EKURHULENI METROPOLITAN MUNICIPALITY,

TRAFFIC IMPACT ASSESSMENT REPORT FOR

PORTION 296, FARM ZUURFONTEIN 33 IR

FINAL REPORT

JUNE 2017

Prepared by

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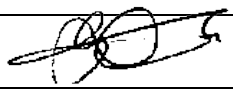
02	05/06/2017	Township layout change	S Ndlovu Pr. Eng	

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1 EXECUTIVE SUMMARY

Proposals for an establishment of a township on Portion 296, Farm Zuurfontein 33 IR site is currently underway. The site is situated in the Edleen area in the northwestern part of Ekurhuleni, ± 4km northwest of the Kempton Park CBD. The site is situated within a residential precinct enclosed by Modderfontein Road (R25) on the north, Parkland Drive on the east, CR Swart Drive on the south and Zuurfontein Avenue on the west. The vacant site is shown on the map below, Figure 1-1:

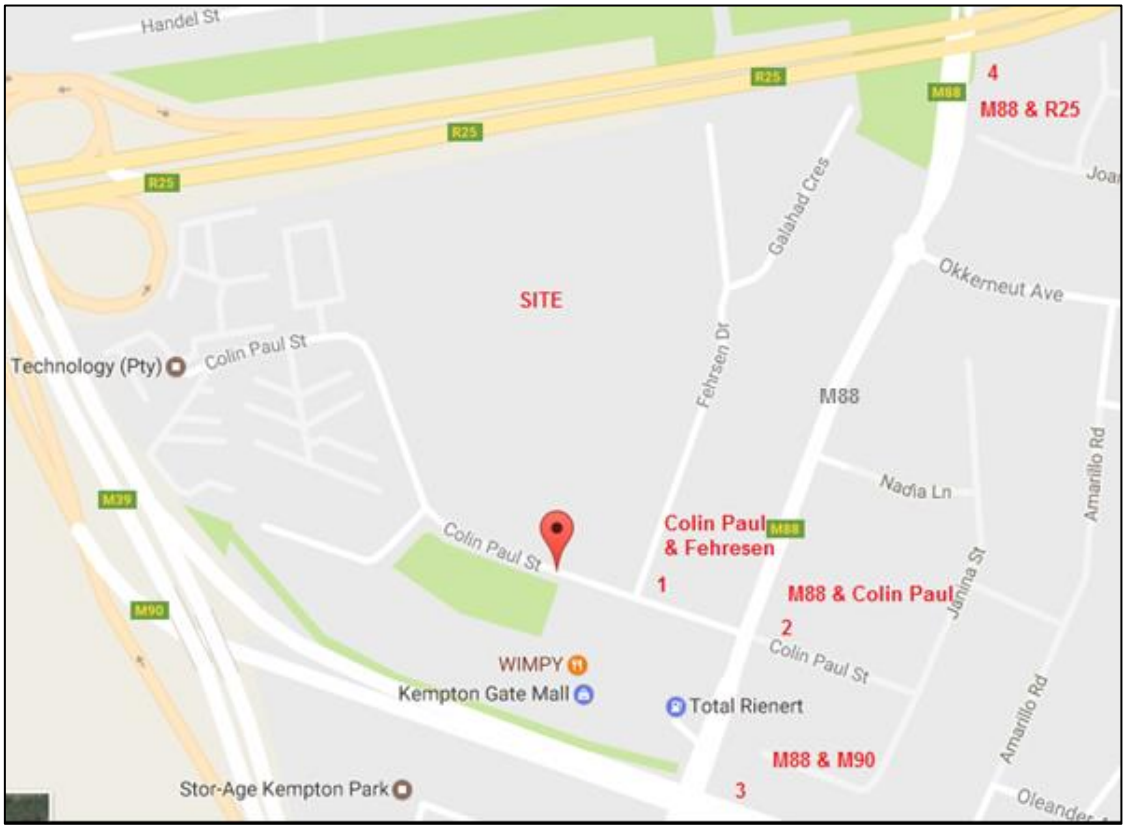

Figure 1-1: Portion 296, Farm Zuurfontein 33 IR site

In support of the proposed township establishment, Shuma Africa was appointed by Ekurhuleni Metropolitan Municipality (EMM) to conduct a Traffic Impact Assessment for the township establishment of which this report forms a Traffic Impact Assessment (TIA) study of the site constituting a capacity of 1000 Residential 4 dwelling units and 660 pupils for a single primary school.

The establishment of the township would affect the following major roads:

- R25 Modderfontein Road,
- M90 C R Swart Drive
- M88 Rienert Avenue

The affected internal access roads are Fehresen Drive and Colin Paul Street and from the foregoing, the following intersections were analysed in the TIA report:

- Colin Paul Street and Fehrsen Avenue Drive
- M88 (Rienert Avenue) and Colin Paul Street
- M88 (Rienert Avenue) and M90 (CR Swart Drive)
- M88 (Rienert Avenue) and R25

The township establishment is expected to generate 4 070 vehicles per day in both directions combined and characterised by the following:

- The week peak AM and PM generated would be 1 147 combined in and out. A directional split assumed is 85:15 and 15:85 in the determination of the worst-case scenario to evaluate intersections capacity and propose mitigation measures
- From the site investigations, the morning peak hour at the intersections are 7:00 to 8:00 except for M88 (Rienert Avenue) and R25 which occurs between 6:00 to 7:00 am. The afternoon peak hour observed was between 5:00 to 6:00pm, Table 1-1.

Intersection	**AM Peak Hour**	**PM Peak Hour**
Colin Paul Street and Fehrsen Avenue Drive	7:00 – 8:00	5:00 – 6:00
M88 (Rienert Avenue) and Colin Paul Street	7:00 – 8:00	5:00 – 6:00
M88 (Rienert Avenue) and M90 (CR Swart Drive)	7:00 – 8:00	5:00 – 6:00
M88 (Rienert Avenue) and R25 (Modderfontein Road)	6:00 – 7:00	5:00 – 6:00

Table 1-1: Am and PM peak hour for the intersections under study

The expected peak vehicle volumes would be in the range of 1100 vehicles in both directions combined, Table 1-2:

Land use	Units	Trips	AADT	Peaking Factor	Peak hourly flow
Residential 4 (Flats or apartments)	1000	2.75	2750	0.225	619
School	660	2	1320	0.4	528
Total			4 070		1 147

Table 1-2: Portion 296, Farm Zuurfontein 33 IR

From the proposed township layout plan in Figure 1-2 the 3 accesses to the site would be made through Colin Paul Street and Fehresen Drive that link with Colin Paul Street. Colin Paul Street links with M88 which is a major route taking traffic to either M90 or R25.

The 85% volumes during either AM (7:00 – 8:00) and PM (5:00 – 6:00) is shown below. A 3% reduction factor is used because the area is expected to attract a slightly higher vehicle usage as compared to other low-income dwellings due to its locality to a medium density suburb, Table 1-3.

Access	Peak hour directional split (In / Out) AM and PM	Reduction Factor	Hourly Trips	Proportion	Trip Demand from Township
Access 1	85%	3%	945	47%	462
Access 2	85%	3%	945	24%	236
Access 3	85%	3%	945	29%	283
Total					981

Table 1-3: Trip demand at the accesses

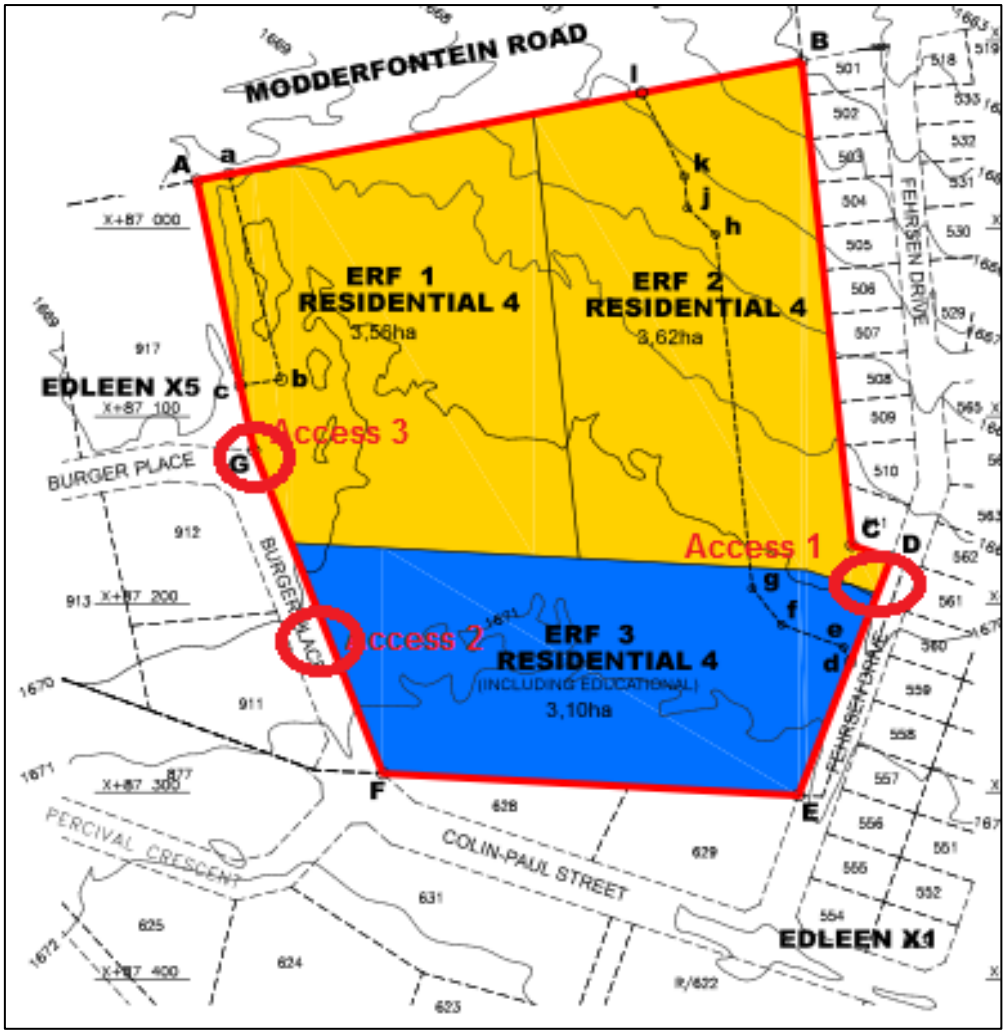

Figure 1-2: Proposed layout plan and accesses

The establishment of the township will impact the Level of Service (LOS) of existing intersections due to increased traffic volumes. The Level of service (LOS) measured according to delay at the intersection for each turning movement is used a measure of intersection performance. In most urban areas, overall rating of A to D are normally considered acceptable. Levels of Service C or better are considered desirable and levels of service E and F are normally undesirable.

The following 4 intersections would be impacted by the establishment of the proposed township:

- Colin Paul Street and Fehrsen Drive currently operating at LOS B both AM and PM
- Colin Paul Street and M88 (Rienert Avenue) currently is at LOS D both AM and PM
- M88 (Rienert Avenue) and M90 (C.R Swart Drive) currently operating at LOS F both AM and PM
- M88 (Rienert Avenue) and R25 currently operating at LOS E during AM and LOSF during PM

The status of the above intersections after full township establishment assuming a 5-year horizon (in year 2022) and 3% growth rate on existing traffic would be as follows.

- Colin Paul Street and Fehrsen Drive would operate at LOS F for AM and PM
- Colin Paul Street and M88 (Rienert Avenue) is at LOS F for AM and PM
- M88 (Rienert Avenue) and M90 (C.R Swart Drive) is at LOS F for AM and PM
- M88 (Rienert Avenue) and R25 is at LOS F for AM and PM

In summary, the TIA report posits mitigation measures to minimise the effect of the traffic generated as a result of the township establishment on Portion 296, Farm Zuurfontein 33 IR:

- All three accesses in the layout plan would have roundabouts
- Intersection between Colin Paul Street and Fehrsen Drive would require traffic signs and additional lanes
- Intersections between Colin Paul Street and M88 (Rienert Avenue) would require traffic signs and additional lanes
- Intersection between M88 (Rienert Avenue) and M90 (C.R Swart Drive) would require additional lanes and slip lanes
- Intersections between M88 (Rienert Avenue) and R25 would require additional lanes and slip lanes.

2 INTRODUCTION

Portion 296, Farm Zuurfontein 33 IR site is situated in the Edleen area in the northwestern part of Ekurhuleni, ± 4km northwest of the Kempton Park CBD. The site is situated within a residential precinct enclosed by Modderfontein Road (R25) on the north, Parkland Drive on the east, CR Swart Drive on the south and Zuurfontein Avenue on the west, Figure 2-1 and Figure 2-2

Portion 296, Farm Zuurfontein 33 IR needs to be upgraded to a township as currently it is unused and Shuma Africa Projects was appointed by Ekurhuleni Metropolitan Municipality to conduct a Traffic Impact Assessment (TIA) for the proposed development in accordance with the Manual of Traffic Impact Studies Technical Methods for Highways published by the South African Roads Agency Limited, TMH16 and TMH17. These manuals set the guidelines for carrying out a traffic impact investigations as a result of proposed developments.

In terms of the guidelines, a fully-fledged traffic impact analysis is required to be carried out if more than 50 vehicle trips per hour will be generated by any development. This should include conducting vehicle count surveys, conflicting turning movement analysis, intersection performance analysis and road safety assessment if applicable. Measures such as level of service, delay, and volume or capacity ratio can be used to quantify the performance of an intersection or a roadway facility as a result of the proposed development.

Further, the report assesses the impact of the township establishment on the existing provincial roads, particularly R25 and M90, Figure 2-1 and Figure 2-2.

The findings of the Traffic Impact Assessment indicate that the affected intersections would require upgrades in terms of additional lanes and signal timing. The estimated cost of the mitigation measure on provincial route under the jurisdiction of Gauteng Department of Roads and Transport (R25 Modderfontein Road) is estimated to be in the range of R7 million.

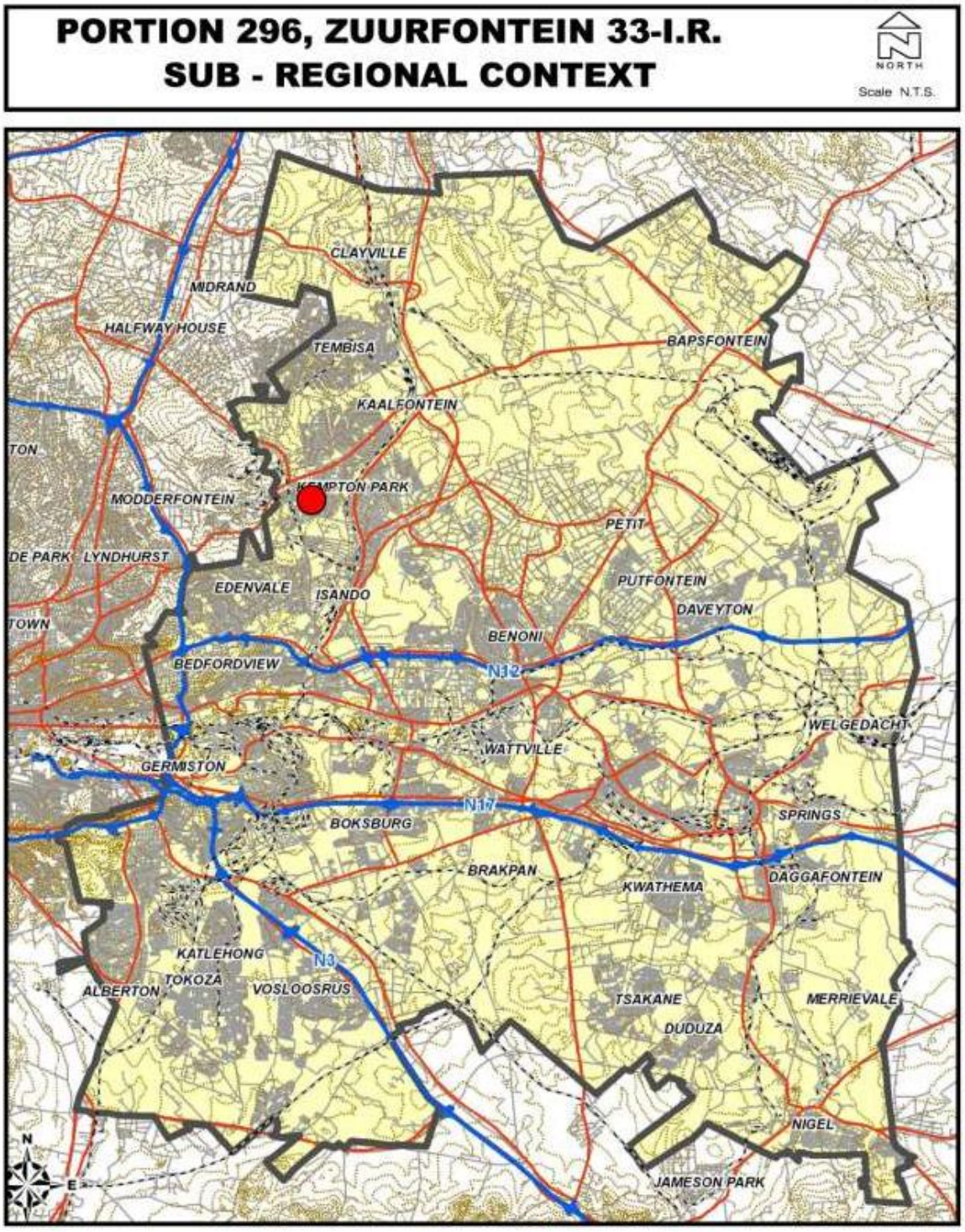

Figure 2-1: Portion 296, Farm Zuurfontein 33 IR located in Kempton Park in Ekurhuleni Metropolitan Municipality, Gauteng, South Africa

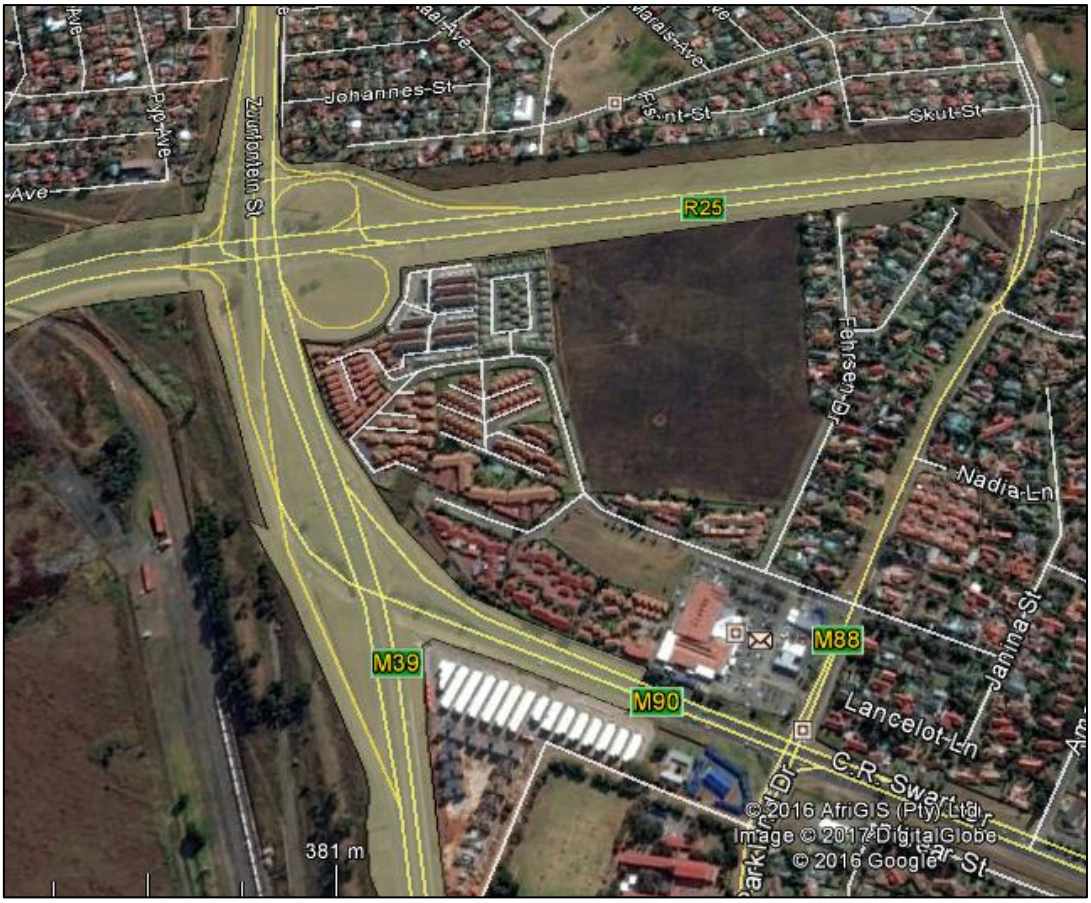

Figure 2-2: Existing provincial roads R25, and M90 that might be affected by the proposed township establishment

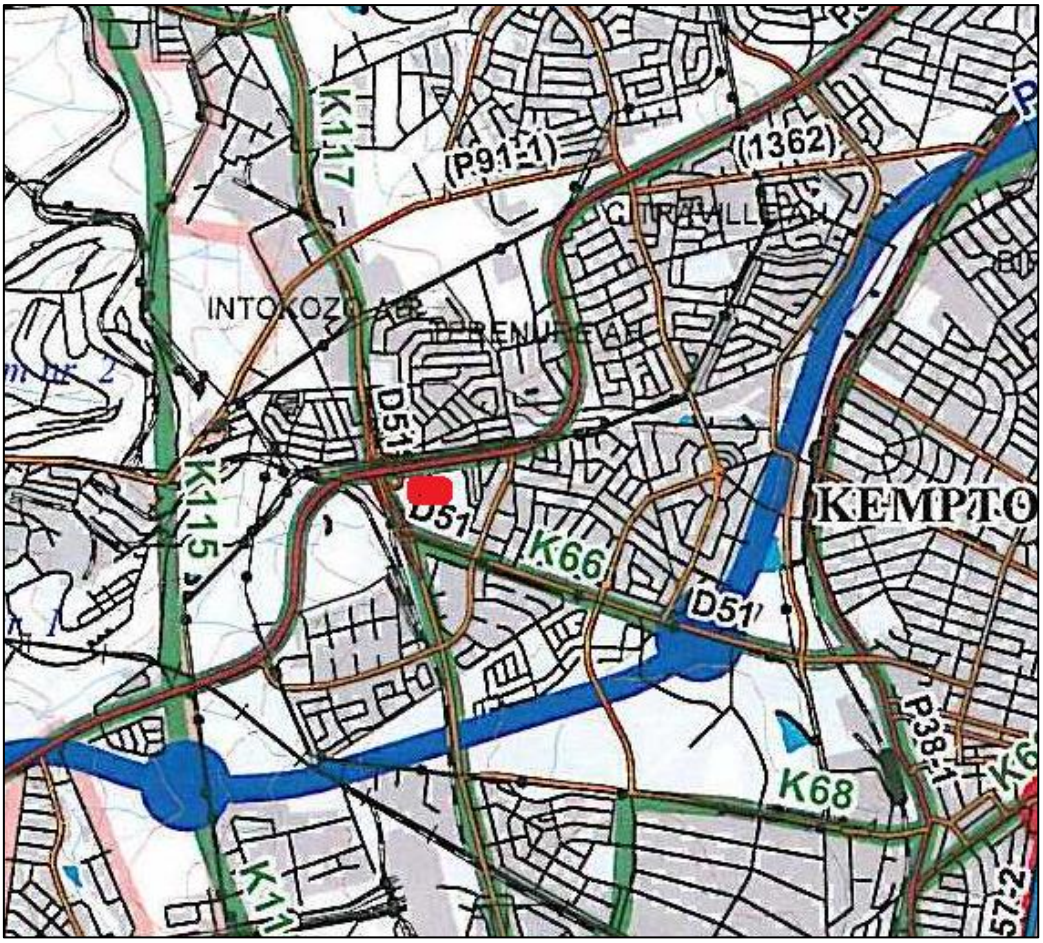

Figure 2-3: Location of future national or provincial roads with reference to the proposes township establishment

3 SCOPE OF THE ASSESSMENT

3.1 General

The Traffic Impact Assessment is conducted according to TMH 16 and 17 and in terms of this manuals, Shuma Africa is fully responsible for the Traffic Impact and Site Traffic Assessments. This responsibility, however, is restricted to the assessments described in TMH 16 and TMH17 and Shuma Africa shall not be responsible for undertaking any assessments that would normally form part of the master planning of the Municipality (as described in TMH16). The assessments that were undertaken by Shuma Africa are as follows:

- Traffic Impact Assessment, requiring the assessment to assess the traffic impact of a proposed change in land-use rights.
- Site Traffic Assessment which entail the assessment of transportation facilities and site accesses proposed in a Site Development Plan or during Township Establishment.

3.2 Objectives of the Traffic Impact Assessment

Traffic Impact Assessments (TIA) are required to determine the traffic impact of a land development proposal and whether such development can be accommodated by the

transportation system. Transportation and land development are inescapably related and Traffic Impact Assessments are required to ensure that the impact of land development can be accommodated by the transportation system. An inadequate transportation system will lead to congestion and result in deterioration of traffic safety, as well as a diminished quality of life and a reduced economic viability of development.

The purpose of traffic assessments is to support sustainable development by protecting the overall integrity of the transportation system for the benefit of all users. Neither public nor private interests are served if transportation systems are needlessly degraded due to poor development planning and control. An efficient, reliable and safe transportation system will in fact unlock and enhance land development potential.

The specific objectives of a Traffic Impact Assessment for Portion 296, Farm Zuurfontein 33 IR were to determine:

- The local impact of a proposed change in land use on the road and transportation system surrounding the development.
- To evaluate the combined impacts not only of the proposed development, but also other likely nearby developments,
- Whether it is possible to accommodate the proposed change in land use, with or without the implementation of mitigation measures.
- The mitigation measures and improvements that may be required to accommodate the proposed change.

3.3 Legal Framework

3.3.1 Integrated Development Plan

The Constitution of the Republic of South Africa empowers a Municipality to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation. According to the constitution, the Municipality has executive authority in respect of, and has the right to administer, inter alia, the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5, which includes municipal roads. The Municipality also has the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions.

In terms of Section 152(1) of the Constitution, the objects of local government include, inter alia, to ensure provision of services to communities in a sustainable manner and to promote social and economic development. Section 153 emphasises that in its budgeting and planning processes, the Municipality must give priority to the basic needs of the community and to promote social and economic development of the community.

Municipal development planning in South Africa is regulated by the Municipal Systems Act (Act No 32 of 2000). This act requires the preparation and adoption of Integrated Development Plans

(IDPs) to guide and regulate all planning and development in the Municipality. The National Land Transport Act NLTA (Act No 5 of 2009) requires the integration of land transport planning with the land development process and the preparation of integrated transport plans which constitutes the transport component of the integrated development plans of municipalities. These integrated transport plans include the regulation and provision of transport infrastructure for all modes of transport. According to the National Land Transport Act, property developments within a transport area are subject to traffic impact and transport assessments.

3.4 Assessment Methodology

The assessment methodology entailed the baseline assessment, traffic demand estimation, traffic impact assessment and recommended mitigation measures and associated costs. The baseline assessment included the identification of the following:

- Background study:
    - Proposed land use for Portion 296, Farm Zuurfontein 33 IR;
    - identification of affected external roads;
    - the investigation and assessment of the status quo of internal and external road networks;
    - existing traffic volumes;
    - capacity analysis of the existing affected access roads and intersections.

Traffic demand estimation entailed the adoption of a methodology for estimating traffic demand as a combination of “traffic growth” and "build-up" methods. The future traffic demand is estimated by applying a growth rate to existing traffic counts and by accumulating the trip generation of other expected developments, including those that have been approved but not yet fully implemented.

The potential impacts of the upgrade of the township establishment were identified and assessed as presented in Section 7 followed by conclusion and recommendations in mitigating the impact of traffic.

4 FINDINGS OF THE BACKGROUND STUDY

4.1 Transportation Master Plan or Spatial Development Framework

The Capital Investment Framework (CIF) is geared towards focusing capital budgeting for the Ekurhuleni Metro into strategically geographic priority areas in accordance with the Municipality Spatial Development Framework in order to achieve the spatial strategy outlined within the MSDF and take into consideration new spatial trends.

The Capital Investment Framework (CIF) is a requirement in terms of Section 4(e) of the Municipal Planning and Performance Management Regulations, 2001 as promulgated in terms of

the Municipal Systems Act. The CIF also fulfils the function of a Capital Expenditure Framework (CEF) as required in terms of Section 21(n) of the Spatial Planning and Land Use Management Act, 2013. In addition, the CIF also informs the Capital Expenditure Programme (CEP) as referred to by National Treasury. The CIF also strives to meet Section 153(a) of the constitution, in which the developmental duties of a municipality is outlined to "*structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community*".

The purpose of the CIF within the Built Environment Performance Plan (BEPP) is premised on informing and setting the basis for spatial targeting by identifying the what, when, and where. This includes the integration of key sectors (economic development, transport, housing, finance, environment, and project management), co-ordination, fiscal alignment and governance that should result in triggering long-term spatial transformation and facilitating economic growth. The CIF is therefore a tool utilized within the BEPP to achieve medium to long outcomes with regard to spatial transformation through guiding and focusing investment into strategic spatial areas.

The CIF has therefore aligned three geographic priority areas with the development trajectory defined within the GDS[1] in order to achieve the advancement of the EMM in terms of promoting the Metro as a 'Delivering City' with a 10 year implementation horizon (Priority area 1 – annotated), a 'Capable City' with a 10 year implementation horizon (Priority area), and a 'Sustainable City' with a 20 year and beyond implementation horizon (Priority area 3).

The CIF has included the proposed housing projects as reflected on the housing funding model and earmarked Portion 296, Farm Zuurfontein 33 IR forming subject of this Traffic Impact Assessment Report.

4.2 Proposed Land Use

The proposed land use shall contain low income residential. The site is currently vacant and is surrounded by middle-income residential developments. The cadastral boundary for Portion 296, Farm Zuurfontein 33 IR represents 10.2 ha, with 3 erven allocated for 1000 Res4 high density residential dwellings and a primary school. The town planning layout is shown below, Figure 4-1 together with the position of access points to abutting class 5 roads.

[1] City of Ekurhuleni: Growth and Development Strategy 2055

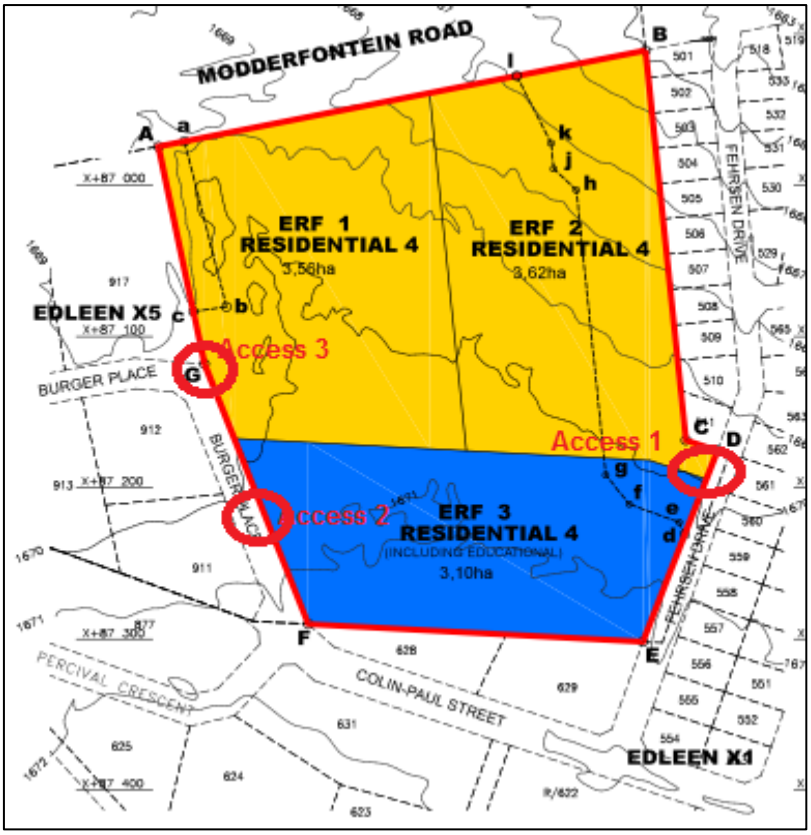

Figure 4-1: Proposed township layout for Portion 296, Farm Zuurfontein 33 IR

4.3 Modelled Traffic Demand

There is no traffic demand model available and the traffic demand estimates described in TMH16 Appendix B would be used to estimate the traffic demand.

4.4 Existing Land Use Rights

The site originally formed part of the proposed Edleen Ext. 4 township application which was a Municipal township approved before 1994. The western part of the township was later sold to a private developer and became Edleen Ext. 5, while the site itself was expropriated by the Provincial Education Department with the view to develop it as a school. A strip of land between the expropriated school site and Edleen Ext. 1 east of it (R.E. Ptn 259, Zuurfontein 33 I.R.), remains in Municipal ownership

The total site area is approximately 10.28 ha. The sizes of development per land use type and in the units specified in the Trip Data Manual is a high density residential units with 1000 dwelling units and a primary school with a capacity of 655 students.

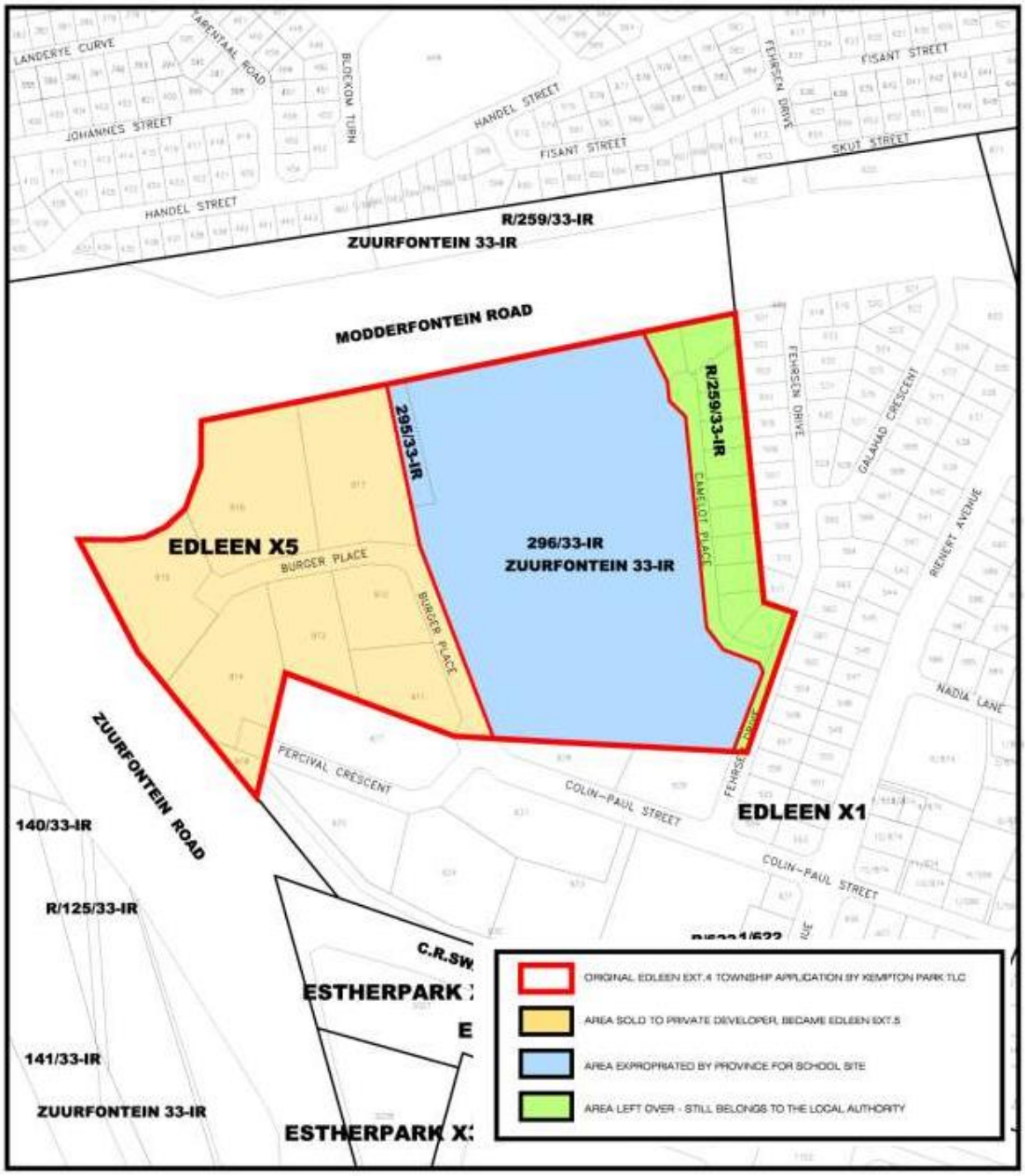

Figure 4-2: Land ownership and use

4.5 Implementation of Proposed Development and Horizon Years

According to the EMM Spatial Development Frame work approved in December 2015, the envisaged completion date from January 2016 is December 2025. The analysis period is 2017 and an 8-year horizon is required assuming a full buildout and occupancy in year 2025. In terms of TMH16, a maximum of 5 year horizon is more accurate and recommended and therefore this report design horizon is based on a 5 year horizon which is year 2022.

4.6 Surrounding Land Use

Various land uses characterise the area surrounding the Portion 296, Farm Zuurfontein 33 IR, Figure 4-2:

- North: Modderfontein Road (R25) forms the northern edge of the site, with Terenure residential township (low density "Residential 1" stands) situated north of the road.
- East: Edleen residential township (low density "Residential 1" stands) is situated east of the site. A long, narrow strip of vacant land (Ptn 259/33 I.R.) directly abuts the site on the east, between it and the existing residential development.
- South: Medium density sectional title development abuts the site on the south. The Kempton Gate Mall is situated only ± 100m south of the site on the northwestern quadrant of the C.R. Swart Road/Parkland Drive intersection. Mini-storage units and the Edleen Primary school is situated directly south of C.R. Swart Road.
- West: Edleen Extension 5 medium density residential township abuts the site on the west.

Figure 4-3: Land use surrounding the site

4.7 Primary Study Area

4.7.1 Accesses to the site

From the proposed township layout plan, the 3 accesses to site would be made through Colin Paul Street and Fehresen Drive that link with Colin Paul Street. Colin Paul Street links with M88 which a major route taking traffic to either M90 or R25.

Assessment of the intersections between M88 and R25 and M88 and M90 (C.R Swart Drive) would be critical as they are the major intersections .

4.7.2 External roads

The following are the external roads providing link to Colin Paul Street and Fehresen Drive that provides access to site as discussed above:

- Modderfontein Road (R25)

  A double carriageway major east-west arterial forming the northern boundary of the site. Modderfontein Road links the N3 to the west with the R21 to the east. No direct access to the site from this road.

- Zuurfontein Avenue (M39)

  A double carriageway major north-south arterial linking Isando to the south with Tembisa to the north, running ± 400m west of the site, interchanging with Modderfontein Road.

- CR Swart Road (M90)

  A double carriageway east-west arterial running ± 200m south of the site, linking Zuurfontein Road with Kempton Park CBD.

- Parkland Drive / Reinert (M88)
  A single carriageway minor arterial running ± 100m east of the site, linking CR Swart Road with Modderfontein Road.

4.7.3 New or improved external and Internal roads

From the Transportation Master Plan, no major upgrade is expected on major roads and all existing internal streets. Internal roads on Portion 296, Farm Zuurfontein 33 IR would be upgraded to a 5.5m wide class 5 with a 16m road reserve as part of township development.

4.7.4 Public transportation

From the traffic survey done, public transport is dominated by taxis and very few buses.

4.7.5 Pedestrian

There is few pedestrian walkway made available. According to the EMM Transportation Plan Framework, it is becoming a requirement that pedestrian walkway be made available as significant number of people are pedestrians.

4.8 Secondary Study Area

TMH 16 recommends that a primary study area defined in the previous section is adequate for most land uses except those that require the transport of heavy goods. For land uses that require transportation of heavy goods, the primary study area must be extended to include a secondary study area:

Based on the land use for the prosed development, they won't be a need of a secondary study area.

4.9 Site Investigations

4.9.1 Important Definitions and Functional Classification of Roads

Due to recent changes and updates made on TRH26, the following definitions are applicable in the description of the site.

- **Arterial** - class 1, 2 or 3 vehicle priority, access managed, mobility route whose major function is to provide for movement of person and goods vehicles between cities, towns or urban districts with as few restrictions as possible.
- **Collector** - a road which collects (or distributes) traffic in a local district. Collectors do not carry traffic passing through the district with destinations elsewhere but serve as activity spines and streets. Although all roads have a “collection function”, the term “collector” is reserved for Class 4 roads.
- **Distributor** - long distance arterials which distribute traffic over wide areas. Although all roads have a “distribution function”, the term “distributor” is reserved for Class 1 to 3 roads and is often preferred to the word “arterial” in rural areas.
- **Functional classification** - the classification of roads and streets according to their primary function, i.e. mobility/movement or access/activity, subdivided into Classes according to the character of service they are intended to render.
- **Street** - a town or village “road” typically with access to buildings on one or both sides. A street is exclusively associated with the access/activity function (see road).
- **Road** - a wide way between places. Roads are generally but not exclusively associated with the mobility function (see street).
- **Local road/street** - A Class 5 road (rural) or street (urban) carrying traffic with origins or destinations in the immediate (local) area with the main purpose of giving access to individual properties

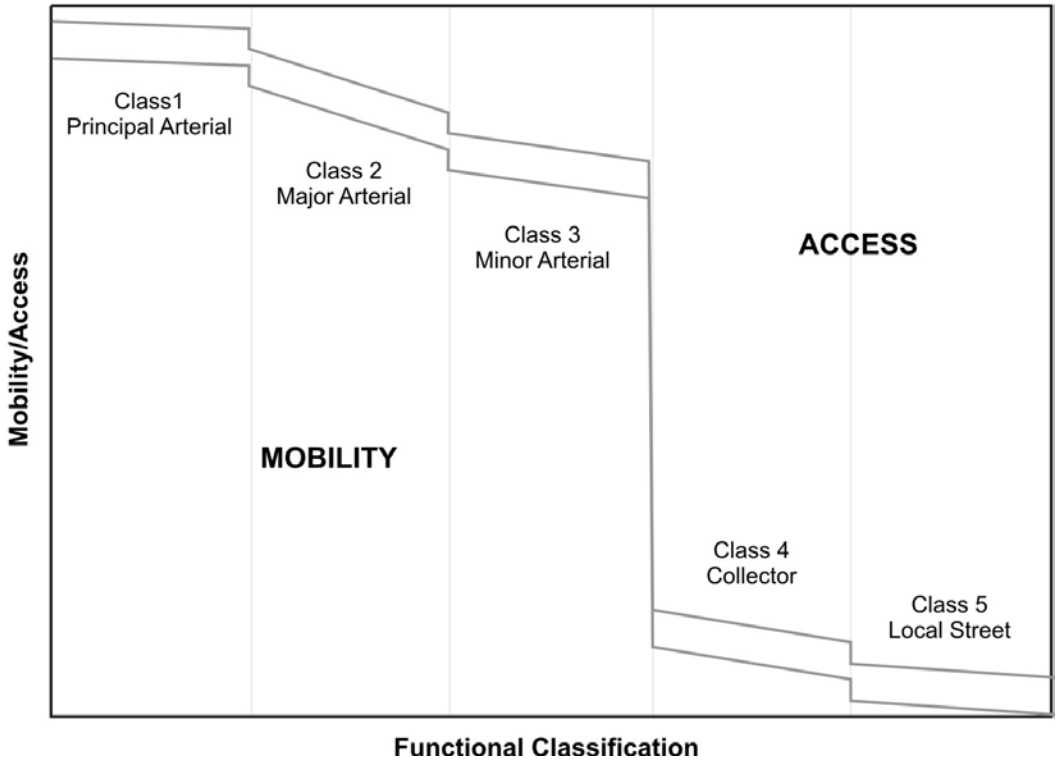

Figure 1: Road functional classification Figure 6 (TRH26)

4.9.2 Site

A site inspection revealed that the site is covered by secondary grassland with a single tree situated in its centre. The grass seems to be cut regularly.

Figure 4-4: View towards the north over the site

4.9.3 Roads and Streets

The roads and street that would be affected by the township establishment are shown below, see Figure 4-5 to Figure 4-11.

Road / Street	Width	Class	Function
M88 (Rienert Avenue)	7.4m	3	Arterial
Colin Paul Street	7.0m	4	Collector
Fehrsen Drive	7.0	5	Local street
R25 (Modderfontein Road)	dual carriage way	2	Major arterial
M90 (to the east)	Dual carriageway	2	Major arterial

Table 4-1: Functional classification of the roads and street

Figure 4-5: View along Fehrson Drive abutting the site on the east

Figure 4-6: Intersection at Colin Paul Street and Percival Crescent

Figure 4-7 Intersection between Colin Paul Street and Fehresen Drive

Figure 4-8: Colin Paul Street abuting site from west to south

Figure 4-9: M88 view from south to north

Figure 4-10: Intersection between M88 (Rienert Avenue) and R25 (Modderfontein Road)

Figure 4-11: Intersection between M88 (to the north) and M90 (to the east)

4.9.4 Traffic Counts

Site visits were conducted on 20 March 2017, and as part of the assessment and scoping process. Traffic counts were carried out for 12 hours (6AM – 6PM) on 23 March 2017 at the following intersections:

- Colin Paul Street and Fehrsen Avenue Drive
- M88 (Rienert Avenue) and Colin Paul Street
- M88 (Rienert Avenue) and M90 (CR Swart Drive)
- M88 (Rienert Avenue) and R25

The light vehicles, taxes, buses and heavy vehicles were all counted during the survey process. The summarised traffic counts are contained in tables and figures that follow.

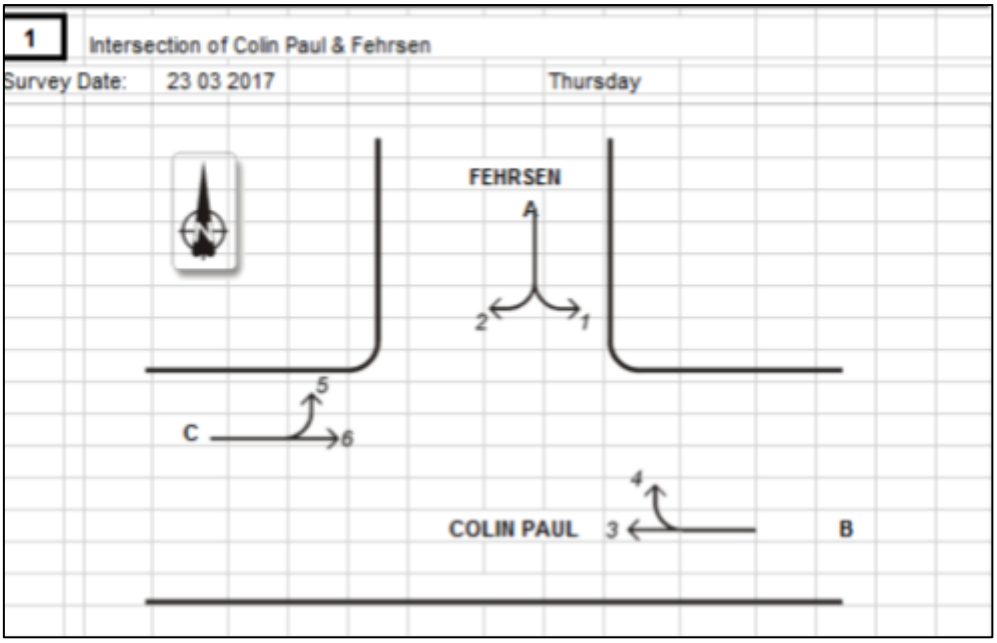

Figure 4-12:Colin Paul Street and Fehrsen Avenue Drive

Colin Paul Street and Fehresen Avenue						
Movement	**Total Vehicles**	**% Light**	**% Taxis**	**% Buses**	**% HV**	**% HV (including Heavy vehicles and Buses)**
Movement 1	133	94.74%	3.76%	0.75%	0.75%	1.50%
Movement 2	3	66.67%	0.00%	0.00%	33.33%	33.33%
Movement 3	694	91.93%	4.61%	0.00%	1.57%	1.6%
Movement 4	83	86.75%	6.02%	1.20%	6.02%	7.2%
Movement 5	7	42.86%	28.57%	0.00%	28.57%	28.6%
Movement 6	1027	94.45%	2.92%	0.05%	2.53%	2.6%
Day Traffic	1947	79.56%	7.65%	0.33%	12.13%	12.5%
25%-night traffic	487					
ADT	**2434**	**79.6%**	**7.6%**	**0.3%**	**12.1%**	**12.5%**

Table 4-2: Colin Paul Street and Fehrsen Avenue Drive intersection traffic volumes and modal split

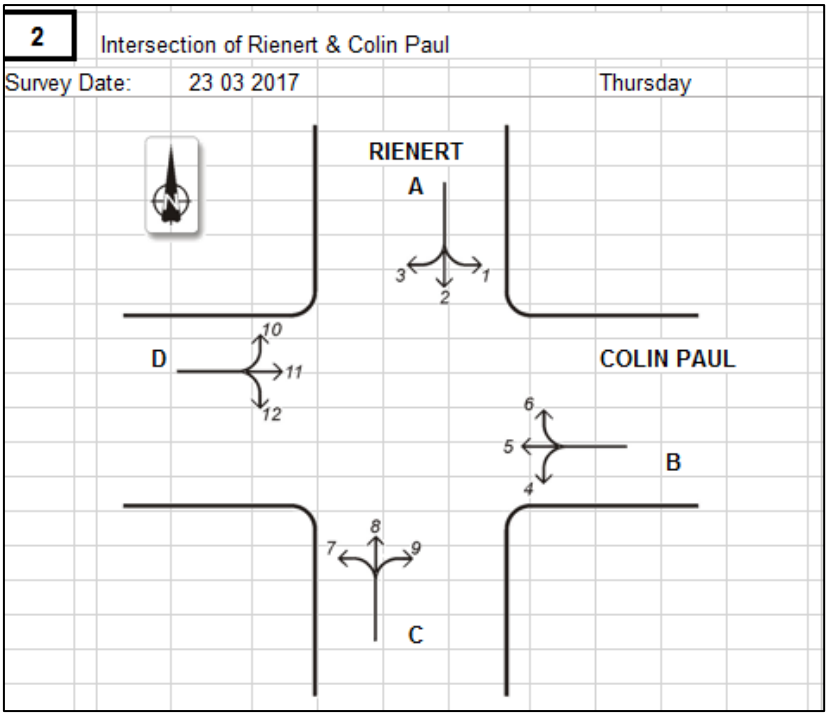

Figure 4-13: Movement direction on M88 (Rienert Avenue) and Colin Paul Street

Rienert Avenue (M88) and Colin Paul Street						
Movement	**Total Vehicles**	**% Light**	**% Taxis**	**% Buses**	**% HV**	**Total % HV (including Heavy vehicles & Buses)**
Movement 1	104	87.50%	5.77%	3.85%	2.88%	6.73%
Movement 2	3127	96.35%	2.59%	0.03%	1.02%	1.06%
Movement 3	621	95.01%	2.42%	0.00%	2.58%	2.6%
Movement 4	142	98.59%	0.00%	0.70%	0.70%	1.4%
Movement 5	16	100.00%	0.00%	0.00%	0.00%	0.0%
Movement 6	97	92.78%	4.12%	2.06%	1.03%	3.1%
Movement 7	422	88.39%	4.98%	0.95%	5.69%	6.6%
Movement 8	2300	93.78%	3.48%	0.22%	2.52%	2.7%
Movement 9	108	94.44%	3.70%	0.00%	1.85%	1.9%
Movement 10	675	91.85%	4.89%	0.59%	2.67%	3.3%

Rienert Avenue (M88) and Colin Paul Street						
Movement	**Total Vehicles**	**% Light**	**% Taxis**	**% Buses**	**% HV**	**Total % HV (including Heavy vehicles & Buses)**
Movement 11	32	87.50%	3.13%	3.13%	6.25%	9.4%
Movement 12	720	88.75%	5.14%	0.14%	5.97%	6.1%
Day Traffic	8364	92.91%	3.35%	0.97%	2.76%	3.7%
25% night traffic	2091					
ADT	**10455**	**92.9%**	**3.4%**	**1.0%**	**2.8%**	**3.7%**

Table 4-3: M88 (Rienert Avenue) and Colin Paul Street intersection traffic volumes and modal split

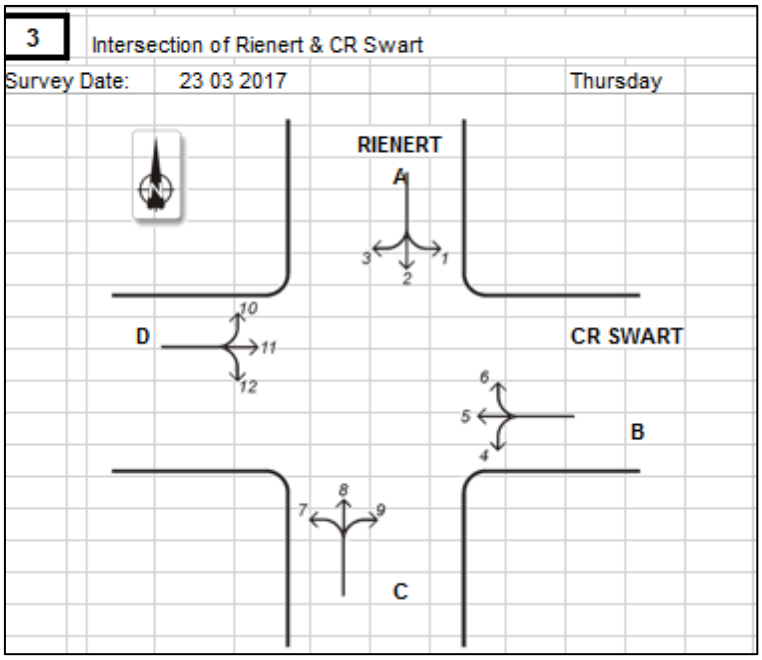

Figure 4-14: Movement direction on M88 (Rienert Avenue) and M90 (CR Swart Drive)intersection

Rienert Avenue (M88) and CR Swart Drive (M90)						
Movement	**Total Vehicles**	**% Light**	**% Taxis**	**% Buses**	**% HV**	**Total % HV (Including Heavy vehicles and Buses)**
Movement 1	1378	93.98%	2.98%	0.51%	2.54%	3.05%
Movement 2	2244	95.63%	2.50%	0.27%	1.60%	1.87%
Movement 3	508	97.64%	0.79%	0.20%	1.38%	1.6%
Movement 4	1124	88.79%	7.12%	2.05%	2.05%	4.1%
Movement 5	7460	85.46%	9.54%	0.19%	4.81%	5.0%
Movement 6	1228	94.30%	2.85%	0.24%	2.61%	2.9%
Movement 7	429	76.69%	19.58%	0.00%	3.73%	3.7%
Movement 8	2196	92.21%	5.01%	0.41%	2.37%	2.8%
Movement 9	2151	92.28%	6.04%	0.09%	1.58%	1.7%
Movement 10	108	62.96%	12.96%	6.48%	17.59%	24.1%
Movement 11	8967	87.32%	8.40%	0.11%	4.17%	4.3%
Movement 12	271	77.12%	18.45%	0.00%	4.43%	4.4%
Day Traffic	28064	87.03%	8.02%	0.88%	4.07%	5.0%
25%-night traffic	7016					
ADT	**35080**	**87.0%**	**8.0%**	**0.9%**	**4.1%**	**5.0%**

Table 4-4: M88 (Rienert Avenue) and M90 (CR Swart Drive) intersection traffic volumes and modal split

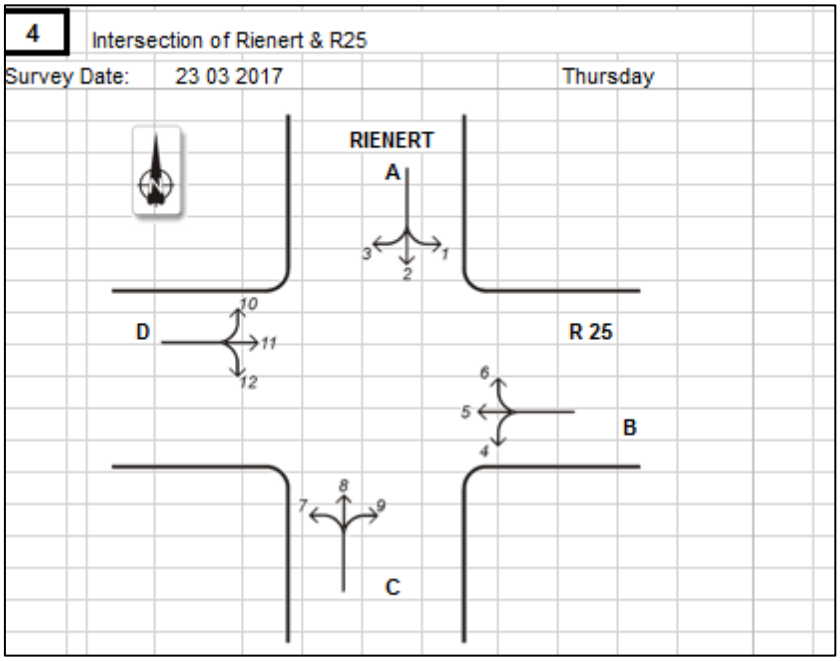

Figure 4-15: Movement direction on M88 (Rienert Avenue) and R25 intersection

Rienert Avenue (M88) and R25						
Movement	**Total Vehicles**	**% Light**	**% Taxis**	**% Buses**	**% HV**	**Total % HV (Including Heavy vehicles and Buses)**
Movement 1	469	97.01%	2.13%	0.21%	0.64%	0.85%
Movement 2	1545	94.89%	3.37%	0.26%	1.49%	1.75%
Movement 3	521	95.78%	0.96%	0.00%	3.26%	3.3%
Movement 4	1327	95.10%	2.49%	0.23%	2.19%	2.4%
Movement 5	7020	95.17%	0.73%	0.04%	4.06%	4.1%
Movement 6	422	95.50%	3.79%	0.00%	0.71%	0.7%
Movement 7	568	96.65%	1.41%	0.00%	1.94%	1.9%
Movement 8	1378	92.09%	6.17%	0.15%	1.60%	1.7%
Movement 9	1299	95.54%	2.23%	0.08%	2.16%	2.2%
Movement 10	125	92.00%	1.60%	3.20%	3.20%	6.4%
Movement 11	7068	95.51%	0.85%	0.04%	3.59%	3.6%
Movement 12	689	97.68%	0.44%	0.15%	1.74%	1.9%
Day Traffic	22431	95.24%	2.18%	0.36%	2.21%	2.6%
25%-night traffic	5608					
ADT	**28038.75**	**95.2%**	**2.2%**	**0.4%**	**2.2%**	**2.6%**

Table 4-5: M88 (Rienert Avenue) and R25 intersection traffic volumes and modal split

5 Level of Service of Existing Background Traffic

5.1 Assessment Variables of Intersections

The following variables have been considered to assess the impact of Portion 296, Farm Zuurfontein 33 IR proposed township development.

5.1.1 Level of Service (LOS)

A measure of intersection or roadway performance, determined based on delay for unsignalised intersections. The LOS definitions in terms of delay are shown in *Table 5-1*.

In the calculation of the delay, the critical gap is defined as the minimum time interval in the major street traffic stream that allows intersection entry for one minor street vehicle and the gap acceptances are based on the potential capacity of each minor traffic stream.

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (S/VEH)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	> 50

Table 5-1: Level of service for two-way stop controlled intersection

In most urban areas, overall rating of A to D are normally considered acceptable. Levels of service C or better are considered desirable and levels of service E and F are normally undesirable (Insert TMH16)

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (S/VEH)
A	0 - 10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	> 80

Table 5-2: LOS criteria for signalised intersections (HCM,2000)

For a street segment, the LoS is given in Table 5-3 according to the Highway Capacity Manual (HCM,2000 Exhibit 15-2).

EXHIBIT 15-2. URBAN STREET LOS BY CLASS

Urban Street Class	I	II	III	IV
Range of free-flow speeds (FFS)	90 to 70 km/h	70 to 55 km/h	55 to 50 km/h	55 to 40 km/h
Typical FFS	80 km/h	65 km/h	55 km/h	45 km/h
LOS	Average Travel Speed (km/h)			
A	> 72	> 59	> 50	> 41
B	> 56–72	> 46–59	> 39–50	> 32–41
C	> 40–56	> 33–46	> 28–39	> 23–32
D	> 32–40	> 26–33	> 22–28	> 18–23
E	> 26–32	> 21–26	> 17–22	> 14–18
F	≤ 26	≤ 21	≤ 17	≤ 14

Table 5-3: LoS for an urban street according to the Highway Capacity Manual (2000)

5.1.2 Delay

It is a measure of intersection or roadway performance. It is the measure of driver discomfort, frustration, fuel consumption and lost travel time. Delay at intersections depends on various factors such as type of signal control, volume of traffic and volume/capacity ratio of each approach at an intersection (*C A O'Flaherty, 1997*). The intersections performance has been rated based on the average delay, i.e. the LOS of the intersections under investigation will be measured based on the intersection average delay.

5.1.3 Volume or capacity ratio

It is a measure of intersection or roadway performance. It is the ratio of number of vehicles on the road to the available capacity of the roadway. The road link capacity in the study area has been rated based on the volume/capacity ratio.

5.1.4 Road safety aspects

This variable has been subjectively assessed in terms of pedestrian and driver's safety on the roads under investigation. Variables such as speed limit and alignment and geometry of the road have been taken into consideration for the safety assessment.

5.2 Input Parameters and Assumptions for Background Traffic

5.2.1 Proportions of Turning movements

The proportion of turning movements determent as the ratio of turning movements and the total traffic counted for the intersection are shown in Table 5-4.The proportion of turning vehicles is used in the trip distribution emanating from the township development.

Movement I.D	Colin Paul and Fehresen	Rienert and Colin Paul	Rienert and CR Swart	Rienert and R25
1	6.8%	1.2%	4.9%	2.1%
2	0.2%	37.4%	8.0%	6.9%
3	35.6%	7.4%	1.8%	2.3%
4	4.3%	1.7%	4.0%	5.9%
5	0.4%	0.2%	26.6%	31.3%
6	52.7%	1.2%	4.4%	1.9%
7		5.0%	1.5%	2.5%
8		27.5%	7.8%	6.1%
9		1.3%	7.7%	5.8%
10		8.1%	0.4%	0.6%
11		0.4%	32.0%	31.5%
12		8.6%	1.0%	3.1%
Total	100.00%	100.00%	100.00%	100.00%

Table 5-4: Proportions of turning movement per intersection

5.2.2 Stop controlled intersections Level of Service (LoS)

The processed peak hourly volumes in the appendix were used to evaluate the year 2017 capacity of the stop controlled intersection. The following are the simplifying input assumptions for the determination of stop controlled intersections Level of Service (LOS):

- Unit time (for volumes) is 60 minutes;
- Peak flow period (for performance) is 15 minutes;
- Basic saturation flow rate is 1950 pcu per hour;
- Lane width is 3.2m for the approach and exit ;
- The lane length is more than 500m for both approach and exit;
- The approach and exit cruise speed is 60km/h;
- The queue space for light vehicles is 7.0m and that for heavy vehicles is 13.0m;
- Light vehicle length is 4.5m and that for heavy vehicles is 10.0m; and
- The slope for all intersections is 0%.

5.2.3 Signalised intersection Level of Service (LoS)

The processed peak hourly volumes in the appendix were used to evaluate the year 2017 capacity of the signalised intersection level of service (LoS). The following are the input assumption underpinning the assessment of the intersections level of service (LoS):

- Lane width 3.5m
- Basic saturation 1950 pcu/hr
- Approach cruise speed 60km/h
- Exit cruise sped 60km/hr
- Signal coordination – isolated
- Vehicle length light 4.5m
- Vehicle length HV – 10.0m
- Turn adjustment – normal
- Pedestrian effect – extra start loss 4 seconds
- Critical gap 4.5 seconds
- Follow-up headway 2.6 seconds
- End departure 2.2 vehicles
- Pedetrian = 50 per minutes
- A two phase timing exists

5.3 LOS of Existing Intersections

Sidra 5.0 was used to analyse the intersections LOS based on the existing background traffic. Both morning (AM) and late afternoon peak volumes were used in the analysis.

Movement	Colin Paul Street and Fehresen Drive			Rienert Avenue (M88) and Colin Paul Street			Rienert Avenue (M88) and CR Swart Drive (M90)			Rienert Avenue (M88) and R25		
I.D	Volume	%HV	PHF	Volume	%HV	PHF	Volume	%HV	PHF	Volume	%HV	PHF
1	30	1.5%	0.54	7	6.7%	0.44	121	3.0%	0.82	62	0.9%	0.70
2	1	33.3%	0.25	381	1.1%	0.92	334	1.9%	0.81	292	1.7%	0.55
3	50	3.5%	0.89	33	2.6%	0.69	109	1.6%	0.57	197	3.3%	0.79
4	6	7.2%	0.30	25	1.4%	0.57	181	4.1%	0.77	214	2.4%	0.64
5	1	28.6%	0.00	2	0.0%	0.50	881	5.0%	0.92	1476	4.1%	0.89
6	210	2.6%	0.83	20	3.1%	0.45	63	2.9%	0.83	24	0.7%	0.67
7				40	6.6%	0.77	130	3.7%	0.59	128	1.9%	0.67
8				203	2.7%	0.67	223	2.8%	0.00	59	1.7%	0.64
9				3	1.9%	0.75	384	1.7%	0.70	102	2.2%	0.71
10				60	3.3%	0.88	2	24.1%	0.50	16	6.4%	0.67
11				1	9.4%	0.42	764	4.3%	0.89	214	3.6%	0.70
12				151	6.1%	0.86	83	4.4%	0.52	38	1.9%	0.48

Table 5-5: Summary of AM peak traffic counts

Movement	Colin Paul Street and Fehresen Drive			Rienert Avenue (M88) and Colin Paul Street			Rienert Avenue (M88) and CR Swart Drive (M90)			Rienert Avenue (M88) and R25		
I.D	Volume	%HV	PHF	Volume	%HV	PHF	Volume	%HV	PHF	Volume	%HV	PHF
1	10	1.5%	0.50	13	6.7%	0.46	162	3.0%	0.86	48	0.9%	0.92
2	1	33.3%	0.25	261	1.1%	0.93	128	1.9%	0.86	110	1.7%	0.79
3	133	3.5%	0.90	82	2.6%	0.62	20	1.6%	0.63	11	3.3%	0.69
4	10	7.2%	0.63	5	1.4%	0.25	71	4.1%	0.81	109	2.4%	0.88
5	1	28.6%	0.25	3	0.0%	0.25	529	5.0%	0.66	321	4.1%	0.84
6	84	2.6%	0.84	5	3.1%	0.63	161	2.9%	0.86	88	0.7%	0.73
7				63	6.6%	0.75	42	3.7%	0.55	31	1.9%	0.55
8				272	2.7%	0.89	277	2.8%	0.00	298	1.7%	0.82
9				25	1.9%	0.45	124	1.7%	0.86	224	2.2%	0.92
10				64	3.3%	0.84	16	24.1%	0.33	15	6.4%	0.54
11				3	9.4%	0.25	972	4.3%	0.89	1713	3.6%	0.80
12				22	6.1%	0.79	20	4.4%	0.71	89	1.9%	0.56

Table 5-6: Summary of PM peak traffic counts

5.3.1 Colin Paul Street and Fehrsen Drive

The traffic flow at the intersection is shown in Figure 5-1. The intersection LOS (worst movement) is LOS B for the Fehrsen Drive approach leg, right turning vehicles for both AM and PM peak, *Table 5-7* and Table 5-8.

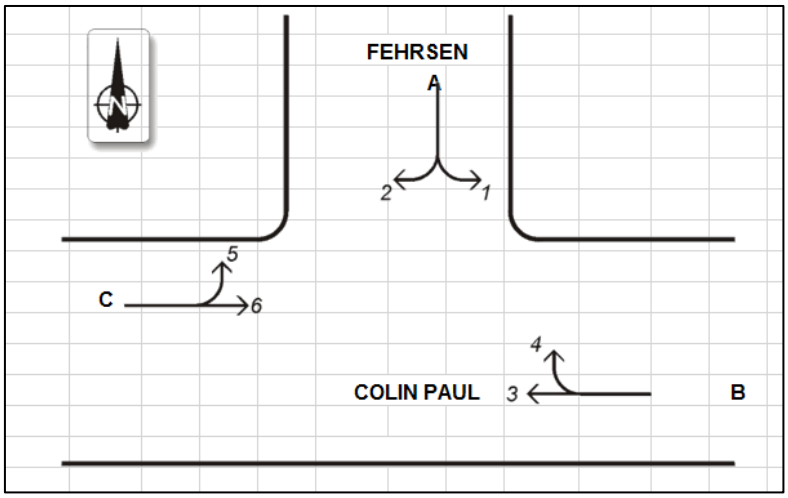

Figure 5-1: Traffic flow movements at the intersection between Colin Paul Street and Fehrsen Drive

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Colin Paul Street East											
3	T	56	3.5	0.043	1.1	LOS A	0.3	2.3	0.37	0.00	52.8
4	R	15	7.2	0.043	9.8	LOS A	0.3	2.3	0.37	0.89	48.7
Approach		70	4.3	0.043	2.9	LOS A	0.3	2.3	0.37	0.19	51.9
North: Fehrsen Drive North											
1	L	41	1.5	0.056	10.0	LOS A	0.3	1.8	0.38	0.66	47.1
2	R	4	33.0	0.056	11.3	LOS B	0.3	1.8	0.38	0.78	46.9
Approach		45	4.3	0.056	10.1	LOS B	0.3	1.8	0.38	0.67	47.1
West: Colin Paul Street West											
5	L	4	29.0	0.133	9.0	LOS A	0.0	0.0	0.00	1.15	49.0
6	T	253	2.6	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		257	3.0	0.135	0.1	LOS A	0.0	0.0	0.00	0.02	59.8
All Vehicles		372	3.4	0.135	1.9	NA	0.3	2.3	0.12	0.13	56.3

Table 5-7: AM Level of Service at the Intersection between Colin Paul Street and Fehrsen Drive

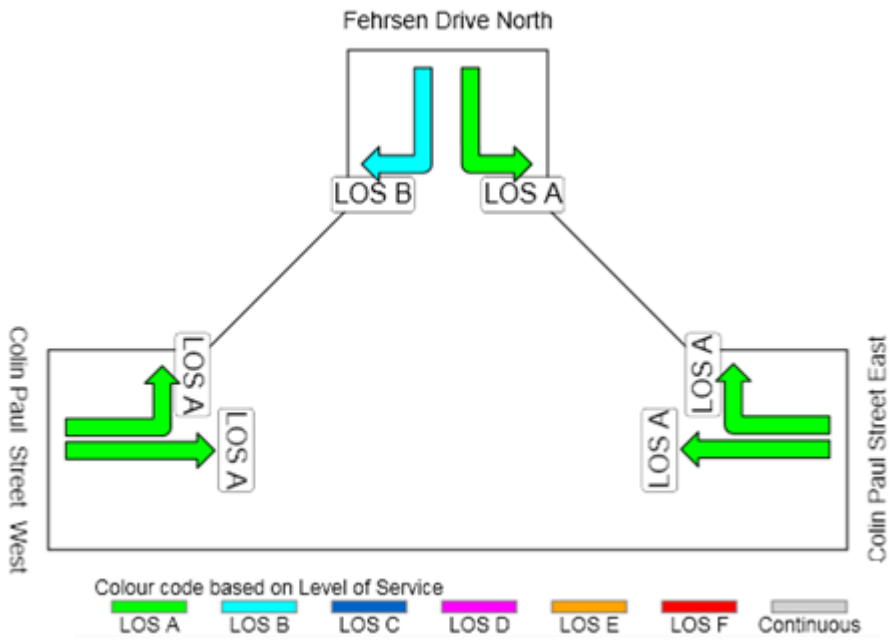

Figure 5-2: AM graphical presentation of the Level of Service at the Intersection between Colin Paul Street and Fehrsen Drive

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Colin Paul Street East											
3	T	148	3.5	0.090	0.4	LOS A	0.7	4.8	0.24	0.00	55.4
4	R	16	7.2	0.090	9.1	LOS A	0.7	4.8	0.24	0.98	48.8
Approach		164	3.9	0.090	1.3	LOS A	0.7	4.8	0.24	0.10	54.7
North: Fehrsen Drive North											
1	L	20	1.5	0.028	9.4	LOS A	0.1	0.9	0.23	0.61	47.7
2	R	4	33.0	0.028	10.7	LOS B	0.1	0.9	0.23	0.73	47.5
Approach		24	6.8	0.028	9.6	LOS B	0.1	0.9	0.23	0.63	47.7
West: Colin Paul Street West											
5	L	4	29.0	0.055	9.0	LOS A	0.0	0.0	0.00	1.13	49.0
6	T	100	2.6	0.055	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		104	3.6	0.055	0.3	LOS A	0.0	0.0	0.00	0.04	59.5
All Vehicles		292	4.0	0.090	1.6	NA	0.7	4.8	0.15	0.12	55.6

Table 5-8: PM Level of Service at the Intersection between Colin Paul Street and Fehrsen Drive

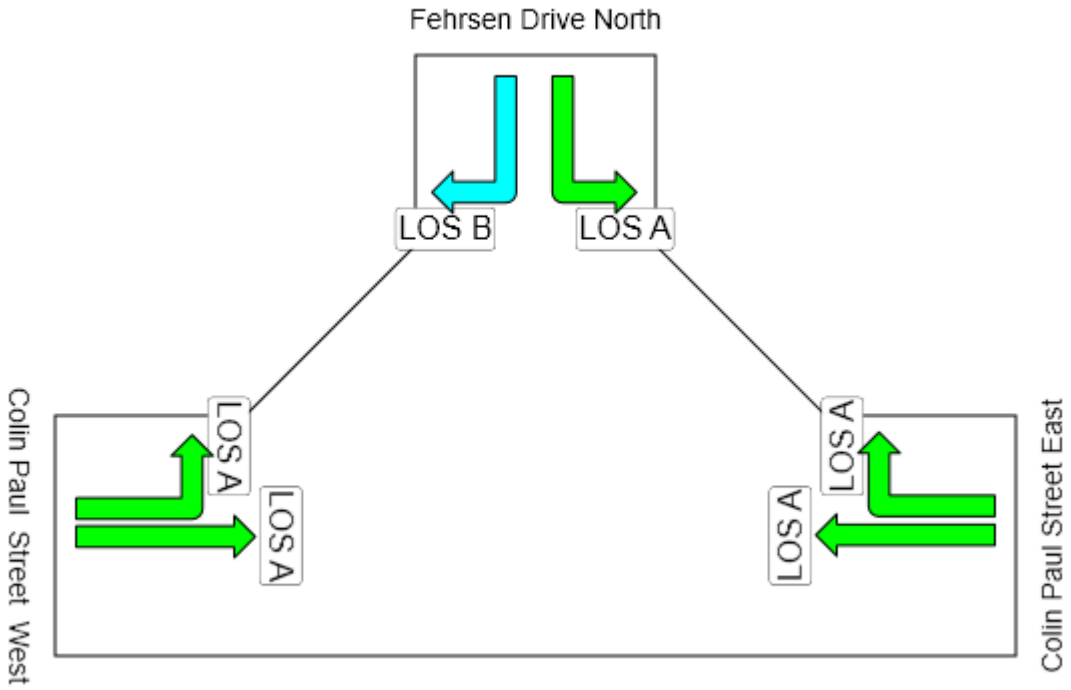

Figure 5-3: PM graphical presentation of the Level of Service at the Intersection between Colin Paul Street and Fehrsen Drive

5.3.2 Colin Paul Street and M88 (Rienert Avenue)

The intersection movement I.D is shown in Figure 5-4 and Figure 5-5. The AM Level of Service based on average delay for all lanes is LOS D, Table 5-9. The worst LOS is E on Colin Paul Street, Figure 5-6.

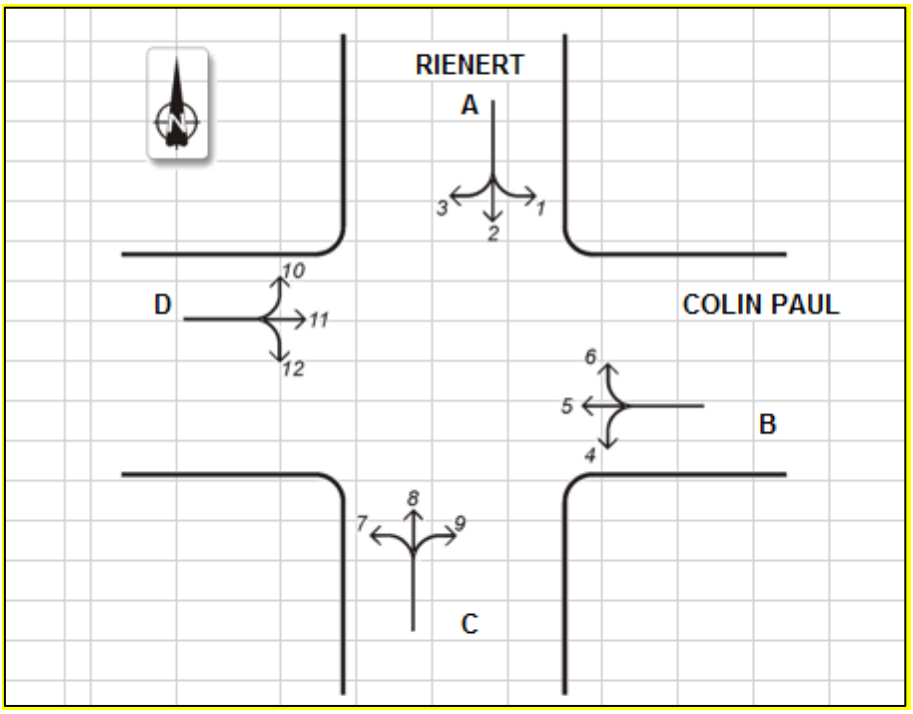

Figure 5-4: Traffic flow movements at the intersection between Colin Paul Street and M88 (Rienert Avenue)

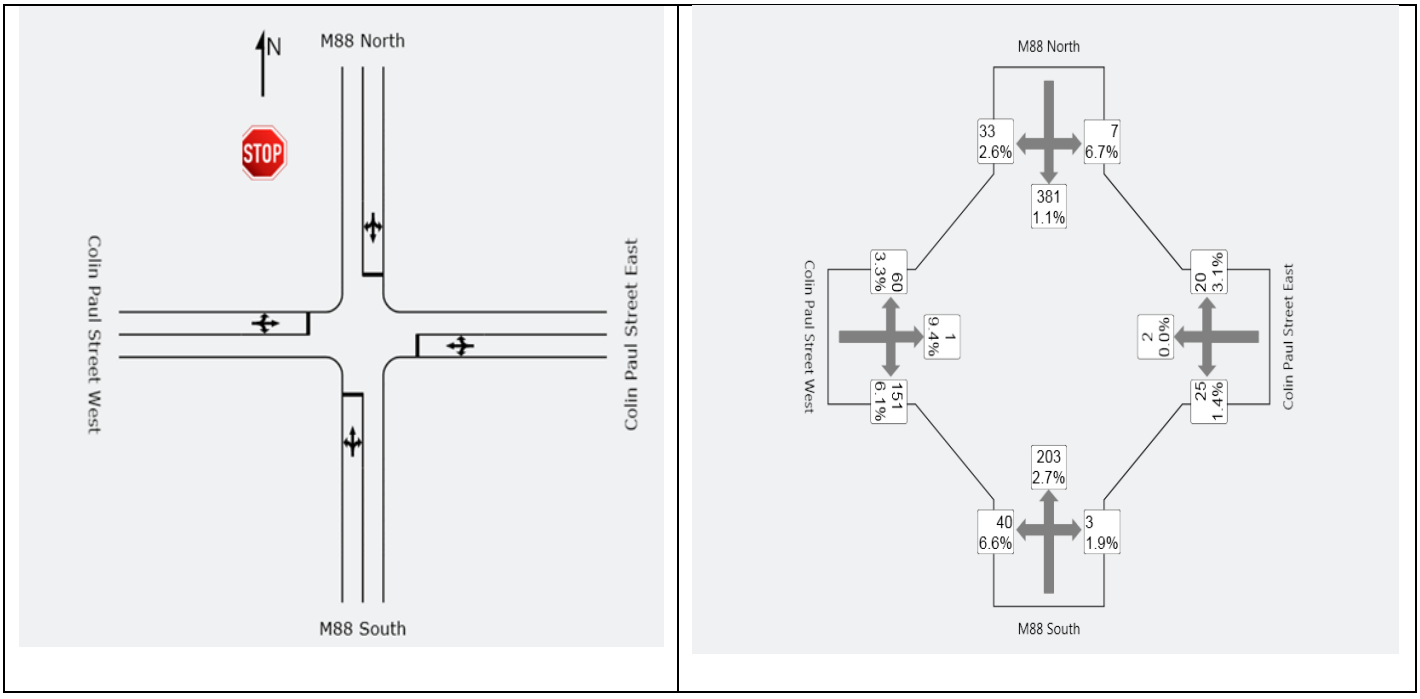

Figure 5-5: All way stop intersection layout of Colin Paul Street and M88 (Rienert Avenue)

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: M88 South											
7	L	46	6.6	0.522	22.0	LOS C	2.5	17.8	0.91	1.28	38.8
8	T	226	2.7	0.521	21.4	LOS C	2.5	17.8	0.91	1.28	39.0
9	R	7	1.9	0.513	21.6	LOS C	2.5	17.8	0.91	1.29	39.0
Approach		278	3.3	0.521	21.5	LOS C	2.5	17.8	0.91	1.28	39.0
East: Colin Paul Street East											
4	L	38	1.4	0.468	38.8	LOS E	2.2	15.7	1.00	1.25	29.7
5	T	8	0.0	0.471	38.3	LOS E	2.2	15.7	1.00	1.25	29.8
6	R	44	3.1	0.468	38.7	LOS E	2.2	15.7	1.00	1.25	29.8
Approach		90	2.1	0.467	38.7	LOS E	2.2	15.7	1.00	1.25	29.8
North: M88 North											
1	L	13	6.7	0.735	25.6	LOS D	4.9	34.4	0.96	1.48	36.5
2	T	414	1.1	0.736	24.8	LOS C	4.9	34.4	0.96	1.48	36.7
3	R	38	2.6	0.735	25.2	LOS D	4.9	34.4	0.96	1.48	36.7
Approach		464	1.4	0.736	24.9	LOS D	4.9	34.4	0.96	1.48	36.7
West: Colin Paul Street West											
10	L	70	3.3	0.742	38.2	LOS E	5.0	36.3	1.00	1.48	30.0
11	T	2	9.4	0.794	38.2	LOS E	5.0	36.3	1.00	1.48	30.1
12	R	176	6.1	0.744	38.2	LOS E	5.0	36.3	1.00	1.48	30.1
Approach		248	5.3	0.745	38.2	LOS E	5.0	36.3	1.00	1.48	30.0
All Vehicles		1080	2.8	0.745	28.2	LOS D	5.0	36.3	0.96	1.41	34.8

Table 5-9:AM peak LOS for the intersection of Colin Paul Street and M88 (Rienert Avenue)

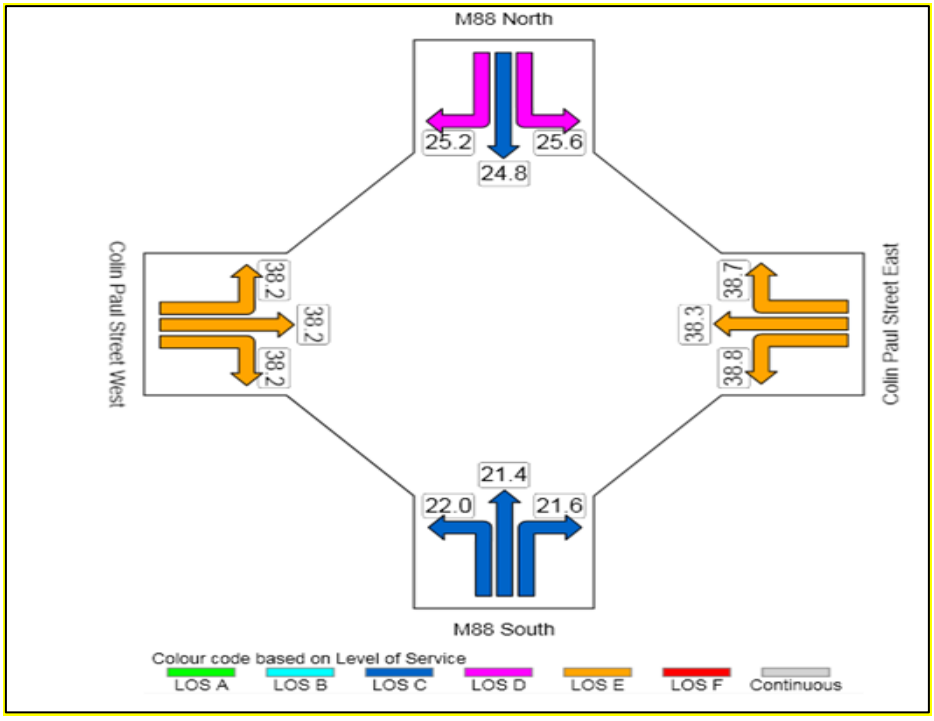

Figure 5-6: AM peak average control delay per vehicle at intersection between Colin Paul Street and M88 (Rienert Avenue)

The intersection PM Level of Service based on average delay is LOS C. The Level of Service worst movement is experienced on the Colin Paul approaches with LOS D.

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: M88 South											
7	L	84	6.6	0.515	17.8	LOS C	2.3	16.3	0.76	1.28	41.7
8	T	306	2.7	0.515	17.2	LOS C	2.3	16.3	0.76	1.28	42.0
9	R	56	1.9	0.514	17.3	LOS C	2.3	16.3	0.76	1.29	41.9
Approach		445	3.3	0.515	17.3	LOS C	2.3	16.3	0.76	1.28	41.9
East: Colin Paul Street East											
4	L	20	1.4	0.156	26.9	LOS D	0.6	4.2	0.97	1.16	35.6
5	T	12	0.0	0.156	26.4	LOS D	0.6	4.2	0.97	1.16	35.8
6	R	7	3.1	0.155	26.7	LOS D	0.6	4.2	0.97	1.16	35.7
Approach		39	1.3	0.156	26.7	LOS D	0.6	4.2	0.97	1.16	35.7
North: M88 North											
1	L	28	6.7	0.471	16.8	LOS C	1.9	13.5	0.70	1.25	42.3
2	T	281	1.1	0.469	16.1	LOS C	1.9	13.5	0.70	1.25	42.6
3	R	132	2.6	0.469	16.4	LOS C	1.9	13.5	0.70	1.27	42.5
Approach		441	1.9	0.469	16.3	LOS C	1.9	13.5	0.70	1.26	42.6
West: Colin Paul Street West											
10	L	76	3.3	0.438	30.6	LOS D	2.0	14.5	1.00	1.24	33.6
11	T	12	9.4	0.444	30.5	LOS D	2.0	14.5	1.00	1.24	33.8
12	R	28	6.1	0.435	30.5	LOS D	2.0	14.5	1.00	1.24	33.7
Approach		116	4.6	0.438	30.6	LOS D	2.0	14.5	1.00	1.24	33.7
All Vehicles		1041	2.8	0.515	18.7	LOS C	2.3	16.3	0.77	1.26	40.8

Table 5-10: PM peak LOS for the intersection of Colin Paul Street and M88 (Rienert Avenue)

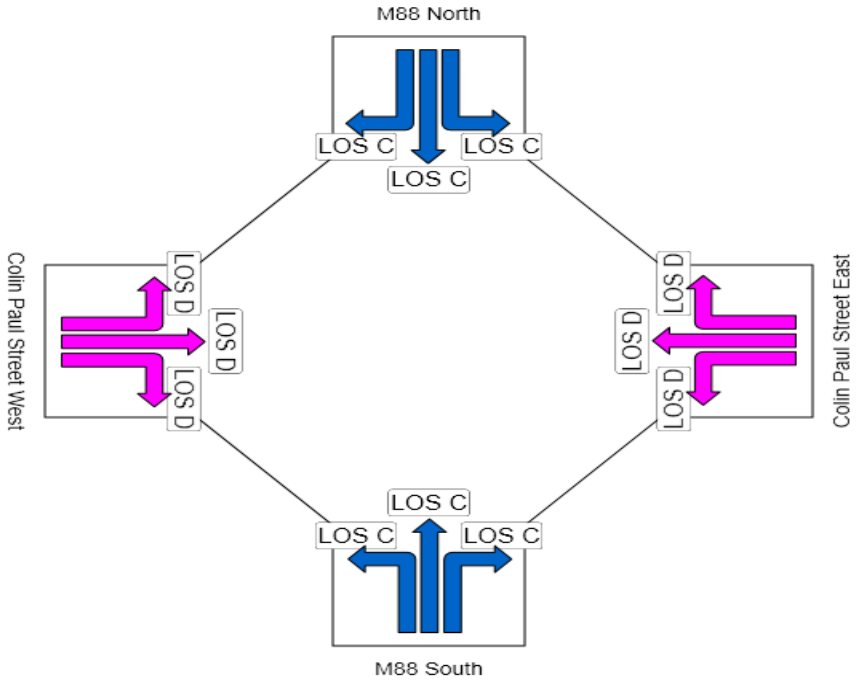

Figure 5-7: Graphical presentation of the PM peak LOS for the intersection of Colin Paul Street and M88 (Rienert Avenue)

5.3.3 M88 (Rienert Avenue) and M90 (C.R Swart Drive)

The intersection layout is shown in Figure 5-8. The AM peak Level of Service based on the average delay for the intersection is LOS F, Table 5-11 and *Figure 5-9*.

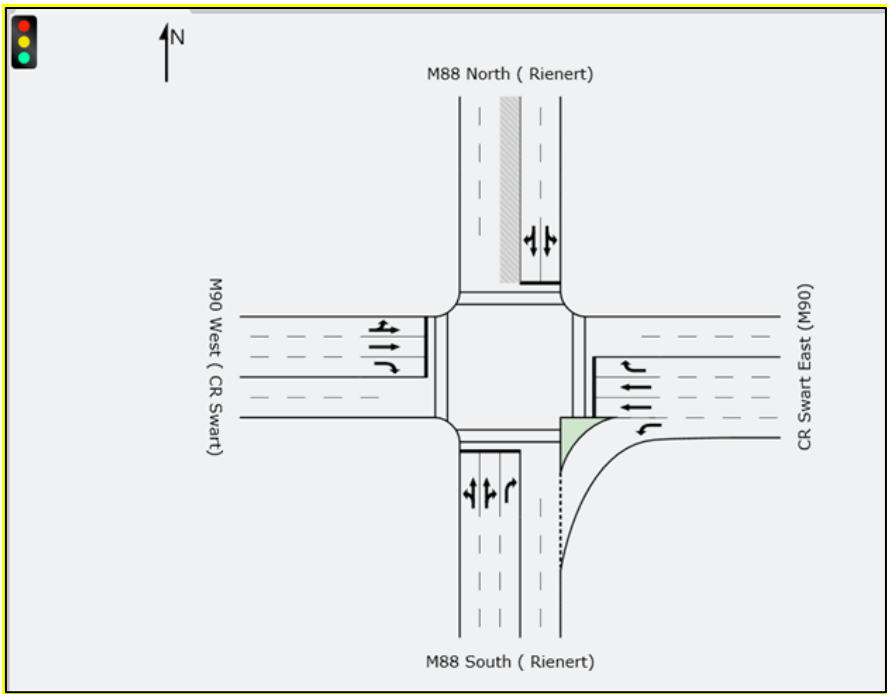

Figure 5-8: M88 (Rienert Avenue) and M90 (C.R Swart Drive) intersection layout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: M88 South (Rienert)											
7	L	220	3.7	1.127	159.1	LOS F	24.7	178.6	1.00	1.11	11.1
8	T	235	2.8	0.968	94.6	LOS F	21.4	153.8	1.00	1.05	16.2
9	R	549	1.7	0.547	31.2	LOS C	26.0	184.7	0.70	0.82	32.4
Approach		1004	2.4	1.127	74.1	LOS E	26.0	184.7	0.84	0.94	19.6
East: CR Swart East (M90)											
4	L	235	4.1	0.161	9.9	LOS A	4.3	31.1	0.23	0.65	47.3
5	T	958	5.0	2.002	538.5	LOS F	87.1	636.1	1.00	1.87	3.8
6	R	73	2.9	1.007	117.8	LOS F	8.4	60.4	1.00	0.97	14.1
Approach		1266	4.7	2.001	416.0	LOS F	87.1	636.1	0.86	1.59	4.8
North: M88 North (Rienert)											
1	L	141	3.0	2.399	727.5	LOS F	109.9	783.5	1.00	1.99	2.9
2	T	412	1.9	2.399	719.2	LOS F	109.9	783.5	1.00	1.99	2.9
3	R	191	1.6	3.096	1660.8	LOS F	44.0	312.1	1.00	1.56	1.3
Approach		744	2.0	3.108	962.7	LOS F	109.9	783.5	1.00	1.88	2.2
West: M90 West (CR Swart)											
10	L	6	24.1	1.858	484.6	LOS F	78.0	567.1	1.00	1.80	4.2
11	T	888	4.3	1.863	475.7	LOS F	78.2	567.3	1.00	1.80	4.2
12	R	160	4.4	2.216	647.3	LOS F	31.2	226.4	1.00	1.46	3.2
Approach		1054	4.4	2.216	501.7	LOS F	78.2	567.3	1.00	1.75	4.0
All Vehicles		4068	3.6	3.108	453.9	LOS F	109.9	783.5	0.91	1.52	4.4

Table 5-11: AM LOS for the intersection M88(Rienert Avenue) and M90 (C.R Swart Drive)

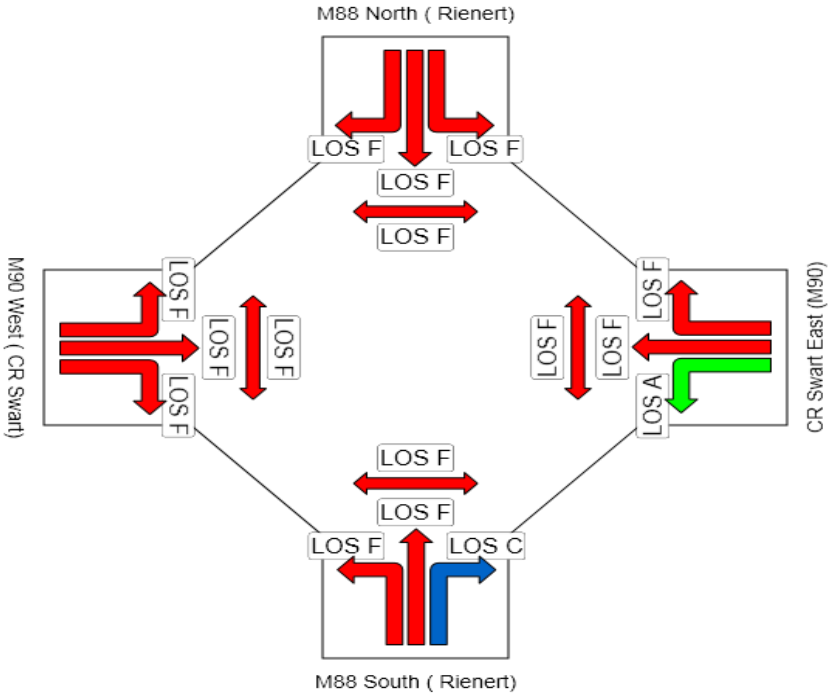

Figure 5-9: AM LOS for the intersection M88 (Rienert Avenue) and M90 (C.R Swart Drive)

The PM Level of Service based on the average overall delay for all lanes is LOS D as shown in , Table 5-12 and Figure 5-10.

Lane Use and Performance																
	Demand Flows				HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Length	SL Type	Cap. Adj.	Prob. Block.
	L	T	R	Total							Vehicles	Distance				
	veh/h	veh/h	veh/h	veh/h	%	veh/h	v/c	%	sec		veh	m	m		%	%
South: M88 South (Rienert)																
Lane 1	76	115	0	192	3.2	338	0.567	100	43.9	LOS D	10.4	74.8	500	–	0.0	0.0
Lane 2	0	176	30	206	2.6	364	0.567	100	41.6	LOS D	11.0	78.8	500	–	0.0	0.0
Lane 3	0	0	114	114	1.7	202	0.567	100	55.6	LOS E	7.2	51.0	500	–	0.0	0.0
Approach	76	292	144	512	2.6		0.567		45.6	LOS D	11.0	78.8				
East: CR Swart East (M90)																
Lane 1	88	0	0	88	4.1	1407	0.062	100	8.7	LOS A	0.9	6.2	500	–	0.0	0.0
Lane 2	0	401	0	401	5.0	642	0.624	100	29.9	LOS C	17.6	128.6	500	–	0.0	0.0
Lane 3	0	401	0	401	5.0	642	0.624	100	29.9	LOS C	17.6	128.6	500	–	0.0	0.0
Lane 4	0	0	187	187	2.9	218	0.857	100	63.5	LOS E	11.9	85.1	500	–	0.0	0.0
Approach	88	802	187	1076	4.6		0.857		34.0	LOS C	17.6	128.6				
North: M88 North (Rienert)																
Lane 1	188	119	0	307	2.6	353	0.870	100	56.8	LOS E	17.9	127.8	500	–	0.0	0.0
Lane 2	0	30	32	62	1.7	71	0.870	100	66.9	LOS E	4.9	35.0	500	–	0.0	0.0
Approach	188	149	32	369	2.4		0.870		58.5	LOS E	17.9	127.8				
West: M90 West (CR Swart)																
Lane 1	48	517	0	566	6.0	634	0.892	100	45.8	LOS D	31.2	229.8	500	–	0.0	0.0
Lane 2	0	575	0	575	4.3	645	0.892	100	44.8	LOS D	31.7	229.8	500	–	0.0	0.0
Lane 3	0	0	28	28	4.4	216	0.130	100	51.8	LOS D	1.9	13.9	500	–	0.0	0.0
Approach	48	1092	28	1169	5.1		0.892		45.5	LOS D	31.7	229.8				
Intersection				3126	4.2		0.892		43.1	LOS D	31.7	229.8				

Table 5-12: PM LOS for the intersection M88(Rienert Avenue) and M90 (C.R Swart Drive)

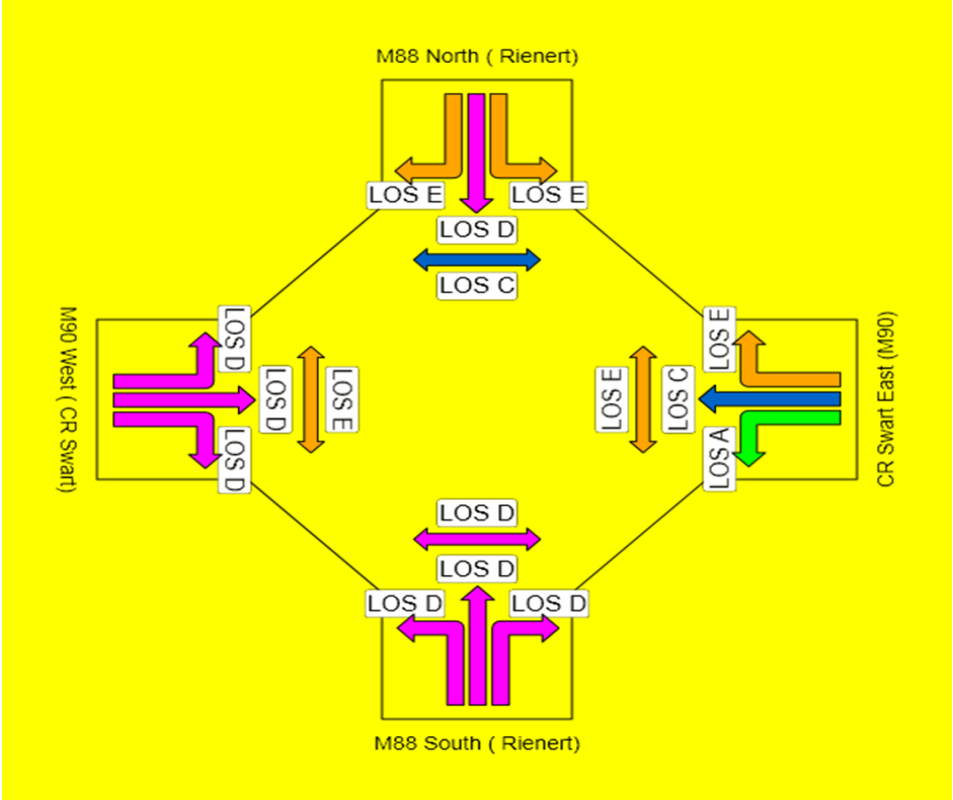

Figure 5-10: PM LOS for the intersection M88 (Rienert Avenue) and M90 (C.R Swart Drive)

5.3.4 M88 (Rienert Avenue) and R25

The intersection layout between M88 and R25 is shown in Figure 5-11. The AM peak traffic movement at the intersection is operating at LOS E based on average delay, Table 5-13 and Figure 5-12. The PM peak traffic Level of Service of the intersection is LOS F based on average delay for all vehicle movements, Table 5-14 and Figure 5-13.

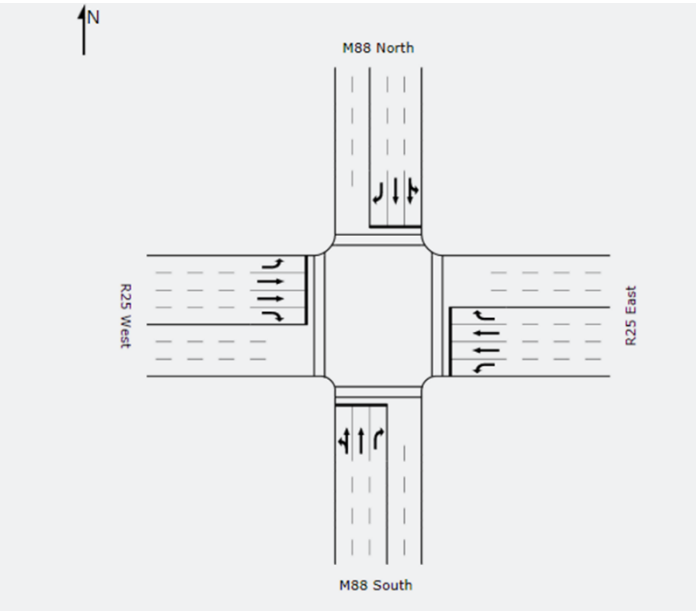

Figure 5-11: Signalised intersection layout for M88 and R25

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: M88 South											
7	L	191	1.9	0.602	70.5	LOS E	14.5	103.0	0.98	0.82	20.4
8	T	92	1.7	0.276	58.1	LOS E	7.5	53.4	0.91	0.72	22.3
9	R	144	2.2	0.513	71.6	LOS E	11.4	81.6	0.97	0.81	20.3
Approach		427	2.0	0.602	68.2	LOS E	14.5	103.0	0.96	0.80	20.7
East: R25 East											
4	L	334	2.4	0.392	35.8	LOS D	16.9	120.8	0.70	0.81	30.2
5	T	1658	4.1	0.935	56.4	LOS E	66.2	479.9	1.00	1.03	22.7
6	R	36	0.7	0.415	87.4	LOS F	3.9	27.1	1.00	0.73	17.7
Approach		2029	3.8	0.936	53.6	LOS D	66.2	479.9	0.95	0.99	23.5
North: M88 North											
1	L	89	0.9	0.932	91.8	LOS F	26.4	187.0	1.00	1.03	17.4
2	T	531	1.7	0.932	83.5	LOS F	26.7	189.4	1.00	1.04	17.6
3	R	249	3.3	0.897	87.9	LOS F	21.1	151.8	1.00	0.95	17.6
Approach		869	2.1	0.933	85.6	LOS F	26.7	189.4	1.00	1.01	17.6
West: R25 West											
10	L	24	6.4	0.029	30.9	LOS C	1.4	10.4	0.56	0.71	32.5
11	T	306	3.6	0.172	24.4	LOS C	8.0	57.8	0.62	0.51	34.7
12	R	79	1.9	0.926	101.1	LOS F	8.4	59.6	1.00	0.93	15.9
Approach		409	3.4	0.926	39.6	LOS D	8.4	59.6	0.69	0.60	28.1
All Vehicles		3733	3.1	0.936	61.2	LOS E	66.2	479.9	0.93	0.93	21.9

Table 5-13: AM LOS for the intersection M88(Rienert Avenue) and R25

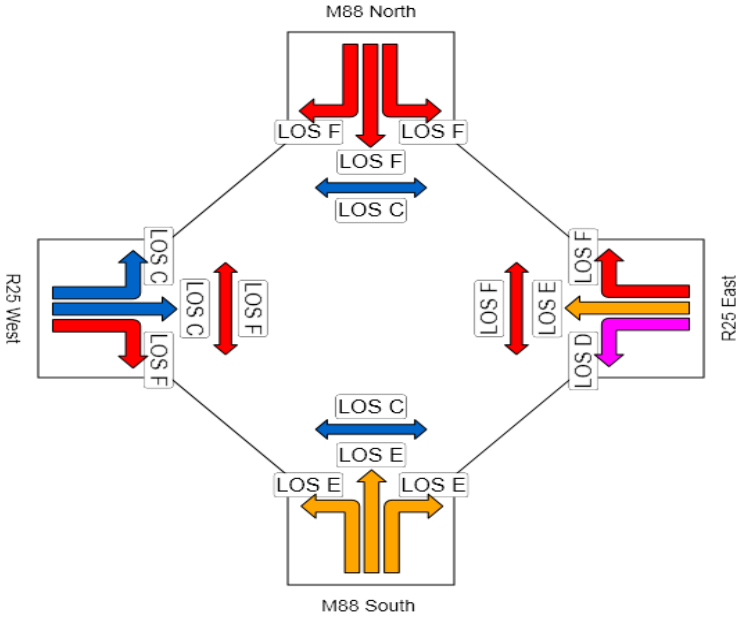

Figure 5-12: AM LOS for the intersection M88 (Rienert Avenue) and R25

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: M88 South											
7	L	46	1.9	0.668	72.8	LOS E	15.5	110.5	0.99	0.83	20.6
8	T	363	1.7	0.668	64.6	LOS E	15.7	111.5	0.99	0.82	20.8
9	R	243	2.2	1.110	150.4	LOS F	26.3	187.8	1.00	1.11	11.7
Approach		653	1.9	1.110	97.2	LOS F	26.3	187.8	1.00	0.93	16.1
East: R25 East											
4	L	170	2.4	0.192	31.2	LOS C	8.6	61.4	0.60	0.77	32.3
5	T	361	4.1	0.195	22.9	LOS C	9.0	65.3	0.60	0.51	35.5
6	R	121	0.7	0.890	94.4	LOS F	11.5	80.9	1.00	0.93	16.7
Approach		652	3.0	0.890	38.3	LOS D	11.5	80.9	0.68	0.65	28.8
North: M88 North											
1	L	74	0.9	0.376	69.3	LOS E	9.1	64.6	0.94	0.80	20.9
2	T	155	1.7	0.376	61.1	LOS E	9.4	66.4	0.94	0.75	21.5
3	R	14	3.3	0.064	71.3	LOS E	1.4	10.1	0.92	0.70	20.3
Approach		243	1.5	0.376	64.2	LOS E	9.4	66.4	0.94	0.76	21.2
West: R25 West											
10	L	20	6.4	0.023	29.2	LOS C	1.1	8.4	0.54	0.71	33.3
11	T	2141	3.6	1.155	138.2	LOS F	124.1	895.2	1.00	1.38	12.3
12	R	153	1.9	1.142	165.3	LOS F	17.9	127.6	1.00	1.12	10.8
Approach		2315	3.5	1.155	139.0	LOS F	124.1	895.2	1.00	1.36	12.2
All Vehicles		3862	3.0	1.155	110.3	LOS F	124.1	895.2	0.94	1.13	14.6

Table 5-14 PM LOS for the intersection M88(Rienert Avenue) and R25

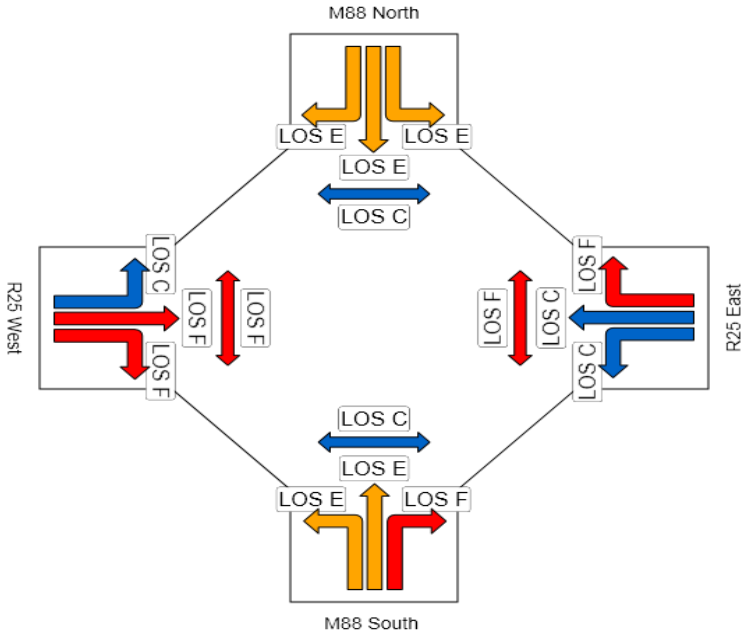

Figure 5-13: PM LOS for the intersection M88 (Rienert Avenue) and R25

6 TRAFFIC DEMAND ESTIMATION

6.1 General

The methodology for estimating traffic demand described in this appendix is a combination of “traffic growth” and "build-up" methods. The future traffic demand is estimated by applying a growth rate to existing traffic counts and by accumulating the trip generation of the expected township developments.

6.2 Traffic growth

Appropriate growth rates must be used for the estimation of future background traffic. Growth rates are only applied to traffic counts and not to the trip generation rates of developments since such rates are determined for fully occupied developments. Typical growth rates are provided in the Trip Data Manual, Table 6-1. For the Zuurfontein township establishment, a moderate annual growth rate of 3% would be used.

Table 1.1: Typical Traffic Growth Rates

Development Area	Growth rate
Low growth areas	0 - 3%
Average growth areas	3 - 4%
Above average growth areas	4 - 6%
Fast growing areas	6 - 8%
Exceptionally high growth areas	> 8%

Source: City Council of Pretoria (1998)

Table 6-1: TMH17 Typical growth rates for background traffic

6.3 Trip Generation

Trip generation fundamentally consists of four types of trips:

(a) Primary trips, - new trips on the total road network. This is in contrast with the other types of trips that are already on the road network, although they could be new on segments of the road network.

(b) Pass-by trips, - these are trips attracted from roads directly adjacent to a development and from which direct access is provided to the development. These trips are made as intermediate stops on the on the way from an origin to a primary destination without route diversion. Pass-by trips are not new trips on the road network, but are trips turning in and out of accesses to the development. The trips should therefore not be deducted from the trip generation of the development – it is only the trip distribution that is affected.

(c) Diverted trips – are the attracted trips from roads in the vicinity of the generator but which require a diversion to another road to gain access to the development. Diverted trips add traffic to streets adjacent to a site, but may not add traffic to other roads in the road network. The trips are similar to pass-by trips, except that they have to deviate to other roads to obtain access to the site. Diverted trips well tend to return to their original route and continue to their original destinations after visiting the development.

(d) Transferred trips, are those that are already present on the road network and which are visiting similar developments near to the proposed development and which has the potential of transferring or switching their destination to the proposed development. These trips are different from pass-by and diverted trips in that trips are wholly transferred from one development to another

The trip generation and other traffic characteristics of a development depend not only on the type of development but also on its size and for this project, the Single Dwelling Units would be used as provided in the township layout plan designed for 10 erven with 652 dwelling.

500	**Institutional**				
520	Public Primary School	1 Student	2.00	0.400	0.80
530	Public Secondary School	1 Student	2.00	0.400	0.80
536	Private School	1 Student	2.00	0.400	0.80
550	University / College	1 Student	1.90	0.110	0.21
560	Places of Public Worship (Weekend)	1 Seat	0.65	0.085	0.06
561	Places of Public Worship (Weekday)	1 Seat	0.60	0.085	0.05
565	Pre-School (Day Care Centre)	1 Student	3.00	0.275	0.83
566	Cemetery	1 Ha	6.00	0.050	0.30

Table *6-2* was extracted from Table 3.1 of TMH17(2013), and used to determine trips that would be generated by the township establishment.

Table 3.1: Daily Trip Generation Rates and Parameters

	Land Use	Size Units	Daily Trip rate $AADT_D$	Peaking Factor F_{QD}	Hourly Trip rate $F_{QD}.AADT_D$	Percent Heavy P_{HD}	E80 Axles Per HV E_{HD}	Size Adjustment 1+A/(1+sqm Size/B) Factor A	Factor B
100	**Industrial**								
110	Service Industry	100 sqm GLA	6.00	0.150	0.90	10%	1.34		
120	Heavy industry/manufacturing	100 sqm GLA	1.25	0.150	0.19	10%	2.35		
121	Mining	1 Employees	0.65	0.150	0.10	10%	2.35		
130	Industrial Area (Park)	100 sqm GLA	6.00	0.150	0.90	10%	2.35		
140	Manufacturing	100 sqm GLA	2.00	0.250	0.50	10%	2.35		
150	Warehousing and Distribution	100 sqm GLA	3.00	0.140	0.42	10%	2.35		
151	Mini-Warehousing	100 sqm GLA	2.50	0.100	0.25				
200	**Residential**								
210	Single Dwelling Units	1 D/Unit	4.00	0.225	0.90				
220	Apartments and Flats	1 D/Unit	2.75	0.225	0.62				
225	Student Apartments and Flats	1 D/Unit	1.25	0.225	0.28				
231	Townhouses (Simplexes and Duplexe	1 D/Unit	3.75	0.225	0.84				
232	Multi-Level Townhouses	1 D/Unit	3.25	0.225	0.73				
251	Retirement Village	1 D/Unit	3.40	0.110	0.37				
254	Old-Age Home	1 D/Unit	2.50	0.100	0.25				
260	Recreational Homes	1 D/Unit	3.00	0.100	0.30				
500	**Institutional**								
520	Public Primary School	1 Student	2.00	0.400	0.80				
530	Public Secondary School	1 Student	2.00	0.400	0.80				
536	Private School	1 Student	2.00	0.400	0.80				
550	University / College	1 Student	1.90	0.110	0.21				
560	Places of Public Worship (Weekend)	1 Seat	0.65	0.085	0.06				
561	Places of Public Worship (Weekday)	1 Seat	0.60	0.085	0.05				
565	Pre-School (Day Care Centre)	1 Student	3.00	0.275	0.83				
566	Cemetery	1 Ha	6.00	0.050	0.30				

Table 6-2: TMH17 table 3.1 daily trip generation rates and parameters

210 Single Dwelling Units									1 D/Unit
Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.00	1.00				0.50	0.50		
% Heavy									
In/Out	25:75	70:30				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

220 Apartments and Flats									1 D/Unit
Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.65	0.65				0.35	0.35		
% Heavy									
In/Out	25:75	70:30				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

Table 6-3: THM17 Table 3.3: Peak-hour trip generation rates and parameters

6.4 Trips from the Proposed Township

From the township layout plan, there will be 2 erven with proposed 700 dwelling units as apartments and flats. An additional erf will consist of a primary school and 300 dwelling units. A design of 1000 dwelling units shall be used in the determination of the traffic trips. In addition, there are 12 erven with 12 medium density dwelling units. The directional split during peak AM and PM assumed is 85:15 and 15:85 respectively and slightly differ from the proposed THM17 Table 3.3 outlined above in Table 6-3. Table 6-4 is a determination of the peak hourly volume generated by the land use.

Land use	Units	Trips	AADT	Peaking Factor	Peak hourly flow
Residential 4 (Flats or apartments)	1000	2.75	2750	0.225	619
School	660	2	1320	0.4	528
Total			4 070		1 147

Table 6-4: Trip peak hourly volumes generated by the proposed development

6.5 Total Traffic Demand

6.5.1 General

The total traffic demand was determined by first estimating the background traffic and then adding the trip generation of the development to this background traffic. The background ("without" development) traffic demand is estimated as follows:

- Traffic counts are used to estimate current demand.
- From the traffic counts, subtract the trip generation of the existing exercised rights of the development.

- The resultant traffic is then grown using an appropriate growth rate
- Traffic from other developments and future development is added to the grown traffic to determine future background traffic

6.5.2 Traffic demand on existing intersections

From the foregoing, the following are proposed:

- Growth rate on background traffic is varied between 2% to 4%. Therefore, a moderate rate of 3% shall be used.
- The analysis period is 2017 and a 5-year horizon, that is, the time taken to opening date assuming full buildout and occupancy is year 2022. THM16 recommends that TIAs be done for a maximum horizon of 5 years due to drastic changes that are expected to take place because of previously approved Municipality Plans.

The total traffic demand for the four intersections is shown in Table 6-5 and Table 6-6 for the AM and PM peak movements.

Movement	Colin Paul Street and Fehresen Drive					Rienert Avenue (M88) and Colin Paul Street					Rienert Avenue (M88) and CR Swart Drive (M90)				
I.D	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF
1	35	462	497	1.50%	0.54	8	0	8	6.73%	0.44	140	417	557	3.05%	0.82
2	1	0	1	33.33%	0.25	442	0	442	1.06%	0.92	387	151	538	1.87%	0.81
3	58	92	150	3.46%	0.89	38	76	114	2.58%	0.69	126	136	262	1.57%	0.57
4	7	82	88	7.23%	0.30	29	0	29	1.41%	0.57	210	0	210	4.09%	0.77
5	1	0	1	28.57%	0.00	2	5	7	0.00%	0.50	1021	0	1021	5.00%	0.92
6	243	527	770	2.63%	0.83	23	0	23	3.09%	0.45	73	20	93	2.85%	0.83
7						46	92	139	6.64%	0.77	151	0	151	3.73%	0.59
8						235	0	235	2.74%	0.67	259	72	330	2.78%	0.00
9						3	0	3	1.85%	0.75	445	0	445	1.67%	0.70
10						70	280	349	3.26%	0.88	2	1	3	24.07%	0.50
11						1	5	6	9.38%	0.42	886	0	886	4.28%	0.89
12						175	704	879	6.11%	0.86	96	0	96	4.43%	0.52

Movement	Rienert Avenue (M88) and R25				
I.D	Background Volume	New Trafic	Total	%HV	PHF
1	72	0	72	0.9%	0.70
2	339	61	400	1.7%	0.55
3	228	0	228	3.3%	0.79
4	248	45	293	2.4%	0.64
5	1711	0	1711	4.1%	0.89
6	28	0	28	0.7%	0.67
7	148	124	272	1.9%	0.67
8	68	57	126	1.7%	0.64
9	118	99	217	2.2%	0.71
10	19	0	19	6.4%	0.67
11	248	0	248	3.6%	0.70
12	44	8	52	1.9%	0.48

Table 6-5: Total AM peak traffic demand for the four intersections under the study for a horizon of 5 years and moderate growth rate of 3%.

Movement	Colin Paul Street and Fehresen Drive					Rienert Avenue (M88) and Colin Paul Street					Rienert Avenue (M88) and CR Swart Drive (M90)				
I.D	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF
1	12	82	93	1.50%	0.50	15	0	15	6.73%	0.46	188	36	224	3.05%	0.92
2	1	0	1	33.33%	0.25	303	0	303	1.06%	0.93	148	28	177	1.87%	0.79
3	154	520	674	3.46%	0.90	95	555	650	2.58%	0.62	23	4	28	1.57%	0.69
4	12	462	474	7.23%	0.63	6	0	6	1.41%	0.25	82	0	82	4.09%	0.88
5	1	0	1	28.57%	0.25	3	0	3	0.00%	0.25	613	0	613	5.00%	0.84
6	97	92	189	2.63%	0.84	6	0	6	3.09%	0.63	187	177	364	2.85%	0.73
7						73	427	500	6.64%	0.75	49	0	49	3.73%	0.55
8						315	0	315	2.74%	0.89	321	305	626	2.78%	0.82
9						29	0	29	1.85%	0.45	144	0	144	1.67%	0.92
10						74	125	199	3.26%	0.84	19	18	36	24.07%	0.54
11						3	6	9	9.38%	0.25	1127	0	1127	4.28%	0.80
12						26	43	68	6.11%	0.79	23	0	23	4.43%	0.56

Movement	Rienert Avenue (M88) and R25				
I.D	Background Volume	New Trafic	Total	%HV	PHF
1	56	0	56	0.9%	0.92
2	128	198	326	1.7%	0.79
3	13	0	13	3.3%	0.69
4	126	196	323	2.4%	0.88
5	372	0	372	4.1%	0.84
6	102	0	102	0.7%	0.73
7	36	7	43	1.9%	0.55
8	345	67	413	1.7%	0.82
9	260	50	310	2.2%	0.92
10	17	0	17	6.4%	0.54
11	1986	0	1986	3.6%	0.80
12	103	160	264	1.9%	0.56

Table 6-6: Total PM peak traffic demand for the four intersection under the study for a horizon of 5 years and moderate growth rate of 3%.

6.5.3 Traffic Demand on proposed Accesses

The proposed access layout on Portion 296, Farm Zuurfontein 33 IR are shown in Figure 6-1 to Figure 6-4.

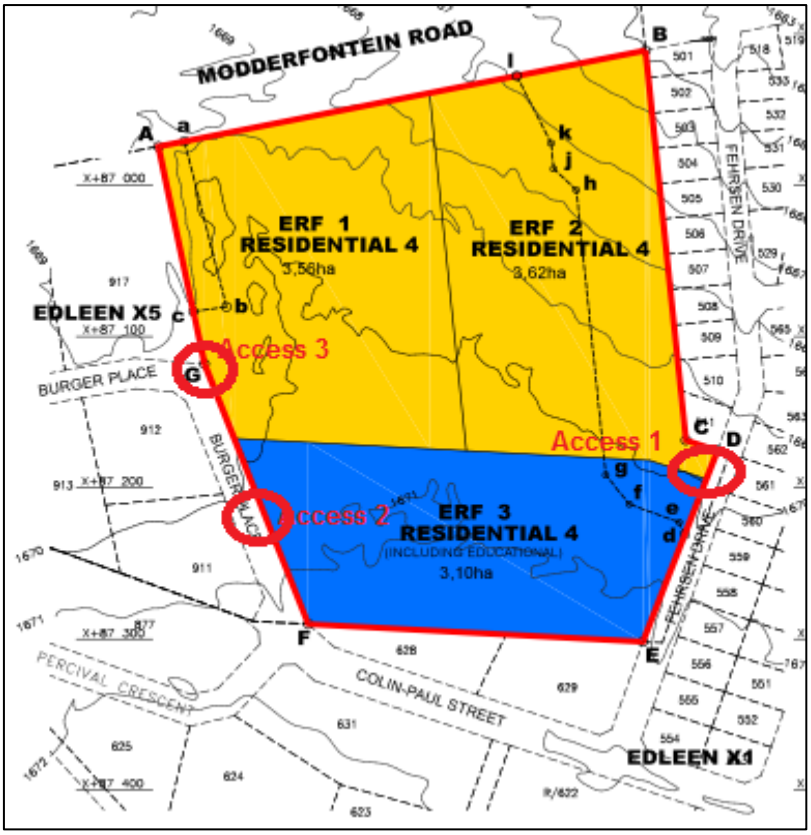

Figure 6-1: Proposed accesses for Portion 296, Farm Zuurfontein 33 IR

The total estimated traffic demand for the proposed accesses is shown in Table 6-7 and Table 6-8.Table 4-1 A 3% reduction is applied.

Land use	Units	Trips	AADT	Peaking Factor	Peak hourly flow
Residential 4 (Flats or apartments)	1000	2.75	2750	0.225	619
School	660	2	1320	0.4	528
Total			4 070		1 147

Table 6-7: Trip generated by the proposed development

Access	Peak hour directional split (In / Out) AM and PM	Reduction	Hourly Trips	Proportion	Trip Demand from Township
Access 1	85%	3%	945	47%	462
Access 2	85%	3%	945	24%	236
Access 3	85%	3%	945	29%	283
Total					981

Table 6-8: Estimated peak hourly volumes on access roads

The proposed layout for the accesses that would be used in the traffic impact assessment for the proposed township establishment are shown from Figure 6-2and and the peak hour flows are in Table 6-9 and Table 6-10.

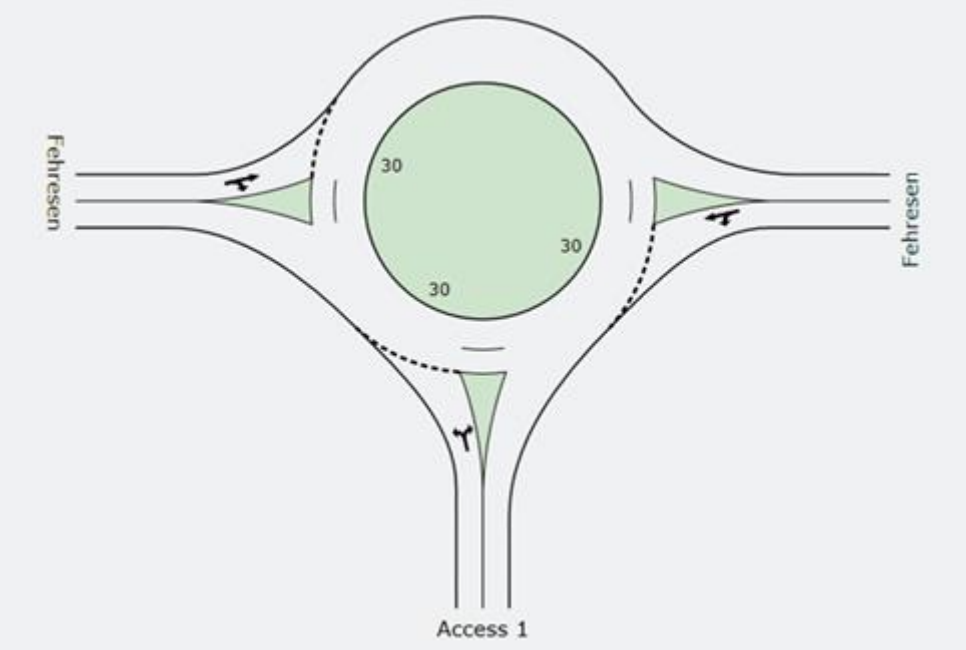

Figure 6-2: Proposed layout for access 1

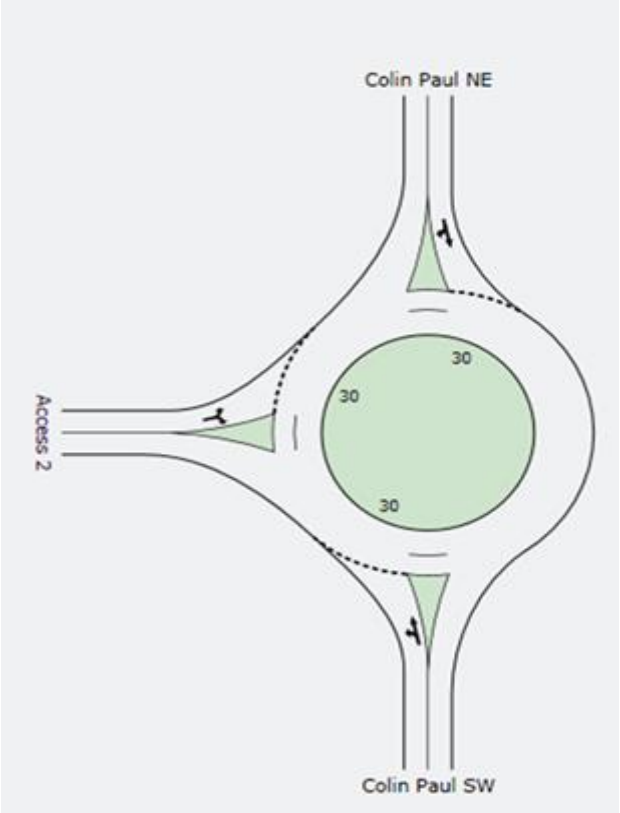

Figure 6-3:Proposed layout for access 2

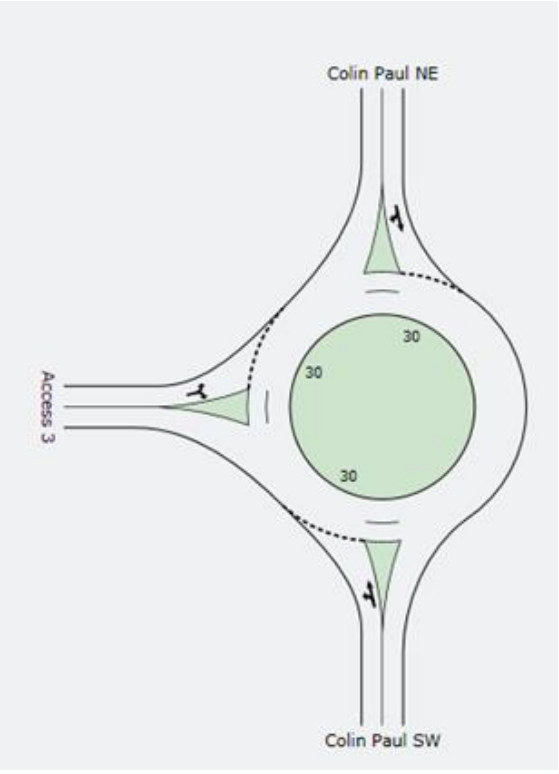

Figure 6-4: Proposed layout for access 3

Movement	Access 1					Access 2					Access 3				
I.D	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF
1	0	0	0	10.0%	0.8	0	236	236	10.0%	0.8	0	283	283	10.0%	0.80
2	0	462	462	10.0%	0.8	0	0	0	10.0%	0.8	0	0	0	10.0%	0.80
3	35	0	35	1.5%	0.54	58	50	108	3.5%	0.89	58	0	58	3.5%	0.89
4	0	0	0	10.0%	0.8	0	42	42	10.0%	0.8	0	50	50	10.0%	0.80
5	0	75	75	10.0%	0.8	0	0	0	10.0%	0.8	0	0	0	10.0%	0.80
6	0	6	6	10.0%	0.80	243	283	527	2.6%	0.83	243	0	243	2.6%	0.83

Table 6-9: Estimated AM peak hourly volumes on proposed accesses to Portion 296, Farm Zuurfontein 33 IR

Movement	Access 1					Access 2					Access 3				
I.D	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF	Background Volume	New Trafic	Total	%HV	PHF
1	0	0	0	10.0%	0.8	0	42	42	10.0%	0.8	0	50	50	10.0%	0.80
2	0	82	82	10.0%	0.8	0	0	0	10.0%	0.8	0	0	0	10.0%	0.38
3	0	0	0	10.0%	0.8	154	0	154	3.5%	0.90	154	0	154	3.5%	0.90
4	0	0	0	10.0%	0.8	0	236	236	10.0%	0.8	0	283	283	10.0%	0.80
5	0	462	462	10.0%	0.8	0	0	0	10.0%	0.8	0	0	0	10.0%	0.80
6	1	0	1	28.6%	0.84	97	50	147	2.6%	0.84	97	0	97	2.6%	0.84

Table 6-10: Estimated PM peak hourly volumes on proposed accesses to Portion 296, Farm Zuurfontein 33 IR

7 TRAFFIC IMPACT FROM PROPOSED DEVELOPMENT

7.1 Operation of Existing Intersections from Proposed Development

The proposed township establishment will have an impact on the existing access roads, Municipality roads and provincial routes, especially the intersections.

7.1.1 Colin Paul Street and Fehresen Drive intersection

The intersection is currently at an LOS A and will operate under LOS F during morning and evening peak traffic trips derived from the proposed township establishment, Figure 7-1.

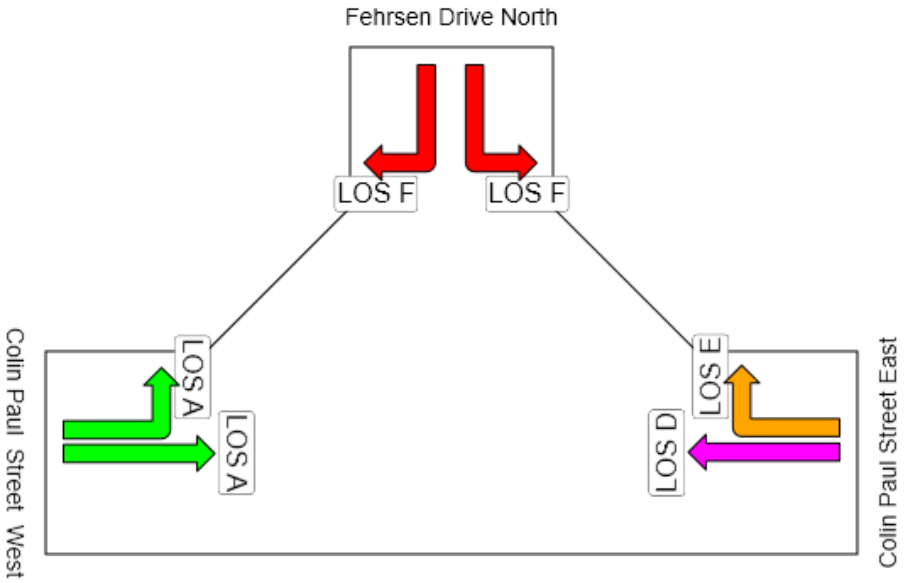

Figure 7-1:Impact of proposed township establishment on the AM LOS for Colin Paul Street and Fehresen Drive intersection

7.1.2 Colin Paul Street and M88 (Rienert Avenue) intersection

The AM Level of Service based on average delay for all lanes without the proposed development is LOS D. The worst LOS is E on Colin Paul Street. Due to increase in estimated vehicle trips, the estimated LOS for the intersection would be LOS F.

7.1.3 M88 (Rienert Avenue and M90 (C.R Swart Drive) intersection

This intersection is currently operating at LOS F in the morning and LOS D in the evenings. Additional vehicles from the proposed township establishment will worsen the performance of the intersection.

7.1.4 M88 (Rienert Avenue) and R25 intersection

This intersection is currently operating at LOS F in the morning and LOS D in the evenings. Additional vehicles from the proposed township establishment will worsen the situation.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusion

The proposed township establishment will adversely impact the level of service of existing intersections owned by the Municipality and one intersection under the jurisdiction of Gauteng Provincial Government.

Recommended intersections upgrades and signal timing are provided in the recommendations below together with the expected Level of Service at an annual growth rate of 2%.

The township establishment will not affect any future upgrades on provincial roads manged by Gauteng Department of Road and Transport based on the information made available at the time of the study.

8.2 Recommendations and Mitigation Measures

8.2.1 Colin Paul Street and Fehresen Drive intersection

The intersection will require an upgrade from an existing give way yield control to a signalised control in order to provide enough capacity for the proposed trips generated by the township. The proposed layout is shown in Figure 8-1. It is expected that the PM Level of Service on Colin Paul Street and Fehresen Drive intersection would be LOS D based on average delay on each lane for a signal timing in

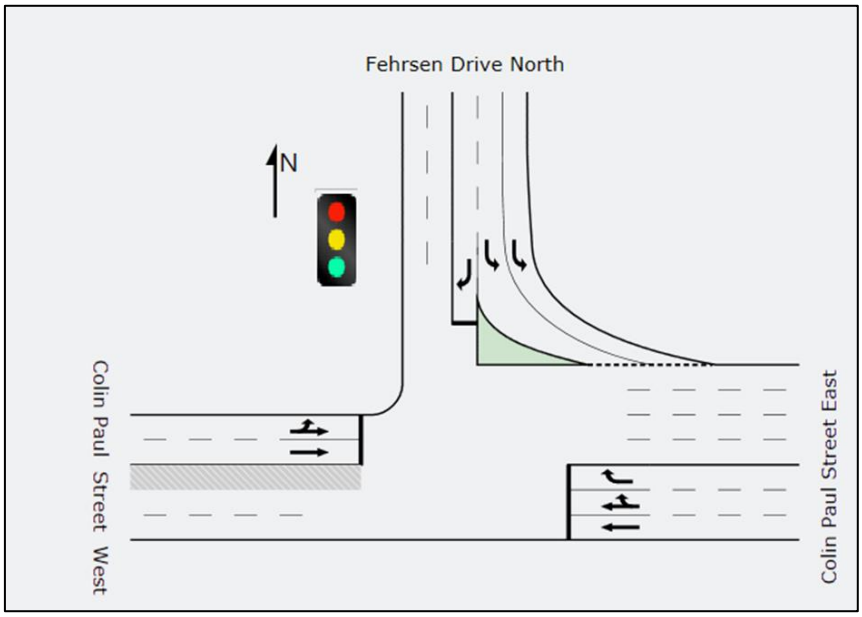

Figure 8-1: Proposed intersection layout to mitigate increased vehicle trips on Colin Paul Street and Fehresen Drive intersection

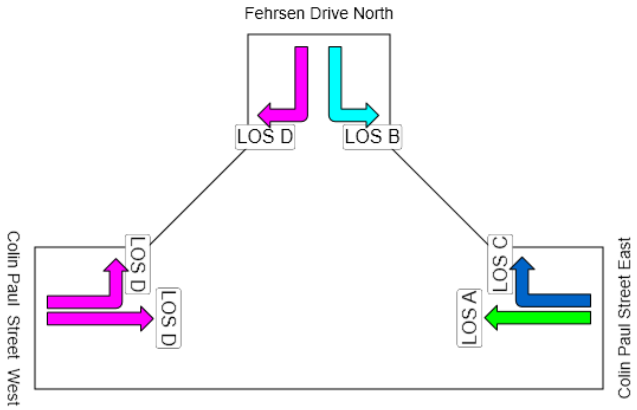

Figure 8-2: PM LOS on Colin Paul Street and Fehresen Drive intersection

Phase Timing Results

Phase	A	B	C
Green Time (sec)	25	7	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	20	5	5
Phase Time (sec)	49	16	15
Phase Split	61%	20%	19%

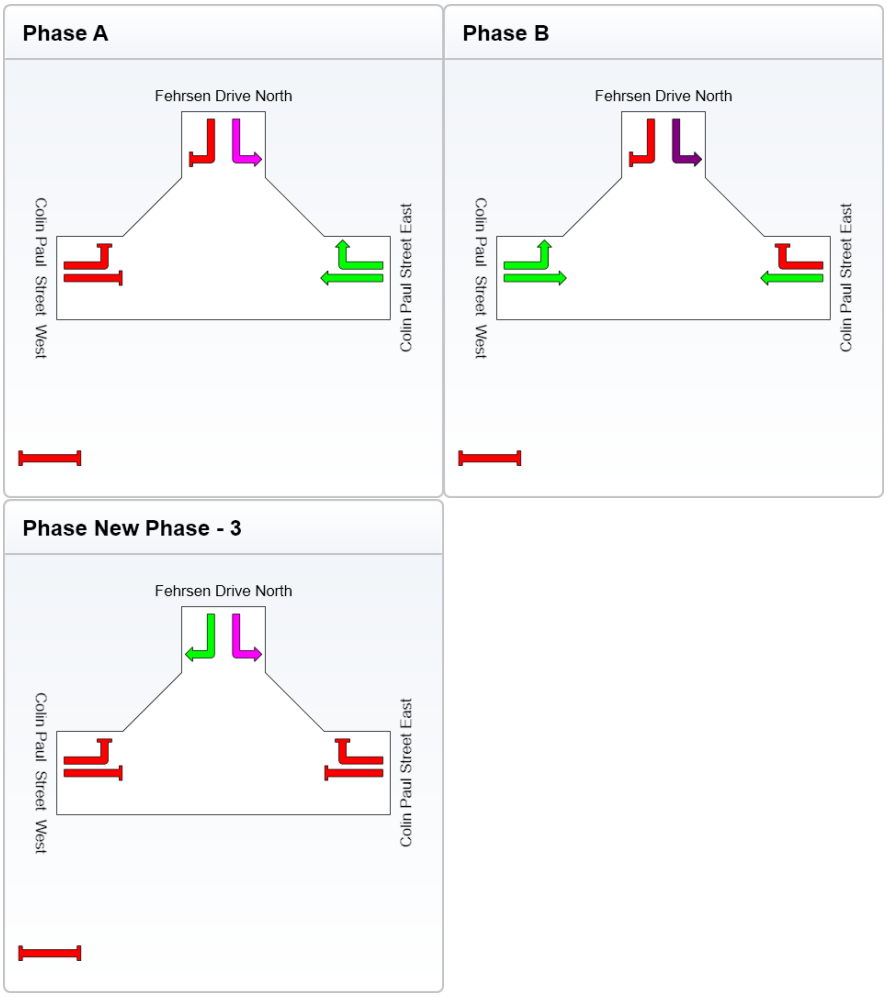

Figure 8-3: Signal timing to mitigate against increased in expected vehicle trips on Colin Paul Street and Fehresen Drive intersection

8.2.2 Colin Paul Street and M88 (Rienert Avenue) intersection

The proposed new layout is shown in Figure 8-5 and this is an upgrade from a four way stop controlled intersection shown in Figure 8-4 to a signalised control. The recommended signal timing is shown in Figure 8-6. It expected that the upgrade will provide a LOS C for servicing trips as a result of the proposed township establishment, Figure 8-7.

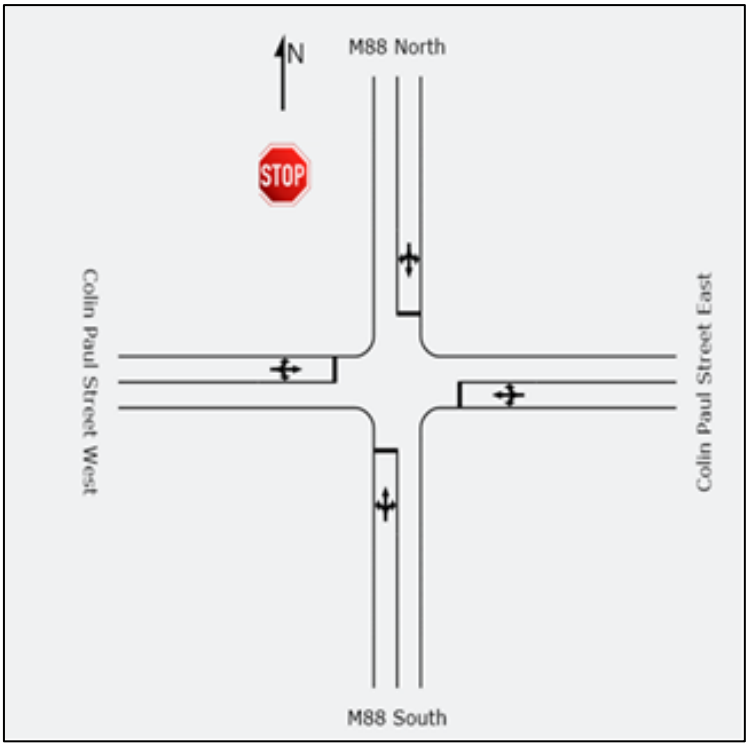

Figure 8-4: Existing layout for Colin Paul Street and M88 (Rienert Avenue) intersection

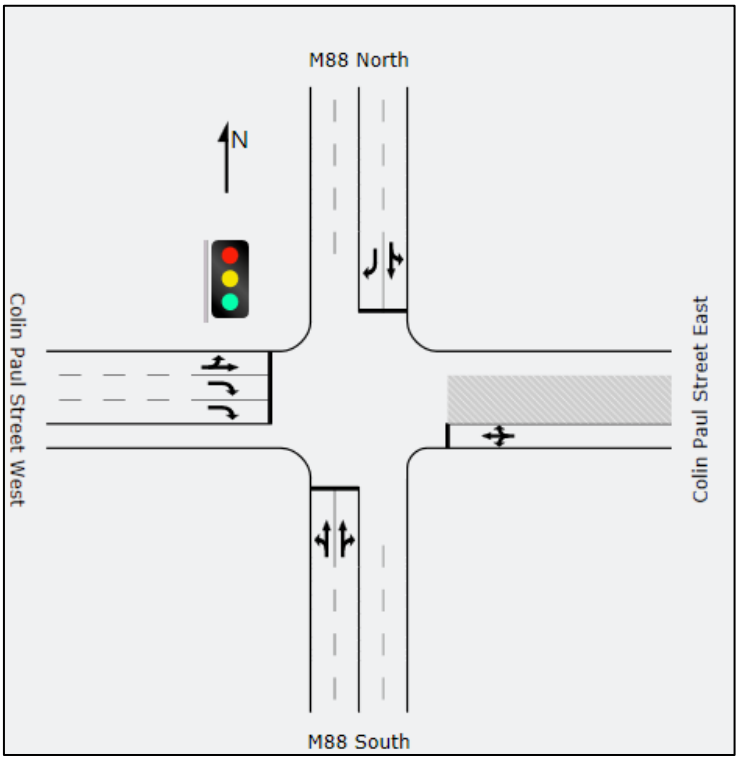

Figure 8-5: Proposed new layout for Colin Paul Street and M88 (Rienert Avenue) intersection

Phase Timing Results

Phase	A	B
Green Time (sec)	15	23
Yellow Time (sec)	4	4
All-Red Time (sec)	2	2
Phase Time (sec)	21	29
Phase Split	42%	58%

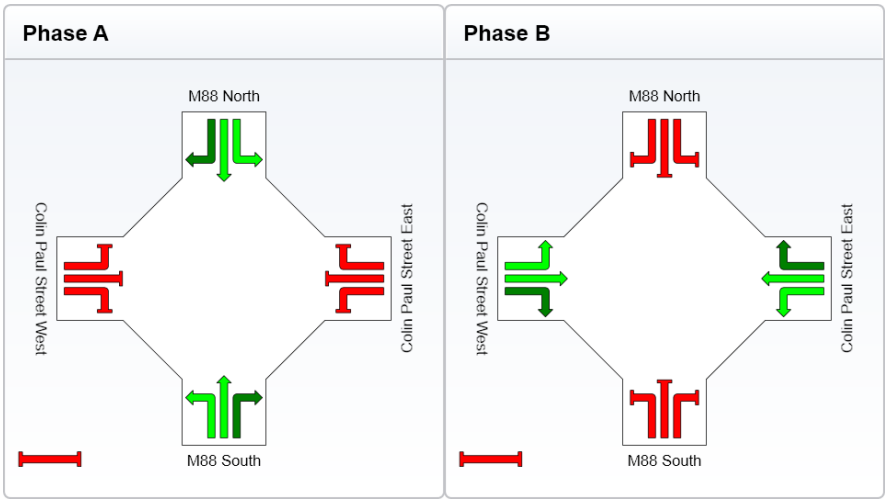

Figure 8-6: Proposed signal timing for Colin Paul Street and M88 (Rienert Avenue) intersection

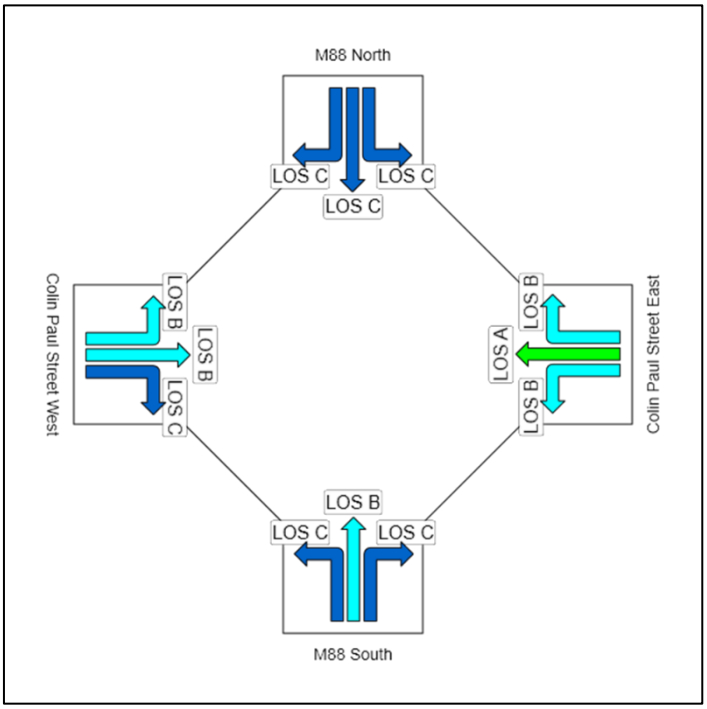

Figure 8-7: LOS for Colin Paul Street and M88 (Rienert Avenue) intersection upon upgrade under estimated vehicles during peak hours.

8.2.3 M88 (Rienert Avenue and M90 (C.R Swart Drive) intersection

The proposed upgrade for the intersection from existing, Figure 8-8 would require additional lanes and slip lanes, Figure 8-9. This is based on the signal timing in Figure 8-10 and an expected LOS D based on average delay for all lanes, Figure 8-11.

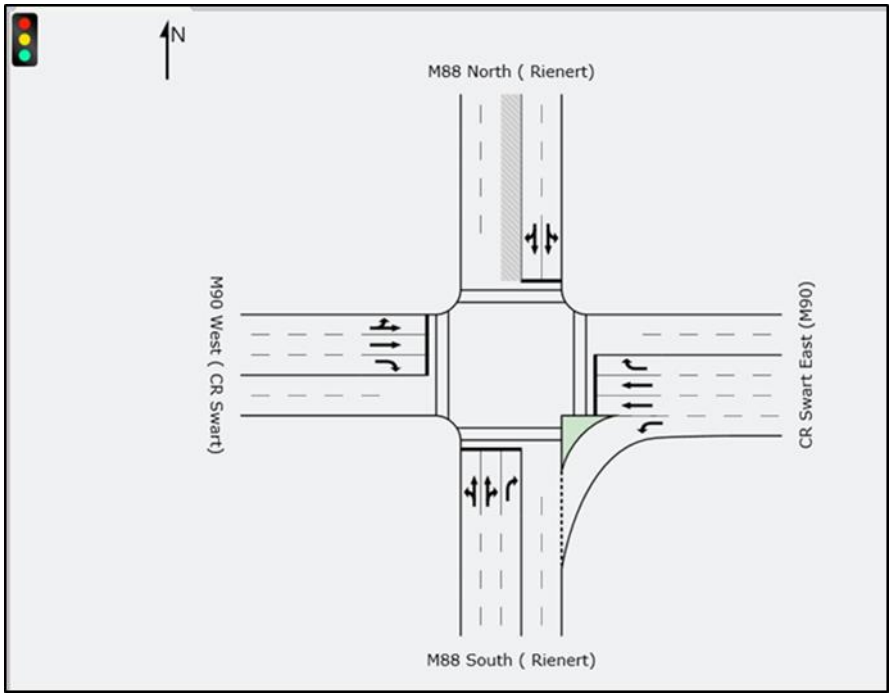

Figure 8-8: Existing intersection between M88 (Rienert Avenue and M90 (C.R Swart Drive)

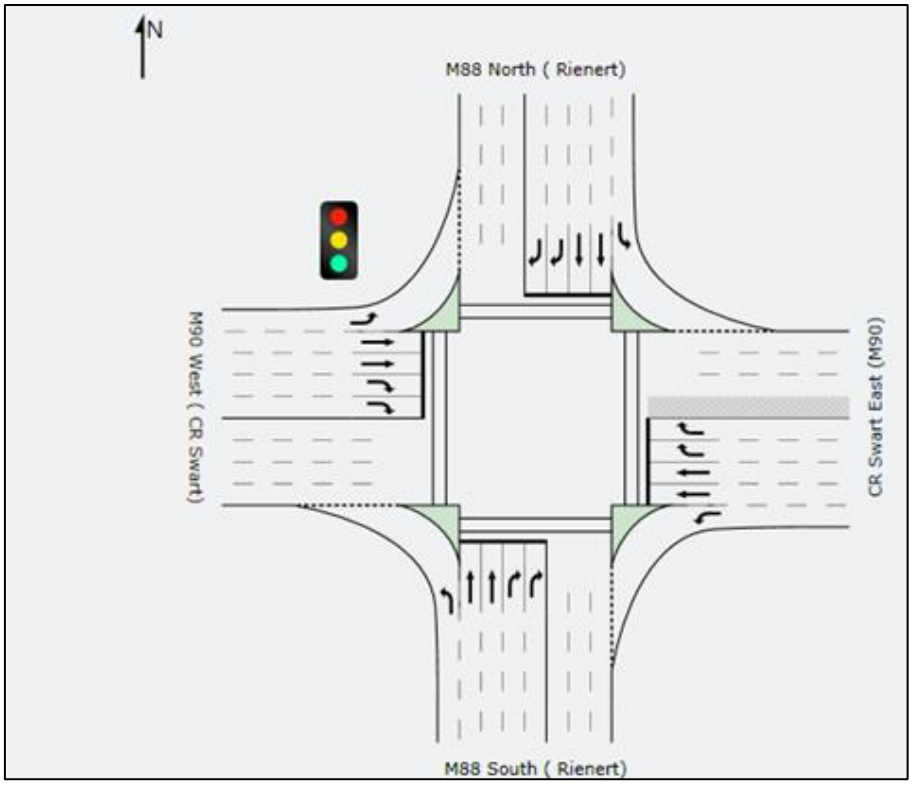

Figure 8-9: Proposed upgrade for the intersection between M88 (Rienert Avenue and M90 (C.R Swart Drive)

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	20	27	6	33
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	26	33	12	39
Phase Split	24%	30%	11%	35%

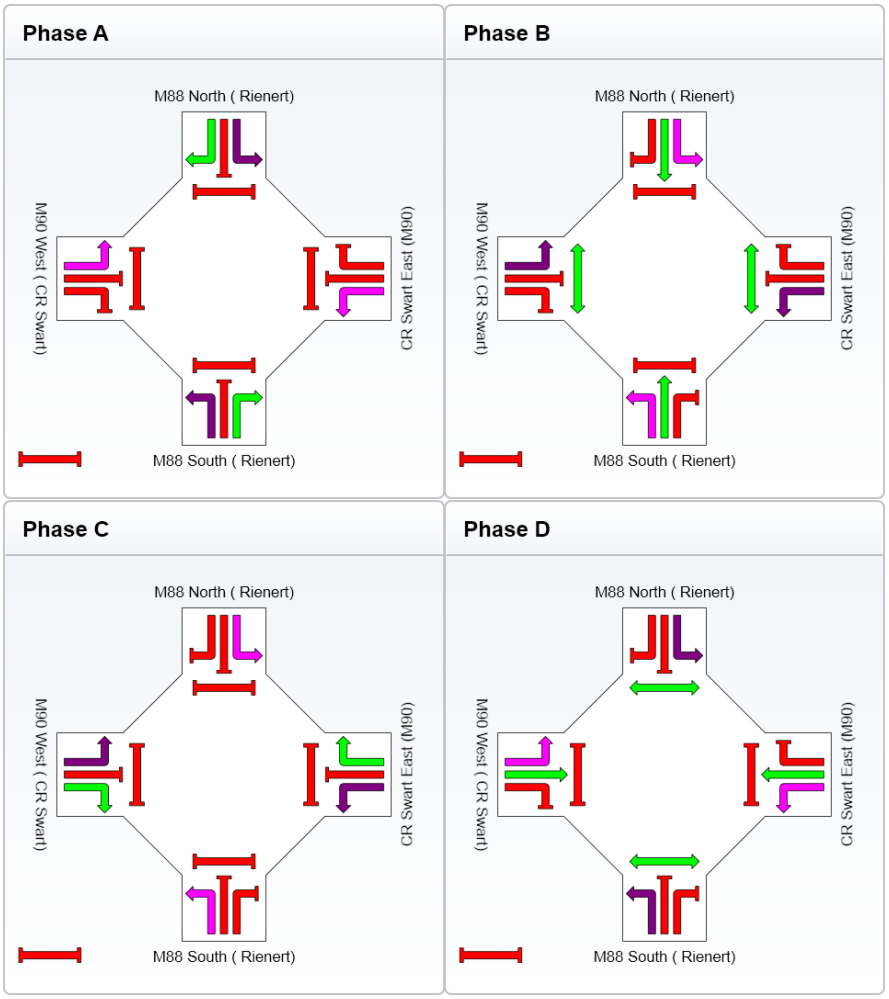

Figure 8-10: Proposed signal timing for M88 (Rienert Avenue and M90 (C.R Swart Drive)

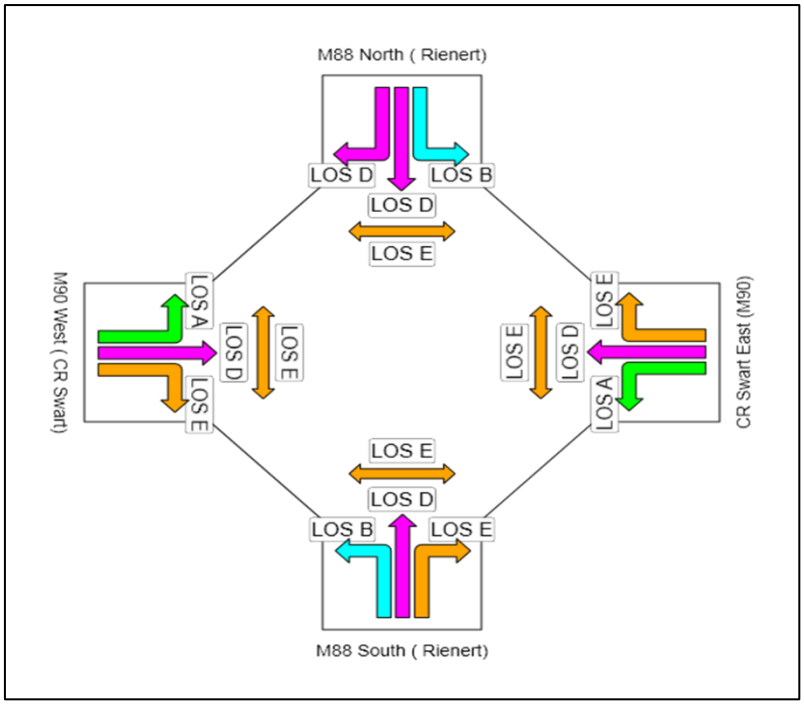

Figure 8-11: Expected Level of Service after the upgrade of the intersection servicing estimated generated trips at the intersection between M88 (Rienert Avenue and M90 (C.R Swart Drive)

8.2.4 M88 (Rienert Avenue) and R25 intersection

To service estimated trips from the proposed township establishment on Portion 296, Farm Zuurfontein 33 IR, the existing intersection between M88 (Rienert Avenue) and R25, Figure 8-12 would require additional lanes and slip lanes as shown in Figure 8-13. An overall LOS D based on average delay for all lanes is expected based on the signal timing outlined in Figure 8-14.

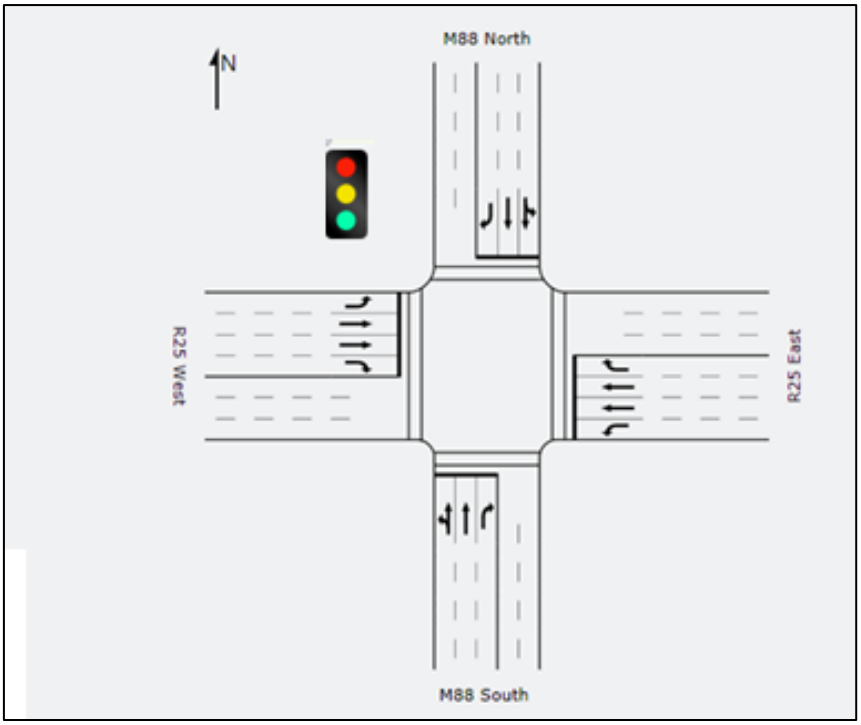

Figure 8-12: Existing intersection for M88 (Rienert Avenue) and R25 intersection

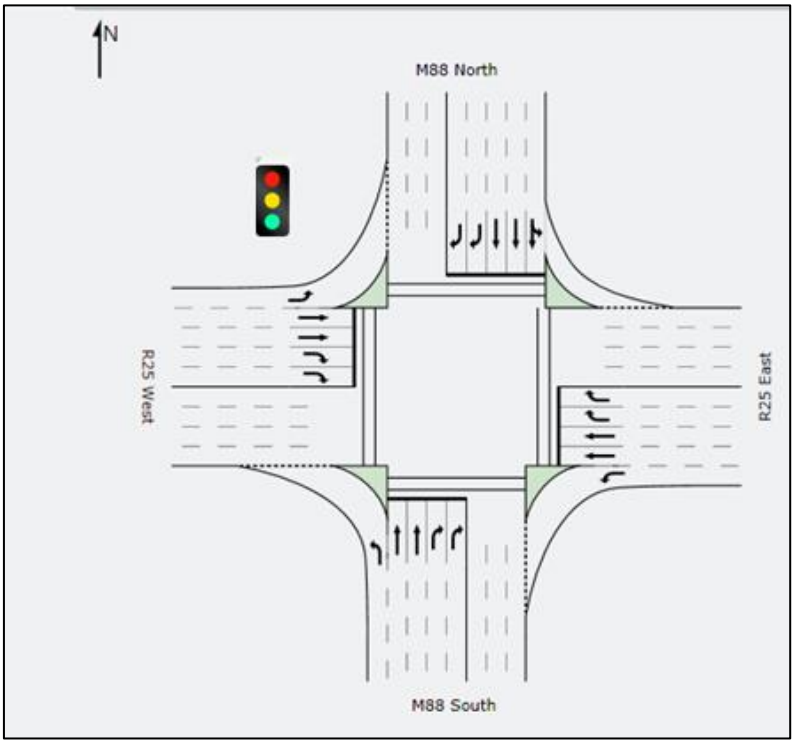

Figure 8-13: Proposed upgrade for the intersection between M88 (Rienert Avenue) and R25

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	12	27	6	71
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	18	33	12	77
Phase Split	13%	24%	9%	55%

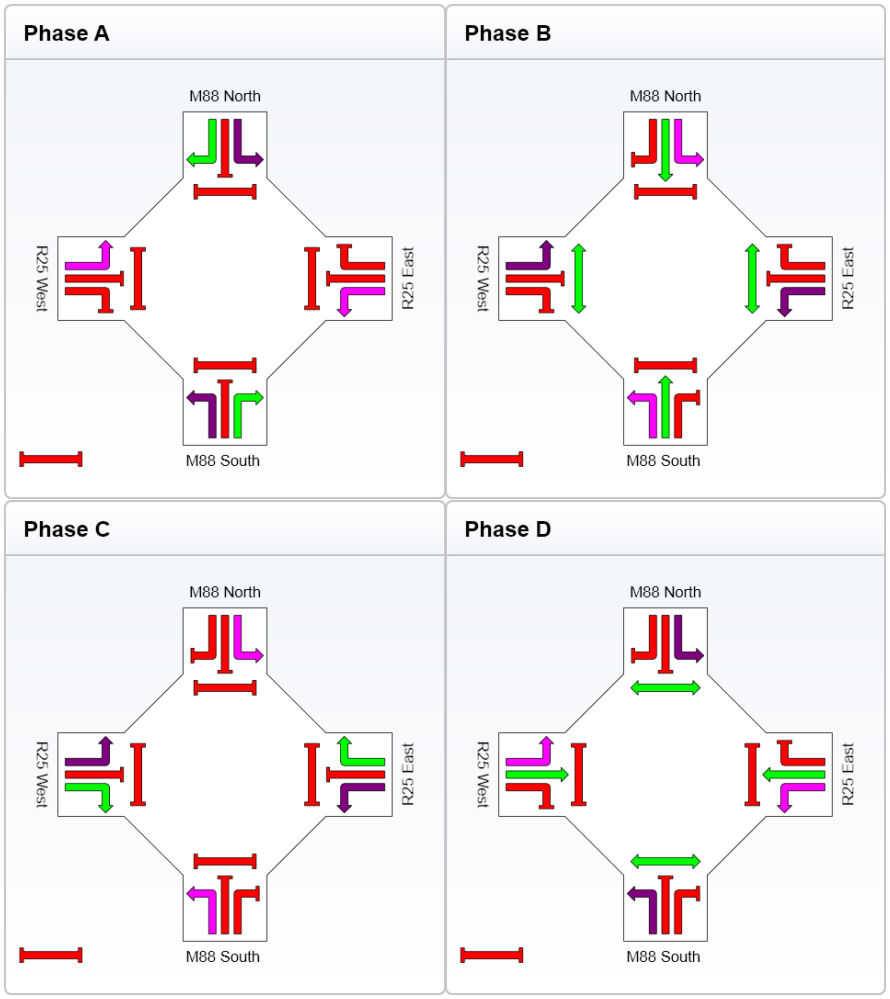

Figure 8-14: Proposed signal timing for intersection between M88 (Rienert Avenue) and R25 intersection

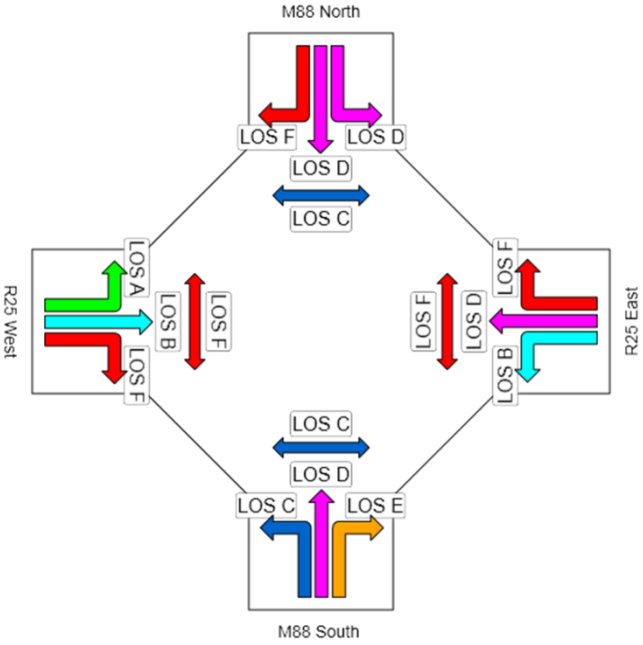

Figure 8-15: Expected Level of Service after the upgrade of the intersection servicing estimated generated trips

8.2.5 Proposed layout of accesses on Portion 296, Farm Zuurfontein 33 IR

The proposed layout accesses for portion 296, Farm Zuurfontein 33IR are shown from Figure 8-16 to Figure 8-19. All access will operate at LOS B during peak hours utilising a roundabout control.

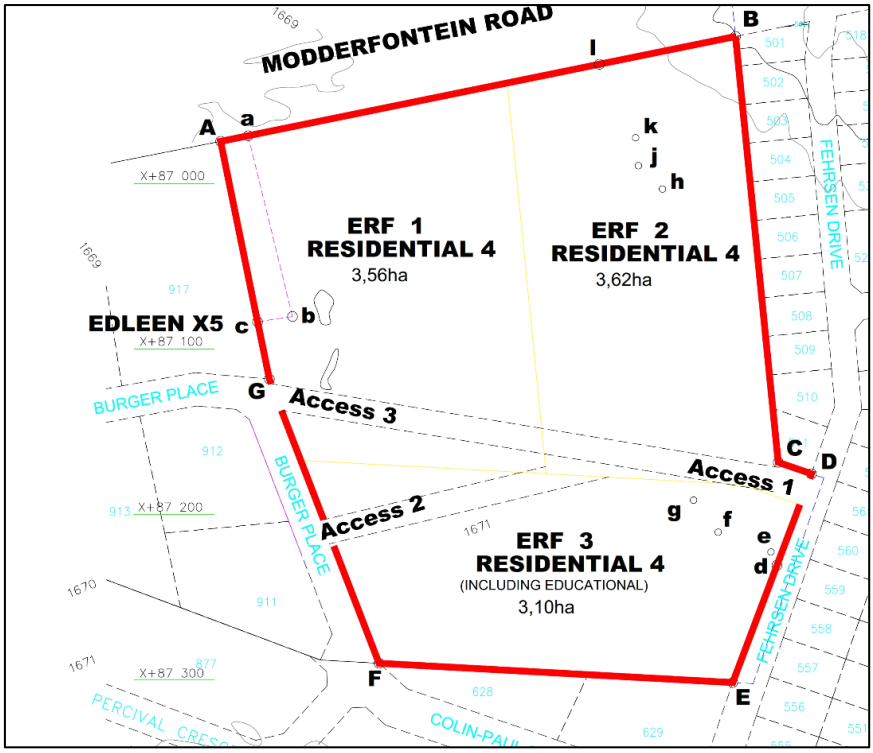

Figure 8-16: Proposed accesses for Portion 296, Farm Zuurfontein 33 IR

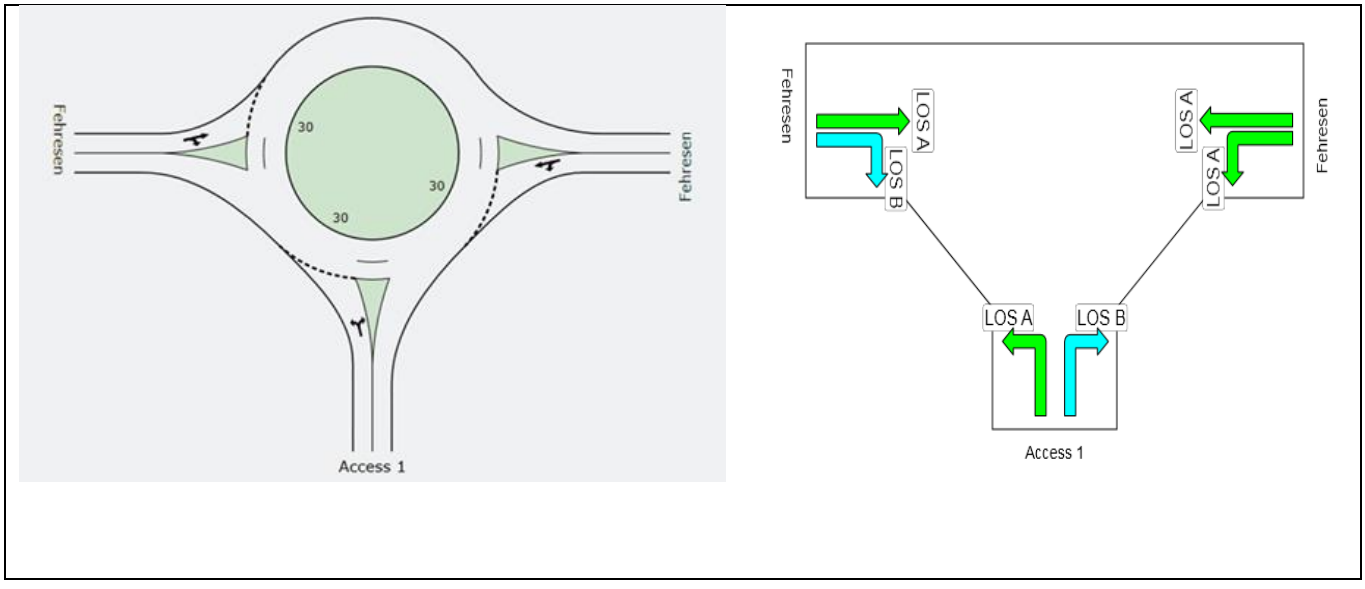

Figure 8-17: Proposed Access 1 and expected Level of Service

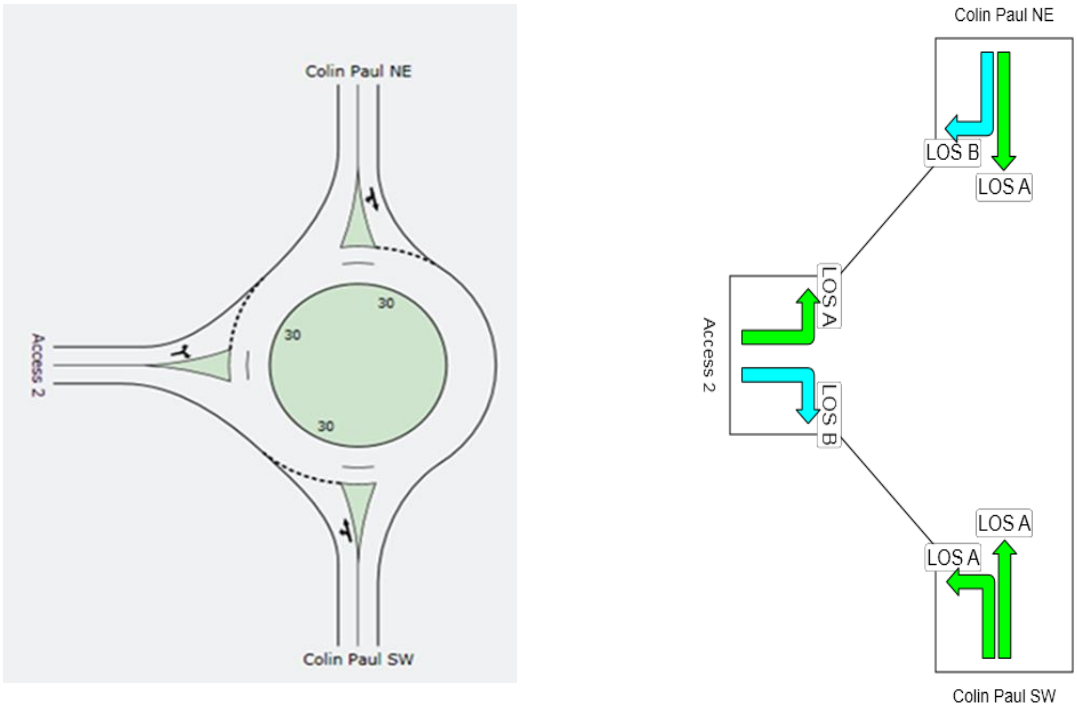

Figure 8-18: Proposed Access 2 and expected Level of Service during PM peak hour

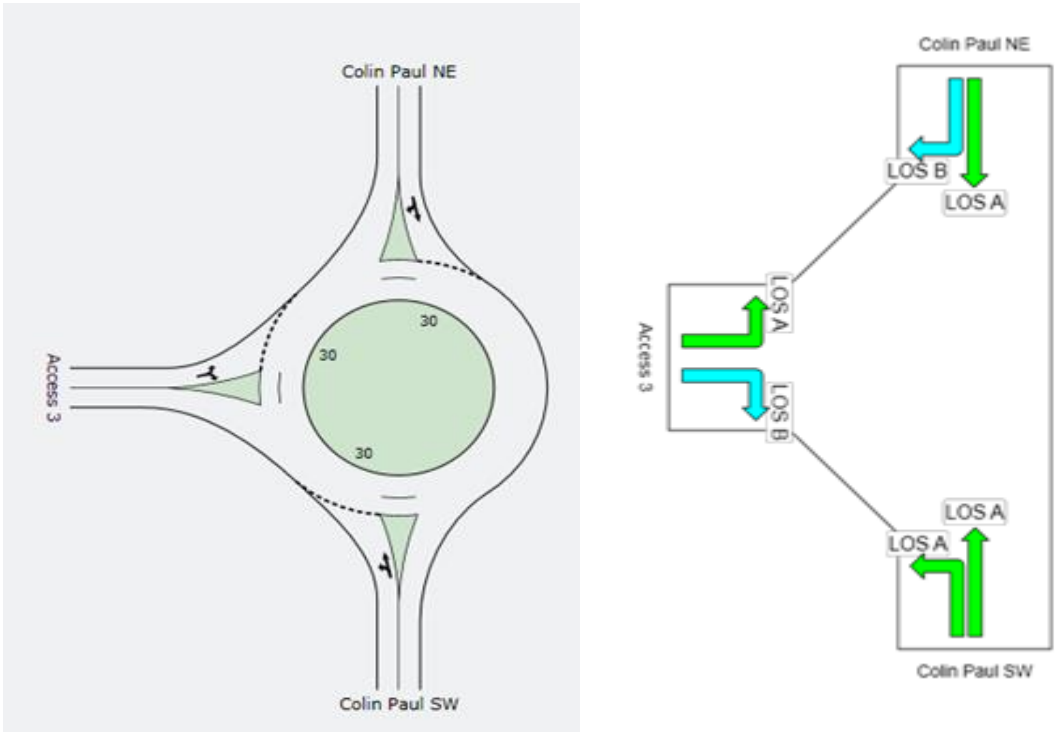

Figure 8-19: Proposed layout for access 3 and expected Level of Service

8.3 Cost of Upgrades on Gauteng Provincial Routes

Route R25 (Modderfontein Road) is the only affected provincial route in the proposed township establishment according to the provincial information we are aware of from Gauteng Provincial Government, Department of Roads and Transport at the time of the study. The cost of additional lanes consisting of 500m approach and exit to the intersection between R25 (Modderfontein Road and M88 (Rienert Avenue) including slip lanes and new signal timing is estimated to be in the range of R7 million.

9 BIBLIOGRAPHY

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O'Flaherty, C. A. (1997). *Transport Planning and Traffic Engineering.*

10 APPENDICES

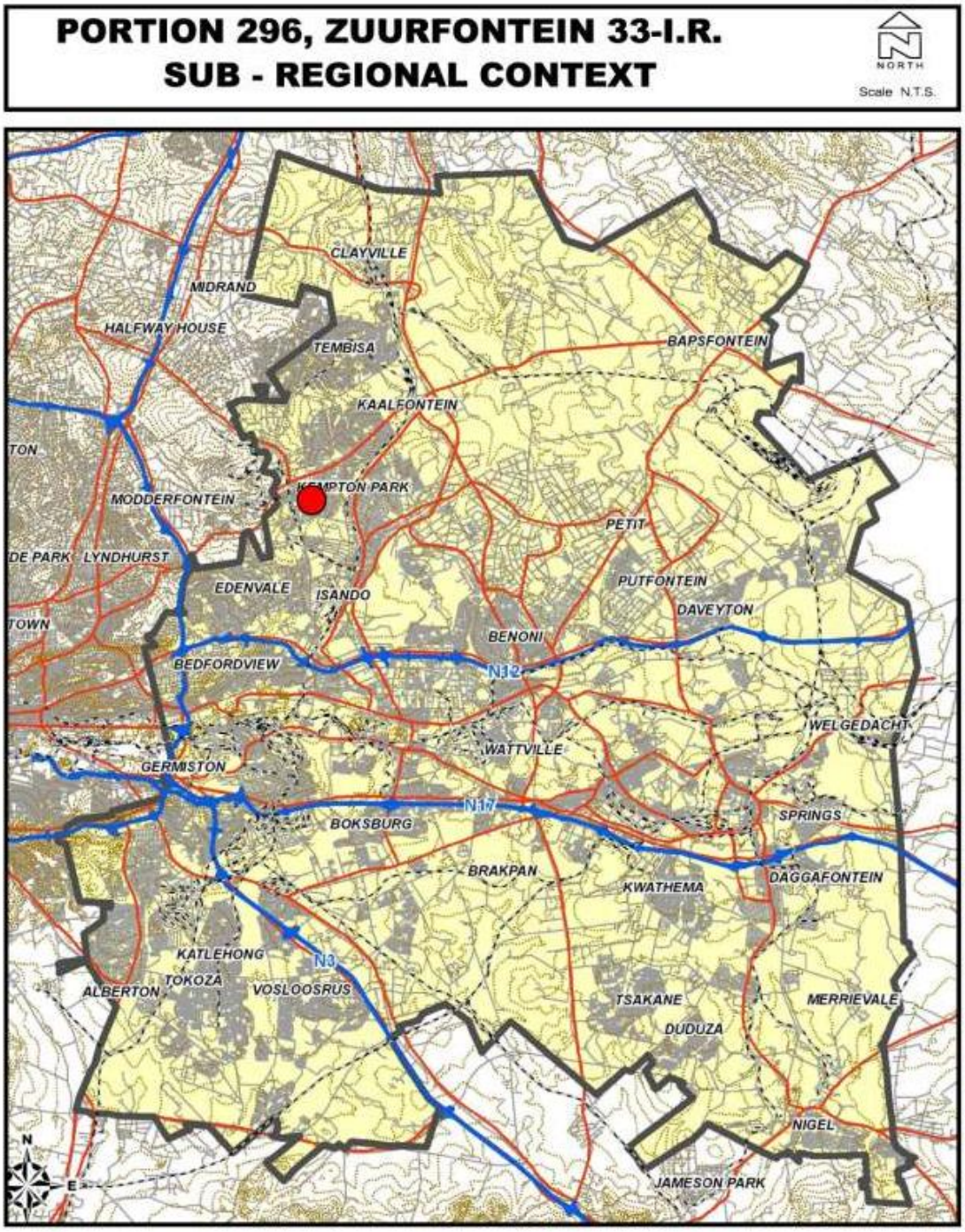
10.1 Appendix A: Locality Map

10.2 Appendix B: Proposed Township Layout Plan

10.3 Appendix C: Traffic Counts

10.4 Appendix D: Calculations and Analysis `

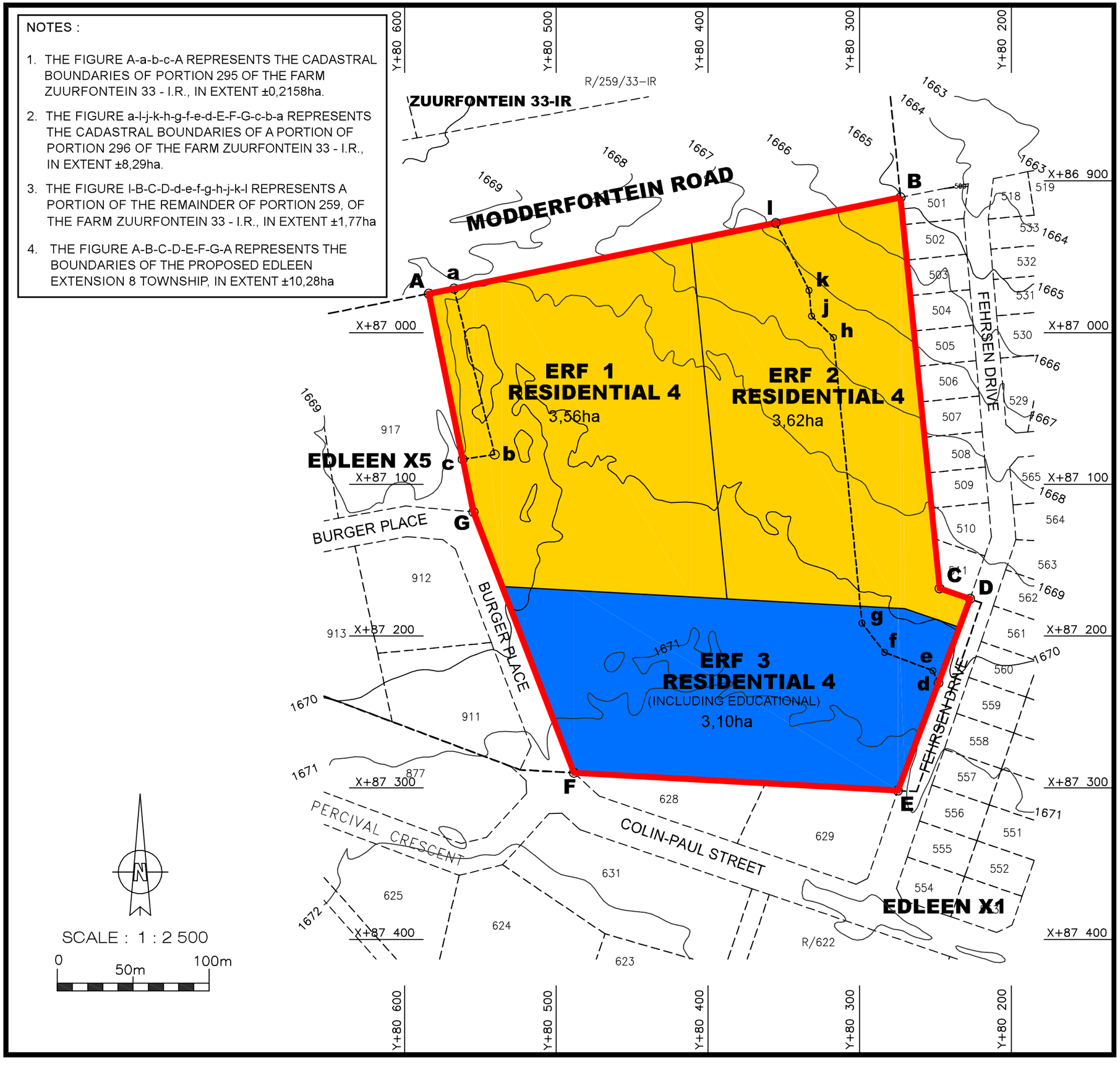
Appendix A: Locality Map



Appendix B: Proposed Layout Plan

NOTES :

1. THE FIGURE A-a-b-c-A REPRESENTS THE CADASTRAL BOUNDARIES OF PORTION 295 OF THE FARM ZUURFONTEIN 33 - I.R., IN EXTENT ±0,2158ha.
2. THE FIGURE a-l-j-k-h-g-f-e-d-E-F-G-c-b-a REPRESENTS THE CADASTRAL BOUNDARIES OF A PORTION OF PORTION 296 OF THE FARM ZUURFONTEIN 33 - I.R., IN EXTENT ±8,29ha.
3. THE FIGURE I-B-C-D-d-e-f-g-h-j-k-I REPRESENTS A PORTION OF THE REMAINDER OF PORTION 259, OF THE FARM ZUURFONTEIN 33 - I.R., IN EXTENT ±1,77ha
4. THE FIGURE A-B-C-D-E-F-G-A REPRESENTS THE BOUNDARIES OF THE PROPOSED EDLEEN EXTENSION 8 TOWNSHIP, IN EXTENT ±10,28ha



SCALE : 1 : 2 500

0 50m 100m

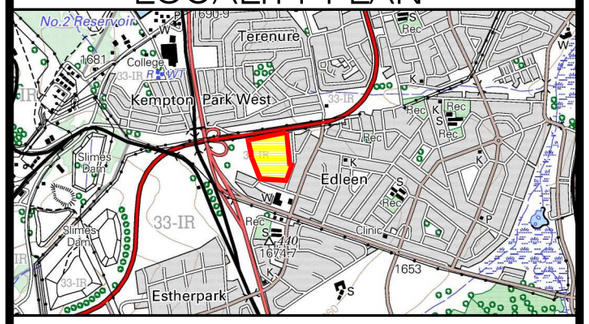
PROPOSED TOWNSHIP

EDLEEN EXT. 8

SITUATED ON PTN'S. 295, 296 &
A PTN. OF THE REM.OF PTN. 259
OF THE FARM ZUURFONTEIN 33-I.R.
EKURHULENI METRO. MUNICIPALITY

IN EXTENT : ±10,28ha

LOCALITY PLAN



SCALE - 1 : 50 000

ANNEXURE 1

LAND USE	NOTE	ERF No	No of ERVEN	AREA (ha)	%of TWNSHP
RESIDENTIAL 4		1 & 2	2	7,18	69,84
RESIDENTIAL 4 (INCLUDING EDUCATIONAL)		3	1	3,10	30,16
TOTAL			3	10,28ha	100%

ANNEXURE 2

MIN AREA OF ERVEN : 31000m²
CONTOURS HAVE 1m INTERVALS.
CONTOURS ARE IN ACCORDANCE WITH REGULATION 18(2), ORDINANCE 15 OF 1986
ALL AREAS AND DIMENSIONS ARE APPROXIMATE AND SUBJECT TO FINAL SURVEY.
CONTOUR SURVEY BY VAN RYSSEN KROGH LAND SURVEYORS, PRETORIA.
CO-ORDINATE GRID ON WG 29°

TOWNSHIP OWNER

AMENDMENT:	DATE :

PLAN No.:

TAPP REF. :EDLEENX8

APPLICATION DATE : JUNE 2017

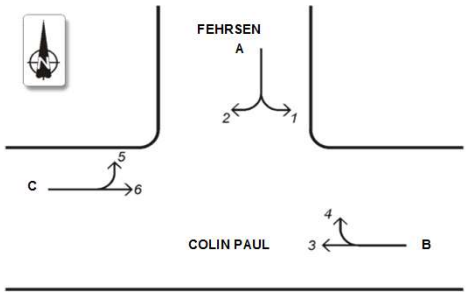
Appendix C: Traffic Counts

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

1 Intersection of Colin Paul & Fehrsen

Survey Date: 23 03 2017 Thursday

TES
TRAFFIC ENGINEERING SERVICES TRUST
NO: 939/97
PO Box
Posbus : 2042 Swavelpoort Pretoria 0036 Tel: 991 0411 Fax: 991 0410 Cel: 083 250 5066



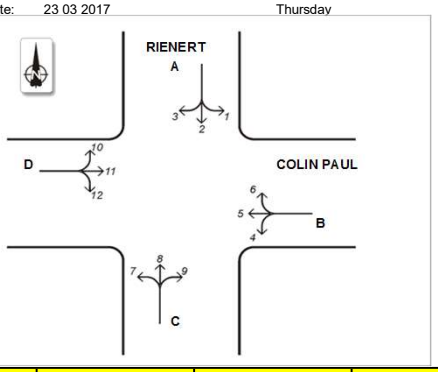
PERIOD	MOVEMENT 1				MOVEMENT 2				MOVEMENT 3				MOVEMENT 4				MOVEMENT 5				MOVEMENT 6			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	10	2	0	0	0	0	0	0	5	2	0	0	0	1	0	0	0	0	0	0	22	0	0	0
6:15 - 6:30	5	1	0	0	1	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	48	1	0	0
6:30 - 6:45	10	1	0	0	0	0	0	0	9	4	0	0	19	3	0	0	0	0	0	0	34	1	0	0
6:45 - 7:00	11	0	0	1	0	0	0	0	13	3	0	0	12	0	0	1	0	1	0	0	53	4	0	1
7:00 - 7:15	14	0	0	0	0	0	0	0	8	0	0	1	1	0	0	0	0	0	0	0	62	1	0	0
7:15 - 7:30	4	0	0	0	0	0	0	0	9	3	0	1	0	0	0	0	0	0	0	0	49	3	0	2
7:30 - 7:45	9	0	0	0	0	0	0	0	12	1	0	1	5	0	0	0	0	0	0	0	48	1	0	0
7:45 - 8:00	3	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0
8:00 - 8:15	0	0	0	0	0	0	0	0	7	0	0	0	1	0	0	0	0	0	0	0	35	0	0	1
8:15 - 8:30	4	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	26	1	0	0
8:30 - 8:45	1	0	0	0	0	0	0	0	10	0	0	1	0	0	0	0	0	0	0	0	19	0	0	0
8:45 - 9:00	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
9:00 - 9:15	4	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	20	0	0	0
9:15 - 9:30	5	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	14	0	0	2
9:30 - 9:45	2	1	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
9:45 - 10:00	0	0	0	0	0	0	0	0	12	0	0	1	1	0	0	0	0	0	0	0	7	0	0	0
10:00 - 10:15	1	0	0	0	0	0	0	0	13	0	0	3	1	0	0	0	0	0	0	0	11	0	0	2
10:15 - 10:30	0	0	0	0	0	0	0	0	6	0	0	2	1	0	0	1	0	0	0	1	8	0	0	2
10:30 - 10:45	0	0	0	0	0	0	0	1	10	0	0	0	1	0	0	1	0	0	0	0	11	0	0	3
10:45 - 11:00	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	8	0	0	0
11:00 - 11:15	0	0	0	0	0	0	0	0	11	0	0	0	1	0	0	0	0	0	0	0	13	0	0	0
11:15 - 11:30	1	0	0	0	0	0	0	0	9	0	0	1	2	0	0	0	0	0	0	0	17	0	0	2
11:30 - 11:45	2	0	0	0	0	0	0	0	7	0	0	0	2	0	0	0	0	0	0	0	10	0	0	0
11:45 - 12:00	3	0	0	0	0	0	0	0	12	0	0	2	1	0	0	0	0	0	0	0	3	0	0	0
12:00 - 12:15	0	0	0	0	0	0	0	0	5	0	0	2	0	0	0	1	0	0	0	0	7	0	0	0
12:15 - 12:30	0	0	0	0	0	0	0	0	14	1	0	0	0	0	0	0	0	0	0	0	11	0	0	2
12:30 - 12:45	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	11	3	0	0
12:45 - 13:00	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0
13:00 - 13:15	2	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	0	0	0	7	1	0	0
13:15 - 13:30	0	0	0	0	0	0	0	0	12	1	0	0	0	0	0	0	0	0	0	0	15	2	0	0
13:30 - 13:45	2	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0
13:45 - 14:00	4	0	0	0	0	0	0	0	13	1	0	0	1	0	0	0	0	0	0	0	10	0	0	0
14:00 - 14:15	3	0	0	0	0	0	0	0	13	1	0	0	0	0	0	0	0	0	0	0	11	1	0	1
14:15 - 14:30	1	0	0	0	0	0	0	0	11	2	0	1	1	0	0	1	0	0	0	0	19	2	0	0
14:30 - 14:45	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	1	0	1	15	1	0	1
14:45 - 15:00	0	0	0	0	0	0	0	0	11	3	0	0	0	0	0	0	0	0	0	0	26	0	1	0
15:00 - 15:15	1	0	0	0	0	0	0	0	17	1	0	0	0	0	0	0	1	0	0	0	21	3	0	0
15:15 - 15:30	1	0	0	0	0	0	0	0	19	2	0	1	2	0	0	0	0	0	0	0	25	2	0	1
15:30 - 15:45	2	0	0	0	0	0	0	0	18	2	0	2	1	0	0	0	0	0	0	0	25	1	0	1
15:45 - 16:00	1	0	0	0	1	0	0	0	23	0	0	0	1	1	0	0	0	0	0	0	13	0	0	1
16:00 - 16:15	2	0	0	0	0	0	0	0	19	0	0	0	4	0	0	0	0	0	0	0	19	0	0	0
16:15 - 16:30	3	0	0	0	0	0	0	0	26	1	0	1	1	0	0	0	1	0	0	0	12	1	0	0
16:30 - 16:45	2	0	0	0	0	0	0	0	31	1	0	0	2	0	0	0	0	0	0	0	11	1	0	0
16:45 - 17:00	3	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	19	0	0	1
17:00 - 17:15	2	0	1	0	0	0	0	0	36	0	0	1	2	0	1	0	0	0	0	0	16	0	0	1
17:15 - 17:30	0	0	0	0	0	0	0	0	34	0	0	0	1	0	0	0	0	0	0	0	20	0	0	1
17:30 - 17:45	2	0	0	0	0	0	0	0	31	0	0	1	4	0	0	0	0	0	0	0	24	0	0	1
17:45 - 18:00	5	0	0	0	0	0	0	0	29	0	0	1	2	0	0	0	1	0	0	0	21	0	0	0
TOTAL	126	5	1	1	2	0	0	1	638	32	0	24	72	5	1	5	3	2	0	2	970	30	1	26

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

2 Intersection of Rienert & Colin Paul

Survey Date: 23 03 2017 Thursday

TES
TRAFFIC ENGINEERING SERVICES TRUST
NO: 939/97
PO Box : 2042 Swavelpoort Pretoria 0036 Tel: 991 0411 Fax: 991 0410 Cel: 083 250 5066
Posbus



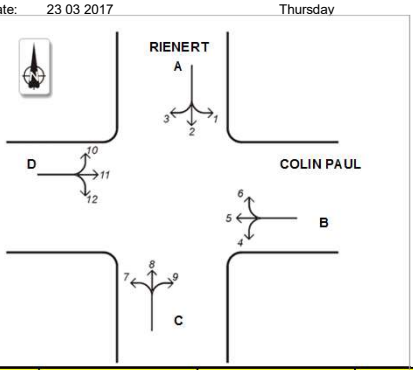
PERIOD	MOVEMENT 1				MOVEMENT 2				MOVEMENT 3				MOVEMENT 4				MOVEMENT 5				MOVEMENT 6			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	4	3	0	0	81	0	0	0	5	1	0	0	5	0	0	0	0	0	0	0	4	0	0	0
6:15 - 6:30	6	0	0	0	88	1	0	0	2	0	0	0	9	0	0	0	0	0	0	0	2	0	0	0
6:30 - 6:45	0	0	0	0	73	4	0	0	4	1	0	1	12	0	0	0	0	0	0	0	0	0	0	0
6:45 - 7:00	0	1	0	0	99	15	0	1	3	2	0	0	16	0	0	0	1	0	0	0	6	0	0	0
7:00 - 7:15	0	0	0	0	91	13	0	0	2	0	0	0	11	0	0	0	0	0	0	0	11	0	0	0
7:15 - 7:30	2	0	0	0	97	6	0	0	7	2	0	0	9	0	0	0	0	0	0	0	3	0	0	0
7:30 - 7:45	4	0	0	0	92	5	0	1	12	0	0	0	3	0	0	0	1	0	0	0	2	0	0	0
7:45 - 8:00	0	1	0	0	73	2	0	1	9	0	0	1	2	0	0	0	1	0	0	0	4	0	0	0
8:00 - 8:15	4	0	0	0	81	0	0	0	16	0	0	0	6	0	0	0	1	0	0	0	2	0	0	0
8:15 - 8:30	1	0	0	0	65	2	0	2	10	1	0	0	4	0	0	0	0	0	0	0	7	0	0	0
8:30 - 8:45	2	0	0	0	55	0	0	2	11	0	0	1	5	0	0	0	0	0	0	0	1	0	0	0
8:45 - 9:00	0	0	0	0	52	0	1	1	12	0	0	0	5	0	0	0	0	0	0	0	5	0	0	0
9:00 - 9:15	6	0	0	0	65	0	0	2	16	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0
9:15 - 9:30	0	0	0	0	75	0	0	1	8	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
9:30 - 9:45	1	0	0	1	69	3	0	3	7	0	0	1	3	0	0	0	1	0	0	0	0	0	0	0
9:45 - 10:00	0	0	0	0	83	1	0	0	19	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
10:00 - 10:15	0	1	0	0	70	1	0	2	12	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0
10:15 - 10:30	1	0	0	0	74	0	0	1	10	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
10:30 - 10:45	1	0	0	0	52	1	0	0	7	0	0	1	6	0	0	0	0	0	0	0	3	0	0	0
10:45 - 11:00	0	0	0	0	49	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
11:00 - 11:15	5	0	0	0	62	1	0	1	10	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
11:15 - 11:30	0	0	0	0	50	1	0	1	12	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
11:30 - 11:45	0	0	0	0	45	0	0	1	6	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
11:45 - 12:00	0	0	0	0	51	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 - 12:15	0	0	0	0	36	0	0	1	5	1	0	0	4	0	0	0	0	0	0	0	1	0	0	0
12:15 - 12:30	0	0	0	0	41	2	0	0	9	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
12:30 - 12:45	0	0	0	0	53	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
12:45 - 13:00	1	0	0	1	64	0	0	2	7	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
13:00 - 13:15	2	0	0	1	70	0	0	0	13	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0
13:15 - 13:30	0	0	0	0	56	1	0	0	19	1	0	1	2	0	0	0	1	0	0	0	0	0	0	0
13:30 - 13:45	2	0	0	0	62	2	0	0	15	1	0	0	1	0	0	0	0	0	0	0	5	0	0	0
13:45 - 14:00	1	0	0	0	44	4	0	2	15	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
14:00 - 14:15	0	0	1	0	29	1	0	0	9	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
14:15 - 14:30	2	0	1	0	27	4	0	0	11	0	0	1	1	0	0	0	1	0	0	0	6	1	0	1
14:30 - 14:45	0	0	0	0	43	2	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45 - 15:00	5	0	0	0	61	0	0	2	16	3	0	0	1	0	0	0	0	0	0	0	5	0	0	0
15:00 - 15:15	0	0	2	0	84	3	0	1	25	0	0	2	1	0	1	0	0	0	0	0	1	2	2	0
15:15 - 15:30	0	0	0	0	62	1	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30 - 15:45	8	0	0	0	51	0	0	0	15	0	0	1	1	0	0	0	0	0	0	0	4	0	0	0
15:45 - 16:00	0	0	0	0	56	1	0	1	19	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	4	0	0	0	44	1	0	0	21	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
16:15 - 16:30	9	0	0	0	60	0	0	0	26	0	0	1	3	0	0	0	1	0	0	0	1	0	0	0
16:30 - 16:45	5	0	0	0	58	0	0	0	22	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
16:45 - 17:00	2	0	0	0	63	0	0	0	24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00 - 17:15	4	0	0	0	69	1	0	0	32	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
17:15 - 17:30	7	0	0	0	57	1	0	1	24	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
17:30 - 17:45	2	0	0	0	68	1	0	0	14	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0
17:45 - 18:00	0	0	0	0	63	0	0	0	11	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**91**	**6**	**4**	**3**	**3013**	**81**	**1**	**32**	**590**	**15**	**0**	**16**	**140**	**0**	**1**	**1**	**16**	**0**	**0**	**0**	**90**	**4**	**2**	**1**

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

TES
TRAFFIC ENGINEERING SERVICES TRUST
NO: 939/97
PO Box : 2042 Swavelpoort Pretoria 0036 Tel: 991 0411 Fax: 991 0410 Cel: 083 250 5066
Posbus

2 Intersection of Rienert & Colin Paul

Survey Date: 23 03 2017 Thursday



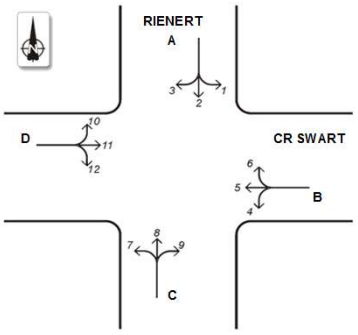
PERIOD	MOVEMENT 7				MOVEMENT 8				MOVEMENT 9				MOVEMENT 10				MOVEMENT 11				MOVEMENT 12			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	3	0	0	0	18	1	0	0	3	0	0	0	5	0	0	0	0	0	0	0	17	1	0	0
6:15 - 6:30	0	0	0	0	24	1	0	0	5	0	0	0	4	1	0	0	0	0	0	0	40	0	0	0
6:30 - 6:45	5	2	0	1	24	4	1	0	3	1	0	0	15	1	0	0	1	0	0	0	34	4	0	0
6:45 - 7:00	10	1	0	0	29	0	0	0	1	1	0	1	19	1	0	0	1	0	0	0	45	3	0	2
7:00 - 7:15	5	0	0	1	28	2	0	1	0	0	0	0	15	0	0	0	0	0	0	0	39	2	0	0
7:15 - 7:30	7	2	1	0	44	3	0	1	1	0	0	0	15	1	0	1	0	0	0	0	27	1	0	0
7:30 - 7:45	12	0	0	1	69	4	0	3	1	0	0	0	14	1	0	0	0	0	0	0	36	1	0	1
7:45 - 8:00	11	0	0	0	48	0	0	0	1	0	0	0	12	1	0	0	0	0	0	0	44	0	0	0
8:00 - 8:15	9	0	0	0	37	0	0	2	1	0	0	0	13	0	0	0	0	0	0	0	23	0	0	1
8:15 - 8:30	7	0	0	0	24	0	0	1	0	0	0	0	5	1	0	0	0	0	0	0	25	0	0	0
8:30 - 8:45	3	0	0	0	40	1	0	0	0	0	0	0	17	0	0	0	1	0	0	0	22	0	0	0
8:45 - 9:00	5	0	0	1	37	0	0	1	3	0	0	0	7	0	0	0	0	0	0	0	23	0	0	0
9:00 - 9:15	4	0	0	0	31	0	0	1	1	0	0	0	8	0	1	2	0	0	0	0	4	0	0	3
9:15 - 9:30	6	0	0	0	28	0	0	2	1	0	0	0	14	0	0	0	0	0	0	0	3	0	0	1
9:30 - 9:45	5	0	0	0	25	2	0	0	0	0	0	0	7	0	0	0	0	1	0	0	11	1	0	2
9:45 - 10:00	4	0	0	1	40	0	0	2	0	0	0	0	11	0	1	0	1	0	0	0	3	0	0	1
10:00 - 10:15	7	1	0	4	39	0	0	3	3	0	0	0	16	0	1	0	0	0	0	0	5	0	0	2
10:15 - 10:30	5	0	0	1	45	1	0	2	0	0	0	0	12	1	0	2	0	0	0	0	2	0	0	4
10:30 - 10:45	6	0	0	0	44	0	0	0	0	0	0	0	11	0	0	2	0	0	0	0	8	0	0	0
10:45 - 11:00	7	0	0	0	26	1	0	2	2	0	0	0	11	0	0	0	0	0	0	0	4	0	0	1
11:00 - 11:15	6	0	0	1	22	0	0	2	0	0	0	0	8	2	0	0	0	0	0	0	2	0	0	2
11:15 - 11:30	8	0	0	0	36	0	0	12	2	0	0	0	9	0	0	1	1	0	0	1	8	2	0	2
11:30 - 11:45	7	0	0	0	31	0	0	1	0	0	0	0	12	1	0	0	0	0	0	0	13	0	0	1
11:45 - 12:00	2	0	0	3	40	0	0	0	1	0	0	0	4	0	0	0	2	0	0	1	6	1	0	0
12:00 - 12:15	2	0	0	3	35	1	0	3	0	0	0	0	16	0	0	0	2	0	1	0	8	0	0	1
12:15 - 12:30	3	1	0	0	41	0	0	4	8	0	0	0	15	0	0	1	1	0	0	0	12	1	0	1
12:30 - 12:45	3	0	0	0	32	1	0	2	2	0	0	0	15	0	0	1	0	0	0	0	3	0	0	2
12:45 - 13:00	3	0	0	0	39	2	0	2	1	0	0	0	12	0	0	0	1	0	0	0	1	1	0	0
13:00 - 13:15	6	2	0	0	34	0	0	0	0	0	0	1	17	1	0	1	4	0	0	0	6	0	0	1
13:15 - 13:30	5	1	0	0	51	5	0	0	3	0	0	0	9	3	0	0	0	0	0	0	8	1	0	0
13:30 - 13:45	1	3	0	0	53	5	0	2	8	0	0	0	14	2	0	0	0	0	0	0	14	0	0	1
13:45 - 14:00	9	0	0	0	68	1	0	1	2	0	0	0	12	0	0	0	0	0	0	0	16	0	0	0
14:00 - 14:15	8	1	0	0	72	3	0	1	1	0	0	0	14	2	0	1	0	0	0	0	12	1	0	0
14:15 - 14:30	8	1	1	1	63	11	2	1	1	0	0	0	15	4	0	0	2	0	0	0	16	2	0	0
14:30 - 14:45	11	1	1	0	65	6	1	1	0	0	0	0	12	1	0	1	1	0	0	0	12	1	0	0
14:45 - 15:00	4	0	0	0	79	7	1	0	0	0	0	0	15	0	0	1	1	0	0	0	9	1	1	1
15:00 - 15:15	5	1	0	1	63	8	0	2	0	0	0	0	13	3	0	0	0	0	0	0	2	5	0	2
15:15 - 15:30	6	0	1	1	51	4	0	0	2	0	0	0	12	2	1	0	1	0	0	0	4	1	0	4
15:30 - 15:45	6	3	0	2	43	2	0	0	6	0	0	0	20	1	0	0	1	0	0	0	6	1	0	2
15:45 - 16:00	16	0	0	0	47	1	0	0	2	0	0	0	20	0	0	0	0	0	0	0	12	0	0	3
16:00 - 16:15	17	0	0	0	44	1	0	1	4	0	0	0	15	0	0	0	2	0	0	0	10	2	0	0
16:15 - 16:30	18	1	0	0	49	0	0	0	4	0	0	0	19	1	0	0	1	0	0	0	8	2	0	0
16:30 - 16:45	15	0	0	1	65	0	0	0	0	0	0	0	17	0	0	0	1	0	0	0	6	1	0	1
16:45 - 17:00	21	0	0	0	64	0	0	2	6	0	0	0	14	1	0	1	0	0	0	0	9	0	0	1
17:00 - 17:15	20	0	0	0	55	1	0	0	5	0	0	0	13	0	0	0	3	0	0	0	7	0	0	0
17:15 - 17:30	21	0	0	0	75	0	0	0	2	0	0	0	17	0	0	1	0	0	0	0	2	0	0	0
17:30 - 17:45	11	0	0	1	64	1	0	0	4	0	0	0	13	0	0	1	0	0	0	0	7	0	0	0
17:45 - 18:00	10	0	0	0	76	0	0	0	12	2	0	0	17	1	0	1	0	0	0	0	5	1	0	0
TOTAL	**373**	**21**	**4**	**24**	**2157**	**80**	**5**	**58**	**102**	**4**	**0**	**2**	**620**	**33**	**4**	**18**	**28**	**1**	**1**	**2**	**639**	**37**	**1**	**43**

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

TES
TRAFFIC ENGINEERING SERVICES TRUST
NO: 939/97
PO Box / Posbus : 2042 Swavelpoort Pretoria 0036 Tel: 991 0411 Fax: 991 0410 Cel: 083 250 5066

3 Intersection of Rienert & CR Swart

Survey Date: 23 03 2017 Thursday



PERIOD	MOVEMENT 1				MOVEMENT 2				MOVEMENT 3				MOVEMENT 4				MOVEMENT 5				MOVEMENT 6			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	27	2	0	1	72	0	0	0	8	0	0	0	41	6	1	0	135	45	4	1	10	0	0	0
6:15 - 6:30	35	1	0	0	81	1	0	0	25	0	0	0	31	2	0	0	163	34	0	1	8	1	0	1
6:30 - 6:45	30	0	0	1	61	0	0	2	28	0	0	0	30	3	0	0	205	31	0	1	12	3	1	0
6:45 - 7:00	26	11	0	3	85	11	2	0	46	0	0	0	47	0	0	0	179	29	0	3	16	0	0	2
7:00 - 7:15	35	2	0	0	75	6	0	2	29	0	0	0	31	5	0	1	179	24	0	1	15	0	0	1
7:15 - 7:30	29	0	0	0	97	3	0	1	14	0	0	0	51	7	0	1	177	25	1	0	18	0	0	1
7:30 - 7:45	25	0	0	2	92	6	0	5	18	0	0	0	46	6	0	2	200	27	2	5	12	1	0	1
7:45 - 8:00	27	0	0	1	41	4	0	2	48	0	0	0	29	1	1	0	207	26	0	7	14	0	0	0
8:00 - 8:15	25	0	0	0	76	0	0	0	17	0	0	1	27	2	7	2	188	25	0	5	15	1	0	0
8:15 - 8:30	28	1	0	2	54	0	0	0	19	0	0	0	17	2	0	0	174	19	0	15	12	0	0	0
8:30 - 8:45	33	0	0	4	36	0	0	0	11	0	0	0	12	0	7	0	179	14	0	9	10	0	0	0
8:45 - 9:00	25	0	1	0	29	0	0	0	25	0	0	0	27	1	0	0	153	17	0	14	20	0	0	0
9:00 - 9:15	28	0	0	0	27	1	0	1	14	0	0	0	11	0	1	0	147	9	0	12	22	1	0	0
9:15 - 9:30	18	1	0	2	58	1	0	2	12	0	0	1	17	1	0	0	145	12	0	9	14	0	0	2
9:30 - 9:45	16	1	0	1	60	3	0	1	13	0	0	0	19	3	0	2	130	9	0	7	17	1	0	0
9:45 - 10:00	18	0	0	0	58	0	0	1	8	0	0	0	17	0	0	1	138	11	0	11	26	0	0	2
10:00 - 10:15	25	1	0	2	42	0	0	4	16	0	0	0	19	1	0	3	120	12	0	11	28	0	0	3
10:15 - 10:30	25	1	0	0	56	0	0	1	12	0	0	0	19	1	0	0	127	15	0	21	33	0	0	1
10:30 - 10:45	31	0	0	0	33	1	0	0	7	0	0	0	12	2	0	0	131	11	0	6	29	0	0	1
10:45 - 11:00	26	1	0	0	22	0	0	0	6	0	0	0	9	0	1	1	132	8	0	9	16	0	0	0
11:00 - 11:15	29	0	0	1	29	0	0	1	7	2	0	1	10	0	0	1	144	8	0	9	27	2	0	2
11:15 - 11:30	25	0	0	3	27	1	0	0	8	0	0	2	26	2	0	1	123	10	0	8	35	0	0	1
11:30 - 11:45	29	3	0	0	34	0	0	2	2	0	0	0	14	1	0	0	111	12	0	6	28	1	0	0
11:45 - 12:00	28	0	0	1	28	0	0	1	9	0	0	0	18	0	0	0	101	8	1	12	21	1	0	1
12:00 - 12:15	31	0	0	0	15	0	0	0	1	0	0	0	10	0	0	0	106	7	0	6	22	1	0	1
12:15 - 12:30	26	1	0	1	24	1	0	3	2	0	0	0	9	0	0	1	103	8	0	12	30	1	0	3
12:30 - 12:45	35	1	0	1	16	0	0	0	9	0	0	0	21	4	3	0	113	15	0	15	29	1	0	0
12:45 - 13:00	30	0	0	0	20	0	0	1	6	0	0	0	29	2	0	0	134	15	1	7	30	0	0	1
13:00 - 13:15	36	0	0	0	54	0	0	0	8	0	0	0	25	1	0	0	131	13	0	6	26	2	0	0
13:15 - 13:30	21	2	0	0	49	1	0	0	4	0	0	1	19	4	0	2	98	11	0	15	28	1	0	0
13:30 - 13:45	24	0	0	0	71	4	0	0	2	0	0	1	28	3	1	0	100	10	0	4	20	1	0	0
13:45 - 14:00	14	0	0	0	30	2	0	2	6	0	0	0	27	2	0	0	131	8	2	4	32	1	0	0
14:00 - 14:15	9	0	1	0	20	1	0	0	0	0	0	0	26	2	0	0	107	12	0	6	35	1	0	0
14:15 - 14:30	16	3	0	0	26	3	1	0	5	0	0	0	23	4	0	0	99	9	0	13	23	2	0	0
14:30 - 14:45	23	0	1	0	27	1	0	1	0	0	0	0	23	4	0	0	105	10	0	8	29	2	2	3
14:45 - 15:00	25	2	0	2	58	0	0	0	3	0	0	0	13	3	0	0	117	12	0	7	18	4	0	0
15:00 - 15:15	39	1	0	5	49	1	0	0	0	2	0	0	4	0	1	2	107	6	0	6	22	1	0	0
15:15 - 15:30	37	2	0	1	36	3	0	1	4	0	0	0	14	1	0	0	96	10	0	12	10	1	0	0
15:30 - 15:45	21	0	0	0	33	0	0	0	3	0	0	0	11	0	0	0	80	8	0	4	17	1	0	0
15:45 - 16:00	25	1	1	0	40	0	0	0	7	0	0	0	6	0	0	0	121	10	0	6	24	1	0	1
16:00 - 16:15	23	0	0	0	36	0	1	0	4	0	0	0	9	1	0	1	123	5	1	7	21	1	0	1
16:15 - 16:30	18	0	0	1	49	0	0	0	5	0	0	0	22	0	0	0	114	9	1	5	32	1	0	1
16:30 - 16:45	15	0	0	0	49	0	1	0	1	0	0	0	17	2	0	1	119	17	0	8	44	0	0	0
16:45 - 17:00	28	0	0	0	47	0	0	0	5	0	0	0	13	0	0	0	125	26	0	5	48	0	0	1
17:00 - 17:15	41	0	0	0	36	0	0	1	6	0	1	0	18	1	0	1	174	21	0	4	45	0	0	0
17:15 - 17:30	38	0	0	0	31	0	1	1	2	0	0	0	22	0	0	0	102	9	1	8	41	0	0	0
17:30 - 17:45	32	1	3	0	29	0	0	0	3	0	0	0	13	0	0	0	80	8	0	0	28	0	0	0
17:45 - 18:00	45	2	0	0	28	1	0	0	8	0	0	0	16	0	0	0	102	12	0	8	46	0	0	1
TOTAL	**1295**	**41**	**7**	**35**	**2146**	**56**	**6**	**36**	**496**	**4**	**1**	**7**	**998**	**80**	**23**	**23**	**6375**	**712**	**14**	**359**	**1158**	**35**	**3**	**32**

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

TES
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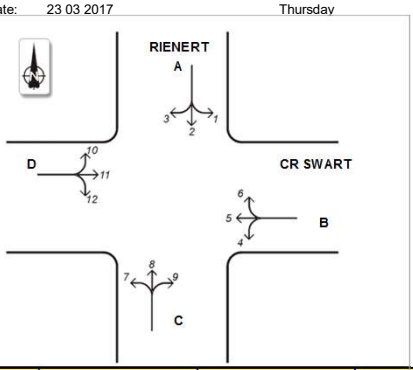
NO: 939/97
PO Box : 2042 Swavelpoort Pretoria 0036 Tel: 991 0411 Fax: 991 0410 Cel: 083 250 5066
Posbus

3 Intersection of Rienert & CR Swart

Survey Date: 23 03 2017 Thursday



PERIOD	MOVEMENT 7				MOVEMENT 8				MOVEMENT 9				MOVEMENT 10				MOVEMENT 11				MOVEMENT 12			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	8	0	0	0	13	0	0	0	20	4	0	0	4	3	0	0	112	21	1	3	6	0	0	0
6:15 - 6:30	14	2	0	0	22	0	0	0	55	5	0	0	2	1	0	0	169	37	3	4	0	3	0	0
6:30 - 6:45	11	5	0	0	29	1	0	1	95	1	0	0	1	1	0	0	154	51	2	8	8	4	0	0
6:45 - 7:00	16	1	0	0	23	4	0	1	85	12	0	2	1	0	0	0	165	53	0	8	15	6	0	4
7:00 - 7:15	18	1	0	2	31	2	0	1	128	8	0	2	1	0	0	0	163	46	0	5	17	1	0	0
7:15 - 7:30	46	8	0	1	48	5	0	0	110	9	0	4	1	0	0	0	121	28	1	3	37	3	0	0
7:30 - 7:45	25	6	0	1	81	10	0	5	70	8	1	1	0	0	0	0	158	29	0	5	12	1	0	1
7:45 - 8:00	17	5	0	0	40	0	0	0	39	4	0	0	0	0	0	0	179	18	0	8	9	2	0	0
8:00 - 8:15	4	0	0	0	34	3	0	1	29	2	0	0	0	0	0	0	123	20	0	6	6	0	0	0
8:15 - 8:30	1	0	0	0	13	0	0	0	32	4	0	0	0	0	0	0	103	13	0	9	3	0	0	2
8:30 - 8:45	5	0	0	0	40	0	0	2	27	1	0	0	1	1	0	0	115	10	0	11	1	2	0	1
8:45 - 9:00	1	2	0	1	33	0	0	1	26	3	0	2	5	4	0	1	157	18	0	11	0	0	0	0
9:00 - 9:15	2	1	0	3	20	0	0	2	29	7	0	2	0	0	0	0	169	7	0	4	3	1	0	0
9:15 - 9:30	2	1	0	0	27	0	0	1	35	4	0	1	1	0	0	0	213	10	0	4	1	0	0	0
9:30 - 9:45	2	0	0	0	29	1	0	1	36	1	0	0	0	0	0	0	203	16	1	12	1	0	0	3
9:45 - 10:00	4	0	0	1	27	0	0	1	27	1	0	2	0	0	0	0	108	13	0	6	1	1	0	0
10:00 - 10:15	3	1	0	1	43	0	4	3	27	1	0	0	1	0	0	2	193	10	0	7	1	2	0	0
10:15 - 10:30	4	1	0	0	31	1	0	4	10	2	0	0	0	0	0	2	151	17	0	14	2	0	0	0
10:30 - 10:45	2	0	0	0	35	0	0	0	26	0	0	1	5	0	0	0	94	10	0	18	3	0	0	0
10:45 - 11:00	1	1	0	0	26	1	0	1	25	2	0	1	1	0	6	0	148	17	0	6	2	2	0	0
11:00 - 11:15	13	0	0	0	16	1	0	0	33	0	0	1	1	0	0	2	156	17	0	17	2	1	0	0
11:15 - 11:30	1	0	0	0	15	0	0	2	32	2	0	0	9	2	0	6	96	13	0	8	2	1	0	0
11:30 - 11:45	3	0	0	0	29	0	0	0	36	0	0	0	0	0	0	0	124	14	0	14	3	0	0	0
11:45 - 12:00	1	1	0	0	26	1	0	0	23	0	0	0	3	0	0	0	124	14	0	10	0	0	0	0
12:00 - 12:15	2	4	0	0	25	0	0	1	28	1	0	0	1	0	0	1	146	14	0	8	2	1	0	0
12:15 - 12:30	3	1	0	0	31	2	0	1	24	1	0	0	4	0	0	0	110	11	0	12	1	2	0	0
12:30 - 12:45	3	0	0	0	17	0	0	1	27	0	1	1	0	0	0	0	145	10	0	9	1	0	0	0
12:45 - 13:00	1	1	0	0	32	1	0	0	41	0	0	2	0	0	1	1	116	17	0	12	10	0	0	0
13:00 - 13:15	1	1	0	1	26	2	0	1	36	2	0	3	0	0	0	0	126	9	0	6	3	1	0	0
13:15 - 13:30	4	2	0	0	49	3	0	0	57	0	0	2	0	0	0	1	123	11	1	9	3	0	0	0
13:30 - 13:45	1	7	0	1	62	5	0	5	41	6	0	1	0	0	0	0	131	11	0	6	4	0	0	0
13:45 - 14:00	1	2	0	0	48	2	0	2	28	2	0	0	0	2	0	1	190	17	0	7	12	1	0	1
14:00 - 14:15	7	1	0	0	68	7	0	1	85	9	0	0	4	0	0	0	192	14	0	3	5	0	0	0
14:15 - 14:30	5	8	0	1	62	19	4	1	64	9	0	3	3	0	0	0	184	15	0	6	1	1	0	0
14:30 - 14:45	14	2	0	0	74	6	0	1	43	4	0	0	0	0	0	0	194	10	0	4	0	1	0	0
14:45 - 15:00	12	1	0	1	85	9	1	0	23	1	0	0	0	0	0	0	172	6	0	15	3	2	0	0
15:00 - 15:15	13	3	0	1	70	3	0	2	53	0	0	1	0	0	0	1	159	10	0	12	2	0	0	0
15:15 - 15:30	4	2	0	0	62	1	0	1	52	5	0	0	1	0	0	0	176	2	0	6	0	0	0	0
15:30 - 15:45	10	0	0	0	44	3	0	3	33	1	0	0	0	0	0	0	171	13	0	9	1	1	0	0
15:45 - 16:00	1	0	0	0	39	3	0	0	25	0	0	0	1	0	0	0	151	9	0	10	3	1	0	0
16:00 - 16:15	4	0	0	0	51	5	0	1	23	1	0	1	1	0	0	0	164	5	0	10	3	0	0	0
16:15 - 16:30	1	0	0	0	59	1	0	0	55	3	0	0	0	0	0	0	252	8	0	4	1	1	0	0
16:30 - 16:45	4	0	0	0	62	0	0	0	25	0	0	1	0	0	0	0	246	6	0	5	4	0	0	0
16:45 - 17:00	1	5	0	0	60	1	0	2	45	2	0	0	0	0	0	1	275	6	1	4	3	0	0	0
17:00 - 17:15	7	3	0	0	41	1	0	0	30	0	0	0	12	0	0	0	254	16	0	4	4	0	0	0
17:15 - 17:30	3	2	0	0	60	2	0	0	33	0	0	0	1	0	0	0	224	12	0	3	3	2	0	0
17:30 - 17:45	17	2	0	0	75	0	0	1	25	0	0	0	1	0	0	0	199	8	0	4	1	3	0	0
17:45 - 18:00	6	1	0	1	92	4	0	1	34	2	0	0	2	0	0	0	232	11	0	5	4	3	0	0
TOTAL	329	84	0	16	2025	110	9	52	1985	130	2	34	68	14	7	19	7830	753	10	374	209	50	0	12

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

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TRAFFIC ENGINEERING SERVICES TRUST
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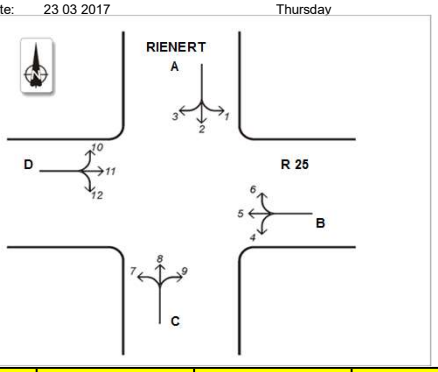
Posbus

4 Intersection of Rienert & R25

Survey Date: 23 03 2017 Thursday



PERIOD	MOVEMENT 1				MOVEMENT 2				MOVEMENT 3				MOVEMENT 4				MOVEMENT 5				MOVEMENT 6			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	8	1	0	0	24	1	0	0	46	0	0	0	35	3	0	0	376	0	0	4	3	1	0	1
6:15 - 6:30	10	1	0	0	52	1	0	1	62	0	0	0	44	0	0	0	413	1	0	1	6	0	0	0
6:30 - 6:45	17	3	0	0	77	2	0	1	47	0	0	0	47	0	0	1	365	4	0	3	4	0	0	0
6:45 - 7:00	22	0	0	0	122	8	1	2	42	0	0	0	77	7	0	0	303	3	1	2	9	0	0	0
7:00 - 7:15	28	0	0	0	98	9	0	1	41	1	0	1	96	9	0	0	239	6	0	2	16	2	0	0
7:15 - 7:30	19	0	0	0	86	6	1	0	21	0	0	0	76	3	0	0	242	1	0	3	12	0	0	0
7:30 - 7:45	17	1	0	2	62	3	0	0	18	1	0	0	44	0	0	0	280	1	0	1	9	0	0	0
7:45 - 8:00	6	0	0	0	39	0	0	1	14	0	0	0	40	1	0	1	235	1	0	9	6	0	0	0
8:00 - 8:15	5	0	0	0	19	0	0	0	15	0	0	1	17	0	0	0	204	1	0	3	5	0	0	0
8:15 - 8:30	11	0	0	0	36	1	0	2	15	0	0	0	15	0	0	0	234	0	0	4	10	1	0	0
8:30 - 8:45	4	0	0	0	22	0	0	0	7	0	0	0	13	0	0	1	184	0	0	9	2	0	0	0
8:45 - 9:00	6	1	0	0	30	0	0	0	12	0	0	0	14	0	0	1	208	0	0	6	4	0	0	0
9:00 - 9:15	4	0	0	0	26	0	0	1	6	0	0	0	20	0	0	0	165	0	0	3	6	0	0	0
9:15 - 9:30	9	0	0	0	20	0	0	2	5	0	0	0	14	0	0	0	172	0	0	7	6	0	0	1
9:30 - 9:45	7	0	0	0	22	3	0	0	4	0	0	0	24	0	0	3	159	1	0	10	2	0	0	0
9:45 - 10:00	3	0	0	0	20	0	0	0	12	1	0	1	17	1	0	0	135	0	0	7	2	0	0	0
10:00 - 10:15	6	0	0	0	20	1	0	1	7	0	0	1	13	0	0	1	136	1	0	3	1	0	0	0
10:15 - 10:30	7	0	0	0	19	0	0	0	5	0	0	0	11	0	0	1	128	2	0	11	3	0	0	0
10:30 - 10:45	4	0	0	0	16	0	0	0	4	0	0	0	18	0	0	0	90	0	0	7	6	0	0	0
10:45 - 11:00	13	0	0	0	17	0	0	0	6	0	0	0	12	0	0	2	86	1	0	8	4	0	0	0
11:00 - 11:15	5	0	0	0	22	0	0	0	2	0	0	1	16	0	0	0	78	0	0	3	5	0	0	0
11:15 - 11:30	6	0	0	0	17	1	0	0	4	0	0	0	9	0	0	1	94	0	0	11	4	1	0	0
11:30 - 11:45	3	0	0	0	21	0	0	0	2	0	0	0	12	0	0	0	99	0	0	8	1	0	0	0
11:45 - 12:00	5	0	0	0	17	0	0	0	0	0	0	2	23	0	0	0	89	0	0	5	2	1	0	0
12:00 - 12:15	3	0	0	0	15	0	0	1	2	0	0	1	14	0	0	0	81	0	0	9	5	0	0	0
12:15 - 12:30	7	0	0	0	13	1	0	1	5	0	0	1	17	1	0	0	97	0	0	1	3	0	0	0
12:30 - 12:45	4	0	0	0	15	0	0	0	4	0	0	2	8	0	0	1	73	0	0	7	4	1	0	0
12:45 - 13:00	7	0	0	0	15	0	0	1	1	0	0	0	18	1	0	1	88	0	0	5	4	1	0	0
13:00 - 13:15	10	0	0	0	14	0	1	2	4	0	0	0	30	0	0	1	92	1	0	14	7	0	0	0
13:15 - 13:30	6	0	0	0	27	0	0	0	2	0	0	0	23	1	0	1	94	0	0	7	6	0	0	0
13:30 - 13:45	6	0	0	0	38	4	0	0	5	0	0	1	20	1	0	0	88	1	0	2	8	3	0	0
13:45 - 14:00	12	1	0	0	33	3	0	1	8	1	0	0	21	0	0	0	85	0	0	11	8	0	0	0
14:00 - 14:15	11	0	0	1	22	1	0	1	5	0	0	0	20	0	0	0	73	1	0	3	6	0	0	1
14:15 - 14:30	7	0	0	0	28	3	0	0	6	0	0	0	28	0	0	0	82	0	0	9	3	0	0	0
14:30 - 14:45	15	1	0	0	24	1	1	0	5	0	0	1	33	0	0	0	82	0	0	3	20	0	0	0
14:45 - 15:00	12	1	1	0	34	1	0	0	3	0	0	0	27	1	1	3	87	1	0	9	9	3	0	0
15:00 - 15:15	10	0	0	0	23	1	0	0	2	0	0	0	14	2	0	1	102	1	1	4	15	1	0	0
15:15 - 15:30	8	0	0	0	20	0	0	2	7	0	0	0	16	0	0	1	94	0	0	9	8	0	0	0
15:30 - 15:45	10	0	0	0	17	0	0	0	13	0	0	0	34	0	0	3	89	0	0	4	10	0	0	0
15:45 - 16:00	7	0	0	0	16	0	0	2	2	0	0	1	26	0	1	1	85	0	0	7	13	1	0	0
16:00 - 16:15	6	0	0	0	23	0	0	0	4	1	0	0	21	1	0	0	65	0	0	11	10	0	0	0
16:15 - 16:30	13	0	0	0	14	0	0	0	5	0	0	1	17	0	0	1	88	2	1	5	13	0	0	0
16:30 - 16:45	11	0	0	0	27	0	0	0	5	0	0	0	22	0	0	0	57	0	0	3	12	0	0	0
16:45 - 17:00	17	0	0	0	34	1	0	0	3	0	0	2	41	0	1	0	86	1	0	10	23	0	0	0
17:00 - 17:15	13	0	0	0	35	0	0	0	2	0	0	0	29	0	0	1	52	2	0	7	20	0	0	0
17:15 - 17:30	10	0	0	0	21	0	0	0	2	0	0	0	25	0	0	2	76	8	0	5	23	0	0	0
17:30 - 17:45	12	0	0	0	31	0	0	0	3	0	0	0	30	1	0	0	81	7	0	8	15	0	0	0
17:45 - 18:00	13	0	0	0	23	0	0	0	4	0	0	0	21	0	0	0	70	3	0	2	30	0	0	0
TOTAL	**455**	**10**	**1**	**3**	**1466**	**52**	**4**	**23**	**499**	**5**	**0**	**17**	**1262**	**33**	**3**	**29**	**6681**	**51**	**3**	**285**	**403**	**16**	**0**	**3**

SHUMA AFRICA: CLASSIFIED MANUAL INTERSECTION COUNTS ZUURFONTEIN

TES
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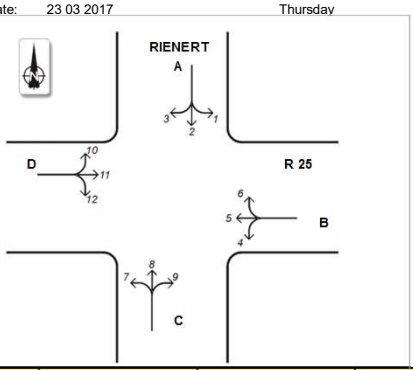
Posbus

4 Intersection of Rienert & R25

Survey Date: 23 03 2017 Thursday



PERIOD	MOVEMENT 7				MOVEMENT 8				MOVEMENT 9				MOVEMENT 10				MOVEMENT 11				MOVEMENT 12			
	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy	Light	Taxi	Bus	Heavy
6:00 - 6:15	35	2	0	0	3	2	0	0	22	0	0	0	2	2	1	0	30	7	0	3	2	0	0	0
6:15 - 6:30	48	0	0	0	10	2	0	0	17	1	0	0	2	0	0	0	36	3	0	6	7	0	0	0
6:30 - 6:45	22	0	0	0	23	0	0	0	26	0	0	0	5	0	1	0	66	7	0	3	6	2	0	1
6:45 - 7:00	20	1	0	0	19	0	0	0	35	1	0	0	3	0	0	0	50	1	0	2	19	1	0	0
7:00 - 7:15	19	0	0	0	21	2	0	0	38	2	0	0	6	0	0	0	85	0	0	9	16	0	0	0
7:15 - 7:30	22	1	0	1	36	2	0	0	25	1	0	1	5	0	0	0	59	0	0	5	17	0	0	1
7:30 - 7:45	31	0	0	1	36	4	0	0	26	1	0	1	2	0	0	0	42	0	0	2	12	0	0	1
7:45 - 8:00	24	0	0	0	27	1	0	0	29	0	0	0	4	0	0	0	44	4	0	3	2	0	0	0
8:00 - 8:15	13	0	0	1	12	2	0	0	10	0	0	1	1	0	0	0	49	1	0	9	9	0	0	0
8:15 - 8:30	19	0	0	0	7	1	0	0	11	0	0	1	2	0	0	0	36	0	0	7	5	0	0	0
8:30 - 8:45	17	0	0	0	11	1	0	0	23	0	0	0	1	0	0	0	54	1	0	7	1	0	0	1
8:45 - 9:00	12	0	0	0	19	0	0	0	11	0	0	0	1	0	0	0	59	0	0	4	4	0	0	0
9:00 - 9:15	20	0	0	0	15	0	0	2	14	0	0	1	1	0	0	0	57	1	0	10	3	0	0	1
9:15 - 9:30	11	0	0	0	8	1	0	1	22	0	0	1	1	0	0	0	64	1	0	5	4	0	0	1
9:30 - 9:45	11	0	0	1	10	1	0	0	22	0	0	0	3	0	0	0	60	1	0	3	4	0	0	0
9:45 - 10:00	5	0	0	0	6	1	0	0	17	0	0	1	0	0	1	0	47	2	0	9	3	0	0	1
10:00 - 10:15	11	0	0	0	22	1	0	1	15	0	0	0	0	0	0	0	63	1	0	7	9	0	0	0
10:15 - 10:30	5	0	0	0	12	0	0	1	9	0	0	2	0	0	0	0	80	2	0	5	9	0	0	0
10:30 - 10:45	9	0	0	1	17	0	0	0	4	0	0	1	1	0	0	0	83	0	0	7	3	0	0	0
10:45 - 11:00	6	0	0	0	14	1	0	0	12	0	0	2	1	0	0	0	85	0	0	10	4	0	0	0
11:00 - 11:15	2	0	0	0	6	0	0	0	6	0	0	1	0	0	0	0	94	0	0	9	9	0	0	0
11:15 - 11:30	13	0	0	0	11	0	0	1	11	0	0	1	1	0	0	0	60	1	0	7	4	0	0	0
11:30 - 11:45	7	0	0	0	17	0	0	2	12	0	0	0	0	0	0	1	66	1	0	3	11	0	0	1
11:45 - 12:00	8	0	0	0	11	0	0	0	12	0	0	0	0	0	0	0	66	0	0	6	3	0	0	0
12:00 - 12:15	3	0	0	0	23	1	0	0	14	0	0	1	0	0	0	0	93	0	0	8	11	0	0	1
12:15 - 12:30	5	0	0	0	13	1	0	1	13	0	0	2	2	0	0	0	104	1	0	9	15	0	0	0
12:30 - 12:45	8	0	0	0	22	0	0	1	20	0	0	1	2	0	0	0	115	0	0	2	11	0	0	0
12:45 - 13:00	10	0	0	1	27	1	0	1	19	1	0	0	0	0	0	0	161	0	0	8	20	0	0	0
13:00 - 13:15	3	0	0	0	17	0	0	0	11	1	0	0	2	0	0	0	180	0	0	7	11	0	0	0
13:15 - 13:30	7	0	0	0	24	3	0	0	13	1	0	0	0	0	0	0	82	0	2	5	19	0	0	0
13:30 - 13:45	7	0	0	0	18	6	0	0	22	0	0	1	0	0	1	1	145	1	0	4	4	0	0	1
13:45 - 14:00	7	0	0	0	34	4	0	1	21	0	0	1	0	0	0	0	84	1	0	4	10	0	1	0
14:00 - 14:15	8	0	0	1	30	1	0	0	38	1	0	2	0	0	0	0	66	2	0	3	7	0	0	0
14:15 - 14:30	4	0	0	0	22	12	1	1	31	4	1	0	0	0	0	0	123	3	0	5	3	0	0	1
14:30 - 14:45	10	3	0	1	26	5	1	1	26	5	0	1	0	0	0	0	124	0	0	3	4	0	0	0
14:45 - 15:00	10	0	0	0	30	14	0	1	43	5	0	1	1	0	0	1	173	4	0	6	9	0	0	0
15:00 - 15:15	12	0	0	0	30	5	0	1	45	3	0	1	5	0	0	0	211	0	0	2	12	0	0	0
15:15 - 15:30	2	0	0	0	35	5	0	0	43	0	0	0	3	0	0	0	162	0	0	3	14	0	0	0
15:30 - 15:45	2	0	0	0	39	3	0	0	33	0	0	0	2	0	0	1	284	0	0	5	25	0	0	0
15:45 - 16:00	5	0	0	1	13	1	0	0	40	0	0	1	5	0	0	0	244	1	0	7	38	0	0	0
16:00 - 16:15	6	0	0	0	36	0	0	2	35	1	0	1	5	0	0	0	361	0	0	4	88	0	0	1
16:15 - 16:30	8	0	0	0	45	0	0	0	31	0	0	0	12	0	0	0	361	3	0	5	16	0	0	0
16:30 - 16:45	7	0	0	0	57	0	0	0	37	0	0	0	11	0	0	0	226	1	0	4	57	0	0	0
16:45 - 17:00	7	0	0	0	61	0	0	1	54	0	0	1	8	0	0	0	327	0	0	6	44	0	0	0
17:00 - 17:15	5	0	0	0	86	0	0	1	52	1	0	0	6	0	0	0	258	1	0	1	36	0	0	0
17:15 - 17:30	12	1	0	1	91	0	0	0	56	0	0	0	7	0	0	0	431	2	1	6	40	0	0	0
17:30 - 17:45	8	0	0	0	58	1	0	1	61	0	0	0	2	0	0	0	468	5	0	4	12	0	0	0
17:45 - 18:00	3	0	0	1	59	0	0	1	54	0	0	0	0	0	0	0	533	1	0	2	1	0	0	0
TOTAL	**549**	**8**	**0**	**11**	**1269**	**85**	**2**	**22**	**1241**	**29**	**1**	**28**	**115**	**2**	**4**	**4**	**6751**	**60**	**3**	**254**	**673**	**3**	**1**	**12**

Appendix D: Calculations

Traffic Signals

Movement Timing Information
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID	Mov Typ	First Green Fr	First Green To	First Green Op Pr Und	Second Green Fr	Second Green To	Second Green Op Pr Und	Lost Tim 1st Grn	Lost Tim 2nd Grn	Req.Mov.Time 1st Grn	Req.Mov.Time 2nd Grn	Eff. Grn 1st Grn	Eff. Grn 2nd Grn
East: Colin Paul Street East													
3	T	A	#####					9		45.0Min		56	
4	R	*A	B					9		16.4		8	
North: Fehrsen Drive North													
1	L (Slp)	B	#####	Y	#####	B		41	9	30.0Min	31.3	7	23
2	R	*#####	A					9		15.0Min		6	
West: Colin Paul Street West													
5	L	*B	#####					24		46.2		24	
6	T	B	#####					24		45.6		24	

Current Phase Sequence: Opposed Turns
Input phase sequence: A B New Phase - 3
Output phase sequence: A B #####

* Critical Movement/Green Period
Y (under heading 'Op') - Movement is opposed in the indicated green period

Movement Types:
Slp Slip Lane Movement
Ped Pedestrian
Dum Dummy

CRITICAL MOVEMENTS AND CYCLE TIME

Crit Mov ID	App. and Turn	Green Period Fr	Phases To	Adjusted Lost Time	Adjusted Flow Ratio	Required Grn Time Ratio	Required Movement Time
4	E_R	A	B	9	0.083	0.092	16.4
5	W_L	B	#####	24	0.250	0.278	46.2
2	N_R	#####A		15	-	-	15.0Min
				----	------	------	------
		Total:		48	0.333	0.370	77.6

\- Flow ratio not used for cycle time calculations and
the adjusted lost time equals the required movement time
(=Min or Max as shown in Movement Timing Information)

Cycle Time:

Minimum	Maximum	Practical	Chosen
60	150	76	80

Phase Information
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Phase	Change Time	Starting Intgrn	Green Start	Displayed Green	Green End	Terminating Intgrn	Phase Time	Phase Split
A	0	9	9	8	17	24	32	40%
B	17	24	41	24	65	9	33	41%
#####	65	9	74	6	80	9	15	19%

Current Phase Sequence: Opposed Turns
Input phase sequence: A B New Phase - 3
Output phase sequence: A B #####

Progression and Actuated Signal Parameters
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID	Control	Coord.	Arrival Type	% Arriving During Green	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
East: Colin Paul Street East										
3 T	FT	No	3	70.0	1.000	1.000	6	NA		
4 R	FT	No	3	10.0	1.000	1.000	6	NA		
North: Fehrsen Drive North										
1 L	FT	No	3	37.5	1.000	1.000	6	NA	6	NA
2 R	FT	No	3	7.5	1.000	1.000	6	NA		
West: Colin Paul Street West										
5 L	FT	No	3	30.0	1.000	1.000	6	NA		
6 T	FT	No	3	30.0	1.000	1.000	6	NA		

Movements

Movement Capacity Parameters
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID	Dem Flow	HV	Satn Flow 1st Grn	Satn Flow 2nd Grn	Flow Ratio 1st Grn	Flow Ratio 2nd Grn	Total Cap.	Prac. Deg. Satn	Prac. Spare Cap.	Lane Util	Deg. Satn
	veh/h	%					veh/h	xp	%	%	x
East: Colin Paul Street East											
3 T	167	3.5	1907		0.087		1335	0.90	621	15	0.125
4 R	293	7.2	3533		0.083		353	0.90	8	100	0.830
North: Fehrsen Drive North											
1 L	920	1.5	3083	3675	0.000	0.250	1326	0.90	30	100	0.694
2 R	4	33.0	1503		0.003		113	0.90	2436	100	0.035
West: Colin Paul Street West											
5 L	4	29.0	16		0.250		5	0.90	8	100	0.833*
6 T	928	2.6	3815		0.243		1145	0.90	11	100	0.811

* Maximum degree of saturation

Movement Performance
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
East: Colin Paul Street East									
3 T	0.19	0.23	4.2	0.29	48.3	3.43	101.1	1.9	52.2
4 R	4.35	5.22	53.3	0.94	276.9	16.79	178.8	7.3	24.5
North: Fehrsen Drive North									
1 L	7.69	9.23	30.1	0.96	880.8	36.89	566.1	17.1	33.1
2 R	0.05	0.06	48.3	0.64	2.6	0.20	2.4	0.1	26.0
West: Colin Paul Street West									
5 L	0.05	0.06	41.6	0.97	3.9	0.21	2.4	0.1	29.9
6 T	8.39	10.06	32.5	0.95	885.1	45.49	562.6	18.7	30.1

Intersection Negotiation Data
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream m	Distance User Spec?
East: Colin Paul Street East								
	North	Right	14.9	23.5	23.5	500	116	No
	West	Thru	S	60.0	19.8	500	163	No
North: Fehrsen Drive North								
	East	Left	20.0	26.2	31.4	500	116	No
	West	Right	9.9	20.1	15.6	500	136	No
West: Colin Paul Street West								
	East	Thru	S	60.0	19.8	500	161	No
	North	Left	10.0	20.2	15.7	500	82	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Movement Speeds and Geometric Delay
Site:Colin Paul and Fehresen -TIA-AM-

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
East: Colin Paul Street East									
3 T	60.0	60.0	60.0	60.0	45.0		53.8	52.2	0.0
4 R	60.0	23.5	23.5	60.0	21.0		42.7	24.5	8.0
North: Fehrsen Drive North									
1 L	60.0	26.2	26.2	60.0	17.9	26.2	43.5	33.1	7.6
2 R	60.0	20.1	20.1	60.0			45.0	26.0	9.1
West: Colin Paul Street West									
5 L	60.0	20.2	20.2	60.0	37.1		48.4	29.9	9.0
6 T	60.0	60.0	60.0	60.0	37.1		44.1	30.1	0.0

"Running Speed" is the average speed excluding stopped periods.

Lanes

Lane Performance
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Effective Green Times (sec) R1	G1	R2	G2	Dem Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
East: Colin Paul Street East												
1 T	24	56	0	0	167	1335	0.125	4.2	0.29	3.1	22.1	500.0
2 R	72	8	0	0	147	177	0.830	53.3	0.94	8.2	60.6	500.0
3 R	72	8	0	0	147	177	0.830	53.3	0.94	8.2	60.6	500.0
North: Fehrsen Drive North												
1 L	41	7	9	23	460	663	0.694	30.1	0.96	13.6	96.8	500.0
2 L	41	7	9	23	460	663	0.694	30.1	0.96	13.6	96.8	500.0
3 R	74	6	0	0	4	113	0.035	48.3	0.64	0.2	2.2	500.0
West: Colin Paul Street West												
1 LT	56	24	0	0	465	574	0.811	32.6	0.95	19.7	141.0	500.0
2 T	56	24	0	0	466	575	0.811	32.5	0.95	19.7	140.9	500.0

Lane Flow and Capacity Information
Site:Colin Paul and Fehresen -TIA-AM-5

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width m	Saturation Flow Adj. Basic (tcu)	Aver 1st (veh)	Aver 2nd (veh)	End Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
East: Colin Paul Street East												
1 T	0	167	0	167	3.30	1950	1907	0	0	1335	0.125	15P
2 R	0	0	147	147	3.30	1950	1766	0	0	177	0.830	100
3 R	0	0	147	147	3.30	1950	1766	0	0	177	0.830	100
North: Fehrsen Drive North												
1 L	460	0	0	460	3.30	1950	1541	1837	112	663	0.694	100
2 L	460	0	0	460	3.30	1950	1541	1837	112	663	0.694	100
3 R	0	0	4	4	3.30	1950	1503	0	0	113	0.035	100
West: Colin Paul Street West												
1 LT	4	461	0	465	3.30	1950	1914	0	0	574	0.811	100
2 T	0	466	0	466	3.30	1950	1918	0	0	575	0.811	100

P Lane under-utilisation found by the "Program". This includes cases where the value of lane under-utilisation due to downstream effects has been modified by the program during lane flow calculations (e.g. a de facto exclusive lane has been found).

Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:Colin Paul and Fehresen -TIA-AM-5

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
East: Colin Paul Street East												
1 T		167		167	4	1949	56		0.125	4.2	22	500
2 R			147	147	7	1949	8		0.830	53.3	61	500
3 R			147	147	7	1950	8		0.830	53.3	61	500
	0	167	293	460	6				0.830	35.5	61	
North: Fehrsen Drive North												
1 L	460			460	2	1949	7	23	0.694	30.1	97	500
2 L	460			460	2	1949	7	23	0.694	30.1	97	500
3 R			4	4	33	1949	6		0.035	48.3	2	500
	920	0	4	924	2				0.694	30.2	97	
West: Colin Paul Street West												
1 LT	4	461		465	3	1950	24		0.811	32.6	141	500
2 T		466		466	3	1950	24		0.811	32.5	141	500
	4	928	0	932	3				0.811	32.6	141	

ALL VEHICLES	Total Flow	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	2316	3	80	0.833	32.2	141

Peak flow period = 15 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Driver Characteristics
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
East: Colin Paul Street East						
1 T	45.0	1907	1.89	23.60	7.21	1.31
2 R	NA - Shared lane phases differ					
3 R	23.5	1766	2.04	13.30	7.43	0.90
North: Fehrsen Drive North						
1 L	NA - Opposed turn					
2 L	NA - Opposed turn					
3 R	20.1	1503	2.40	13.37	8.98	0.79
West: Colin Paul Street West						
1 LT	44.8	1914	1.88	23.41	7.17	1.31
2 T	45.0	1918	1.88	23.47	7.16	1.30

Lane Delays
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

		Stop-line Delay			Delay (seconds/veh) Acc.	Queuing		Stopd		
Lane No.	Deg. Satn x	1st d1	2nd d2	Total dSL	Dec. dn	Total dq	MvUp dqm	(Idle) di	Geom dig	Control dic
East: Colin Paul Street East										
1 T	0.125	4.2	0.0	4.2	3.0	1.2	0.0	1.2	0.0	4.2
2 R	0.830	40.9	4.4	45.3	4.6	40.7	2.4	38.3	8.0	53.3
3 R	0.830	40.9	4.4	45.3	4.6	40.7	2.4	38.3	8.0	53.3
North: Fehrsen Drive North										
1 L	0.694	22.3	0.2	22.5	4.5	17.9	1.9	16.0	7.6	30.1
2 L	0.694	22.3	0.2	22.5	4.5	17.9	1.9	16.0	7.6	30.1
3 R	0.035	39.1	0.0	39.1	3.9	35.2	0.0	35.2	9.1	48.3
West: Colin Paul Street West										
1 LT	0.811	28.4	4.1	32.6	8.4	24.1	1.2	23.0	0.1	32.6
2 T	0.811	28.4	4.1	32.5	8.5	24.1	1.1	22.9	0.0	32.5

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:Colin Paul and Fehresen -TIA-AM-5

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
East: Colin Paul Street East											
1 T	0.125	0.0	1.3	0.0	1.3	3.1	0.04	0.0	100.0	0.2	0.7
2 R	0.830	0.2	3.7	0.3	4.0	8.2	0.12	0.0	100.0	1.8	5.0
3 R	0.830	0.2	3.7	0.3	4.0	8.2	0.12	0.0	100.0	1.8	5.0
North: Fehrsen Drive North											
1 L	0.694	0.0	7.4	0.0	7.4	13.6	0.19	0.0	100.0	2.9	7.2
2 L	0.694	0.0	7.4	0.0	7.4	13.6	0.19	0.0	100.0	2.9	7.2
3 R	0.035	0.0	0.1	0.0	0.1	0.2	0.00	0.0	100.0	0.0	0.2
West: Colin Paul Street West											
1 LT	0.811	0.6	10.5	0.9	11.4	19.7	0.28	0.0	100.0	4.2	9.7
2 T	0.811	0.6	10.5	0.9	11.5	19.7	0.28	0.0	100.0	4.2	9.7

Lane Queues (Distance)
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
East: Colin Paul Street East											
1 T	0.125	0.0	9.3	0.0	9.3	22.1	0.04	0.0	100.0	1.4	4.8
2 R	0.830	1.5	27.5	1.9	29.5	60.6	0.12	0.0	100.0	13.7	37.4
3 R	0.830	1.5	27.5	1.9	29.5	60.6	0.12	0.0	100.0	13.7	37.4
North: Fehrsen Drive North											
1 L	0.694	0.2	52.4	0.3	52.7	96.8	0.19	0.0	100.0	20.4	50.7
2 L	0.694	0.2	52.4	0.3	52.7	96.8	0.19	0.0	100.0	20.4	50.7
3 R	0.035	0.0	0.8	0.0	0.8	2.2	0.00	0.0	100.0	0.4	1.4
West: Colin Paul Street West											
1 LT	0.811	4.3	75.2	6.8	82.0	141.0	0.28	0.0	100.0	30.2	69.6
2 T	0.811	4.3	75.3	6.8	82.0	140.9	0.28	0.0	100.0	30.2	69.6

Lane Queue Percentiles (Vehicles)
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
East: Colin Paul Street East							
1 T	0.125	1.3	1.6	2.1	2.5	3.1	3.6
2 R	0.830	4.0	5.0	6.2	7.0	8.2	9.2
3 R	0.830	4.0	5.0	6.2	7.0	8.2	9.2
North: Fehrsen Drive North							
1 L	0.694	7.4	9.3	11.2	12.2	13.6	14.8
2 L	0.694	7.4	9.3	11.2	12.2	13.6	14.8
3 R	0.035	0.1	0.1	0.2	0.2	0.2	0.3
West: Colin Paul Street West							
1 LT	0.811	11.4	14.2	17.0	18.2	19.7	20.8
2 T	0.811	11.5	14.2	17.0	18.2	19.7	20.8

Lane Queue Percentiles (Distance)
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
East: Colin Paul Street East							
1 T	0.125	9.3	11.7	15.3	17.8	22.1	26.2
2 R	0.830	29.5	36.9	46.2	51.8	60.6	68.7
3 R	0.830	29.5	36.9	46.2	51.8	60.6	68.7
North: Fehrsen Drive North							
1 L	0.694	52.8	65.7	79.8	86.8	96.8	105.2
2 L	0.694	52.8	65.7	79.8	86.8	96.8	105.2
3 R	0.035	0.8	1.1	1.4	1.7	2.2	2.7
West: Colin Paul Street West							
1 LT	0.811	82.1	102.0	121.7	130.2	141.0	149.2
2 T	0.811	82.0	102.0	121.6	130.2	140.9	149.1

Lane Stops
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
East: Colin Paul Street East									
1 T	0.125	0.29	0.00	0.00	0.29	48.3	0.00	0.0	0.35

```
 2 R   0.830  0.80  0.15  0.00   0.94    138.5    0.35    51.3   1.00
 3 R   0.830  0.80  0.15  0.00   0.94    138.5    0.35    51.3   1.00
--------------------------------------------------------------------
 North: Fehrsen Drive North
 1 L   0.694  0.79  0.12  0.06   0.96    440.4    0.31   144.2   0.91
 2 L   0.694  0.79  0.12  0.06   0.96    440.4    0.31   144.2   0.91
 3 R   0.035  0.61  0.00  0.03   0.64      2.6    0.00     0.0   0.95
--------------------------------------------------------------------
 West: Colin Paul  Street  West
 1 LT  0.811  0.86  0.09  0.00   0.95    444.1    0.14    64.9   0.99
 2 T   0.811  0.86  0.09  0.00   0.95    444.9    0.14    64.9   0.99
--------------------------------------------------------------------
  hig is the average value for all movements in a shared lane
  hqm is average queue move-up rate for all vehicles queued and unqueued
```

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:Colin Paul and Fehresen -TIA-AM

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time =  80 sec (Practical Cycle Time)

-------------------------------------------------------------------------
 From      To          Mov           Flow Rate   Flow Scale   Peak Flow
 Approach  Approach    ID    Turn     LV    HV   Fixed   Var     Factor
-------------------------------------------------------------------------
 East: Colin Paul Street East
           North         4   Right   272    21    1.00   1.00      0.30
           West          3   Thru    161     6    1.00   1.00      0.90
-------------------------------------------------------------------------
 North: Fehrsen Drive North
           East          1   Left    907    14    1.00   1.00      0.54
           West          2   Right     3     1    1.00   1.00      0.25
-------------------------------------------------------------------------
 West: Colin Paul  Street  West
           East          6   Thru    904    24    1.00   1.00      0.83
           North         5   Left      3     1    1.00   1.00      0.25
-------------------------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Separate Light and Heavy Vehicles)
Site:Colin Paul and Fehresen -TIA-AM

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time =  80 sec (Practical Cycle Time)

-----------------------------------------------
  Mov          Left       Through       Right
  ID        ---------    ---------    ---------
             LV    HV     LV    HV     LV    HV
-----------------------------------------------
Demand flows in veh/h as used by the program
East: Colin Paul Street East
    3 T       0     0    161     6      0     0
    4 R       0     0      0     0    272    21
-----------------------------------------------
North: Fehrsen Drive North
    1 L     907    14      0     0      0     0
    2 R       0     0      0     0      3     1
-----------------------------------------------
West: Colin Paul  Street  West
    5 L       3     1      0     0      0     0
    6 T       0     0    904    24      0     0
-----------------------------------------------
Unit Time for Volumes =  60 minutes
```

Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Total Vehicles and Percent Heavy)
Site:Colin Paul and Fehresen -TIA-AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 80 sec (Practical Cycle Time)

Mov ID		Left		Through		Right	
		Total	%HV	Total	%HV	Total	%HV
Demand flows in veh/h as used by the program							
East: Colin Paul Street East							
3	T	0	0.0	167	3.5	0	0.0
4	R	0	0.0	0	0.0	293	7.2
North: Fehrsen Drive North							
1	L	920	1.5	0	0.0	0	0.0
2	R	0	0.0	0	0.0	4	33.0
West: Colin Paul Street West							
5	L	4	29.0	0	0.0	0	0.0
6	T	0	0.0	928	2.6	0	0.0

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

INTERSECTION BETWEEN M88 AND COLIN PAUL DRIVE

Traffic Signals

Movement Timing Information
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID	Mov Typ	PHASE MATRIX First Green Fr	To	Op Pr Und	Second Green Fr	To	Op Pr Und	Lost Tim 1st Grn	Lost Tim 2nd Grn	Req.Mov.Time 1st Grn	Req.Mov.Time 2nd Grn	Eff. Grn 1st Grn	Eff. Grn 2nd Grn
South: M88 South													
7	L	A	B					6		12.7		15	
8	T	A	B					6		12.7		15	
9	R	A	B	Y				18		19.3		3	
East: Colin Paul Street East													
4	L	B	A					6		12.3		23	
5	T	B	A					6		12.3		23	
6	R	B	A	Y				14		18.1		15	
North: M88 North													
1	L	*A	B					6		20.4		15	
2	T	A	B					6		20.4		15	
3	R	A	B	Y				11		16.1		10	
West: Colin Paul Street West													
10	L	B	A					6		18.9		23	
11	T	B	A					6		18.8		23	
12	R	*B	A	Y				8		27.5		21	

Current Phase Sequence: Opposed Turns
Input phase sequence: A B
Output phase sequence: A B

* Critical Movement/Green Period
Y (under heading 'Op') - Movement is opposed in the indicated green period

Movement Types:
Slp Slip Lane Movement
Ped Pedestrian
Dum Dummy

CRITICAL MOVEMENTS AND CYCLE TIME

Crit Mov ID	App. and Turn	Green Period	Phases Fr	Phases To	Adjusted Lost Time	Adjusted Flow Ratio	Required Grn Time Ratio	Required Movement Time
1	N_L		A	B	6	0.260	0.289	20.4
12	W_R		B	A	8	0.351	0.390	27.5
					----	------	------	------
			Total:		14	0.611	0.678	47.9

Cycle Time:

Minimum	Maximum	Practical	Chosen
24	150	44	50

Phase Information
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Phase	Change Time	Starting Intgrn	Green Start	Displayed Green	Green End	Terminating Intgrn	Phase Time	Phase Split
A	0	6	6	15	21	6	21	42%
B	21	6	27	23	50	6	29	58%

Current Phase Sequence: Opposed Turns
Input phase sequence: A B
Output phase sequence: A B

Progression and Actuated Signal Parameters
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID	Control	Coord.	Arrival Type	% Arriving During Green	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
South: M88 South										
7 L	FT	No	3	30.0	1.000	1.000	6	NA		
8 T	FT	No	3	30.0	1.000	1.000	6	NA		
9 R	FT	No	3	6.0	1.000	1.000	6	NA		
East: Colin Paul Street East										
4 L	FT	No	3	46.0	1.000	1.000	6	NA		
5 T	FT	No	3	46.0	1.000	1.000	6	NA		
6 R	FT	No	3	30.0	1.000	1.000	6	NA		
North: M88 North										
1 L	FT	No	3	30.0	1.000	1.000	6	NA		
2 T	FT	No	3	30.0	1.000	1.000	6	NA		
3 R	FT	No	3	20.0	1.000	1.000	6	NA		
West: Colin Paul Street West										
10 L	FT	No	3	46.0	1.000	1.000	6	NA		
11 T	FT	No	3	46.0	1.000	1.000	6	NA		
12 R	FT	No	3	42.0	1.000	1.000	6	NA		

SCATS Parameters
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Stopline Flow veh/h	Capacity veh/h	SCATS Satn Flow	SCATS MF	Hdwy at MF sec	Occ Time sec	Space Time sec	Deg. Satn x	Lane Util. %
South: M88 South									
1 LT	218	543	1881	1344	2.68	0.60	2.07	0.402	100
2 TR	210	522	1947	1298	2.77	0.37	2.41	0.402	100
East: Colin Paul Street East									
1 LTR	130	528	1876	1488	2.42	0.65	1.77	0.246	100
North: M88 North									
1 LT	499	579	1946	1390	2.59	0.37	2.22	0.861	100
2 R	130	281	1857	884	4.07	0.76	3.31	0.462	100
West: Colin Paul Street West									
1 LT	420	835	1860	1475	2.44	0.77	1.67	0.503	100
2 R	511	612	1857	1345	2.68	0.86	1.82	0.835	100
3 R	511	612	1857	1345	2.68	0.86	1.82	0.835	100

STOPLINE FLOW: Departure flow rate in veh/h as measured at the stop line. This cannot exceed capacity.

SCATS SATURATION FLOW: This allows for lane width, approach grade and turning vehicles. Saturation flow scale applies if specified. The effects of heavy vehicles, parking manoeuvres, number of buses stopping and conflicting pedestrian volume are not included.

SCATS MF: This emulates the MF (Maximum Flow) parameter used in the SCATS control system. It is calculated from the SCATS SATURATION FLOW parameter.

DEG. SATN: The Demand (Arrival) Flow Rate may exceed the Stopline Flow Rate, therefore x > 1 is possible.

Movements

Movement Capacity Parameters
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID	Dem Flow veh/h	HV %	Satn Flow 1st Grn	Satn Flow 2nd Grn	Flow Ratio 1st Grn	Flow Ratio 2nd Grn	Total Cap. veh/h	Prac. Deg. Satn xp	Prac. Spare Cap. %	Lane Util %	Deg. Satn x
South: M88 South											
7 L	160	6.6	1326		0.120		398	0.90	124	100	0.402
8 T	261	2.7	2168		0.120		650	0.90	124	100	0.401
9 R	7	1.9	277		0.024		17	0.90	124	100	0.401
East: Colin Paul Street East											
4 L	51	1.4	449		0.113		207	0.90	265	100	0.246
5 T	28	0.0	247		0.113		114	0.90	265	100	0.246
6 R	51	3.1	692		0.074		208	0.90	266	100	0.246

North: M88 North										
1	L	18	6.7	70	0.260	21	0.90	4	100	0.866*
2	T	480	1.1	1859	0.258	558	0.90	4	100	0.861
3	R	130	2.6	1403	0.092	281	0.90	95	100	0.462
West: Colin Paul Street West										
10	L	406	3.3	1753	0.231	806	0.90	79	100	0.503
11	T	14	9.4	62	0.230	29	0.90	80	100	0.501
12	R	1022	6.1	2913	0.351	1223	0.90	8	100	0.835

* Maximum degree of saturation

Intersection Negotiation Data
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream m	Distance User Spec?
South: M88 South								
	East	Right	8.4	18.9	13.2	500	68	No
	North	Thru	S	60.0	16.5	500	164	No
	West	Left	10.0	20.2	15.7	500	105	No
East: Colin Paul Street East								
	South	Left	10.0	20.2	15.7	500	102	No
	North	Right	8.4	18.9	13.2	500	101	No
	West	Thru	S	60.0	16.5	500	191	No
North: M88 North								
	South	Thru	S	60.0	16.5	500	162	No
	East	Left	10.0	20.2	15.7	500	73	No
	West	Right	11.7	21.4	18.3	500	109	No
West: Colin Paul Street West								
	South	Right	8.4	18.9	13.2	500	108	No
	East	Thru	S	60.0	16.5	500	211	No
	North	Left	10.0	20.2	15.7	500	107	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

vement Speeds and Geometric Delay
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID		App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: M88 South										
7	L	60.0	20.2	20.2	60.0			46.4	36.8	8.4
8	T	60.0	60.0	60.0	60.0			46.0	38.8	0.0
9	R	60.0	18.9	18.9	60.0			49.6	38.1	8.4
East: Colin Paul Street East										
4	L	60.0	20.2	20.2	60.0			46.8	40.9	8.2
5	T	60.0	60.0	60.0	60.0			46.9	43.5	0.0
6	R	60.0	18.9	18.9	60.0			46.9	40.9	8.4

North: M88 North									
1	L	60.0	20.2	20.2	60.0	29.3	46.6	33.1	8.4
2	T	60.0	60.0	60.0	60.0	29.3	42.5	33.3	0.0
3	R	60.0	21.4	21.4	60.0		45.1	33.6	8.1
West: Colin Paul Street West									
10	L	60.0	20.2	20.2	60.0		45.9	39.7	8.3
11	T	60.0	60.0	60.0	60.0		44.9	41.4	0.0
12	R	60.0	18.9	18.9	60.0	18.9	44.0	32.9	8.5

"Running Speed" is the average speed excluding stopped periods.

Lanes

Lane Performance
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Effective Red and Green Times (sec) R1	G1	R2	G2	Dem Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: M88 South												
1 LT	35	15	0	0	218	543	0.402	21.7	0.78	5.9	43.2	500.0
2 TR	36	14	0	0	210	522	0.402	16.6	0.71	5.8	41.5	500.0
East: Colin Paul Street East												
1 LTR	27	23	0	0	130	528	0.246	15.7	0.73	2.9	20.9	500.0
North: M88 North												
1 LT	35	15	0	0	499	579	0.861	25.8	1.06	15.7	111.4	500.0
2 R	40	10	0	0	130	281	0.462	28.6	0.79	4.2	30.3	500.0
West: Colin Paul Street West												
1 LT	27	23	0	0	420	835	0.503	18.4	0.81	9.1	65.4	500.0
2 R	29	21	0	0	511	612	0.835	30.0	0.98	15.6	114.6	500.0
3 R	29	21	0	0	511	612	0.835	30.0	0.98	15.6	114.6	500.0

Lane Flow and Capacity Information
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width m	Saturation Flow Adj. Basic (tcu)	Aver 1st (veh)	Aver 2nd (veh)	End Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: M88 South												
1 LT	160	58	0	218	3.30	1950	1810	0	0	543	0.402	100
2 TR	0	203	7	210	3.30	1950	1864	0	75	522	0.402	100
East: Colin Paul Street East												
1 LTR	51	28	51	130	3.30	1950	1148	0	106	528	0.246	100
North: M88 North												
1 LT	18	480	0	499	3.30	1950	1930	0	0	579	0.861	100
2 R	0	0	130	130	3.30	1950	1403	0	158	281	0.462	100

West: Colin Paul Street West												
1 LT	406	14	0	420	3.30	1950	1815	0	0	835	0.503	100
2 R	0	0	511	511	3.30	1950	1457	0	156	612	0.835	100
3 R	0	0	511	511	3.30	1950	1457	0	156	612	0.835	100

Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: M88 South												
1 LT	160	58		218	6	1950	15		0.402	21.7	43	500
2 TR		203	7	210	3	1950	14		0.402	16.6	42	500
	160	261	7	428	4				0.402	19.2	43	
East: Colin Paul Street East												
1 LTR	51	28	51	130	2	1950	23		0.246	15.7	21	500
	51	28	51	130	2				0.246	15.7	21	
North: M88 North												
1 LT	18	480		499	1	1950	15		0.861	25.8	111	500
2 R			130	130	3	1949	10		0.462	28.6	30	500
	18	480	130	628	2				0.861	26.4	111	
West: Colin Paul Street West												
1 LT	406	14		420	4	1950	23		0.503	18.4	65	500
2 R			511	511	6	1949	21		0.835	30.0	115	500
3 R			511	511	6	1949	21		0.835	30.0	115	500
	406	14	1022	1442	5				0.835	26.6	115	

ALL VEHICLES	Total Flow	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	2628	4	50	0.866	24.8	115

Peak flow period = 15 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Driver Characteristics
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: M88 South						
1 LT	26.8	1810	1.99	14.81	7.33	1.00

2 TR	NA - Opposed turn					
East: Colin Paul Street East						
1 LTR	NA - Opposed turn					
North: M88 North						
1 LT	44.1	1930	1.87	22.85	7.08	1.29
2 R	NA - Opposed turn					
West: Colin Paul Street West						
1 LT	21.0	1815	1.98	11.58	7.21	0.75
2 R	NA - Opposed turn					
3 R	NA - Opposed turn					

Lane Delays
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Stop-line Delay 1st d1	2nd d2	Total dSL	Delay (seconds/veh) Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: M88 South										
1 LT	0.402	15.6	0.0	15.6	4.3	11.2	0.0	11.2	6.1	21.7
2 TR	0.402	16.3	0.0	16.3	7.2	9.2	0.0	9.2	0.3	16.6
East: Colin Paul Street East										
1 LTR	0.246	9.2	0.0	9.2	3.1	6.1	0.0	6.1	6.5	15.7
North: M88 North										
1 LT	0.861	18.6	7.0	25.5	8.4	17.1	2.7	14.4	0.3	25.8
2 R	0.462	20.4	0.0	20.4	4.0	16.5	0.0	16.5	8.1	28.6
West: Colin Paul Street West										
1 LT	0.503	10.4	0.0	10.4	3.2	7.3	0.0	7.3	8.0	18.4
2 R	0.835	14.6	7.0	21.5	3.7	17.8	1.2	16.6	8.5	30.0
3 R	0.835	14.6	7.0	21.5	3.7	17.8	1.2	16.6	8.5	30.0

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 LT	0.402	0.0	2.7	0.0	2.7	5.9	0.09	0.0	100.0	0.9	2.9
2 TR	0.402	0.0	2.6	0.0	2.6	5.8	0.08	0.0	100.0	1.0	2.9
East: Colin Paul Street East											
1 LTR	0.246	0.0	1.2	0.0	1.2	2.9	0.04	0.0	100.0	0.3	1.1
North: M88 North											
1 LT	0.861	1.0	7.3	1.5	8.8	15.7	0.22	0.0	100.0	3.5	8.4
2 R	0.462	0.0	1.8	0.0	1.8	4.2	0.06	0.0	100.0	0.7	2.3
West: Colin Paul Street West											

1 LT	0.503	0.0	4.5	0.0	4.5	9.1	0.13	0.0	100.0	1.2	3.6
2 R	0.835	1.1	7.1	1.6	8.7	15.6	0.23	0.0	100.0	3.1	7.5
3 R	0.835	1.1	7.1	1.6	8.7	15.6	0.23	0.0	100.0	3.1	7.5

Lane Queues (Distance)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 LT	0.402	0.0	19.8	0.0	19.8	43.2	0.09	0.0	100.0	6.9	21.1
2 TR	0.402	0.0	18.9	0.0	18.9	41.5	0.08	0.0	100.0	6.8	20.8
East: Colin Paul Street East											
1 LTR	0.246	0.0	8.7	0.0	8.7	20.9	0.04	0.0	100.0	2.4	7.9
North: M88 North											
1 LT	0.861	7.3	52.0	10.5	62.5	111.4	0.22	0.0	100.0	25.0	59.7
2 R	0.462	0.0	13.2	0.0	13.2	30.3	0.06	0.0	100.0	5.3	16.6
West: Colin Paul Street West											
1 LT	0.503	0.0	32.6	0.0	32.6	65.4	0.13	0.0	100.0	8.8	25.9
2 R	0.835	8.0	52.5	11.7	64.1	114.6	0.23	0.0	100.0	22.5	55.3
3 R	0.835	8.0	52.5	11.7	64.1	114.6	0.23	0.0	100.0	22.5	55.3

Lane Queue Percentiles (Vehicles)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 LT	0.402	2.7	3.4	4.3	4.9	5.9	6.8
2 TR	0.402	2.6	3.3	4.2	4.8	5.8	6.7
East: Colin Paul Street East							
1 LTR	0.246	1.2	1.6	2.0	2.4	2.9	3.5
North: M88 North							
1 LT	0.861	8.8	11.0	13.2	14.3	15.7	16.9
2 R	0.462	1.8	2.3	3.0	3.5	4.2	5.0
West: Colin Paul Street West							
1 LT	0.503	4.5	5.7	7.0	7.8	9.1	10.2
2 R	0.835	8.7	10.8	13.1	14.1	15.6	16.7
3 R	0.835	8.7	10.8	13.1	14.1	15.6	16.7

Lane Queue Percentiles (Distance)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 LT	0.402	19.8	24.8	31.6	36.0	43.2	50.0
2 TR	0.402	18.9	23.8	30.3	34.6	41.5	48.0
East: Colin Paul Street East							
1 LTR	0.246	8.8	11.1	14.4	16.8	20.9	24.8
North: M88 North							
1 LT	0.861	62.5	77.8	93.7	101.2	111.4	119.7
2 R	0.462	13.2	16.6	21.4	24.7	30.3	35.5
West: Colin Paul Street West							
1 LT	0.503	32.6	40.8	50.7	56.4	65.4	73.5
2 R	0.835	64.2	79.9	96.2	104.0	114.6	123.3
3 R	0.835	64.2	79.9	96.2	104.0	114.6	123.3

Lane Stops
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: M88 South									
1 LT	0.402	0.69	0.00	0.09	0.78	170.1	0.00	0.0	0.84
2 TR	0.402	0.70	0.00	0.01	0.71	148.4	0.00	0.0	0.86
East: Colin Paul Street East									
1 LTR	0.246	0.53	0.00	0.21	0.73	95.4	0.00	0.0	0.64
North: M88 North									
1 LT	0.861	0.87	0.19	0.00	1.06	526.7	0.34	170.8	1.00
2 R	0.462	0.74	0.00	0.05	0.79	102.4	0.00	0.0	0.93
West: Colin Paul Street West									
1 LT	0.503	0.65	0.00	0.16	0.81	341.3	0.00	0.0	0.75
2 R	0.835	0.84	0.11	0.03	0.98	502.8	0.29	146.6	0.96
3 R	0.835	0.84	0.11	0.03	0.98	502.8	0.29	146.6	0.96

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	Flow Rate HV	Flow Scale Fixed	Flow Scale Var	Peak Flow Factor
South: M88 South								
	East	9	Right	7	0	1.00	1.00	0.45
	North	8	Thru	254	7	1.00	1.00	0.90
	West	7	Left	149	11	1.00	1.00	0.87
East: Colin Paul Street East								
	South	4	Left	50	1	1.00	1.00	0.57
	North	6	Right	50	2	1.00	1.00	0.45
	West	5	Thru	28	0	1.00	1.00	0.25
North: M88 North								
	South	2	Thru	475	5	1.00	1.00	0.92
	East	1	Left	17	1	1.00	1.00	0.44
	West	3	Right	126	3	1.00	1.00	0.88
West: Colin Paul Street West								
	South	12	Right	960	62	1.00	1.00	0.86
	East	11	Thru	13	1	1.00	1.00	0.42
	North	10	Left	392	13	1.00	1.00	0.86

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Separate Light and Heavy Vehicles)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID		Left LV	Left HV	Through LV	Through HV	Right LV	Right HV
Demand flows in veh/h as used by the program							
South: M88 South							
7	L	149	11	0	0	0	0
8	T	0	0	254	7	0	0
9	R	0	0	0	0	7	0
East: Colin Paul Street East							
4	L	50	1	0	0	0	0
5	T	0	0	28	0	0	0
6	R	0	0	0	0	50	2
North: M88 North							
1	L	17	1	0	0	0	0
2	T	0	0	475	5	0	0
3	R	0	0	0	0	126	3
West: Colin Paul Street West							
10	L	392	13	0	0	0	0
11	T	0	0	13	1	0	0
12	R	0	0	0	0	960	62

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Total Vehicles and Percent Heavy)
Site:M88 and Colin Paul -TIA AM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 50 sec (Practical Cycle Time)

Mov ID		Left		Through		Right	
		Total	%HV	Total	%HV	Total	%HV
Demand flows in veh/h as used by the program							
South: M88 South							
7	L	160	6.6	0	0.0	0	0.0
8	T	0	0.0	261	2.7	0	0.0
9	R	0	0.0	0	0.0	7	1.9
East: Colin Paul Street East							
4	L	51	1.4	0	0.0	0	0.0
5	T	0	0.0	28	0.0	0	0.0
6	R	0	0.0	0	0.0	51	3.1
North: M88 North							
1	L	18	6.7	0	0.0	0	0.0
2	T	0	0.0	480	1.1	0	0.0
3	R	0	0.0	0	0.0	130	2.6
West: Colin Paul Street West							
10	L	406	3.3	0	0.0	0	0.0
11	T	0	0.0	14	9.4	0	0.0
12	R	0	0.0	0	0.0	1022	6.1

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Traffic Signals

Movement Timing Information
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID	Mov Typ	P H A S E M A T R I X First Green Fr	To	Op	Pr	Und	Second Green Fr	To	Op	Pr	Und	Lost Tim 1st Grn	Lost Tim 2nd Grn	Req.Mov.Time 1st Grn	Req.Mov.Time 2nd Grn	Eff. Grn 1st Grn	Eff. Grn 2nd Grn
South: M88 South																	
7	L (Slp)	A	#####	Y			*#####	A	Y			9	6	12.0Min	12.0Min	19	6
8	T	A	#####									6		12.0Min		22	
9	R	A	#####	Y								10		14.6		18	
East: Colin Paul Street East																	
4	L	#####	A									6		12.0Min		6	
5	T	#####	A									6		12.0Min		6	
6	R	#####	A	Y								6		12.0Min		6	
North: M88 North																	
1	L	A	#####									6		14.3		22	
2	T	A	#####									6		14.3		22	
3	R	*A	#####	Y								8		27.4		20	

```
West: Colin Paul Street West
   10 L  (Slp) A      #####  Y          #####  A      Y           8    6   12.0Min  12.0Min  20    6
   11 T        #####  A                                          6        12.0Min            6
   12 R        #####  A      Y                                   6        12.0Min            6
-------------------------------------------------------------------------------------------------
  Current Phase Sequence: Opposed Turns
  Input phase sequence: A New Phase - 4
  Output phase sequence: A #####
-------------------------------------------------------------------------------------------------
  * Critical Movement/Green Period
  Y (under heading 'Op') - Movement is opposed in the indicated green period

  Movement Types:
  Slp  Slip Lane Movement
  Ped  Pedestrian
  Dum  Dummy


  CRITICAL MOVEMENTS AND CYCLE TIME

------------------------------------------------------------------------
   Crit App.  Green   Phases   Adjusted    Adjusted   Required   Required
   Mov  and   Period  ------     Lost        Flow     Grn Time   Movement
   ID   Turn          Fr  To     Time        Ratio     Ratio       Time
------------------------------------------------------------------------
     3  N_R          A    #####    8         0.437      0.485       27.4
     7  S_L    2nd   #####A       12           -          -         12.0Min
                                   ----       ------     ------     ------
                         Total:    20        0.437      0.485       39.4
------------------------------------------------------------------------
  -  Flow ratio not used for cycle time calculations and
     the adjusted lost time equals the required movement time
     (=Min or Max as shown in Movement Timing Information)

   Cycle Time:
     Minimum   Maximum   Practical   Chosen
        24       150         39         40
```

Phase Information
Site:M88 and Colin Paul -TIA PM

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time =  40 sec (Practical Cycle Time)

------------------------------------------------------------------------
Phase  Change  Starting  Green  Displayed  Green  Terminating  Phase  Phase
       Time    Intgrn    Start    Green     End     Intgrn     Time   Split
------------------------------------------------------------------------
 A        0       6        6       22       28        6         28    70%
 #####   28       6       34        6       40        6         12    30%
------------------------------------------------------------------------
  Current Phase Sequence: Opposed Turns
  Input phase sequence: A New Phase - 4
  Output phase sequence: A #####
```

Progression and Actuated Signal Parameters
Site:M88 and Colin Paul -TIA PM

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time =  40 sec (Practical Cycle Time)

------------------------------------------------------------------------------
                              % Arriving Delay   Queue   Disp. Grn. Settings
  Mov                   Arrival  During   Prog.   Prog.    1st Grn   2nd Grn
  ID      Control  Coord.  Type    Green    Factor  Factor  Gmin Gmax Gmin Gmax
------------------------------------------------------------------------------
 South: M88 South
    7 L     FT      No      3        62.5   1.000   1.000     6   NA    6   NA
```

8	T	FT	No	3	55.0	1.000	1.000	6	NA		
9	R	FT	No	3	45.0	1.000	1.000	6	NA		
East: Colin Paul Street East											
4	L	FT	No	3	15.0	1.000	1.000	6	NA		
5	T	FT	No	3	15.0	1.000	1.000	6	NA		
6	R	FT	No	3	15.0	1.000	1.000	6	NA		
North: M88 North											
1	L	FT	No	3	55.0	1.000	1.000	6	NA		
2	T	FT	No	3	55.0	1.000	1.000	6	NA		
3	R	FT	No	3	50.0	1.000	1.000	6	NA		
West: Colin Paul Street West											
10	L	FT	No	3	65.0	1.000	1.000	6	NA	6	NA
11	T	FT	No	3	15.0	1.000	1.000	6	NA		
12	R	FT	No	3	15.0	1.000	1.000	6	NA		

SCATS Parameters
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Stopline Flow veh/h	Capacity veh/h	SCATS Satn Flow	SCATS MF	Hdwy at MF sec	Occ Time sec	Space Time sec	Deg. Satn x	Lane Util. %
South: M88 South									
1 L	333	793	1857	NA				0.420	100
2 L	333	793	1857	NA				0.420	100
3 T	242	1054	1950	1532	2.35	0.36	1.99	0.230	100
4 TR	176	768	1915	1436	2.51	0.46	2.05	0.230	100
East: Colin Paul Street East									
1 LTR	46	259	1881	940	3.83	0.60	3.22	0.176	100
North: M88 North									
1 LT	358	1056	1941	1525	2.36	0.38	1.98	0.339	100
2 R	524	600	1857	1327	2.71	0.69	2.02	0.874	100
3 R	524	600	1857	1327	2.71	0.69	2.02	0.874	100
West: Colin Paul Street West									
1 L	193	1009	1857	NA				0.191	100
2 LT	80	420	1898	NA				0.191	100
3 R	43	271	1857	929	3.88	0.69	3.19	0.159	100
4 R	43	271	1857	929	3.88	0.69	3.19	0.159	100

NA Not Applicable - SCATS MF was not calculated for this lane due to one of the following reasons:
- the lane is not controlled by signals (slip or continuous lane)
- two movements share this lane and do not run in the same phases

STOPLINE FLOW: Departure flow rate in veh/h as measured at the stop line. This cannot exceed capacity.

SCATS SATURATION FLOW: This allows for lane width, approach grade and turning vehicles. Saturation flow scale applies if specified. The effects of heavy vehicles, parking manoeuvres, number of buses stopping and conflicting pedestrian volume are not included.

SCATS MF: This emulates the MF (Maximum Flow) parameter used in the SCATS control system. It is calculated from the SCATS SATURATION FLOW parameter.

DEG. SATN: The Demand (Arrival) Flow Rate may exceed the Stopline Flow Rate, therefore x > 1 is possible.

Movements

Movement Capacity Parameters
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID		Dem Flow	HV	Satn Flow 1st Grn	Satn Flow 2nd Grn	Flow Ratio 1st Grn	Flow Ratio 2nd Grn	Total Cap.	Prac. Deg. Satn	Prac. Spare Cap.	Lane Util	Deg. Satn
		veh/h	%					veh/h	xp	%	%	x
South: M88 South												
7	L	667	6.6	1978	4306	0.043	0.135	1585	0.90	114	100	0.420
8	T	354	2.7	2803		0.126		1542	0.90	292	100	0.230
9	R	64	1.9	624		0.103		281	0.90	292	100	0.230
East: Colin Paul Street East												
4	L	24	1.4	909		0.026		136	0.90	411	100	0.176
5	T	12	0.0	454		0.026		68	0.90	411	100	0.176
6	R	10	3.1	361		0.026		54	0.90	412	100	0.176
North: M88 North												
1	L	33	6.7	175		0.186		96	0.90	166	100	0.339
2	T	326	1.1	1745		0.187		960	0.90	165	100	0.339
3	R	1048	2.6	2400		0.437		1200	0.90	3	100	0.874*
West: Colin Paul Street West												
10	L	237	3.3	1566	3049	0.000	0.078	1240	0.90	371	100	0.191
11	T	36	9.4	1257		0.029		189	0.90	371	100	0.191
12	R	86	6.1	3610		0.024		542	0.90	466	100	0.159

* Maximum degree of saturation

Movement Performance
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID		Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: M88 South										
7	L	1.87	2.24	10.1	0.74	493.4	14.35	410.0	8.7	46.9
8	T	0.52	0.62	5.3	0.46	163.1	7.26	214.6	4.3	49.7
9	R	0.25	0.30	14.1	0.86	55.5	1.64	38.8	0.9	44.7
East: Colin Paul Street East										
4	L	0.17	0.20	25.5	0.74	17.7	0.78	14.5	0.4	35.8
5	T	0.06	0.07	17.3	0.67	8.0	0.36	7.3	0.2	36.4
6	R	0.07	0.08	25.5	0.74	7.0	0.31	5.8	0.2	35.8
North: M88 North										
1	L	0.13	0.15	13.8	0.93	30.4	0.84	19.7	0.4	45.7
2	T	0.50	0.59	5.5	0.50	164.0	6.90	197.6	4.0	49.4
3	R	8.59	10.30	29.5	1.10	1153.7	42.30	639.1	19.2	33.3
West: Colin Paul Street West										
10	L	0.69	0.83	10.5	0.70	166.7	4.93	145.7	3.1	46.6
11	T	0.08	0.10	8.4	0.62	22.2	0.84	21.8	0.5	43.5
12	R	0.60	0.72	25.2	0.72	62.4	2.79	52.5	1.5	35.6

Intersection Negotiation Data
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream m	Distance User Spec?
South: M88 South								
	East	Right	8.4	18.9	13.2	500	86	No
	North	Thru	S	60.0	26.4	500	182	No
	West	Left	20.0	26.2	31.4	500	121	No
East: Colin Paul Street East								
	South	Left	10.0	20.2	15.7	500	100	No
	North	Right	10.4	20.5	16.4	500	102	No
	West	Thru	S	60.0	23.1	500	190	No
North: M88 North								
	South	Thru	S	60.0	26.4	500	165	No
	East	Left	10.0	20.2	15.7	500	76	No
	West	Right	14.9	23.5	23.5	500	112	No
West: Colin Paul Street West								
	South	Right	14.9	23.5	23.5	500	115	No
	East	Thru	S	60.0	23.1	500	193	No
	North	Left	20.0	26.2	31.4	500	107	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Movement Speeds and Geometric Delay
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: M88 South									
7 L	60.0	26.2	26.2	60.0			46.9	46.9	7.7
8 T	60.0	60.0	60.0	60.0			50.3	49.7	0.0
9 R	60.0	18.9	18.9	60.0			48.3	44.7	8.4
East: Colin Paul Street East									
4 L	60.0	20.2	20.2	60.0			46.3	35.8	8.2
5 T	60.0	60.0	60.0	60.0			43.3	36.4	0.0
6 R	60.0	20.5	20.5	60.0			46.2	35.8	8.2
North: M88 North									
1 L	60.0	20.2	20.2	60.0			49.1	45.7	8.4
2 T	60.0	60.0	60.0	60.0			49.9	49.4	0.0
3 R	60.0	23.5	23.5	60.0	23.5		42.2	33.3	7.9
West: Colin Paul Street West									
10 L	60.0	26.2	26.2	60.0			47.5	46.6	7.6
11 T	60.0	60.0	60.0	60.0			43.5	43.5	0.0
12 R	60.0	23.5	23.5	60.0			45.2	35.6	8.0

"Running Speed" is the average speed excluding stopped periods.

Lanes

Lane Performance
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Effective Red and Green Times (sec) R1	G1	R2	G2	Dem Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	m	Lane Length m
South: M88 South												
1 L	9	19	6	6	333	793	0.420	10.1	0.74	3.4	25.3	500.0
2 L	9	19	6	6	333	793	0.420	10.1	0.74	3.4	25.3	500.0
3 T	18	22	0	0	242	1054	0.230	5.1	0.46	3.6	25.5	500.0
4 TR	19	21	0	0	176	768	0.230	8.8	0.61	2.8	20.2	500.0
East: Colin Paul Street East												
1 LTR	34	6	0	0	46	259	0.176	23.3	0.72	1.3	9.2	500.0
North: M88 North												
1 LT	18	22	0	0	358	1056	0.339	6.2	0.54	5.4	38.2	500.0
2 R	20	20	0	0	524	600	0.874	29.5	1.10	15.0	107.3	500.0
3 R	20	20	0	0	524	600	0.874	29.5	1.10	15.0	107.3	500.0
West: Colin Paul Street West												
1 L	8	20	6	6	193	1009	0.191	9.3	0.69	1.4	10.1	500.0
2 LT	8	4	22	6	80	420	0.191	12.6	0.69	1.5	11.0	500.0
3 R	34	6	0	0	43	271	0.159	25.2	0.72	1.2	9.0	500.0
4 R	34	6	0	0	43	271	0.159	25.2	0.72	1.2	9.0	500.0

Lane Flow and Capacity Information
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width m	Saturation Flow Adj. Basic (tcu)	Aver 1st (veh)	Aver 2nd (veh)	End Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: M88 South												
1 L	333	0	0	333	3.30	1950	989	2153	442	793	0.420	100
2 L	333	0	0	333	3.30	1950	989	2153	442	793	0.420	100
3 T	0	242	0	242	3.30	1950	1916	0	0	1054	0.230	100
4 TR	0	112	64	176	3.30	1950	1463	0	129	768	0.230	100
East: Colin Paul Street East												
1 LTR	24	12	10	46	3.30	1950	1724	0	113	259	0.176	100
North: M88 North												
1 LT	33	326	0	358	3.30	1950	1920	0	0	1056	0.339	100
2 R	0	0	524	524	3.30	1950	1200	0	198	600	0.874	100
3 R	0	0	524	524	3.30	1950	1200	0	198	600	0.874	100
West: Colin Paul Street West												
1 L	193	0	0	193	3.30	1950	1359	2196	329	1009	0.191	100
2 LT	44	36	0	80	3.30	1950	1366	1889	329	420	0.191	100
3 R	0	0	43	43	3.30	1950	1805	0	196	271	0.159	100

4	R	0	0	43	43	3.30	1950	1805	0	196	271	0.159	100

Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: M88 South												
1 L	333			333	7	1949	19	6	0.420	10.1	25	500
2 L	333			333	7	1949	19	6	0.420	10.1	25	500
3 T		242		242	3	1949	22		0.230	5.1	25	500
4 TR		112	64	176	2	1949	21		0.230	8.8	20	500
	667	354	64	1085	5				0.420	8.8	25	
East: Colin Paul Street East												
1 LTR	24	12	10	46	1	1950	6		0.176	23.3	9	500
	24	12	10	46	1				0.176	23.3	9	
North: M88 North												
1 LT	33	326		358	2	1950	22		0.339	6.2	38	500
2 R			524	524	3	1949	20		0.874	29.5	107	500
3 R			524	524	3	1949	20		0.874	29.5	107	500
	33	326	1048	1407	2				0.874	23.6	107	
West: Colin Paul Street West												
1 L	193			193	3	1949	20	6	0.191	9.3	10	500
2 LT	44	36		80	6	1950	4	6	0.191	12.6	11	500
3 R			43	43	6	1949	6		0.159	25.2	9	500
4 R			43	43	6	1949	6		0.159	25.2	9	500
	237	36	86	359	5				0.191	13.8	11	

ALL VEHICLES	Total Flow	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	2896	4	40	0.874	16.8	107

Peak flow period = 15 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Driver Characteristics
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: M88 South						
1 L	NA - Opposed turn					
2 L	NA - Opposed turn					
3 T	45.0	1916	1.88	23.48	7.16	1.31
4 TR	NA - Opposed turn					
East: Colin Paul Street East						
1 LTR	NA - Opposed turn					
North: M88 North						
1 LT	42.7	1920	1.87	22.26	7.10	1.28
2 R	NA - Opposed turn					
3 R	NA - Opposed turn					
West: Colin Paul Street West						
1 L	NA - Opposed turn					
2 LT	NA - Opposed turn					
3 R	NA - Opposed turn					
4 R	NA - Opposed turn					

Lane Delays
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

		Delay (seconds/veh)								
Lane No.	Deg. Satn x	Stop-line 1st d1	2nd d2	Delay Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: M88 South										
1 L	0.420	2.4	0.0	2.4	2.7	0.0	0.0	0.0	7.7	10.1
2 L	0.420	2.4	0.0	2.4	2.7	0.0	0.0	0.0	7.7	10.1
3 T	0.230	5.1	0.0	5.1	4.7	0.4	0.0	0.4	0.0	5.1
4 TR	0.230	5.7	0.0	5.7	3.9	1.8	0.0	1.8	3.1	8.8
East: Colin Paul Street East										
1 LTR	0.176	17.3	0.0	17.3	4.7	12.6	0.0	12.6	6.1	23.3
North: M88 North										
1 LT	0.339	5.5	0.0	5.5	4.8	0.7	0.0	0.7	0.8	6.2
2 R	0.874	10.1	11.4	21.6	4.4	17.2	3.1	14.0	7.9	29.5
3 R	0.874	10.1	11.4	21.6	4.4	17.2	3.1	14.0	7.9	29.5
West: Colin Paul Street West										
1 L	0.191	1.6	0.0	1.6	2.1	0.0	0.0	0.0	7.6	9.3
2 LT	0.191	8.4	0.0	8.4	5.2	3.6	0.0	3.6	4.2	12.6
3 R	0.159	17.2	0.0	17.2	4.1	13.0	0.0	13.0	8.0	25.2
4 R	0.159	17.2	0.0	17.2	4.1	13.0	0.0	13.0	8.0	25.2

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 L	0.420	0.0	1.5	0.0	1.5	3.4	0.05	0.0	100.0	0.2	0.8
2 L	0.420	0.0	1.5	0.0	1.5	3.4	0.05	0.0	100.0	0.2	0.8
3 T	0.230	0.0	1.5	0.0	1.5	3.6	0.05	0.0	100.0	0.3	1.1
4 TR	0.230	0.0	1.2	0.0	1.2	2.8	0.04	0.0	100.0	0.3	0.9
East: Colin Paul Street East											
1 LTR	0.176	0.0	0.5	0.0	0.5	1.3	0.02	0.0	100.0	0.2	0.7
North: M88 North											
1 LT	0.339	0.0	2.4	0.0	2.4	5.4	0.08	0.0	100.0	0.5	1.8
2 R	0.874	1.8	5.9	2.4	8.3	15.0	0.21	0.0	100.0	3.1	7.7
3 R	0.874	1.8	5.9	2.4	8.3	15.0	0.21	0.0	100.0	3.1	7.7
West: Colin Paul Street West											
1 L	0.191	0.0	0.6	0.0	0.6	1.4	0.02	0.0	100.0	0.1	0.3
2 LT	0.191	0.0	0.6	0.0	0.6	1.5	0.02	0.0	100.0	0.2	0.6
3 R	0.159	0.0	0.5	0.0	0.5	1.2	0.02	0.0	100.0	0.2	0.7
4 R	0.159	0.0	0.5	0.0	0.5	1.2	0.02	0.0	100.0	0.2	0.7

Lane Queues (Distance)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 L	0.420	0.0	10.8	0.0	10.8	25.3	0.05	0.0	100.0	1.6	5.6
2 L	0.420	0.0	10.8	0.0	10.8	25.3	0.05	0.0	100.0	1.6	5.6
3 T	0.230	0.0	10.9	0.0	10.9	25.5	0.05	0.0	100.0	2.4	8.2
4 TR	0.230	0.0	8.4	0.0	8.4	20.2	0.04	0.0	100.0	2.0	6.8
East: Colin Paul Street East											
1 LTR	0.176	0.0	3.6	0.0	3.6	9.2	0.02	0.0	100.0	1.5	5.3
North: M88 North											
1 LT	0.339	0.0	17.2	0.0	17.2	38.2	0.08	0.0	100.0	3.9	12.5
2 R	0.874	12.5	42.3	17.3	59.6	107.3	0.21	0.0	100.0	22.5	54.9
3 R	0.874	12.5	42.3	17.3	59.6	107.3	0.21	0.0	100.0	22.5	54.9
West: Colin Paul Street West											
1 L	0.191	0.0	4.0	0.0	4.0	10.1	0.02	0.0	100.0	0.6	2.2
2 LT	0.191	0.0	4.4	0.0	4.4	11.0	0.02	0.0	100.0	1.4	4.8
3 R	0.159	0.0	3.6	0.0	3.6	9.0	0.02	0.0	100.0	1.5	5.2
4 R	0.159	0.0	3.6	0.0	3.6	9.0	0.02	0.0	100.0	1.5	5.2

Lane Queue Percentiles (Vehicles)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 L	0.420	1.5	1.8	2.4	2.8	3.4	4.0
2 L	0.420	1.5	1.8	2.4	2.8	3.4	4.0
3 T	0.230	1.5	1.9	2.5	2.9	3.6	4.2
4 TR	0.230	1.2	1.5	1.9	2.3	2.8	3.4
East: Colin Paul Street East							
1 LTR	0.176	0.5	0.7	0.9	1.0	1.3	1.6
North: M88 North							
1 LT	0.339	2.4	3.0	3.9	4.5	5.4	6.2
2 R	0.874	8.3	10.4	12.5	13.6	15.0	16.2
3 R	0.874	8.3	10.4	12.5	13.6	15.0	16.2
West: Colin Paul Street West							
1 L	0.191	0.6	0.7	0.9	1.1	1.4	1.7
2 LT	0.191	0.6	0.8	1.0	1.2	1.5	1.8
3 R	0.159	0.5	0.6	0.8	1.0	1.2	1.5
4 R	0.159	0.5	0.6	0.8	1.0	1.2	1.5

Lane Queue Percentiles (Distance)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 L	0.420	10.8	13.6	17.7	20.5	25.3	29.9
2 L	0.420	10.8	13.6	17.7	20.5	25.3	29.9
3 T	0.230	10.9	13.7	17.8	20.7	25.5	30.1
4 TR	0.230	8.4	10.6	13.9	16.2	20.2	23.9
East: Colin Paul Street East							
1 LTR	0.176	3.6	4.6	6.1	7.2	9.2	11.0
North: M88 North							
1 LT	0.339	17.2	21.6	27.7	31.6	38.2	44.3
2 R	0.874	59.6	74.2	89.6	97.0	107.3	115.7
3 R	0.874	59.6	74.2	89.6	97.0	107.3	115.7
West: Colin Paul Street West							
1 L	0.191	4.0	5.1	6.8	8.0	10.1	12.1
2 LT	0.191	4.4	5.6	7.4	8.7	11.0	13.2
3 R	0.159	3.6	4.5	6.0	7.1	9.0	10.8
4 R	0.159	3.6	4.5	6.0	7.1	9.0	10.8

Lane Stops
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: M88 South									
1 L	0.420	0.47	0.00	0.27	0.74	246.7	0.00	0.0	0.55
2 L	0.420	0.47	0.00	0.27	0.74	246.7	0.00	0.0	0.55
3 T	0.230	0.46	0.00	0.00	0.46	110.2	0.00	0.0	0.55
4 TR	0.230	0.47	0.00	0.14	0.61	108.4	0.00	0.0	0.57
East: Colin Paul Street East									
1 LTR	0.176	0.67	0.00	0.05	0.72	32.8	0.00	0.0	0.91
North: M88 North									
1 LT	0.339	0.50	0.00	0.04	0.54	194.3	0.00	0.0	0.59
2 R	0.874	0.85	0.22	0.03	1.10	576.8	0.48	252.5	0.95
3 R	0.874	0.85	0.22	0.03	1.10	576.8	0.48	252.5	0.95
West: Colin Paul Street West									
1 L	0.191	0.34	0.00	0.35	0.69	133.4	0.00	0.0	0.42
2 LT	0.191	0.62	0.00	0.07	0.69	55.5	0.00	0.0	0.82
3 R	0.159	0.66	0.00	0.06	0.72	31.2	0.00	0.0	0.90
4 R	0.159	0.66	0.00	0.06	0.72	31.2	0.00	0.0	0.90

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	Flow Rate HV	Flow Scale Fixed	Flow Scale Var	Peak Flow Factor
South: M88 South								
	East	9	Right	63	1	1.00	1.00	0.45
	North	8	Thru	344	10	1.00	1.00	0.89
	West	7	Left	623	44	1.00	1.00	0.75
East: Colin Paul Street East								
	South	4	Left	24	0	1.00	1.00	0.25
	North	6	Right	9	0	1.00	1.00	0.63
	West	5	Thru	12	0	1.00	1.00	0.25
North: M88 North								
	South	2	Thru	322	4	1.00	1.00	0.93
	East	1	Left	30	2	1.00	1.00	0.46
	West	3	Right	1021	27	1.00	1.00	0.62
West: Colin Paul Street West								
	South	12	Right	81	5	1.00	1.00	0.79
	East	11	Thru	33	3	1.00	1.00	0.25
	North	10	Left	229	8	1.00	1.00	0.84

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes

Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Separate Light and Heavy Vehicles)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID		Left		Through		Right	
		LV	HV	LV	HV	LV	HV
Demand flows in veh/h as used by the program							
South: M88 South							
7	L	623	44	0	0	0	0
8	T	0	0	344	10	0	0
9	R	0	0	0	0	63	1
East: Colin Paul Street East							
4	L	24	0	0	0	0	0
5	T	0	0	12	0	0	0
6	R	0	0	0	0	9	0
North: M88 North							
1	L	30	2	0	0	0	0
2	T	0	0	322	4	0	0
3	R	0	0	0	0	1021	27
West: Colin Paul Street West							
10	L	229	8	0	0	0	0
11	T	0	0	33	3	0	0
12	R	0	0	0	0	81	5

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Total Vehicles and Percent Heavy)
Site:M88 and Colin Paul -TIA PM

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 40 sec (Practical Cycle Time)

Mov ID		Left		Through		Right	
		Total	%HV	Total	%HV	Total	%HV
Demand flows in veh/h as used by the program							
South: M88 South							
7	L	667	6.6	0	0.0	0	0.0
8	T	0	0.0	354	2.7	0	0.0
9	R	0	0.0	0	0.0	64	1.9
East: Colin Paul Street East							
4	L	24	1.4	0	0.0	0	0.0
5	T	0	0.0	12	0.0	0	0.0
6	R	0	0.0	0	0.0	10	3.1
North: M88 North							
1	L	33	6.7	0	0.0	0	0.0
2	T	0	0.0	326	1.1	0	0.0
3	R	0	0.0	0	0.0	1048	2.6
West: Colin Paul Street West							
10	L	237	3.3	0	0.0	0	0.0
11	T	0	0.0	36	9.4	0	0.0
12	R	0	0.0	0	0.0	86	6.1

```
-------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

INTERSECTION BETWEEN M88 AND M90

Traffic Signals

Movement Timing Information
Site:M88 and M90 AM - TIA AM and PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID	Mov Typ	PHASE MATRIX First Green Fr	To	Op Pr Und	Second Green Fr	To	Op Pr Und	Lost Tim 1st Grn	2nd Grn	Req.Mov.Time 1st Grn	2nd Grn	Eff. Grn 1st Grn	2nd Grn
South: M88 South (Rienert)													
7	L (Slp)	B	D		D	B	Y	6	36	45.0Min	42.0Min	39	29
8	T	B	C					6		33.0Min		27	
9	R	*A	B					6		24.3		20	
East: CR Swart East (M90)													
4	L (Slp)	B	D	Y	D	B		18	6	45.0Min	42.0Min	27	59
5	T	*D	A					6		37.0		33	
6	R	C	D					6		12.0Min		6	
North: M88 North (Rienert)													
1	L (Slp)	B	D		D	B	Y	6	44	45.0Min	42.0Min	39	21
2	T	*B	C					6		33.0Min		27	
3	R	A	B					6		12.4		20	
West: M90 West (CR Swart)													
10	L (Slp)	B	D	Y	D	B		13	6	45.0Min	42.0Min	32	59
11	T	D	A					6		34.6		33	
12	R	*C	D					6		12.0Min		6	
Pedestrian Movements													
P1	(Ped)	D	A					24		30.0Min		15	
P3	(Ped)	B	C					24		33.0Min		9	
P5	(Ped)	D	A					24		30.0Min		15	
P7	(Ped)	B	C					27		33.0Min		6	

Current Phase Sequence: Leading Right Turn
Input phase sequence: A B C D
Output phase sequence: A B C D

* Critical Movement/Green Period
Y (under heading 'Op') - Movement is opposed in the indicated green period

Movement Types:
Slp Slip Lane Movement
Ped Pedestrian
Dum Dummy

CRITICAL MOVEMENTS AND CYCLE TIME

Crit Mov ID	App. and Turn	Green Period	Phases Fr	To	Adjusted Lost Time	Adjusted Flow Ratio	Required Grn Time Ratio	Required Movement Time
9	S_R		A	B	6	0.149	0.166	24.3
2	N_T		B	C	33	-	-	33.0Min
12	W_R		C	D	12	-	-	12.0Min
5	E_T		D	A	6	0.254	0.282	37.0
				Total:	57	0.403	0.448	106.3

\- Flow ratio not used for cycle time calculations and the adjusted lost time equals the required movement time (=Min or Max as shown in Movement Timing Information)

Cycle Time:

Minimum	Maximum	Practical	Chosen
87	150	103	110

Phase Information
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Phase	Change Time	Starting Intgrn	Green Start	Displayed Green	Green End	Terminating Intgrn	Phase Time	Phase Split
A	0	6	6	20	26	6	26	24%
B	26	6	32	27	59	6	33	30%
C	59	6	65	6	71	6	12	11%
D	71	6	77	33	110	6	39	35%

Current Phase Sequence: Leading Right Turn
Input phase sequence: A B C D
Output phase sequence: A B C D

Progression and Actuated Signal Parameters
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID	Control	Coord.	Arrival Type	% Arriving During Green	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
South: M88 South (Rienert)										
7 L	FT	No	3	61.8	1.000	1.000	6	NA	6	NA
8 T	FT	No	3	24.5	1.000	1.000	6	NA		
9 R	FT	No	3	18.2	1.000	1.000	6	NA		
East: CR Swart East (M90)										
4 L	FT	No	3	78.2	1.000	1.000	6	NA	6	NA
5 T	FT	No	3	30.0	1.000	1.000	6	NA		
6 R	FT	No	3	5.5	1.000	1.000	6	NA		
North: M88 North (Rienert)										
1 L	FT	No	3	54.5	1.000	1.000	6	NA	6	NA
2 T	FT	No	3	24.5	1.000	1.000	6	NA		
3 R	FT	No	3	18.2	1.000	1.000	6	NA		
West: M90 West (CR Swart)										
10 L	FT	No	3	82.7	1.000	1.000	6	NA	6	NA
11 T	FT	No	3	30.0	1.000	1.000	6	NA		
12 R	FT	No	3	5.5	1.000	1.000	6	NA		

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.		Stopline Flow veh/h	Capacity veh/h	SCATS Satn Flow	SCATS MF	Hdwy at MF sec	Occ Time sec	Space Time sec	Deg. Satn x	Lane Util. %
South: M88 South (Rienert)										
1	L	220	887	1857	NA				0.248	100
2	T	117	470	1950	1595	2.26	0.36	1.90	0.250	100
3	T	117	470	1950	1595	2.26	0.36	1.90	0.250	100
4	R	274	334	1857	1429	2.52	0.66	1.86	0.822	100
5	R	274	334	1857	1429	2.52	0.66	1.86	0.822	100
East: CR Swart East (M90)										
1	L	235	1311	1857	NA				0.179	100
2	T	479	567	1950	1650	2.18	0.36	1.82	0.845	100
3	T	479	567	1950	1650	2.18	0.36	1.82	0.845	100
4	R	37	99	1857	929	3.88	0.66	3.22	0.369	100
5	R	37	99	1857	929	3.88	0.66	3.22	0.369	100
North: M88 North (Rienert)										
1	L	141	889	1857	NA				0.158	100
2	T	206	473	1950	1595	2.26	0.36	1.90	0.436	100
3	T	206	473	1950	1595	2.26	0.36	1.90	0.436	100
4	R	96	334	1857	1429	2.52	0.66	1.86	0.286	100
5	R	96	334	1857	1429	2.52	0.66	1.86	0.286	100
West: M90 West (CR Swart)										
1	L	6	1210	1857	NA				0.005	100
2	T	444	569	1950	1650	2.18	0.36	1.82	0.781	100
3	T	444	569	1950	1650	2.18	0.36	1.82	0.781	100
4	R	80	98	1857	929	3.88	0.64	3.24	0.813	100
5	R	80	98	1857	929	3.88	0.64	3.24	0.813	100

NA Not Applicable - SCATS MF was not calculated for this lane due to one of the following reasons:
- the lane is not controlled by signals (slip or continuous lane)
- two movements share this lane and do not run in the same phases

STOPLINE FLOW: Departure flow rate in veh/h as measured at the stop line. This cannot exceed capacity.

SCATS SATURATION FLOW: This allows for lane width, approach grade and turning vehicles. Saturation flow scale applies if specified. The effects of heavy vehicles, parking manoeuvres, number of buses stopping and conflicting pedestrian volume are not included.

SCATS MF: This emulates the MF (Maximum Flow) parameter used in the SCATS control system. It is calculated from the SCATS SATURATION FLOW parameter.

DEG. SATN: The Demand (Arrival) Flow Rate may exceed the Stopline Flow Rate, therefore x > 1 is possible.

Movements

Movement Capacity Parameters
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID		Dem Flow	HV	Satn Flow 1st Grn	Satn Flow 2nd Grn	Flow Ratio 1st Grn	Flow Ratio 2nd Grn	Total Cap.	Prac. Deg. Satn	Prac. Spare Cap.	Lane Util	Deg. Satn
		veh/h	%					veh/h	xp	%	%	x
South: M88 South (Rienert)												
7	L	220	3.7	1544	1288	0.143	0.000	887	0.90	262	100	0.248
8	T	235	2.8	3830		0.061		940	0.90	260	100	0.250
9	R	549	1.7	3670		0.149		667	0.90	9	100	0.822
East: CR Swart East (M90)												
4	L	235	4.1	1396	1804	0.000	0.130	1310	0.90	402	100	0.179
5	T	958	5.0	3777		0.254		1133	0.90	6	100	0.845*
6	R	73	2.9	3639		0.020		198	0.90	144	100	0.369
North: M88 North (Rienert)												
1	L	141	3.0	1818	1281	0.077	0.000	889	0.90	469	100	0.158
2	T	412	1.9	3852		0.107		945	0.90	106	100	0.436
3	R	191	1.6	3672		0.052		668	0.90	214	100	0.286
West: M90 West (CR Swart)												
10	L	6	24.1	1238	1584	0.000	0.004	1210	0.90	****	100	0.005
11	T	888	4.3	3794		0.234		1138	0.90	15	100	0.781
12	R	160	4.4	3601		0.044		196	0.90	11	100	0.813
Pedestrian Movements												
P1		53		12000		0.004		1636	0.90		***	0.032
P3		53		12000		0.004		982	0.90		***	0.054
P5		53		12000		0.004		1636	0.90		***	0.032
P7		53		12000		0.004		655	0.90		***	0.081

* Maximum degree of saturation

Movement Performance
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID		Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: M88 South (Rienert)										
7	L	0.96	1.15	15.7	0.72	158.9	7.04	135.5	3.2	42.0
8	T	2.35	2.82	36.0	0.68	159.4	11.83	142.4	4.9	29.0
9	R	9.23	11.07	60.5	0.92	507.0	36.71	335.5	14.8	22.7
East: CR Swart East (M90)										
4	L	0.64	0.77	9.8	0.67	157.1	5.48	144.6	3.1	47.3
5	T	12.04	14.45	45.3	0.98	937.0	59.52	580.7	22.7	25.6
6	R	1.34	1.61	65.8	0.73	53.3	4.88	44.8	2.1	21.5
North: M88 North (Rienert)										
1	L	0.74	0.88	18.9	0.72	101.2	4.90	86.5	2.2	39.7
2	T	4.35	5.23	38.0	0.74	306.2	21.77	250.1	8.9	28.1
3	R	2.67	3.20	50.2	0.77	147.9	10.95	117.0	4.6	25.3
West: M90 West (CR Swart)										
10	L	0.01	0.02	9.0	0.61	3.6	0.12	3.6	0.1	48.6

11	T	9.96	11.95	40.3	0.90	798.2	51.31	538.7	19.8	27.2
12	R	3.16	3.79	71.2	0.88	140.8	11.42	97.9	4.8	20.5
Pedestrian Movements										
P1		0.60	0.60	41.0	0.86	45.8	1.37	2.4	1.1	2.1
P3		0.68	0.68	46.4	0.92	48.7	1.46	2.4	1.2	2.0
P5		0.60	0.60	41.0	0.86	45.8	1.37	2.4	1.1	2.1
P7		0.72	0.72	49.2	0.95	50.1	1.55	2.6	1.3	2.0

Intersection Negotiation Data
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream Distance m	Distance User Spec?
South: M88 South (Rienert)								
	East	Right	16.8	24.6	26.4	500	113	No
	North	Thru	S	60.0	33.0	500	162	No
	West	Left	20.0	26.2	31.4	500	118	No
East: CR Swart East (M90)								
	South	Left	20.0	26.2	31.4	500	119	No
	North	Right	16.8	24.6	26.4	500	114	No
	West	Thru	S	60.0	29.7	500	164	No
North: M88 North (Rienert)								
	South	Thru	S	60.0	33.0	500	161	No
	East	Left	20.0	26.2	31.4	500	118	No
	West	Right	16.8	24.6	26.4	500	113	No
West: M90 West (CR Swart)								
	South	Right	18.2	25.3	28.6	500	117	No
	East	Thru	S	60.0	29.7	500	164	No
	North	Left	20.0	26.2	31.4	500	136	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Movement Speeds and Geometric Delay
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID		App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: M88 South (Rienert)										
7	L	60.0	26.2	26.2	60.0			47.2	42.0	7.6
8	T	60.0	60.0	60.0	60.0			46.8	29.0	0.0
9	R	60.0	24.6	24.6	60.0	24.6		43.9	22.7	7.8
East: CR Swart East (M90)										
4	L	60.0	26.2	26.2	60.0			48.3	47.3	7.7
5	T	60.0	60.0	60.0	60.0	43.6		44.1	25.6	0.0
6	R	60.0	24.6	24.6	60.0			44.8	21.5	7.8
North: M88 North (Rienert)										

1	L	60.0	26.2	26.2	60.0			47.0	39.7	7.6
2	T	60.0	60.0	60.0	60.0			46.2	28.1	0.0
3	R	60.0	24.6	24.6	60.0			45.2	25.3	7.8
West: M90 West (CR Swart)										
10	L	60.0	26.2	26.2	60.0			48.8	48.6	8.0
11	T	60.0	60.0	60.0	60.0	43.6		44.8	27.2	0.0
12	R	60.0	25.3	25.3	60.0	18.1		43.0	20.5	7.8

"Running Speed" is the average speed excluding stopped periods.

Lanes

Lane Performance
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Effective Red and Green Times (sec) R1	G1	R2	G2	Dem Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: M88 South (Rienert)												
1 L	6	39	36	29	220	887	0.248	15.7	0.72	6.3	45.8	500.0
2 T	83	27	0	0	117	470	0.250	36.0	0.68	6.7	47.8	500.0
3 T	83	27	0	0	117	470	0.250	36.0	0.68	6.7	47.8	500.0
4 R	90	20	0	0	274	334	0.822	60.5	0.92	16.8	119.3	500.0
5 R	90	20	0	0	274	334	0.822	60.5	0.92	16.8	119.3	500.0
East: CR Swart East (M90)												
1 L	18	27	6	59	235	1311	0.179	9.8	0.67	3.7	26.4	500.0
2 T	77	33	0	0	479	567	0.845	45.3	0.98	27.1	197.8	500.0
3 T	77	33	0	0	479	567	0.845	45.3	0.98	27.1	197.8	500.0
4 R	104	6	0	0	37	99	0.369	65.8	0.73	3.0	21.4	500.0
5 R	104	6	0	0	37	99	0.369	65.8	0.73	3.0	21.4	500.0
North: M88 North (Rienert)												
1 L	6	39	44	21	141	889	0.158	18.9	0.72	4.9	35.0	500.0
2 T	83	27	0	0	206	473	0.436	38.0	0.74	11.1	78.9	500.0
3 T	83	27	0	0	206	473	0.436	38.0	0.74	11.1	78.9	500.0
4 R	90	20	0	0	96	334	0.286	50.2	0.77	6.0	42.7	500.0
5 R	90	20	0	0	96	334	0.286	50.2	0.77	6.0	42.7	500.0
West: M90 West (CR Swart)												
1 L	13	32	6	59	6	1210	0.005	9.0	0.61	0.1	0.5	500.0
2 T	77	33	0	0	444	569	0.781	40.3	0.90	23.5	170.6	500.0
3 T	77	33	0	0	444	569	0.781	40.3	0.90	23.5	170.6	500.0
4 R	104	6	0	0	80	98	0.813	71.2	0.88	6.3	45.9	500.0
5 R	104	6	0	0	80	98	0.813	71.2	0.88	6.3	45.9	500.0

Lane Flow and Capacity Information
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width m	Saturation Flow Adj. Basic (tcu)	Aver 1st (veh)	Aver 2nd (veh)	End Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: M88 South (Rienert)												
1 L	220	0	0	220	3.30	1950	1544	1288	82	887	0.248	100
2 T	0	117	0	117	3.30	1950	1915	0	0	470	0.250	100
3 T	0	117	0	117	3.30	1950	1915	0	0	470	0.250	100
4 R	0	0	274	274	3.30	1950	1835	0	0	334	0.822	100
5 R	0	0	274	274	3.30	1950	1835	0	0	334	0.822	100
East: CR Swart East (M90)												
1 L	235	0	0	235	3.30	1950	1396	1804	82	1311	0.179	100
2 T	0	479	0	479	3.30	1950	1889	0	0	567	0.845	100
3 T	0	479	0	479	3.30	1950	1889	0	0	567	0.845	100
4 R	0	0	37	37	3.30	1950	1819	0	0	99	0.369	100
5 R	0	0	37	37	3.30	1950	1819	0	0	99	0.369	100
North: M88 North (Rienert)												
1 L	141	0	0	141	3.30	1950	1818	1281	82	889	0.158	100
2 T	0	206	0	206	3.30	1950	1926	0	0	473	0.436	100
3 T	0	206	0	206	3.30	1950	1926	0	0	473	0.436	100
4 R	0	0	96	96	3.30	1950	1836	0	0	334	0.286	100
5 R	0	0	96	96	3.30	1950	1836	0	0	334	0.286	100
West: M90 West (CR Swart)												
1 L	6	0	0	6	3.30	1950	1238	1584	69	1210	0.005	100
2 T	0	444	0	444	3.30	1950	1897	0	0	569	0.781	100
3 T	0	444	0	444	3.30	1950	1897	0	0	569	0.781	100
4 R	0	0	80	80	3.30	1950	1801	0	0	98	0.813	100
5 R	0	0	80	80	3.30	1950	1801	0	0	98	0.813	100

Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: M88 South (Rienert)												
1 L	220			220	4	1949	39	29	0.248	15.7	46	500
2 T		117		117	3	1949	27		0.250	36.0	48	500
3 T		117		117	3	1949	27		0.250	36.0	48	500
4 R			274	274	2	1949	20		0.822	60.5	119	500
5 R			274	274	2	1949	20		0.822	60.5	119	500
	220	235	549	1004	2				0.822	45.0	119	
East: CR Swart East (M90)												
1 L	235			235	4	1949	27	59	0.179	9.8	26	500
2 T		479		479	5	1949	33		0.845	45.3	198	500
3 T		479		479	5	1949	33		0.845	45.3	198	500
4 R			37	37	3	1949	6		0.369	65.8	21	500
5 R			37	37	3	1949	6		0.369	65.8	21	500

	235	958	73	1266	5				0.845	39.9	198	
North: M88 North (Rienert)												
1 L	141			141	3	1949	39	21	0.158	18.9	35	500
2 T		206		206	2	1949	27		0.436	38.0	79	500
3 T		206		206	2	1949	27		0.436	38.0	79	500
4 R			96	96	2	1949	20		0.286	50.2	43	500
5 R			96	96	2	1949	20		0.286	50.2	43	500
	141	412	191	744	2				0.436	37.5	79	
West: M90 West (CR Swart)												
1 L	6			6	24	1949	32	59	0.005	9.0	1	500
2 T		444		444	4	1949	33		0.781	40.3	171	500
3 T		444		444	4	1949	33		0.781	40.3	171	500
4 R			80	80	4	1949	6		0.813	71.2	46	500
5 R			80	80	4	1949	6		0.813	71.2	46	500
	6	888	160	1054	4				0.813	44.8	171	
Pedestrians												
Across S approach				53			15		0.032	41.0	0.1	
Across E approach				53			9		0.054	46.4	0.2	
Across N approach				53			15		0.032	41.0	0.1	
Across W approach				53			6		0.081	49.2	0.2	

ALL VEHICLES	Total Flow	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	4068	4	110	0.845	42.0	198

Peak flow period = 15 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Driver Characteristics
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: M88 South (Rienert)						
1 L	26.2	1544	2.33	17.00	7.22	1.34
2 T	45.0	1915	1.88	23.50	7.17	1.31
3 T	45.0	1915	1.88	23.50	7.17	1.31
4 R	24.6	1835	1.96	13.40	7.10	0.92
5 R	24.6	1835	1.96	13.40	7.10	0.92
East: CR Swart East (M90)						
1 L	NA - Opposed turn					
2 T	45.0	1889	1.91	23.83	7.30	1.32
3 T	45.0	1889	1.91	23.83	7.30	1.32
4 R	24.6	1819	1.98	13.51	7.17	0.93
5 R	24.6	1819	1.98	13.51	7.17	0.93
North: M88 North (Rienert)						
1 L	26.2	1818	1.98	14.44	7.18	1.00
2 T	45.0	1926	1.87	23.36	7.11	1.30
3 T	45.0	1926	1.87	23.36	7.11	1.30
4 R	24.6	1836	1.96	13.39	7.10	0.92
5 R	24.6	1836	1.96	13.39	7.10	0.92
West: M90 West (CR Swart)						
1 L	NA - Opposed turn					
2 T	45.0	1897	1.90	23.72	7.26	1.32

3 T	45.0	1897	1.90	23.72	7.26	1.32
4 R	25.3	1801	2.00	14.07	7.26	0.97
5 R	25.3	1801	2.00	14.07	7.26	0.97

Lane Delays
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Stop-line Delay 1st d1	2nd d2	Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: M88 South (Rienert)										
1 L	0.248	8.1	0.0	8.1	2.4	5.8	0.0	5.8	7.6	15.7
2 T	0.250	36.0	0.0	36.0	7.2	28.8	0.0	28.8	0.0	36.0
3 T	0.250	36.0	0.0	36.0	7.2	28.8	0.0	28.8	0.0	36.0
4 R	0.822	47.8	5.0	52.8	4.7	48.0	0.9	47.1	7.8	60.5
5 R	0.822	47.8	5.0	52.8	4.7	48.0	0.9	47.1	7.8	60.5
East: CR Swart East (M90)										
1 L	0.179	2.2	0.0	2.2	1.4	0.9	0.0	0.9	7.7	9.8
2 T	0.845	39.1	6.1	45.3	8.6	36.7	1.1	35.6	0.0	45.3
3 T	0.845	39.1	6.1	45.3	8.6	36.7	1.1	35.6	0.0	45.3
4 R	0.369	58.0	0.0	58.0	4.7	53.2	0.0	53.2	7.8	65.8
5 R	0.369	58.0	0.0	58.0	4.7	53.2	0.0	53.2	7.8	65.8
North: M88 North (Rienert)										
1 L	0.158	11.2	0.0	11.2	2.7	8.7	0.0	8.7	7.6	18.9
2 T	0.436	38.0	0.0	38.0	7.7	30.4	0.0	30.4	0.0	38.0
3 T	0.436	38.0	0.0	38.0	7.7	30.4	0.0	30.4	0.0	38.0
4 R	0.286	42.5	0.0	42.5	4.3	38.2	0.0	38.2	7.8	50.2
5 R	0.286	42.5	0.0	42.5	4.3	38.2	0.0	38.2	7.8	50.2
West: M90 West (CR Swart)										
1 L	0.005	1.0	0.0	1.0	0.9	0.2	0.0	0.2	8.0	9.0
2 T	0.781	38.1	2.2	40.3	8.4	32.0	0.5	31.5	0.0	40.3
3 T	0.781	38.1	2.2	40.3	8.4	32.0	0.5	31.5	0.0	40.3
4 R	0.813	60.1	3.3	63.4	4.9	58.6	2.0	56.6	7.8	71.2
5 R	0.813	60.1	3.3	63.4	4.9	58.6	2.0	56.6	7.8	71.2

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South (Rienert)											
1 L	0.248	0.0	2.9	0.0	2.9	6.3	0.09	0.0	100.0	0.5	1.6
2 T	0.250	0.0	3.1	0.0	3.1	6.7	0.10	0.0	100.0	1.2	3.5
3 T	0.250	0.0	3.1	0.0	3.1	6.7	0.10	0.0	100.0	1.2	3.5
4 R	0.822	0.4	8.9	0.6	9.5	16.8	0.24	0.0	100.0	4.0	9.4
5 R	0.822	0.4	8.9	0.6	9.5	16.8	0.24	0.0	100.0	4.0	9.4
East: CR Swart East (M90)											
1 L	0.179	0.0	1.6	0.0	1.6	3.7	0.05	0.0	100.0	0.1	0.5
2 T	0.845	0.9	14.9	1.4	16.3	27.1	0.40	0.0	100.0	6.0	13.2
3 T	0.845	0.9	14.9	1.4	16.3	27.1	0.40	0.0	100.0	6.0	13.2
4 R	0.369	0.0	1.2	0.0	1.2	3.0	0.04	0.0	100.0	0.6	1.9

5 R	0.369	0.0	1.2	0.0	1.2	3.0	0.04	0.0	100.0	0.6	1.9
North: M88 North (Rienert)											
1 L	0.158	0.0	2.2	0.0	2.2	4.9	0.07	0.0	100.0	0.4	1.5
2 T	0.436	0.0	5.8	0.0	5.8	11.1	0.16	0.0	100.0	2.2	5.7
3 T	0.436	0.0	5.8	0.0	5.8	11.1	0.16	0.0	100.0	2.2	5.7
4 R	0.286	0.0	2.8	0.0	2.8	6.0	0.09	0.0	100.0	1.1	3.4
5 R	0.286	0.0	2.8	0.0	2.8	6.0	0.09	0.0	100.0	1.1	3.4
West: M90 West (CR Swart)											
1 L	0.005	0.0	0.0	0.0	0.0	0.1	0.00	0.0	100.0	0.0	0.0
2 T	0.781	0.3	13.4	0.5	14.0	23.5	0.34	0.0	100.0	5.0	11.2
3 T	0.781	0.3	13.4	0.5	14.0	23.5	0.34	0.0	100.0	5.0	11.2
4 R	0.813	0.1	2.8	0.1	2.9	6.3	0.09	0.0	100.0	1.4	4.0
5 R	0.813	0.1	2.8	0.1	2.9	6.3	0.09	0.0	100.0	1.4	4.0

Lane Queues (Distance)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane	Deg. Satn	Ovrfl. Queue	Back of Queue (m)				Queue Stor.	Prob. Block	P'ile Block	Cyc-Av. Queue	
No.	x	No	Nb1	Nb2	Nb	95%	Ratio	%	%	Nc	95%
South: M88 South (Rienert)											
1 L	0.248	0.0	21.2	0.0	21.2	45.8	0.09	0.0	100.0	3.6	11.7
2 T	0.250	0.0	22.3	0.0	22.3	47.8	0.10	0.0	100.0	8.4	24.9
3 T	0.250	0.0	22.3	0.0	22.3	47.8	0.10	0.0	100.0	8.4	24.9
4 R	0.822	3.0	63.2	4.5	67.7	119.3	0.24	0.0	100.0	28.5	66.4
5 R	0.822	3.0	63.2	4.5	67.7	119.3	0.24	0.0	100.0	28.5	66.4
East: CR Swart East (M90)											
1 L	0.179	0.0	11.3	0.0	11.3	26.4	0.05	0.0	100.0	1.0	3.5
2 T	0.845	6.5	108.5	10.4	119.0	197.8	0.40	0.0	100.0	43.9	96.0
3 T	0.845	6.5	108.5	10.4	119.0	197.8	0.40	0.0	100.0	43.9	96.0
4 R	0.369	0.0	9.0	0.0	9.0	21.4	0.04	0.0	100.0	4.2	13.6
5 R	0.369	0.0	9.0	0.0	9.0	21.4	0.04	0.0	100.0	4.2	13.6
North: M88 North (Rienert)											
1 L	0.158	0.0	15.5	0.0	15.5	35.0	0.07	0.0	100.0	3.2	10.4
2 T	0.436	0.0	41.1	0.0	41.1	78.9	0.16	0.0	100.0	15.5	40.9
3 T	0.436	0.0	41.1	0.0	41.1	78.9	0.16	0.0	100.0	15.5	40.9
4 R	0.286	0.0	19.6	0.0	19.6	42.7	0.09	0.0	100.0	8.0	23.8
5 R	0.286	0.0	19.6	0.0	19.6	42.7	0.09	0.0	100.0	8.0	23.8
West: M90 West (CR Swart)											
1 L	0.005	0.0	0.2	0.0	0.2	0.5	0.00	0.0	100.0	0.0	0.0
2 T	0.781	2.3	97.5	3.9	101.4	170.6	0.34	0.0	100.0	36.1	81.1
3 T	0.781	2.3	97.5	3.9	101.4	170.6	0.34	0.0	100.0	36.1	81.1
4 R	0.813	0.6	20.5	0.8	21.3	45.9	0.09	0.0	100.0	10.2	29.3
5 R	0.813	0.6	20.5	0.8	21.3	45.9	0.09	0.0	100.0	10.2	29.3

Lane Queue Percentiles (Vehicles)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: M88 South (Rienert)							
1 L	0.248	2.9	3.7	4.7	5.3	6.3	7.3
2 T	0.250	3.1	3.9	4.9	5.6	6.7	7.7
3 T	0.250	3.1	3.9	4.9	5.6	6.7	7.7
4 R	0.822	9.5	11.9	14.2	15.3	16.8	18.0
5 R	0.822	9.5	11.9	14.2	15.3	16.8	18.0
East: CR Swart East (M90)							
1 L	0.179	1.6	2.0	2.6	3.0	3.7	4.3
2 T	0.845	16.3	20.2	23.9	25.4	27.1	28.3
3 T	0.845	16.3	20.2	23.9	25.4	27.1	28.3
4 R	0.369	1.2	1.6	2.1	2.4	3.0	3.5
5 R	0.369	1.2	1.6	2.1	2.4	3.0	3.5
North: M88 North (Rienert)							
1 L	0.158	2.2	2.7	3.5	4.0	4.9	5.7
2 T	0.436	5.8	7.2	8.9	9.7	11.1	12.3
3 T	0.436	5.8	7.2	8.9	9.7	11.1	12.3
4 R	0.286	2.8	3.5	4.4	5.0	6.0	6.9
5 R	0.286	2.8	3.5	4.4	5.0	6.0	6.9
West: M90 West (CR Swart)							
1 L	0.005	0.0	0.0	0.0	0.0	0.1	0.1
2 T	0.781	14.0	17.3	20.6	21.9	23.5	24.6
3 T	0.781	14.0	17.3	20.6	21.9	23.5	24.6
4 R	0.813	2.9	3.7	4.7	5.3	6.3	7.3
5 R	0.813	2.9	3.7	4.7	5.3	6.3	7.3

Lane Queue Percentiles (Distance)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: M88 South (Rienert)							
1 L	0.248	21.2	26.6	33.8	38.3	45.8	52.7
2 T	0.250	22.3	28.0	35.5	40.2	47.8	54.8
3 T	0.250	22.3	28.0	35.5	40.2	47.8	54.8
4 R	0.822	67.7	84.3	101.2	109.0	119.3	127.6
5 R	0.822	67.7	84.3	101.2	109.0	119.3	127.6
East: CR Swart East (M90)							
1 L	0.179	11.3	14.3	18.5	21.5	26.4	31.2
2 T	0.845	119.0	147.6	174.7	185.5	197.8	206.3
3 T	0.845	119.0	147.6	174.7	185.5	197.8	206.3
4 R	0.369	9.0	11.3	14.8	17.2	21.4	25.4
5 R	0.369	9.0	11.3	14.8	17.2	21.4	25.4
North: M88 North (Rienert)							
1 L	0.158	15.5	19.5	25.1	28.8	35.0	40.8
2 T	0.436	41.1	51.3	63.0	69.4	78.9	87.2
3 T	0.436	41.1	51.3	63.0	69.4	78.9	87.2
4 R	0.286	19.6	24.6	31.3	35.6	42.7	49.3

5 R	0.286	19.6	24.6	31.3	35.6	42.7	49.3
West: M90 West (CR Swart)							
1 L	0.005	0.2	0.2	0.3	0.4	0.5	0.6
2 T	0.781	101.4	125.9	149.5	159.1	170.6	178.8
3 T	0.781	101.4	125.9	149.5	159.1	170.6	178.8
4 R	0.813	21.3	26.7	33.9	38.5	45.9	52.9
5 R	0.813	21.3	26.7	33.9	38.5	45.9	52.9

Lane Stops
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: M88 South (Rienert)									
1 L	0.248	0.41	0.00	0.31	0.72	158.9	0.00	0.0	0.49
2 T	0.250	0.68	0.00	0.00	0.68	79.7	0.00	0.0	0.85
3 T	0.250	0.68	0.00	0.00	0.68	79.7	0.00	0.0	0.85
4 R	0.822	0.84	0.08	0.00	0.92	253.5	0.17	47.3	1.00
5 R	0.822	0.84	0.08	0.00	0.92	253.5	0.17	47.3	1.00
East: CR Swart East (M90)									
1 L	0.179	0.23	0.00	0.44	0.67	157.1	0.00	0.0	0.28
2 T	0.845	0.88	0.10	0.00	0.98	468.5	0.13	62.5	1.00
3 T	0.845	0.88	0.10	0.00	0.98	468.5	0.13	62.5	1.00
4 R	0.369	0.73	0.00	0.00	0.73	26.7	0.00	0.0	1.00
5 R	0.369	0.73	0.00	0.00	0.73	26.7	0.00	0.0	1.00
North: M88 North (Rienert)									
1 L	0.158	0.44	0.00	0.28	0.72	101.2	0.00	0.0	0.54
2 T	0.436	0.74	0.00	0.00	0.74	153.1	0.00	0.0	0.89
3 T	0.436	0.74	0.00	0.00	0.74	153.1	0.00	0.0	0.89
4 R	0.286	0.71	0.00	0.06	0.77	74.0	0.00	0.0	0.91
5 R	0.286	0.71	0.00	0.06	0.77	74.0	0.00	0.0	0.91
West: M90 West (CR Swart)									
1 L	0.005	0.12	0.00	0.48	0.61	3.6	0.00	0.0	0.18
2 T	0.781	0.85	0.04	0.00	0.90	399.1	0.06	25.6	0.98
3 T	0.781	0.85	0.04	0.00	0.90	399.1	0.06	25.6	0.98
4 R	0.813	0.76	0.12	0.00	0.88	70.4	0.32	25.5	1.00
5 R	0.813	0.76	0.12	0.00	0.88	70.4	0.32	25.5	1.00

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	Flow Rate HV	Flow Scale Fixed	Flow Scale Var	Peak Flow Factor
South: M88 South (Rienert)								
	East	9	Right	539	9	1.00	1.00	0.70
	North	8	Thru	228	7	1.00	1.00	0.95
	West	7	Left	212	8	1.00	1.00	0.59
East: CR Swart East (M90)								
	South	4	Left	225	10	1.00	1.00	0.77
	North	6	Right	71	2	1.00	1.00	0.86
	West	5	Thru	910	48	1.00	1.00	0.92
North: M88 North (Rienert)								
	South	2	Thru	405	8	1.00	1.00	0.81
	East	1	Left	136	4	1.00	1.00	0.86
	West	3	Right	188	3	1.00	1.00	0.57
West: M90 West (CR Swart)								
	South	12	Right	153	7	1.00	1.00	0.52
	East	11	Thru	850	38	1.00	1.00	0.86
	North	10	Left	4	1	1.00	1.00	0.34

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Separate Light and Heavy Vehicles)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID		Left LV	Left HV	Through LV	Through HV	Right LV	Right HV
Demand flows in veh/h as used by the program							
South: M88 South (Rienert)							
7	L	212	8	0	0	0	0
8	T	0	0	228	7	0	0
9	R	0	0	0	0	539	9
East: CR Swart East (M90)							
4	L	225	10	0	0	0	0
5	T	0	0	910	48	0	0
6	R	0	0	0	0	71	2
North: M88 North (Rienert)							
1	L	136	4	0	0	0	0
2	T	0	0	405	8	0	0
3	R	0	0	0	0	188	3
West: M90 West (CR Swart)							
10	L	4	1	0	0	0	0
11	T	0	0	850	38	0	0
12	R	0	0	0	0	153	7

Unit Time for Volumes = 60 minutes

Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Total Vehicles and Percent Heavy)
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID		Left		Through		Right	
		Total	%HV	Total	%HV	Total	%HV
Demand flows in veh/h as used by the program							
South: M88 South (Rienert)							
7	L	220	3.7	0	0.0	0	0.0
8	T	0	0.0	235	2.8	0	0.0
9	R	0	0.0	0	0.0	549	1.7
East: CR Swart East (M90)							
4	L	235	4.1	0	0.0	0	0.0
5	T	0	0.0	958	5.0	0	0.0
6	R	0	0.0	0	0.0	73	2.9
North: M88 North (Rienert)							
1	L	141	3.0	0	0.0	0	0.0
2	T	0	0.0	412	1.9	0	0.0
3	R	0	0.0	0	0.0	191	1.6
West: M90 West (CR Swart)							
10	L	6	24.1	0	0.0	0	0.0
11	T	0	0.0	888	4.3	0	0.0
12	R	0	0.0	0	0.0	160	4.4

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Pedestrian Flow Rates
Site:M88 and M90 AM - TIA AM AND PM

Intersection ID: 3
Fixed-Time Signals, Cycle Time = 110 sec (Practical Cycle Time)

Mov ID	Stage	Flow Rate ped/h	Flow Scale Fixed	Var	Peak Flow Factor
Across South Approach					
P1		53	1.00	1.00	0.95
Across East Approach					
P3		53	1.00	1.00	0.95
Across North Approach					
P5		53	1.00	1.00	0.95
Across West Approach					
P7		53	1.00	1.00	0.95

Unit Time for Volumes = 60 minutes
Peak Flow Period = 15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

INTERSECTION M88 AND R25

Traffic Signals

Movement Timing Information
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Mov ID	Mov Typ	Phase Matrix: First Green Fr	First Green To	First Green Op	First Green Pr	First Green Und	Second Green Fr	Second Green To	Second Green Op	Second Green Pr	Second Green Und	Lost Tim 1st Grn	Lost Tim 2nd Grn	Req.Mov.Time 1st Grn	Req.Mov.Time 2nd Grn	Eff. Grn 1st Grn	Eff. Grn 2nd Grn
South: M88 South																	
7	L (Slp)	B	D				D	B	Y			6	68	45.0Min	45.0Min	39	27
8	T	B	C									6		33.0Min		27	
9	R	A	B									6		12.1		12	
East: R25 East																	
4	L (Slp)	B	D	Y			D	B				21	6	45.0Min	45.0Min	24	89
5	T	*D	A									6		73.9		71	
6	R	C	D									6		12.0Min		6	
North: M88 North																	
1	L (Slp)	B	D				D	B	Y			6	17	45.0Min	45.0Min	39	78
2	T	*B	C									6		33.0Min		27	
3	R	*A	B									6		16.7		12	
West: R25 West																	
10	L (Slp)	B	D	Y			D	B				9	6	45.0Min	45.0Min	36	89
11	T	D	A									6		33.0Min		71	
12	R	*C	D									6		12.0Min		6	
Pedestrian Movements																	
P1	(Ped)	D	A									24		33.0Min		53	
P3	(Ped)	B	C									27		33.0Min		6	
P5	(Ped)	D	A									27		33.0Min		50	
P7	(Ped)	B	C									27		33.0Min		6	

Current Phase Sequence: Leading Right Turn
Input phase sequence: A B C D
Output phase sequence: A B C D

* Critical Movement/Green Period
Y (under heading 'Op') - Movement is opposed in the indicated green period

Movement Types:
Slp Slip Lane Movement
Ped Pedestrian
Dum Dummy

CRITICAL MOVEMENTS AND CYCLE TIME

Crit Mov ID	App. and Turn	Green Period Fr	Green Period To	Adjusted Lost Time	Adjusted Flow Ratio	Required Grn Time Ratio	Required Movement Time
3	N_R	A	B	6	0.069	0.076	16.7
2	N_T	B	C	33	-	-	33.0Min
12	W_R	C	D	12	-	-	12.0Min
5	E_T	D	A	6	0.437	0.485	73.9
			Total:	57	0.505	0.561	135.6

\- Flow ratio not used for cycle time calculations and the adjusted lost time equals the required movement time

(=Min or Max as shown in Movement Timing Information)

Cycle Time:

Minimum	Maximum	Practical	Chosen
90	150	130	140

Phase Information
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Phase	Change Time	Starting Intgrn	Green Start	Displayed Green	Green End	Terminating Intgrn	Phase Time	Phase Split
A	0	6	6	12	18	6	18	13%
B	18	6	24	27	51	6	33	24%
C	51	6	57	6	63	6	12	9%
D	63	6	69	71	140	6	77	55%

Current Phase Sequence: Leading Right Turn
Input phase sequence: A B C D
Output phase sequence: A B C D

Progression and Actuated Signal Parameters
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Mov ID	Control	Coord.	Arrival Type	% Arriving During Green	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
South: M88 South										
7 L	FT	No	3	47.1	1.000	1.000	6	NA	6	NA
8 T	FT	No	3	19.3	1.000	1.000	6	NA		
9 R	FT	No	3	8.6	1.000	1.000	6	NA		
East: R25 East										
4 L	FT	No	3	80.7	1.000	1.000	6	NA	6	NA
5 T	FT	No	3	50.7	1.000	1.000	6	NA		
6 R	FT	No	3	4.3	1.000	1.000	6	NA		
North: M88 North										
1 L	FT	No	3	83.6	1.000	1.000	6	NA	6	NA
2 T	FT	No	3	19.3	1.000	1.000	6	NA		
3 R	FT	No	3	8.6	1.000	1.000	6	NA		
West: R25 West										
10 L	FT	No	3	89.3	1.000	1.000	6	NA	6	NA
11 T	FT	No	3	50.7	1.000	1.000	6	NA		
12 R	FT	No	3	4.3	1.000	1.000	6	NA		

SCATS Parameters
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Stopline Flow veh/h	Capacity veh/h	SCATS Satn Flow	SCATS MF	Hdwy at MF sec	Occ Time sec	Space Time sec	Deg. Satn x	Lane Util. %
South: M88 South									
1 L	191	677	1857	NA				0.282	100
2 T	46	372	1950	1595	2.26	0.36	1.90	0.124	100
3 T	46	372	1950	1595	2.26	0.36	1.90	0.124	100
4 R	72	157	1857	1238	2.91	0.66	2.25	0.458	100
5 R	72	157	1857	1238	2.91	0.66	2.25	0.458	100
East: R25 East									
1 L	334	1377	1857	NA				0.243	100
2 T	829	963	1950	1798	2.00	0.36	1.64	0.861	100
3 T	829	963	1950	1798	2.00	0.36	1.64	0.861	100
4 R	18	79	1857	929	3.88	0.64	3.24	0.226	100
5 R	18	79	1857	929	3.88	0.64	3.24	0.226	100
North: M88 North									
1 LT	217	402	1911	NA				0.540	100
2 T	201	372	1950	1595	2.26	0.36	1.90	0.540	100
3 T	201	372	1950	1595	2.26	0.36	1.90	0.540	100
4 R	125	156	1857	1238	2.91	0.66	2.25	0.802	100
5 R	125	156	1857	1238	2.91	0.66	2.25	0.802	100
West: R25 West									
1 L	24	1523	1857	NA				0.016	100
2 T	153	966	1950	1798	2.00	0.36	1.64	0.158	100
3 T	153	966	1950	1798	2.00	0.36	1.64	0.158	100
4 R	40	79	1857	929	3.88	0.64	3.24	0.504	100
5 R	40	79	1857	929	3.88	0.64	3.24	0.504	100

NA Not Applicable - SCATS MF was not calculated for this lane due to one of the following reasons:
- the lane is not controlled by signals (slip or continuous lane)
- two movements share this lane and do not run in the same phases

STOPLINE FLOW: Departure flow rate in veh/h as measured at the stop line. This cannot exceed capacity.

SCATS SATURATION FLOW: This allows for lane width, approach grade and turning vehicles. Saturation flow scale applies if specified. The effects of heavy vehicles, parking manoeuvres, number of buses stopping and conflicting pedestrian volume are not included.

SCATS MF: This emulates the MF (Maximum Flow) parameter used in the SCATS control system. It is calculated from the SCATS SATURATION FLOW parameter.

DEG. SATN: The Demand (Arrival) Flow Rate may exceed the Stopline Flow Rate, therefore x > 1 is possible.

Movements

Movement Capacity Parameters
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Mov ID	Dem Flow	HV	Satn Flow 1st Grn	Satn Flow 2nd Grn	Flow Ratio 1st Grn	Flow Ratio 2nd Grn	Total Cap.	Prac. Deg. Satn	Prac. Spare Cap.	Lane Util	Deg. Satn
	veh/h	%					veh/h	xp	%	%	x
South: M88 South											
7 L	191	1.9	1832	865	0.104	0.000	677	0.90	219	100	0.282
8 T	92	1.7	3857		0.024		744	0.90	626	100	0.124
9 R	144	2.2	3657		0.039		313	0.90	96	100	0.458
East: R25 East											

4	L	334	2.4	1264	1826	0.000	0.183	1378	0.90	271	100	0.243
5	T	1658	4.1	3799		0.437		1927	0.90	5	100	0.861*
6	R	36	0.7	3696		0.010		158	0.90	298	100	0.226
North: M88 North												
1	L	89	0.9	526	31	0.168	0.000	164	0.90	66	100	0.541
2	T	531	1.7	5094		0.104		982	0.90	67	100	0.540
3	R	249	3.3	3629		0.069		311	0.90	12	100	0.802
West: R25 West												
10	L	24	6.4	1533	1776	0.000	0.013	1523	0.90	5641	100	0.016
11	T	306	3.6	3811		0.080		1933	0.90	469	100	0.158
12	R	79	1.9	3665		0.022		157	0.90	79	100	0.504
Pedestrian Movements												
P1		53		12000		0.004		4543	0.90		***	0.012
P3		53		12000		0.004		514	0.90		***	0.103
P5		53		12000		0.004		4286	0.90		***	0.012
P7		53		12000		0.004		514	0.90		***	0.103

* Maximum degree of saturation

Movement Performance
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Mov ID		Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: M88 South										
7	L	1.69	2.03	31.8	0.78	149.1	9.73	117.5	3.7	32.2
8	T	1.28	1.54	50.1	0.65	60.4	5.73	55.9	2.3	24.4
9	R	3.03	3.63	75.8	0.77	110.3	11.04	87.9	4.5	19.6
East: R25 East										
4	L	0.95	1.14	10.2	0.67	224.9	8.60	205.6	4.4	47.0
5	T	16.25	19.49	35.3	0.90	1492.9	104.03	1005.7	34.6	29.1
6	R	0.81	0.98	81.7	0.70	25.0	2.86	22.0	1.2	18.6
North: M88 North										
1	L	1.31	1.58	53.3	0.85	75.6	5.61	54.0	2.2	25.0
2	T	7.79	9.35	52.8	0.79	421.4	35.09	322.0	13.7	23.5
3	R	5.69	6.83	82.2	0.89	221.8	20.59	152.5	8.2	18.5
West: R25 West										
10	L	0.05	0.06	8.1	0.62	14.7	0.45	14.7	0.3	49.2
11	T	1.65	1.98	19.4	0.47	144.5	12.24	185.4	4.9	37.8
12	R	1.84	2.20	83.5	0.73	58.0	6.45	48.5	2.6	18.4
Pedestrian Movements										
P1		0.40	0.40	27.0	0.62	32.9	1.09	2.4	0.9	2.6
P3		0.94	0.94	64.1	0.96	50.7	1.77	2.6	1.5	1.7
P5		0.43	0.43	28.9	0.64	34.1	1.16	2.6	1.0	2.6
P7		0.94	0.94	64.1	0.96	50.7	1.77	2.6	1.5	1.7

Intersection Negotiation Data
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream m	Distance User Spec?
South: M88 South								
	East	Right	16.8	24.6	26.4	500	114	No
	North	Thru	S	60.0	33.0	500	160	No
	West	Left	20.0	26.2	31.4	500	117	No
East: R25 East								
	South	Left	20.0	26.2	31.4	500	117	No
	North	Right	18.2	25.3	28.6	500	114	No
	West	Thru	S	60.0	29.7	500	163	No
North: M88 North								
	South	Thru	S	60.0	33.0	500	160	No
	East	Left	15.0	23.5	23.6	500	94	No
	West	Right	16.8	24.6	26.4	500	115	No
West: R25 West								
	South	Right	18.2	25.3	28.6	500	115	No
	East	Thru	S	60.0	29.7	500	163	No
	North	Left	20.0	26.2	31.4	500	121	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Movement Speeds and Geometric Delay
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: M88 South									
7 L	60.0	26.2	26.2	60.0			46.1	32.2	7.6
8 T	60.0	60.0	60.0	60.0			46.6	24.4	0.0
9 R	60.0	24.6	24.6	60.0			44.8	19.6	7.8
East: R25 East									
4 L	60.0	26.2	26.2	60.0			48.3	47.0	7.6
5 T	60.0	60.0	60.0	60.0	45.0		45.3	29.1	0.0
6 R	60.0	25.3	25.3	60.0			44.8	18.6	7.7
North: M88 North									
1 L	60.0	23.5	23.5	60.0		9.0	46.9	25.0	7.9
2 T	60.0	60.0	60.0	60.0		0.0	44.5	23.5	0.0
3 R	60.0	24.6	24.6	60.0	24.6		43.5	18.5	7.8
West: R25 West									
10 L	60.0	26.2	26.2	60.0			49.2	49.2	7.7
11 T	60.0	60.0	60.0	60.0			50.5	37.8	0.0
12 R	60.0	25.3	25.3	60.0	18.1		44.7	18.4	7.7

"Running Speed" is the average speed excluding stopped periods.

Lanes

Lane Performance
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Effective Green Times (sec) R1	G1	R2	G2	Dem Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: M88 South												
1 L	6	39	68	27	191	677	0.282	31.8	0.78	10.3	73.1	500.0
2 T	113	27	0	0	46	372	0.124	50.1	0.65	3.7	26.4	500.0
3 T	113	27	0	0	46	372	0.124	50.1	0.65	3.7	26.4	500.0
4 R	128	12	0	0	72	157	0.458	75.8	0.77	6.4	45.7	500.0
5 R	128	12	0	0	72	157	0.458	75.8	0.77	6.4	45.7	500.0
East: R25 East												
1 L	21	24	6	89	334	1377	0.243	10.2	0.67	6.4	45.8	500.0
2 T	69	71	0	0	829	963	0.861	35.3	0.90	51.2	371.2	500.0
3 T	69	71	0	0	829	963	0.861	35.3	0.90	51.2	371.2	500.0
4 R	134	6	0	0	18	79	0.226	81.7	0.70	1.9	13.4	500.0
5 R	134	6	0	0	18	79	0.226	81.7	0.70	1.9	13.4	500.0
North: M88 North												
1 LT	82	29	27	2	217	402	0.540	48.7	0.82	13.4	95.2	500.0
2 T	113	27	0	0	201	372	0.540	55.2	0.79	13.9	99.0	500.0
3 T	113	27	0	0	201	372	0.540	55.2	0.79	13.9	99.0	500.0
4 R	128	12	0	0	125	156	0.802	82.2	0.89	10.8	77.4	500.0
5 R	128	12	0	0	125	156	0.802	82.2	0.89	10.8	77.4	500.0
West: R25 West												
1 L	9	36	6	89	24	1523	0.016	8.1	0.62	0.2	1.2	500.0
2 T	69	71	0	0	153	966	0.158	19.4	0.47	7.1	51.1	500.0
3 T	69	71	0	0	153	966	0.158	19.4	0.47	7.1	51.1	500.0
4 R	134	6	0	0	40	79	0.504	83.5	0.73	4.0	28.7	500.0
5 R	134	6	0	0	40	79	0.504	83.5	0.73	4.0	28.7	500.0

Lane Flow and Capacity Information
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width m	Saturation Flow Adj. Basic (tcu)	Aver 1st (veh)	Aver 2nd (veh)	End Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: M88 South												
1 L	191	0	0	191	3.30	1950	1832	865	64	677	0.282	100
2 T	0	46	0	46	3.30	1950	1929	0	0	372	0.124	100
3 T	0	46	0	46	3.30	1950	1929	0	0	372	0.124	100
4 R	0	0	72	72	3.30	1950	1828	0	0	157	0.458	100
5 R	0	0	72	72	3.30	1950	1828	0	0	157	0.458	100
East: R25 East												
1 L	334	0	0	334	3.30	1950	1264	1826	64	1377	0.243	100
2 T	0	829	0	829	3.30	1950	1899	0	0	963	0.861	100
3 T	0	829	0	829	3.30	1950	1899	0	0	963	0.861	100
4 R	0	0	18	18	3.30	1950	1848	0	0	79	0.226	100
5 R	0	0	18	18	3.30	1950	1848	0	0	79	0.226	100

North: M88 North												
1 LT	89	129	0	217	3.30	1950	1848	1369	41	402	0.540	100
2 T	0	201	0	201	3.30	1950	1929	0	0	372	0.540	100
3 T	0	201	0	201	3.30	1950	1929	0	0	372	0.540	100
4 R	0	0	125	125	3.30	1950	1814	0	0	156	0.802	100
5 R	0	0	125	125	3.30	1950	1814	0	0	156	0.802	100
West: R25 West												
1 L	24	0	0	24	3.30	1950	1533	1776	63	1523	0.016	100
2 T	0	153	0	153	3.30	1950	1905	0	0	966	0.158	100
3 T	0	153	0	153	3.30	1950	1905	0	0	966	0.158	100
4 R	0	0	40	40	3.30	1950	1832	0	0	79	0.504	100
5 R	0	0	40	40	3.30	1950	1832	0	0	79	0.504	100

Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: M88 South												
1 L	191			191	2	1949	39	27	0.282	31.8	73	500
2 T		46		46	2	1949	27		0.124	50.1	26	500
3 T		46		46	2	1949	27		0.124	50.1	26	500
4 R			72	72	2	1949	12		0.458	75.8	46	500
5 R			72	72	2	1949	12		0.458	75.8	46	500
	191	92	144	427	2				0.458	50.6	73	
East: R25 East												
1 L	334			334	2	1949	24	89	0.243	10.2	46	500
2 T		829		829	4	1949	71		0.861	35.3	371	500
3 T		829		829	4	1949	71		0.861	35.3	371	500
4 R			18	18	1	1949	6		0.226	81.7	13	500
5 R			18	18	1	1949	6		0.226	81.7	13	500
	334	1658	36	2029	4				0.861	32.0	371	
North: M88 North												
1 LT	89	129		217	1	1950	29	2	0.540	48.7	95	500
2 T		201		201	2	1950	27		0.540	55.2	99	500
3 T		201		201	2	1950	27		0.540	55.2	99	500
4 R			125	125	3	1949	12		0.802	82.2	77	500
5 R			125	125	3	1949	12		0.802	82.2	77	500
	89	531	249	869	2				0.802	61.3	99	
West: R25 West												
1 L	24			24	6	1949	36	89	0.016	8.1	1	500
2 T		153		153	4	1949	71		0.158	19.4	51	500
3 T		153		153	4	1949	71		0.158	19.4	51	500
4 R			40	40	2	1949	6		0.504	83.5	29	500
5 R			40	40	2	1949	6		0.504	83.5	29	500
	24	306	79	409	3				0.504	31.2	51	
Pedestrians												
Across S approach				53			53		0.012	27.0	0.1	
Across E approach				53			6		0.103	64.1	0.2	
Across N approach				53			50		0.012	28.9	0.1	
Across W approach				53			6		0.103	64.1	0.2	

ALL VEHICLES	Total Flow	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	3733	3	140	0.861	40.8	371

Peak flow period = 15 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Driver Characteristics
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: M88 South						
1 L	26.2	1832	1.96	14.32	7.11	0.99
2 T	45.0	1929	1.87	23.33	7.10	1.30
3 T	45.0	1929	1.87	23.33	7.10	1.30
4 R	24.6	1828	1.97	13.44	7.13	0.92
5 R	24.6	1828	1.97	13.44	7.13	0.92
East: R25 East						
1 L	NA - Opposed turn					
2 T	45.0	1899	1.90	23.69	7.25	1.32
3 T	45.0	1899	1.90	23.69	7.25	1.32
4 R	25.3	1848	1.95	13.71	7.04	0.95
5 R	25.3	1848	1.95	13.71	7.04	0.95
North: M88 North						
1 LT	NA - Shared lane phases differ					
2 T	45.0	1929	1.87	23.33	7.10	1.30
3 T	45.0	1929	1.87	23.33	7.10	1.30
4 R	24.6	1814	1.98	13.55	7.20	0.93
5 R	24.6	1814	1.98	13.55	7.20	0.93
West: R25 West						
1 L	NA - Opposed turn					
2 T	45.0	1905	1.89	23.62	7.22	1.31
3 T	45.0	1905	1.89	23.62	7.22	1.31
4 R	25.3	1832	1.96	13.83	7.11	0.95
5 R	25.3	1832	1.96	13.83	7.11	0.95

Lane Delays
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

		Delay (seconds/veh)								
		Stop-line Delay			Acc.	Queuing		Stopd		
Lane No.	Deg. Satn x	1st d1	2nd d2	Total dSL	Dec. dn	Total dq	MvUp dqm	(Idle) di	Geom dig	Control dic
South: M88 South										
1 L	0.282	24.2	0.0	24.2	3.6	20.8	0.0	20.8	7.6	31.8
2 T	0.124	50.1	0.0	50.1	7.4	42.7	0.0	42.7	0.0	50.1
3 T	0.124	50.1	0.0	50.1	7.4	42.7	0.0	42.7	0.0	50.1
4 R	0.458	68.0	0.0	68.0	4.7	63.3	0.0	63.3	7.8	75.8

5 R	0.458	68.0	0.0	68.0	4.7	63.3	0.0	63.3	7.8	75.8
East: R25 East										
1 L	0.243	2.6	0.0	2.6	1.4	1.3	0.0	1.3	7.6	10.2
2 T	0.861	32.0	3.3	35.3	8.1	27.1	0.3	26.8	0.0	35.3
3 T	0.861	32.0	3.3	35.3	8.1	27.1	0.3	26.8	0.0	35.3
4 R	0.226	74.0	0.0	74.0	4.8	69.2	0.0	69.2	7.7	81.7
5 R	0.226	74.0	0.0	74.0	4.8	69.2	0.0	69.2	7.7	81.7
North: M88 North										
1 LT	0.540	45.5	0.0	45.5	6.4	39.1	0.4	38.7	3.2	48.7
2 T	0.540	55.2	0.0	55.2	8.2	47.0	0.0	47.0	0.0	55.2
3 T	0.540	55.2	0.0	55.2	8.2	47.0	0.0	47.0	0.0	55.2
4 R	0.802	70.7	3.7	74.4	4.7	69.6	1.4	68.2	7.8	82.2
5 R	0.802	70.7	3.7	74.4	4.7	69.6	1.4	68.2	7.8	82.2
West: R25 West										
1 L	0.016	0.4	0.0	0.4	0.6	0.0	0.0	0.0	7.7	8.1
2 T	0.158	19.4	0.0	19.4	4.9	14.6	0.0	14.6	0.0	19.4
3 T	0.158	19.4	0.0	19.4	4.9	14.6	0.0	14.6	0.0	19.4
4 R	0.504	75.8	0.0	75.8	4.9	70.9	0.0	70.9	7.7	83.5
5 R	0.504	75.8	0.0	75.8	4.9	70.9	0.0	70.9	7.7	83.5

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 L	0.282	0.0	5.3	0.0	5.3	10.3	0.15	0.0	100.0	1.3	3.7
2 T	0.124	0.0	1.6	0.0	1.6	3.7	0.05	0.0	100.0	0.6	2.1
3 T	0.124	0.0	1.6	0.0	1.6	3.7	0.05	0.0	100.0	0.6	2.1
4 R	0.458	0.0	3.0	0.0	3.0	6.4	0.09	0.0	100.0	1.4	3.9
5 R	0.458	0.0	3.0	0.0	3.0	6.4	0.09	0.0	100.0	1.4	3.9
East: R25 East											
1 L	0.243	0.0	3.0	0.0	3.0	6.4	0.09	0.0	100.0	0.2	0.8
2 T	0.861	0.8	29.9	1.5	31.4	51.2	0.74	0.0	100.0	8.1	17.3
3 T	0.861	0.8	29.9	1.5	31.4	51.2	0.74	0.0	100.0	8.1	17.3
4 R	0.226	0.0	0.8	0.0	0.8	1.9	0.03	0.0	100.0	0.4	1.2
5 R	0.226	0.0	0.8	0.0	0.8	1.9	0.03	0.0	100.0	0.4	1.2
North: M88 North											
1 LT	0.540	0.0	7.3	0.0	7.3	13.4	0.19	0.0	100.0	2.7	6.9
2 T	0.540	0.0	7.6	0.0	7.6	13.9	0.20	0.0	100.0	3.1	7.6
3 T	0.540	0.0	7.6	0.0	7.6	13.9	0.20	0.0	100.0	3.1	7.6
4 R	0.802	0.1	5.4	0.2	5.6	10.8	0.15	0.0	100.0	2.6	6.6
5 R	0.802	0.1	5.4	0.2	5.6	10.8	0.15	0.0	100.0	2.6	6.6
West: R25 West											
1 L	0.016	0.0	0.1	0.0	0.1	0.2	0.00	0.0	100.0	0.0	0.0
2 T	0.158	0.0	3.3	0.0	3.3	7.1	0.10	0.0	100.0	0.8	2.6
3 T	0.158	0.0	3.3	0.0	3.3	7.1	0.10	0.0	100.0	0.8	2.6
4 R	0.504	0.0	1.7	0.0	1.7	4.0	0.06	0.0	100.0	0.8	2.6
5 R	0.504	0.0	1.7	0.0	1.7	4.0	0.06	0.0	100.0	0.8	2.6

Lane Queues (Distance)
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: M88 South											
1 L	0.282	0.0	37.4	0.0	37.4	73.1	0.15	0.0	100.0	9.1	26.7
2 T	0.124	0.0	11.3	0.0	11.3	26.4	0.05	0.0	100.0	4.6	14.6
3 T	0.124	0.0	11.3	0.0	11.3	26.4	0.05	0.0	100.0	4.6	14.6
4 R	0.458	0.0	21.2	0.0	21.2	45.7	0.09	0.0	100.0	9.7	28.0
5 R	0.458	0.0	21.2	0.0	21.2	45.7	0.09	0.0	100.0	9.7	28.0
East: R25 East											
1 L	0.243	0.0	21.2	0.0	21.2	45.8	0.09	0.0	100.0	1.7	5.8
2 T	0.861	5.8	216.7	10.6	227.3	371.2	0.74	0.0	100.0	58.9	125.2
3 T	0.861	5.8	216.7	10.6	227.3	371.2	0.74	0.0	100.0	58.9	125.2
4 R	0.226	0.0	5.4	0.0	5.4	13.4	0.03	0.0	100.0	2.6	8.7
5 R	0.226	0.0	5.4	0.0	5.4	13.4	0.03	0.0	100.0	2.6	8.7
North: M88 North											
1 LT	0.540	0.0	51.7	0.0	51.7	95.2	0.19	0.0	100.0	19.5	48.9
2 T	0.540	0.0	54.2	0.0	54.2	99.0	0.20	0.0	100.0	21.9	53.7
3 T	0.540	0.0	54.2	0.0	54.2	99.0	0.20	0.0	100.0	21.9	53.7
4 R	0.802	1.1	38.5	1.5	40.0	77.4	0.15	0.0	100.0	18.5	47.3
5 R	0.802	1.1	38.5	1.5	40.0	77.4	0.15	0.0	100.0	18.5	47.3
West: R25 West											
1 L	0.016	0.0	0.5	0.0	0.5	1.2	0.00	0.0	100.0	0.0	0.1
2 T	0.158	0.0	24.2	0.0	24.2	51.1	0.10	0.0	100.0	6.0	18.5
3 T	0.158	0.0	24.2	0.0	24.2	51.1	0.10	0.0	100.0	6.0	18.5
4 R	0.504	0.0	12.4	0.0	12.4	28.7	0.06	0.0	100.0	5.9	18.4
5 R	0.504	0.0	12.4	0.0	12.4	28.7	0.06	0.0	100.0	5.9	18.4

Lane Queue Percentiles (Vehicles)
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 L	0.282	5.3	6.6	8.1	9.0	10.3	11.4
2 T	0.124	1.6	2.0	2.6	3.0	3.7	4.4
3 T	0.124	1.6	2.0	2.6	3.0	3.7	4.4
4 R	0.458	3.0	3.7	4.7	5.4	6.4	7.4
5 R	0.458	3.0	3.7	4.7	5.4	6.4	7.4
East: R25 East							
1 L	0.243	3.0	3.7	4.7	5.4	6.4	7.4
2 T	0.861	31.4	38.9	45.8	48.4	51.2	53.0
3 T	0.861	31.4	38.9	45.8	48.4	51.2	53.0
4 R	0.226	0.8	1.0	1.3	1.5	1.9	2.3
5 R	0.226	0.8	1.0	1.3	1.5	1.9	2.3
North: M88 North							
1 LT	0.540	7.3	9.1	11.1	12.0	13.4	14.6
2 T	0.540	7.6	9.5	11.5	12.5	13.9	15.1
3 T	0.540	7.6	9.5	11.5	12.5	13.9	15.1
4 R	0.802	5.6	6.9	8.5	9.4	10.8	11.9

5 R	0.802	5.6	6.9	8.5	9.4	10.8	11.9
West: R25 West							
1 L	0.016	0.1	0.1	0.1	0.1	0.2	0.2
2 T	0.158	3.4	4.2	5.3	6.0	7.1	8.1
3 T	0.158	3.4	4.2	5.3	6.0	7.1	8.1
4 R	0.504	1.7	2.2	2.8	3.3	4.0	4.7
5 R	0.504	1.7	2.2	2.8	3.3	4.0	4.7

Lane Queue Percentiles (Distance)
Site:M88 and R25 - TIA

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: M88 South							
1 L	0.282	37.4	46.8	57.7	63.8	73.1	81.4
2 T	0.124	11.3	14.3	18.5	21.4	26.4	31.1
3 T	0.124	11.3	14.3	18.5	21.4	26.4	31.1
4 R	0.458	21.2	26.6	33.8	38.3	45.7	52.6
5 R	0.458	21.2	26.6	33.8	38.3	45.7	52.6
East: R25 East							
1 L	0.243	21.3	26.7	33.8	38.4	45.8	52.7
2 T	0.861	227.3	281.8	332.1	351.0	371.2	383.9
3 T	0.861	227.3	281.8	332.1	351.0	371.2	383.9
4 R	0.226	5.4	6.9	9.1	10.6	13.4	16.0
5 R	0.226	5.4	6.9	9.1	10.6	13.4	16.0
North: M88 North							
1 LT	0.540	51.7	64.5	78.3	85.3	95.2	103.6
2 T	0.540	54.2	67.6	81.9	89.0	99.0	107.4
3 T	0.540	54.2	67.6	81.9	89.0	99.0	107.4
4 R	0.802	40.1	50.0	61.5	67.9	77.4	85.9
5 R	0.802	40.1	50.0	61.5	67.9	77.4	85.9
West: R25 West							
1 L	0.016	0.5	0.6	0.8	1.0	1.2	1.5
2 T	0.158	24.2	30.3	38.2	43.2	51.1	58.5
3 T	0.158	24.2	30.3	38.2	43.2	51.1	58.5
4 R	0.504	12.4	15.6	20.2	23.4	28.7	33.7
5 R	0.504	12.4	15.6	20.2	23.4	28.7	33.7

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: M88 South									
1 L	0.282	0.61	0.00	0.17	0.78	149.1	0.00	0.0	0.71
2 T	0.124	0.65	0.00	0.00	0.65	30.2	0.00	0.0	0.86
3 T	0.124	0.65	0.00	0.00	0.65	30.2	0.00	0.0	0.86
4 R	0.458	0.76	0.00	0.00	0.77	55.1	0.00	0.0	0.99
5 R	0.458	0.76	0.00	0.00	0.77	55.1	0.00	0.0	0.99
East: R25 East									
1 L	0.243	0.24	0.00	0.44	0.67	224.9	0.00	0.0	0.27
2 T	0.861	0.87	0.03	0.00	0.90	746.5	0.03	27.4	0.95
3 T	0.861	0.87	0.03	0.00	0.90	746.5	0.03	27.4	0.95
4 R	0.226	0.69	0.00	0.00	0.70	12.5	0.00	0.0	1.00
5 R	0.226	0.69	0.00	0.00	0.70	12.5	0.00	0.0	1.00
North: M88 North									
1 LT	0.540	0.78	0.02	0.02	0.82	179.3	0.12	25.5	0.94
2 T	0.540	0.79	0.00	0.00	0.79	158.9	0.00	0.0	0.95
3 T	0.540	0.79	0.00	0.00	0.79	158.9	0.00	0.0	0.95
4 R	0.802	0.79	0.09	0.00	0.89	110.9	0.20	24.6	1.00
5 R	0.802	0.79	0.09	0.00	0.89	110.9	0.20	24.6	1.00
West: R25 West									
1 L	0.016	0.08	0.00	0.53	0.62	14.7	0.00	0.0	0.11
2 T	0.158	0.47	0.00	0.00	0.47	72.3	0.00	0.0	0.57
3 T	0.158	0.47	0.00	0.00	0.47	72.3	0.00	0.0	0.57
4 R	0.504	0.73	0.00	0.00	0.73	29.0	0.00	0.1	1.00
5 R	0.504	0.73	0.00	0.00	0.73	29.0	0.00	0.1	1.00

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	Flow Rate HV	Flow Scale Fixed	Flow Scale Var	Peak Flow Factor
South: M88 South								
	East	9	Right	141	3	1.00	1.00	0.71
	North	8	Thru	91	2	1.00	1.00	0.64
	West	7	Left	187	4	1.00	1.00	0.67
East: R25 East								
	South	4	Left	326	8	1.00	1.00	0.64
	North	6	Right	36	0	1.00	1.00	0.67
	West	5	Thru	1590	68	1.00	1.00	0.89
North: M88 North								
	South	2	Thru	522	9	1.00	1.00	0.55
	East	1	Left	88	1	1.00	1.00	0.70
	West	3	Right	241	8	1.00	1.00	0.79
West: R25 West								
	South	12	Right	78	2	1.00	1.00	0.48

```
           East         11   Thru    295    11    1.00   1.00     0.70
           North        10   Left     22     2    1.00   1.00     0.67
-------------------------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Separate Light and Heavy Vehicles)
Site:M88 and R25 - TIA

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

-----------------------------------------------
  Mov          Left       Through       Right
  ID        ---------    ---------    ---------
             LV    HV     LV    HV     LV    HV
-----------------------------------------------
Demand flows in veh/h as used by the program
South: M88 South
    7 L     187     4      0     0      0     0
    8 T       0     0     91     2      0     0
    9 R       0     0      0     0    141     3
-----------------------------------------------
East: R25 East
    4 L     326     8      0     0      0     0
    5 T       0     0   1590    68      0     0
    6 R       0     0      0     0     36     0
-----------------------------------------------
North: M88 North
    1 L      88     1      0     0      0     0
    2 T       0     0    522     9      0     0
    3 R       0     0      0     0    241     8
-----------------------------------------------
West: R25 West
   10 L      22     2      0     0      0     0
   11 T       0     0    295    11      0     0
   12 R       0     0      0     0     78     2
-----------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Total Vehicles and Percent Heavy)
Site:M88 and R25 - TIA

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

-------------------------------------------------
  Mov          Left         Through         Right
  ID        ----------    ----------    ----------
            Total  %HV    Total  %HV    Total  %HV
-------------------------------------------------
Demand flows in veh/h as used by the program
South: M88 South
    7 L      191   1.9       0   0.0       0   0.0
    8 T        0   0.0      92   1.7       0   0.0
    9 R        0   0.0       0   0.0     144   2.2
-------------------------------------------------
East: R25 East
    4 L      334   2.4       0   0.0       0   0.0
    5 T        0   0.0    1658   4.1       0   0.0
    6 R        0   0.0       0   0.0      36   0.7
-------------------------------------------------
North: M88 North
    1 L       89   0.9       0   0.0       0   0.0
    2 T        0   0.0     531   1.7       0   0.0
```

```
    3 R        0   0.0       0   0.0     249   3.3
------------------------------------------------------
West: R25 West
   10 L       24   6.4       0   0.0       0   0.0
   11 T        0   0.0     306   3.6       0   0.0
   12 R        0   0.0       0   0.0      79   1.9
------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Pedestrian Flow Rates
Site:M88 and R25 - TIA

```
Intersection ID: 1
Fixed-Time Signals, Cycle Time = 140 sec (Practical Cycle Time)

-----------------------------------------------
 Mov        Flow Rate   Flow Scale   Peak Flow
 ID   Stage   ped/h     Fixed   Var   Factor
-----------------------------------------------
Across South Approach
  P1            53       1.00   1.00   0.95
-----------------------------------------------
Across East Approach
  P3            53       1.00   1.00   0.95
-----------------------------------------------
Across North Approach
  P5            53       1.00   1.00   0.95
-----------------------------------------------
Across West Approach
  P7            53       1.00   1.00   0.95
-----------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  15 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```