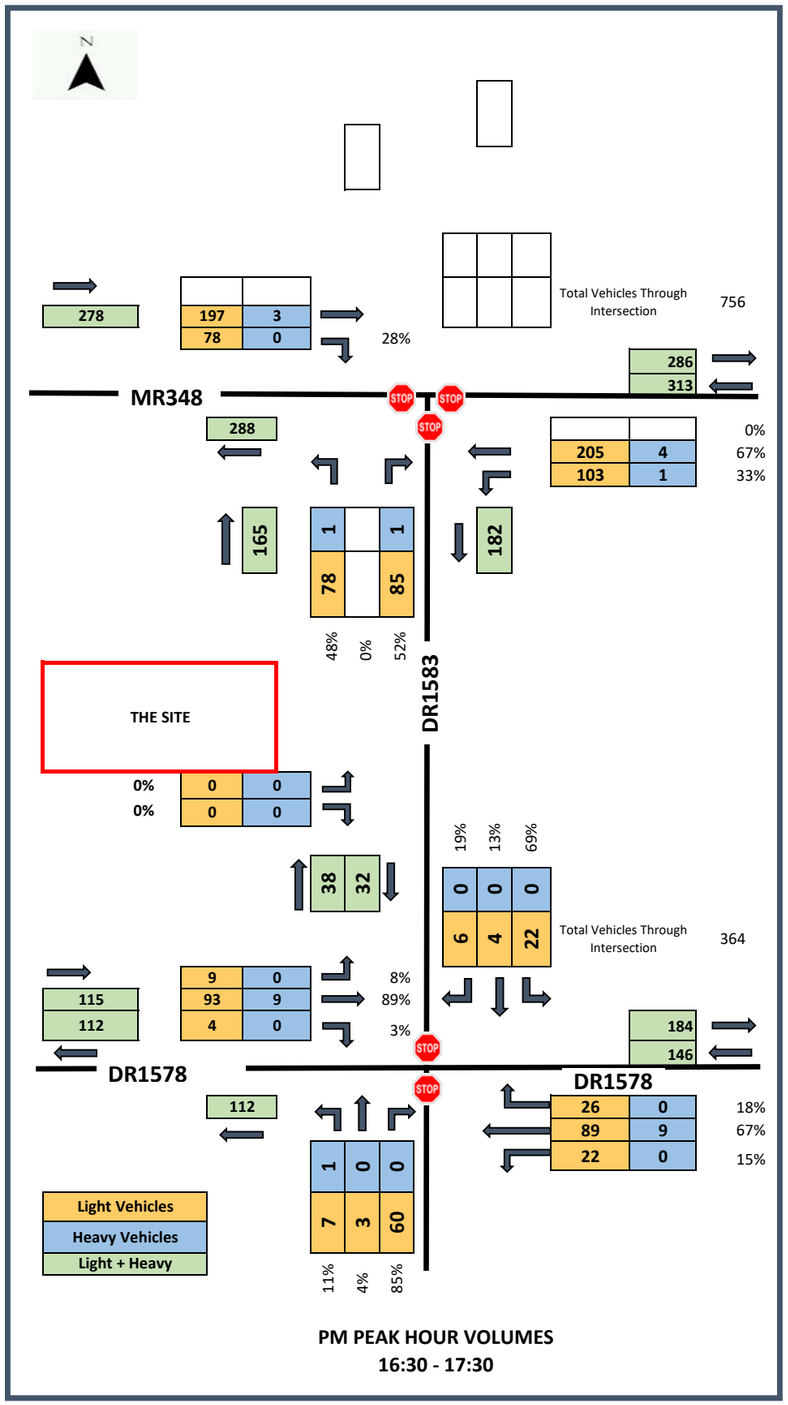

07:15 TO 08:15
AM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour volume (veh/hr)
280
282
78/0/0/0 (78)
201/0/0/3 (204)
0/0/0 /0(0)
MR0348
212
83/0/0/2 (85)
0/0 /0/0(0)
146
127/0/0/0 (127)
0/0/0/0 (0)
0/0/0 /0 (0)
0/0/0 /0 (0)
0
0
DR1583
NO LEG
MR0348
66/0/0/2 (68)
191/0 /0/4(195)
0/0 /0/0(0)
263
331
12:15 TO 13:15
NM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour
261
274
59/0/0/2 (61)
206/0 /0/7(213)
0/0 /0/0(0)
MR0348
136
58/0/0/4 (62)
0/0 /0/0(0)
155
72/0/0/2 (74)
0/0/0/0 (0)
0/0/0 /0 (0)
0/0/0 /0 (0)
0
0
DR1583
NO LEG
MR0348
92/0/0/2 (94)
193/0 /0/6(199)
0/0 /0/0(0)
293
287
16:00 TO 17:00
PM - PEAK
Legend :
99
: Total direction Pk hour volume (veh/hr)
14/9/1/1 (25)
: L/T/B/H (Total) Pk hour volume (veh/hr)
288
278
78/0/0/0 (78)
197/0/0/3 (200)
0/0/0 /0(0)
MR0348
165
78/0/0/1 (79)
0/0 /0/0(0)
182
85/0/0/1 (86)
0/0/0/0 (0)
0/0/0 /0 (0)
0/0/0 /0 (0)
0
0
DR1583
NO LEG
MR0348
103/0/0/1 (104)
205/0 /0/4(209)
0/0 /0/0(0)
313
286
URBAN
ENGINEERING

ANNEXURE D

TRIP DISTRIBUTION







URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

Project:

23-041 REM ERF 2833, GREAT BRAK RIVER

Description:

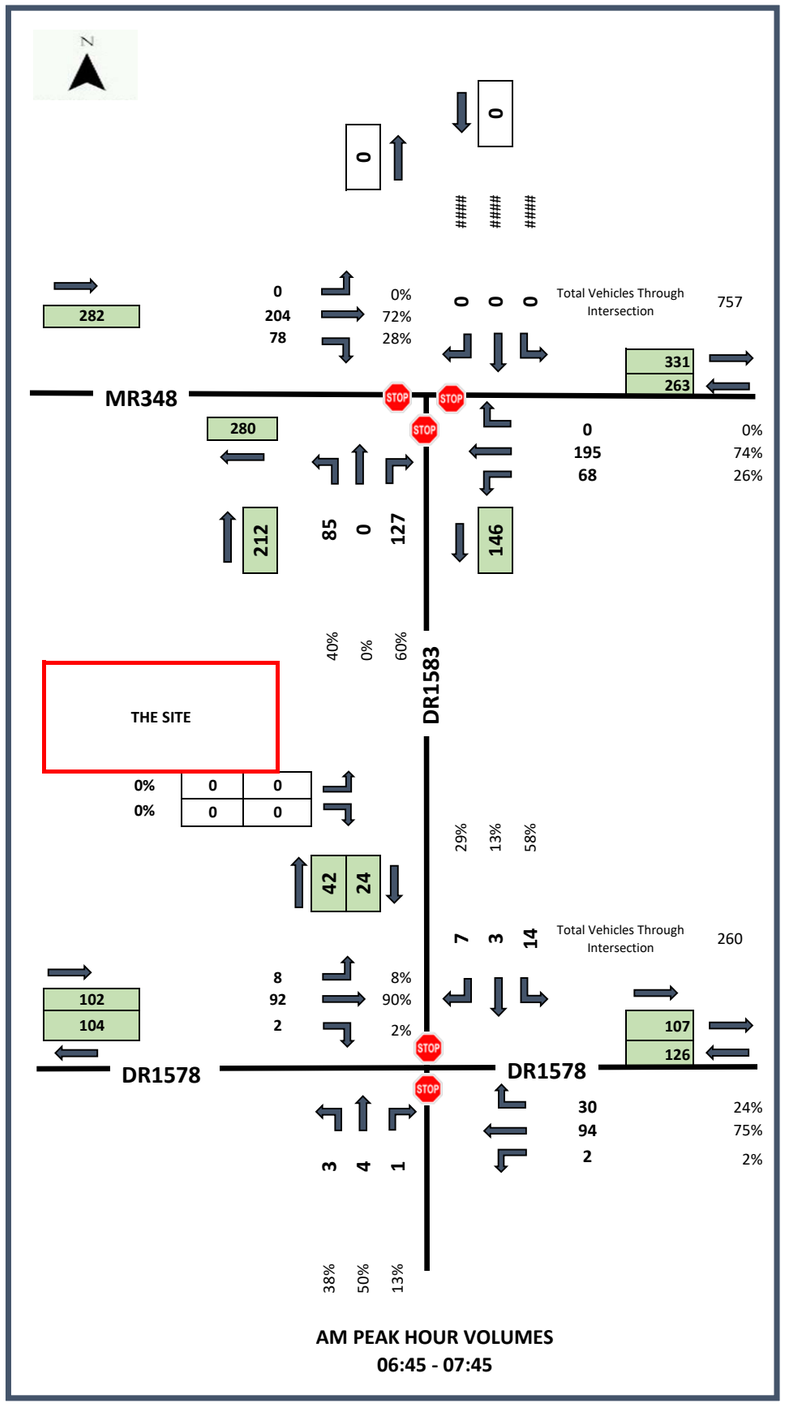
PEAK HOUR VOLUMES (WEDNESDAY 05 MAY 2023)

Legend

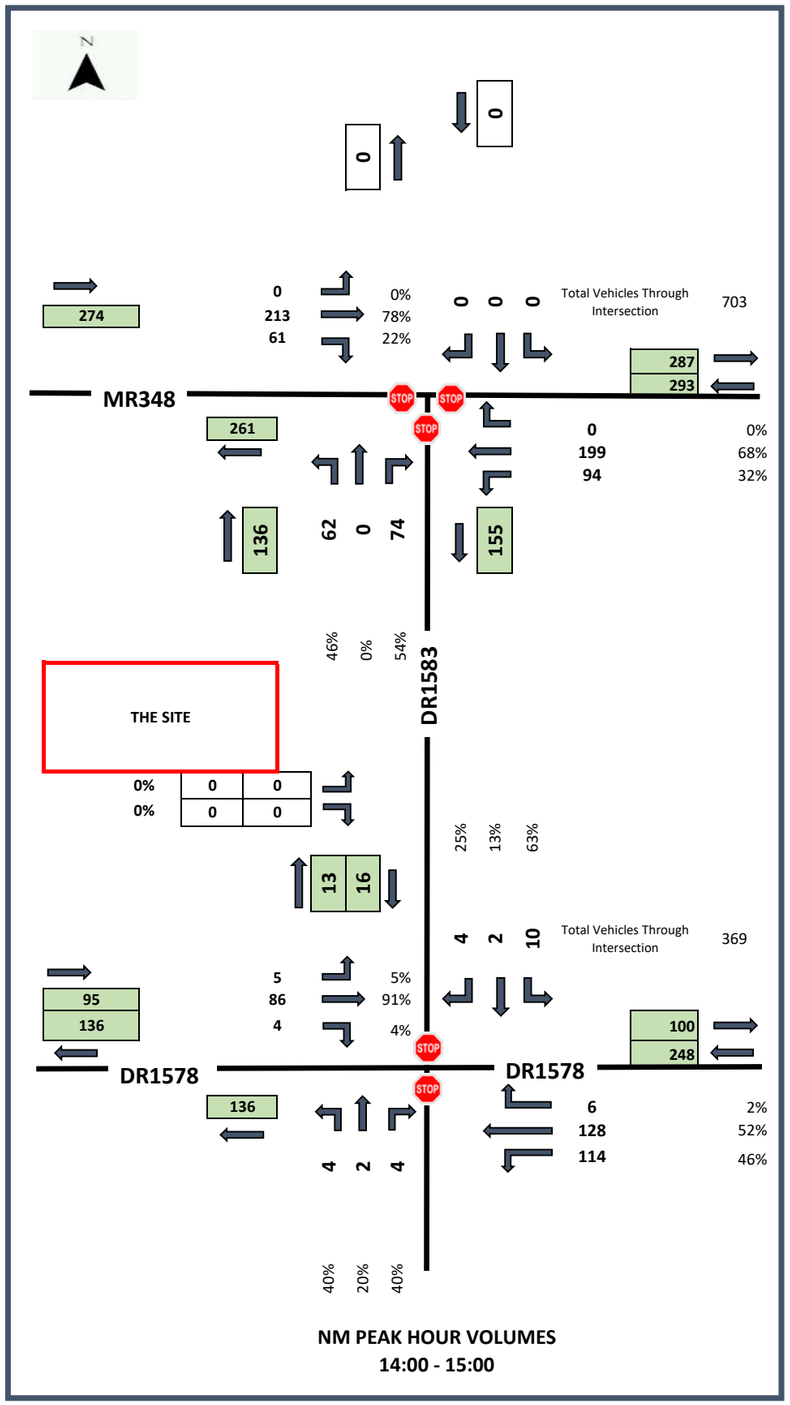
STOP CONTROLLED INTERSECTION

Title

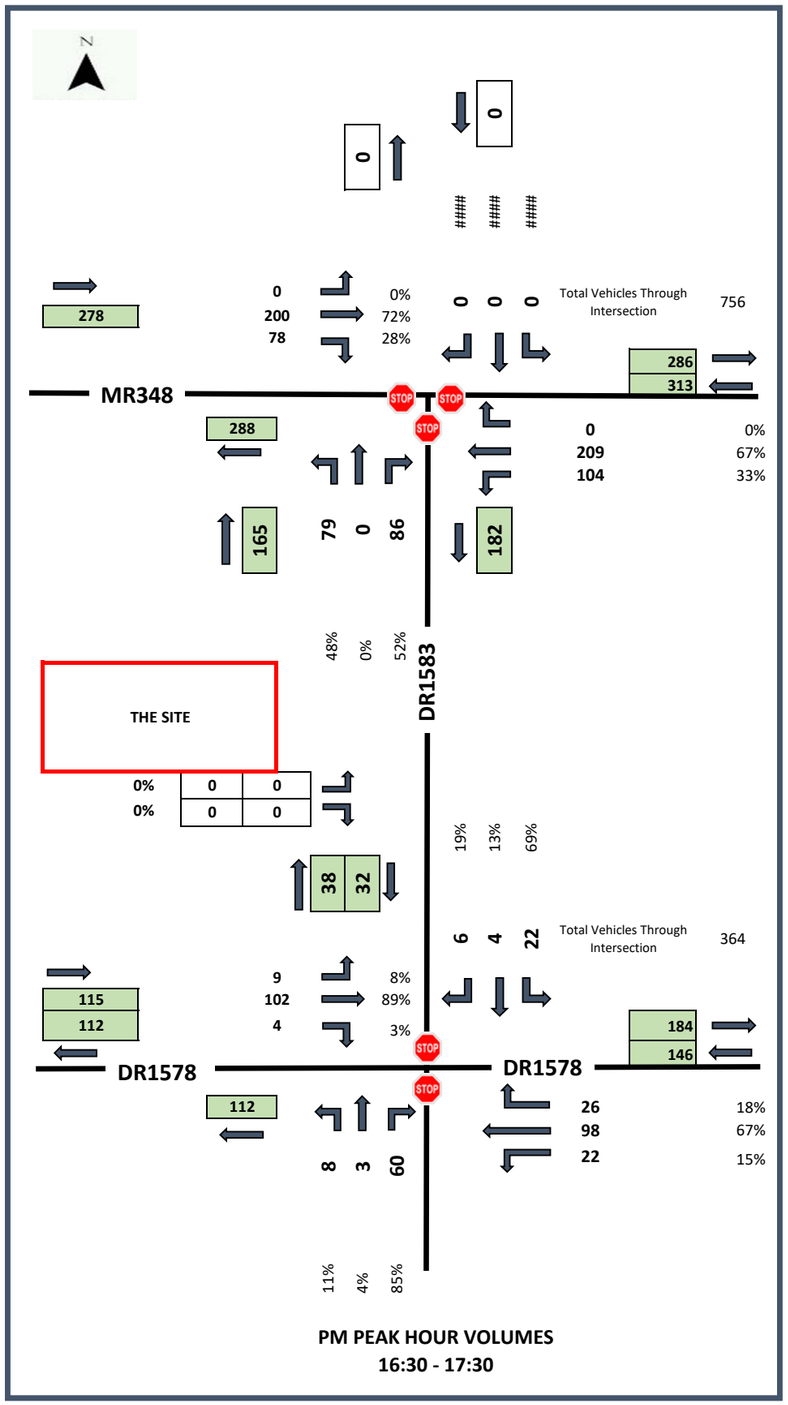
FIGURE A



AM PEAK HOUR VOLUMES
06:45 - 07:45



NM PEAK HOUR VOLUMES
14:00 - 15:00



PM PEAK HOUR VOLUMES
16:30 - 17:30

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

Project:

23-041 REM ERF 2833, GREAT BRAK RIVER

Description:

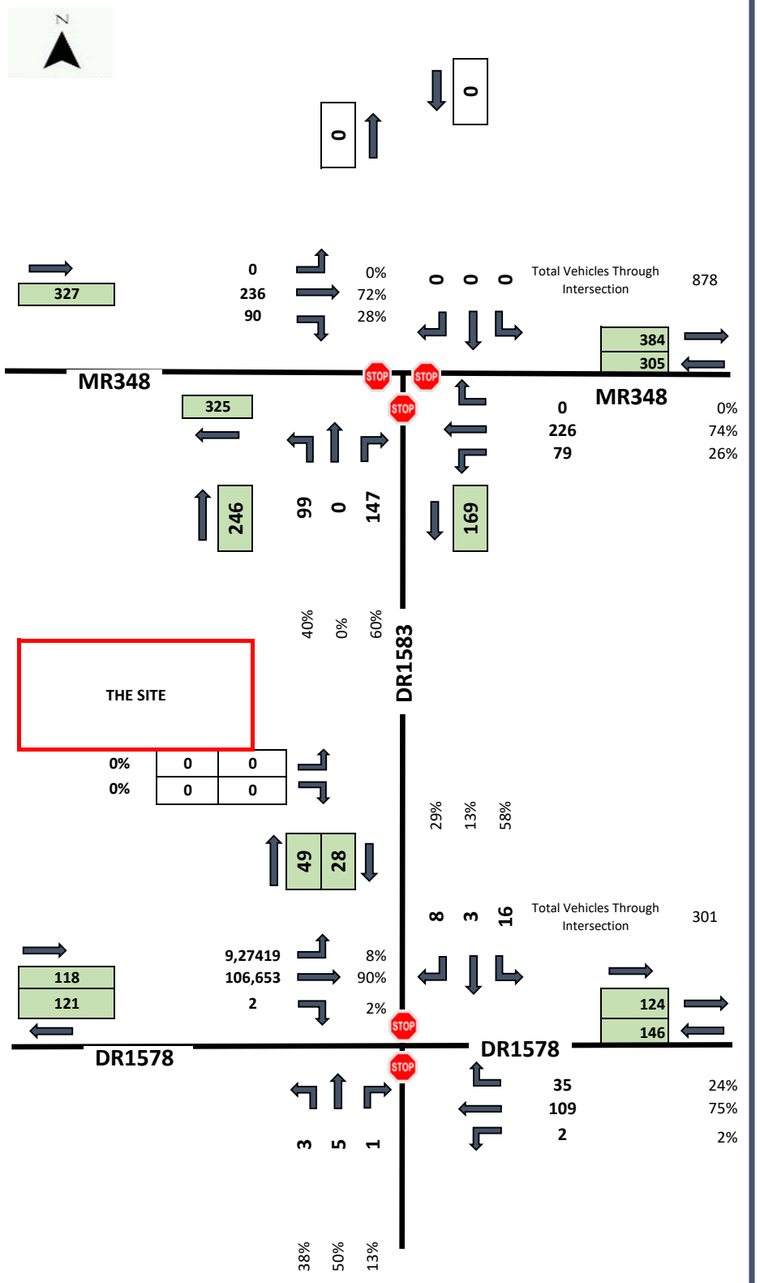
STATUS QUO PEAK HOUR VOLUMES (COMBINED)

Legend

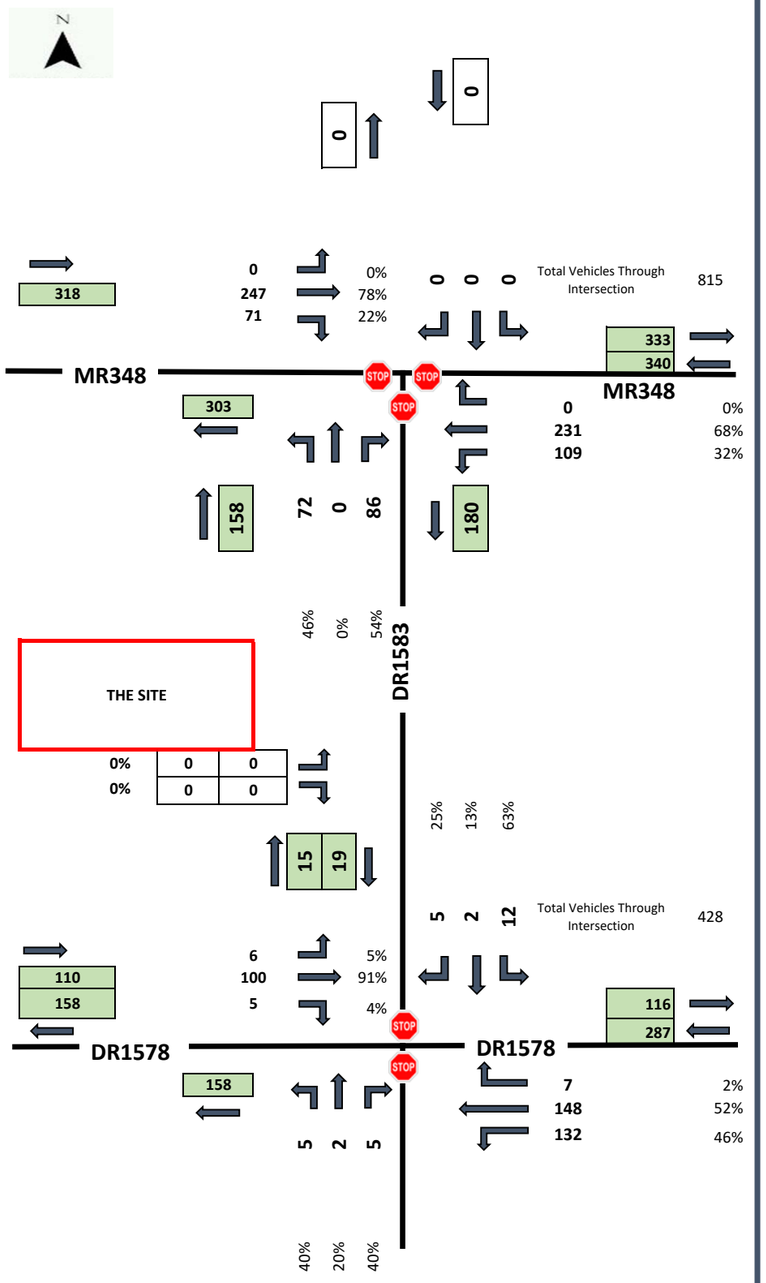
STOP — **STOP CONTROLLED INTERSECTION**

Title

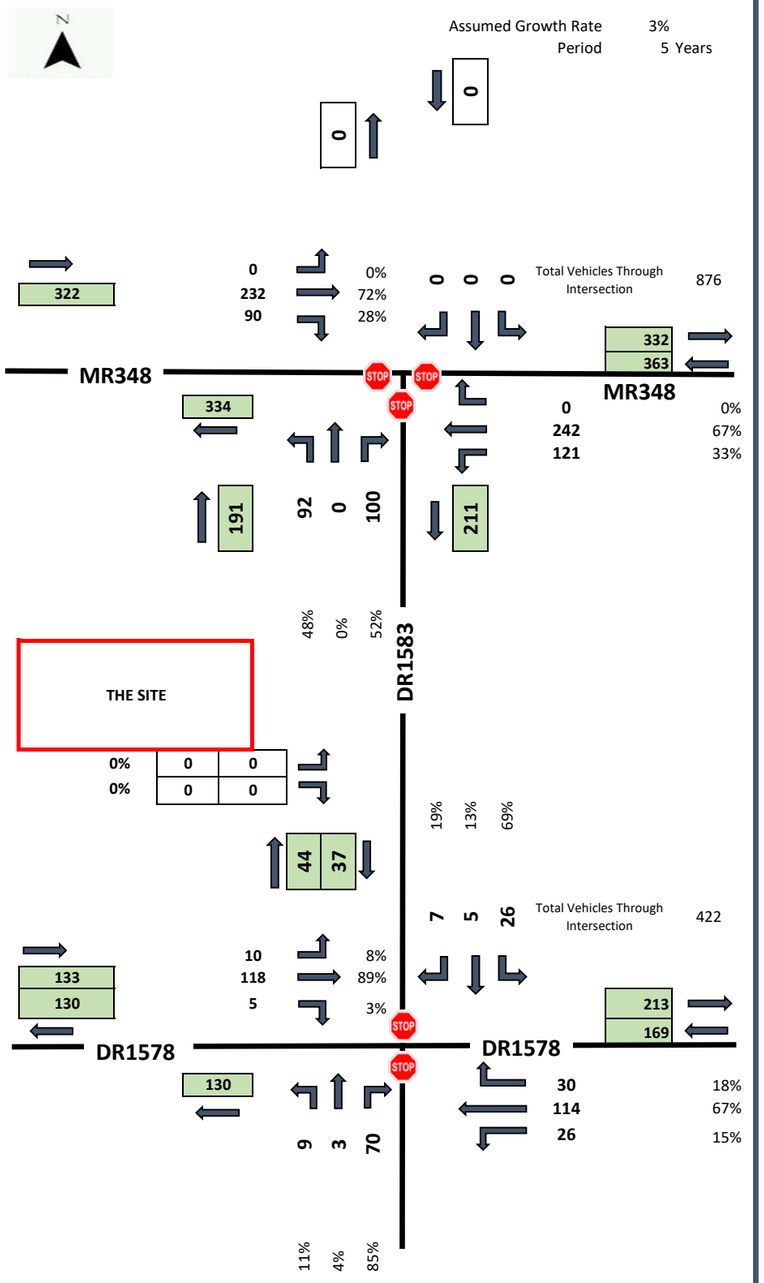
FIGURE B



AM PEAK HOUR VOLUMES
06:45 - 07:45



NM PEAK HOUR VOLUMES
14:00 - 15:00



PM PEAK HOUR VOLUMES
16:30 - 17:30

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

Project:

23-041 REM ERF 2833, GREAT BRAK RIVER

Description:

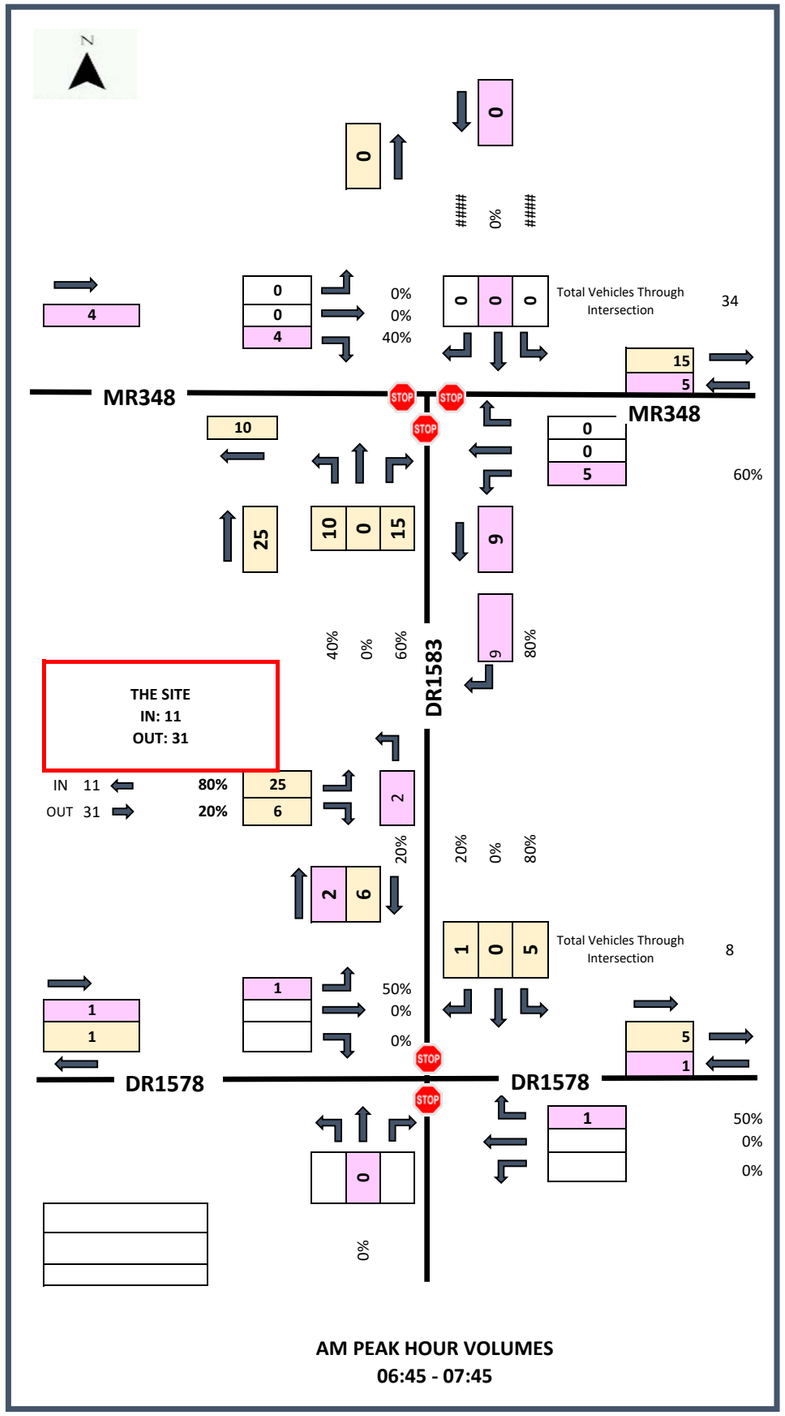
ESTIMATED 2028 BACKGROUND VOLUMES (3%, 5 YEARS)

Legend

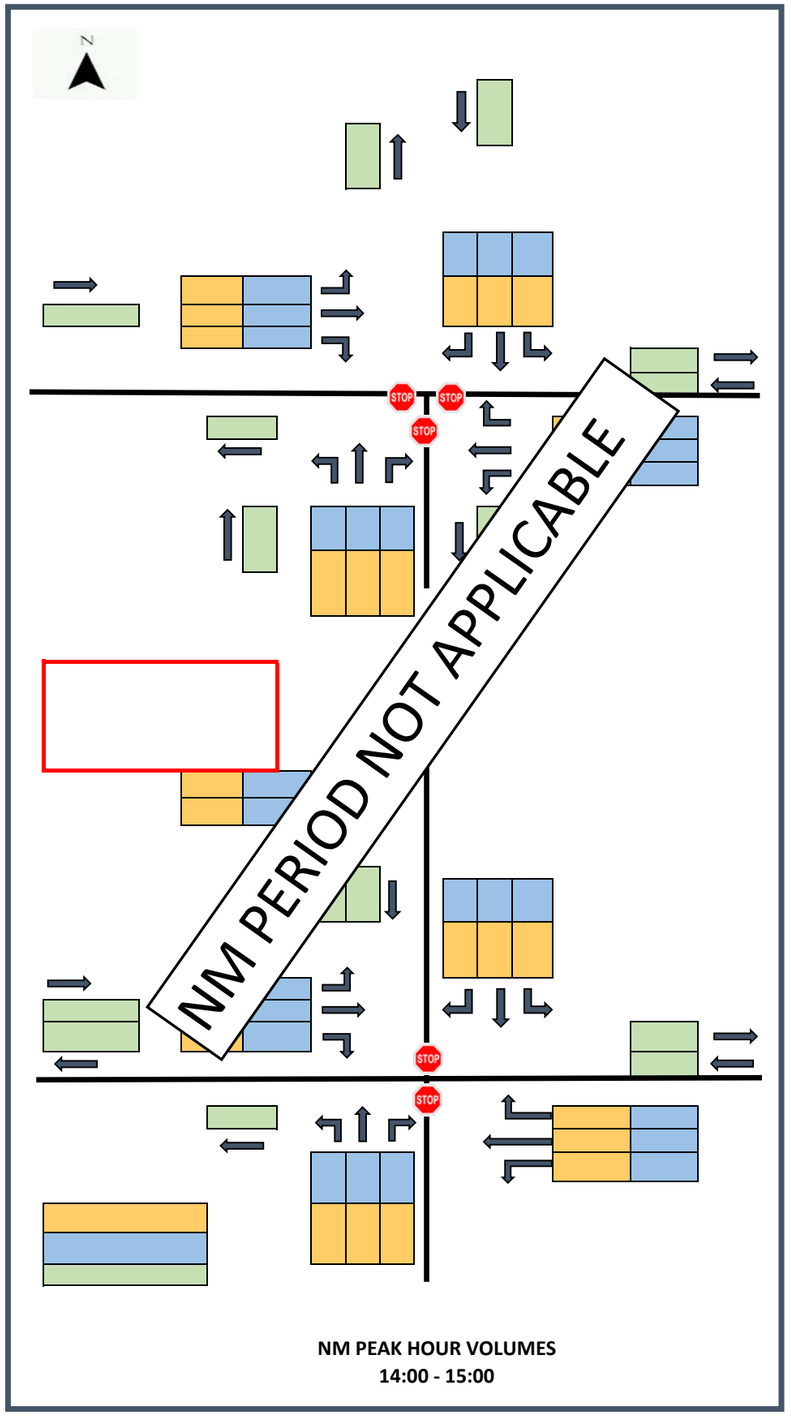
STOP CONTROLLED INTERSECTION

Title

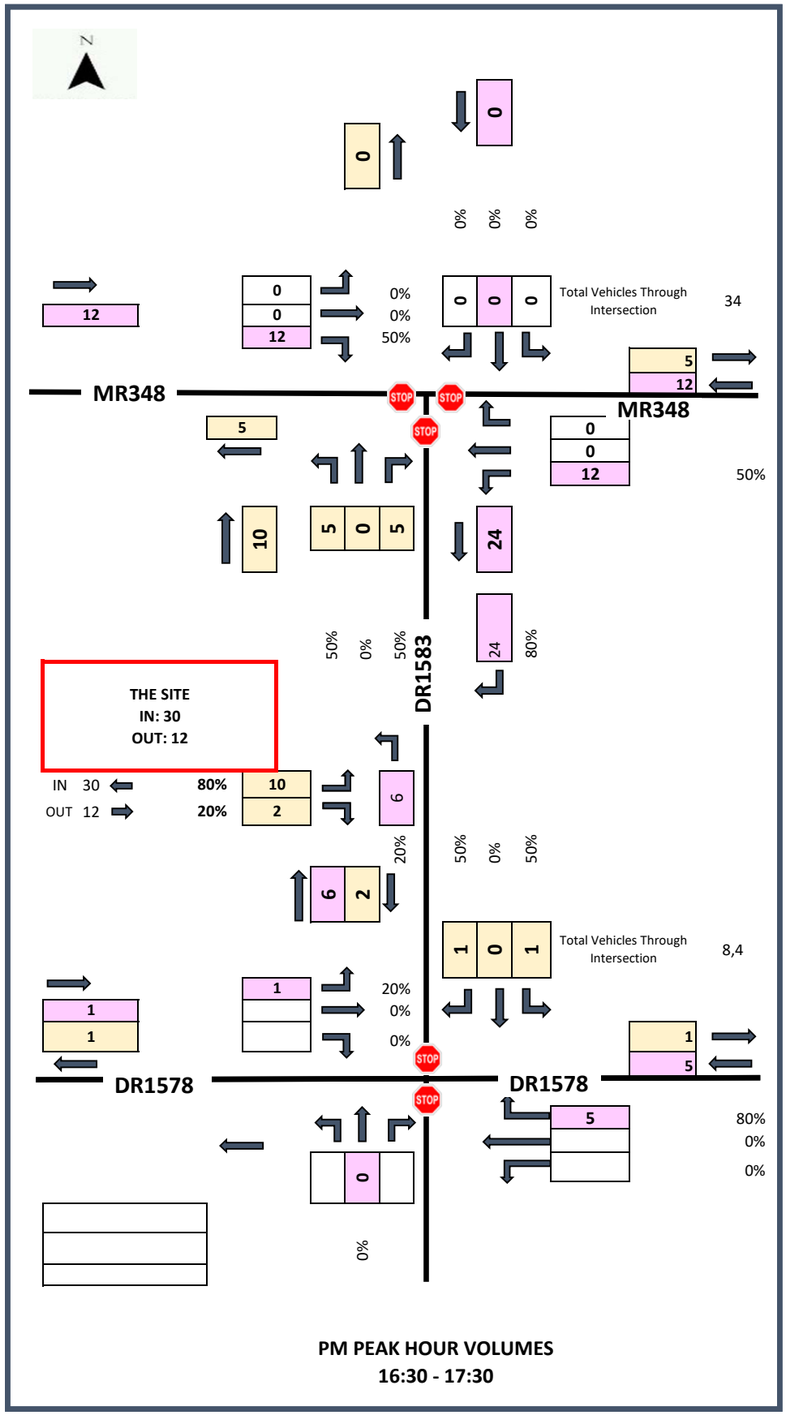
FIGURE C



AM PEAK HOUR VOLUMES
06:45 - 07:45



NM PEAK HOUR VOLUMES
14:00 - 15:00



PM PEAK HOUR VOLUMES
16:30 - 17:30

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

Project:

23-041 REM ERF 2833, GREAT BRAK RIVER

Description:

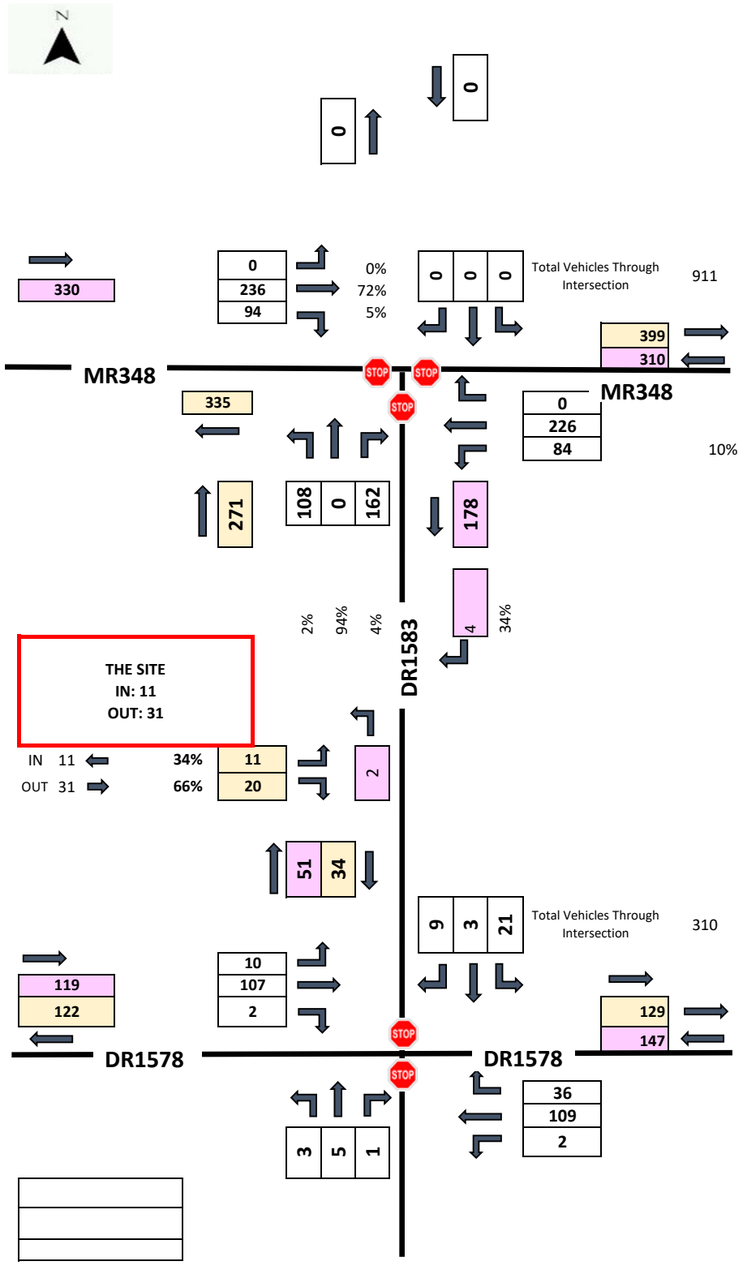
DEVELOPMENT TRIP GENERATION AND DISTRIBUTION

Legend

STOP CONTROLLED INTERSECTION

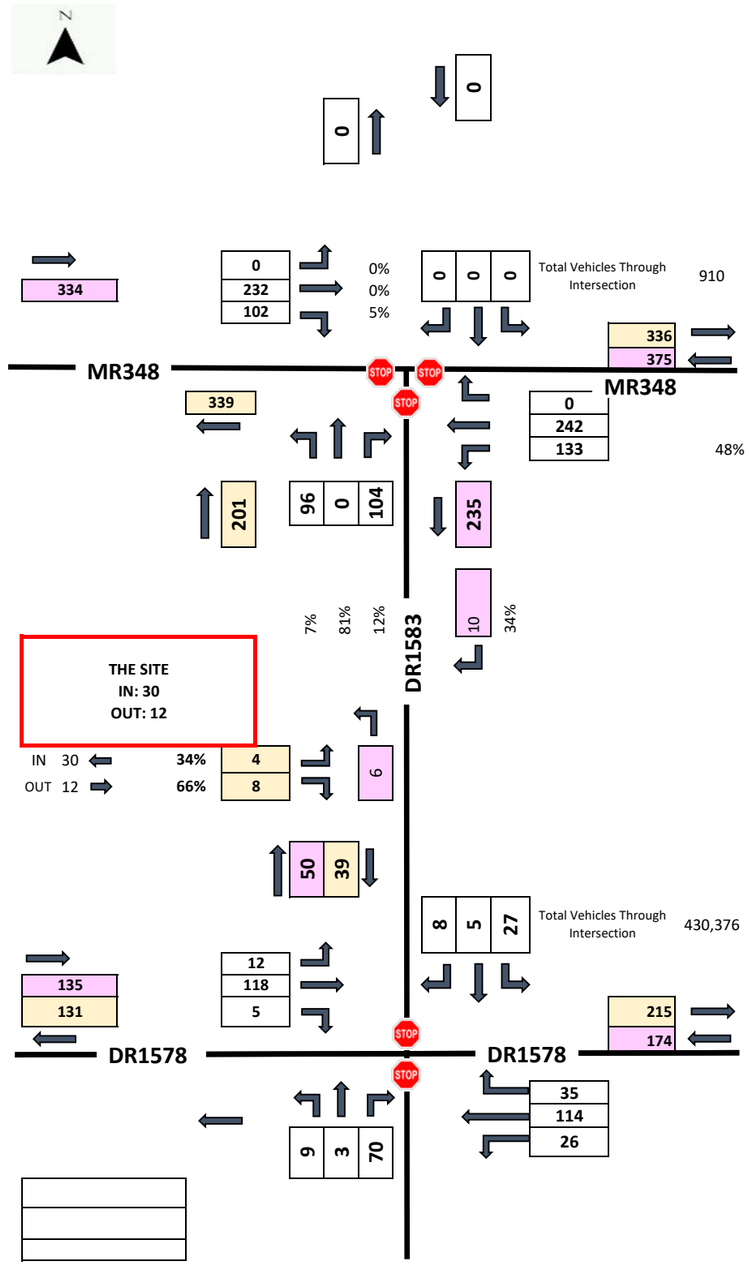
Title

FIGURE D



AM PEAK HOUR VOLUMES
06:45 - 07:45

NM PEAK HOUR VOLUMES
14:00 - 15:00



PM PEAK HOUR VOLUMES
16:30 - 17:30

URBAN ENGINEERING
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

Project:

23-041 REM ERF 2833, GREAT BRAK RIVER

Description:

2028 BACKGROUND + DEVELOPMENT TRAFFIC

Legend

STOP CONTROLLED INTERSECTION

Title

FIGURE E

ANNEXURE E

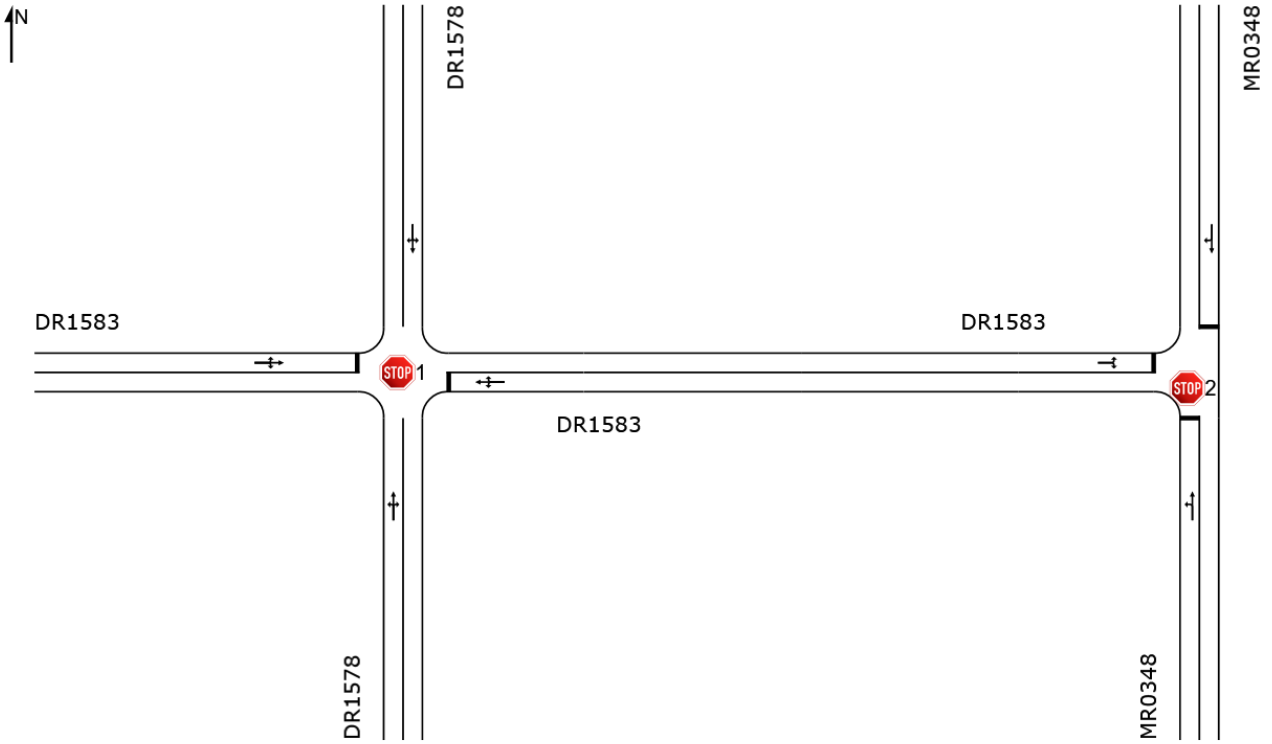
SIDRA RESULTS

NETWORK LAYOUT

Network: N101 [AM Status Quo (Network Folder: Status Quo)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
1	NA	DR1578/DR1583 Status Quo AM
2	NA	DR1583/MR0348 Satus Quo AM

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 Status Quo AM (Site Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	2	50,0	2	50,0	0,070	6,1	LOS A	0,2	1,4	0,11	0,18	0,11	53,6
2	T1	All MCs	94	6,4	94	6,4	0,070	0,0	LOS A	0,2	1,4	0,11	0,18	0,11	58,2
3	R2	All MCs	30	3,3	30	3,3	0,070	6,2	LOS A	0,2	1,4	0,11	0,18	0,11	58,4
Approach			126	6,3	126	6,3	0,070	1,6	NA	0,2	1,4	0,11	0,18	0,11	58,3
East: DR1583															
4	L2	All MCs	14	0,0	14	0,0	0,023	8,3	LOS A	0,1	0,6	0,23	0,88	0,23	56,7
5	T1	All MCs	3	0,0	3	0,0	0,023	8,7	LOS A	0,1	0,6	0,23	0,88	0,23	56,7
6	R2	All MCs	7	0,0	7	0,0	0,023	8,8	LOS A	0,1	0,6	0,23	0,88	0,23	56,6
Approach			24	0,0	24	0,0	0,023	8,5	LOS A	0,1	0,6	0,23	0,88	0,23	56,7
North: DR1578															
7	L2	All MCs	8	0,0	8	0,0	0,053	5,5	LOS A	0,0	0,1	0,01	0,06	0,01	59,0
8	T1	All MCs	92	0,0	92	0,0	0,053	0,0	LOS A	0,0	0,1	0,01	0,06	0,01	59,4
9	R2	All MCs	2	0,0	2	0,0	0,053	5,7	LOS A	0,0	0,1	0,01	0,06	0,01	56,6
Approach			102	0,0	102	0,0	0,053	0,5	NA	0,0	0,1	0,01	0,06	0,01	59,3
West: DR1583															
10	L2	All MCs	3	0,0	3	0,0	0,008	8,3	LOS A	0,0	0,2	0,26	0,89	0,26	51,0
11	T1	All MCs	4	0,0	4	0,0	0,008	8,7	LOS A	0,0	0,2	0,26	0,89	0,26	56,7
12	R2	All MCs	1	0,0	1	0,0	0,008	8,8	LOS A	0,0	0,2	0,26	0,89	0,26	50,8
Approach			8	0,0	8	0,0	0,008	8,6	LOS A	0,0	0,2	0,26	0,89	0,26	55,2
All Vehicles			260	3,1	260	3,1	0,070	2,0	NA	0,2	1,4	0,09	0,22	0,09	58,1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 Status Quo PM (Site Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	22	0,0	22	0,0	0,081	5,5	LOS A	0,2	1,4	0,11	0,22	0,11	55,4
2	T1	All MCs	98	9,2	98	9,2	0,081	0,0	LOS A	0,2	1,4	0,11	0,22	0,11	57,7
3	R2	All MCs	26	0,0	26	0,0	0,081	6,4	LOS A	0,2	1,4	0,11	0,22	0,11	58,3
Approach			146	6,2	146	6,2	0,081	2,0	NA	0,2	1,4	0,11	0,22	0,11	57,7
East: DR1583															
4	L2	All MCs	22	0,0	22	0,0	0,029	8,4	LOS A	0,1	0,8	0,24	0,88	0,24	56,7
5	T1	All MCs	4	0,0	4	0,0	0,029	9,0	LOS A	0,1	0,8	0,24	0,88	0,24	56,7
6	R2	All MCs	6	0,0	6	0,0	0,029	9,0	LOS A	0,1	0,8	0,24	0,88	0,24	56,6
Approach			32	0,0	32	0,0	0,029	8,6	LOS A	0,1	0,8	0,24	0,88	0,24	56,7
North: DR1578															
7	L2	All MCs	9	0,0	9	0,0	0,063	5,5	LOS A	0,0	0,3	0,02	0,07	0,02	58,9
8	T1	All MCs	102	8,8	102	8,8	0,063	0,0	LOS A	0,0	0,3	0,02	0,07	0,02	59,2
9	R2	All MCs	4	0,0	4	0,0	0,063	6,0	LOS A	0,0	0,3	0,02	0,07	0,02	56,5
Approach			115	7,8	115	7,8	0,063	0,6	NA	0,0	0,3	0,02	0,07	0,02	59,1
West: DR1583															
10	L2	All MCs	8	12,5	8	12,5	0,089	9,0	LOS A	0,3	2,2	0,35	0,89	0,35	50,2
11	T1	All MCs	3	0,0	3	0,0	0,089	9,0	LOS A	0,3	2,2	0,35	0,89	0,35	56,6
12	R2	All MCs	60	0,0	60	0,0	0,089	9,2	LOS A	0,3	2,2	0,35	0,89	0,35	50,5
Approach			71	1,4	71	1,4	0,089	9,2	LOS A	0,3	2,2	0,35	0,89	0,35	51,1
All Vehicles			364	5,2	364	5,2	0,089	3,5	NA	0,3	2,2	0,14	0,36	0,14	56,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 Satus Quo AM (Site Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	68	2,9	68	2,9	0,468	18,1	LOS C	2,1	15,3	0,89	1,35	2,74	54,5
2	T1	All MCs	195	2,1	195	2,1	0,468	17,7	LOS C	2,1	15,3	0,89	1,35	2,74	46,0
Approach			263	2,3	263	2,3	0,468	17,8	LOS C	2,1	15,3	0,89	1,35	2,74	50,0
North: MR0348															
8	T1	All MCs	204	1,5	204	1,5	0,399	14,2	LOS B	1,6	11,5	0,79	1,32	2,44	48,1
9	R2	All MCs	78	0,0	78	0,0	0,399	13,9	LOS B	1,6	11,5	0,79	1,32	2,44	55,4
Approach			282	1,1	282	1,1	0,399	14,1	LOS B	1,6	11,5	0,79	1,32	2,44	51,7
West: DR1583															
10	L2	All MCs	85	2,4	85	2,4	0,449	19,9	LOS C	2,0	14,4	0,92	1,32	2,71	54,0
12	R2	All MCs	127	0,0	127	0,0	0,449	19,2	LOS C	2,0	14,4	0,92	1,32	2,71	53,9
Approach			212	0,9	212	0,9	0,449	19,5	LOS C	2,0	14,4	0,92	1,32	2,71	54,0
All Vehicles			757	1,5	757	1,5	0,468	16,9	LOS C	2,1	15,3	0,86	1,33	2,62	52,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 Satus Quo PM (Site Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	104	1,0	104	1,0	0,471	16,2	LOS C	2,1	15,1	0,84	1,36	2,71	55,0
2	T1	All MCs	209	1,9	209	1,9	0,471	15,9	LOS C	2,1	15,1	0,84	1,36	2,71	55,0
Approach			313	1,6	313	1,6	0,471	16,0	LOS C	2,1	15,1	0,84	1,36	2,71	55,0
North: MR0348															
8	T1	All MCs	197	0,0	197	0,0	0,345	12,4	LOS B	1,3	9,1	0,72	1,30	2,23	55,9
9	R2	All MCs	81	3,7	81	3,7	0,345	12,5	LOS B	1,3	9,1	0,72	1,30	2,23	48,7
Approach			278	1,1	278	1,1	0,345	12,4	LOS B	1,3	9,1	0,72	1,30	2,23	54,9
West: DR1583															
10	L2	All MCs	79	1,3	79	1,3	0,387	19,8	LOS C	1,6	11,6	0,92	1,28	2,53	45,0
12	R2	All MCs	86	1,2	86	1,2	0,387	19,2	LOS C	1,6	11,6	0,92	1,28	2,53	53,9
Approach			165	1,2	165	1,2	0,387	19,5	LOS C	1,6	11,6	0,92	1,28	2,53	51,5
All Vehicles			756	1,3	756	1,3	0,471	15,5	LOS C	2,1	15,1	0,81	1,32	2,50	54,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

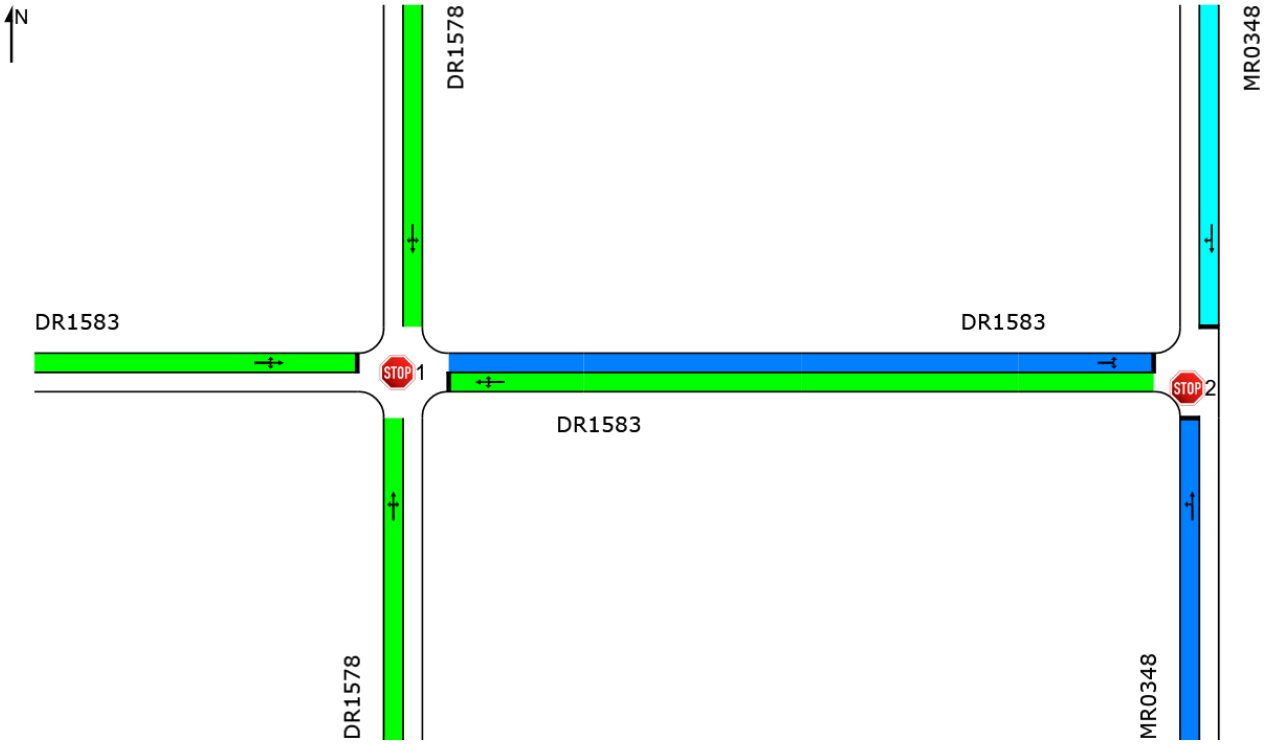
LEVEL OF SERVICE

Lane Level of Service

Network: N101 [AM Status Quo (Network Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 2028 AM (Site Folder: Future 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)
Design Life Analysis: Constant Number of Years = 5

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	2	50,0	2	50,0	0,091	6,1	LOS A	0,2	1,8	0,13	0,19	0,13	53,5
2	T1	All MCs	120	6,4	120	6,4	0,091	0,0	LOS A	0,2	1,8	0,13	0,19	0,13	58,1
3	R2	All MCs	39	3,3	39	3,3	0,091	6,4	LOS A	0,2	1,8	0,13	0,19	0,13	58,4
Approach			161	6,2	161	6,2	0,091	1,6	NA	0,2	1,8	0,13	0,19	0,13	58,2
East: DR1583															
4	L2	All MCs	18	0,0	18	0,0	0,030	8,4	LOS A	0,1	0,7	0,27	0,87	0,27	56,7
5	T1	All MCs	3	0,0	3	0,0	0,030	9,1	LOS A	0,1	0,7	0,27	0,87	0,27	56,7
6	R2	All MCs	9	0,0	9	0,0	0,030	9,3	LOS A	0,1	0,7	0,27	0,87	0,27	56,6
Approach			30	0,0	30	0,0	0,030	8,8	LOS A	0,1	0,7	0,27	0,87	0,27	56,6
North: DR1578															
7	L2	All MCs	10	0,0	10	0,0	0,067	5,5	LOS A	0,0	0,1	0,01	0,06	0,01	59,0
8	T1	All MCs	118	0,0	118	0,0	0,067	0,0	LOS A	0,0	0,1	0,01	0,06	0,01	59,4
9	R2	All MCs	2	0,0	2	0,0	0,067	5,8	LOS A	0,0	0,1	0,01	0,06	0,01	56,7
Approach			130	0,0	130	0,0	0,067	0,5	NA	0,0	0,1	0,01	0,06	0,01	59,3
West: DR1583															
10	L2	All MCs	3	0,0	3	0,0	0,010	8,4	LOS A	0,0	0,3	0,31	0,88	0,31	50,9
11	T1	All MCs	6	0,0	6	0,0	0,010	9,1	LOS A	0,0	0,3	0,31	0,88	0,31	56,7
12	R2	All MCs	1	0,0	1	0,0	0,010	9,3	LOS A	0,0	0,3	0,31	0,88	0,31	50,7
Approach			10	0,0	10	0,0	0,010	8,9	LOS A	0,0	0,3	0,31	0,88	0,31	55,3
All Vehicles			331	3,0	331	3,0	0,091	2,0	NA	0,2	1,8	0,10	0,22	0,10	58,1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 2028 PM (Site Folder: Future 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	26	0,0	26	0,0	0,095	5,5	LOS A	0,2	1,7	0,12	0,22	0,12	55,4
2	T1	All MCs	114	9,2	114	9,2	0,095	0,0	LOS A	0,2	1,7	0,12	0,22	0,12	57,7
3	R2	All MCs	30	0,0	30	0,0	0,095	6,5	LOS A	0,2	1,7	0,12	0,22	0,12	58,3
Approach			170	6,2	170	6,2	0,095	2,0	NA	0,2	1,7	0,12	0,22	0,12	57,7
East: DR1583															
4	L2	All MCs	26	0,0	26	0,0	0,036	8,5	LOS A	0,1	0,9	0,27	0,87	0,27	56,7
5	T1	All MCs	5	0,0	5	0,0	0,036	9,2	LOS A	0,1	0,9	0,27	0,87	0,27	56,7
6	R2	All MCs	7	0,0	7	0,0	0,036	9,3	LOS A	0,1	0,9	0,27	0,87	0,27	56,6
Approach			38	0,0	38	0,0	0,036	8,7	LOS A	0,1	0,9	0,27	0,87	0,27	56,6
North: DR1578															
7	L2	All MCs	10	0,0	10	0,0	0,073	5,5	LOS A	0,0	0,3	0,03	0,07	0,03	58,9
8	T1	All MCs	118	8,8	118	8,8	0,073	0,0	LOS A	0,0	0,3	0,03	0,07	0,03	59,2
9	R2	All MCs	5	0,0	5	0,0	0,073	6,3	LOS A	0,0	0,3	0,03	0,07	0,03	56,5
Approach			133	7,8	133	7,8	0,073	0,7	NA	0,0	0,3	0,03	0,07	0,03	59,1
West: DR1583															
10	L2	All MCs	9	12,5	9	12,5	0,109	9,1	LOS A	0,4	2,7	0,39	0,90	0,39	50,0
11	T1	All MCs	3	0,0	3	0,0	0,109	9,3	LOS A	0,4	2,7	0,39	0,90	0,39	56,5
12	R2	All MCs	70	0,0	70	0,0	0,109	9,6	LOS A	0,4	2,7	0,39	0,90	0,39	50,2
Approach			82	1,4	82	1,4	0,109	9,6	LOS A	0,4	2,7	0,39	0,90	0,39	50,8
All Vehicles			423	5,2	423	5,2	0,109	3,6	NA	0,4	2,7	0,15	0,37	0,15	56,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 2028 AM (Site Folder: Future 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	79	2,9	79	2,9	0,542	20,0	LOS C	2,8	19,7	0,91	1,42	3,06	54,0
2	T1	All MCs	226	2,1	226	2,1	0,542	19,6	LOS C	2,8	19,7	0,91	1,42	3,06	45,0
Approach			305	2,3	305	2,3	0,542	19,7	LOS C	2,8	19,7	0,91	1,42	3,06	49,2
North: MR0348															
8	T1	All MCs	236	1,5	236	1,5	0,461	15,2	LOS C	2,0	14,5	0,82	1,36	2,65	47,5
9	R2	All MCs	90	0,0	90	0,0	0,461	14,8	LOS B	2,0	14,5	0,82	1,36	2,65	55,1
Approach			326	1,1	326	1,1	0,461	15,1	LOS C	2,0	14,5	0,82	1,36	2,65	51,3
West: DR1583															
10	L2	All MCs	99	2,4	99	2,4	0,520	21,9	LOS C	2,6	18,3	0,94	1,38	2,99	53,5
12	R2	All MCs	147	0,0	147	0,0	0,520	21,1	LOS C	2,6	18,3	0,94	1,38	2,99	53,4
Approach			246	0,9	246	0,9	0,520	21,4	LOS C	2,6	18,3	0,94	1,38	2,99	53,5
All Vehicles			877	1,5	877	1,5	0,542	18,5	LOS C	2,8	19,7	0,88	1,38	2,89	51,6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 2028 PM (Site Folder: Future 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	121	1,0	121	1,0	0,543	17,7	LOS C	2,7	19,5	0,87	1,42	3,02	54,6
2	T1	All MCs	242	1,9	242	1,9	0,543	17,5	LOS C	2,7	19,5	0,87	1,42	3,02	46,1
Approach			363	1,6	363	1,6	0,543	17,6	LOS C	2,7	19,5	0,87	1,42	3,02	50,9
North: MR0348															
8	T1	All MCs	232	0,0	232	0,0	0,399	13,1	LOS B	1,6	11,3	0,74	1,33	2,39	48,7
9	R2	All MCs	90	3,7	90	3,7	0,399	13,1	LOS B	1,6	11,3	0,74	1,33	2,39	55,6
Approach			322	1,0	322	1,0	0,399	13,1	LOS B	1,6	11,3	0,74	1,33	2,39	52,2
West: DR1583															
10	L2	All MCs	92	1,3	92	1,3	0,447	21,1	LOS C	2,0	14,4	0,94	1,32	2,72	53,7
12	R2	All MCs	100	1,2	100	1,2	0,447	20,6	LOS C	2,0	14,4	0,94	1,32	2,72	53,6
Approach			192	1,2	192	1,2	0,447	20,8	LOS C	2,0	14,4	0,94	1,32	2,72	53,6
All Vehicles			877	1,3	877	1,3	0,543	16,6	LOS C	2,7	19,5	0,84	1,37	2,73	52,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

NETWORK SUMMARY

Network: N101 [AM Status Quo (Network Folder: Status Quo)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)

Network Performance - Hourly Values			
Performance Measure	**Vehicles:**	**All MCs**	**Persons**
Network Level of Service (LOS)		LOS B	
Speed Efficiency		0,86	
Travel Time Index		8,46	
Congestion Coefficient		1,16	
Travel Speed (Average)	km/h	51,7	51,7 km/h
Travel Distance (Total)	veh-km/h	1418,1	1701,7 pers-km/h
Travel Time (Total)	veh-h/h	27,4	32,9 pers-h/h
Desired Speed	km/h	60,0	
Demand Flows (Total for all Sites)	veh/h	1017	1220 pers/h
Arrival Flows (Total for all Sites)	veh/h	1017	1220 pers/h
Demand Flows (Entry Total)	veh/h	781	
Midblock Inflows (Total)	veh/h	170	
Midblock Outflows (Total)	veh/h	-122	
Percent Heavy Vehicles (Demand)	%	1,9	
Percent Heavy Vehicles (Arrival)	%	1,9	
Degree of Saturation		0,468	
Control Delay (Total)	veh-h/h	3,70	4,44 pers-h/h
Control Delay (Average)	sec	13,1	13,1 sec
Control Delay (Worst Lane by MC)	sec	19,5	
Control Delay (Worst Movement by MC)	sec	23,6	23,6 sec
Geometric Delay (Average)	sec	6,2	
Stop-Line Delay (Average)	sec	6,9	
Ave. Que Storage Ratio (Worst Lane)		0,02	
Effective Stops (Total)	veh/h	1065	1278 pers/h
Effective Stop Rate		1,05	1,05
Proportion Queued		0,66	0,66
Performance Index		45,6	45,6
Cost (Total) *	$/h	1252,64	1252,64 $/h
Fuel Consumption (Total)	L/h	112,8	
Fuel Economy	L/100km	8,0	
Carbon Dioxide (Total)	kg/h	266,0	
Hydrocarbons (Total)	kg/h	0,022	
Carbon Monoxide (Total)	kg/h	0,31	
NOx (Total)	kg/h	0,241	

Network Model Variability Index (Average value of largest changes in Lane Degrees of Saturation or Queue Storage Ratios from the third to the last Network Iterations): 0,0 %

Number of Iterations: 5 (Maximum: 30)

Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0,0% 0,0% 0,0%

Network Level of Service (LOS) Method: SIDRA Speed Efficiency.

Software Setup used: Standard Left.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Network Performance - Annual Values			
Performance Measure	**Vehicles:**	**All MCs**	**Persons**
Demand Flows (Total for all Sites)	veh/y	488 160	585 792 pers/y
Delay (Total)	veh-h/y	1 776	2 131 pers-h/y
Effective Stops (Total)	veh/y	511 203	613 443 pers/y
Travel Distance (Total)	veh-km/y	680 675	816 811 pers-km/y
Travel Time (Total)	veh-h/y	13 169	15 803 pers-h/y
Cost (Total)	$/y	601 265	601 265 $/y

Fuel Consumption (Total)	L/y	54 121
Carbon Dioxide (Total)	kg/y	127 681
Hydrocarbons (Total)	kg/y	10
Carbon Monoxide (Total)	kg/y	151
NOx (Total)	kg/y	115

1 Hours per Year: 480 (Network)

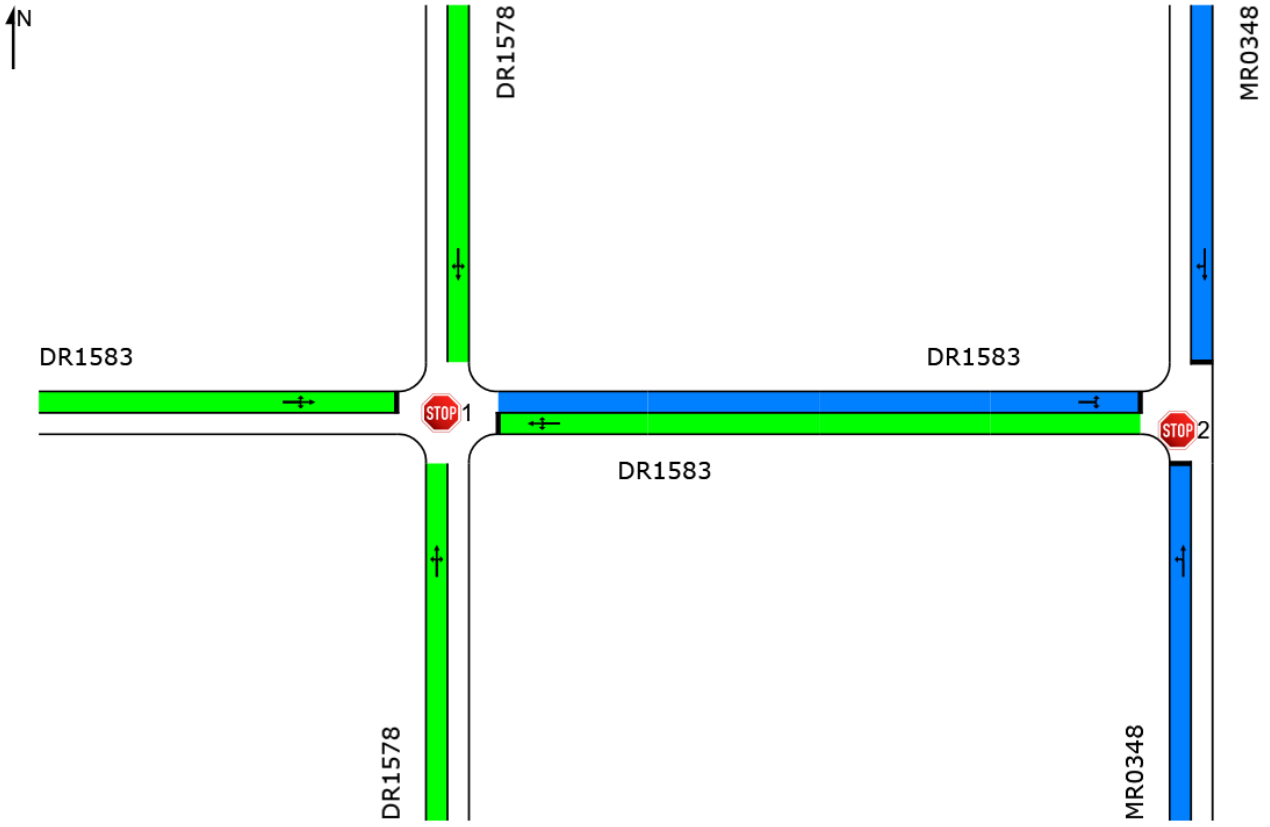
LEVEL OF SERVICE

Lane Level of Service

Network: N101 [2028 AM (Network Folder: 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 2028 + Dev AM (Site Folder: Future 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)
Design Life Analysis: Constant Number of Years = 5

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	2	50,0	2	50,0	0,092	6,1	LOS A	0,3	1,9	0,13	0,19	0,13	53,5
2	T1	All MCs	120	6,4	120	6,4	0,092	0,0	LOS A	0,3	1,9	0,13	0,19	0,13	58,1
3	R2	All MCs	40	3,3	40	3,3	0,092	6,4	LOS A	0,3	1,9	0,13	0,19	0,13	58,4
Approach			162	6,2	162	6,2	0,092	1,6	NA	0,3	1,9	0,13	0,19	0,13	58,2
East: DR1583															
4	L2	All MCs	23	0,0	23	0,0	0,035	8,4	LOS A	0,1	0,9	0,27	0,87	0,27	56,7
5	T1	All MCs	3	0,0	3	0,0	0,035	9,1	LOS A	0,1	0,9	0,27	0,87	0,27	56,7
6	R2	All MCs	10	0,0	10	0,0	0,035	9,3	LOS A	0,1	0,9	0,27	0,87	0,27	56,6
Approach			36	0,0	36	0,0	0,035	8,7	LOS A	0,1	0,9	0,27	0,87	0,27	56,6
North: DR1578															
7	L2	All MCs	11	0,0	11	0,0	0,068	5,5	LOS A	0,0	0,1	0,01	0,06	0,01	59,0
8	T1	All MCs	118	0,0	118	0,0	0,068	0,0	LOS A	0,0	0,1	0,01	0,06	0,01	59,4
9	R2	All MCs	2	0,0	2	0,0	0,068	5,8	LOS A	0,0	0,1	0,01	0,06	0,01	56,6
Approach			131	0,0	131	0,0	0,068	0,6	NA	0,0	0,1	0,01	0,06	0,01	59,3
West: DR1583															
10	L2	All MCs	3	0,0	3	0,0	0,010	8,4	LOS A	0,0	0,3	0,31	0,88	0,31	50,9
11	T1	All MCs	6	0,0	6	0,0	0,010	9,1	LOS A	0,0	0,3	0,31	0,88	0,31	56,6
12	R2	All MCs	1	0,0	1	0,0	0,010	9,3	LOS A	0,0	0,3	0,31	0,88	0,31	50,6
Approach			10	0,0	10	0,0	0,010	8,9	LOS A	0,0	0,3	0,31	0,88	0,31	55,3
All Vehicles			340	3,0	340	3,0	0,092	2,2	NA	0,3	1,9	0,11	0,23	0,11	58,0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1 [DR1578/DR1583 2028 + Dev PM (Site Folder: Future 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: DR1578															
1	L2	All MCs	26	0,0	26	0,0	0,098	5,5	LOS A	0,3	1,9	0,13	0,24	0,13	55,3
2	T1	All MCs	114	9,2	114	9,2	0,098	0,0	LOS A	0,3	1,9	0,13	0,24	0,13	57,6
3	R2	All MCs	35	0,0	35	0,0	0,098	6,5	LOS A	0,3	1,9	0,13	0,24	0,13	58,2
Approach			175	6,0	175	6,0	0,098	2,1	NA	0,3	1,9	0,13	0,24	0,13	57,6
East: DR1583															
4	L2	All MCs	27	0,0	27	0,0	0,038	8,5	LOS A	0,1	1,0	0,27	0,87	0,27	56,7
5	T1	All MCs	5	0,0	5	0,0	0,038	9,3	LOS A	0,1	1,0	0,27	0,87	0,27	56,7
6	R2	All MCs	8	0,0	8	0,0	0,038	9,3	LOS A	0,1	1,0	0,27	0,87	0,27	56,6
Approach			40	0,0	40	0,0	0,038	8,7	LOS A	0,1	1,0	0,27	0,87	0,27	56,6
North: DR1578															
7	L2	All MCs	12	0,0	12	0,0	0,074	5,5	LOS A	0,0	0,3	0,03	0,08	0,03	58,9
8	T1	All MCs	118	8,8	118	8,8	0,074	0,0	LOS A	0,0	0,3	0,03	0,08	0,03	59,1
9	R2	All MCs	5	0,0	5	0,0	0,074	6,3	LOS A	0,0	0,3	0,03	0,08	0,03	56,4
Approach			135	7,7	135	7,7	0,074	0,7	NA	0,0	0,3	0,03	0,08	0,03	59,0
West: DR1583															
10	L2	All MCs	9	12,5	9	12,5	0,110	9,1	LOS A	0,4	2,7	0,39	0,91	0,39	50,0
11	T1	All MCs	3	0,0	3	0,0	0,110	9,4	LOS A	0,4	2,7	0,39	0,91	0,39	56,5
12	R2	All MCs	70	0,0	70	0,0	0,110	9,7	LOS A	0,4	2,7	0,39	0,91	0,39	50,2
Approach			82	1,4	82	1,4	0,110	9,6	LOS A	0,4	2,7	0,39	0,91	0,39	50,8
All Vehicles			432	5,1	432	5,1	0,110	3,7	NA	0,4	2,7	0,16	0,37	0,16	56,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 2028 + Dev AM (Site Folder: Future 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	84	2,9	84	2,9	0,568	21,3	LOS C	3,0	21,7	0,93	1,44	3,20	53,7
2	T1	All MCs	226	2,1	226	2,1	0,568	20,9	LOS C	3,0	21,7	0,93	1,44	3,20	44,3
Approach			310	2,3	310	2,3	0,568	21,0	LOS C	3,0	21,7	0,93	1,44	3,20	48,8
North: MR0348															
8	T1	All MCs	236	1,5	236	1,5	0,476	15,6	LOS C	2,2	15,3	0,83	1,37	2,72	47,3
9	R2	All MCs	94	0,0	94	0,0	0,476	15,3	LOS C	2,2	15,3	0,83	1,37	2,72	55,0
Approach			330	1,1	330	1,1	0,476	15,5	LOS C	2,2	15,3	0,83	1,37	2,72	51,2
West: DR1583															
10	L2	All MCs	108	2,4	108	2,4	0,551	22,4	LOS C	2,9	20,4	0,94	1,41	3,13	53,4
12	R2	All MCs	162	0,0	162	0,0	0,551	21,6	LOS C	2,9	20,4	0,94	1,41	3,13	53,3
Approach			270	0,9	270	0,9	0,551	21,9	LOS C	2,9	20,4	0,94	1,41	3,13	53,3
All Vehicles			910	1,4	910	1,4	0,568	19,3	LOS C	3,0	21,7	0,90	1,41	3,00	51,5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [DR1583/MR0348 2028 + Dev PM (Site Folder: Future 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: MR0348															
1	L2	All MCs	133	1,0	133	1,0	0,568	18,6	LOS C	3,0	21,3	0,88	1,45	3,16	54,4
2	T1	All MCs	242	1,9	242	1,9	0,568	18,3	LOS C	3,0	21,3	0,88	1,45	3,16	45,7
Approach			375	1,6	375	1,6	0,568	18,4	LOS C	3,0	21,3	0,88	1,45	3,16	50,7
North: MR0348															
8	T1	All MCs	232	0,0	232	0,0	0,412	13,2	LOS B	1,7	11,8	0,74	1,34	2,43	48,6
9	R2	All MCs	102	3,7	102	3,7	0,412	13,2	LOS B	1,7	11,8	0,74	1,34	2,43	55,6
Approach			334	1,1	334	1,1	0,412	13,2	LOS B	1,7	11,8	0,74	1,34	2,43	52,4
West: DR1583															
10	L2	All MCs	96	1,3	96	1,3	0,465	21,6	LOS C	2,2	15,3	0,94	1,33	2,78	53,5
12	R2	All MCs	104	1,2	104	1,2	0,465	21,0	LOS C	2,2	15,3	0,94	1,33	2,78	53,5
Approach			200	1,2	200	1,2	0,465	21,3	LOS C	2,2	15,3	0,94	1,33	2,78	53,5
All Vehicles			909	1,3	909	1,3	0,568	17,1	LOS C	3,0	21,3	0,84	1,38	2,81	52,1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

NETWORK SUMMARY

Network: N101 [2028 + Dev AM (Network Folder: 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)

Network Performance - Hourly Values				
Performance Measure	**Vehicles:**	**All MCs**	**Persons**	
Network Level of Service (LOS)		LOS B		
Speed Efficiency		0,84		
Travel Time Index		8,27		
Congestion Coefficient		1,18		
Travel Speed (Average)	km/h	50,7	50,7	km/h
Travel Distance (Total)	veh-km/h	1829,7	2195,7	pers-km/h
Travel Time (Total)	veh-h/h	36,1	43,3	pers-h/h
Desired Speed	km/h	60,0		
Demand Flows (Total for all Sites)	veh/h	1282	1539	pers/h
Arrival Flows (Total for all Sites)	veh/h	1282	1539	pers/h
Demand Flows (Entry Total)	veh/h	963		
Midblock Inflows (Total)	veh/h	231		
Midblock Outflows (Total)	veh/h	-153		
Percent Heavy Vehicles (Demand)	%	1,8		
Percent Heavy Vehicles (Arrival)	%	1,8		
Degree of Saturation		0,598		
Control Delay (Total)	veh-h/h	5,51	6,62	pers-h/h
Control Delay (Average)	sec	15,5	15,5	sec
Control Delay (Worst Lane by MC)	sec	22,8		
Control Delay (Worst Movement by MC)	sec	26,8	26,8	sec
Geometric Delay (Average)	sec	6,3		
Stop-Line Delay (Average)	sec	9,2		
Ave. Que Storage Ratio (Worst Lane)		0,03		
Effective Stops (Total)	veh/h	1441	1729	pers/h
Effective Stop Rate		1,12	1,12	
Proportion Queued		0,70	0,70	
Performance Index		62,6	62,6	
Cost (Total) *	$/h	1642,27	1642,27	$/h
Fuel Consumption (Total)	L/h	146,0		
Fuel Economy	L/100km	8,0		
Carbon Dioxide (Total)	kg/h	344,3		
Hydrocarbons (Total)	kg/h	0,028		
Carbon Monoxide (Total)	kg/h	0,41		
NOx (Total)	kg/h	0,305		

Network Model Variability Index (Average value of largest changes in Lane Degrees of Saturation or Queue Storage Ratios from the third to the last Network Iterations): 0,0 %

Number of Iterations: 5 (Maximum: 30)

Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0,0% 0,0% 0,0%

Network Level of Service (LOS) Method: SIDRA Speed Efficiency.

Software Setup used: Standard Left.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Network Performance - Annual Values				
Performance Measure	**Vehicles:**	**All MCs**	**Persons**	
Demand Flows (Total for all Sites)	veh/y	615 411	738 493	pers/y
Delay (Total)	veh-h/y	2 647	3 177	pers-h/y
Effective Stops (Total)	veh/y	691 488	829 786	pers/y
Travel Distance (Total)	veh-km/y	878 262	1 053 915	pers-km/y
Travel Time (Total)	veh-h/y	17 336	20 803	pers-h/y
Cost (Total)	$/y	788 290	788 290	$/y
Fuel Consumption (Total)	L/y	70 064		

Carbon Dioxide (Total)	kg/y	165 265
Hydrocarbons (Total)	kg/y	14
Carbon Monoxide (Total)	kg/y	195
NOx (Total)	kg/y	146

1 Hours per Year: 480 (Network)

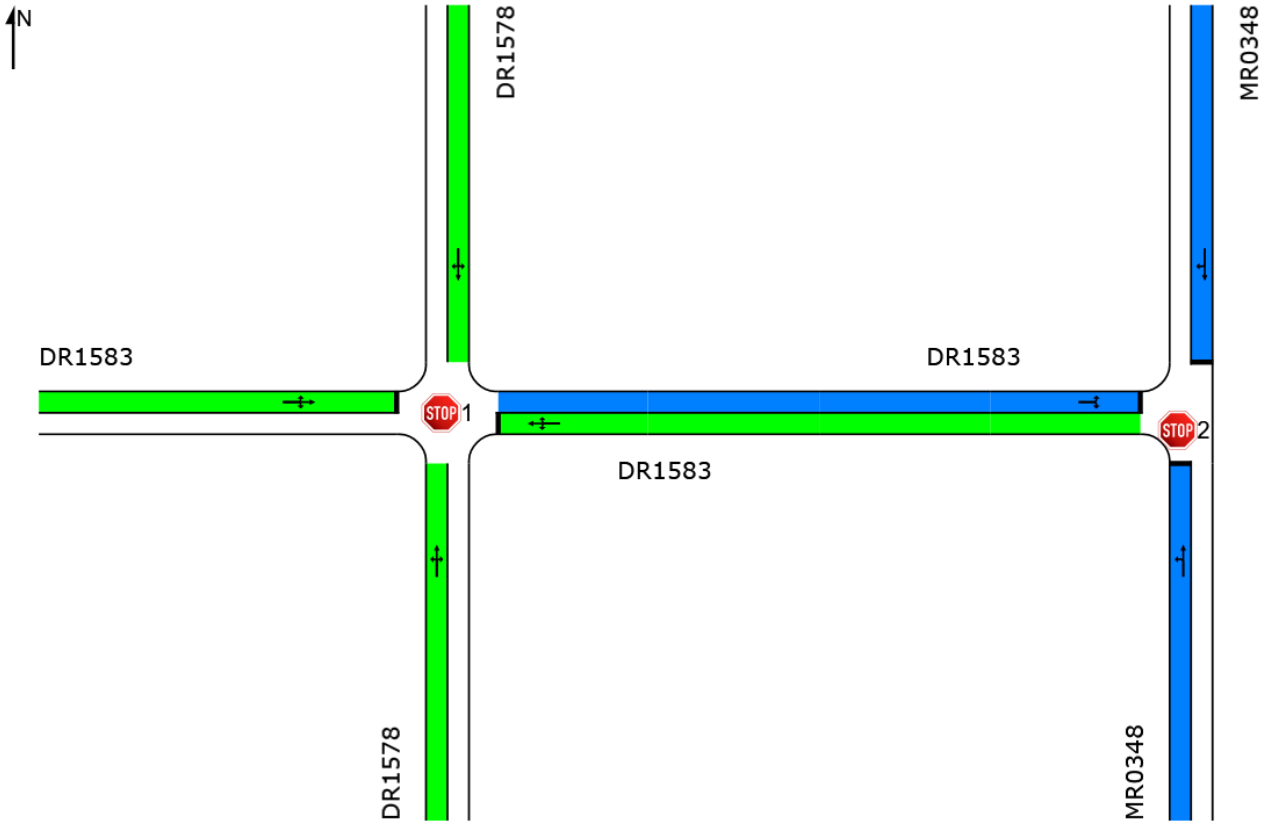
LEVEL OF SERVICE

Lane Level of Service

Network: N101 [2028 + Dev AM (Network Folder: 2028 + Dev)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

NETWORK SUMMARY

Network: N101 [2028 AM (Network Folder: 2028)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Network
Network Category: (None)

Network Performance - Hourly Values			
Performance Measure	**Vehicles:**	**All MCs**	**Persons**
Network Level of Service (LOS)		LOS B	
Speed Efficiency		0,85	
Travel Time Index		8,31	
Congestion Coefficient		1,18	
Travel Speed (Average)	km/h	50,9	50,9 km/h
Travel Distance (Total)	veh-km/h	1727,0	2072,5 pers-km/h
Travel Time (Total)	veh-h/h	34,0	40,7 pers-h/h
Desired Speed	km/h	60,0	
Demand Flows (Total for all Sites)	veh/h	1239	1487 pers/h
Arrival Flows (Total for all Sites)	veh/h	1239	1487 pers/h
Demand Flows (Entry Total)	veh/h	952	
Midblock Inflows (Total)	veh/h	207	
Midblock Outflows (Total)	veh/h	-149	
Percent Heavy Vehicles (Demand)	%	1,9	
Percent Heavy Vehicles (Arrival)	%	1,9	
Degree of Saturation		0,570	
Control Delay (Total)	veh-h/h	5,07	6,08 pers-h/h
Control Delay (Average)	sec	14,7	14,7 sec
Control Delay (Worst Lane by MC)	sec	22,2	
Control Delay (Worst Movement by MC)	sec	26,3	26,3 sec
Geometric Delay (Average)	sec	6,2	
Stop-Line Delay (Average)	sec	8,5	
Ave. Que Storage Ratio (Worst Lane)		0,03	
Effective Stops (Total)	veh/h	1362	1634 pers/h
Effective Stop Rate		1,10	1,10
Proportion Queued		0,69	0,69
Performance Index		58,4	58,4
Cost (Total) *	$/h	1546,75	1546,75 $/h
Fuel Consumption (Total)	L/h	138,2	
Fuel Economy	L/100km	8,0	
Carbon Dioxide (Total)	kg/h	326,0	
Hydrocarbons (Total)	kg/h	0,027	
Carbon Monoxide (Total)	kg/h	0,38	
NOx (Total)	kg/h	0,294	

Network Model Variability Index (Average value of largest changes in Lane Degrees of Saturation or Queue Storage Ratios from the third to the last Network Iterations): 0,0 %

Number of Iterations: 5 (Maximum: 30)

Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0,0% 0,0% 0,0%

Network Level of Service (LOS) Method: SIDRA Speed Efficiency.

Software Setup used: Standard Left.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Network Performance - Annual Values			
Performance Measure	**Vehicles:**	**All MCs**	**Persons**
Demand Flows (Total for all Sites)	veh/y	594 695	713 634 pers/y
Delay (Total)	veh-h/y	2 433	2 919 pers-h/y
Effective Stops (Total)	veh/y	653 702	784 442 pers/y
Travel Distance (Total)	veh-km/y	828 983	994 780 pers-km/y
Travel Time (Total)	veh-h/y	16 300	19 560 pers-h/y
Cost (Total)	$/y	742 442	742 442 $/y
Fuel Consumption (Total)	L/y	66 340	

Carbon Dioxide (Total)	kg/y	156 501
Hydrocarbons (Total)	kg/y	13
Carbon Monoxide (Total)	kg/y	184
NOx (Total)	kg/y	141

1 Hours per Year: 480 (Network)