

(PTY) LTD

Engineers

Central Property Dev JHB (Pty) Ltd

Traffic Impact Study

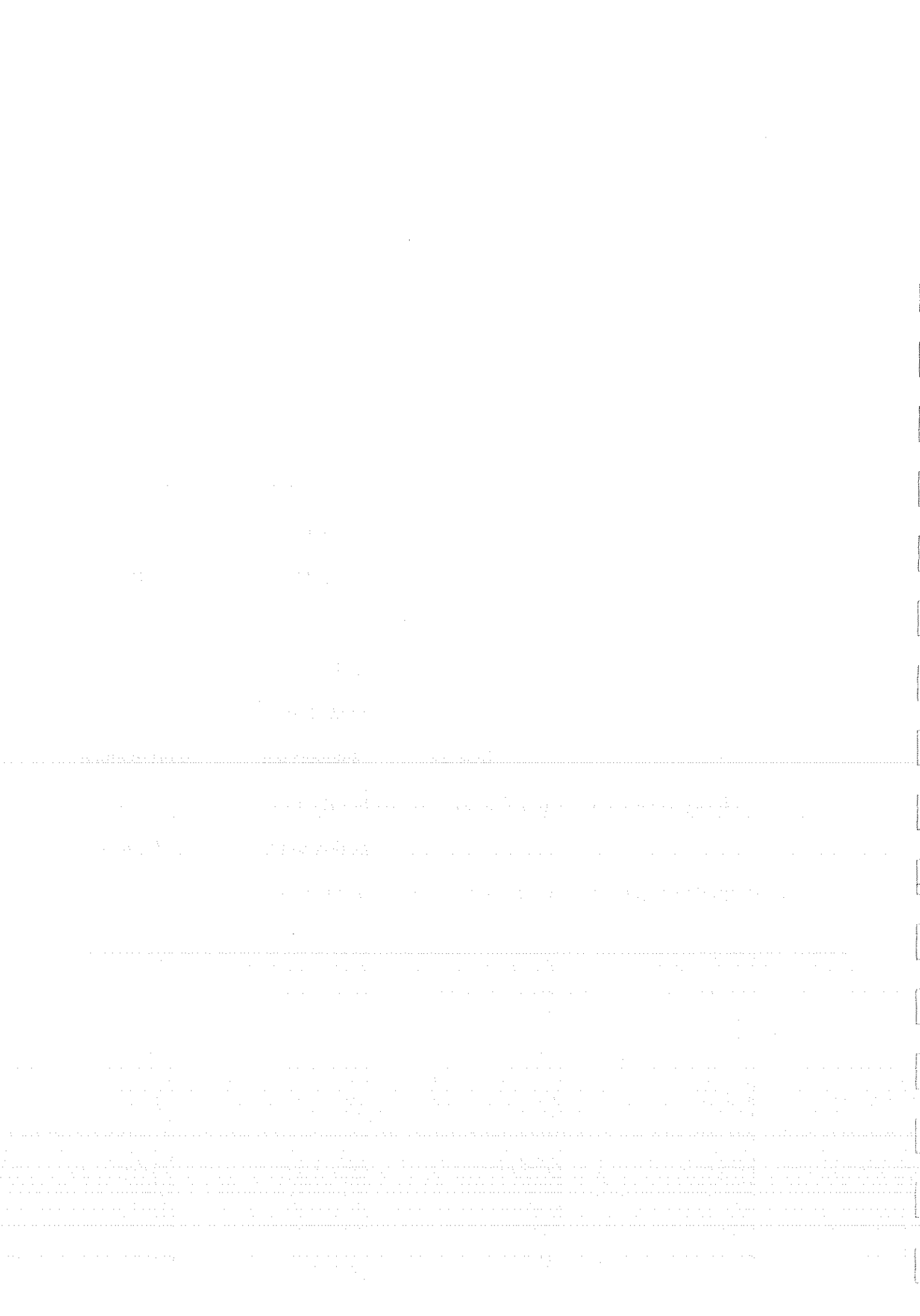
Proposed Township Chloorkop (Extension 65)

May 2007

Draft Report

29 De Havilland Crescent
Pro Park
Building 1
Persequor Park 0020

Tel: (012) 349 1664
Fax: (012) 349 1665
e-mail: mail@itse.co.za



Traffic Impact Study
Proposed Township Chloorkop (Extension 65)
Summary

LOCATION	The development site will be located on Portions 38 and 39 (Portion of Portion 12) and Portion 44 (Portion of Portion 18) of the Farm Moofontein 14 IR. The site is located in the Chloorkop area within the Ekurhuleni Metropolitan Municipality roughly halfway between the R21 and the N3 Eastern Bypass.
LAND USE	1505 residential units (medium cost housing @ 85 units/hectar)
TRIP GENERATION	South African Trip Generation Rates: 1.1 trips per unit
TRAFFIC COUNTS	April 2007
TIME FRAME FOR ANALYSIS	Scenario 1: 2007 background traffic demand Scenario 2: 2007 background traffic demand with development trips Note that the horizon year was not analysed due to the existing oversaturated traffic, and the future K115 parallel to Zuurfontein Avenue that will provide the necessary north/south capacity. However, the current road network will be upgraded to adequate capacity levels in the vicinity of the development.
STUDY AREA	The following intersections were evaluated: Intersection 1: Zuurfontein Avenue/Chloorkop Road; Intersection 2: Zuurfontein Avenue/Ossewa Straat; Intersection 3: Zuurfontein Avenue/Bergrivier Drive; Intersection 4: Ossewa Straat/Element Road; Intersection 5: Ossewa Straat/Proton Street; Intersection 6: Proton Street/Molucule Street/New access into development; Intersection 7: Boomkruiper Street/New access into development; Intersection 8: Kuifreier/Pongolarivier Drive; and Intersection 9: Pongolarivier Drive/Kwartel Road.
ACCESS	Access is proposed via Proton Road and Boomkruiper Street.
TRIP DISTRIBUTION	The following trip distribution was assumed: <ul style="list-style-type: none"> • 30% of trips to the north along Chloorkop Road towards the N1; • 10% of trips to the north via Modderfontein Road and Andrew Mapheto Drive towards Midrand and the R21; • 30% of trips to the east via Pongolarivier Drive towards the R21; and • 30% of trips to the south along Zuurfontein Avenue towards Edenvale.
CAPACITY ANALYSIS	The Intersections in the vicinity of the development are expected to operate at an acceptable level of service given the proposed road upgrading is implemented. Road upgrading is proposed at the Zuurfontein Avenue/Ossewa Street intersection to accommodate the trips generated by the development.
CAPACITY OF ACCESSES	The two proposed accesses can accommodate the expected demand. Three entry and two exit lanes are proposed at the Proton Street Access, and three entry and three exit lanes at the Ossewa Street Access.
UPGRADING PROPOSED	Refer to Drawing 2216/GL/01 for recommended upgrades.
COST OF UPGRADES	R6 473 300 using a unit rate of R650/m ² , which excludes professional fees, contingencies, the relocation of major services and VAT.
RECOMMENDATION	The proposed development should be considered favourably from a traffic engineering point of view by the relevant authorities, given the road upgrading proposed in this document (refer to Drawing 2216/GL/01). The detail design of the upgrading proposed should be designed by a professional engineer with suitable road design experience. New traffic signals should only be implemented when volumes warrant the construction thereof according to SARTSM requirements.

PROPOSED TOWNSHIP CHLOORKOP (EXTENSION 65)

TRAFFIC IMPACT STUDY

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	LAND USE	1
3.	ADJACENT ROAD NETWORK	2
4.	LONG TERM ROAD PLANNING	3
5.	ACCESS	4
5.1	Accesses number of gates	4
6.	COUNTED TRAFFIC VOLUMES	5
7.	LATENT RIGHTS	5
8.	TRIP GENERATION	5
9.	TRIP DISTRIBUTION AND TRIP ASSIGNMENT	6
10.	EXTENT OF THE STUDY	7
10.1	Intersections and Accesses Evaluated	7
10.2	Relevant Peak Hours	7
10.3	Assessment Years	7
10.4	Assessment Scenarios	8
11.	UPGRADES AND COST ESTIMATE	9
12.	CONCLUSIONS	11
13.	RECOMMENDATIONS	12
14.	REFERENCES	12
	APPENDIX A: FIGURES	
	APPENDIX B: DRAWINGS	

PROPOSED TOWNSHIP CHLOOKOP (EXTENSION 65)

TRAFFIC IMPACT STUDY

1. INTRODUCTION

Central Property Dev JHB (Pty) Ltd is presently planning a medium income residential development in the Chlookop area within the Ekurhuleni Metropolitan Municipality situated roughly halfway between the R21 and the N3 Eastern Bypass.

The envisaged land-use rights for the development include residential rights for 1505 units at a density of 85 units per hectare. The locality of the proposed development is shown in **Figure 1**. Access to the development is proposed from Proton and Boomkruiper Street.

Central Property Dev JHB (Pty) Ltd appointed ITS Engineers (Pty) Ltd to prepare the traffic impact study for the proposed township.

The objective of the traffic impact study is to determine the impact that the additional traffic generated by the proposed development will have on the adjacent road network. The expected trip generation, distribution and assignment, as well as the required road upgrading to accommodate the proposed development trips, are discussed in this report.

The document titled "Manual for Traffic Impact Studies", prepared by the National Department of Transport in 1995, was applied in the preparation of this traffic impact study.

2. LAND USE

The development site will be located on Portions 38 and 39 (Portion of Portion 12) and Portion 44 (Portion of Portion 18) of the Farm Mooifontein 14 IR. The proposed site is ±17.7 ha in area and was previously unused.

The envisaged land-use rights for the development include residential rights for 1505 units (medium cost housing).

3. ADJACENT ROAD NETWORK

The proposed development is located in the vicinity of the following roads, as indicated on **Figure 1**:

- **Zuurfontein Avenue:** The Class 3 road provides north-south linkage between Chloorkop and Isando. It has three through lanes northbound and southbound in the vicinity of the Ossewa Street and Bergrivier Drive intersections.
- **Bergrivier Drive:** The Class 3 road provides east-west linkage between Chloorkop and Kwartel Street.
- **Chloorkop Road:** The Class 3 road provides east-west linkage between Chloorkop and Kyalami. Chloorkop Road becomes Allandale Road to the west.
- **Ossewa Street/Boomkruiper Street:** The Class 5 road provides access to the development on the south eastern side. Ossewa Street is called Boomkruiper Street after the curve to the left (driving in an easterly direction). It is a two way two lane road (single carriageway) and slopes downward towards Kuifreier Street.
- **Element Street:** The Class 5 road provides access into the industrial premises of Chloorkop via Ossewa Street. Element Street is named Nuwejaarsvoël Avenue after a curve to the right (driving in a northerly direction).
- **Nuwejaarsvoël Avenue:** The Class 5 road connects Element Street and Proton Street, and continues to the east from the north eastern border of the proposed development (Nuwejaarsvoël Avenue does not run adjacent to the northern border of the proposed development.) The eastern road section of Nuwejaarsvoël Avenue is called Kuifreier Street at the four way stop intersection with Pongolarivier Drive.
- **Proton Street:** The Class 5 road provides access to the development at the western side of the development. It is a two way two lane road (single carriageway) and has a flatter gradient than Boomkruiper Street.
- **Kuifreier Street:** The Class 5 road has a four way stop intersection with **Pongolarivier Drive** (Class 3), which connects Birch Acres (adjacent to Chloorkop) with Bichleigh North .
- **Kwartel Road:** The Class 3 road links Pongolarivier Drive with Bergriver Drive in a north-south direction.

4. LONG TERM ROAD PLANNING

The proposed long term road planning in the vicinity of the development is shown in Diagram 1a. It can be seen that the K115 route will in future supplement the existing K117 (Zuurfontein Road). This proposed route will provide additional north/south capacity and will alleviate the current high traffic flows on the K117.

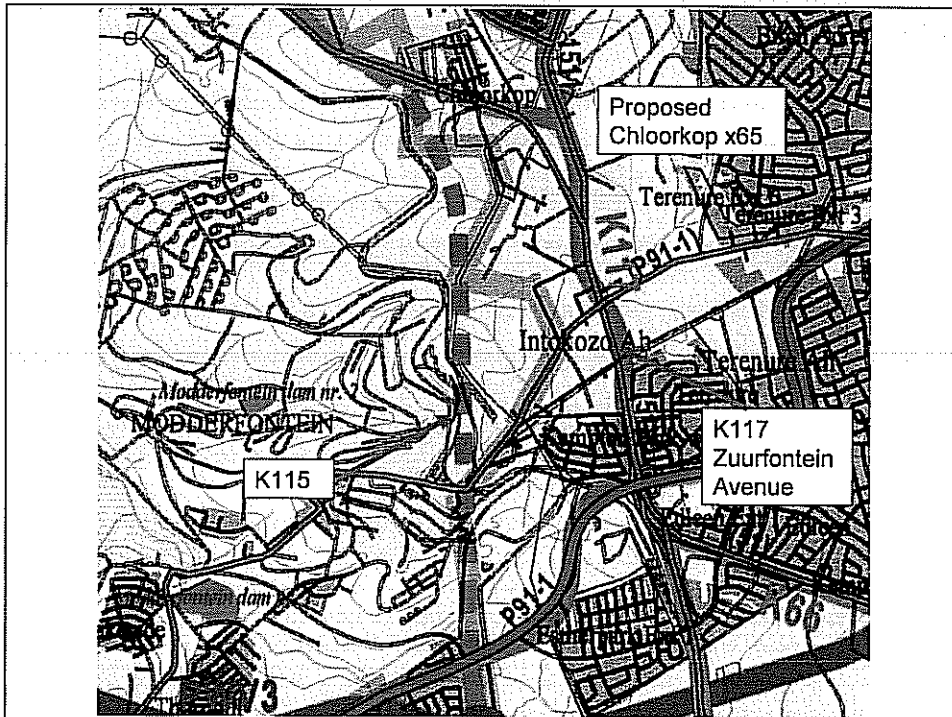


Diagram 1a: Proposed K115 in vicinity of Proposed Chloorkop x65

From a long term road planning point of view it therefore does not make sense to construct additional lanes in a north/south direction on the K117. Such additional capacity should rather be constructed on a parallel route such as the K115.

For the purposes of this study, no additional north/south capacity is proposed on the K117. However, additional turning capacity is proposed to be constructed at the Zuurfontein (K117)/Ossewa Street intersection to mitigate the impact of the trips generated by the proposed development.

Given, the above and the high levels of congestion currently experienced at the K117, the horizon year scenario was not considered in this study as the background traffic growth should be accommodated on new routes such as the K115.

5. ACCESS

Access to the development is proposed via Proton Street and Boomkruiper Street. There are no other roads adjacent to the proposed development. Both Proton Street and Boomkruiper Street are two way two lane roads (single carriageway) and slope downwards in a northerly direction. The gradient on Proton Street is +2.4% and on Boomkruiper Street a maximum gradient of +4.6%.

5.1 Accesses number of gates

Three entry and two exit lanes are proposed at the Proton Street Access, and three entry and three exit lanes at the Ossewa Street Access to accommodate the AM and PM peak traffic including visitors to the development. At the entry gates a minimum of 20m storage space is needed. The calculations are based on a lane capacity at the accesses of 300 vehicles per hour, and a residential medium income development density of 85 units per hectare. Also, equal entry/exit on Boomkruiper Street and Proton Street is assumed.

6. COUNTED TRAFFIC VOLUMES

Traffic counts were conducted on the 16th of April 2007 (refer to **Figures 1a and 1b**) at the following locations:

- Zuurfontein Avenue/Bergrivier Drive;
- Zuurfontein Avenue/Chloorkop Road;
- Zuurfontein Avenue/Ossewa Straat;
- Ossewa Straat/Element Road;
- Ossewa Straat/Proton Straat;
- Kuifreier/Pongolarivier Drive; and
- Pongolarivier Drive/Kwartel Road.

These traffic counts constitute the background traffic demand, as no latent rights traffic were identified (refer to Section 6).

The traffic counts were conducted between 06h00 and 08h00, and 15h30 and 18h30. The morning (AM) peak was determined as 06h30 to 07h30 and the afternoon (PM) peak as 16h45 to 17h45. The existing traffic volumes are shown in Figures 1a and 1b.

7. LATENT RIGHTS

No information on any latent rights in the direct vicinity of the development was available at the time of writing this report.

8. TRIP GENERATION

The additional traffic that will be generated by the proposed development was calculated based on trip generation rates obtained from the document "South African Trip Generation Rates".

The estimated design trip generation associated with the land use of the proposed development is indicated in **Table 7.1** below.

Table 7.1: Design Trip Generation for Proposed Development

LAND USE	EXTENT OF LAND USE	TRIP RATE (PER UNIT)	DIRECTIONAL SPLIT (%)		TRIPS GENERATED (VPH)		TOTAL TRIPS (VPH)
			IN	OUT	IN	OUT	IN + OUT
WEEKDAY AM PEAK HOUR							
Residential 3	1505 units (max 85units/ha @ 17.7ha)	1.1	25	75	414	1241	1655
WEEKDAY PM PEAK HOUR							
Residential 3	1505 units (max 85units/ha @ 17.7ha)	1.1	75	25	1241	414	1655

As indicated above the proposed township Chloorkop Extension 65 is expected to generate an estimated 1655 vehicle trips during the Weekday AM and PM peak hour.

9. TRIP DISTRIBUTION AND TRIP ASSIGNMENT

The expected additional vehicle trips that will be generated by the proposed Chloorkop Development were distributed and assigned to the adjacent road network based on the expected origin and destinations of the trips.

The expected trip distribution and assignment of the new development trips to and from the proposed development are as shown in **Figures 3a and 3b** for the Weekday AM and PM peak hour. The following trip distribution was assumed:

- 30% of trips to the north along Chloorkop Road towards the N1;
- 10% of trips to the north via Modderfontein Road and Andrew Mapheto Drive towards Midrand and the R21;
- 30% of trips to the east via Pongolarivier Drive towards the R21; and
- 30% of trips to the south along Zuurfontein Avenue towards Edenvale.

10. EXTENT OF THE STUDY

10.1 Intersections and Accesses Evaluated

Based on a consideration of the likely impact of the development, the following intersections were evaluated:

- **Intersection 1:** Zuurfontein Avenue/Chloorkop Road;
- **Intersection 2:** Zuurfontein Avenue/Ossewa Straat;
- **Intersection 3:** Zuurfontein Avenue/Bergrivier Drive;
- **Intersection 4:** Ossewa Straat/Element Road;
- **Intersection 5:** Ossewa Straat/Proton Street;
- **Intersection 6:** Proton Street/Molecule Street/New access into development;
- **Intersection 7:** Boomkruiper Street/New access into development;
- **Intersection 8:** Kuifreier/Pongolarivier Drive; and
- **Intersection 9:** Pongolarivier Drive/Kwartel Road.

10.2 Relevant Peak Hours

The critical peak hour from a road capacity point of view, occurs when the traffic generated by the development is at a maximum or when the highest combination of existing road traffic and traffic generated by the development occurs.

Based on a consideration of the relevant land use, it was decided to consider the following peak hours for analyses:

- **Weekday AM peak hour**
- **Weekday PM peak hour**

10.3 Assessment Years

The assessment years that were considered relevant for the type of development and the area within which it is located are:

- **Base Year 2007:** The base year, and the year that the development is assumed to be fully developed is year 2007. The background traffic volumes are assumed to be representative of the base year traffic demand on the existing road network.

Note that the Horizon Year (2012) was not analysed due to the existing oversaturated traffic conditions, and the future K115 that will run parallel to Zuurfontein Avenue (K117). Additional north/south capacity should rather be constructed on the K115 than the K117.

10.4 Assessment Scenarios

The capacity analyses were done using the Highway Capacity Manual 2000 intersection analysis methodologies for signalised and unsignalised intersections. The following scenarios were analysed:

- **Scenario 1:** 2007 background traffic demand: The expected 2007 Weekday AM and PM background traffic demand and intersection analysis results are shown in **Figures 2a and 2b**. The existing intersection layout in Scenario 1 is shown in **Figure 2c** and the required intersection layout to accommodate the traffic demand is shown in **Figure 2d**.
- **Scenario 2:** 2007 background traffic with development trips: The expected 2007 Weekday AM and PM traffic demand including the development, as well as the intersection analysis results are shown in **Figures 4a and 4b**. The required intersection layout to accommodate the traffic demand is shown in **Figure 4c**.

It can be seen from the analysis results given the road upgrading proposed, sufficient capacity will be created on the road network to accommodate the trips generated by the development. The road upgrading is discussed in the next section of the report.

11. UPGRADES AND COST ESTIMATE

The upgrades proposed for the development are as indicated in **Drawing 2216/GL/01**.

The following upgrades are necessary from a traffic point of view for the additional development traffic to be accommodated by the existing road network:

- **Intersection 2 (Zuurfontein Avenue/Ossewa Straat)**
 - Additional right turn lane on all approaches

- **Intersection 5 (Ossewa Straat/Proton Street)**
 - Upgrade control to signals;
 - Westbound approach: short exclusive right turn lane (30m lane, 20m taper);
 - Eastbound approach: short exclusive left turn lane (60m lane, 60m taper); and
 - Construct an additional through lane in both directions on Ossewa Street from Proton Street to Zuurfontein Avenue.

- **Intersection 6 (Proton Street/Molucule Street/New access into development)**
 - Construct the eastern approach with two lanes into and two lanes out of the development; and
 - Construct Traffic Circle (8.6m radius).

- **Intersection 7 (Boomkruiper Street/New access into development)**
 - Construct the northern approach with two lanes into and two lanes out of the development;
 - Westbound approach: short exclusive right turn lane (60m lane, 20m taper);
 - Eastbound approach: short exclusive left turn lane (60m lane, 60m taper); and
 - Introduce Traffic Signal Control.

- **Intersection 8 (Kuifreier/Pongolarivier Drive)**
 - Upgrade control to a traffic circle (5m radius)

The provisional cost estimates for the upgrades are summarised in **Table 10.1** below.

Table 10.1: Summary of the Upgrades and Cost Estimates (Excluding VAT)

NO	INTERSECTION/ ROAD SECTION	EXTENT OF UPGRADES	COST
1	Intersection 2 (Zuurfontein Avenue/Ossewa Straat) & Additional two lanes between Zuurfontein Avenue and Proton Street	Lanes	R1 361 750
		Signal Works	R150 000
2	Intersection 5 (Ossewa Straat/Proton Street)	Lanes	R3 672 500
		Signal Works	R280 000
4	Intersection 6 (Proton Street/Molucule Street/New access into development)	Traffic Circle	R210 000
5	Intersection 7 (Boomkruiper Street/New access into development)	Lanes	R432 250
		Signal Works	R280 000
6	Intersection 8 (Kuifreier/Pongolarivier Drive)	Traffic Circle	R86 800
	TOTAL		R6 473 300

From the above, it can be seen that the total cost of the proposed upgrades is ±R6 473 300 (excluding VAT).

Note must please be taken that the above cost estimate was based on a unit rate approach, which exclude professional fees, contingencies, the relocation of major services and VAT. The estimate was also based a conceptual layout, which was done without detailed services information being available at the time of the study.

12. CONCLUSIONS

Given the findings of this report, the following conclusions are drawn:

1. The proposed development will be established as the township of Chloorkop x65.
2. The development site is ± 17.7 ha in extent and is envisaged to yield residential rights for 1505 units (85 units/ha density).
3. Access to the development will be obtained via Proton Street and Boomkruiper Street.
4. It is expected that ± 1655 vehicle trips will be generated by the proposed development during the Weekday AM and PM peak hours respectively.
5. Capacity analyses indicate that the proposed accesses and upgraded intersection configurations are adequate to accommodate the expected additional development trips.
- 5.1 The upgrades proposed for the development are as indicated in **Drawing 2216/GL/01**. It is proposed that the developer implement the necessary upgrades at Intersection 2 (Zuurfontein Avenue/Ossewa Straat), Intersection 5 (Ossewa Straat/Proton Street), the additional lane (in both directions) on Ossewa Street between Zuurfontein Avenue and Proton Street, Intersection 6 (Proton Street/Molucule Street/New access into development), Intersection 7 (Boomkruiper Street/New access into development) and Intersection 8 (Kuifreier/Pongolarivier Drive).
6. The total cost of all the accesses and upgrades is estimated at **$\pm R6\ 473\ 300$ (excluding VAT)**. *The cost estimate was based on a unit rate approach, which excludes professional fees, contingencies, the relocation of major services and VAT.*

13. RECOMMENDATIONS

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

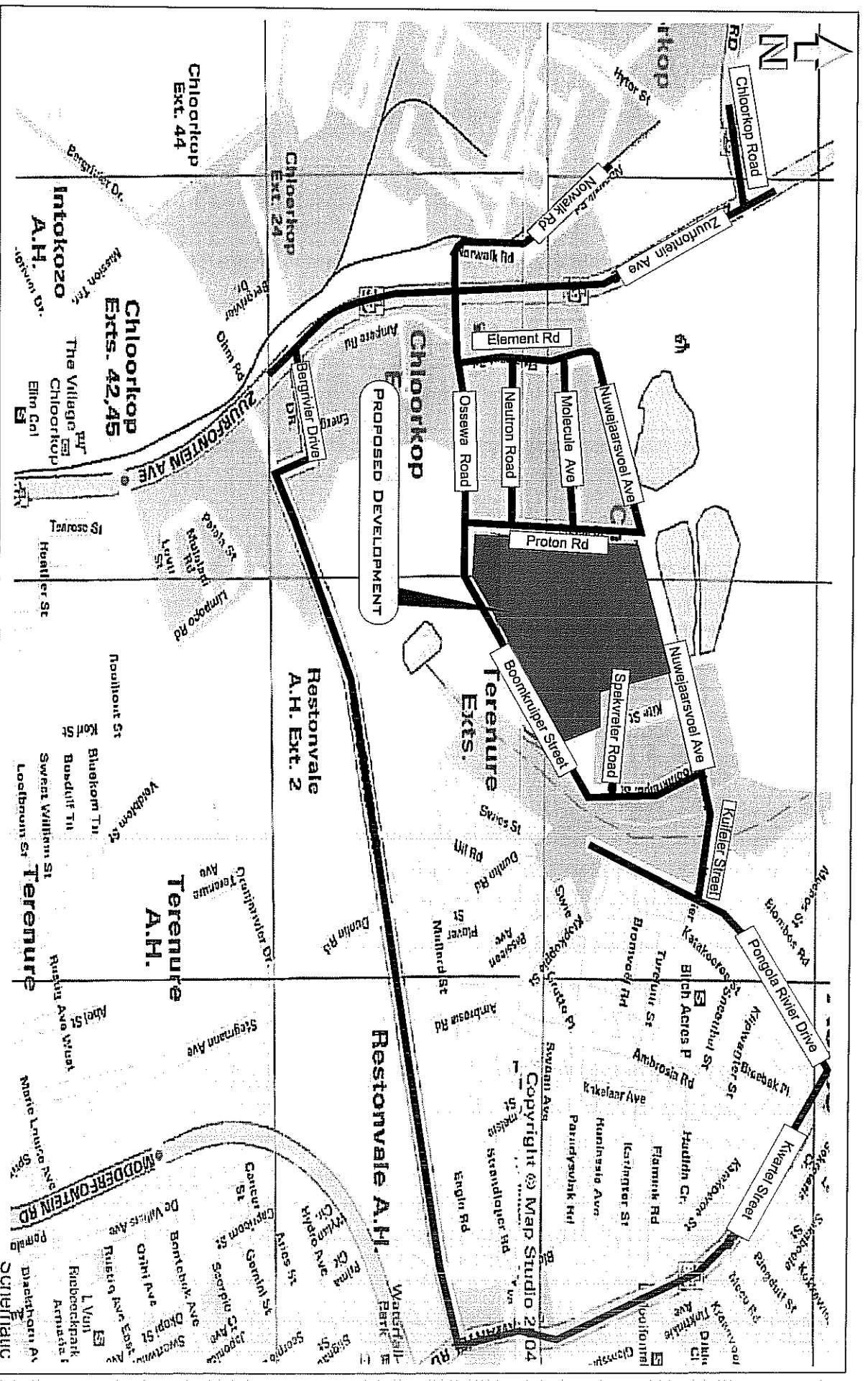
1. The proposed development should be considered favourably from a traffic engineering point of view by the relevant authorities, given the road upgrading proposed in this document (refer to **Drawing 2216/GL/01**).
2. The detail design of the upgrading proposed should be designed by a professional engineer with suitable road design experience.
3. New traffic signals should only be implemented when volumes warrant the construction thereof according to SARTSM requirements.

14. REFERENCES

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

1. BKS (Pty) Ltd, Manual for Traffic Impact Studies, Department of Transport, October 1995.
2. BKS (Pty) Ltd, South African Trip Generation Rates, Department of Transport, Pretoria, June 1995.

APPENDIX A FIGURES



Project:

PROPOSED TOWNSHIP
CHLOORKOP X 65

Figure:

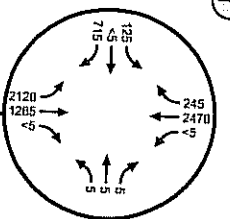
LOCALITY PLAN

Nr.

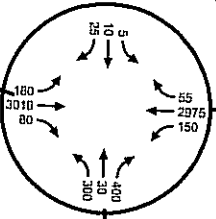
1

2216_Locality.cdr

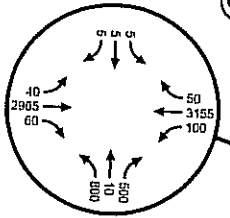
1



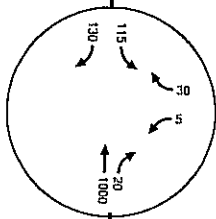
2



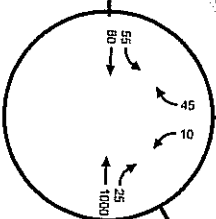
3



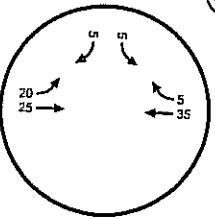
4



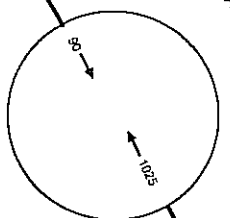
5



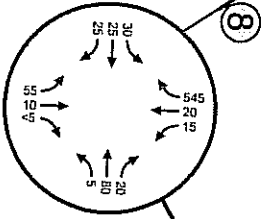
6



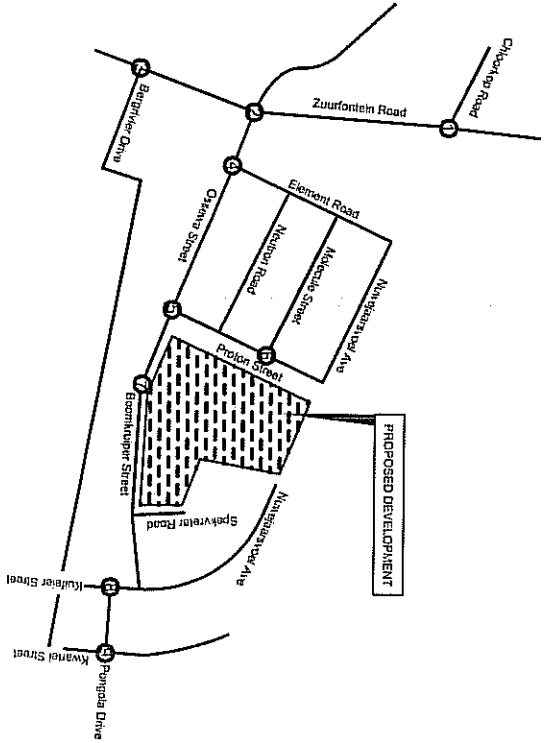
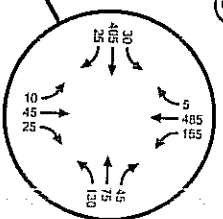
7



8



9



LEGEND

— TURNING VOLUMES

— LEVEL OF SERVICE

— DELAY SECOND / VEHICLE

— VOLUME / CAPACITY RATIO

490
205
430



PROJECT:

CHILLOORKOP X 02 PROPOSED DEVELOPMENT

FIGURE:

BASE YEAR VOLUMES (2007)
WEEKDAY AM

SCHEMATIC
2216 traffic fig 1A

1a

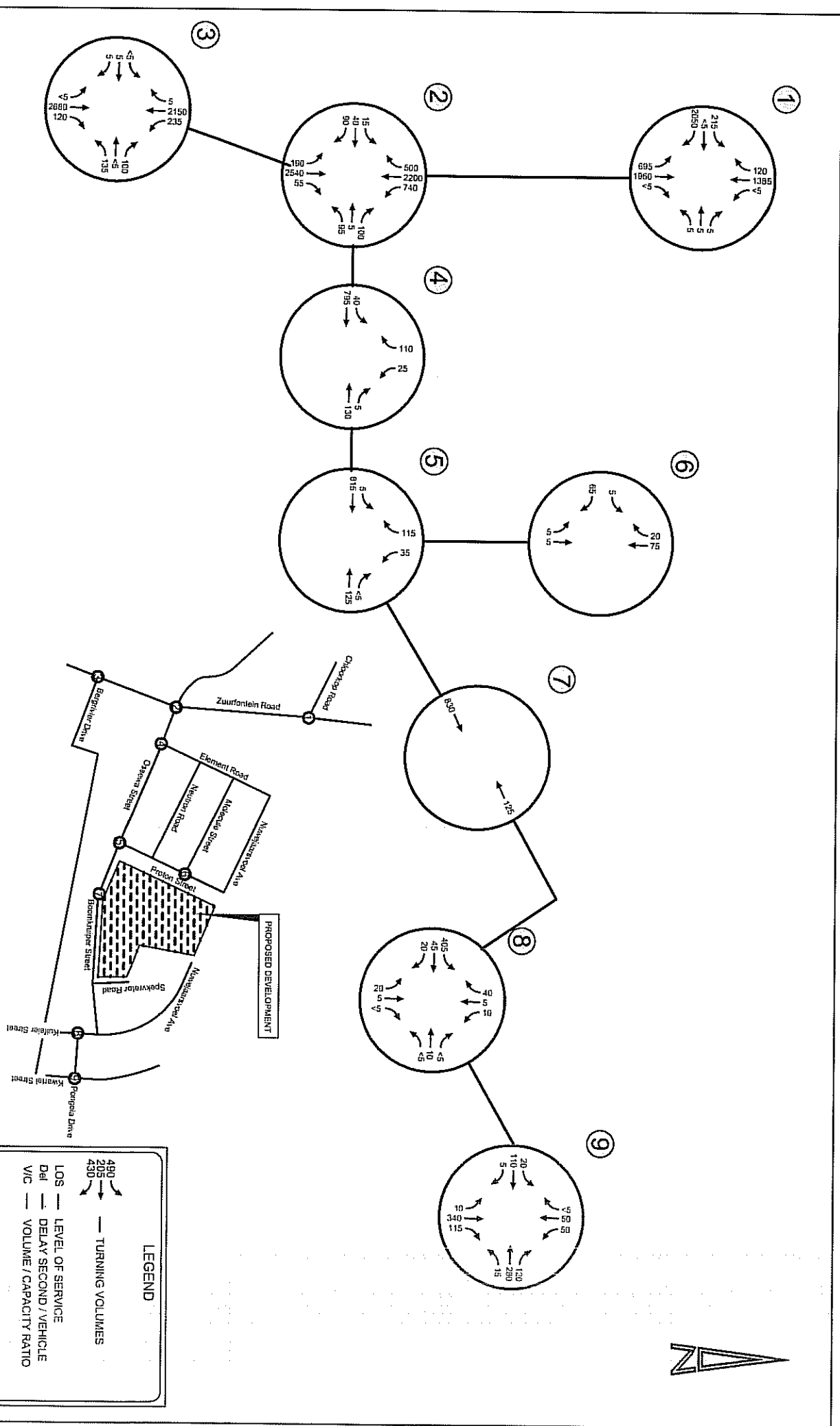


PROJECT: CHLOORKOP x 02 PROPOSED DEVELOPMENT

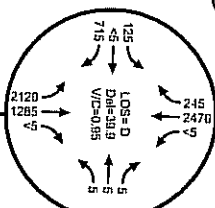
FIGURE:

BASE YEAR VOLUMES (2007)
WEEKDAY PM

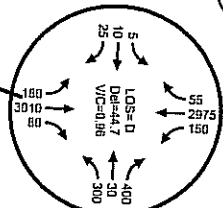
SCHEMATIC
2216 traffic - fig 1b



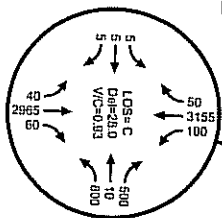
1



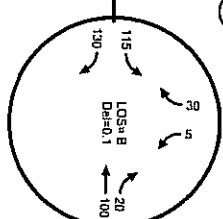
2



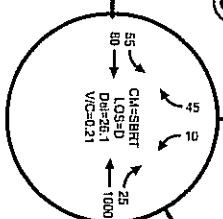
3



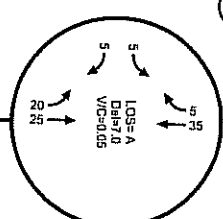
4



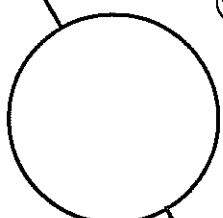
5



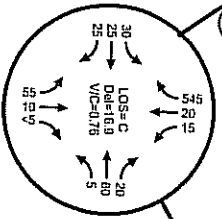
6



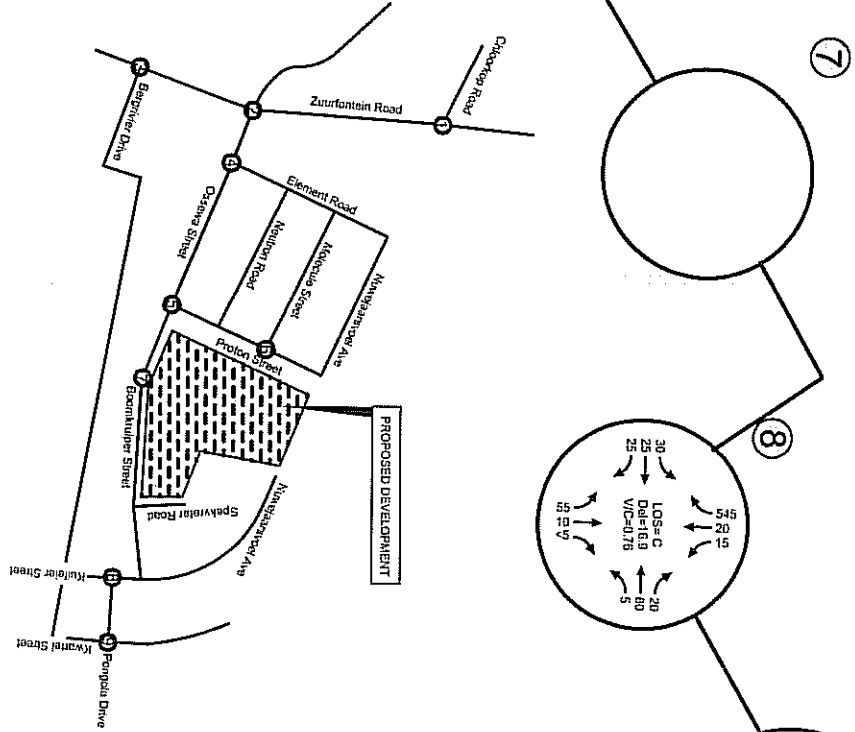
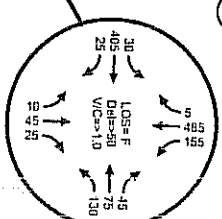
7



8



9



LEGEND

490, 205, 430 — TURNING VOLUMES

LOS — LEVEL OF SERVICE

Del — DELAY SECOND / VEHICLE

V/C — VOLUME / CAPACITY RATIO



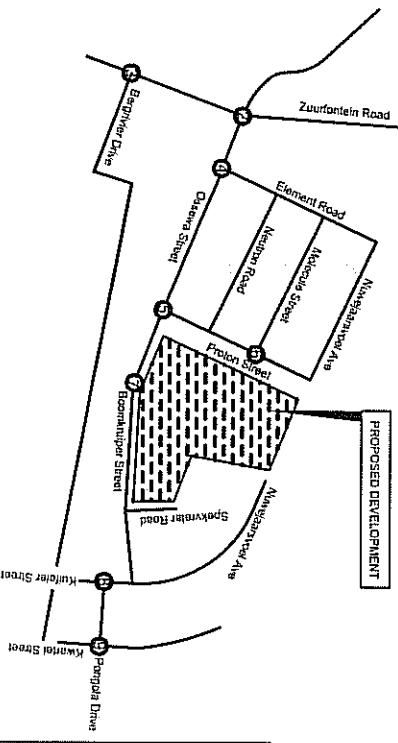
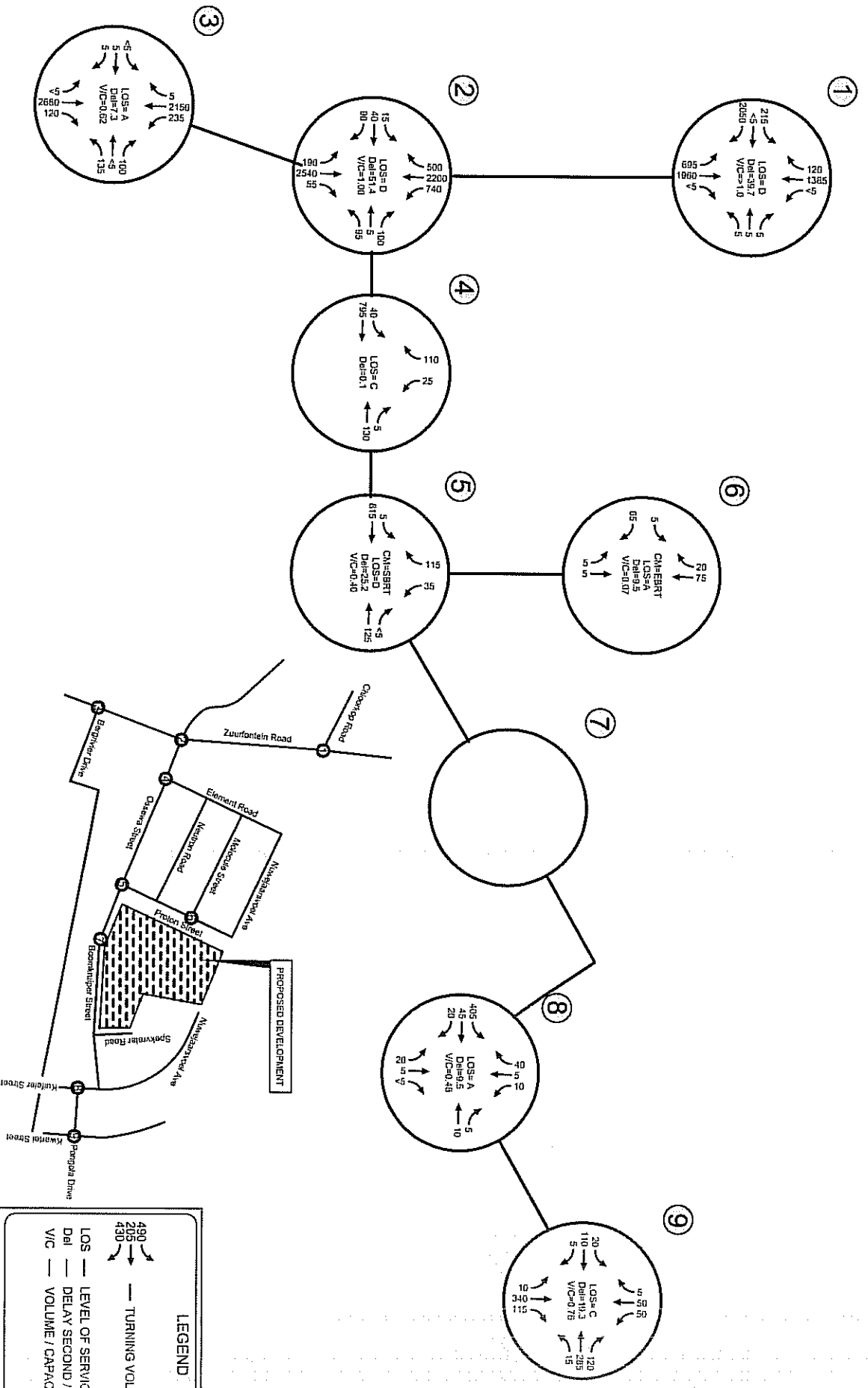
PROJECT: **CHLOORKOP x 02 PROPOSED DEVELOPMENT**

FIGURE: **SCENARIO 1 - 2007 WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES & ANALYSIS RESULTS**

SCHEMATIC

2216 Traffic, fig 2a

Number: **2a**



LEGEND

490	—	TURNING VOLUMES
255	—	LEVEL OF SERVICE
430	—	DELAY SECOND / VEHICLE
V/C	—	VOLUME / CAPACITY RATIO



PROJECT:

CHLOORKOP x 02 PROPOSED DEVELOPMENT

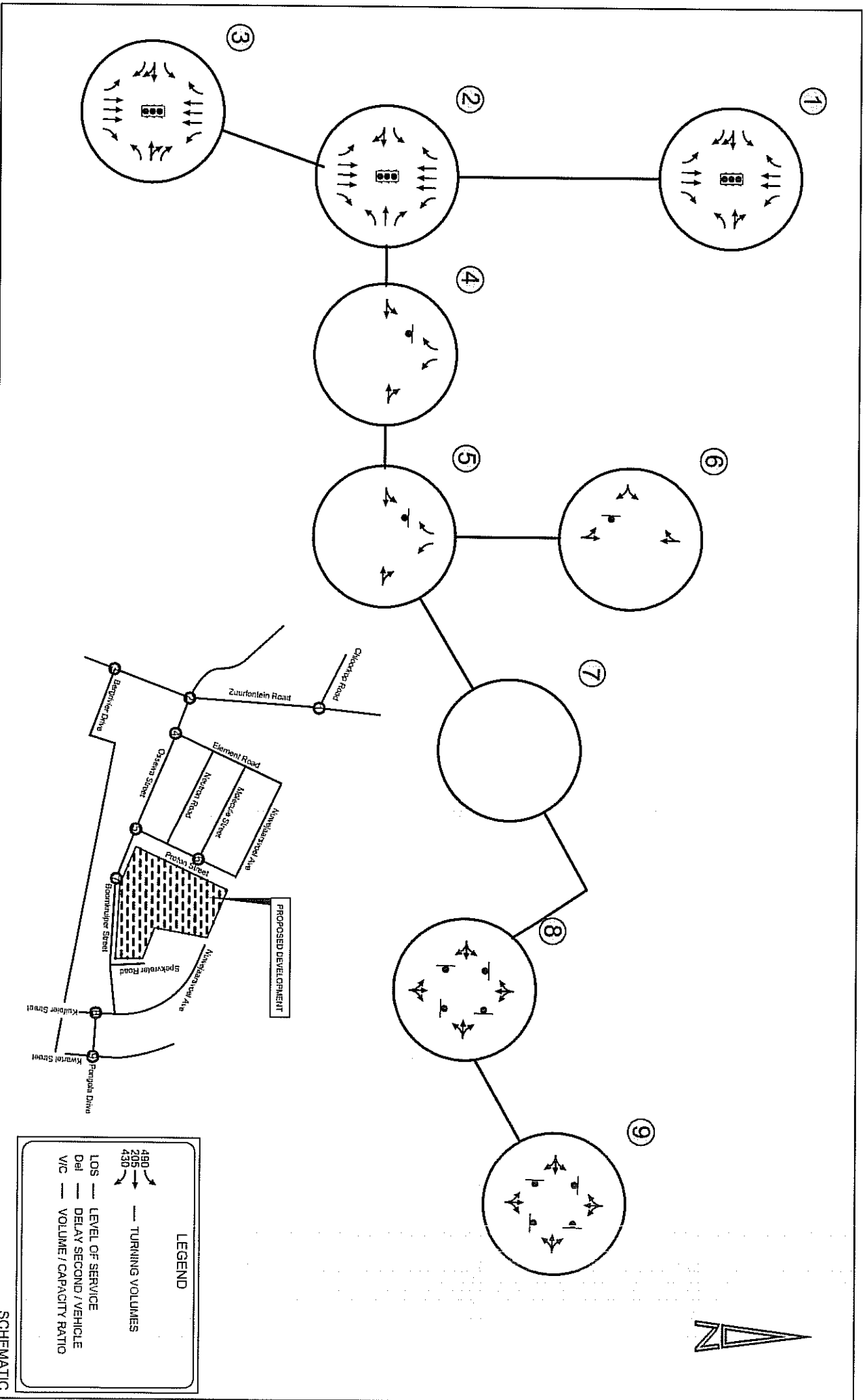
FIGURE:

SCENARIO 1 - 2007 WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES & ANALYSIS RESULTS

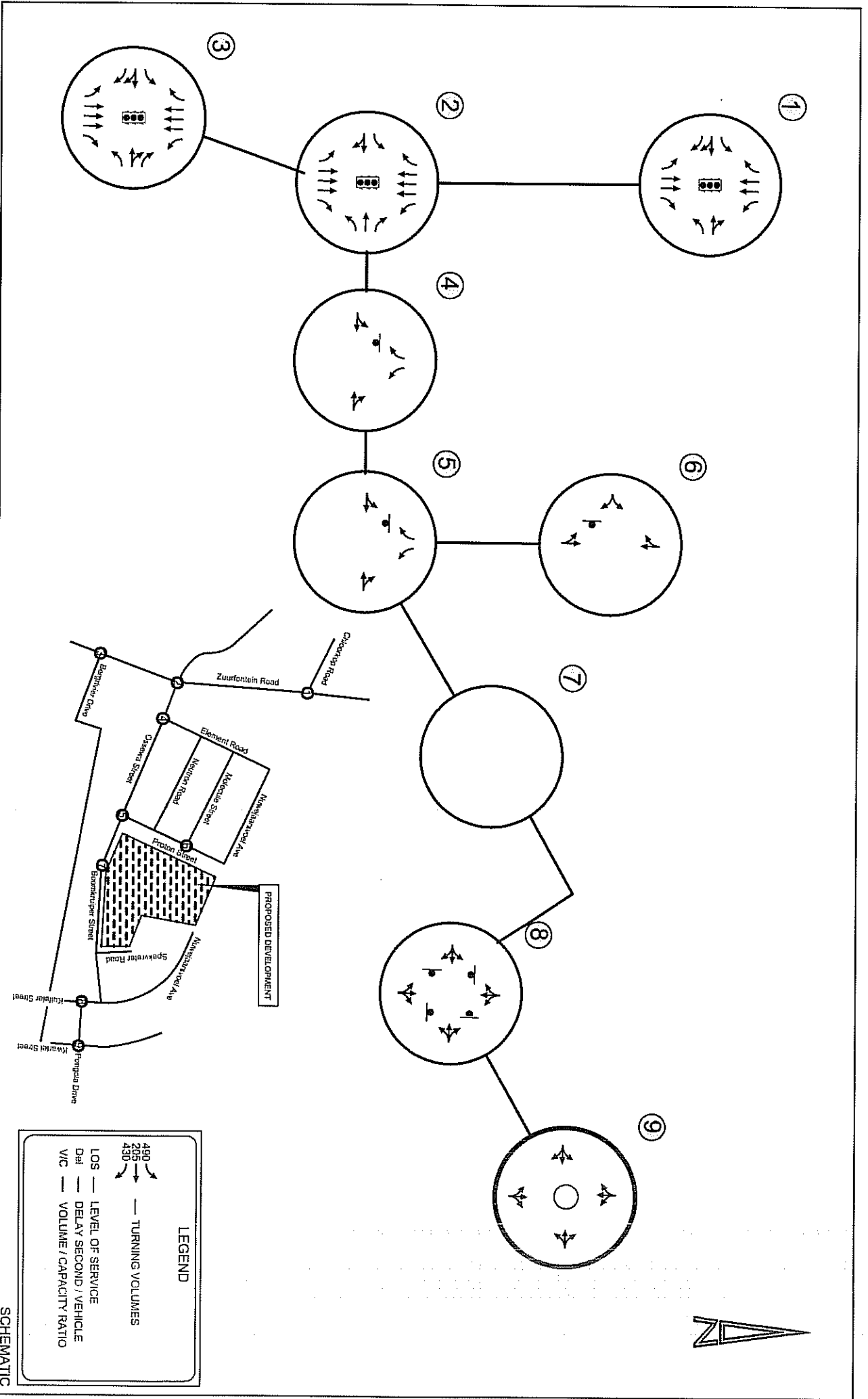
SCHEMATIC
2216 Traffix fig 2b

NUMBER:

2b



LEGEND	
490	TURNING VOLUMES
205	
439	
LOS	LEVEL OF SERVICE
Del	DELAY SECOND / VEHICLE
V/C	VOLUME / CAPACITY RATIO



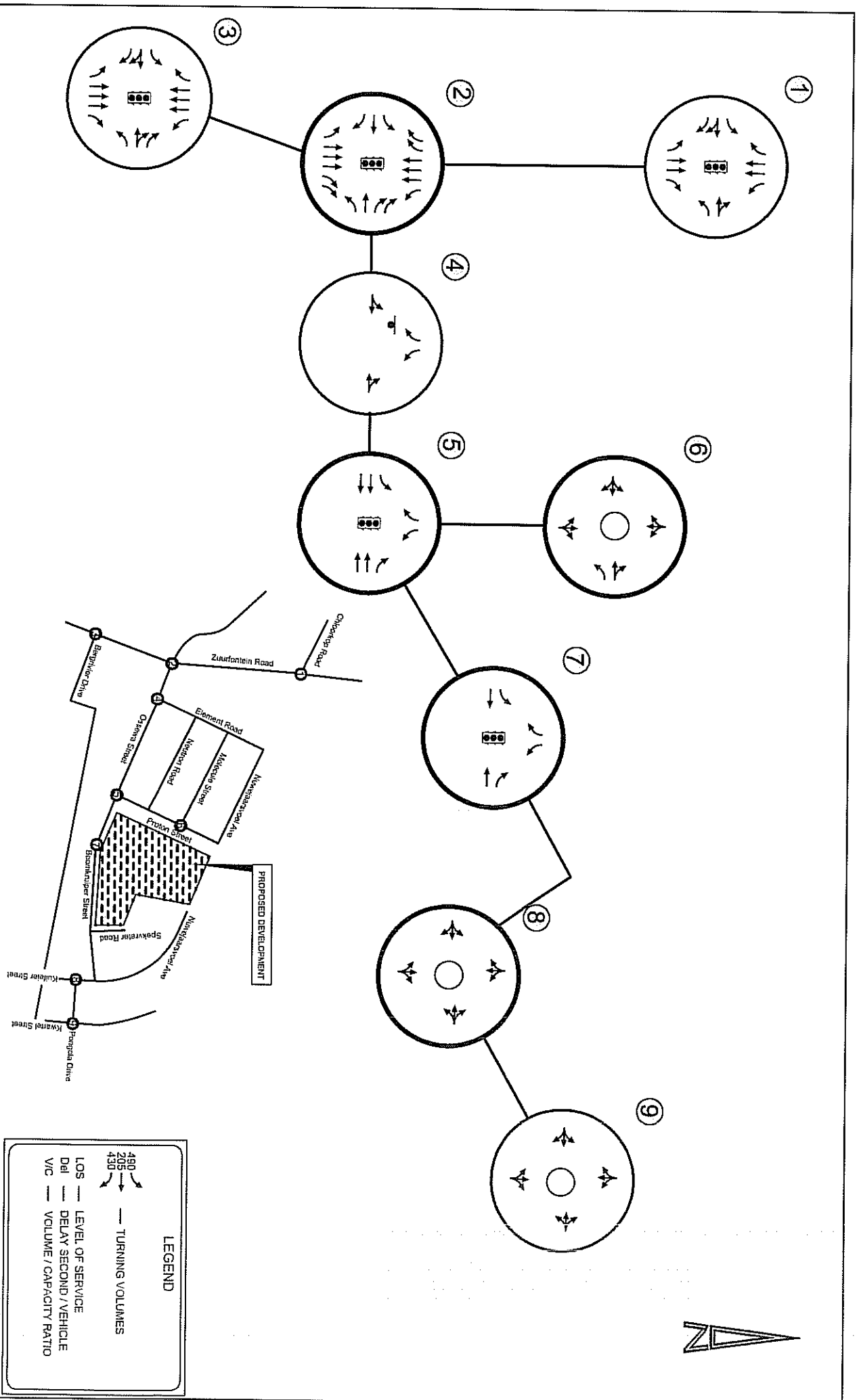
PROJECT:

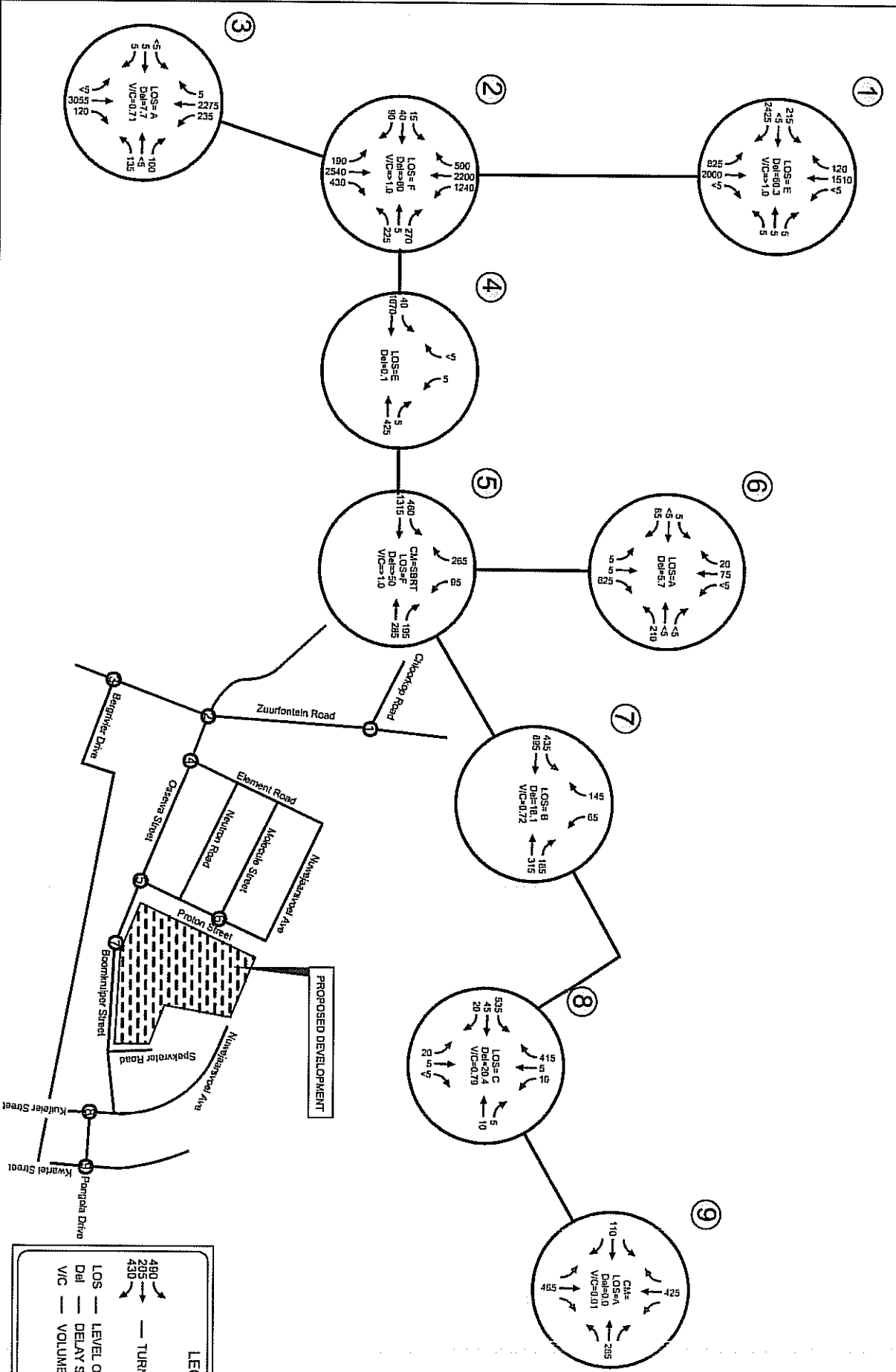
CHLOORKOP X 02 PROPOSED DEVELOPMENT

FIGURE:

SCENARIO 2u - PROPOSED INTERSECTION
GEOMETRY TO ACCOMMODATE SCENARIO 2
TRAFFIC DEMAND

SCHEMATIC
2216 Traffic - fig 4c





LEGEND

480
288
430

LOS — LEVEL OF SERVICE
 DSI — DELAY SECOND / VEHICLE
 V/C — VOLUME / CAPACITY RATIO

— TURNING VOLUMES



PROJECT: CHILOOKOP x 02 PROPOSED DEVELOPMENT

FIGURE: SCENARIO 2 - 2007 WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES INCLUDING PROPOSED DEVELOPMENTS & ANALYSIS RESULTS

SCHEMATIC NUMBER: 2216 Traffic fig 4b 4b

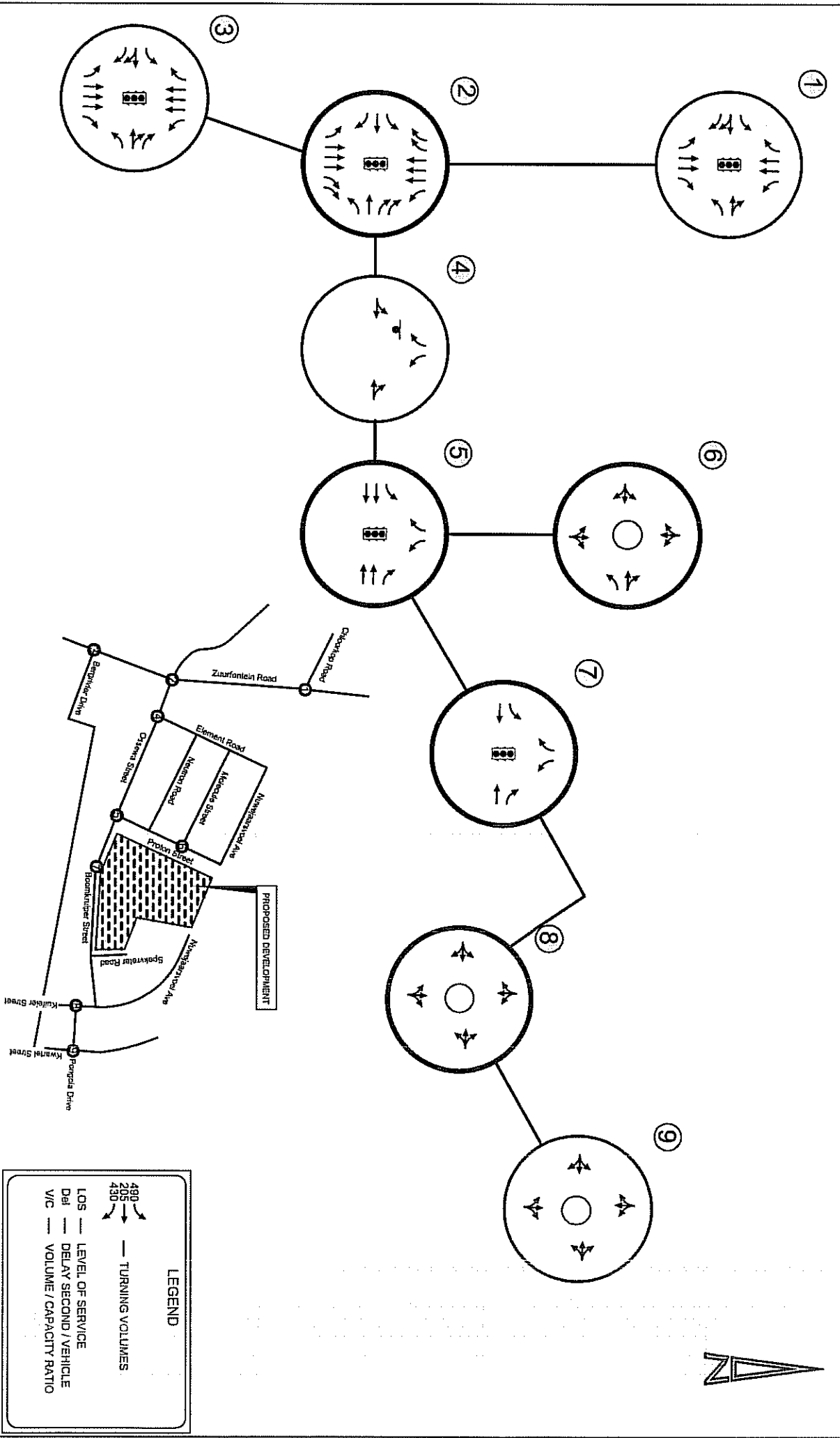
PROJECT:

CHLOORKOP x 02 PROPOSED DEVELOPMENT

FIGURE:

SCENARIO 2u - PROPOSED INTERSECTION
GEOMETRY TO ACCOMMODATE SCENARIO 2
TRAFFIC DEMAND

SCHEMATIC
2216 Traffic_fig 4c



**APPENDIX B
DRAWINGS**