# N4/R35 TRUCK STOP AND INDUSTRIAL DEVELOPMENT

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality (The Site)

# TRAFFIC IMPACT ASSESSMENT (TIA)

for rezoning purposes (Agricultural to Industrial 2)

December 2019

mpe moyeni professional engineering mpe0282

Report mpe0282/TIA

# NOTE:

 Moyeni Professional Engineering (MPE) appointed Trafsol to undertake the data collection under MPE's supervision.

# **TITLE OF REPORT:**



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for rezoning purposes (Agricultural to Industrial 2)

CLIENT:			
Bakkos Projects	(Pty) Ltd		
REPORT NO:	MPE0282 - N4/R35 Truck Deport and Industrial TIA		
PREPARED BY:			
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REVIEWED BY :			The engineer and his team
APPROVED:	I certify that this Traffic Impact Assessment has been prepared by myself and have the experience and training in the field of traffic and transportation engineering.		
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TABLE OF CONTENTS			
Chapter no.	Chapter description	Page	
1.	INTRODUCTION	2	
2.	TRANSPORTATION INFRASTRUCTURE	17	
3.	SITE ACCESS	20	
4.	DATA COLLECTION	25	
5.	TRIP GENERATION	28	
6.	TRIP DISTRIBUTION	29	
7.	CAPACITY ANALYSES	32	
8.	NON-MOTORISED TRANSPORT	39	
9.	PUBLIC TRANSPORT	40	
10	CONCLUSIONS	43	
11.	RECOMMENDATIONS	45	
12.	REFERENCES	46	

**ANNEXURE A: Intersection layouts** 

**ANNEXURE B: Traffic data collected** 

**ANNEXURE C: Traffic flow calculations** 

**ANNEXURE D: Capacity analysis results** 

**ANNEXURE E: Town planning extracts** 

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#### N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

N4/R35 TRUCK STOP AND INDUSTRIAL DEVELOPMENT
Portion 58 of the farm Vaalbank 289 JS
Steve Tshwete Local Municipality
(The Site)

TRAFFIC IMPACT ASSESSMENT (TIA) for rezoning purposes (Agricultural to Industrial 2)

#### 1. INTRODUCTION

- The farm portion is located in the south-eastern quadrant of the N4/R35 Interchange in Middelburg Central as shown in Figures 1-5.
- In terms of the requirement of the Steve Tshwete Local Municipality, a Traffic Impact Assessment (TIA) was required as part of the rezoning application.
- The farm portion currently operates 4 businesses with preparation of more to come.
- The four businesses are a large truck stop and 3 truck distribution logistic type operations (generally related to the transportation of coal).
- The owner of the farm portion intends to rezone the property to Industrial 2 which will allow the existing and future business to operate into the future.
- The N4/R35 Interchange is a crucial section of the road network and is included in this study.
- This TIA is carried out in terms of National Manuals as set out by the COTO.
- As is the normal case, road upgrades will be required to be carried out by both the Road Agencies and the Applicant.



Figure 1: N4/R35 TRUCK STOP & INDUSTRIAL - Regional Locality Plan



Figure 2: N4/R35 TRUCK STOP & INDUSTRIAL - Area-wide Locality Plan (Google)



Figure 3: N4/R35 TRUCK STOP & INDUSTRIAL – Local Locality Plan (Google) and farm portion boundaries

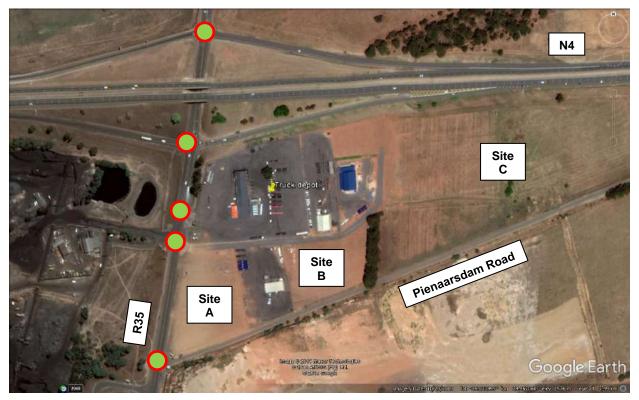


Figure 4: N4/R35 TRUCK STOP & INDUSTRIAL - Site Locality Plan and study area

Intersections counted



Figure 5: N4/R35 TRUCK STOP & INDUSTRIAL - Site Locality Plan (zoomed in)



Figure 6: N4/R35 TRUCK STOP & INDUSTRIAL - Existing accesses

#### **TOWN PLANNING**

Details are included in Annexure E.

An application to rezoning the farm portion from Agricultural to Industrial 2 was lodged on 22 March 2019 by Hlukane development consultants.

# LAND USE MAP The Farm portion 58 of the Farm Vaalbank 289, JS Agricultural

In November 2019, and based on existing trends in the market, an **amendment to the FAR from 1,6 to 0,1** was made by Urban Dynamics Mpumalanga.

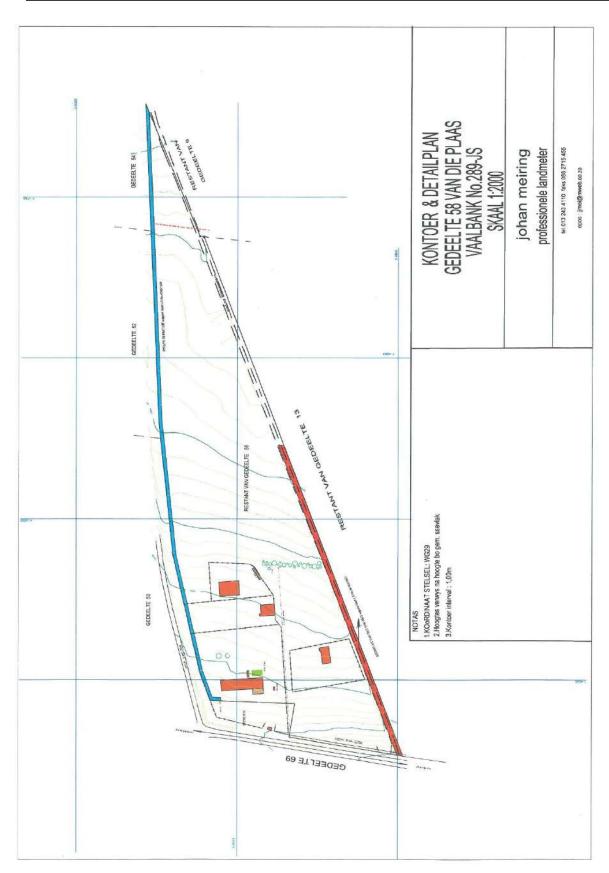


Figure 7: Land surveyor's diagram

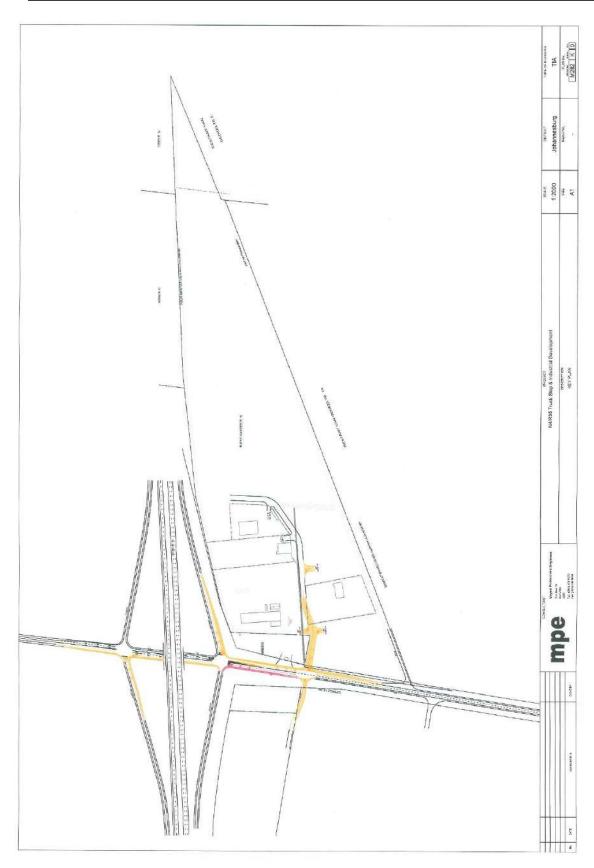


Figure 8: Overall road upgrading proposal

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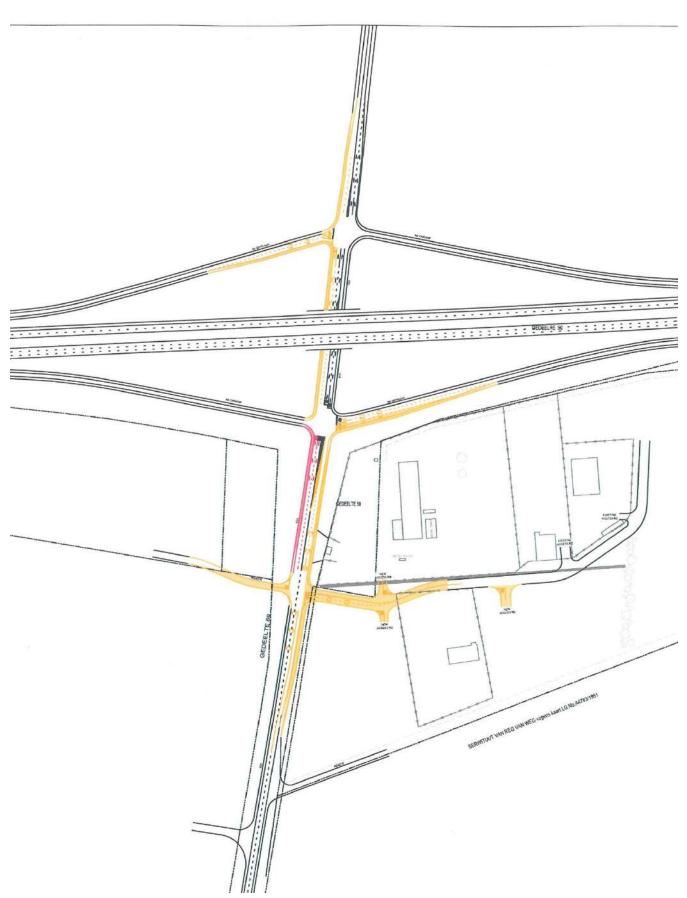


Figure 9: Overall road upgrading proposal (zoomed in)

#### N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

The land uses included in the applied for rights include:

#### Primary rights:

- A Service Industry
- Workshops
- Petrol Filling Station
- Warehouse
- Parking Garage
- Light Industry
- General Industry
- Business premises

#### By consent

- Communications tower
- Kiosk
- Canteen
- Place of refreshment
- Factory shop
- · Retail warehouse outlet
- Truck stop

#### **Statistics**

Refer to Table 1 overleaf for details.

- The farm portion is 22,6971sqm and with an Far of o,1 gives 22 697sqm of rights.
- Approximately 4 130sqm GLA is developed on 4 sites including a large truck stop and coal-related distribution activities.
- The undeveloped portions of the farm portion are divided into 3 Sites, namely:
  - Site A a platform of approximately 16 535sqm
  - Site B a platform of approximately 14 781sqm
  - Site C farm remainder of approximately 121 819sqm
     Totalling 15 313sqm of potential GLA to be developed.

However, taking an overall view, a potential 18 567sqm of rights has been investigated in this report.

Table 1: Land use rights summary

		Site (m²)	GLA	FAR
	Existing			
	-			
1	Truck stop	28 120	2 060	
2	Distribution 1	16 535	450	
3	Distribution 2 - Shosholoza	17 136	500	
4	Distribution 3	12 046	1 120	
	Subtotal	73 836	4 130	
	Farm portion	226 971	22 697	0,1
	Remainder	153 135	18 567	
	Site A	16 535	1 653	0,1
	Site B	14 781	1 478	0,1
	Subtotal	31 316	3 132	
	Site C	121 819	12 182	0,1
	Subtotal	153 135	15 313	

For this TIA, three land use scenarios were adopted on the undeveloped sections of the farm portion, namely;

- 1. Industrial only
- 2. Distribution only
- 3. Combination of Industrial and distribution

# **Architect's layout**

There is no concept plan at this stage and each Site is sized and leased as the market requires.

# Photographs of the farm portion activities



Photo 1: Looking east at the Truck Stop from the R35 (south of the N4)



Photo 2: Looking east at the Truck Stop's entrance from the R35



Photo 3: Looking east approaching the Truck Stop' building – Access to the pumps is to the left, under the cover portion.



Photo 4: Looking north at the Truck Stop' building – entrance on the left (west) and exit is to the right (where the pumps are located)



Photo 5: Looking south at the Truck Stop' "canteen" area



Photo 6: Typical lunch menu



Photo 7: Looking west -leaving the Truck Stop towards the R35



Photo 8: Looking east at one of the truck distribution businesses (Shosholoza Transport)



Photo 9: Looking south-west at one of other the truck distribution businesses.



Photo 10: Looking north from the Pienaarsdam road at the same one truck distribution businesses across a future site with a prepared platform.

### 2. TRANSPORTATION INFRASTRUCTURE

# 2.1 Existing Road Network (refer to Annexure A for details)

The definitions of any road network is in terms of 5 classes with associated characteristics (Department of Community Development, Guidelines for the provision of engineering Services in residential townships, 1994. (Pages B4 and B5)(11) as follows:

#### Class 1 roads

These are predominantly rural roads whose main function is to facilitate regional distribution of traffic (inter-city movement). They may be national or provincial roads and the type of facilities found in this class is freeways, expressways, dual carriageways and single carriageway main roads. Continuous sections of trunk roads in urban areas of trunk roads in urban areas should be designed as by-pass routes.

Continuity of route is important.

#### Class 2 roads

They can be described as primary distributors

"...form the primary network for the urban area as a whole. All long distance traffic movements to, from and within the city should be focussed onto such roads. Characteristics are high volumes, restricted access and fairly high speeds. Continuity of route is important."

#### Class 3 roads

This road can be described as **District Distributors (Class 3)** i.e. road that:

"distribute traffic between the various residential, industrial and principle business districts of the town and form the link between the primary network and the roads within residential areas. They should connect environmental areas without passing through them. They should also carry high volumes, have restricted access and be characterized by moderately high speeds. The major public transport movements are routed on district distributors and accordingly, facilities should be provided off the roadway for passenger loading and unloading."

#### Class 4 roads

They can be described as local distributors (Class 4), i.e. roads that:

"...distribute traffic between various residential, industrial and principal business districts of the town and form the link between the primary road network and the roads within the residential areas ... should also carry high volumes, have restricted access and be characterised by moderate traffic speeds. The major public transport movements are routed on district distributors and accordingly, facilities should be provided off the roadway for passenger loading and unloading."

#### Class 5 roads

These are residential and access roads.

Access roads form the final interface between the domestic unit and the primary network, and because of their narrowness and higher environmental standard, will not normally be used by bus services. It may, however, be necessary to make use of certain access roads to provide a turn-around for buses, avoiding the need for reversing. The minimum roadway width of access road so used, should be 6,8 metres.

TABLE 2: Road network classification

Road / Street	Class	Carriageway	Number of lanes	Road reserve width (m)	Characteristic
N4	2	Dual	4	75	SANRAL / TRAC
R35	3	Single	2	45	Provincial
Pienaarsdam Road	4	Single	2	24	Local Municipality
Access Road / colliery access road	2	Single	2	15	Private

N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### 2.2 Planned Road Network (future)

There are no road network changes planned for the future. Due to growing traffic demand, the interchange is likely to be upgraded in the medium to longer term. No formal plans, however, in this regard.

#### 2.3 Public Transport

Interlink coal distribution type trucks (ore carriers) use the R35 route to deliver coal to the nearby Eskom power stations. As such there is little need for public transport in the area. Local staff use mini-bus taxis as their main mode of transport to the places of work.

No lay byes or in-lane stops exist within / on the roads within the study area.

#### 2.4 Non-motorised transport

As the R35 is predominantly a rural type road, no paved sidewalks exist on either side of the study area roads within the study area. This is also the situation for improved traffic safety reasons.

Likewise, no separate bicycle lanes are evident.

#### 3 SITE ACCESS

#### 3.1 Existing access

Refer to Figure A3-1 in Annexure A for details.

- A The farm portion is accessed from <u>ONE central collector type gravel road linking</u>
  to nearly opposite the existing Black Wattle Colliery access on the R35 (termed the
  <u>Access Road in this report)</u>. This access existed before the truck stop and
  distribution type businesses were established.
- The existing Access Road is an upgrade of what the existing owner "inherited".
- As the Access Road is located in the central portion of the farm portion, access to each site is easily obtained for either side of the road as shown in the overall plan.



Photo 11: Looking north over the truck Stop access towards the N4 Interchange.

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Photo 12: Looking north over the truck Stop access from the Access Road towards the N4 Interchange.



Photo 13: Looking east along the Access Road from the R35 (the Trcuk Stop is on the left and its new proposed access is proposed 60m down the Access Road



Photo 14: Looking west along the Access Road towards the R35 at the Colliery Access access road (note the small staggered layout)



Photo 15: Looking south at the R35 from the Access Road

#### 3.2 Proposed upgraded and new access positions

Refer to Figure A3-3 in Annexure A for details.

- The Truck Stop has access directly off the R35 some 47m north of the site's Access Road and 120m south of the Interchange's southern terminal. This access is not approved, is proposed to be closed and relocated 60m east of the R35 off the Access Road.
- A new access to Site A (refer to Image 1 overleaf) is proposed to be opposite this new Truck Stop access.
- As the existing Access Road traverses over a triangular area under the SANRAL juridiction, this road is proposed to be "kinked" around the SANRAL land so as, in the immediate term, not require permission from SANRAL to use their land for road purposes. The SANRAL permission process is expected to take some time to obtain and approval for this study is required now by the Local Municipality.
- All other existing and future sites within this farm portion, are planned to take access off the Access Road and at a distance well in excess of 100m from the R35.



Photo 16: Looking north along the R35 showing typical high volumes of coalorientated truck traffic.



Image 1: Proposed immediate Access Road upgrade.

#### **4 DATA COLLECTION**

Refer to Figures 10 for traffic flow details.

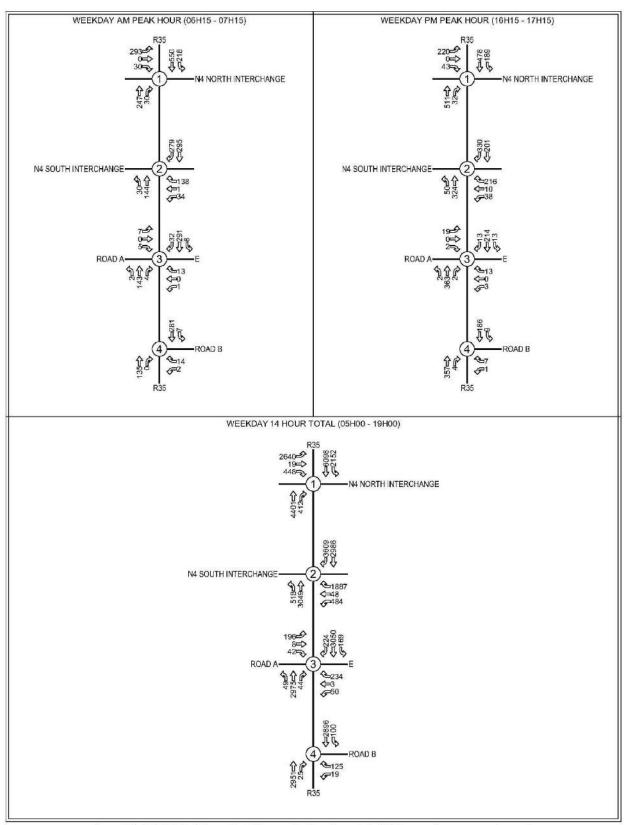
Classified manual traffic counts were conducted by Trafsol who undertook manual classified counts on **Tuesday 5 November 2019** as detailed in **Annexure D.** 

The traffic mid-block volumes have the following characteristics:

TABLE 3: Link traffic flows

Road	Flow (vph)	AM peak hour	PM peak hour	Capacity (vph) / Number of lanes required / existing	% of capacity
R35 north of the Interchange /	Northbound	540 / <b>149</b>	731 / <b>367</b>	1900 / 1 / 1	38 / <b>19</b>
At the Access Road	Southbound	580 / <b>331</b>	667 / <b>240</b>	1900 / 1 / 1	35 / <b>17</b>
Access Road	Eastbound	12	15	1200 / 1 / 1	2
Access Noad	Westbound	14	16	1200 / 1 / 1	2
Colliery	Eastbound	12	21	1200 / 1 / 1	2
access road	Westbound	33	15	1200 / 1 / 1	2
Pienaarsdam	Eastbound	7	13	1800 / 1 / 1	3
Road	Westbound	16	8	1800 / 1 / 1	1

The above shows that the links capacities are more than adequate to meet the current traffic demand. NO additional link lanes are required in 2019.



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N4/R35 Truck Stop & Industrial Development

2019 Existing Traffic Flows Weekday AM & PM Peak Hours 10

Notwithstanding the slowdown in traffic flow over the past 3 years, a **traffic growth rate of 3% pa** was adopted in this mature rural area and guided from the COTO data Manual.

The existing modal split is as follows:

TABLE 4: Modal Split (as per traffic survey) 2019

Mode	All surveyed hours and intersections
Wode	Tuesday 5 <sup>th</sup> November 2019
Cars	33 083
Mini-bus taxi	1 289
Buses	94
Trucks	7 445
All vehicles	41 911
Mode	Percentage
Cars	78,9
Mini-bus taxi	3,1
Buses	0,2
Trucks	17,8
All vehicles	100.0

The client had 7-day counts undertaken by **Mikros Traffic Monitoring (Pty) Ltd** which are included in **Annexure D** for information purposes. The traffic counts undertaken by **mpe** were used in this TIA report.

**Queue lengths** were recorded at the N4 / R35 Interchange, as follows:

- Northern terminal
  - o Off ramp, 4 and 9 vehicles between 09:00 and 13:30.
  - Southbound through lane more than 10 vehicles for most of the day.
- Southern terminal
  - Northbound through lane more than 10 vehicles for most of the afternoon.
  - Westbound off-ramp more than 10 vehicles in the late afternoon
  - Southbound right-turn lane between 4 and 9 vehicles for most of the day until
     16:00 when it increases to 10 plus vehicles until 17:00

#### **5 TRIP GENERATION**

Details are included in Annexure C.

The <u>surveyed trip generation was adopted for the distribution trip generation rate as</u> it is higher than the COTO rate for code 150.

Table 5: Surveyed and future trip generation rate (trips per peak hour)

PEAK HOUR	IN	OUT	TWO-WAY			
Existing s	Existing surveyed trips - 11 998sqm GLA					
Weekday AM	12	14	26			
Weekday PM	15	16	31			
Saturday	276	214	490			
Weekday AM	0,29	0,34	0,63			
Weekday PM	0,36	0,39	0,75			
Industrial trip generation	n rate (trips/1	100sqm) (COTC	code 130)			
Weekday AM	0,56	0,24	0,80			
Weekday PM	0,56	0,24	0,80			
•	Distribution trip generation rate (trips/100sqm)					
(Used the surveyed results as the trip generation is higher						
than the COTO rate)						
Weekday AM	0,29	0,34	0,63			
Weekday PM	0,36	0,39	0,75			

All three land use scenarios were tested for levels of service as shown overleaf.

Table 6: Trip generation (trips per hour) (2020) (peak hour trips for 17620sqm)

PEAK HOUR	IN	OUT	TWO-WAY		
	Industr	rial			
Weekday AM	86	37	123		
Weekday PM	31	92	123		
	Distribut	ion			
Weekday AM	44	52	96		
Weekday PM	56	59	115		
Combined	Combined Industrial and Distribution				
Weekday AM	77	40	117		
Weekday PM	80	132	212		

#### **6 TRIP DISTRIBUTION**

The expected trip distribution is based on the existing traffic flow situation.

TABLE 7: Trip Distribution percentages
(Refer to Figures 11 for a pictorial representation)

DIRECTION OF	PERCENT (AM / PM pe	ROUTE FOLLOWED	
ORIGIN	From	То	
From / to the north	17 / 20	22 / 22	R35
From / to the west	25 / 34	32 / 35	N4 west
From / to the east	28 / 31	36 / 23	N4 east
Access south	30 / 15	10 / 20	R35 south
TOTAL	100 / 100	100 / 100	

#### The above indicates that:

- The majority of additional trips are, as in the existing situation, expected to originate and return from and to the east and west along the N4 freeway.
- The northern area is secondary re distribution and
- the south is more for local requirements.

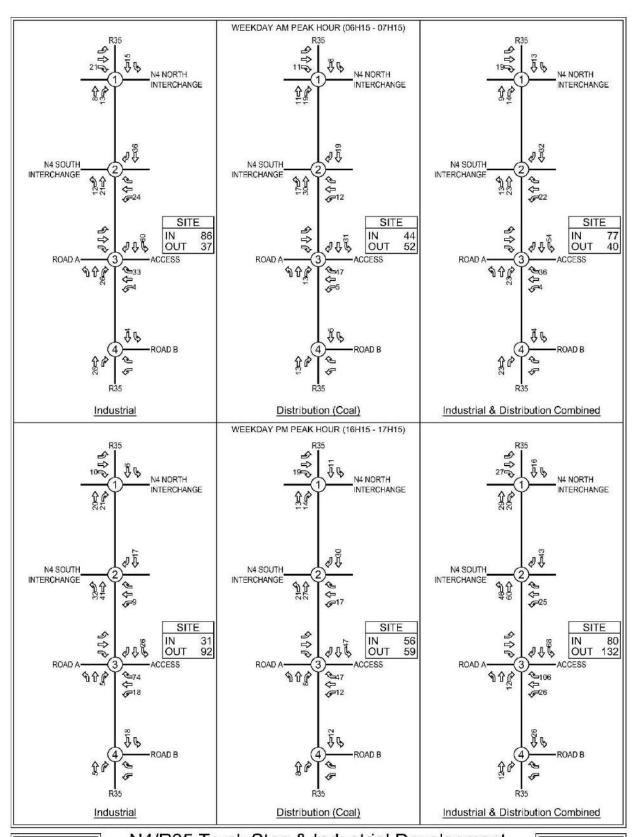
WEEKDAY AM PEAK HOUR (06H15 - 07H15) N4 NORTH INTERCHANGE N4 SOUTH INTERCHANGE OUT ROAD B Industrial, Distribution & Combined WEEKDAY PM PEAK HOUR (16H15 - 17H15) N4 NORTH INTERCHANGE N4 SOUTH INTERCHANGE 900 OUT Industrial, Distribution & Combined

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N4/R35 Truck Stop & Industrial Development

Trip Distribution (%) - Industrial, Distribution & Combined Weekday AM & PM Peak Hours

11



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N4/R35 Truck Stop & Industrial Development

Trip assignments (vph) - Industrial, Distribution & Combined

Weekday AM & PM Peak Hours

12

#### 7 CAPACITY ANALYSES

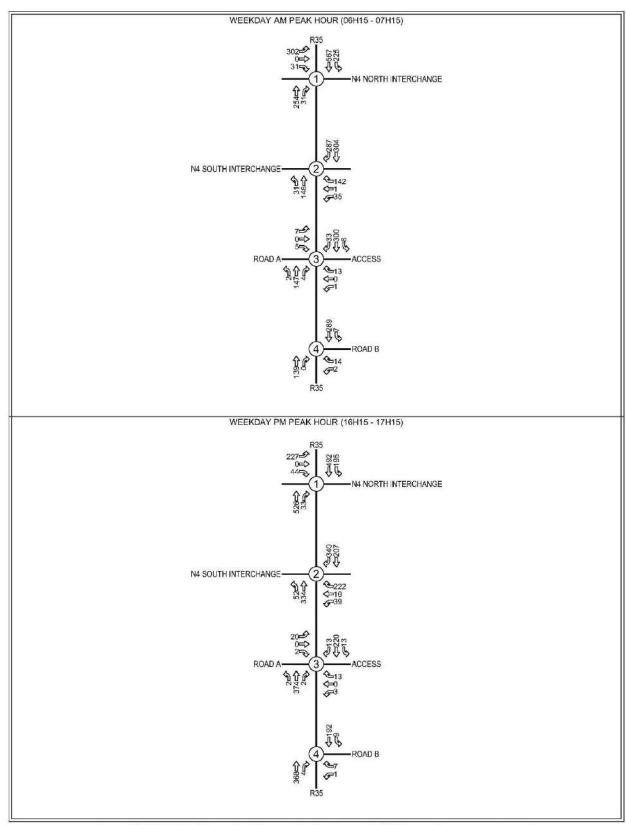
#### 7.1 Introduction

The performance of intersections in urban road networks is defined by the level of service (LOS) for each approach to the intersection. These levels of service have been defined in the Highway Capacity Manual (HCM) (**Reference 5**) as shown in **TABLE** below. During the peak hours, the road infrastructure capacity provided should ensure that the intersection approach level of service should <u>ideally</u> not exceed LOS D.

**TABLE 8: Level of Service Criteria (HCM)** 

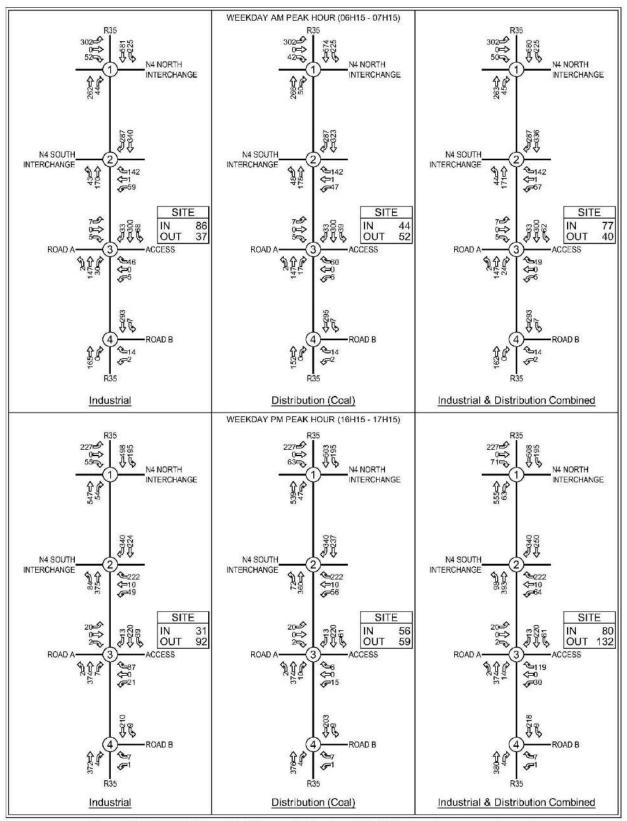
Level of Service	Average Approach Delay (d) for Signalised Intersections (seconds)	Average Approach Delay (d) for Priority Intersections (seconds)
Α	d ≤ 10	d ≤ 10
В	10 < d ≤ 20	10 < d ≤ 15
С	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ 55	25 < d ≤ 35
Е	55 < d ≤ 80	35 < d ≤ 50
F	80 < d	50 < d

The intersection approach performance for the intersections within the study area was determined using the AutoJ software programme.



N4/R35 Truck Stop & Industrial Development

2020 Expected Traffic Flows Only Weekday AM & PM Peak Hours



N4/R35 Truck Stop & Industrial Development

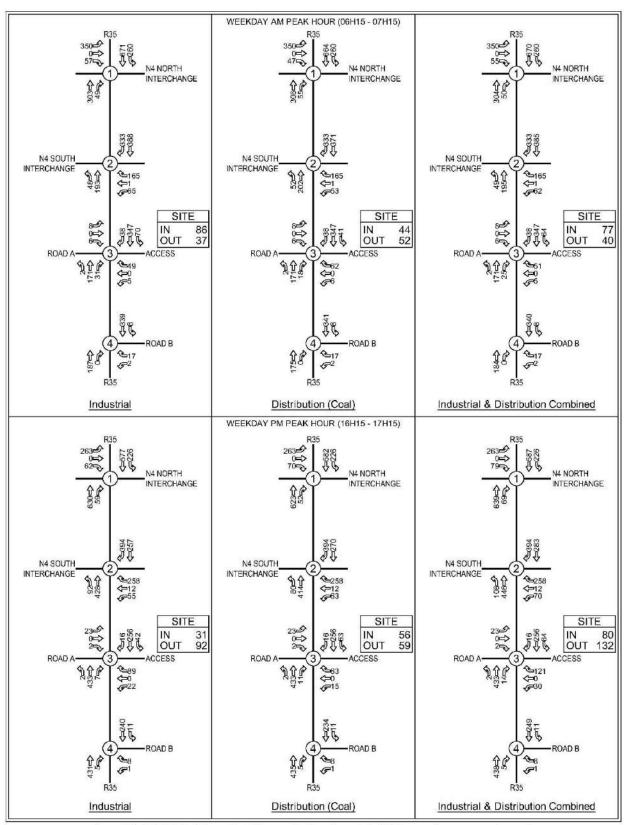
2020 Expected Traffic Flows With Site Trips Weekday AM & PM Peak Hours

WEEKDAY AM PEAK HOUR (06H15 - 07H15) N4 NORTH INTERCHANGE N4 SOUTH INTERCHANGE WEEKDAY PM PEAK HOUR (16H15 - 17H15) N4 NORTH INTERCHANGE N4 SOUTH INTERCHANGE

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N4/R35 Truck Stop & Industrial Development

2025 Expected Traffic Flows Only Weekday AM & PM Peak Hours



N4/R35 Truck Stop & Industrial Development

2025 Expected Traffic Flows With Site Trips Weekday AM & PM Peak Hours

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#### 7.2 2019

The existing traffic flows from the surrounding road network for the AM and PM peak hours are shown in **Figure 10.** The detailed capacity analyses results are shown in **Annexure C.** 

Of importance is the result that the N4 / R35 interchange is failing in terms of levels of service, as follows:

- The all-way stop controls on both the northern and southern terminals cause excessive delays on both north/south through movements.
- The existing Access Road / Colliery access road as well as the Pienaarsdam Road intersection are currently operating satisfactorily.

It is important to note that since TRAC are not in favour of traffic signal controls along the N4 route (due to high incidents of theft) non-signal controls have been proposed instead.

The following without site road upgrades are proposed (refer to **Annexure A**):

- Figure A1-2 Immediate requirement remove the stop controls on the southern and northern legs. It has been noted that these controls were implemented for traffic safety reasons (large trucks) but the consequence is long delays in the north-south directions (Road Authority responsibility)
- **Figure A2-2** Additional right-turn lane from the off-ramp and new associated second accepting northbound lane (Road Authority responsibility)
- Figure A3-2 Additional right-turn lanes on the R35 to improve the traffic safety
  of the access intersection (Not required from a level of service viewpoint) from
  the off-ramp and new associated second accepting lane (Developer
  responsibility)

No upgrading is required at the R35 / Pienaarsdam Road intersection.

#### 7.3 2020

Refer to **Figures 13 and 14** for the expected traffic flows.

The capacity analysis results are included in **Annexure C** for details.

The following without-development road upgrades are proposed (refer to **Annexure A**):

 Figure A1-3 – additional through lane from the south as well as an additional right-turn lane from the west on the off-ramp (Road Authority responsibility & Developer)

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

No further road upgrading is required at the R35 intersections.

#### 7.4 2025

Refer to Figures 15 and 16 for the expected traffic flows.

The capacity analysis results are included in **Annexure C** for details.

The following without-development road upgrades are proposed (refer to **Annexure A**):

• **Figures A2-3** & **A3-3** – additional left-turn lane from the south. (Road Authority responsibility & Developer)

No further road upgrading is required at the R35 intersections.

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### 8 NON-MOTORISED TRANSPORT

The provision of non-motorised transport facilities forms an integral part of transport planning, and should be considered during the planning phases. Non-motorised transport facilities include pedestrian walkways, pedestrian crossings and cycling lanes. The following facilities should be taken into account when undertaking the Site development plan. In terms of good practice all new townships require 1,2m walkways / footpaths to be provided on one side of the road where pedestrian demand is expected to be high.

The following is relevant:

 Pedestrian walkways – Paved sidewalks do not <u>exist within the study area</u> for traffic safety reasons and are proposed to remain that way.

**Pedestrian crossings** – Not required as all pedestrians are expected to cross at the intersections.

#### 9 PUBLIC TRANSPORT

#### 9.1 Context

This section of the report deals with public transport proposals that are essential to, and will impact on the Site. In order to promote manoeuvrability of all modes of transport, it is vital to design within a framework that will relate to the surroundings. In this case there are no Council initiatives existing or planned in the vicinity of the Site.

#### 9.2 Background

It is good planning practice as well as a requirement of the NLTA Act (1) that an assessment of the public transport be included in a traffic impact assessment.

The following comments are relevant in respect to the public transport availability at the expanded development.

The R35 route is characteristic of mini-bus taxis. These have been counted separately in the Traffic Data section.

#### 9.3 Public Transport Requirements

Road-based public transport such as mini-bus taxis and buses are subject to the same road operating conditions as private vehicles.

In the context of the type of expanded development for the Site, thorough planning will be required to accommodate the following factors relating to public transport:

- Taxi routes
- Bus routes
- Non-motorised transport

The above factors are therefore pivotal in the provision of adequate public transport system.

The existing public transport routes are found along the R35 route.

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

On the R35 the following public transport exists:

- Mini bus taxis AM peak hour (15 southbound, 18 northbound) and PM peak hour (10 southbound, 10 northbound).
- Buses AM peak hour (2 southbound, 4 northbound) and PM peak hour (1 southbound, 0 northbound).

#### Lay byes and facilities

- No lay byes exist throughout the study roads.
- Public transport makes use of in-lane stops whilst Minibus Taxis occasionally use the road's shoulder.
- No further public transport facilities are therefore proposed as the existing system is adequate to meet the demands of the local staff.

#### Additional Minibus taxis

It should be noted however, that am additional 4 Minibus Taxis are recommended to operate on the R35 route to meet the future additional public transport supply demands as detailed overleaf.

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### **EXPECTED PUBLIC TRANSPORT DEMAND**

#### MODAL SPLIT

Vehicle	Percentage by vehicle	Average vehicle Occupancy	Persons	Percentage by persons
Car	78,9%	1,6	126	69.6%
MBT	3,1%	15	46	25,4%
Bus	0,2%	40	9	4,9%
TOTAL			181	100,0%

#### Industrial

#### TRIP GENERATION (Peak hour)

Max one way = 92

PT vehicles required				
	116	1,6	73	Car
3	42	15	3	MBT
0	8	40	0	Bus
	167		76	TOTAL

#### Distribution (Coal)

#### TRIP GENERATION (Peak hour)

Max one way = 59

required				0.
	75	1,6	47	Car
2	27	15	2	MBT
0	5	40	0	Bus
	108		49	TOTAL

#### COMBINED INDUSTRIAL & Distributi

#### TRIP GENERATION (Peak hour)

Max one way = 132

required				
316	167	1,6	104	Car
4	61	15	4	MBT
0	12	40	0	Bus
	239		109	TOTAL

#### 0

#### TRIP GENERATION (Peak hour)

Max one way = 132

PT vehicles required				
	167	1,6	104	Car
4	61	15	4	MBT
(	12	40	0	Bus
	239		109	TOTAL

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### 10 CONCLUSIONS

The following can be concluded:

- 1. The local intersections around the property for the proposed development are operating at satisfactory levels of service, except for the N4/R35 Interchange which fails mainly on:
  - The southern and northern through lanes
  - The right-turn movement on the westbound off-ramp
- 2. Proposals to upgrade these two terminals, which are NOT signal control related, are depicted in Figures A1-2, A2-2 and A3-2 in Annexure A. Additional lanes are proposed on two-way priority-controlled intersections. The proposed road upgrades are the responsibility of both the Road Authority and the developer (the former in the first two cases and the latter in the latter case).
- 3. In 2020, Figure A1-3 in Annexure A depicts an additional through lane from the south as well as an additional right-turn lane from the west on the eastbound off-ramp is required (Road Authority and developer responsibility).
- 4. In 2020, the developer is required upgrade the existing Access Road intersection with the R35. The proposed right-turn lane on the R35 is for safety and not capacity reasons as shown in Figure A3-2 in Annexure A.
  - 5. By 2025 and beyond and as depicted in Figures A2-3 and A3-3 in Annexure A an additional northbound left-turn lane is proposed at the southern terminal.

#### 6. Pedestrians

- Pedestrian walkways No paved sidewalks <u>exist within the study area</u> for traffic safety reasons and are proposed to remain that way.
- Pedestrian crossings Not required as all pedestrians are expected to cross at the intersections.

#### 7. Public Transport

On the R35 the following public transport exists:

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

- Mini bus taxis AM peak hour (15 southbound, 18 northbound) and PM peak hour (10 southbound, 10 northbound).
- Buses AM peak hour (2 southbound, 4 northbound) and PM peak hour (1 southbound, 0 northbound).

#### Lay byes and facilities

- No lay byes exist throughout the study roads.
- Public transport makes use of in-lane stops whilst Minibus Taxis occasionally use the road's shoulder.
- No further public transport facilities are therefore proposed as the existing system is adequate to meet the demands of the local staff.

#### Additional Minibus taxis

It should be noted however, that am additional 4 Minibus Taxis are recommended to operate on the R35 route to meet the future additional public transport supply demands as detailed overleaf.

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### 10 RECOMMENDATIONS

Given the findings of this review report, the following **recommendations** are made:

- 1. That the proposed rezoning of Portion 58 of the farm Vaalbank 289 JS from agricultural to Industrial 2 be approved from a Traffic and Transportation point of view with road upgrading being required as depicted in Annexure A.
- 2. No additional sidewalks along the external roads be implemented, as paved sidewalks are currently not available for traffic safety reason and is proposed to remain that way.
- 3. An additional 4 Mini-bus Taxis be permitted to travel along the R35 route to service the needs of the future development.

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

#### 11 REFERENCES

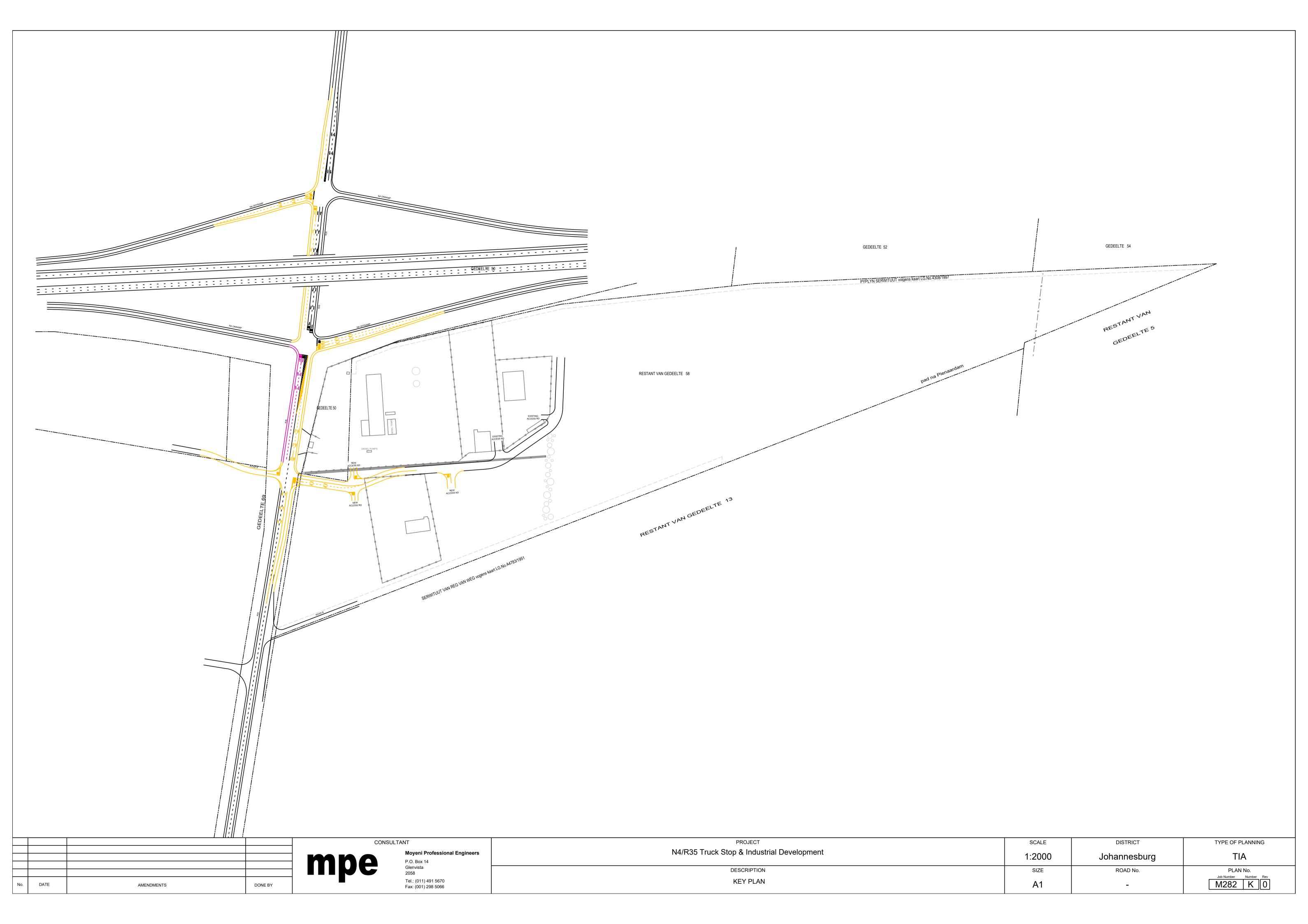
The following references were used in the compilation of this report:

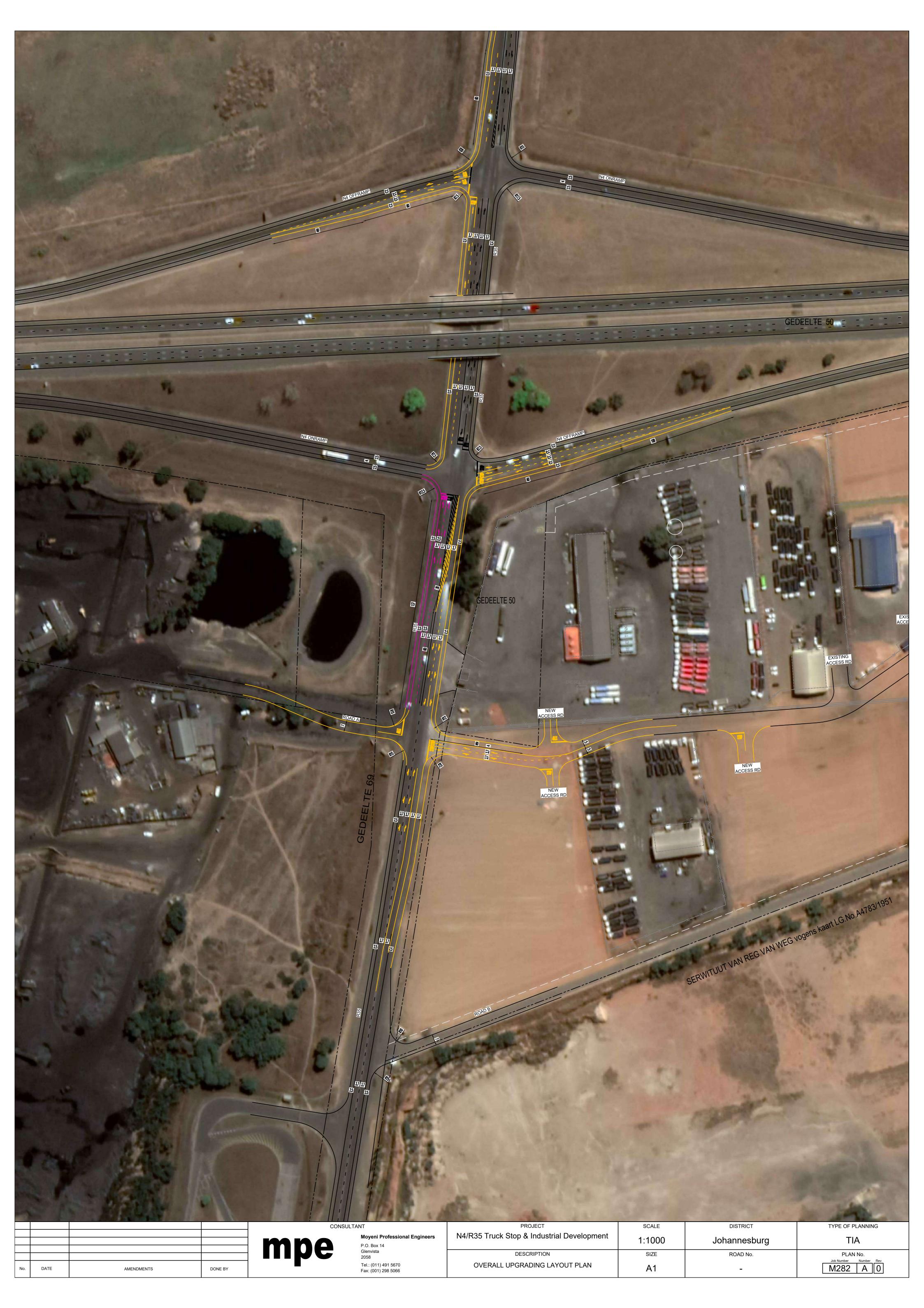
- 1. National Land Transport Act **NLTA** (Act No 5 of 2009).
- 2. **TMH 15** South African Engineering Service Contribution Manual for Municipal Road Infrastructure, Ver 1.0, COTO, September 2012.
- 3. **TMH 16** Volumes 1 & 2 South African Traffic Impact and Site Traffic Assessment Manual, Ver 1.0, COTO, August 2012.
- 4. **TMH 17** Volume 1, Trip Data Manual, COTO, September 2012.
- TMH 26 South African Road Classification and Access Management Manual, Ver 1.0, COTO, August 2012.
- 6. Highway Capacity Manual, FHWA, USA, 2000.
- 7. Department of Community Development, Guidelines for the provision of engineering Services in residential townships, 1994.
- 8. AutoJ User Guide, (2016)
- 9. Highway Capacity Manual, FHWA, USA, 2000.
- 10. Application for rezoning of portion 58 of the farm Vaalbank 286 JS, Hlukani Development consultants, 2019.
- 11. Mikros Traffic monitoring (Pty) Ltd, 7-day counts

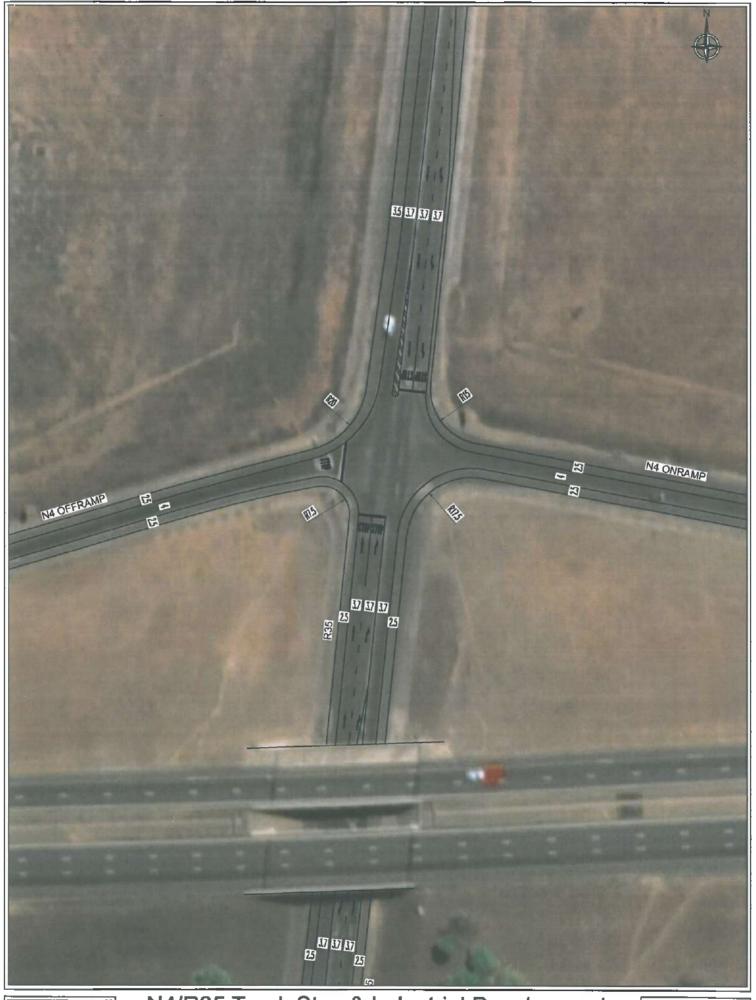
Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

## ANNEXURE A INTERSECTION LAYOUTS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019



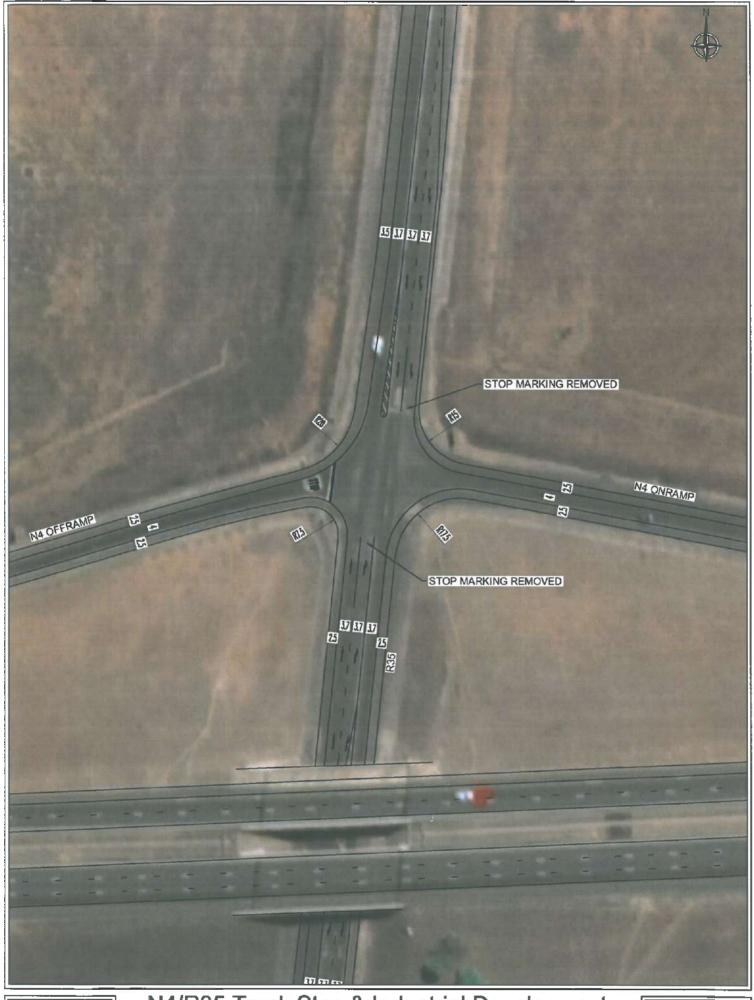




N4/R35 Truck Stop & Industrial Development

Existing Intersection of R35 and N4 North Interchange

A1-1



N4/R35 Truck Stop & Industrial Development

Proposed Changes of Intersection of R35 and N4 North Interchange

A1-2



N4/R35 Truck Stop & Industrial Development

Proposed 2020 Upgrading of R35 and N4 North Interchange

A1-3



N4/R35 Truck Stop & Industrial Development

Existing Intersection of R35 and N4 South Interchange

A2-1



N4/R35 Truck Stop & Industrial Development

Proposed 2020 Upgrading of R35 and N4 South Interchange

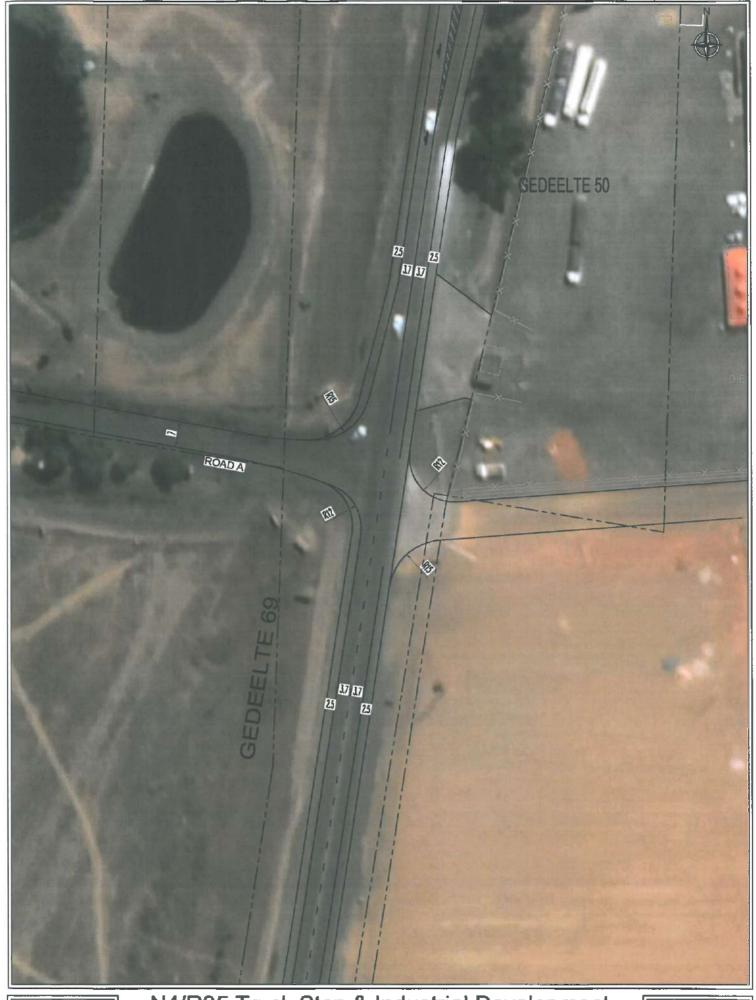
A2-2



N4/R35 Truck Stop & Industrial Development

Proposed 2025 Upgrading of R35 and N4 South Interchange

**A2-3** 



N4/R35 Truck Stop & Industrial Development

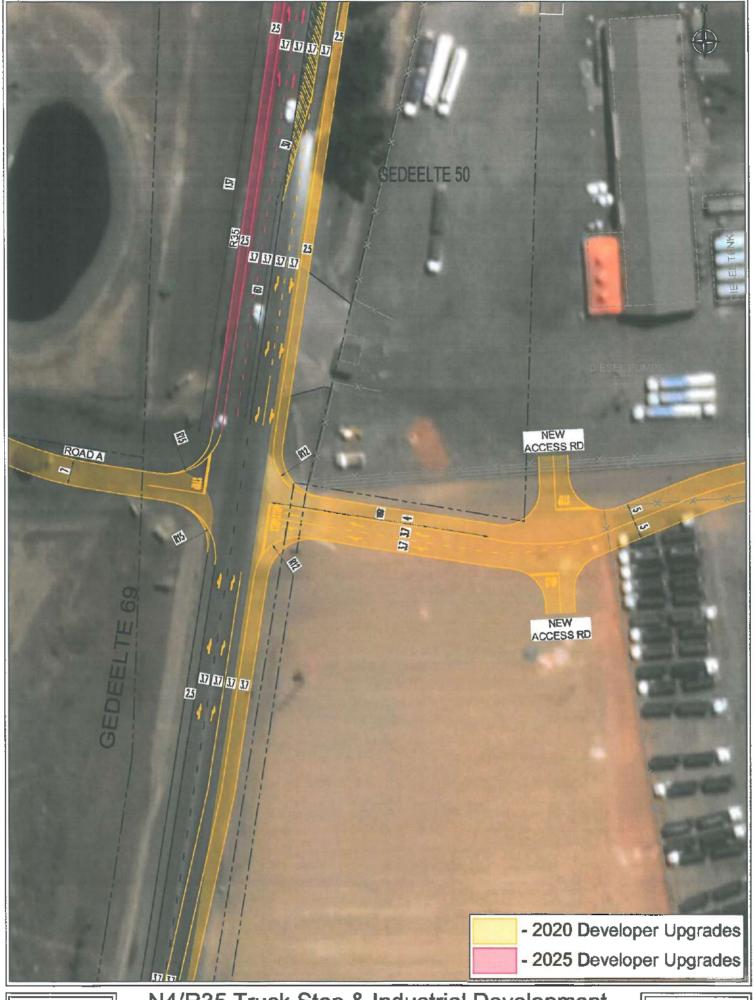
Existing Intersection of R35 and Road A/Access Rd

A3-1



N4/R35 Truck Stop & Industrial Development

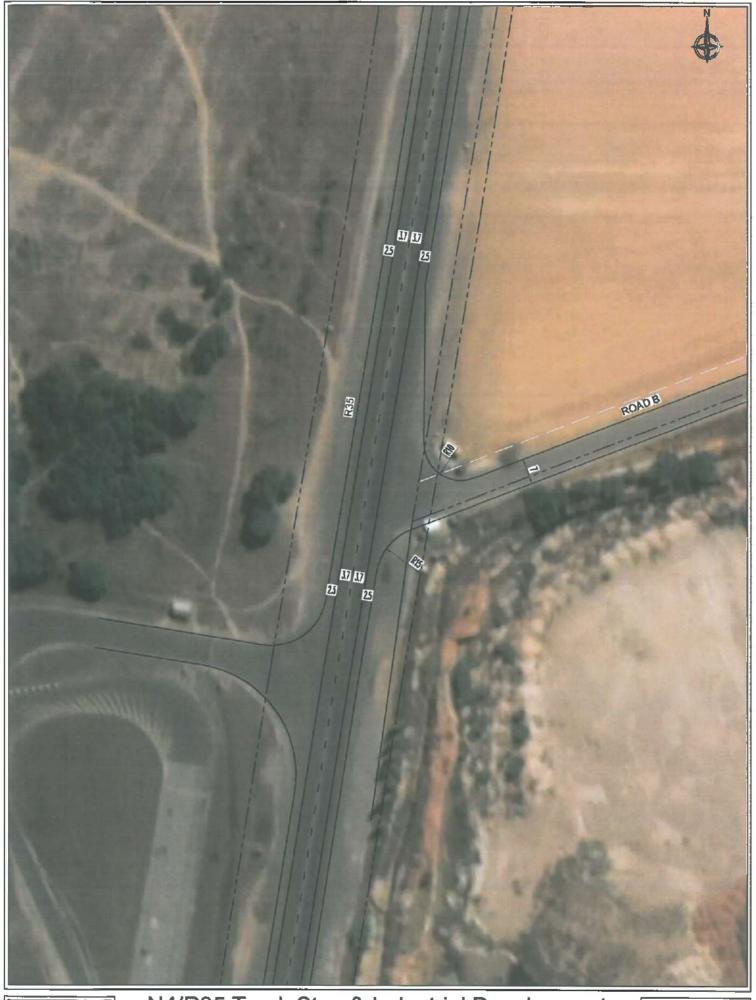
Proposed 2020 Upgrading of R35 and Road A/Access Rd



N4/R35 Truck Stop & Industrial Development

Proposed 2025 Upgrading of R35 and Road A/Access Rd

A3-3



N4/R35 Truck Stop & Industrial Development

Existing Intersection of R35 and Road B



Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

### **ANNEXURE B**

**Traffic Flow Calculations** 

#### N4/R35 Truck Stop and Industrial development Portion 58 of the farm Vaalbank 289 JS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

INDUSTRIAL	
AND	
9	
TRUCK	
4/R35	

# From Agricultural to Industrial 2

Single Bar 2019   Free Cot 4 age	Coal distribution   Coal	As & 18 November 2019														
15,11   1,10	15,31   1,00   15,313   Trips   Trips   Trips   Trips	oyen	slonal Enginoering	Project MPE 27	=			RATE		TRIPS NEW	IMI	EKDAYA	M	IM	EEKDAY P	M
15,31   0,10   15,313   Trips   Trip	15,31   0,10   15,313   Trips	COTO CODE Lar	og nae	She size (He)		FAR	GLA sqm	2	TUO	TWO-WAY	Z	no.	TWO-WAY	Ž,	100	TWO-WAY
15,31   0,10   15,313   Trips   Trip	15.31 6,10 15.313 Trips  Trips  S.13 0,10 15.313 Trips  Tr	Exis	sting TRUCK STOP & Coal distribution	7,38		90'0	4 130				12	14	28	15	16	31
15.31   0.10   15.313   Trips   Trips   15.31   Trips   Trips   15.31   Trips   Trip	15,31   0,10   15,313   Trips	<b>5</b>	usinesses)								0,29	0,34	0,63	0,36	0,39	0,75
15,31   0,10   15,513   Trips   Trip	15,31   0,10   15,313   Trips	4									40%	54%		48%	32%	
15,31   0,10   15,313   Trips   Trip	15,31 0,10 15 313 Trips  COMBINATION  12,18 0,10 15 313 Trips  Trips  Trips  Trips  Trips  Worst case - All Industrial  Trips  Worst case - Combined  New Pass-by  New Pass-by  New Pass-by  New Pass-by  New Pass-by	War	ahousing & Distribution	7,38		90.0	4 130	Tribos			121	40	24	0	+	27
15,31   0,10   15,313   Trips   0,20   0,2	15,31 0,10 15,313 Trips  15,31 0,10 15,313 Trips  15,31 0,10 15,313 Trips  16,31 0,10 15,313 Trips  16,31 Trips  16,31 Trips  Worst case - All Industrial  Worst case - Combined  New Pass-by  New Pass-by  New Pass-by  New Pass-by	Rem	winder of the farm portion								0.30	0,20	0,50	0,23	0,28	0,50
15.31   0,10   15.313   Trips   Trip	15,31 0,10 15,313 Trips  COMBINATION  COMBINATION  COMBINATION  Trips  T	Н									%-009	40%		45%	38%	
15,31   0,10   15,313   Trips   Trip	15,31 0,10 15,313 Trips  COMBINATION  12,18 0,10 15,313 Trips  Trips  Worst case - All Industrial  New Pass-by  New Pass-by  New Pass-by	_														
15.31   0.10   15.513   Trips   Trip	15,31   0,10   15,313   Trips	PE PE	industrial	15,31		0,10	15 313	Trips			9.8	37	123	3	92	123
15,31   0,10   15,313   Trips   44   52   96   56   59   59   59   59   59   59	15,31	Re	maindedr of the farm portion								0,56	0,24	09'0	0,20	09'0	0,80
15,31   0,10   15,313   Trips	15,31   0,10   15,313   Trips   Trips	-									20%	30%		36%	75%	
12.18	12.18	Č	d-Builon (Coal)	1. 26.		9 40	45 949	Total			*	\$	8	S	9	145
12.18	12.18   0.10   12.182   Trips     15.31   0.10   15.313   Trips     15.31   0.10   15.313   Trips     Trips   Trips     Worst case - All distribution     Trips   Trips	3	ing survey trip generation rates								0.26	0.34	0.63	0.36	0.38	0.75
12.16	12.18	H									40%	S-C-X		46%	42%	
12.18	12.18   0.10   12.182   Trips						MOD	CHANIS	7							
15,31   0,10   15,313   Trips   Trip	3-13   0,10   15.313   Trips   Trips	<u><u> </u></u>	ustrial	12.18		0.10	12 182	Tribs			60	29	-82	24	23	97
15,31   0,10   15,313   Tripe	15,31   0,10   3132   Trips   Worst case - All Industrial   New	5	mainder of farm portion								970	0,24	08'0	6,20	09'0	0,60
15,31   0,10   15,313   Tripes	15,31   0,10   15,313   Trips	-									2602	30%		25%	75%	
19,31   0,10   3132   Trips   Trips	15,31   0,10   15,313   Trips   Trips   1,00   New   Pass-by	_														
15,31   0,10   15,313   Tripes	15,31	중	Arribution (Coal)	3,13		0,10	3 132	Trips			60	11	20	8	28	115
15,31   0,10   15,313   Trips   77   40   117   80   132	15,31	흜	≥s A & B								0,20	0.34	0,63	98'0	0,36	0,75
15,31   0,10   15,313   Trips	19,31 0,10 15,313 Trap  Ractor Factor used  Ra 1,00  Ra 1,00  Ra 1,00										46%	16		***	× A	
H 17 - Table 3.2   Factor used   Worst case - All Industrial   86 37 123 31 92	IH 17 - Table 3.2 Factor Factor used  Na 1,00  or corridors na 1,00  or corridors na 1,00  na 1,00	8	MABINED INDUSTRIAL & DISTRIBUTION (CORI)	15,31	No.	0,10	15 313	Trips			11	40	417	80	132	212
H 17 - Table 3.2   Factor used   New   86   37   123   31   92	H 17 - Table 3,2 Factor Used An 1,00 An 1,00 Cle ownership na 1,00 or corridors na 1,00  na 1,00							We	orst case - I	Ali Industrial						
na         1,00         New         86         37         122         31         92           cle ownership         na         1,00         Worst case - All distribution         44         52         96         56         59           or corridors         na         1,00         Worst case - All distribution         44         52         96         56         59           Pass-by         New         44         52         96         56         59         96           Worst case - Combined         77         40         117         80         132	whership na 1,00 cle ownership na 1,00 or corridors na 1,00 na 1,00		COTO TMH 17 - Table 3.2	Factor	Factor u	sed					98	37	123	31	92	123
New   1,00   New	or corridors na 1,00 na 1,00 na 1,00	Σ.	xed Use	2	1,00					New	98	37	123	31	92	123
Cicle ownership         Ital         1,00         Worst case - All distribution         44         52         96         56         59           New         44         52         96         56         59           Pass-by         0         0         0         0         0           Worst case - Combined         77         40         117         80         132	or corridors na 1,00	9	w vehicle ownership	æ	1,00					Pass-by	0	0	0	0	0	0
New 44 52 96 59	na 1,00	3 5	ry Low vehicle ownership and modes or corridors	BU R	00,1			Mos	A - oses - A	II elicetrifustion						
New 44 52 96 56 59 Pass-by 0 0 0 0 0 0 0 0  Worst case - Combined  77 40 117 80 132	Worst case - Com	õ	erall factor	2	1.00				200000	100000000000000000000000000000000000000	44	52	8	3	90	115
77 40 117 80 132 77 40 117 80 132	Worst case - Combined New Pass-by				î					New Pass-by	44	50	8 0	95 0	850	115
77 40 117 80 132 77 40 117 80 132	New Pass-by							3	orst case -	Combined						
77 40 117 80 132	New Pass-by									;	71	40	117	08	132	212
	Ag-ssed									New	F	9	117	88	132	212

#### N4/R35 TRUCK STOP AND INDUSTRIAL DEVELOPMENT

#### MODAL SPLIT 2019

Tuesday 25 November 201	9	A RESERVE	Tuesday pe	ak period	- Novembe	r 2019	
Intersection No	Intersection Name	TOTAL	Cars	Taxl	Bus	Trucks	HEAVIES
1	N4/R35 - Northern terminal	16170	13486	369	28	2287	2315
		100%	83%	2%	0,2%	14%	14%
2	N4/R35 - Northern terminal	12581	9945	393	24	2219	2243
		100%	79%	3%	0,2%	18%	18%
3	R35/Truckstop plus R35/Access Road	7044	5087	291	29	1637	1666
		100%	72%	4%	0,4%	23%	249
4	R35/Pienaars Dam	6116	4565	236	13	1302	131:
		100%	75%	4%	0,2%	21%	22%
TOTAL		41911	33083	1289	94	7445	7539
Average		100%	78,9%	3,1%	0,2%	17,8%	18,09
Percentage - average		100%	78,9%	3,1%	0,2%	17,8%	18,09

2026 SITE plue Beckground traffic Model 7 Model 9 Model 9 2025 briffs | 2026 briffs | 2026 briffs | The 2020 SITE plus Background traffic Medel 3 Model Model B 2020 baffe 2020 baffe 2020 baffe AM PEAK COMBINED INDUSTRIAL & Distribution (Coal Inches) of the Engineers In The Particular (Natural Inches) of These Inches Inch COMBINED INDUSTRIAL & DIER Trip Distribution (%) Trip Distribution (%) Trips Trips Trips Trips Trips Trips 22% 촧 Trip Distribution (Coal)
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Trip Distribution Fig. Trip sasignment
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Trip Distribution (N)
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346

Growth Rate pa

1,16

Distribution (Coat)

NA/R35 TRUCK STOP AND INDUSTRIAL DEVELOPMENT

AM PEAK

Intersection 3:	R35/True	suld dotals	R35/Truckstop plus R35/Access Road	Road													AM	AM PEAK						
					Distribution (Coal	on (Coal)			Distribution	m (Coal)	Ö	<b>OMBINED</b> I	NDUSTRIAL	COMBINED INDUSTRIAL & Distribution (Coal	tion (Coal		SITE							
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(approach)	Paffic	Lraffic .	traffic	Trips	Trips	Triba	Tripe	Trips	Trips	Trips	Tripa	Trips	Tripsa	l rape	Fergis	Two-way	Two-way	Thro-way	Lings	1 rtps	Lins	Links		140-440v
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	2 143	147	171				0			0	0		-	0	0	0	0	a	147	147	147	171	141	121
	*		90	30%		13	0	30%	-	13	0	30%	-	a	P	29	13	23	30	47	27		9	82
	+	-	-		10%	0	7		803	•			10%	0	**	4	en	-	10	9	10	9	D	N3
	0	0	c			0	-		-	0	0		_	0	0	0	0	a	0	0	0	0	9	0
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	ľ	1 627	209	fook	36001	99	37	100%	100%	*	52	100%	100%	22	99	1 623	2	117	970	1 464	638	727	105	727
Intersection 4:	R35/Plers	R35/Pieraers Dem																						
					Distribution (Coal)	on (Coal)			Distribution	n [Coal]		OMBINED I	INDUSTRIAL.	COMBINED INDUSTRIAL & Distribution (Coa	tion (Coal		SI C							
				Trip Distri	74p Distribution (%)	Trip estalgrament	gnoment	Trip Distribution (%)	Light (30)	Trip analg	F	HARFY.	1	Trip abalgement	sprent 1	Sychophysical 1	Diethburken	Combined	Model 3	Model 4	Model 6	Model 7	Model #	Mode/ II
	2019	2020	2026	Inbound	Culbound	_	Outbound	Inbound	Outbound	Inhound	Outbound	_	Outbound	ζ.	Outbound I	TOTAL I	TOTAL	TOYAL	2020 traffic	2020 traffic	2020 traffic	2025 Iraffic	2025 traffic	2025 traffic
	traffic	UNERC	(FATTIC	Trios	Trips	Tripe	Tripa	Trips	Trips	Tripa	Tripa	Trips	Trips	Tribe	Prope	Turo-unay I	Two-way	Taro-eray	Tripe	Trips	Trips	Trips	Tips	I WO-WON
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Models 1 Medels 6

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Cultionnd Information
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45% 0 \$25 23% N4/R35 - Northern terminal term inst N4R35 - Northern 220 25 tr 201 224 324 324 324 324 326 326 330 330 PM PEAK Arterpedalor 1; ioteresction 2:

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		Model 7	Thips	7. 1. 2. 2. 4. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	727		Model 7 2025 treffic Tribit	o	20%
		Model 8	Tripe	7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	638		Model 6 2020 traffic	0 2 0 4 4 5 0 0 0 0	479
		_	Trips   Zo	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	010		Medaw 4 A	0 20 7 1 2 2 0 0 0 0	471
		-	Tripe		344		Model 3 M 2020 baffic 202 Tribs		300
		-							-
M PEAK		oe Combine	1		123		Or Combine TOTAL		77
-	SITE	G I	THOMAS		98	SITE		020000000000	
	al la		TWO-WBY	***********	97		f TOTAL	0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20
	Inbution (Co	Н	o Curbound	c ⇔ c → c % c c c c c	1 40	COMBINED INDUSTRIAL & Distribution (Cos	ocend Ordbaund		,
	R35/Truckstop plus R35/Acress Road Distribution (Cos) Distribution (Cos) Distribution (Cos) COMBINED (HDUSTRIAL & Distribution (Cos)	J	ind t imbound		4 1 2	TRIAL & DIS	E		53
ston (Coal) Distribution (Coal) COMBINED (HOUSTRIAL & Distribution (Coal) STF	М.	nd Outbound		% top%	NED INDUS	nd Dutbound		704	
	COMBI	-	and I inbound		1001	COMBI	und Inbound		305
	u)	8	nd Outbound		62	6	and Outboard		-
	uggn	-	Intourie Tribs		*	Distribution (Cost)	nd bibound		-
	A35Tructstop par A35/Access Road A35Tructstop par A35/Access Road Distribution (Cost) Distribution (Cost) Distribution (Cost) Distribution (Cost) Distribution (Cost)	Cupi	nd Cultbound		400%	- ANO	77tp Distribution (%) Inbound Outbound Tribe Tribe		%04
			und Inbound		1 1009	_	2		3000
	(lax	П	Trips Trips		37	(lac	Trip essignment hound Cutboard Trips		
	tribution (Co	-	Outbound Info		100% I &	Distribution (Cost)	E .		2 . %0.
	Die	욵-	Trips Tr	-	00% 10	ā	Trip Classification (NG Inbound Custours Trips	D	20%
CDass Road		-	ZQZ6 neb		654		2025   Fred 1980 1980 1980 1980 1980 1980 1980 1980		524
s plus R35/A		_	ZOZO Z	7. <del>2</del> . 4 − 0 25 ± 00 € 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	524 6	Dem	2020 20		ARZ I E
35/T ruckstop		-	traffic I		999	R35/Plansars Dam	2019   24 page   24		7 GCF
								- からまでおと目の力性分	
Intersaction 3;			Movement (approach)	무슨하다 유수소에 무슨하다 우수하다 우수하다 구수수의 구수수의 구수소의 구속하다 구속하다 구속하다 구속하다 구속하다		interportion 4.	Movement	Selection Select	

## N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

## **ANNEXURE C**

**Capacity Analysis Results (AutoJ)** 

## N4/R35 Truck Stop and Industrial development Portion 58 of the farm Vaalbank 289 JS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

	print:	2019-12-06
ш		

							4-1	1. R35	25	N4 ter	N4 terminal (north	north)					
2 <b>(</b>	2	to.						2	burg	ja A	,	•					
	AE AU	reo)							2019								
un.								S	SUMMARY	¥				:		&Autoj 19	&AutoJ 1910 roberts
									-								
		4000		Volume	/ Capacity	/ (max)	1001		Delay,	/ venicle (max)	maxj	200		2 /04	Queue (max)	100	700
	Control	Perf Index	Peds	AM	off	MA.	i/s ave	Peds	AM	off	PM	i/s ave	Peds	AM	off	PM	i/s sum
BEST overall		81%		0,30		0,30	23		はなくのない		T stee	7		1,1		1,0	5,5
best signal	2	46%		0,53		0,46	0,27		21		21	13		1,9		1,5	10,1
		14	Peds	AM	ffo	PM	i/s ave	Peds	AM	ffo	PM	I/s ave	Peds	AM	ffo	PM	//s sum
Priority	Xns	36%		99'0		0,73	0,30		17		19	13		2,5		2,8	8,3
	Xwe	23%		09'0		0,68	0,20		14		16	4		1,1		6'0	3,0
	XX	13%		1,69		1,26	99'0		829		470	343		126,7		8'99	247,8
	mC	28%		0,52		0,46	97.0		89		7	7		1,2		6'0	5,2
	RR	81%		\$ 0,30 m		0,30	6,17		7		7	7		1,1		1,0	5,5
2 stage	2	46%		0,53		0,46	0,27		21		21	13		1,9		1,5	10,1
3 stage	3ns	39%		0,59		0,52	0,30		27		27	18		2,8		2,2	13,8
	3we	40%		0,59		0,52	0,30		27		27	18		2,8		2,2	13,6
	m3	41%		0,57		0,54	0,28		56		28	15		2,1		2,4	11,8
	23	39%		0,61		0,52	0,30		28		27	18		2,9		2,2	13,1
	w3	41%		65'0		0,52	0,28		19		19	16		2,7		2,2	12,5
	e3	38%		0,61		0,54	0,31		28		28	19		2,9		2,4	14,2
4 stage	4nswe	35%		0,65		0,58	0,33		33		32	23		3,7		3,0	17,6
	n4we	36%		0,63		09'0	0,31		32		33	20		2,6		3,2	15,3
	s4we	35%		0,68		0,57	0,33		34		32	23		3,9		3,0	16,8
	w4ns	36%		0,65		0,58	0,31		24		24	21		3,6		3,0	16,4
	e4ns	34%		89'0		09'0	0,34		34		33	24		3,9		3,2	18,2
	hw4	39%		0,53		0,60	0,29		23		25	18		2,5		3,1	14,2
	ne4	35%	1	99'0		0,62	0,32		33		34	20		2,7		3,3	15,9
	SW4	36%		29'0		0,57	0,31		25		24	21		3,8		2,9	15,6
	sed	34%		0,70		0,59	0,34		35		33	24		4,1		3,1	17,4
separate	n-s-3	79%		69'0		0,77	0,43		39		41	33		4,0		4,6	24,6
(split)	W-e-3	37%		0,62		0,55	0,32		31		31	21		3,4		2,8	16,2
stage	n-5-4we	76%		0,76		0,84	0,46		45		20	41		5,1		0'9	30,1
	w-e-4ns	33%		0,68		09'0	0,35		38		37	26		4,3		3,5	20,2
	n-5-W-e-4	73%		0,82		16'0	0,50		49		61	20		5,9		2,6	35,3
	optimums	81%		0,30		05'0	0,17		7		7	4		1,1		6'0	3,0
- Constitution	and on one		Arcon	midding too	100% of ont	current.		2	S coloure	A.R	9	L	L				
periorina	periorinarice colours	near	d iban	near best, within 10% or optimin	TOW OI OB!	JE INTERIOR		3	LOS COLOUIS	D-K	2	١					
ght:							1,	1. N4 N R35 2019	2019								
n Sampson								SMY									2019

3	Auto]	Xwe	35	A35 & Middelb 2019	N4 terminal (north)			&AutoJ 1910 roberts
Volume	Volume (evu/hr) from North peds left str right AM 218 550	1+5+R 768	from South peds left str right 247 30	1+5+R p	from West           peds         left         str         right         L+S+R           293         30         32:	from East From E	L+5+R	intersection total
PM		299		543		263		1473
Lanes # lanes	L~ L 1,0	or S:R = 0.5:0.5	(if lanes shared LtS or StR = 0.5:0.5; LtStR = 0.3:0.4:0.3)  S R L~ L S R  1,0   1,0   1,0		L~ L 5 R 0,3 0,4 0,3	L~ L S R		
Control	from North peds left str right		from South  peds left str right		from West peds left str right stop stop	from East peds left str right		
VOLUN AM off PM	VOLUME to CAPACITY (V/C)	L+S+R 0,23	A-B C-D E V/C from South  V/C from South  str right L 0,12 0,04	L+S+R p p 0,24	105 A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  v/C from West  right L+S+R  0,60 0,60 0,60 0,68 0,68	2-0.99 Ped LOS A-0.1, B-0.3, C-0.4, D-0.6, E-0.97, F=0.97+  V/C from East  W/C from East  Deds left str right L+5+R  0,60  0,68	CO.6, ECO.97, F=C	No. 207+  No. 200  No
Average AM off	Average DELAY per vehicle (secs)  delay from North  peds left str right  AM  off  PM  Off  Off  Off  Off  Off  Off  Of	L+S+R	A-B C-D E delay from South  peds left str right L 0	L+S+R	LOS A<10, 8<15, C<25, D<35, E<50  delay from West  peds left str right L+1  13 14	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+    delay from East	35, E<50, F=50+	delay / veh max overall 14 4
Average AM off PM	Average QUEUE length (veh)  Q from North  Q from North  AM 0,0 0,0 0,2  PM 0,0 0,0 0,2	(= total delay veh-hrs / hr)  L+S+R  0,3  0,2	OK WARN  Q from South left str right 0,0 0,0 0,2 0,0	0,0 0,0	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+1  1,1 0,1  0,9	Q from East L+5+R peds left str right 1,2	L+S+R	Queue max total 1,1 1,5 0,9 1,5

***	Ne Autol		& N4 terminal (north)	8.Au	&AutoJ 1910 roberts
	RR		Roundabout, yield on all approaches		
Volum	from North	from South	from West	from East	intersection
AM off PM	peds left str right L+5+R 218 550 768 189 478 667	peds         left         str         right         L+S+R           247         30         277           511         32         543	peds left str right L+5+R 293 30 323 220 43 263	peds left str right L+5+R	1 368
Lanes # lanes	L~ LSR 2,0	L~ LSR 2,0	L~ LSR 1,0	L~ LSR	
Contro	from North  peds left str right  yield yield	from South  peds left str right  yield yield	from West  peds left str right yield yield	from East peds left str right	
VOLU	C from North	C from South	/C from West str right	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+   V/C from East  peds left str right L+S+R max	\$\frac{0}{2}
AM off PM	0,30 0,30 0,30 <b>0,30</b> 0,30 0,26 0,26	0,10 0,10 0,10 0,10 0,20 0,20 0,20 0,20	0,29 0,29 0,29 <b>0,29</b> 0,28		0,30 0,24
Averag	Average DELAY per vehicle (secs) delay from North	A-B C-D E F	LOS A<10, B<15, C<25, D<35, E<50 delay from West	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+ delay from East	delay / veh
off PM	peds         left         str         right         L+S+R           7         7         7         7	peds         left         str         right         1+5+R           6         6         6         6         6	peds         left         str         right         L+S+R          7        7        7        7	ht L+S+R	max overall
Averag	Average QUEUE length (veh) (= total delay veh-hrs / hr)	ļ	Q <4 = OK, <10 = WARN, 10+ = POOR		
	Q from North	Q from South	Q from West	norde left etr right L+S+B m	max total
AM	0,4 1,1	0,4 0,1	0,6		
₩.	0,4 0,9 1,3	1,0 0,1 1,0	0,4 0,1 0,5		1,0 2,8

2019-12-07

3	Autoj	Xwe	1. R35 & N4 tern Middelburg  2020 PLUS INDUSTRIA Stop street on west an	1. R35 & N4 terminal (north)  Middelburg  2020 PLUS INDUSTRIAL Stop street on west and east approaches		&AutoJ 1910 roberts
Volume  AM  off  PM  Lanes  # lanes	Volume (evu/hr)         from North         from North         from Sor Single (if lares shared List or Single left)         from North         from North         from North         from Sor Single left	L+S+R 791 687 or S:R = 0.5:0.5; L:S:R peds	str righ South 262 S46 546 Li,0 1,0 uth str righ	from West           peds         left         str         right         L+5+R           302         52         354           1         227         54         281           1         5         R         1           1         5         0,3         0,4         0,3           1         5         5         281           1         5         6         281           1         5         6         281           1         5         6         3           1         5         6         3           1         5         6         6           1         5         6         6           1         5         7         6           1         5         6         7           1         5         7         6           1         5         7         6           1         5         7         6           1         5         7         7           1         5         7         7           1         5         7         7           1	from East    Langer   Langer	total 1451 1568
VOLUN AM off PM	VOLUME to CAPACITY (V/C)   V/C from North   V/C from North   V/C from North   AM   0,12   0,28   O,10   O,25   O	1+5+R peds 0,24	V/C from South  V/C from South  left str right L+S+R  0,13 0,07 0,12	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  Peds left str right L+S+R 0,78 0,78 0,90 0,90	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  may  peds left str right L+S+R 0,77	W/C max overall 0,78 0,35
Average AM off PM	Average DELAY per vehicle (secs)  delay from North  delay from North  peds left str right  off 0 2  PM 0 0 1	L+S+R peds	A-B C-D E F delay from South left str right L+5+R	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right L+S+R  20 21 20  35 37 35	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	delay / veh max overall 21 6
Average AM off PM	Average QUEUE length (veh)  Q from North	(= total delay veh-hrs / hr) L+S+R 0.3 0.2	7 hr) OK WARN POOR Q from South C+5+R 0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,	Q <4 = OK, <10 = WARN, 10+ = POOR <b>Q from West</b> peds left str right L+S+R  1,7 0,3 2,0  2,2 0,6 2,7	Q from East  Q from East  L+S+R	Queue max total 1,7 2,3

	2	Auto]	_							1. R35 & N4 termi	35 & N4 t	N4 terminal (north)	al (nor	(F)							& Autol 1910 roberts	) roberts
****	- 25				×	Xwe			St	Stop street on west and	t on wes		ast appl	east approaches								
Volume	Volume (evu/hr)																					
A P O P	peds	222 191	from North	th right	L+S+R 799	peds	left	from South	right 50	1+5+R 315 586	beds	302 302 227	from West	right 42	1+S+R 344 290	beds	le ft	from East	right	L+S+R	intersection total	total 1458 1574
Lanes # lanes	2			shared L:S	(if lares shared L.5 or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)  S R L^ L L 1,0	5:0.5; L.S.R	= 0.3:0.4:	1 1-1	11, 8		2	L 0,3	S 0,4	R 0,3	_	<u>.</u>		v.	<u>~</u>			
Control	peds	from North	North	right		peds		from South left str	right		peds		from West left str ttop	right		spad	fram	from East eft str	right			
AM off	Peds	VOLUME to CAPACITY (V/C)           VOLUME to CAPACITY (V/C)           V/C from peds           PAM         0,12         0,2           PM         0,10         0,2	17 (v/c) v/c from North t str rig t 0,29 t0 0,25	orth	L+S+R 0,24 0,21	beds	A e	V/C from South  The str right  O,13 0,0	outh right 0,08	F (1+5+R 0,12 0,25	LOS A-	10.5, B	<ul> <li>Co.8, C&lt;0.9, D&lt;0</li> <li>V/C from West</li> <li>t str rig</li> <li>str 0,</li> </ul>	. D<0.95, West right 0,73 0,87	E<0.99  L+S+R  0,73	ped LOS	V/ V/	V/C from East	1.4, D<0.6	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  peds left str right L+S+R  max  0,73	>	C overall 0,33
Average AM off PM	peds	Average DELAY per vehicle (secs)  delay from N  delay from	vehicle (secs) delay from North of str right 0 2	right	L+S+R	spad		delay from South	South right	F 1+S+R	LOS A-	(10, B	<ul> <li>&lt;15, C&lt;25, D&lt;35,</li> <li>delay from West</li> <li>ft str rig</li> <li>17</li> <li>28</li> </ul>	D<35, E<5 West right 18	17 17	Ped LO	S A<10, B	0, 8<15, C<25, D delay from East ft str rig	5, D<35, E ast right 1	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	max 18	/ veh overall 5
Average AM off PM	peds	Average QUEUE length (veh) Q from Q from O,0 off PM 0,0	Q from North str ri	th gath	(= total delay veh-hrs / hr)  L+5+R  0,3  0,2	peds	eff	Q from South	WARN uth right 0,0	POOR 1.45+R 0,0	Q <4 =	š	Q from West	<pre>&lt;10 = WARN, 10+ = POOR Q from West eft str right L*: 1,4 0,2 1,8 0,5</pre>	1,6 2,3	beds	left	Q from East	tige tige	L+5+R	Oueue	2,0 2,7

3	* AutoJ	Xwe		1. R35 & N4 Middelburg 2025 Stop street on w	1. R35 & N4 terminal (north)  Middelburg  2025 Stop street on west and east approaches		&AutoJ 1910 roberts
Volume (evu/hr)  Peds  AM  off  PM	from North   left   str   right     260   657     226   571	1+S+R peds 917 796	from South left str 295 610	1ight L+5+R 36 331	from West           peds         left         str         right         L+5+R           350         36         386           263         51         314	peds left str right L+S+R	intersection total 1633
# lanes Control	(if fanes shared L.S or S:R = 0.5:0.5; L.S:R = 0.3:0.4:0.3)	or S:R = 0.5:0.5; L:S:R.	S S 11,0	R 1,0 right		from East from East from far right	
VOLUM AM off PM	VOLUME to CAPACITY (V/C)   V/C from North	L+S+R peds 0,27	A-B C-D - V/C from Sor left str 0,15 0,15	E F F right L+S+R 0,07 0,14	10S A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right 1+5+R  0,79 0,97 0,97	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  peds left str right L+S+R 0,78	-0.97+  W/C  max overall  0,79 0,37
Average AM off PM	Average DELAY per vehicle (secs)  delay from North  peds left str right  AM  off  PM  0  2	L+S+R peds	delay from So left str	E F F nuth right L*5+R 0 0	LOS A<10, B<15, C<25, D<35, E<50   delay from West   L+S+R     21   22   21	Ped LOS A<10, 8<15, C<25, D<35, E<50, F=50+  delay from East  peds left str right L+5+R	delay / veh max overall 22 6
Average AM off PM	Average QUEUE length (veh)  Q from North  Q from North	L+S+R peds   peds   0,3	OK Q from So left str 0,1	WARN         POOR           right         L+5+R           0,0         0,1           0,0         0,3	Q <4 = OK, <1.0 = WARN, 10+ = POOR  Q from West  peds left str right 1+5+R  2,0 0,2 2,2	O from East peds left str right L+S+R	Queue

3	Auto]			1. R35 & N4	N4 terminal (north)	north)					&Autol 19	&AutoJ 1910 roberts
		Хwе	Ste	2025 plus upgrade top street on west a	2025 plus upgrade Stop street on west and east approaches	approaches						
Volume AM off	Volume (evu/hr)         from North           AM         260         657           PM         226         571	1+S+R peds 917 796	from South left str right 295 3	331 648	fron peds left 350 350	from West str right 36	286 386 314	peds	from East	it right L+5+R	inters	intersection total 1633
Lanes # (anes	≝   □	. 5:R = 0.5:0.5; L.S:R	S R 1,0 1,0			S R 0,5 1,0		٤	S	æ		
Control	from North peds left str right	peds	from South left str right		from West from Strop strop	est str right		peds	from East left str	right		
VOLUM AM off	VOLUME to CAPACITY (v/C)           V/C from North           V/C from North           peds         left         str         right         L           off         0,14         0,33         -         -           PM         0,12         0,29         -         -	L+S+R peds 0,27	A-B C-D E V/C from South str right 0,15 0,07	L+S+R 0,14	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R 0,47 0,48 0,58 0,38 0,59	<ul> <li>Co.8, C&lt;0.9, D&lt;0.95, I</li> <li>V/C from West</li> <li>t str right</li> <li>7 0,18</li> <li>3 0,38</li> </ul>		Ped LOS A	V/C from East	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  ### V/C from East  ### peds left str right L+5+R may    0,455	v b m	0,29 0,30
Average AM off PM	Average DELAY per vehicle (secs)  delay from North  delay from North  1 2 right L  AM  off  PM  0 2	L+S+R peds	A-B C-D E delay from South left str right 0	L+S+R	DOS A<10, B<15, C<25, D<35, E<50   delay from West   delay from West   left   str   right   1   9	<pre>&lt;15, C&lt;25, D&lt;35, E&lt;50 delay from West ift str right 11 9 12 11</pre>	11 11 12	Ped LOS A<	<10, B<15, C<25, D delay from East left str rig	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+  delay from East  peds left str right L+5+R		delay / veh nax overall 11 4
Average AM off PM	Average QUEUE length (veh)  Q from North  Q from North  AM  O,0  O,4  Off  PM  O,0  O,0  O,3	(= total delay ven-hrs / hr) L+S+R D,4 0,3	/ hr) OK WARN Q from South left str right 0,1 0,0	POOR 0,1	Q <4 = OK, <10 = WARN, 10+ = POOR Q from West peds left str right L+4 1,1 0,1	Q from Wes, 10+ = PO Q from West str right 1,1 0,1	OR 1,2 1,0	beds 1	Q from East	right L+5+R	Qu max 1,1 0,9	Queue x total 1,6

3	AutoJ €	1. R35 & N4 Middelburg  Middelburg  Xwe Stop street on w	1. R35 & N4 terminal (north)  Middelburg  LUS INDUSTRIAL plus upgrade Stop street on west and east approaches	&AutoJ 19	&AutoJ 1910 roberts
AM off PM	Volume (evu/hr)         from North           peds left str         right L+S+R           AM         260         672         932           off         226         577         802           PM         226         577         802	from South           peds         left         str         ri           303         303         630           630         630         630	from West (i) 350 263	from East ight L+S+R	intersection total 1690
# lanes	from North  peds left str right	from South	from West right stop stop	from East right	
VOLUN Off PM	VOLUME to CAPACITY (V/C)           V/C from North           V/C from North           V/C from North           Deds         left         str         right         L+S+R           AM         0,14         0,34         0,28           PM         0,12         0,29         0,24	A-B         C-D         E         F           V/C from South         c.from South         c.from South           peds         left         str         right         L+S+R           0,15         0,09         0,14           0,32         0,09         0,30	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  //C from West  peds left str right L+S+R 0,47 0,31 0,54 0,54	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  V/  max  0,47  0,54	v/C overall · 0,29
Average AM off PM	Average DELAY per vehicle (secs)  delay from North  delay from North  delay from North  L+S+R  AM  1 2 right L+S+R  off  PM  0 2	A-B   C-D   E   F	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right L+S+R  10 11	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+           delay from East         delay           peds         left         str         right         L+5+R         max           11	delay / veh
Average AM off PM	Average QUEUE length (veh)         (= total of total	(= total delay veh-hrs / hr) OK WARN POOR  L+S+R	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+S+R  1,1 0,2 1,3	peds left str right L+S+R max 1.1	Oueue x total 1,1 1,7

peds

anes

Lanes

Control

peds

PM PM PM

peds

PM PM

Volume (evu/hr)

peds

AM off

Xwe

print: 2019-12-07

peds

P of M

3	Auto)	utoj		Xwe	GI GI		202	1. 2025 PLUS Stor	1. R35 & N4 terminal (north) Middelburg LUS COMBINED plus upgrade Stop street on west and east approaches	NA te	N4 terminal (north) urg D plus upgrade	(nort	h)							& Autol	&AutoJ 1910 roberts
Volume AM off	Volume (evu/hr)  peds le off  PM	from North left str 250 670	right	L+5+R 930 814	peds	fre	from South str 1 304 639	[isi]	1+S+R 354 707	peds	fr left 350 263	from West	1 1 1 1 1 1 1	L+S+R 405 341	peds	left	from East	st right	L+S+R	11/2	intersection total 1688 1 683
Lanes # lanes Control	L 1	(if lares shall a shal	R R R R R R R R R R R R R R R R R R R	(if lares shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)  2,0  Vorth  Str right  peds left	0.5; L:S:R =	= 0.3:0.4:0.3) L S L 1,0 Trom South left str	S 1,0 mth str	R 1,0		L~	1 S 0,5 P.5 P.5 P.5 P.5 P.5 P.5 P.5 P.5 P.5 P.	S 0,5 West	R 1,0 right		spad ≥	fron	from East	R	_		
VOLUM AM off	VOLUME to CAPACITY (V/C)  V/C from  peds left st  AM  0,14 0,33  off  PM  0,12 0,2	0 E E	2	0,25	spad	V/C	B C-D C V/C from South (18 o.0.15 o.0.15 o.0.15 o.0.15	1 39 H	F L+S+R 0,14	LOS A <c< td=""><td>10S A&lt;0.5, B&lt;0.8, C&lt;0.9, D&lt;0.95, E&lt;0.99  V/C from West  peds left str right L+S+R  0,47 0,30 0,45</td><td>60.8, C&lt;0.9, D&lt;0 V/C from West t str rig 7 0,</td><td>D&lt;0.95, E est right 0,30 0,69</td><td>:&lt;0.99 L+S+R 0.45</td><td>ped LO:</td><td>N N N N N N N N N N N N N N N N N N N</td><td>v/C from East</td><td>0.4, D&lt;0.</td><td>Ped LOS A&lt;0.1, B&lt;0.3, C&lt;0.4, D&lt;0.6, E&lt;0.97, F=0.97+  V/C from East  peds left str right L+S+R man  0,47</td><td>max 0,47</td><td>V/C overall 0,29</td></c<>	10S A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R  0,47 0,30 0,45	60.8, C<0.9, D<0 V/C from West t str rig 7 0,	D<0.95, E est right 0,30 0,69	:<0.99 L+S+R 0.45	ped LO:	N N N N N N N N N N N N N N N N N N N	v/C from East	0.4, D<0.	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  peds left str right L+S+R man  0,47	max 0,47	V/C overall 0,29
Average AM off	DELAY per per peds le	Average DELAY per vehicle (secs)  delay from North  peds left str right  AM  off  PM  0  2	± 1	L+S+R	beds	delay left	delay from South	100	F L+S+R	LOS A<1	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right	<15, C<25, D<35, delay from West fit str right 11 con 12	:35, E<50	L+5+R - 11	Ped LC	de de left	0, B<15, C<25, D delay from East t str rig	East right	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+		delay / veh
Average off PM	Average QUEUE length (veh) Q from Q from Q from Q 0,0	0,3 6,4	ght	[= total delay veh-hrs / hr]  L+S+R  0,4  0,3	peds	left	Q from South str ri	0,0 0,0	POOR L+S+R 0,1	Q < 4 = C	Q <4 = OK, <10 = WARN, 10+ = POOR	Q from West  2 from West  3tr ri  1	10+ = POC st right 0,2	1,2 1,3	peds	left	Q from East	right	L+S+R	Qu 1,1 0,9	Queue  x total  1,1 1,7  5,9 1,9

							,	Tee.		MIN A.		1717					Ī
Z							•	Z. K35	න්	N4 terminai (south	minai (	(south)					
	ATI	itol						4	Middelburg	DAC.							
									2019								
n								S	SUMMARY	٨						&Autol 19	&Autol 1910 roberts
				Volume	Volume / Capacity				Delay	Delay / vehicle (max)	max)			ď	Queue (max)		
	weighting	100%		25%	4%	25%	10%		4%	7%	4%	989		%	3%	4%	2%
	Control	Perf Index	Peds	AM	ffo	PM	i/s ave	Peds	AM	Off	PM	i/s ave	Peds	AM	Ho	PM	i/s sum
BEST overall	RR	83%		0,21		0,43	6,16		7		90	7		9,0		2'0	4,1
best signal	- Pa	52%		0,32		0,54	0,25		23		27	17		6'0		2,0	9,4
		ld	Peds	AM	ffo	PM	i/s ave	Peds	AM	Off	PM	i/s ave	Peds	AM	Ho	PM	ils sum
Priority	Xns	31%		0,51		1,04	0,33		13		154	51		1,0		14,1	19,2
	Xwe	25%		0,75		1,48	0,25		21		678	153		0,7		40,3	50,6
	×	16%		1,03	:	1,38	99'0		154		586	329		12,6		52,8	126,4
	mC	71%		0,36		0,47	0,22		9		7	g		0,5		9,0	3,6
	RR	83%		0,21 %		0,43	0,16		1		89	7		9'0		0,7	4,1
2 stage	2	46%		0,39		0,76	0,25	12	19		30	13		8,0		1,6	7,1
3 stage	3ns	47%		0,39		0,55	0,27		26		28	21		1,5		2,1	11,1
1	3we	38%		0,44		06'0	0,28		25		45	20		1,1		2,8	10,3
	n3	52%		0,32		0,54	0,25		23		27	17		6'0		2,0	9,4
	83	36%		0,45		6,93	0,29		76		20	22		1,2		3,5	11,0
	w3	36%		0,45		0,93	08'0		26		50	24		1,2		3,5	11,8
	63	40%		0,41		06'0	0,26		20		30	18		1,0		2,7	9,2
4 stage	4nswe	40%		0,43		0,64	06,0	5 5	32		35	97		2,0		2,7	14,0
	n4we	44%		0,37		0,63	0,28		28		34	23		1,1		2,7	12,2
	s4we	28%		0,51		1,14	0,32		32		365	112		1,5		27,9	41,1
	w4ns	40%		0,44		0,64	0,31		32		35	27		2,0		2,7	14,6
	edns	45%		0,41		0,57	0,28		56		28	23		1,8		2,4	12,5
	nw4	44%		0,37		0,63	0,29		29		34	24		1,1		2,7	12,6
	ne4	20%		0,34		0,56	0,25		56		28	20		1,1		2,3	10,6
	Sw4	27%		0,52		1,18	0,34		33		424	130		1,6		32,2	47,3
	se4	78%		0,48		1,14	05'0		56		351	111		1,4		32,2	40,2
separate	B-2-B	41%		0,40		0,62	0,31		31		34	30		1,8		2,8	16,0
(split)	W-e-3	34%		0,46		0,94	0,31		29		09	29		1,3		4,3	14,1
stage	n-s-4we	37%		0,45		0,70	0,34		36	,	41	35		2,2		3,4	19,1
	w-e-4ns	38%		0,45		0,65	0,32		36		39	31		2,3		3,0	16,5
	n-s-w-e-4	34%		0,48		0,74	0,37		38		43	38		2,4		3,6	20,7
	optimums	83%		0,21		0,43	0,16		9		7	9		5'0		9'0	3,6
performs	performance colours	best	a near b	a near best, within 10% of optimum	10% of op	timum 🐃		רכ	LOS colours	A-B	C-D	В	ш				
i i							2	2. N4 S R35 2019	2019								

2. N4 S R35 2020 - all

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								2. R35	త	N4 ter	N4 terminal (south	south)		:			
2-(	2	toT						2	burg	bń							
		(01)						2020	plus upgrade	grade							
								SI	SUMMARY	Α.					:	&Autol 1	&AutoJ 1910 roberts
				Volume	Volume / Capacity (	y (max)			Delay	Delay / venicle (max)	[max]				Queue (max)		70.7
	weighting	100%	4-6	25%	4%	25%	301	Dode	2000	1%	4% DAA	i/c min	Dorde	4%	3%	47% DAA	oxc.
DCCT more with	Control	Perf Index	Peds	AM 4 000 000	Off	FM FM	1/5 ave	SDay	AM 7	oly	L X	1/s ave	reas	0.6	5	0.8	4.1
heet stangt		62%		0.25		0.44	0.19		29		30	14		1,2		1,9	7,8
But about		a	Peds	AM	ffo	PM	i/s ave	Peds	AM	ffo	PM	i/s ave	Peds	AM	ffo	PM	ifs sum
Priority	Xns	27%		0,56		1,18	0,35		13		367	112		1,1		34,7	40,2
	Xwe	68%		0,32		0,59	0,15		10		14	4		0,4		8'0	1,9
	×	19%		0,71		1,67	0,59		18		816	467		1,6		75,7	160,1
	mC	64%		0,37		0,49	0,23		9		7 003	7		0,5		0,7	3,8
	RR RR	78%	,	B 0,22 Ses		0,44	0,15		7		8	7		9'0		8'0	4,1
2 stage	2	58%		0,29		0,52	0,18		24		25	10		1,0		1,5	5,7
3 stage	3ns	55%		0,33		₹ 0,45 ₹	0,21		29		30	17		1,2		1,9	9,5
	3we %	20%		0,33		0,61	0,20		29		29	14		1,0		1,7	2,7
	n3	62%		0,25		0,44 B	0,19		29		30	14		1,2		1,9	7,8
	53	48%		0,35		0,63	0,20		29		30	14		1,2		1,9	7,9
	w3	47%		0,35		0,63	0,21		29		30	16		1,2		1,9	8,6
	e3	20%		0,35		0,63	0,20		21		21	13		8'0		1,4	7,5
4 stage	4nswe	49%		0,37		0,51	0,23		34		34	23		1,6		2,1	12,0
	n4we	55%		0,28		05'0	0,20		34		34	18		1,2		2,0	6'6
	s4we	41%		0,39		0,75	0,22		34		34	18		1,2		2,1	10,2
	wens	47%		0,39		0,53	0,24		34		36	23		1,7		2,2	12,9
	e4ns	48%		0,39		0,53	0,23		25		26	21		1,7		2,2	11,7
	nw4	53%		0,29		0,52	0,22		34		36	20		1,4		2,2	10,7
	peu .	22%		0,29		0,52	0,20		25		26	17		1,0		2,1	9'6
	Sw4	40%		0,41		0,77	0,24		34		36	20		1,4		2,3	11,2
	se4	41%		0,41		0,77	0,22		25		26	18		1,2		2,3	10,0
separate	6-5-0	46%		0,36		0,55	0,26		34		35	28		1,5		2,5	15,3
(split)	w-e-3	45%		0,36		0,63	0,23		35		39	18		1,4		2,4	10,4
stage	n-s-4we	42%		0,39		0,61	0,28		39		39	32		1,9		3,0	18,0
	w-e-4ns	45%		0,39		0,54	0,26		43		43	26	-27	1,9		2,7	14,8
	n-s-w-e-4	38%		0,43		99'0	0,32		44		46	36		2,2		3,3	20,1
	optimums	78%		0,22	-34	0,44	0,15		9		7	4		0,4		0,7	1,9
performa	performance colours	best	* near b	🐃 near best, within 10% of optimum 🚟	10% of op	timum me		LOS colours	3S colours	A-B	C-D	щ	u.				
							2 6	MA S R35 21	lle - OCC								

2. N4 S R35 2020 - all SMY

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3	z - (	Autol	_								2.	2. R35 8 Midde	35 & N41 Middelburg	termi	N4 terminal (south)	outh)				į				&.A	&AutoJ 1910 roberts	roberts
	) }					Xwe	Q.		4		20. Stop	20 plu street	2020 plus upgrade top street on west and	de it and	east ag	east approaches	hes									
Volume AM off	Volume (evu/hr)  peds  AM  off  PM	left	from North		┩ ╸ ┃ ┃ ┃ ┃	591 547	peds		from 2	South tr right 148 334	브	179 179 385	peds	s left	from West	west rig		L+S+R	spad	lef lef	from East t str 35 1 39 10	right 1 142 0 222	L+5+R 178		intersection total	total 949
# lanes			(if lanes 5 5 1,0	shared R R 1,0	LIS or 5	(if lares shared LtS or S-R = 0.5:0.5; LtS:R = 0.3:0.4:0.3)  S R L^ L  1,0 1,0	25; L.S.R	L L L 0,5:0.4	4:0.3) 5 5 0,5	H	Œ.		3		s H		<u>~</u>		3	L 0,5	\$ 0.5	R 2,0				
	spad		from North	right	Į.		peds	$\Box$	from South	r right	Į		peds		from West		right		peds	155	from East eft str top stop	right				
VOLUN Off PM	NE to CA	IPACI	TY (V/C) V/C from North R str rig 0,15 0,	North right 0,20		0,17 0,23	spad	0,0 0,0	V/C from 5 v/C from 5 t str str 9 0,09	V/C from South th str right 9 0.09	E	F L+S+R 0,09	LOS A«	(<0.5, B </td <td>v/C from West</td> <td>LOS A&lt;0.5, B&lt;0.8, C&lt;0.9, D&lt;0.95, E&lt;0.99  V/C from West  peds left str right L+S+R</td> <td>&gt;&lt;0.95, E&lt;</td> rightL4	v/C from West	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R	><0.95, E<	E<0.99	ped LOS	V V I left 0,006	V/C from East  V/C from East  str ri  str ri  0,06 0	20.4, D<0	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  Nav  O,06 0,06 0,32 0,27  O,07 0,07 0,59 0,50	7, F=0.9	> ~ ~	0,18
Average AM off PM	peds	ped	dehicle (secs) delay from North sft str righ	right 1		1 1	peds	A A	elay from t str of or str	delay from South		F   L+S+R   0	peds	s left	115, C<25	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right l	F<50	C   +5+R	Ped LO	obs A<10,	delay from East delay from East ft str rig 8 9 9	<ul> <li>&lt;25, D&lt;35</li> <li>m East</li> <li>right</li> <li>9 10</li> <li>9</li> <li>9</li> </ul>	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+		delay / veh 10 14	/ veh overall
Average AM off PM	peds	E lengtl	Q from North str ri 0,1	1 20		(= total delay veh-hrs / hr)  L+S+R  0,1  0,2	peds	1   2   1   1   1	O Los	NK WARN South tr right 0,0		POOR 1+5+R 0,0	Q <4 =	= OK, <10	t str ri	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right Left	0+ = POOF	OR [-+5+R	peds	left   0,1	O from East str r 0,0 1 0,0	ast right 0,4	1+5+R 0,5		Queue max to 0,4 0,8	ue total 0,6

3	2	Auto]	[ ]o						L	2020 PL	2 S PLUS	2. R35	& ddelb	N4 terminal (south) urg AL plus upgrade	minal	(sou	£								P8	&AutoJ 1910 roberts	0 roberts
	uh					Xwe	ve				Sto	p stre	Stop street on west and east approaches	west a	nd eas	t appr	pache	15									
Volume	Volume (evu/hr)	-							1										l I				:	:			
AM	peds	left	from North str 340	E	right L	L+S+R 627	peds	l	fron left 43	from South str 169	right	1+5+R 212		spad	left	from West	right	L+5+R		peds	left 59	from East	right 142	L+S+R 202		intersection total	total 1 042
PM		Ш	27	224	340	564		H	84	375		458									48	ᄗ	222	281		Н	1 303
tanes # Janes	<u></u>		(if lane S	es share	red LiS o	(if Pares shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)  S R L L L  1,0 1,0 0,5	:0.5; L.S.;	R = 0.3:4	3:0.4:0.3) L 0,5	5,0	~			<u>.</u>		s	œ			١	L 0,5	\$ 0,5	R 2,0				<u> </u>
Control	peds		from North		right		peds		from South left str		right			peds	from West left str	West	right		لنتنا	peds stop	from East left st stop sto	str stop	right stop				
NICS	NE to Co	OLIME to CAPACITY (V/C)	(0//0)					A	A-B	9-3	12	14	2	)\$ A<0.º	. 8<0.8	C<0.9	0<0.95	105 A<0.5, B<0.8, C<0.9, D<0.95, E<0.99		d LOS A	<0.1, B<	:0,3, C<0	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	6, E<0.9	7, F=0.9	)7+	
A	peds	V/	V/C from North ft str rig	North	11 H	L+S+R 0,19	peds		V/C fr	Š –	보	L+S+R 0,11		spad	V/C	V/C from West	vest right	L+S+R		peds	V/C left 0,09	V/C from East           t         str         ri           9         0,09         0	right 0,35	L+S+R 0,27		>   _   _	overall 0,19
PM PM			0,11		0,34	0,25		O'	0,24	0,24		0,24									80'0	0,08	0,63	0,51		0,63	. 0,30
Average	DELAY	Average DELAY per vehicle (secs)	rehicle (secs)	cs)				Ø	A-8 delay fi	delay from South	H th	ш	3	35 A<10	, 8<15, delay	<15, C<25, D<35, delay from West	LOS A<10, B<15, C<25, D<35, E<50 delay from West	20		ed LOS /	A<10, Badela	0, B<15, C<25, D delay from East	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+ delay from East	E<50, F	=50+	delay / veh	veh
AM	spad		str	i Li	+ -	L+S+R	beds		left 0	str o	ų.	L+S+R		peds	left	str	right	L+S+R		peds	left 9	str 9	# <sup>9</sup>	L+S+R 10		max 0	overall 3
off MM				-	2	П		Sud-set.	ewl	I man		Canadae 1		$\parallel$	$\prod$						6	6 salvage	14	13		14	4
Average	QUEUI	Average QUEUE length (veh)	(veh)	1	=)	(= total delay veh-hrs / hr)	y veh-hrs	(/hr)	4	ok v	ARN	POOR	αΓ	<4 = 0	(, <10 =	0 = WARN, 10	Q <4 = OK, <10 = WARN, 10+ = POOR	OOR	L		Č	O from Eact			L	o o	
MA	peds	ef.	str ri	0.00	right L	L+S+R	peds		left o	str ri	Ę.	L+S+R		spad		str	right	1+5+R		beds	eft o	str 0.0	ight 0.4	L+S+R 0.6		max 0,4	total 0,7
# 2					0.0	0.2		#	0.0	0.1	$\prod$	0.2	11		$\prod$			Щ			0,1	0.0	6.0	1,0	<u> </u>	6,0	1,4
					7.5	-10		$\  \ $	2,5	1 31									-   -						<u> </u>		

2 🕎	Auto]	huto							020 PLI	2. R35 & N4 terminal (sc Middelburg 2020 PLUS DISTRIBUTION plus ungrade	35 & N4 Middelburg	termir plus up	N4 terminal (south)	£ _							&AutoJ 1910 roberts	0 roberts
en .						Xwe				Stop street on west and east approaches	et on we	st and e	ast app	roache	16							
Volume (evu/hr)	evu/hr)																					
A Off	peds	left fro	from North str 323	rth right	3		peds le	from South	South tr right 178	t L+S+R	peds	s left	from West	right	L+S+R	spad	left 47	from East	right 142	190	intersection total	total 1 027
Μd			224	340	564			! !	361	433							26	10	222	289		1 286
tanes #	<u>_</u>		(if lanes S	shared I R 1,0	(if lanes shared L:S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)  S R L^ L  1,0 1,0 0,5	0.5:0.5; Li	15:8 = 0.3:0.4 L^ L 0,5	.4:0.3) . S 5 0,5	~		١	-	S .	œ		١	0,5	5,0	R 2,0			
Control	spad	from North	str	right		ad	fron peds left	from South	right		peds		from West eft str	right	<u> </u>	peds	from East left str	str stop	right			
VOLUME	VOLUME to CAPACITY (V/C)	ACITY (	()/c)			L	A-8	8 .C-D	E E	LC.	10S A	<0.5, B<	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99	3, D<0.95	, E<0.99	Ped 1.05	A<0.1, B	<0.3, C<0	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	E<0.97, F		
off PM	spad	eff	t st rig 0,16 0,	ortn right 0,21	0,18 0,24	be	peds left 0,12 0,22	V/C rrom south  th str rig 2 0,12 2 0,22	right 2	0,12 0,22	peds	lef	V/C from West	right	L+S+R	peds	0,08	V/L from East str rig s 0,08 0,	34 A	0,27 0,50	0,34 (0,000)	overall 0,19 0,29
Average DELAY per vehicle (secs)  delay from N  peds left str  AM  off	peds	delay left	vehicle (secs) delay from North sft str rigt	North right	L+S+R	od	A-B del	delay from South	m South	F L+S+R	LOS A-	de de left	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right l	D<35, E<	1.550 1.45+R	Spad CO	dels teft eft	0, 8<15, C<25, D delay from East ft str rig	435, 10	E<50, F=50 L+S+R	delay max 10	/ veh
Ma .	10110		1		2 1			-	7					- 3			6	6 1000 0000	14	13	14	4
אַעבו פּופּע	Q from	Q fi	Q from North	ıt.	l= total d.	(= total delay ven-nrs / nr)	lu / su	Q from South	South	TOOK	U <4 = UK,	= OK, < II	Q from West	/est	200		ď	Q from East			Quene	Je Je
AM	spad	left	str 0,1	right 0,1	L+S+R L 0,1	peds	<u> </u>	<u>اد</u>	tr right	1 L+S+R 0,0	peds	s left	str	right	L+S+R	peds	left 0,1	0,0	right L	L+S+R 0,5	0,4	total 0,7
± ₩	+		0,0	0,2	0,2		1	0,0	0,1	0,1							0,1	0,0	6'0	1,0	6'0	1,4
															the second by Arrest definitions	:	!					

7	2	Auto)	<u>[</u>					2	2020 PL	2. R35 & N4 terminal (s Middelburg US COMBINED plus upgrade	Middelburg	termir us upgi	N4 terminai (south) urg D plus upgrade	utn)							&Autol	&AutoJ 1910 roberts
	uh				×	Xwe			S	Stop street on west and east approaches	t on we	t and	ast app	proache	Si							
Volume	Volume (evu/hr)																					
AM off PM	peds	left	str 336 250	rith right 5 287 0 340	L+S+R 7 623 0 590	spad	left 4	from South  str  171  8 394	right 1	215 215 491	beds	left	from West	Vest	L+S+R	peds	lei	from East t str 57 1 64 10	right 142 222	200 200	inte	intersection total 1039
# lanes	2		(if lares S	s shared L R 1,0	(if lares shared LiS of S:R = 0.5:0.5; LiS:R = 0.3:0.4:0.3)  S R L^ L  1,0 1,0	5:05; L:S:R	(= 0.3:0.4); L 0,5	.0.3) S 0,5	~		-	_	~	~		٤	1 0,5	\$ 0,5	R 2,0			
Control	peds	from	from North left str	right		beds		from South left str	th		spad		from West	right		peds	- 5	from East eft str top stop	right			
Average Average Average	Peds  Peds  Peds  Peds	Average QUEUE left   V/C)  Average QUEUE left   V/C)	eft (veh)  Strom North  V/C from North  O,17 0,2  O,13 0,3  delay from North  I  Ofrom North  Cfrom North  of str righ	night right right	1 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3	peds peds		C from O,13 str str str	South right out was nouth right	L+S+R D,25 D,25 L+S+R L+S+R	LOS A<	40.5, B4466666678910	105 A<0.5, B<0.8, C<0.9, D<0.95, E<0   V/C from West   Let	N, 10+ = P	105 A<0.5, B<0.8, C<0.9, D<0.95, E<0.99   Peds   Peds	Ped LC peds	0,009 0,009 0,011 0,111 0,111 0,111 0,111 0,111 0,111 0,111 0,111	1, 8<0.3, C<0.4, V/C from East R str rig 0, 8<15, C<25, D delay from East R str rig 9 9 9 0 from East R str rig 10 from East R str rig 10 from East 10 from East 10 from East 11 from East 12 from East 13 from East 14 from East 15 from East 16 from East 16 from East 16 from East 17 from East 18 from East 19 from East	0>0 10 10 10 10 10	6, E<0.97, 1+5+R 0,27 0,27 10 1-5+R 10 1-5+R 10 1-5+R	0,67 delay max max max max max max max	7+ V/C nax overall 0,67 0,19 10 3 115 4 115 7 0,10 115 7 0,10 115 7 0,10 115 7 0,10
P of			0,0				000			0,2							0,2			1,1	1, 1	

N4 terminal (south)	rade	&AutoJ 1910 roberts	Delay / vehicle (max) Queue (max)	7% 4% 6% 4% 3% 4% 5%	off PM 1/s ave Peds AM off PM 1/s sum	7 55 4,8 30	31 15 1,4 2,2 9,5	off PM i/s ave Peds AM off PM i/s sum	812 239 1,6 88,9 96,6	45 10 0,5 3,2 4,7	894 306 35,5 97,8 182,5	9 8 0,7 1,0 4,9	7 27 7 0,7 0,8 4,8	25 11 1,1 1,8 6,9	18	31 15 1,2 1,9 9,5	31 15 1,4 2,2 9,5	31 15 1,4 2,2 9,6	31 17 1,4 2,2 10,6	21 15 1,0 2,1 9,3	36 22 2,0 2,7 14,2	36 19 1,4 2,6 11,9	41 23 1,4 4,5 13,9	36 23 2,1 2,8 15,2		36 20 1,6 2,7 12,9	26 18 1,2 2,7 11,6	60 30 1,6 6,5 16,8	60 28 1,5 6,5 15,5		41 19 1,6 3,0 12,4	42 32 2,1 3,6 20,3	43 27 2,3 3,2 17,5	36 24 4.0	2,4
		8/8	eue (max)			)	Z		8	**1	6		)	1		1		7	; 	7		7	7		Ž			9	ę	113		147	(1)	4	0.8
			ďn	4%	AM	0,7	1,4	AM	1,6	0,5	35,5	0,7	0,7	1,1	1,5	1,2	1,4	1,4	1,4	1,0	2,0	1,4	1,4	2,1	2,1	97	1,2	1,6	1,5	1,7	1,6	2,1	2,3	2,4	20
					Peds			Peds																											
south)				%9	i/s ave	100.7	15	i/s ave	239	10	306	00	7	11	18	15	15	15	17	15	22	19	23	23	22	20	18	30	28	27	19	32	27	36	7
minal (			max)	4%	PM	7 250	31	PM	812	45	894	6	1	25	31	31	31	31	31	21	36	36	41	36	26	36	26	09	90	36	41	42	43	46	7
N4 ter	grade	Α.	/ vehicle	7%	ffo			off													:								380 - 381						
% & Middelburg	2025 plus upgrade	SUMMARY	Delay	4%	AM	7	30	AM	18	12	363	183	100 X 000	24	30	29	30	30	30	21	33	34	33	35	26	35	92	35	26	35	36	38	43	43	7
2. R35	2025	S			Peds			Peds																											
				10%	i/s ave	0.15	0,20	i/s ave	0,43	0,19	79'0	0,28	* 0,15 ×	0,20	0,23	0,22	0,20	0,23	0,24	0,22	0,25	0,22	0,25	0,26	0,25	0,23	0,22	0,27	0,25	0,27	0,26	0,29	0,28	0,34	0.15
			(max)	25%	PM	0,30	0,48	PM	1,67	0,93	1,81	0,64	≈ 0,30 ≈	0,63	0,49	0,75	0,48	0,78	0,78	0,78	0,55	0,54	0,92	0,57	0,57	0,56	95'0	96'0	96'0	0,60	92'0	0,65	0,59	0,72	030
			Volume / Capacity	4%	Ho			ffo					-																						
			Volume	25%	AM	0,25	0,29	AM	0,73	0,49	1,18	0,43	5 0,25 ···	0,34	0,39	0,39	0,29	0,41	0,41	0,41	0,44	0,32	0,46	0,46	0,46	0,33	0,33	0,48	0,48	0,39	0,42	0,43	0,45	0,47	0.25
					Peds			Peds																											
	<b>[</b> 0]			100%	Perf Index	85%	54%	14	20%	45%	12%	54%	85%	20%	46%	43%	54%	41%	40%	43%	41%	48%	34%	39%	40%	46%	48%	32%	33%	41%	38%	37%	38%	33%	85%
	Auro)			weighting	-		113		Xns	Xwe	×	mC	RR	2	3ns	3we	n3	53	w3	63	4nswe	n4we	s4we	w4ns	e4ns	nw4	ne4	sw4	se4	R-S-3	W-e-3	n-s-4we	w-e-4ns	P-9-M-5-U	optimums
z-(	2	ø1		7		BEST overall	best signal		Priority					2 stage	3 stage						4 stage									separate	(split)	stage			

2. N4 S R3S 2025 - all SMY

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3	z-Ö	E Auto]	-					4		2 2	2. R35 & N4 ter Middelburg 2025 plus upgrade	35 & N4	termii de	N4 terminal (south)	outh)								&Aut	& AutoJ 1910 roberts	berts
						Xwe				Sto	Stop street on west and east approaches	on we	et and	east at	proact	25									
Volume AM off	Volume (evu/hr)  peds  AM  off  PM	left	from North str 352 352	right 333	1+5+R 685 634		peds	fron 36 60	from South  str  5 172  0 387	ight	1+S+R 208 447	beds	s	from West	West		1+S+R	peds	left 41	from East str 1	right 165 258	207 315	Ē	intersection total 110	tion 1 100 1 396
Lanes # lanes	2		(if lares s S 1,0	shared L:S R 1,0	S or S:R:	(if lanes shared LiS or S:R = 0.5:0.5; LiS:R = 0.3:0.4:0.3)  S R L^ L  1,0 1,0	.5:8 = 0.3	s:0.4:0.3) L 1,5	s 0,5	œ		٥	-1		œ			<u>.</u>	1 0,9	5	R 2,0				
Control	peds		from North	right		ă	peds	from South		right th		spad		from West	right	<del>L</del>		peds	from East left sti stop sto	str stop	right				
VOLUN AM off	ME to CA	Ie le	TY (V/C)  W/C from North  R str rig  0,18 0,78	right 0,23	L+S+R 0,20 0,27		speds 1	A-B V/C fr left 0,02 (0,03 (0,0))(0,03 (0,03 (0,0))(0,03 (0,0) (0,	W/C from South R str rig 12 0,09 13 0,20	E	F 1,08 0,08	peds	v<0.5, B<1	V/C from West t str rig	10S A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R	10 E<0		ped LOS peds	0,06	. B<0.3, C<0.4, V/C from East str right str right out of 0,06 0,06 0,00 0,00 0,00 0,00 0,00 0,0	134, D<0.0	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+           V/C from East           peds         left         str         right         L+5+R         max           0,06         0,06         0,49         0,40         0,49           0,06         0,90         0,93         0,80         0,93	max 0,49	v/c v/c v/c v/c v/c v/c v/c v/c	22 36
Average AM off PM	e DELAY	Average DELAY per vehicle (secs)  delay from N  peds left str  AM  off  PM	rehicle (secs) delay from North eft str righ	right 1	1+S+R		peds	delay f	delay from South		L+S+R	LOS A-	A<10, B<1	<ul><li>&lt;15, C&lt;25, D&lt;35,</li><li>delay from West</li><li>ft str rig</li></ul>	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right l	E<50	(	Ped LOS	dela dela	Ped LOS A<10, B<15, C<25, D<35, delay from East	5, D<35, Inght right 12	E<50, F=50+ 11 39		delay / veh	trall 3
Average AM off PM	peds	QUEUE length (veh)  Q from  peds left si	Q from North Str ri 0,1	6ht 0,1		elay ve		0,0 0,0	Of No. 10 OK No. 10 OK OV. 10	ARN ARN	POOR 1.+5+R 0,0	Q <4 =	= OK, <10	Q from West t str ri	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+1	= POOR	#	peds	0,1 0,1	O from East str r 0,0 1	1ght 0,5	1+S+R 0,6 3,4	wam 0,5	tot	1 3 0 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8

	7-								j				TILL TO							7	The second second
***	Ä	F Autol	<u></u>				lean	202	2025 PLUS	Middelburg NDUSTRIAL	burg	Middelburg S INDUSTRIAL plus upgrade									
	w.	:			Xwe	a)			Stop	street o	n west	Stop street on west and east approaches	арргоас	hes							
Verlines (assisted)	(mille)							İ													
acinios.	ווו (מאם)	-	from North	th.			Î.	from South				froi	from West				from East		1 1	Ц	intersection
AM	beds	left	str 388	right 333	L+S+R 721	beds	left 48	str r	right	L+S+R 241	beds	left	str rig	right L+5	L+S+R	peds	left str 65	right 1 165	L+5+R 5 231	1=1	total 1 193
off PM			257	394	651		92	428		520							54	12 258	324		1 495
Lanes			(if lares:	shared L:S	(if lanes shared LiS or S:R = 0.5:0.5; LiS:R = 0.3:0.4:0.3)	0.5; L:5:R =	0.3:0.4:0.	~													
##	1		S 1	۳ C		<u>.</u>	1 5	S 0.5	~		<u>-</u>	_	2	۳ <u></u>		<u>-</u>	1 S 0,8 0,2	R 2,2	_		
			2,7		_	į	2/2							]					1		
Control		from	from North				from South	outh				from West	est	Г			from East		_		
	peds	left	str	right		peds	left	H	right		peds	left	H	right		$\vdash$	$\vdash$	H			
													+	$\neg$		stop s	stop stop	stop	_		
VOLUM	VOLUME to CAPACITY (V/C)	PACITY	(v/c)				A-B	C-D	Ш	ч	LOS A<0	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99	J<0.9, D<0	3.95, E<0	66.	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	0.1, B<0.3,	C<0.4, D<	0.6, E<0.	97, F=0.9	- 1
		/A	V/C from North	orth		-	V/C	S-		6	1	V/Cfi	补	1	0.0	- Property	V/C from East	n East	14540		V/C
AM	beas	Геп	0.19	ngnt n 24	0.27	peos	0.03	0.10	118111	0.09	heas	101	100	1119	5	-			1		0,48 0,22
off.			216														-	Н	Н		Н
PM			0,13	0,40	0,29		0,05	0,22		0,19							0,09 0,51	0,88	0,73		0,88 0,35
Average	DELAY	per vehi	Average DELAY per vehicle (secs)				A-B	G-D	ш	ш	LOS A<1	LOS A<10, B<15, C<25, D<35, E<50	<25, D<35	, E<50	[	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	10, 8<15,	C<25, D<3	5, E<50, I	F=50+	
		del	delay from North	Vorth			dela	카	,	0.0.1	1	delay	delay from West	1	1 v C v D	none	delay from East	m East	1+C+R		max overall
Ā	peas	E E	sur 1	rign	L+3+R	beas	0	0	111211	0	hear			111911		ą.	6	6	-		2
JJo																					
PA			et	2	2		O service	L specific.	E.	and conjugate				-		WEE.	6	13 31	1 27		31
Average	QUEUE length (veh)	length (	veh)		(= total delay veh-hrs / hr)	y veh-hrs /		OK ×	WARN P	POOR	Q <4 = C	Q <4 = OK, <10 = WARN, 10+ = POOR	/ARN, 10+	= POOR						[	
		Q	Q from North					Q from South	ء			afrı	Q from West	ŀ			S.	East	ŀ	_	콼
	beds	left	str	.gg	£	beds	left		right L	L+S+R	peds	left	str	right L+	L+S+R	spad	75	5	E		max total
AM			0,1	0,1	0,2		0,0	0,0		0,0			+	+	Ť		7,0	0,0	2		C,U
<u> </u>			0.0	0,3	0,3		0,0	0,1		0,1		-			Γ		0,1	0,0	2,4	I THE	2,2

*	z 💍 ^	E Auto	ī			>			202	2025 PLUS	2. R35 & N4 terminal (south) Middelburg IS DISTRIBUTION plus upgrade	Middelburg	rerm plus u	N4 terminal (south)	outh)								&Autol	&Autol 1910 roberts
						DAK .				2	2006 40		200	3	2	2		l l						
Volume AM off PM	Volume (evu/hr)  AM  off  PPM	left	from North str 371	rth right 333	L+S+R 3 704 4 651		peds	frc left 53	from South str 3 202	right	255 495	spad		from left st	from West		[+5+R	spad	left 53	from East	165 165 258	219 219 332	inte	intersection total 1178
Lanes # Janes			(if lanes S	shared L R 1,0	s or S:R	(if lanes shared L.S or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)  S R L' L L 1,0 1,0	L:S:R = 0.	3:0.4:0.3 L	s 0,5	~		<u>-</u>			\$			2	8,0	\$	R 2,2			
Control	peds		from North	right			peds	from South	str	right		peds		from West	est right	T E		peds	from left stop	from East eft str top stop	right			
VOLUN AM off	ME to CA	Ie	V/C from North R str rig 0,19 0,1	right 0,24	1+S+R 0,21 0,28		spad	A-B V/C left 0,03	V/C from South tt str rig 3 0,10 4 0,21	e right	F L+S+R 0,09	LOS A-	A<0.5, E	V/Cfro	105 A < 0.5, B < 0.8, C < 0.9, D < 0.95, E < 0.99  V/C from West  peds left str right L+5+R	.95, E<0	E<0.99	Ped 109	A<0.1, E v/ V/ left 0,10 0,10	V/C from East right strain 10,004 0,	134, D<0.1 right 0,47	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  Deds left str right L+S+R may 0,10 0,04 0,47 0,37 0,41 0,41		0,22 0,35
Average AM off PM	peds peds	ber 1	vehicle (secs) delay from North eft str righ	lorth right	L+S+R		peds	A-B delay	-B C-D E delay from South righ of 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	outh right	F 1+5+R 0	LOS A«	A<10, B	B<15, C<25 delay fron left str	LOS A<10, B<15, C<25, D<35, E<50 delay from West peds left str right	E<50	L+S+R	Ped LO	del	0, 8<15, C<25, D delay from East tr str rig 9 9 9	5, D<35, ast right 12	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+		delay / veh
Average AM off PM	peds	QUEUE length (veh)  Q from  peds left si	Q from North  Office Str ri  O,1  0,0	right 0,1		elay ve	h-hrs/hr		OK W. 2 cuth strength of the s	WARN right	POOR 1+5+R 0,0	Q <4 =	= OK, <	<10 = WA Q from	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+4	= POOR	L+S+R	beds	left 0,1	O from East           str         r           1         0,0           2         0,0	1ght 0,5	L+5+R 0,7	0w max 0,5	Queue  10,5 0,9  2,1 2,7

	z-{(	Ant	j=							2. K30	og ₽	N4 (er	TEULU.	N4 terminal (south)	Ē							&Auto	&Auta) 1910 roberts
<b>₽</b>	<b>5</b>	Auro)							2025 PI		MBINE	D plus	US COMBINED plus upgrade	a				1					
	h				^	Xwe				Stop st	reet on	west a	nd east	Stop street on west and east approaches	aches								
Volume	Volume (evu/hr)		_																				
	peds	left	from North	1 1 = 1	L+S+R	peds	$\Box$	from left st	from South		e	peds	fre left	from West	right	L+S+R	beds	lef	from E	right	1+S+8	inte	intersection total
off PM			283	333	677			106	447	1 5	253							70	12	258	340		1570
Lanes			(if lanes s	hared L:5	or S:R = C	(if lanes shared L:5 or S:R = 0.5:0.5; L:5:R = 0.3:0.4:0 3)	:R = 0.3:0	1,4:0.3)			]												
# lanes	<u>-</u>		S 1,0	1,0		<u>-</u>	~ L	10	S R	П		2		S	~		-	7 0,8	5,0	R 2,2			
			_																				
Contro		from	from North				fr	from South	٩				from West	Vest					from East				
	peds	left	str	right		peds	ds left	$\mathbb{H}$	str right	ŧ		peds	left	str	right		peds	left	stop	right			
VOLUA	AE to CA	VOLUME to CAPACITY (V/C)	(v/c)				A-B	-B C-D	D E	-		OS A<0.	5, 8<0.8,	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99	><0.95, [	<0.99	Ped LO	S A<0.1,	3<0.3, C<(	0.4, D<0.6	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	- 1	
	node	)/V	V/C from North	orth	1+5+R	spaa	V V	V/C fro	V/C from South	of L+S+R	*	peds	left /	V/C from West	iş.	L+S+R	peds	left	V/C from East	ght	L+S+R	Пах	V/C
AM			0,19	0,24	0,22						6			++	-				0,04		0,37	0,47	0,22
PM			0,14	0,41	0,30		0)(0	0,06 0,23	23	0,20	0							0,11	0,55	0,93	0,75	0,93	0,36
Average	DELAY	Average DELAY per vehicle (secs)	le (secs)				A	A-B C	C-D E	4		LOS A<1(	), B<15, (	LOS A<10, B<15, C<25, D<35, E<50	35, E<5(		Ped LC	05 A<10,	3<15, C<2	5, 0<35, 1	Ped LOS A<10, B<15, C<25, 0<35, E<50, F=50+		
	4	-	delay from North	orth	116.0	1 2	-	delay fro	delay from South	11010	0	node	delay	delay from West	+	H-S-LP	spou	ļ	delay from East	±	8+5+1	dela	delay / veh
AM	Sold	44	30	1	LTSTR	peds		0	0		0	hens		Н	+-+					122	11	12	61
PM M			1	2	2			0	-		F							6	14	44	36	44	6
Average	QUEUE	Average QUEUE length (veh)	veh)		(= total de	(= total delay veh-hrs / hr)	rs/hr)	Lº	OK WARN	RN POOR		Q <4 = 0	K, <10 =	Q <4 = OK, <10 = WARN, 10+ = POOR	0+ = PO	OR							
	L	O	Q from North			L		Q fron	Q from South				Qf	Q from West	N.				Q from East	st		a	Quene
	peds	left	str	right	L+S+R	beds	_	6	str right	nt L+S+R	œ	peds	left	str	right	L+S+R	peds	e e	22		L+S+R	max	ţ
AM #			0,1	0,1	0,2		+	9	00	+	읭			+				0,2	0,0	0,5	0,7	0,5	6,0
MA MA			0,1	0,3	0,3		+	0,0	0,1	<u> </u>	0,2							0,2	0'0	3,1	3,4	H,E	3,8

		&AutoJ 1910 roberts		5%	i/s sum	0,4	1,8	t/s snm	3,4	0,4	29,0	1,7	2,2	1,8	2,8	2,8	2,4	2,4	3,0	3,0	3,9	3,4	3,5	4,2	4,2	3,6	3,6	3,7	3,7	7,1	2,6	8,6	3,6	8,6	0,4		2019
		&Autol 1	0	4%	PM	1,0	0,5	PM	1,2	0,1	51,8	9,0	0,7	0,5	0,8	0,8	6'0	0,5	6'0	6'0	1,2	1,3	0,7	1,3	1,3	1,4	1,4	0,8	0,8	2,0	0,7	2,5	1,0	2,4	0,1		
			Queue [max]	3%	ffo			off			:																										
			σ̈	4%	AM	0,1	0,4	AM	6'0	0,1	3,6	0,4	9'0	0,4	9'0	9'0	6,3	0,7	0,7	0,7	6'0	9'0	1,0	1,0	1,0	9'0	9'0	1,1	1,1	1,2	0,5	1,6	0,8	1,5	0,1		
					Peds			Peds												The second																ч	
SC				%9	i/s ave	de de la constante de la const	9	i/s ave	11	1	304	9	7	9	9	6	8	8	10	10	13	12	12	13	13	12	13	12	12	24	90	28	12	28	1	E	
ACCESS ROADS			max)	4%	PM	6	25	PM	12	6	514	* · · · · · · · · · · · · · · · · · · ·	7	25	30	30	30	30	30	30	35	35	35	35	35	35	35	35	35	35	39	40	44	44	9	C-D	
ACCES	50	Y	Delay / vehicle (max)	7%	ffo			ffo																												A-B	
8	Middelburg 2019	SUMMARY	Delay	4%	AM	6	25	AM	12	9	44	the Pares	7	25	30	30	30	30	30	30	35	35	35	35	35	35	35	35	35	35	39	40	44	44	9	S colours	(35 2019
3. R35	2	S			Peds			Peds																												LOS colours	SESS RDS-R
				10%	i/s ave	3,53	0,15	i/s ave	0,22	8 0,11 B	09'0	0,12	0,13	0,15	0,17	0,17	0,16	0,16	0,18	0,18	0,19	0,18	0,18	0,20	0,20	0,18	0,18	0,19	0,19	0,25	0,16	0,27	0,18	0,27	0,11		3. AC
			(max)	75%	PM	0,20	0,29	PM	0,43	S'C 0,20 3	1,30	0,24	0,26	0,29	0,32	0,32	0,33	0,27	0,33	0,33	0,36	0,37	0,30	0,37	0,37	0,39	0,39	0,31	0,31	0,44	0,30	0,48	0,33	0,48	0,20	imum 🐃	
			/ Capacity	4%	Ho			ffo						:																						10% of apt	
			Volume /	25%	AM	0,19	0,28	AM	0,39	0,19	0,92	0,21	0,23	0,28	0,31	0,31	0,26	0,32	0,32	0,32	0,35	0,29	0,36	0,36	0,36	0,30	0,30	0,37	0,37	0,35	0,29	0,39	0,32	0,38	0,19	st, within	
					Peds			Peds																												ar near best, within 10% of optimum	
	[0]			100%	Perf Index	83%	47%	14	34%	83%	11%	64%	21%	47%	40%	40%	44%	43%	39%	39%	36%	38%	38%	35%	34%	37%	37%	37%	37%	31%	43%	78%	39%	28%	83%	best	
	w⊕ Auto]			weighting		Xwe .	2 %		Xns	Xwe	XX	mC	8R	2	3ms	3we	n3	83	w3	63	4nswe	n4we	s4we	wans	e4ns	nw4	ne4	SW4	se4	n-s-3	w-e-3 €	n-s-4we	w-e-4ns	n-s-w-e-4	optimums	e colours	
2-	<b>\$</b>	·		×		BEST overall	best signal		Priority					2 stage	3 stage						4 stage									separate	(split)			u.	0	performance colours	t: Sampson

copyright: Dr John Sampson

3	Auto]   Xwe		3. R35 & ACCESS ROADS Middelburg 2019 Stop street on west and east approaches		&AutoJ 1910 roberts
AM off	Volume (evu/hr)           from North         from North           AM         left         str         right         L+5+R           AM         8         291         32         331           off         13         214         13         240	from South         L+S+R           peds         left         str         right         L+S+R           2         143         4         149           2         363         2         367	from West         left         str         right         L+5+R           7         5         12           19         2         21	from East           peds         left         str         right         L+S+R           1         13         14           3         13         16	intersection total 506 506
# lanes	(if lanes shared U.5 or S:R = 0.5:0.5; L:S:R = 0.3:0.4:0.3)	0.5; L:S:R = 0.3:0.4:0.3)  L	L~ L S R  0,3 0,4 0,3  from West  peds left str right stop stop		
VOLUN Off	VOLUME to CAPACITY (V/C)   V/C from North   V/C from No	A-B C-D E F V/C from South peds left str right L+5+R 0,08 0,08 0,08 0,20 0,20 0,20	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+5+R 0,02 0,02 0,02 0,02	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  peds left str right L+S+R max 0,03 0,03 0,03 0,03 0,03 0,03 0,04 0,20	0.97+  w/c  max overall 0,19 0,15 0,20 0,17
Average AM off PM	Average DELAY per vehicle (secs)  delay from North  delay from North  beds left str right L+S+R  AM off 1 1 1 1 1 1	A-B C-D E F  delay from South  peds left str right L+S+R  0 0 0 0 0	Cos A<10, B<15, C<25, D<35, E<50   delay from West   L+S+R   str right   L+S+R   B   B   B   B   B   B   B   B   B	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	delay / veh max overall - 9 1
Average AM off PM	Average QUEUE length (veh)         Q from North          = total delay           Q from North         Q from North           AM         0,0         0,1         0,0         0,1           PM         0,0         0,0         0,0         0,0         0,0	= total delay veh-hrs / hr   OK   WARN   POOR	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+5+R  0,0 0,0 0,0  0,0 0,0	Q from East           peds         left         str         right         L+S+R           0,0         0,0         0,0           0,0         0,0         0,0	Queue max total 0,1 0,2 0,1 0,2

& Autol 1910 roberts	from East           peds         left         str         right         L+S+R           1         13         14           1         3         13         16           1         5         R           6         0,3         0,4         0,3           6         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1           1         1         1         1	S A<0 0,0 0,0	L+S+R	Q from East         L+5+R           0,0         0,0         0,0           0,0         0,0         0,0
		od 10	beds	peds left 0,
3. R35 & ACCESS ROADS Middelburg 2020 Stop street on west and east approaches	peds         left         str         right         L+S+R           12         20         2         22           12         2         2         22           12         2         2         22           12         8         8         8           12         0,3         0,4         0,3           12         2         22         22           12         2         2         2           12         3         0,4         0,3           12         3         0         4           12         3         0         4           12         3         0         4           12         3         0         4           12         3         0         4           12         3         0         4           12         3         4         4           12         4         4         4           12         4         4         4           12         4         4         4           12         4         4         4           12         4         4	95, F<0.99 nt L+5+R 2 0,02 IS 0,05	delay from West           peds         left         str         right         L+S+R           8         9         8           8         9         8	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+S+R  0,0 0,0 0,0
	from South           peds         left         str         right         L+5+R           2         147         4         153           2         374         2         378           0.5; L5:R = 6.3:0.4:0.3           R         R           L*         L         S         R           C         0,3         0,4         0,3           peds         left         str         right	A-B         C-D         E         F           V/C from South         C-D         F         F           0,08         0,08         0,08         0,08         0,08           0,20         0,20         0,20         0,20         0,20           A-B         C-D         E         F	delay from South           peds         left         str         right         L+S+R           0         0         0         0         0           1         1         1         1         1	(= total delay veh-frs / hr) OK WARN POOR  4 from South  6,1  0,1  0,0  0,0  0,0  0,0  0,0  0,0
Auto) Xwe	Volume (evu/hr)         from North         from North         from Solution         from North         from Solution         from North         from North         from Solution         from North         from North         from North         from Solution         from Solution <th< td=""><td>VOLUME to CAPACITY (V/C)           V/C from North           peds         left         str         right         L+S+R           AM         0,19         0,19         0,19         0,19           PM         0,16         0,16         0,16         0,16           Average DELAY per vehicle (secs)         0,16         0,16         0,16</td><td>delay from North           peds         left         str         right         1+5+R           1         1         1         1           1         1         1         1</td><td>Average QUEUE length (veh)         (= total dela of from North           peds         left         str         right         L+S+R           AM         0,0         0,1         0,0         0,1           PM         0,0         0,0         0,0         0,0</td></th<>	VOLUME to CAPACITY (V/C)           V/C from North           peds         left         str         right         L+S+R           AM         0,19         0,19         0,19         0,19           PM         0,16         0,16         0,16         0,16           Average DELAY per vehicle (secs)         0,16         0,16         0,16	delay from North           peds         left         str         right         1+5+R           1         1         1         1           1         1         1         1	Average QUEUE length (veh)         (= total dela of from North           peds         left         str         right         L+S+R           AM         0,0         0,1         0,0         0,1           PM         0,0         0,0         0,0         0,0

Z			3. R35 & AC	ACCESS ROADS		&AutoJ 1910 roberts
**	F Auto)	Xwe		2020 PLUS INDUSTRIAL Stop street on west and east approaches		:
Volume (evu/hr) Peds AM off PM	from North           peds         left         str         right           68         300         33           39         220         13	1+5+R 3 401 3 273	from South           peds         left         str         right         L+5+R           2         147         30         179           2         374         7         383	from West           peds         left         str         right         L+5+R           7         5         12           20         2         22	from East           peds         left         str         right         L+S+R           5         46         51           21         87         108	intersection total 644
tanes #	(if lares shared L L~ L S R 0,3 0,4 0,3	S at 5:R = 0.5:	(if lanes shared U.S or 5:R = 0.5:0.5; U.S:R = 0.3:0.4:0.3) S R $\sim$ L S R $\sim$ L S R $\sim$ L S R $\sim$ 0,4 0,3 $\sim$ 0,4 0,3	L~ L S R   0,4 0,3	L~ L S R 0,4 0,3	
Control	from North peds left str right		from South  peds left str right	from West right strop stop	from East  peds left str right stop stop	11 2 4
VOLUME Off PM	VOLUME to CAPACITY (V/C)           V/C from North           Deds         left         str         right           AM         0,22         0,22         0,22           Off         0,17         0,17         0,17	L+S+R 0,22 0,17	A-B C-D E F  V/C from South  peds left str right L+S+R  0,12 0,12 0,12 0,12  0,25 0,25 0,25	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  //C from West  peds left str right L+5+R  0,03 0,03  0,05  0,05	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  V/C from East  May  Deds left str right L+S+R  0,12 0,12 0,12  0,28 0,28  0,28	V/C max overall 0,22 0,18 0,28 0,22
Average AM off	Average DELAY per vehicle (secs)  delay from North  delay from North  peds left str right  AM 1 1 1 1  off 1 1 1	L+5+R	A-B         C-D         E         F           delay from South         tr         right         L+S+R           veds         left         str         right         L+S+R           ve         0         ve         1         1         1	LOS A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right L+5+R  8 9 8	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	delay / veh max overall 9 2
Average AM off PM	Average QUEUE length (veh)           Q from North           peds         left         str         right           AM         0.0         0,1         0,0           off         0.0         0,0         0,0           PM         0,0         0,0         0,0		(= total delay veh.hrs / hr) OK WARN POOR  L+5+R  0,1  0,0  0,1  0,0  0,1  0,0  0,1  0,1	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+S+R  0,0 0,0 0,0  0,0 0,0	Q from East           peds         left         str         right         L+S+R           0,0         0,1         0,1           0,1         0,1         0,1           0,1         0,2         0,3	Queue max total 0,1 0,3 0,5

print:	2019-12-10
	2

9,11

11,6

6,4

0'9

2'6

6,0 5,4 5,6 6,5

6,0 5,8

4,0 4,1 4,8

į					Queue (max)	3%	Ho			off					!												:													
						4%	AM	. 0,1	0,4	AM	1,1	0,1	50,3	0,5	9'0	0,4	0,7	0,7	0,4	0,8	0,8	0,8	1,0	9'0	1,1	1,1	1,1	0,7	0,7	1,2	1,2	1,4	9'0	1,7	0,9	1,7	0,1			
							Peds			Peds					į					:				20														:	<u>.</u>	
5	2					%9	i/s ave	THE 2 SER	6	I/s ave	11	2	380	9	7	9	13	12	12	11	13	12	91	16	15	18	16	17	15	16	14	26	14	31	18	32	7		Ш	
	KOAL	grade		:	пах)	4%	PM	10	28	PM	14	10	572	6 402	7	28	33	33	34	33	34	31	39	39	38	40	37	40	37	38	36	38	39	44	44	45	9		<u>م</u>	
200	ACCESS ROADS	dn snld			Delay / vehicle (max)	7%	ffo			ffo				b												:													A-8	
	S S S S S S S S S S S S S S S S S S S	2020 PLUS INDUSTRIAL plus upgrade	SUMMARY		Delay,	4%	AM	6	26	AM	13	6	604	9	7	26	31	31	31	31	31	30	36	36	36	36	35	36	35	36	35	36	40	42	45	46	9		LOS colours	135 2020
	3. R35	NS IND	ns				Peds			Peds								i																					O	3. ACCESS RDS-R35 2020
	. * 3	2020 PL				10%	i/s ave	2. EI'O x	0,20	i/s ave	0,27	€ 0,13 °	0,70	0,14	0,15	0,20	0,22	0,22	0,21	0,22	0,23	0,22	0,25	0,23	0,24	0,26	0,25	0,25	0,23	0,25	0,24	0,28	0,22	0,31	0,25	0,32	0,13			3. AC
					(max)	25%	PM	** 0,28 °	0,41	PIM	95'0	0,28 =	1,36	0,27	0,29	0,41	0,47	0,47	0,48	0,44	0,48	0,47	0,53	0,55	0,50	0,55	0,53	95'0	0,55	0,51	0,46	0,50	0,46	0,55	0,52	95'0	0,27		imum	
			•		/ Capacity (max)	4%	off		į	off.											ŀ																		" near best, within 10% of optimum "	
					Volume	25%	AM	0,22	0,33	AM	0,51	0,22	1,40	0,26	0,29	0,33	0,38	0,38	0,32	0,39	0,39	0,39	0,42	95'0	0,44	0,44	0,44	0,37	0,37	0,46	0,46	0,43	0,35	0,47	0,39	0,46	0,22		est, within	
							Peds			Peds																													"near b	
		[0:				100%	Perf Index	82%	47%	PI	35%	82%	11%	71%	64%	47%	40%	41%	44%	41%	39%	40%	35%	38%	36%	34%	35%	37%	37%	35%	37%	34%	41%	31%	37%	31%	82%		best	
		Auto]				weighting		Xwe to	2		Xns	Xwe	××	mC	RR	2	3ms	3we	n3	cx	w3	63	4nswe	n4we	s4we	w4ns	e4ns	nw4	ne4	Sw4	se4	n-s-3	w-e-3	n-s-4we	w-e-4ns	n-s-w-e-4	optimums		ce colonrs	
	24	P	r uh			4	:	BEST overall	best signal		Priority					2 stage	3 stage						4 stage									separate	(split)	stage			3		performance colours	

&Autol 1910 roberts

i/s sum

3,1

133,5

6'0

i/s sum

3. ACCESS RDS-R35 2020 SMY

	2	F Autol				20	3. 2020 PLUS	R35 & AC Middelburg	ACCE:	3. R35 & ACCESS ROADS Middelburg S INDUSTRIAL plus upgrade	s [				!	:		&Autol 1910 roberts	oberts
	sh.			Xwe			Sto	p street	on west	Stop street on west and east approaches	approac	hes							
Volume	Volume (evu/hr)																		
		from North				from South	th Th			froi	from West	l ŀ			from East			intersection	ion
AM	peds	left str 68 300	right L+S+R 33 401	peds	left	str 2 147	right 30	L+S+R 179	beds	left 7	str rij	right L+S+R 5 12	12 12	beds I	left str	right 46	L+S+R 51	toti	total 644
₩o.		Ш			l (		F	000		5		ſ	   		21	70	100		795
Σ		35 770	13 6/2		-	2 3/4	1	202		707		7	ارد ا		777	b	TAG		8
Lanes		(if lanes shan	(if lanes shared LtS or StR = $0.5:0.5$ ; LtStR = $0.3:0.4:0.3$ )	0.5:0.5; L:S:9	= 0.3:0.4:	0.3)													
	٢.	ر 2	<u>~</u> [	<u></u>	_	S	~		3		-	۳.	Ĺ	3	ŀ	œ .			
# lanes	1	0,3 0,4 0	0,3		0,3	0,4	0,3			0,3	0,4	0,3	_		0,3 0,4	0,3			
Control																			
		from North	П		fron	from South				from West					from East				
	peds	left str rig	right	beds	left	str	right		peds	left	Str rij	right		peds l	left str	right			
			]		-						-	]	1						
VOLUM	E to CA	VOLUME to CAPACITY (V/C)			A-B	0-0	e e	LL.	LOS A<0	LOS A<0.5, B<0.8, C<0.9, D<0.95, F<0.99	3<0.9, D<	0.95, F<0.		ed LOS Act	0.1, B<0.3, (	C<0.4, D<0	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97±	- 1	
		/C from No				V/C from South				v/c fi	š			-	Ş.	East		⋝ŀ	:
	beds	str		beds	+	str	-	L+S+R	beds	left	str ri	right L+S+R		peds	left str	right	L+5+K	max overall	Verall
AIM		0,22 0,22 0,	0,22 0,62		0,12	77'0	77'0	0,14		com		0,00	2		77.	77'0	710	-	2
PM		0,17 0,17 0,	0,17 0,17		0,25	0,25	0,25	0,25		0,05	0	0,05 0,05	35	0	0,28	0,28	0,28	0,28 0,2	0,22
Average	DELAY	Average DELAY per vehicle (secs)			A-B	C-D	ш	ш	LOS A<1	LOS A<10, B<15, C<25, D<35, E<50	(25, D<35	, E<50	e.	ed LOS A	10, 8<15, C	<25, D<35	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	+	
		delay from North	h		de	delay from South	outh			delayı	delay from West				delay from East	n East		delay / veh	reh
784	spad	left str rig	right L+5+R	peds	left	str	right	L+S+R	beds	left g	str ri	right L+S+R		beds	left str	right	L+S+R	max overall	erall
off			1			4						)			>				
PM		1 1	1 1			1 1	1	1		50		9.	20		10	10	» 10	10	7
Average	QUEUE	Average QUEUE length (veh)	(= total de	(= total delay veh-hrs / hr)	/ hr]	ŏ	WARN	POOR	0 <4 = 0	<4 = OK, <10 = WARN, 10+ = POOR	(ARN, 10+	- = POOR							
)		Q from North			Ш	Q from South				Q frc	Q from West				Q from East	East		Queue	
	beds	str	L+S	peds	의	72		L+S+R	peds		str	3	_	peds	left str	right	L+S+R	ţ	total
AM Off		0,0 0,1	0,0	<u></u>	0,0	0,0	0,0	0,0		0,0	+	0,0	0,0	+	0,0	0,1	0,1	0,1	0,3
N N		0,0 0,0	0,0		0,0	0,1	0,0	0,1		0,0	+	0,0	0,1		0,1	0,2	0,3	0,2	0,5

	2	Auto)	-			Xwe	<u>o</u>		4	2020	3. Stop	Mid Mid DISTRIE	3. R35 & ACCESS ROADS Middelburg  2020 PLUS DISTRIBUTION plus upgrade Stop street on west and east approaches	CESS I plus est an	ACCESS ROADS  urg  ON plus upgrade  west and east ap	DS de	aches		:						&Autol 1	&Auto/ 1910 roberts
Volume AM off PM Lanes	Volume (evu/hr) off off PM Lanes L~ # lanes	fr left 39 60 60 L		orth right 0 33 0 13 0 13 0 0,3	133 H	orn North         from From Str.           300         33         372         2           220         13         294         2           (if lares shared LiS or S:R = 0.5:0.5; LiS:R = 0.3:0.4:0.3)         2           0,4         0,3         0,3	peds [0.5; 1.5:8	s left s = 6.3:0.4	from from 2 2 2 2 2 2 2 2 3 3 3 0 0 3 3	from South  str r  2 147 2 374 2 374 0.3) S		166 386		peds 1	fro left 7 20 20	from West	right 5 2 2 2 2 0,3	12 12 22 22 22 22 22 22 22 22 22 22 22 2		peds II	fron	from East rig	60 60 60 R	1.45+R 67	inter	intersection total 618
Control	peds	from	from North	right	l t		spad				right		De d	peds	from West left str stop	Jest str	right		90	ls l	from East left sti stop		right			
AM off	peds	VOLUME to CAPACITY (V/C)  V/C from  V/C from  Deds left str  Str  O,21 0,2  Off  PM 0,18 0,1	V/C from North ft str rig 21 0,21 0,2 18 0,18 0,	north right 0,21	2 F	1+S+R 0,21	spad	0,1	8 C Frc 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	V/C from South R str rig 0 0,10 0,10 0,1	±0 \$	F L+S+R 0,10	105	05 A<0.5,	v/c f v/c f v/c f o,02	co.8, C<0.9, D<0 V/C from West t str rig 2 0,	10S A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R  0,02 0,05 0,05 0,05	E<0.99 L+S+R 0,02	bed bed	peds 16	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/c from East  Peds left str right L+S+R ma  0,15 0,15 0,15 0,20 0,20 0,20	V/C from East in ight strain in ight	st right L+ 0,15 0	6, E<0.97, F L+S+R 0,13		0/C overall 0,17
Average AM off PM	peds	Average DELAY per vehicle (secs)  delay from N  peds left str  AM  off 1 1	delay from North	right right	· ·	1+5+R	beds	4	B C-D delay from the str of the s	8 0 1	+0 +	F L+S+R 0	CO.	OS A<10,	delay delay 8	415, C<25, D<35, delay from West fr str rig	LOS A<10, B<15, C<25, D<35, F<50  delay from West  peds left str right   8 9 9   9	CL+S+R		peds h	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+         delay from East       1+5+R         peds       left       str       right       1+5+R         9       9       9       9	0, B<15, C<25, D delay from East t str rig	sst right L+	E<50, F=50		delay / veh
Average AM off PM	peds	QUEUE length (veh) Q from Q from 0,0	Q from North of from 0,0 0,1 0,0 0,1			(= total delay veh-h:s / hr)  L+S+R  0,1  0,1	peds	1   2   1   1   1	0,0 0,0 0,0 0,0	Q from South 2 str ri 30 0,0 0,0 0,0	O,0 O,0	POOR L+5+R 0,0	o a	> < 4 = OK,	<10 = V Q free 0,0 0,0	Q from West	<10 = WARN 10+ = POOR	0,0 0,0		peds	Q fro	Ofrom East	right L+ 0,2	L+S+R 0,2	0,2 0,2 0,2	Queue x total 3,2 0,3

	AutoJ		3			2020 PLL	3. R35 & ACCESS ROAD Middelburg US COMBINED plus upgrade	35 & ACCE Middelburg	ACCESS ROADS urg D plus upgrade	SQ								&Autal 1910 roberts	10 roberts
			Awe			ñ	סוסף פונתפו חון אפטר מווע פמטר מקףו סמרוופט	OII WEST	מונת במא	appro	בנועי						!		T
Volume	Volume (evu/hr) from North	h			from South	outh			fre	from West		П		fron	from East		П	intersection	ection
Δ A Ω	peds left str 62 300	right L+S+R 33 395		peds left	ft str 2 147	right 17 27	L+S+R 176	beds	left 7	str	right Ly	1+5+R	peds	left s	str right	-S+1	24 24		total 638
P M	81 220	13 3	315		2 37	374 14	390		20	+	2	22		29	1	119	148	_	875
ranes		(if lanes shared LtS or StR = 0.5:0.5; LtStR = 0.3:0,4:0.3}	R = 0.5:0.5; L:	.S:R = 0.3:0		1				·	c		-		c				
# lanes	S 7 ~7 ~7	1,0 1,0		L~ L	5 0,5	1,0			0,3	0,4	D)3			0 6,0	0,1 1,0				
Control			l				_									Γ			
	from North	right	124	fr peds le	from South	right		spad	+		right		peds	<u></u>		+ 1			
		7		+	$\frac{1}{2}$	_	_		dors		dors			Stop	olo)s	2			
VOLUN	VOLUME to CAPACITY (V/C)	4		A	A-B C-D E	Courth	u.	LOS A«	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99	<0.8, C<0.9, D<0	<0.95, E<	0.99	Ped LOS /	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	L, B<0.3, C<0.4, E	D<0.6, E<	0.97, F=(	.97÷ V/C	ر
	peds left str	right L+S+R	1 1	peds le	left str	right	L+S+R	peds	lef	str	¥ 8	L+S+R	peds	left s	str right	ht L+S+R	<u>د</u> .	max o	overall
of #				Ď		-	10,0		coʻo		-	Colo		Total	2	++		1	170
PM	0,16 0,16	0,01 0,15	r.	0	0,19 0,19	0,01	0,18		0,05		0,05	0,05		0,04	0,33	3 0,27	7	0,33	0,18
Average	Average DELAY per vehicle (secs)		]	d	A-B C-D	ш.	L	LOS A	LOS A<10, B<15, C<25, D<35, F<50	C<25, D<	15, E<50		Ped 1.05	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	, C<25, D	<35, E<50	), F=50+		
4	delay from North  peds left str righ	17		peds le	delay from South	right	L+S+R	peds	delay	delay from West	4	L+S+R	beds	left s	t str right	o L+S+R	40	max overa	overall
off of	Т	Ď.	-   -   -   -   -   -   -   -   -   -			0	2		0		6	0		O					7
PM	1 1	0	-	4	4 1 m	11 0	10000		60		0	0		တ		10	10	10	EC)
Average	QUEUE length		(= total delay veh-hrs / hr)	hrs / hr)	ŏ	WARN	POOR	Q <4 =	Q <4 = OK, <10 = WARN, 10+ = POOR	WARN, 10	)+ = POO	ac					[		
	Q fro	-	_	-	<u></u>	South	0		ď	≱⊦	1		1			0.5.0	9	Queue	eue total
AM	<i>peds</i> left str 0,0 0,1	0,0 0,1		peds le	0,0 0,0	0,0 0,0	0,0	peds	0,0	str	ngnt 0,0	0,0	peas	0,0	str right		후 [다	0,1	0,3
₩ Z				+					-	+			1	-	+		75	0	30
Z Z	lo'o lo'o l	0,0	] []	-	0,0	0,1 0,0	0,1		0,0		0,0	U,1		1, <u>U</u>	-		1,4	6,0	0,0
											:								

## ACCESS ROADS

							,	3. R35	જ	ACCES	ACCESS ROADS	S					
	A A	toT						2	Middelburg								
	(OTHE THEO)	(0.1					<b>2025 PLUS</b>		INDUSTRIAL plus upgrade	plus ur	grade						
^								St	SUMMARY	<b>&gt;</b>				:		&AutoJ 1910 roberts	10 roberts
				Volume	Volume / Capacity	r (max)			Delay,	Delay / vehicle (max)	max)			ā	Queue (max)		
	weighting	100%		25%	4%	25%	10%		4%	7%	4%	969		4%	3%	4%	2%
	Control	Perf Index	Peds	AM	ffo	PM	i/s ave	Peds	AM	off	PM	i/s ave	Peds	AM	ffo	PM	i/s sum
BEST overall		72%		\$ 0,17		0,18 %	2 600		7		120	7		9'0		8'0	2,9
best signal	1 2	41%		0,31		0,32	0,16		26		76	80		6,5		0,7	3,2
		id	Peds	AM	Off	pw	i/s ave	Peds	AM	ffo	PM	i/s ave	Peds	AM	Off	PM	i/s sum
Priority	Xns	25%		0,53		0,62	0,27		14		15	12		1,3		1,9	5,1
	Xwe	%19		0,22		0,28	0,12		6		10	2		0,1		0,2	6'0
	×	%6		96'0		1,75	0,65		92		865	542		6,2		104,1	142,5
	JW.	48%		0,30		0,32	91'0		9		. 6 800	9		9'0		2'0	2,6
	S.S.	72%		* 0,17		0,18 €	≥ 60'0 ≥		7	,	780	7		9'0	:	0,8	2,9
2 stage	2	41%		0,31	!	0,32	0,16		26		56	90		0,5		0,7	3,2
3 stage	3ms 3	35%		0,35		0,35	0,18		31		32	11		0,8		1,0	4,7
	3we	35%		0,35		0,35	0,18		30		31	11		0,8		1,0	4,6
	n3	38%		0,29		0,37	0,17		31		32	11		0,4		1,1	4,1
	53	38%		0,36		0,30	0,17		31	:	32	10		6'0	:	0,8	4,3
• •	w3	34%		95'0		0,37	0,19		31		32	12		6'0		1,1	5,0
	63	34%		0,36		0,37	0,18		30		31	11		6'0		1,1	4,7
4 stage	4nswe	31%	į	0,38		66,0	0,19		35		36	15		1,1		1,4	6,2
	n4we	33%		0,32		0,41	0,18		35		36	14		0,7		1.6	5,6
	sawe	34%		0,40		0,33	0,19		35		36	13		1,3		6'0	5,7
	w4ns	30%		0,40		0,41	0,20		36		37	16		1,3	:	1,6	6,7
	e4ns	30%		0,40	:	0,41	0,20		35		36	15		1,3		1,6	6,4
	hwn.	32%		0,34		0,42	0,19		36		37	15		8,0		1,7	6,0
	ned	32%		0,34		0,42	0,19		35		36	14		8,0		1,7	5,7
	5W4	32%		0,41		0,34	0,20		36		37	14		1,4		1,0	6,2
	se4	32%		0,41		0,34	0,19		35		36	13		1,4		1,0	5,8
separate	n-5-3	25%		0,43		0,53	0,28		36		37	56		1,5		2,6	10,7
(split)	W-e-3	33%		0,35		0,37	0,19		37		36	14		6'0		1,3	5,8
stage	n-s-4we	22%		0,47		0,58	0,30		40		41	30		1,9		3,2	12,8
	w-e-4ns	30%		0,39		0,41	0,20		42		42	18		1,3		1,8	7,5
	n-s-w-e-4	21%		0,51		0,63	0,33		42		43	33		2,2		3,6	14,0
	optimums	72%		0,17		0,18	60'0		9		9	2		1,0		0,2	6,0
perform	performance colours	best	near b	near best, within 10% of optimum	10% of opt	ğmum		07	LOS colours	A-8	C-D	ш	F			i	
ight:							3. ACC	3. ACCESS RDS-R35 2025U	35 2025U								

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	Z S	E Auto)			×	Xwe			2025 PLU St	3. R35 Mic LUS INDU Stop street	35 & AC Middelburg DUSTRIAL treet on W	3. R35 & ACCESS ROADS Middelburg SINDUSTRIAL plus upgrade op street on west and east approaches	S ROA upgrad	DS appros	ches							&Autol 1910 roberts	roberts
Volume AM off PM	Volume (evu/hr)  peds  AM  off  PM	fre 1eft 70 70 42	from North str 0 347 2 256	16 16	1+5+R 455 313	spad	left i	from South str 2 171 2 2 433	Triging (Sept.)	<u> </u>	5+R 204 443	beds	left 8 8 23	from West	right 6	14 14 25	peds	fro left 5 22	from East	right L+:	1111	intersection total	total 727 892
# fanes	. ∼ J	(I) Tare S 0,5 0,5 0,5 0,5 1 0	S S O,5	R R 1,0	S	peds	fron fron	1 S S O S O S O S O S O S O S O S O S O	R 1,0			» beds	from West est stop	$H \mid H \mid$	R 0,3 right stop		peds.	from East		R 1,0 1,0 stop			
VOLUM AM off PM	VOLUME to CAPACITY (V/C)   V/C from   V/C from   V/C from   Peds   left   str   st	V/C   left   0,22   0,15	117 (V/C) V/C from North tt str rig 22 0,22 0,0	33 BH	L+S+R 0,20 0,15	beds	0,000 O.C.	B C.D E V/C from South R str rig 99 0,09 0,0	South right of 0,03	L+S+R 0,08		LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R  0,03 0,03 0,03 0,03	V/Cf V/Cf left 0,03	c0.8, C<0.9, D<0 V/C from West t str rig 3 0,1	><0.95, E  est   right   0,03	E<0.99 L+S+R 0,03	Ped LOS	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  V/C from East  O,01	y/C from East v/C from East ri	st right 1+ 0,13 0,	6, E<0.97, F= 1+S+R 0,12 0,23	> ~ ~	overall 0,16 0,19
Average AM off	Average DELAY per vehicle (secs)  delay from N  delay from N  delay from N  delay from N  off delay from N  peds left str  AM  off delay from N  peds left str  from 1	delay left		right 0	L+S+R	beds	4 3 1	delay from South		L+S+R		Coccession	delay left 8	<ul> <li>&lt;15, C&lt;25, D&lt;35,</li> <li>delay from West</li> <li>ft str right</li> <li>8</li> <li>9</li> </ul>	35, E<50 /est right   1	L+S+R	Ped LOS	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+	O, B<15, C<25, D delay from East ft str rig 8	sst right L+	E<50, F=50+	delay max 9	/ veh
Average AM off PM	QUEUE	QUEUE length (veh) Q from peds left st 0,0 0,0	0,1,0 0,1	0,0 0,0	(= total delay veh-hrs / hr)  L+S+R  0,1  0,1	lay veh-hrs /		P O O	NA WARN South tr right 0,0 0,0 0,1 0,0	PO PO		Q <4 = 0K,		Q from West	0,0 0,0	OR L+S+R 0,0 0,1	peds	0 fr 0,0 0,1	Q from East str ri	t right L+: 0,1	L+S+R 0,1 0,3	Queue max to 0,1	ue total 0,3

	Autol Xwe	2025 PL	3. R35 & ACCESS ROADS Middelburg JS DISTRIBUTION plus upgrade Stop street on west and east approaches		&Autol 1910 roberts
Volume (evu/hr)  peds  AM  off  PM	evu/hr)         from North           peds         left         str         right         L+S+R           41         347         38         426           63         256         16         334	from South           peds         left         str         right         L+5+R           2         171         18         191           2         433         10         446	from West           peds         left         str         right         L+S+R           8         6         14           23         2         25	from East           peds         left         str         right         L+S+R           7         63         70           16         63         78	intersection total 701
Lanes # lanes	(if lares shared L:5 or S:R = 0.5:0.5; L:S:R = 0.3:0.4:9.3)  L	0.5; t.S:R = 0.3:0.4:0.3)  L  L  L  L  S  R  1.0	L~ L S R 0,4 0,3	L~ L S R 0,9 0,1 1,0	
Cantrol	from North peds left str right	from South peds left str right	from West  peds left str right stop stop	from Eastpedsleftstrrightstopstop	
AM off	VOLUME to CAPACITY (V/C)	A-B         C-D         E         F           V/C from South         L+S+R           peds         left         str         right         L+S+R           0,09         0,09         0,02         0,08           0,22         0,22         0,01         0,21	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  V/C from West  peds left str right L+S+R 0,03 0,03 0,03	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  Peds left str right L+S+R man  0,01 0,17 0,15 0,15 0,20	=0.97+
Average AM off PM	Average DELAY per vehicle (secs)           delay from North           peds         left         str         right         1+5+R           AM         1         0         1           PM         1         1         0         1	A-B C-D E F  delay from South  peds left str right L+5+R  1 1 0 1 1	10S A<10, B<15, C<25, D<35, E<50  delay from West  peds left str right L+S+R  e=8 9 8	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+   delay from East   str right   L+S+R   9   9   9   9   9   9   9   9   9	delay / veh max overall 9 2
Average AM off PM	Average QUEUE length (veh)         (= total delated and the peds)         (= total delated and the peds)           AM         0,0         0,1         0,0         0,1           PM         0,0         0,1         0,0         0,1           PM         0,0         0,1         0,0         0,1	(= total delay veh-hrs / hr) OK WARN POOR L+S+R	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+5+R  0,0 0,0 0,0 0,0	Q from East           peds         left         str         right         L+5+R           0,0         0,2         0,2           0,0         0,2         0,2	Queue max total 0,2 0,3 0,3 0,5

3	E Auto)	2025 F	3. R35 & ACCESS ROADS  Middelburg  LUS COMBINED plus upgrade Stop street on west and east approaches	&Autol	&Autol 1910 roberts
Volume (evu/hr)  peds  AM  off  PM	evu/hr)         from North           peds         left         str         right         L+S+R           64         347         38         449           84         256         16         355	from South           peds         left         str         right         1+5+R           2         171         28         201           2         433         14         450	from West           peds         left         str         right         L+5+R           8         6         14           23         2         25	from East         intermination           peds         left         str         right         L+5+R           5         52         57           30         122         151	intersection total 721
# lanes	(if lares shared L.S or S.R = 0.5.0.5; L.S.R = 0.3:0.4:0.3)   L	10.5; L:S:R = 0.3:0.4:0.3)  L	L~ L S R  0,3 0,4 0,3  from West  stop  stop	1,0   5 R   1,0	
VOLUM AM off PM	VOLUME to CAPACITY (V/C)           V/C from North           V/C from North         L+S+R           AM         0,21         0,21         0,03         0,20           off         0,17         0,17         0,01         0,17	A-B         C-D         E         F           V/C from South           peds         left         str         right         L+S+R           0,09         0,09         0,03         0,08           0,22         0,22         0,01         0,21	1.05 A<0.5, B<0.8, C<0.9, D<0.95, E<0.99  //Cfrom West  //	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+  V/C from East  peds left str right L+S+R max  0,01 0,39 0,32 0,39	V/C v overall 1 0,15 9 0,21
Average AM off PM	Average DELAY per vehicle (secs)           delay from North           AM         peds         left         str         right         L+S+R           AM         1         1         0         1           PM         1         1         0         1	A-B         C-D         E         F           delay from South         conth         conth           0         0         0         0           1         1         1         0         0	Coccord	Ped LOS A<10, B<15, C<25, D<35, E<50, F=50+         delay from East       delay from East         peds       left       str       right       L+5+R       max         8       9       9       9         8       9       9       5	delay / veh nax overall 9 2
Average AM off PM	Average QUEUE length (veh)  Q from North  Q from North  AM 0,0 0,1 0,0 0,1  off 0,0 0,1 0,0 0,1	(= total delay veh-hrs / hr) OK WARN POOR L+S+R D,1 O,0 0,0 0,0 0,0 0,1 O,1 O,0 0,0 0,1 O,1 O,0 0,1	Q <4 = OK, <10 = WARN, 10+ = POOR  Q from West  peds left str right L+S+R 0,0 0,0 0,0	Q from East         Q           peds         left         str         right         L+S+R         max           0,0         0,1         0,1         0,1         0,4         0,4         0,4	Queue ax total 0,1 0,3 0,4 0,7

							7	4. R35	-S	PIENA	PIENAARSDAM RD	MRD					
2	Z Z	Total						2	Middelburg	ស្នា							_
	nu z	(01)							2019								
20								S	SUMMARY	Υ.						&Autol 19	&Autol 1910 roberts
		1000/		Volume	Volume / Capacity	y (max)	100		Uelay	Delay / venicle (max)	(xem)	20/		700	Queue (max)	40%	50%
	Control	Perf Index	Peds	AM	off	PM	i/s ave	Peds	AM	off	PM	i/s ave	Peds	AM	off	PM	I/s sum
BEST overall	Xwe	83%		0,15	*	0,18	(40%)		9	3	6	***		0,1		0,1	0,2
best signal	2	47%		0,21		0,26	0,13		25		25	5		6'0		0,4	1,3
		ld	Peds	AM	ffo	PM	i/s ave	Peds	AM	ffo	PM	i/s ave	Peds	AM	flo	PM	i/s sum
Priority	Xns	32%		0,33		0,41	0,20		11		12	11		6'0		1,2	3,0
	Xwe	83%		0,15 at		0,18	60'0		6		6	1		0,1		0,1	0,2
	×	25%		0,40		0,58	0,27		12	70	14	13		6'0		1,4	3,4
	mC	%65		0,18		0,23	0,11		5		9	ın		0,4		9'0	1,5
	RR	25%		0,20		0,25	0,12		7		7	7		0,5		2'0	1,9
2 stage	2	47%		0,21		0,26	0,13		25		25	5	3	6,3		0,4	1,3
3 stage	3ns	41%		0,23		0,29	0,14		30		30	8		9'0		8'0	2,1
	3we	41%		0,23		0,29	0,14		30		30	90		9'0		0,8	2,1
	n3	44%		0,20		0,30	0,14		30		30	2		0,3		6,0	1,8
	53	44%		0,24		0,25	0,13		30		30	7		9'0		0,4	1,8
	w3	39%		0,24		0,30	0,15		30		30	6		9,0		6'0	2,4
	e3	40%		0,24		0,30	0,15		21		21	90		9'0		6'0	2,3
4 stage	4nswe	36%		0,26		0,32	0,16		35		35	11		0,8		1,1	3,1
	n4we	39%		0,22		0,33	0,15		35		35	10		0,5		1,2	2,7
	s4we	39%		0,27		0,27	0,15		35		35	10		6'0		2'0	2,6
	wens	35%		0,27		0,33	0,16		35		35	12		6'0		1,2	3,4
	e4ns	35%		0,27		0,33	0,16		26		26	12		6'0		1,2	3,3
	nw4	37%		0,23		0,35	0,16		35		35	11		9'0		1,3	2,9
	ne4	38%		0,23		0,35	0,16	0.00	26		56	11		9'0		1,3	2,9
	SW4	37%		0,28		0,28	0,15		35		35	12		1,0		8'0	2,9
	se4	38%		0,28		0,28	0,15		52		97	11		1,0		8'0	2,8
separate	n-s-3	29%		0,30		0,40	0,23		35		35	22		1,2		1,7	5,8
(split)	w-e-3	44%		0,22		0,27	0,13		39		39	7		0,5		9'0	1,9
stage	n-5-4we	27%		0,33		0,43	0,25		40		40	92		1,5		2,2	7,1
	w-e-4ns	39%		0,24		0,29	0,15		44		44	10		0,7		1,0	2,7
	n-5-W-e-4	27%		0,33		0,43	0,25		44		44	26		1,4		2,1	7,1
	optimums	83%		0,15		0,18	60'0		5		9	1		0,1		0,1	0,2
performa	performance colours	best	∴ near b	🗽 near best, within 10% of optimum 🤲	10% of opi	mnmı 🦟		07	LOS colours	A-B	C-D	ш	ш	2000			
<b>#</b>							4. PIENA	ARSDAM R	4. PIENAARSDAM RD-R35 2019	σ <u>j</u>							
Sampson								SMY									2019-

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2019-12-10

2019-12-10

	z		4. R35 & PII	PIENAARSDAM RD	&Aur	&AutoJ 1910 roberts
<b>₽</b> ≥	Auro)		2025	25		
	uh.	Xwe	Stop street	Stop street on west and east approaches		
Volume	Volume (evu/hr)					
	from North		from Sout	l l	from East	intersection
A	peds         left         str         right           8         336	L+S+R peds 344	left str right L+S+R 161 161	peds left str right L+S+R	peds         left         str         right         L+S+R           2         17         19	total 524
off PM	11 222	233	426 5 431		1 8 10	673
	2:-	25 C-A O-C O = 0-3-1-2 O-2 O = 0-3-2 O-3	0.5.0 4.0.53			
ranes	ПГ	- N.S.N = V.S.U.S. L.S.N = N.S.N = 1.	S	L~ L S R	L~ L S R	
# lanes	5'0 5'0		5,0 5,0		***	
Control		L	de como de la como dela como de la como de l	from Mac	from Fact	
	peds left str right	peds	left str right	peds left str right	peds left str right	
					stop	
VOLUA	VOLUME to CAPACITY (V/C)		A-B C-D E F	LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99	Ped LOS A<0.1, B<0.3, C<0.4, D<0.6, E<0.97, F=0.97+	- 1
	V/C from North	1+S+R	V/C from South	V/C from West  oeds   left   str   right   L+S+R	V/Cfrom East  peds left str right L+S+R m	wax overall
AM	0,17 0,17		80'0		0,04 0,04 0,04	0,17 0,14
E W	0,12 0,12	0,12	0,22 0,22 0,22		0,03 0,03 0,03	0,22 0,18
Average	Average DELAY per vehicle (secs)		. A-8 C-0 E F	LOS A<10, B<15, C<25, D<35, E<50	<35, E<50, F=50+	
	delay from North		lay from South	delay from West	delay from East	>
AM	peds left str right	L+S+R peds	left str right L+5+R	peds left str right L+5+R	peds left str right L+S+R = 8 9 9	max overall
#o#	O CONTRACTOR				6	9 1
	4		+	OCCUPATION OF MANAGEMENT		
Averag	Average QUEUE length (ven)	(= total delay veh-hrs / hr)	O from South	Q from West	Q from East	Quene
	ght	L+S+R peds	left str right L+5+R	peds left str right L+5+R	peds left str right L+5+R	tot
AM	0,0 0,1	0,1	0'0		0'0 0'0	0,1 0,1
₽ d	0,0	0,0	0,1 0,0 0,1		0,0 0,0 0,0	0,1 0,2

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peds

lanes

Lanes

Control

spad

PM PM

peds

AM off PM

Volume (evu/hr)

peds

AM off PM

prlnt: 2019-12-10

peds

AM PM PM

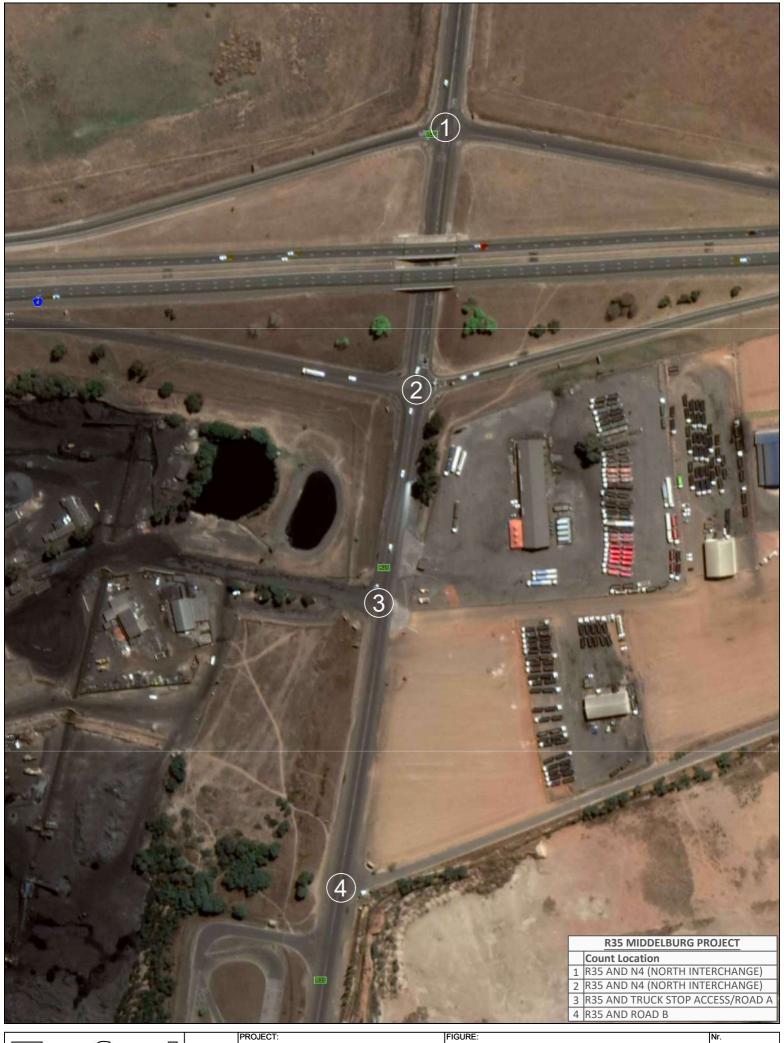
## N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

## ANNEXURE D TRAFFIC DATA

## N4/R35 Truck Stop and Industrial development Portion 58 of the farm Vaalbank 289 JS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

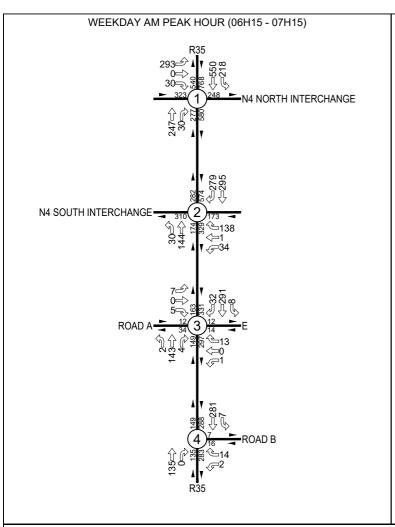


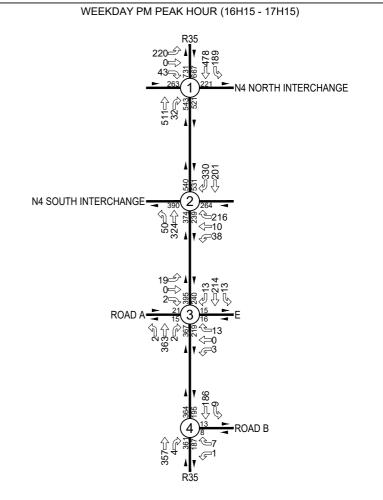




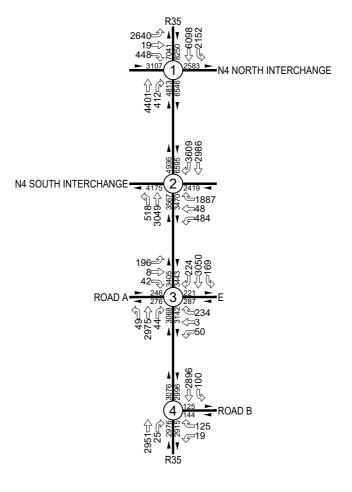
R35 MIDDELBURG PROJECT

TRAFFIC SURVEY LOCATIONS





WEEKDAY 14 HOUR TOTAL (05H00 - 19H00)





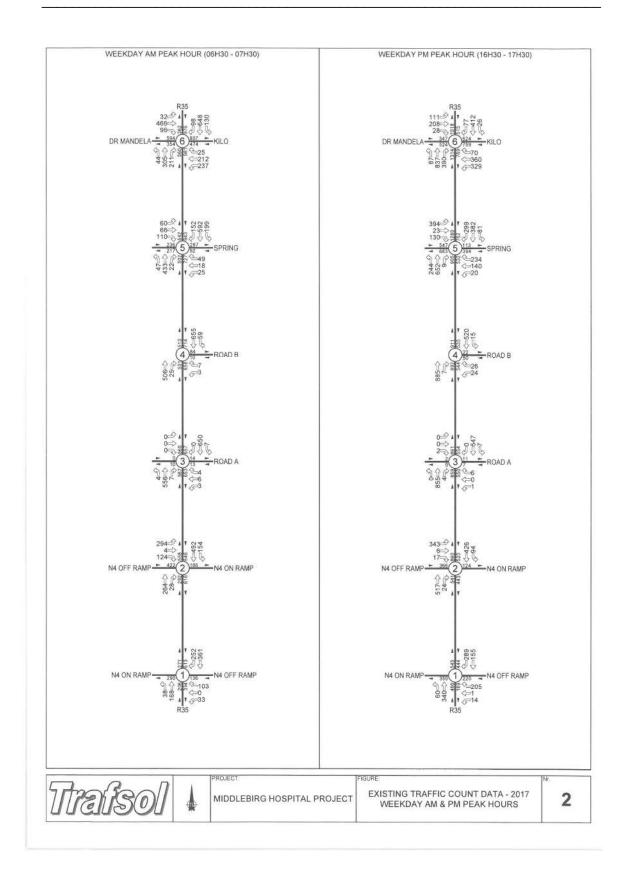
**R35 MIDDELBURG PROJECT** 

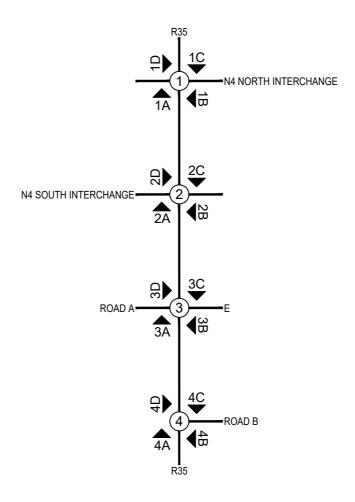
OCATION 1	T		-		ND N4							05.11.2	019	
14 HOUR COUN	T		R35 AND N4 (NORTH TERMINAL						,			TUESDAY		
AM PEAK	06:15	07:15			100000		- A	100		P	M PEA		17:	
						R35								
				540	0	550	218	768						
					0	0	0							
				731 OUT	0	478	189	667 IN						
		000			- 41	80	L.			115525				
		323		263	2 4	*	\$	248		221				
NII (NIOD		293	0	220	10	K		0	0	0				
N4 (NOR		0	0	0	11		<b>—</b>	0	0	0		N4 (NORTH		
TERMINA	L)	30	0	43	12		-	0	0	0		FERMINAL	-)	
		00		7.0			~	U	- 000	V				
					E 4	T	<b>P</b> ≥							
				IN.	0	247	30	OUT						
				277	0	0	0	580						
Copter	000			543	0	511	32	521						
Markon	1 D					R35							v2.	
Time	South			East			North			West		Hour	lu.	
AM PEAK	2	3				7	8		10	11	12		511	
AMIFEAN	247	30				218	550		293		30	1368	5	
PM PEAK	511	32				189	478		220		43	1473	3	
TOTAL	4401	412				2152	6098		2640	19	448	1617	0	
05:00	19	5				28	102		13		5			
05:15 05:30	27 30	9				44 34	157		19 27		12 18			
05:45	33	11				44	131		33	4	19	996	05	
06:00	39	9				53	156		35		10	1126	05	
06:15	59	16			17.70	59	154	176	47	1 10	3	1196	05	
06:30 06:45	59 63	2 7				68 47	147		65 88		6	1257	05	
07:00	66	5				44	122		93		17	1368	06	
07:15	56	10				35	133		56		5	1325	06	
07:30	58	12				47	154		59		4	1314	06	
07:45 08:00	83 69	8				41 32	127		54	2	9	1298 1260	07	
08:15	67	5				21	113 96		70 30	- 2	15 4	1188	07	
08:30	85	5		1		34	126		55	1	4	1164	07	
08:45	92	3				25	77		45		9	1093	08	
09:00	91 74	7				41 17	86 118		55 52	1	12	1073	80	
09:30	81	10		1		25	95		36	1	6	1067	80	
09:45	70	6		1		25	125		50	100	4	1096	09	
10:00	74	4				30	89		48		4	1056	09	
10:15	74 55	6 5		-	-	33	107 85		57 48	-	5	1065	09	
10:45	58	6				39	96		68	1	12	1042	10	
11:00	78	4				36	103		59		10	1083	10	
11:15	72	7		1		32	83		57		13	1065	10	
11:30 11:45	68 76	9		1		43 24	102 90		60 64	1	10	1126	11	
12:00	69	3				20	87		40		9	1060	11	
12:15	80	15				29	105		67		9	1101	11	
12:30	68	6		1		41	113		53	22.1	11	1101	11	
12:45	64 67	6				28 32	105 115		54 40	1	7	1090	12	
13:15	61	4				31	122		42		7	1083	12	
13:30	78	5		1		37	105		50		6	1072	12	
13:45	76	4		1		40	104		38		7	1076	13	
14:00	127	9				40	93		30		7	1123	13	
14:30	88	9				65	117		32		6 9	1168	13	
14:45	93	11				51	129		46	2	10	1280	14	
15.00	123	6			-	50	81		51		- 1	1286	14	
15:15 15:30	112 93	11 7				45 22	108 99		62 40	1 2	9	1322	14	
15:45	131	7				36	94		47	1	5	1250	15	
16:00	142	8				39	138		34		5	1304	15	
16:15	121	7				46	131	-	41	-	15	1317	15	
16:30 16:45	154	6		117		37 53	111		53 74	170	4	1413	15	
17.00	109	7				53	119		74 52		9 15	1468	16	
17:15	104	9				55	110		39	-	9	1438	16	
17:30	103	10				47	112		34	1	4	1384	16	
17:45 18:00	82	10				50	69		48	1	10	1278	17	
18:15	64 83	9				38 26	54 74		33 21	1	6	1113	17	
18:30	57	5				39	55		20		8	880	17	
18:45	60	6				21	38		16		7	758	18	
19:00	1	120							V7485			552	18	
19:15 19:30												332	18	
				I	1	l'		1	1		1	148	18	

19:30

OCATION 4					R35 A		DAD B				05.11.	2019
14 HOUR COUN	TT.				-	LVEH	and the same of				TUES	
AM PEAK	06:15	07:15	_		1011		-		_	PM		15 17.1
						R35				- 141	10	150
				149	0	281	7	288				
					0	0	0					
				364	0	186	9	195				
				OUT	2.0	80		IN				
					ž 🖊	+	<b>₩</b> 5	7		13		
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	100		-				201				40	
PM PEAK	357	4	1		7	9	186				56	4
TOTAL	2951	25	19		125	100	2896				61	16
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05:30	25	1:	1		3		100					
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06:00	36				3		67				496	05
06:15 06:30	33				4	1	69				484	05
06:45	29		1		2 5	4 2	96 49				492 438	05:
07:00	36		4		3		67				439	06
07:15	48	7.637			38	1	56				437	06
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08:15	39				3	-	54				445	07
08:30	45				4		55				420	07
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11:15	46	1			4		41				413	10
11:30 11:45	54		1		1	2	41			1 1	389	10
12:00	58 49	1				1	35 38				395	11
12:15	44	2			2	2	36				368	11
12:30	41	1	2		3	3	68				387	11
12:45 13:00	58 43				5	3	52				411	12
13:15	70				2	3	39 39				408	12
13:30	32				1	2	45				395	12
13:45	50				5	2	50				384	13
14:00	75				2	2	35				412	13
14:30	47 80	1	1		2	4	41 42				395	13
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15:30 15:45	61 77	-17	310		1 1	1	52 26				505	14
16:00	81		1		3	3	30				480	15
16:15	114	2		W.	1		46				505	15
16:30	94	1				4	46	-			535	
16:45 17:00	85		1		1 6	4	46				563	1,000,000
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17:30	68		(%)		3	3	44				493	16
17:45	68				1	4	45				474	17
18:00	30				2	2	31				420	17
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1				000	0	0	0	407				
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angelong di hage	South			East			North			West		v2.1
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06:15	36				4	1	67				496 484	05:
06:30	37				2	4	96				492	05:
06:45	29		1		5	2	49		100		438	06:
07:00	36 48		1		3	- 1	67				439	06:
07:30	48 45	2			2	- 1	56 80				437 427	06:
07:45	49	1	1		_ ^	3	51				446	07:
08:00	44	2			3	2	64				454	07:
08:15 08:30	39				3		54				445	07:
08:45	45 53				4	1	55 61				420 430	07:
09:00	60				3		54				432	08:
09:15	45	2	1			3	46				433	08:
09:30 09:45	60 60	1	1	1	5	3	55				453 459	80
10:00	44	900	1		6	- 92	58 68				461	09:
10:15	32				4	2	59				461	09:
10:30	57	1	2		3	3	57				460	09:
10:45	39 62				2	4	43 46				427	10:
11.15	46	1			4	- 85	41				413	10:
11:30	54		1		1	2	41			1 1	389	10:
11:45	58	7				1	35			1 1	395	11:
12:00	49 44	1 2			2	1 2	38 36				374	11:
12:30	41	1	2		3	3	68				387	11:
12:45	58	100	11000		5	3	52				411	12:
13.00	43 70				3 2	1	39				408	12:
13:30	32				1	2	39 45				433	12:
13:45	50				5	2	50				384	13:
14.00	75				2	2	35				412	13:
14:15 14:30	47 80	1	1		2	4	41				395	13:
14.45	56	2	5300		2	3	50				446	13:
15:00	102				1	2	34				471	14;
15:15	93	1	1		4	100	39				515	14:
15:30 15:45	61 77	-17	310		1 1	1	52 26				505 501	14:
16:00	81	- 13	1		3	3	30				480	15:
16:15	114	2		1	1		46				505	15:
16:30	94	1				4	46		-		535	15
16:45 17:00	85		1		1	4	46				563	16:
17:15	64 57	17	2		5	6	48 51		-		564	16:
17:30	68				3	3	44				493	16:
17:45	68				- 1	4	45				474	17:
18:00	30				2	2	31				420	17:
18:15 18:30	51 31				2	3	43 33				400 353	17:
18:45	30				1	1	36				303	17:
19:00	1										238	18:
19:15											139	18:
19:30				1	1		1			1 1	E 68	185





= DIRECTION OF PHOTO







01A



01B



01C



01D



02A



02B



02C



02D



03A





03C



03D



04A



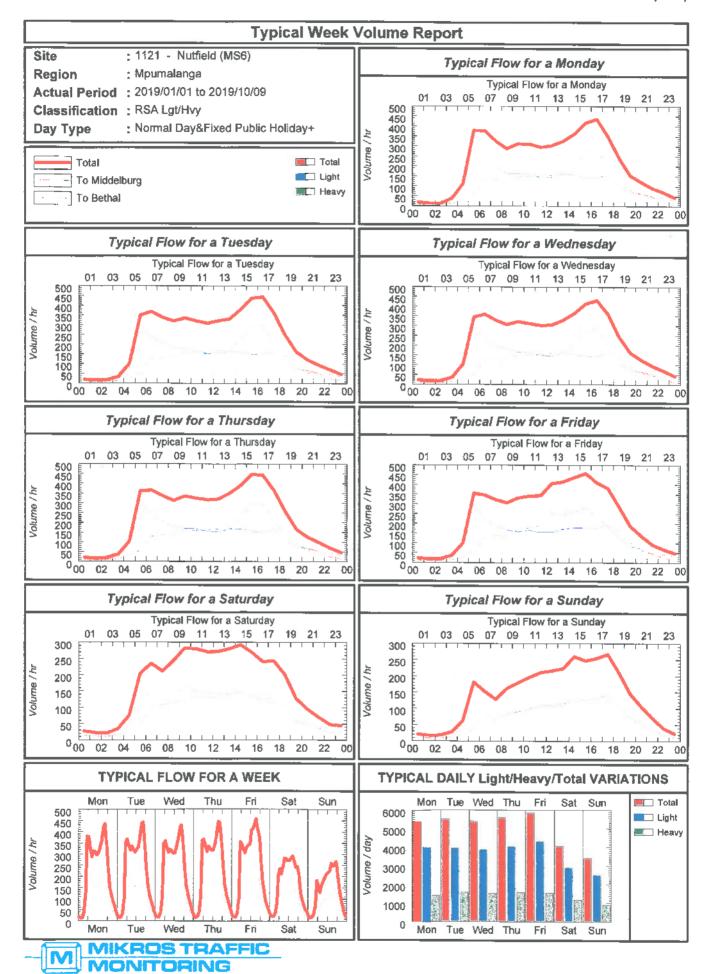
04B



04C

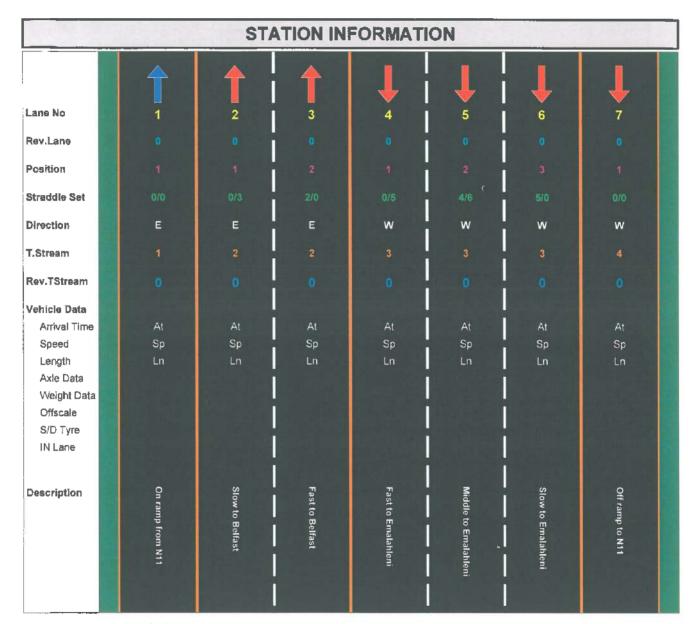


04D



	TRAFFIC HIGHLIGHT	S OF SITE 1121		
1.1	Site Identifier			1121
1.2	Site Name			Nutfield (MS6)
1.3	Site Description		Between M	liddelburg and Bethal
1.4	Road Description	Route: R035	Road : R035 Section : 0.	2 Distance : 69.1km
1.5	GPS Position			0447E -25.855953S
1,6	Number of Lanes			2
1.7	Station Type			Permanent
1.8	Requested Period		201	9/01/01 - 2019/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates		201	9/01/01 - 2019/10/09
1.11	Actual available good data (hours)			6744
1.12	Percentage good data available for requested period			77.0
		To Middelburg	To Bethal	Total
2.1a	Total number of vehicles (counted)	714269	700050	1414319
2.16	Total number of vehicles (projected for period)	927782	909313	1837095
2.2	Average daily traffic (ADT)	2542	2491	5033
2.3	Average daily truck traffic (ADTT)	716	672	1388
2.4	Percentage of trucks	28.2	27.0	27.6
2.5	Truck split % (short:medium:long)	18:5:77	19:5:76	18:5:77
2.6	Percentage of night traffic (20:00 - 06:00)	20,2	11.4	15,9
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	75.2	75.6	75.4
3.3	Average speed - light vehicles (km/hr)	79.7	79.1	79.4
3.4	Average speed - heavy vehicles (km/hr)	63.7	66.2	64.9
3.5	Average night speed (km/hr)	81.1	77.3	79.8
3.6	15th centile speed (km/hr)	55.8	57.8	55.8
3.7	85th centile speed (km/hr)	97.9	97.9	97.9
3.8	Percentage vehicles in excess of speed limit	1.5	1.5	
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	1.5
4.2	Highest volume on the road (vehicles/hr)	0,0	2019/08/08 16:00:00	0.0 582
4.3	Highest volume in the To Middelburg (vehs/hr)		2019/04/29 06:00:00	
4.4	Highest volume in the To Bethal (vehs/hr)		2019/08/08 16:00:00	442
4.5	Highest volume in a lane (vehicles/hr)			418
4.6	15th highest volume on the road (vehicles/hr)		2019/04/29 06:00:00	442
4.7	15th highest volume in the To Middelburg direction (yehs/hr)		2019/06/18 16:00:00	518
4.8			2019/04/05 06:00:00	338
4.9	15th highest volume in the To Bethal direction (vehs/hr)  30th highest volume on the road (vehicles/hr)		2019/04/15 17:00:00	339
	30th highest volume in the To Middelburg direction (vehs/hr)		2019/09/20 16:00:00	505
			2019/07/22 06:00:00	328
4.11 5.1	30th highest volume in the To Bethal direction (vehs/hr) Percentage of vehicles less than 2s behind vehicle ahead	447	2019/01/31 17:00:00	326
6.1	Total number of heavy vehicles (projected for period)	14.7 261206	17.2	15.9
6.2	Estimated average number of axles per truck	261306	245432	506738
6.3	'	6.0	6.0	6.0
	Estimated truck mass (Ton/truck)	34.3	33.9	34.1
6.4 6.5	Estimated average E80/truck	3.2	3.2	3.2
	Estimated daily E80 on the road			4455
6.6	Estimated daily E80 in the To Middelburg direction			2313
6.7	Estimated daily E80 in the To Bethal direction			2142
6.8	Estimated daily E80 in the worst To Middelburg lane			2313
6.9	Estimated daily E80 in the worst To Bethal lane			2142
l i	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
l ì	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31,5 : 39,8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)





Site Identifier : 8233

Site Name : N4 Rockdale

Site Description : Eastern Side of N11 Hendrina I/C

Owner : SANRAL

Physical Lanes : 7

GPS Longitude : 29.531885E
Installation Date : 2017/02/05
Speed Limit : 120.0km/hr
Province : Mpumalanga

Responsibility : TOLL
Route : N004
Section : 04

Road Description: N004-04 KM19.8

Site Number : 8233

Site Type : Permanent

Logical Lanes : 7

GPS Latitude : -25.829508S

Termination Date: Companion Site:

Municipality: (MP) Nkangala

SANRAL Region : Northern Road : N004 Distance : 19.800

# STATION INFORMATION

Site Identifier : 8233

Site Name : N4 Rockdale

Site Description : Eastern Side of N11 Hendrina I/C

Owner : SANRAL

Physical Lanes : 7

GPS Longitude : 29.531885E Installation Date : 2017/02/05

Speed Limit : 120.0km/hr
Province : Mpumalanga

Responsibility : TOLL
Route : N004
Section : 04

Road Description: N004-04 KM19.8

Site Number : 8233

Site Type : Permanent

Logical Lanes :7

GPS Latitude : -25.829508\$

Termination Date : Companion Site :

Distance

Municipality : (MP) Nkangala

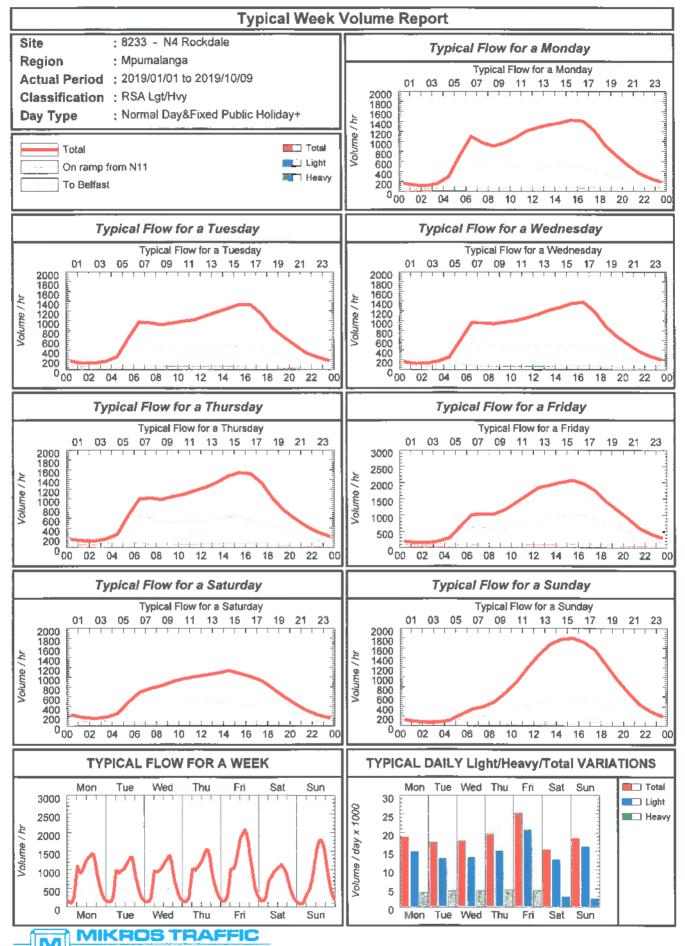
: 19.800

SANRAL Region : Northern Road : N004

No	Direction Description	Direction
01	On ramp from N11	East
02	To Belfast	East
03	To Emalahleni	West
04	Off ramp to N11	West

	TRAFFIC HIGHLIGHT	S OF SITE 8233		
1.1	Site Identifier			8233
1.2	Site Name			N4 Rockdale
1,3	Site Description		Eastern Side	e of N11 Hendrina I/C
1.4	Road Description	Route: N004	Road: N004 Section: 0	4 Distance : 19.8km
1.5	GPS Position		29.53	31885E -25.829508S
1.6	Number of Lanes			7
1.7	Station Type			Permanent
1.8	Requested Period		201	19/01/01 - 2019/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates		201	19/01/01 - <mark>2019/1</mark> 0/09
1.11	Actual available good data (hours)			6749
1.12	Percentage good data available for requested period			77.1
		On ramp from N11	To Belfast	Total
2.1a	Total number of vehicles (counted)	3101683	2204436	5306119
l i	Total number of vehicles (projected for period)	4025478	2860998	6886476
2.2	Average daily traffic (ADT)	11029	7838	18867
2.3	Average daily truck traffic (ADTT)	1938	1917	3858
2,4	Percentage of trucks	17.6	24.5	20.4
2.5	Truck split % (short:medium:long)	39 : 13 : 48	39:13:48	39 : 13 : 48
2.6	Percentage of night traffic (20:00 - 06:00)	15,6	15.0	15.3
3.1	Speed limit (km/hr)	10,5	10.0	120
3.2	Average speed (km/hr)	107.6	105.1	106.6
3.3	Average speed - light vehicles (km/hr)	112.9	111.3	112.3
3.4	Average speed - heavy vehicles (km/hr)	82.7	86.1	84.4
3.5	Average night speed (km/hr)	100.7	98.5	99.8
3.6	15th centile speed (km/hr)	77.7	77.6	77.7
3.7	85th centile speed (km/hr)	129,9	129.9	129.9
3.8	Percentage vehicles in excess of speed limit	34.4	25.7	
4.1	Percentage vehicles in flows over 600 vehicles/hr	60.8		30.8
4.2	Highest volume on the road (vehicles/hr)	60.8	30.1	86.7
4.3	Highest volume in the On ramp from N11 (vehs/hr)		2019/04/22 15:00:00	3145
			2019/06/14 16:00:00	2195
4,4	Highest volume in the To Belfast (vehs/hr)		2019/04/22 15:00:00	1562
4.5 4.6	Highest volume in a lane (vehicles/hr)		2019/06/14 16:00:00	1236
4.7	15th highest volume on the road (vehicles/hr)		2019/06/14 17:00:00	2703
	15th highest volume in the On ramp from N11 direction (vehs/hr)		2019/08/08 17:00:00	1700
4.8	15th highest volume in the To Belfast direction (vehs/hr)		2019/03/24 14:00:00	1246
4.9	30th highest volume on the road (vehicles/hr)		2019/06/28 14:00:00	2439
4.10			2019/08/30 16:00:00	1573
4.11	30th highest volume in the To Belfast direction (vehs/hr)	10.0	2019/07/07 17:00:00	1153
5.1	Percentage of vehicles less than 2s behind vehicle ahead	10,5	6.4	8.8
6.1	Total number of heavy vehicles (projected for period)	707273		1406984
6.2	Estimated average number of axles per truck	4.8	4.8	4.8
6.3	Estimated truck mass (Ton/truck)	27.4	27.4	27.4
6.4	Estimated average E80/truck	2.3	2.3	2.3
6.5	Estimated daily E80 on the road			9029
6.6	Estimated daily E80 in the On ramp from N11 direction			4534
6.7	Estimated daily E80 in the To Belfast direction			4494
6.8	Estimated daily E80 in the worst On ramp from N11 lane			3671
6.9	Estimated daily E80 in the worst To Belfast lane			3338
i	ASSUMPTION on Axles/Fruck (Short:Medium:Long)			(2.0 : 5.0 : 7.0
i I	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)





# STATION INFORMATION

Site Identifier : 1121

Site Name : Nutfield (MS6)

Site Description : Between Middelburg and Bethal

Owner : SANRAL N4

Physical Lanes : 2

 GPS Longitude
 : 29.460447E

 Installation Date
 : 2001/12/03

 Speed Limit
 : 120.0km/hr

Province Mpumalanga

Responsibility : N/A Route : R035 Section : 02

Road Description: R035-02 Km 69.1

Site Number : 1121

Site Type : Permanent

Logical Lanes : 2

GPS Latitude : -25.855953S

Termination Date:

Companion Site

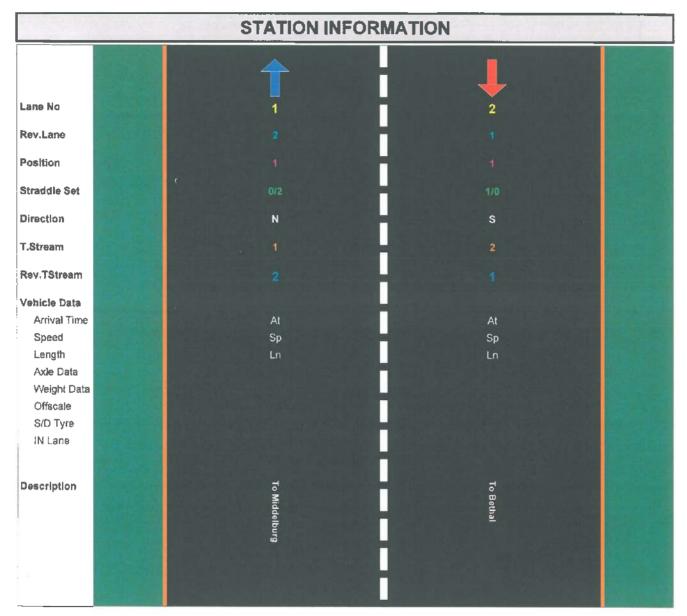
Distance

Municipality : (MP) Nkangala

: 69.100

SANRAL Region : Northern Road : R035

0470	। বালে ক্ষরনাগালে <u>ক্রিকের করে ।</u>	Direction	Pos		RLn	Rev.Log Lane Desc.
01	To Middelburg	North	1	AT,Sp,Ln	02	
02	To Bethal	South	1	AT,Sp,Ln	01	



Site Identifier : 1121

Site Name : Nutfield (MS6)

Site Description : Between Middelburg and Bethal

Owner : SANRAL N4

Physical Lanes : 2

GPS Longitude : 29.460447E Installation Date : 2001/12/03 Speed Limit : 120.0km/hr Province : Mpumalanga

Responsibility : N/A Route : R035 Section : 02

Road Description: R035-02 Km 69.1

Site Number : 1121

Site Type : Permanent

Logical Lanes : 2

GPS Latitude : -25.855953S

Termination Date:
Companion Site

Municipality : (MP) Nkangala

SANRAL Region : Northern Road : R035 Distance : 69.100

No	Direction Description	Direction
01	To Middelburg	North
02	To Bethal	South



Nutfleld (MS6)

#### N4/R35 Truck Stop and Industrial development

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

# ANNEXURE E TOWN PLANNING EXTRACTS

# N4/R35 Truck Stop and Industrial development Portion 58 of the farm Vaalbank 289 JS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

# N4/R35 Truck Stop and Industrial development Portion 58 of the farm Vaalbank 289 JS

Portion 58 of the farm Vaalbank 289 JS Steve Tshwete Local Municipality TRAFFIC IMPACT ASSESSMENT (TIA) December 2019

2019



The integrated development specialists

# APPLICATION FOR REZONING OF PORTION 58 OF THE FARM VAALBANK 286 JS



STEVE TSHWETE LOCAL MUNICIPALITY

2019 -03- 22

Municipal Manager's

HLUKANI DEVELOPMENT CONSULTANTS

PIO 80X 3530

GIVANI

0926

CONTACT: 083 326 0539

hlukanidc@gmail.com

#### 1. INTRODUCTION

#### 1.1 The application

This memorandum is in support of an application for the rezoning of Portion 58 of the Vaalbank 289 JS to amend the Steve Tshwete Land Use Management Scheme, 2008 in respect of the above mentioned property from "Agricultural" to "Industrial 2".

The application for rezoning is made in terms of Section 62 (1) of the Steve Tshwete Local Municipality Spatial Planning and Land Use Management By-laws, 2018 read together with the provisions of the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013).

#### 1.2 Purpose

The owner of the property appointed Hlukani Development Consultants to apply to the Mogalakwena Local Municipality in order to obtain the necessary rights to develop the subject site. The process is necessary in order to enable the owner of the subject property to develop the subject property for mixed use industrial purposes.

#### 1.3 Local Authority

The property is situated within the jurisdiction of the Steve Tshwete Local Municipality. The Municipality is an authorized local authority in terms of the provisions of SPLUMA and has authority to deal with this application.

#### 2. GENERAL PROPERTY DETAILS

#### 2.1 Description of property

The subject property is known as Portion 58 of the farm Vaalbank 289 JS.

#### 2.2 Property Size

The subject property measures 22.6971 ha squares in extent.

#### 2.3 Locality

The subject property is located South of the city/town of Middelburg at the comer of The N4 national road and the R35 road. For detailed locality, see locality plan attached as **Annexure A**.

#### 2.4 Registered Owner

The subject property is held in terms of title deed number T7428/2014 and is registered in the name of Bakkos Projects (Pty) Ltd. The title deed is attached as **Annexure B**.

#### 2.5 Restrictive Title Conditions

There are no restrictive title conditions contained in the relevant Title Deed which restrict the proposed rezoning.

#### 2.6 Mortgage Bonds

There is no bond registered against the subject property.

#### 2.7 Special Power of Attorney & Resolution

Hlukani Development Consultants has been appointed by Bakkos Projects (Pty) Ltd to be their lawful agent and act on their behalf to submit this application. The power of attorney and company resolution giving effect to the appointment are attached as **Annexure C**.

#### 3. EXISTING PHYSICAL FEATURES OF THE PROPERTY

#### 3.1 Existing Zoning

In terms of the Steve Tshwete Local Municipality Land Use Scheme, 2008, the subject property is zoned "Agricultural". See attached Zoning Plan attached as **Annexure D**.

#### 3.2 Land Use

The subject property is currently used as a Truck Stop, General Industry and Light Industrial purposes. See attached Land Use Plan attached as **Annexure E**.

#### 3.3 Proposed Land Use

The proposed land use on the subject property is for Industrial 2 purposes which will include a Service Industry, Workshops, Petrol Filling Station, Warehouse, Parking Garage, Light Industry, General Industry, Business Premises, Kiosk, Canteen and Truck Stop. The proposed zoning is "Industrial 2". See attached Map 3 set attached as Annexure F.

#### 3.4 Surrounding Land Uses

The subject property is surrounded by mining, industrial, business and agricultural land uses. The proposed land use on the subject property will not have any adverse effect on the surrounding land uses. The land use map is attached as **Annexure E**.

#### 3.5 Engineering Services

The subject property is located outside the urban edge where no bulk services are available. The development of the subject property though has access to water, sanitation and electricity with the water being sourced from the existing boreholes on the site, the effluent being disposed through a septic tank on the subject property and serviced weekly. The subject property has access to electricity which is provided by Eskom.

In terms of water, it is the intention of the developer though to request the municipality to provide the development with water from the municipality at the cost of the developer. The application will be made in order to supplement the water being sourced from the boreholes. Currently, there are no upgrades that are needed in terms of engineering services for the proposed development. Should there be a need to upgrade the services, the costs thereof will be incurred by the developer.

#### 3.6 Environmental Impact

In terms of the National Environmental Management Act, 1998, the proposed development according to the Mpumalanga Agriculture, Rural Development, land and Environmental Affairs Department doesn't require a Basic Assessment or a full Environmental Impact Assessment. See attached correspondence from the Department attached as **Annexure G**.

#### 3.7 Heritage Impact Assessment

The proposed development is not subject to any heritage impact assessment as may be required by the relevant legislation.

#### 4. PROPOSED DEVELOPMENT

#### **4.1 Proposed Development**

The proposed development is for a mixed use development on the subject property. The subject property has existing structures on the property which are used for different purposes including a diesel depot, a truck stop, kiosk and a few industries on the property. The owner of the subject property intends to legalize the land use in order to legally practice the land use rights on the property. After having noted that the current land use on the property are contradicting the Steve Tshwete Land Use Management Scheme, the owner commissioned the application in order to legally practice the land uses on site.

The mixed use development provides an estimated 200 permanent jobs and will further create an additional 300 permanent jobs for the locals in the future through future improvements to the property. Furthermore, the proposed development will provide job opportunities in the area, improve service delivery and boost the economy of the Municipality through the collection of revenue. The rezoning of the property will contribute to achieving the Development Objectives as laid out in the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013). Furthermore, the proposed zoning will complement the existing surrounding land uses in the immediate area. The subject property makes provision for ample parking and manoeuvring space, and will have no significant impact on the traffic.

#### 4.2 Proposed Land Use

It is the intention of the developer to develop an Industrial park on the subject property. According to the Land Use Management Scheme, 2008 the zoning that should be granted for the subject property should be "Industrial 2" in terms of the Steve Tshwete Land Use Management Scheme, 2008.

The following development controls would therefore apply to the proposed development:

Use Zone	Industrial 2
Primary Land Use Rights	Service Industry, Industrial Building, Workshops, Motor Workshop, Business Premises, Petrol Filling Station, Parking Site, Warehouse, Parking Garage, Light Industry, General Industry.
Consent Usage	Communications Tower, Canteen, Buildings, Place of refreshment, Kiosk, Factory Shop,

	Retail Warehouse Outlet, Truck Stop.
Height	2 storeys
Parking	6 parking bays per 100 m² GLA
Coverage	60%
FAR	1.6
Building Lines	3 m (rear and 1 side)
	5 m (street boundaries)

#### 5. DEVELOPMENT MERITS

#### 5.1 Steve Tshwete !DP 2017/18-2021/22

The Steve Tshwete Local Municipality IDP identifies a number of strategic objectives which include Local Economic Development which seeks to facilitate investment and development of strategic infrastructure to unlock growth and job creation. The strategic objective encourages the municipality to focus on LED, Job creation, SMME development and investment which will result in the development of the local economy.

The IDP further introduces an aspect of a long term development plan, the 2040 Growth and Development Strategy with its main focus on two core pillars, namely Economy and Spatial Transformation. The strategy encourages the municipality to focus on developing small businesses, support black owned industrial firms, maximising localisation benefits from the ongoing public infrastructure expansion and the implementation of special economic zones.

The proposed development fits perfectly to what is being articulated in the IDP in that firstly, the proposed development will create over 500 jobs directly from the development as small scale industries will be established on the subject site that will create employment opportunities for the local citizens and directly contributing to the economic growth of the municipality, the proposed development further aligns to the objective of the municipality to encourage the growth of SMME's and black owned industrial firms which are already in existence within the subject property. The IDP identifies industrial development as an opportunity whereby this development application aims to tap into that opportunity as it offers possible jobs and development of SMME's.

The location of the site, which is along the N4 Maputo Development Corridor, further presents an opportunity to the municipality to implement a special economic zones in the area as the site is located along a very strategic corridor, further positively contributing to the maximising of the localisation benefits of the road infrastructure in place. Moreover, the proposed development contributes towards the long term development plan of the municipality in that it contributes to the spatial transformation of the area and therefore maximising the localisation benefits of the industries. The IDP further directs that the focus should be on the establishment of development corridors and the fact that the subject site is located along the N4 national road to Maputo positively contributes to the directives of the IDP. Another directive from the IDP is to reduce poverty and the gap between the rich and the poor whereby the proposed development will play as a catalyst to positively create jobs.

#### 6. CONCLUSION

The development merits of the application have been adequately dealt with in terms of the Steve Tshwete Local Municipality Integrated Development Plan 2017/2018- 2021/2020; the State of the Nation Address 2018 (SONA 2018) by the President of the Republic of South Africa who emphasized the need for Radical Socio-Economic Transformation, the Mpumalanga Vison 2030 strategy, the IUDF which advocated for Spatial Integration, the Regional Industrial Strategy which identifies Middelburg as a strategic economic region of South Africa, the Long Term Development Plan 2040 which focuses on spatial transformation and the economy, the national transportation master plan which emphasises greater integration between land use development and transport routes, the SPLUMA Development Principles and also the objectives of the National Development Plan 2030. The background of the application, details and proposal have also been reflected in the paragraphs above and it has been motivated that the application is worthy and favourable.

It has further been motivated beyond any doubt that the proposed development will be to the benefit of the Municipality, the developer, the republic and the community at large and will improve the economic value of the property and the surrounding areas. The proposed development will also give rise to higher property tax and thus improve the existing engineering services.

In light of the information and motivation provided above, this application is therefore made to the Steve Tshwete Local Municipality for the rezoning of Portion 58 of the farm Vaalbank 289 JS from Agriculture to Industrial 2 for the erection of Service Industry, Industrial Building, Workshops, Motor Workshop, Business Premises, Petrol Filling Station, Parking Site, Warehouse, Parking Garage, Light Industry, General Industry as provided for in the Steve Tshwete Land Use Management Scheme, 2008.