

THE KILLING FIELDS OF GERMISTON

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1. INTRODUCTION

The urban freeways within the Germiston Service Delivery Centre (SDC) area of jurisdiction, now part of the Ekurhuleni Metropolitan area, can be considered our killing fields.

The freeways for which this department has assumed responsibility remain dangerous as they claim lives at regular intervals. It will be recommended that the responsible authorities (The National Department of Transport and the Gauteng Provincial Department), take decisive action to rectify certain deficiencies which may precipitate the occurrence of road accidents, and to minimize delays caused by such accidents and other incidents.

2. THE STUDY AREA

For the purpose of this investigation I have selected the freeway network:

- from the Elands Interchange on the N3 (Southern perimeter);
- to the Linksfield off-ramp (Northern perimeter); and
- from Bruma (Western perimeter); to
- the Edenvale off-ramps on the R24 and N12 (Eastern perimeter).

This area includes three (3) major interchanges of which the Geldenhuys and Gillooly's interchanges are probably the busiest in South Africa in terms of vehicular volumes.

These freeways form a vital link between Johannesburg, the northern and southern suburbs as well as the Johannesburg International Airport.

The freeway network here under discussion consists of multi-lane freeways, steep upward and downward gradients as well as sharp curves.

Vehicular volumes of up to 100 000 vehicles per day is not uncommon.

3. ACCIDENTS

The provincial authority (engineers) responsible for the maintenance of the freeway network here under discussion have indicated at a Traffic Management Group (TMG) – meeting held on 6 December 2001 at Boekenhoutkloof that these roads are probably the safest in the country due to the fact that the accident/volume ratio is low.

I will concentrate on this statement with the objective to motivate an intervention even though the provincial engineers may argue to the contrary.

The Automobile Association's (AA) Annual Report on Accidents cites Germiston to have the highest fatality rate per 100 000 population (52,88), followed by Johannesburg (47,34) and Roodepoort (39,56). We would not have had this bad distinction if there were no problems in our area. A great deal of the Germiston SDC's accident related problems are located on its freeway network. As indicated above, the vast majority of fatal collisions within the Germiston SDC occur within this relatively small area of roadway, albeit a very congested network.

It is however necessary to distinguish between peak and off-peak hours when relating accidents to volume.

The more serious (fatal) accidents tend to take place between 18:00 and 21:00. This indicates that accident risk factors increase exponentially when traffic volumes decrease. The technical problems referred to in Part 5 of this paper may precipitate accident risks related to this increase.

**Table 1:
Summary of Accidents within Germiston area for
a period of 3 years, ie from 1 January 1998 to 31 December 2000**

Summary of Accidents					
Road network	Fatal	Serious	Slight	Damage	Total
Study area	73	131	580	3 646	4 430
All freeways in Germiston SDC	131	254	1 201	6 901	8 487
Urban Roads Germiston SDC	173	875	2 768	22 308	26 124
Total Accidents in Germiston SDC	304	1 129	3 969	29 209	34 611

**Table 2:
Accident Percentages
1 January 1998 to 31 December 2000**

Accident Percentages : Study Area and Other Localities					
Road Network	Fatal	Serious	Slight	Damage	Total
Study area	24.01%	11.60%	14.61%	12.48%	12.80%
Other Localities in Germiston SDC	75.99%	88.40%	85.39%	87.52%	87.20%

Accident Percentages : All Freeways and Other Localities					
Road Network	Fatal	Serious	Slight	Damage	Total
All Freeways in Germiston SDC	43.09%	22.50%	30.26%	23.63%	24.52%
Urban Roads in Germiston SDC	56.91%	77.50%	69.74%	76.37%	75.48%

**Table 3:
Fatal Accidents per Kilometer
1 January 1998 to 31 December 2000**

Fatal Accidents per Kilometer in Germiston			
Road Network	Total Distance	Fatal Accidents	Accident per km
Study area	46.5km	73	0.62km
Urban Roads in Germiston SDC	2 000km	173	11,56km

4. THE PROBLEMS

4.1 EXCESSIVE SPEED

The speed limit on all of these roads is 120km/h. This is the general speed limit on freeways as prescribed in the Road Traffic Act. Law enforcement can only start when a motorist exceeds 132km/h (10% grace allowed). During peak hours, the average speed is much lower due to vehicle volume and densities.

The problem with speed violations is particularly extreme during off peak hours and especially after the afternoon peak. At this time the variance in speed, i.e. the difference between fast moving and slow moving vehicles becomes a major road safety risk.

Research has indicated that the variance in the speed of vehicles on a particular segment of roadway is a measure of the distribution of actual vehicle travel speeds above and below the average travel speed. The higher this figure, the more dispersion there is of speeds, which contributes to the potential for more crashes. Statistical analyses indicate that the variance in speeds, more than the average speed, is linked to safety.

A report, "55: A Decade of Experience", by the Transportation Research Board, pointed out that the frequency with which vehicles are in close proximity with one another, increases as the speed variance increases. For example, greater variance increases closure rates of vehicles, which necessitates more frequent lane changes and passing maneuvers. Intervals between vehicles change more dramatically and frequently. A phenomenon of speed variance is that as the speed of a vehicle increases beyond 10 mph (16km/h) above the average speed on a highway, the risk of it being involved in a crash increases exponentially. At 20 mph (32km/h) above the average, the risk of a crash has been estimated at 11 times greater than at the average travel speed.

An analysis of some states in the USA indicates speed limits on urban interstates vary between 88.5km/h and 112.6km/h. Many of these states have different speed limits for rural and urban interstates. The question that arises is why a similar policy is not applied on our urban freeways.

It is incomprehensible to suggest that a speed limit of 120km/h should apply under the operating conditions which are currently being experienced on our urban freeways. Our drivers are not the best in the world and neither is the condition of our vehicles. An added complexity is the presence of pedestrians on our urban freeways.

Although a proponent of a lower speed limit, based on the 85th percentile, it has to be acknowledged that lowering the speed limit does not guarantee a lower accident rate. The US Department of Transportation study into the “Effects of Raising and Lowering Speed Limits” clearly indicated this aspect.

The report also clearly indicated that there are major fluctuations in the hourly 85th percentile speed over a 24 –hour period.

There are also other indicators that point to increased accident risks when speed limits are raised.

I would therefore argue that the speed limit should be re-determined based on the 85th percentile speed and not the original design parameters or purely because the Road Traffic Act determines the general speed limit on freeways at 120km/h.

The existing differences between maximum speed for the different classes of vehicles, i.e.:

- vehicle exceeding 8 000kg;
- taxis and buses; and
- other vehicles,

should be narrowed as there is evidence that speed variance is a greater contributor to accident risk than speed itself.

“There is strong evidence to suggest that a higher standard deviation of speed in a traffic stream (which indicates higher variation in vehicle speeds) increase the occurrence of crashes” (Garber NJ).

His research also indicated that as speeds increase on (rural) freeways, and flows are less than 400 vehicles per hour per lane, the crash rate increases. These conditions may be used to determine when speed limits should be strictly enforced.

4.2 ALCOHOL ABUSE

The prevalence of alcohol abuse amongst South African motorists is well documented.

Major roadblocks by the Germiston SDC on this road network have revealed an inordinate high alcohol incidence amongst motorists.

4.3 UNROADWORTHY VEHICLES

South Africa’s vehicle population is ageing and this is prevalent when one visibly examines unroadworthy vehicles.

4.4 HEAVY VEHICLES

The steep gradients pose a specific problem for heavy vehicles as their speed drop to as low as 30km/h. This is particularly prevalent on the N12 East from the Hyperama to Wesel Road and on the N3 South from the Van Buuren Road off-ramp towards the Geldenhuis Interchange.

4.5 HAZARDOUS MATERIALS

A large number of vehicles transporting hazardous chemicals use the freeways and travel through densely populated residential areas. The likelihood of a major disaster, which involves hazardous chemicals, looms on the horizon. Decisive action is required to minimize this risk.

4.6 OVERVIEW

The combined effect of all of the above raises the intrinsic risk values/attributes on the urban freeway network to unacceptable levels. Many of the risk factors can be minimized by effective policing practices. This paper however does not deal with the policing aspects of highway safety.

Engineers should not shift the focus of highway safety problems to enforcement agencies. It is accepted that the three (3) "E's" in traffic safety are in sequence:

- Engineering (1st)
- Education (2nd)
- Enforcement (3rd)

Enforcement should be the last option, only after it can be stated categorically that all possible remedies in respect of road (highway) safety and design have been explored and attended to.

The 4th "E" (Evaluation) is critical, as it seems as if the provincial authorities do not regularly evaluate the accident risk and accident numbers. This is important given the emphasis now placed on "Road Safety Audits".

5. TECHNICAL PROBLEMS

5.1 MEDIAN BARRIERS

The absence of median barriers to

- restrict pedestrians from crossing the freeways at certain points (particularly on the R24 in the vicinity of Makro. Fences are regularly cut and even vehicles enter the freeway from Herman Road;
- prevent vehicles from crossing the freeway median right in front of opposing traffic.

I can find no reason why the authorities have not considered and approved the provision of median barriers on the section of freeway from Harper Road Bridge eastward, both on the R24 and N12.

Accidents where motorists have crossed the grassed medians into opposing traffic, claim lives at regular intervals.

The latest fatal accident took place on 28 November 2001. This accident claimed the lives of 2 people with 1 seriously injured and 1 with slight injuries. The cause of this accident was that a motorist lost control of his vehicle and went across the median and collided head-on with two vehicles traveling in the opposite direction.

These medians, when wet offer no traction or roughness and a vehicle out of control will crash into opposing traffic without any possible alternative.

If one considers the fact that the freeways here under discussion have been constructed more than 30 years ago, you cannot but come to a conclusion that:

- the responsible authorities do not have an up to date database in respect of accidents;
- do not have funds to provide barriers; and/or
- do not consider the provision of barriers on this section of the freeway(s) warranted.

The largest part of the urban freeway network between Johannesburg and Pretoria (Ben Schoeman) N3 between the Elands Interchange to the Ben Schoeman have barriers. The absence of median barriers eastward remains a mystery.

Median barriers in all probability will not prevent a vehicle from steering out of control but it will prevent it from crashing into oncoming vehicles where the severity increases exponentially.

Proper erected barriers also have an added positive effect, limiting pedestrians from illegally crossing freeways.

5.2 LIGHTING

The absence of lighting on freeways. Vehicles traveling east on the N12 experience extreme difficulty at the point where the street lights end just before the R24 - N12 split. This is on a part of the freeway with five (5) lanes serving two (2) freeways.

The South African Road Safety Manual (Volume 3) clearly reflects on the provision of road lighting. It states:

“The provision of road lighting, specifically in urban areas, can improve road safety (2) particularly with reference to pedestrians and cyclists.

Road lighting plays an important part in the reduction of night-time accidents.”

The sudden termination of road lighting between the Gillooly’s Interchange in an easterly direction, approximately 3 kilometers from the N12/R24 –split is a cause for serious concern.

This section of freeway has 5 lanes of traffic with a large percentage of lane changing due to the split referred to above. The lane changing is further compounded by the sudden darkness which motorists have to contend with. The human eye requires time to adapt to the dark road conditions and once again, it remains a mystery why the road engineers have never acquired funding to extent the lighting in an easterly direction, at least past the Edenvale Road off-ramps.

Even officers with specialized training report that this section at night requires very attentive and careful driving. For motorists strange to this area, and those with vision deficiencies, this is a potential death trap. Driving conditions deteriorate substantially in inclement weather conditions.

5.3 SPEED LIMIT

The speed limit of 120km/h is too high for the vehicle volumes, density and geographical properties of these roads.

The freeways may have been designed to accommodate a 120km/h speed limit, but this was many years ago. One cannot maintain a speed limit on this network compared to relatively safe freeways outside the urban environment. The speed limit on the metropolitan freeway M2 through Johannesburg has a decreased limit of 80km/h at the critical areas.

Speed surveys were conducted on 17, 18 and 24 January 2002 to ascertain the 85th percentile speed on the different lanes. The following reflects the results:

Table 4: Northern Direction

Direction	Time	Number of Vehicles	85 th Percentile
Lane 1	07:00 – 09:00	132	97.08km/h
	10:00 – 12:00	127	95.45km/h
	16:00 – 18:00	86	97.5km/h
	19:00 – 20:00	40	113km/h
Lane 2	07:00 – 09:00	125	100.55km/h
	10:00 – 12:00	127	100.71km/h
	16:00 – 18:00	100	104.37km/h
	19:00 – 20:00	42	126.66km/h
Lane 3	07:00 – 09:00	110	109.44km/h
	10:00 – 12:00	127	111.81km/h
	16:00 – 18:00	108	110km/h
	19:00 – 20:00	45	122km/h
Lane 4	07:00 – 09:00	105	118.18km/h
	10:00 – 12:00	100	121.66km/h
	16:00 – 18:00	108	121.81km/h
	19:00 – 20:00	46	135km/h

Table 5: Southern Direction

Direction	Time	Number of Vehicles	85 th Percentile
Lane 1	07:00 – 09:00	150	97.77km/h
	10:00 – 12:00	99	92.77km/h
	*16:00 – 17:00	52	88.75km/h
	19:00 – 20:00	48	102.77km/h
Lane 2	07:00 – 09:00	150	100.35km/h
	10:00 – 12:00	94	100.55km/h
	*16:00 – 17:00	51	96.25km/h
	19:00 – 20:00	46	107.5km/h
Lane 3	07:00 – 09:00	133	107.1km/h
	10:00 – 12:00	98	110.83km/h
	*16:00 – 17:00	46	99.5km/h
	19:00 – 20:00	43	112.5km/h
Lane 4	07:00 – 09:00	144	123.2km/h
	10:00 – 12:00	92	117.66km/h
	*16:00 – 17:00	43	110km/h
	19:00 – 20:00	45	135km/h

* Surveys conducted during afternoon peak direction South had to be suspended at 17:00 due to rain.

The speeds recorded indicate the difference between the 85th percentiles on the different lanes. This is probably one of the reasons for the high accident rate.

The question that arises, is whether a lowering of the speed limit will decrease accidents. I am of the opinion that it will be the result. The issue that needs to be addressed is whether this will have any negative consequences. Will there be a public reaction, will it lead to congestion during off-peak hours, etc?

5.4 SIGNAGE

The direction indicators do not always assist motorists, particularly the signs indicating the N12 – R24 split. If one misses the first sign, you encounter major difficulty to change lanes before reaching this split. Many fatal and serious accidents have occurred due to this.

5.5 DRAINAGE SYSTEMS

The water drainage system, especially at the Gillooly's need to be checked regularly, as blocked drains have in the past lead to accidents due to aquaplaning.

5.6 HEAVY VEHICLES

Heavy vehicles are not restricted from using the "fast lane" and often use the fast lane to overtake other slow moving heavy vehicles.

During dusk this poses an extremely serious problem as fast moving motorists cannot identify those vehicles with their taillights melting away in a sea of red lights.

5.7 ROAD MARKINGS

It is necessary that more attention be paid to the maintenance of road markings. More use should be made of retro-reflective road studs and painted lane markings should preferably be replaced with thermo-plastic lane markings. They have better endurance and are more skid resistant.

6. RECOMMENDATIONS

I wish to recommend that the following steps be taken in respect of the freeway network in the affected study area:

1. That the speed limit be reduced to 100km/h until variable speed limits may be introduced by means of electronic signboards.
2. That median barriers be extended to cover the total freeway network here under discussion and preferably further in an easterly direction on the R24 and N12.
3. That heavy vehicles (in excess of 10 ton) be restricted to only two (2) lanes on the N12 East between the R24/N12 split and the Kraft Road off-ramp as well as the N3 South between the Kloof Road off-ramp and the Cydonia Road over-bridge.

4. That more secure fences/barriers be constructed, particularly alongside the R24 (Meadowdale area).
5. That street lighting be extended from Gillooly's to the Johannesburg International Airport on the R24 and the Kraft Road off-ramp on the N12.
6. That an investigation be conducted to ensure that road signs are located at conspicuous locations to ensure that motorists have adequate distance to change lanes.
7. That funds be secured for the above-mentioned recommendations as a matter of extreme urgency.
8. That the Provincial Government establish an up-to-date database of accidents on this network in order to assist with the monitoring of progress made in this respect.
9. That comprehensive road safety audits be conducted at regular intervals by independent consultants to ensure the optimization of all resources.

7. CONCLUSION

A young boy who recently lost his whole family due to an accident has stirred my emotions. We owe it to our fellow citizens to do everything possible to stop the senseless killing on our roads.

I urge you, the responsible road engineers as decision makers to become active partners to make these roads safer.

I have another 10 years before retirement. If nothing is done to stop the carnage the following is likely to happen on this small section of freeways:

- 243 people are going to die;
- 436 people are going to be injured seriously;
- 1 933 people are going to sustain minor injuries; and
- 14 766 accidents are going to take place.

If we can reduce the fatality rate by only 10%, we are going to save 24 lives. For this I am prepared to fight the inactivity of my colleagues, even if it takes more intervention from the media, other pressure groups and politicians.

8. ACKNOWLEDGEMENT

I wish to convey my gratitude to my colleagues working these freeways, for their commitment and assistance in recording details and forwarding them to my office.

To Superintendent H Roets for his assistance in collating and analyzing accident and speed data.

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