LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
ROADS & TRANSPORT

Travel Demand Management Study

Business Plan: Traffic Signal Update

Mopani District Municipality

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1. Introduction

The Department of Roads and Transport: Limpopo Province has undertaken an overall Travel Demand Management (TDM) Study covering Mopani and Capricorn District Municipalities. This business plan focuses on the Mopani District Municipality. As described in the District Municipality's TDM report, five pilot programmes were listed in which feasible pilot projects could be identified for short-term implementation. The TDM programmes identified for further investigation included the following:

- Maintain a Road Network Management System (RNMS)
- Undertake a Public Transport Demand Study
- Undertake NMT Planning
- ***Undertake a Traffic Signal Study***
- Undertake a Road Safety Study

This document covers the business plan for the implementation of Traffic Signal upgrading in the Mopani District and is also applicable to the various local municipalities that have traffic signal controlled intersections in their respective areas.

The purpose of this business plan is to ensure that all existing traffic signals comply with the legal requirements of the "South African Road Traffic Signs Manual - Volume 3" (SARTSM), in terms of the "South African Road Traffic Act". It should be noted that "all traffic signals installed after 30 June, 2002 shall be displayed substantially in accordance with the requirements of the manual" and all traffic signal installations shall comply fully with these requirements by 31 December, 2010.

This business plan fits into the larger TDM Policy of the District Municipality as well as all the other relevant frameworks and policies.

2. Mopani District

The Mopani District Municipality comprises the following local municipalities:

- Greater Giyani Local Municipality
- Greater Letaba Local Municipality
- Greater Tzaneen Local Municipality
- Ba-Phalaborwa Local Municipality
- Maruleng Local Municipality

This District Municipality is generally rural in nature. Upgrading of traffic signals is only relevant for built-up areas such as Tzaneen, Phalaborwa and Giyani.

3. Need for Upgrading Traffic Signals

3.1 Legal Compliance

In terms of the "South African Road Traffic Act" and related legislation, all traffic signals in South Africa must comply fully with the requirements of Volume 3 of the South African Road Traffic Signs Manual SARTSM). This applies both to the layout of the traffic signals at the intersection and also to the operation of the traffic signals. Compliance with these requirements ensures that the layout and operation of traffic signals are standardized throughout all provinces in South Africa. Non-compliance with the regulations could result in legal action being taken against the relevant authorities in the case of a road accident. In the case of a fatal accident these consequences could be severe.

To allow the various public authorities sufficient time to implement the requirements of the traffic signal legislation, all the required traffic signal upgrades to existing intersections must be completed by 31 December, 2010. Currently only all new traffic signal installations since 30 June, 2002 must comply fully with the requirements of the legislation.

It is therefore important that a study of the existing traffic signal installations in Mopani District should be undertaken as a matter of priority in order to establish the extent of work required to upgrade them to comply with the legal requirements of the National Road traffic Act.

3.2 Traffic Flow

Traffic signals installed at busy intersections alternately allocate time to conflicting traffic movements. When correctly programmed, these traffic signals can significantly improve the efficiency of traffic flow by reducing stops and delays to vehicles using those roads. Conversely, when the traffic signals have inappropriate settings, traffic flows are negatively impacted and unnecessary delays can be incurred. In congested areas, these delays can have significant cost implications both to individual road users and to the economy as a whole. The importance of appropriate traffic signal timing should not be under-estimated.

New development occurs and additional traffic is generated on the existing road network. This results in traffic patterns that change over time. In order to maintain efficient traffic flow on the road network, it is important that the existing traffic signal timing plans should take cognisance of these changing traffic patterns and should be modified to reflect the current situation. It is thus important that traffic signal timing plans should be updated on a regular basis with the frequency of updating based on the rate of development in that particular area.

In the interest of the general economy, it is important that traffic signalized intersections should operate efficiently.

4. Current Situation in Mopani District

The TDM Study identified that there are currently problems with traffic signals at the following locations:

- Giyani;
- Tzaneen.

During a subsequent site visit to Giyani it was established that there are currently two traffic

signal controlled intersections. The traffic signals at the intersection Road R81 and the main access to Giyani were functioning, but the traffic signal layout did not appear to comply fully with the legislation. The other signalized intersection in Giyani was not operational (in flashing mode). It is understood that the upgrading of these two signalized intersections are currently being undertaken by consulting engineers.

The majority of the traffic signals in Tzaneen are currently operating in flashing mode throughout the day. In terms of Volume 3 of the SARTSM, traffic signals are only permitted to operate in flashing mode on a temporary basis (i.e. to indicate when they are out of order). According to the regulations, "The planned operation of traffic signals in flashing mode for part of the day or night, in place of normal traffic signal operations, is not recommended" (Clause 3.6.6). This is an advisable condition, but "although there is a measure of interpretation in applying the condition, a road authority would be well advised to record why it has not conformed, if it chooses not to conform to the recommended action" (Clause 1.5.3(b)). "…..In the advent of legal actions, the failure to adhere to the intention of the Manual as indicated above, could affect the outcome of such legal actions to the detriment of the authority" (Clause 1.5.4.).

Based on the above it is proposed that consideration should be given to updating the traffic signal timing plans in Tzaneen to exclude the flashing mode from the normal traffic signal operation. Existing traffic signal layouts should also be checked for compliance with the legal requirements.

Traffic signal installations in other areas within the Mopani District, such as Phalaborwa, should also be inspected for compliance with the regulations.

5. Proposed Methodology

The process of upgrading traffic signal controlled intersections comprises a series of six inter-related tasks. These include the following:

- Task 1: SARTSM Compliance:
  - Prepare inventory of existing traffic signal controlled intersections;
  - Check location of traffic signal poles;
  - Check traffic signal faces;
  - Check signal phasing sequence;
  - Check clearance intervals;
  - Modify signal layouts (if not compliant);
  - Install new poles and signal heads (where required).
- Task 2: Operational check:
  - Check for traffic delays at intersections;
  - Observe vehicular queues (if present);
  - Observe co-ordination of adjacent traffic signals;
  - Analyse traffic movements;
  - Identify problem intersections.
- Task 3: Data collection (problem intersections):
  - Conduct detailed traffic movement surveys;
  - Survey vehicular queues;
  - Prepare intersection layout drawings (showing lane marking);

  - Analyse data.
- Task 5: Signal timing upgrading:
  - Analyse intersection operation using suitable analytical software;
  - Prepare new optimized traffic signal timing plans;
  - Determine Clearance Intervals;
  - Co-ordinate adjacent traffic signals;
  - Re-configure traffic signal controllers with new timing plans;
  - Commission updated timing plans.
- Task 6: Fine Tune Traffic Signal Plans:
  - Observe operation of signalized intersection;
  - Modify timing plans to optimize traffic movement;
  - Confirm satisfactory operation of system.

6. Professional Team

In order to successfully update traffic signals, it is proposed that the following key position must form part of the professional team:

- A suitably qualified traffic engineer with expertise in the field of traffic signal planning and operation. (The National Road Traffic Regulations require that "A responsible registered PROFESSIONAL ENGINEER or registered PROFESSIONAL TECHNOLOGIST (engineering) of the road authority SHALL approve every traffic signal installation …….and sign a declaration……". This declaration will address issues such as layout drawings, number, type and location of traffic signal faces, phasing, timing plans etc).

7. Timeframe

The timeframe for the upgrading of traffic signals to comply with the legal requirements of the South African Road Traffic Act is highly dependant on the number of traffic signal controlled intersections that are currently compliant with the legislation. Furthermore there is the legal requirement that all traffic signals should fully comply with the law by the end of 2010.

Detailed traffic movement surveys, required for the preparation of traffic signal timing plans, need to be undertaken during periods when traffic flows are normal. These surveys should not be conducted during holiday periods (eg. public holidays or school holidays).

Traffic Signal Compliance	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6			
	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4
Check traffic signal layouts & update (SARTSM comply)																								
Check operation of existing traffic signals																								
Data collection																								
Traffic signal timing upgrade																								
Traffic signal fine tuning																								

Figure 7.1: Project Schedule

8. Budget

It is difficult to give an accurate estimate of the budget that will be required for the upgrading of traffic signals at various intersections in the Mopani District to achieve compliance with the South African Road Traffic Signs Manual (SARTSM). This compliance is a legal requirement. A detailed survey of the existing traffic signal layouts and their current condition will be required in order to determine the extent of the work required. Typically it can be anticipated that an amount of approximately R 100 000 should be set aside for each traffic signal controlled intersection, to upgrade the traffic signals at that intersection to comply with the current legislation. This estimated amount is however highly dependent on the existing situation at that intersection.

9. References

- South African Road Traffic Signs Manual 3rd Edition: Volume 3: Traffic Signal Design, National Department of Transport, Pretoria, 2001.
- National Road Traffic Act 93 of 1996 (and amendments), Government Gazette, Pretoria.