Gauteng Freeway Improvement Project GFIP: Current and Future Phases

Road Pavement Forum (November 2011)

Alex van Niekerk

SANRAL

Gauteng Freeway Improvement Project (GFIP)

- First phase of GFIP nearing completion
- Comprised:
  - 201 km upgraded
  - 585 additional lane km's
  - Estimated 2100 lane km's of final surfacing (asphalt/UTFC)
  - 34 interchanges were significantly upgraded
  - 4 new directional ramps (fly - overs)
  - ITS deployment
- GFIP has over 1 million users per day – use will continue to grow
- Was implemented through alternative funding (tolling)

Progress

- N1 almost completed
- N3 between Vosloorus and Geldenhuys – completion December 2011
- N12 between N1 and Reading completed
- N12 between Reading and N3 – completion December 2011
- N12 Gilloolys to Daveyton – Completion during 2012
- R21 – Airport to Hans Strydom completed
- R21 – N12 to Airport – Completion December 2011

Tolling

- SANRAL announced commencement of account registration yesterday
- Approximately 3 months available for account registration
- Tolling to commence in February 2012
- Current debate regarding the implementation and financing models of future phases of the GFIP and other SANRAL toll projects
- DOT will have a road funding conference later this year
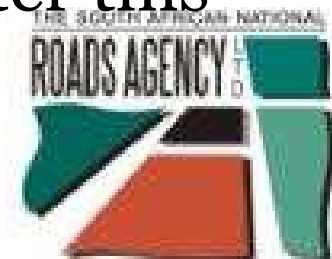
How will we Achieve Sustainable Mobility?

- A number of criteria will determine the ability to achieve sustainable mobility:
  - Integrated planning (land, modes of transport)
  - Cooperation between different spheres of government
  - Cooperation between different government departments and agencies
  - Partnerships between public and private entities

Sustainable Mobility

- Optimisation of infrastructure:
  - Intelligent Transportation Systems (ITS) (Use electronic equipment & communication technologies to optimise capacity)
  - Incident management Systems (early detection and management of incidents)
  - Travel Demand Management (TDM) – reduction in travel demand – trip sharing (HOV/Public Transport), working from home, flexible working hours
- Improved/Expanded public transport
- Sustainable/sufficient funding for infrastructure provision, operations and maintenance (PT, Roads, etc)
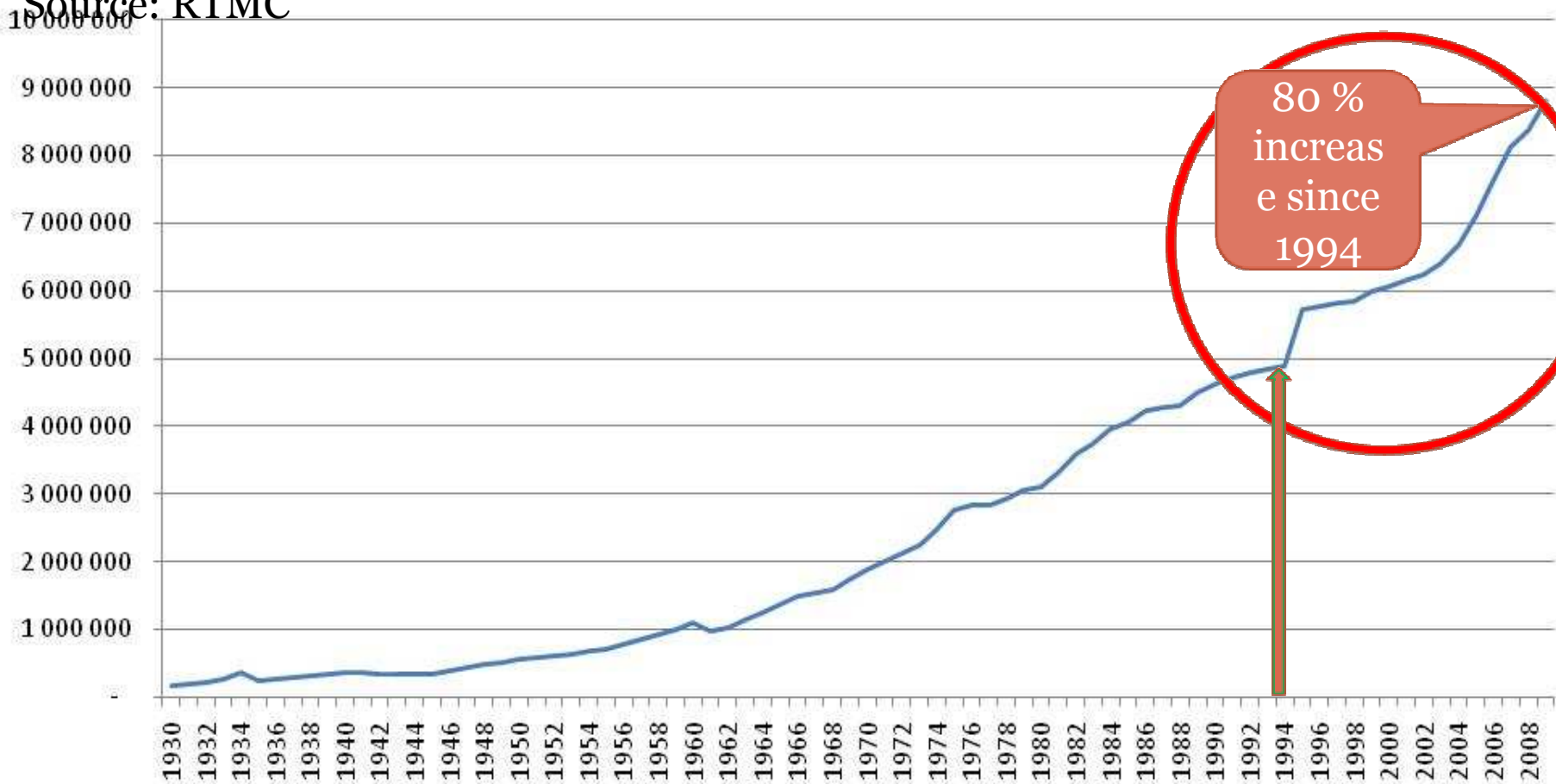
Realities SA/Gauteng

Number of Registered Vehicles

Source: RTMC

Registered Vehicles

- 80 % growth since 1994 – economic empowerment
- Compared to international benchmarks - saturation levels for car ownership not reached
- Household survey in 2003 – average household income at which car is purchased in South Africa - R3000 (2003 Rand)

Traffic Growth

- Average growth in traffic volumes on the N1 between Soweto and N4 (Pretoria) from 2006 to 2011 = 27%
- Growth aligned with traffic modelling predictions – not all new traffic but absorbing demand on supporting road network
- Growth despite recession and PT initiatives

Estimated Number of Road kms

Province	Municipal Urban Roads & Streets	National & Numbered Provincial Roads (N/R)	Prov. Rural Access Roads	Total Roads & Street length
Estimated Length of Road per Road / Street Category - kilometres				
Gauteng	40 917	3 759	10 333	55 009
KwaZulu-Natal	33 237	9 938	54 734	97 909
Western Cape	31 830	10 293	50 057	92 180
Eastern Cape	10 124	10 505	57 855	78 485
Free State	11 484	9 836	90 033	111 353
Mpumalanga	11 471	8 444	36 110	56 025
North West	10 920	9 137	52 556	72 613
Limpopo	10 401	7 936	48 066	66 403
Northern Cape	9 145	12 173	89 877	111 195
RSA	169 530	82 019	489 623	741 172

Source: RTMC

Maintenance Backlog

- SA has extensive road network
- Estimated R149 b maintenance backlog for national and provincial roads alone
- Many other infrastructure maintenance backlogs
- Implementation of new/upgraded infrastructure usually secondary to preservation of current assets

Gauteng Vehicles per 1km

Number of Registered Motorised Vehicles per 1 km road length per Province

Province	GA	KZ	WC	EC	FS	MP	NW	LI	NC	RSA
2000	41	9	11	5	3	6	5	4	1	8
2001	42	9	12	5	3	6	5	4	1	8
2002	43	9	12	5	3	6	5	4	1	8
2003	44	9	12	6	3	7	5	4	1	9
2004	46	10	12	6	3	7	5	4	1	9
2005	49	10	13	6	4	8	5	5	1	10
2006	53	11	14	7	4	8	6	5	1	10
2007	57	12	15	7	4	8	6	6	2	11
2008	59	12	15	7	4	9	6	6	2	11

About 8 times SA average

Source: RTMC

Road Capacity

- Above figure reflects the challenge in Gauteng
- Given the growth in vehicle numbers, road infrastructure did not keep up
- Could not find any info, but expansion of class 1, 2 and 3 roads limited over past 15 years
- Capacity additions mainly as a result of developer contributions

Urban Sprawl

- Low population density in metropolitan areas, compared with international figures
- Distortion in land use development as a result of past political policy
- Urban edge keeps expanding
- Longer distances between home and work is travelled
- More expensive to provide efficient public transport
- Provision of road infrastructure did not keep up with growth in vehicle ownership and urban sprawl
- Average PT trip length in Tshwane 3* London
- Bus and Metrorail subsidies – R7b per annum

Gauteng – Congestion

- The recent commuter pain survey by IBM ranked the emotional and economic toll of commuting in each city into a pain index.

- The daily commute in Johannesburg has been ranked one of the world's worst

- Various economic studies indicated the negative impact of congestion on sustainable economic growth and job creation

Reality Conclusions

- Vehicle ownership will continue to grow – economic empowerment
- If current development patterns is allowed – urban sprawl will continue
- Sprawl results in very high PT operational cost as well as infrastructure provision
- Maintenance backlog on road maintenance
- Can not afford to do nothing
- Requires integrated transport planning and funding to meet demands and sustain economic growth

USA Example

- Historically in the USA - bulk of interstate road network funded through fuel levy

- Estimated maintenance backlog for this network is in excess of $1,3 trillion

- Two national commissions established by the U.S. Congress recommended replacing fuel taxes with a distance based system of user fees

ITS Institute (USA)

- Appointed University of Minnesota
- Report: From Fuel Taxes to Mileage-Based User Fess: Rationale, Technology, and Transitional Issues (August 2011)

Criteria Used

- Evaluated Fuel Levy and MBUF in terms of following Criteria:
  - Efficiency
  - Equity
  - Revenue Adequacy & Sustainability
  - Environmental Sustainability
  - Feasibility
- These criteria provides good framework to evaluate transport infrastructure projects in general

Report Conclusions

- Fuel taxes not sustainable
- MBUF's have a significant advantage over fuel taxes when evaluated under efficiency, equity and revenue adequacy and sustainability criteria
- Fuel taxes outperform MBUF's under administrative feasibility principle
- Recommend the combined use of fuel taxes and MBUF's
- A technology solution is required to address administrative feasibility

Source: University of Minnesota

Report Conclusions

- Technologies considered:
  - On-Board diagnostic unit – all vehicles equipped for mileage monitoring (vehicle class, not route or time of use specific)
  - Cellular – OBU equipped with cellular, give indication of location and time of travel
  - **DSRC – RFID tags, not all roads (vehicle class, route and time of use specific)**
  - E-Vignette – stickers attached indicating vehicle class, time when it can travel, routes it can travel
  - GPS – accurately determine route used, time used, can be linked to vehicle class

Source: University of Minnesota

Future GFIP Phases

- The GFIP and future phases of GFIP will play an important role in order to achieve sustainable mobility in Gauteng

- Future phases should be assessed in terms of achieving government's objectives w.r.t. integrated transport systems, economic growth and job creation
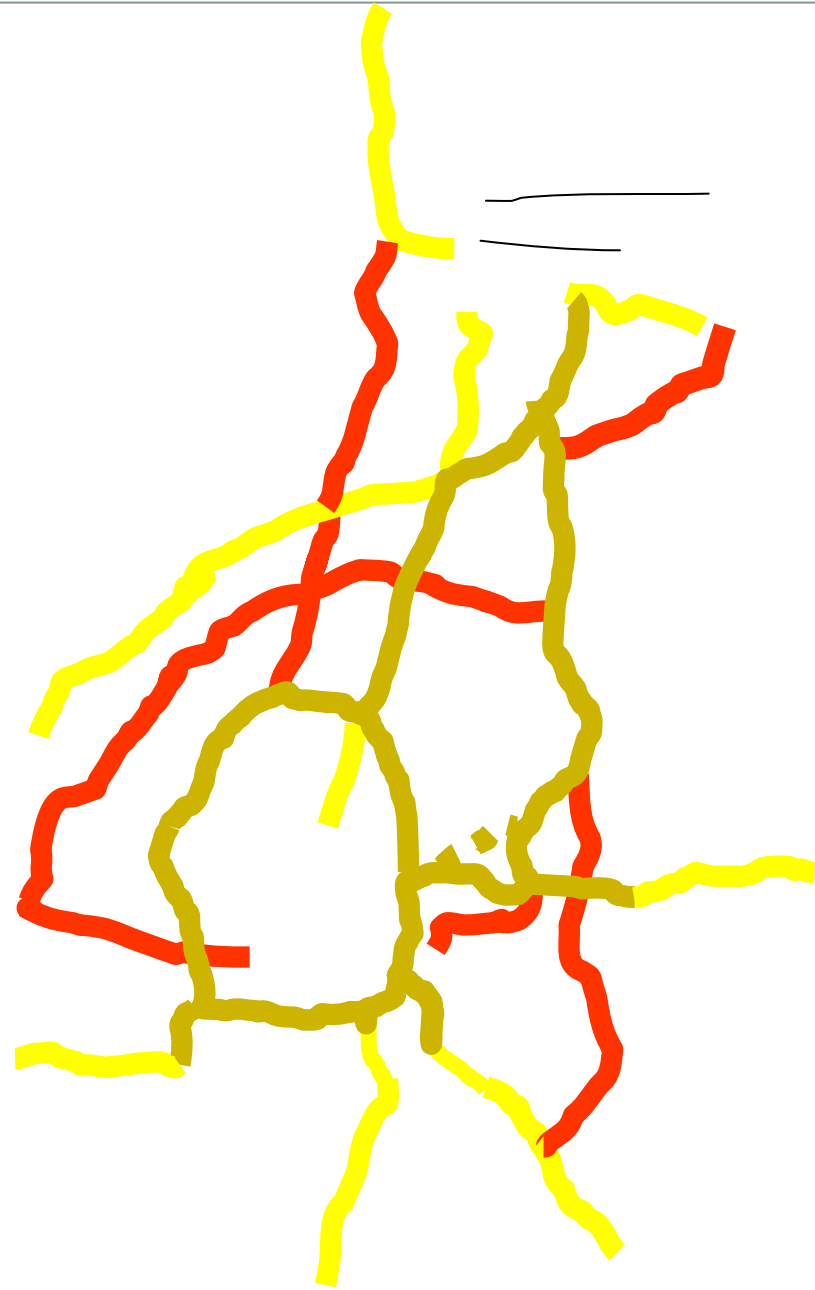
Project Extent:

PLANNED LANE ADDITIONS:
185 km (2010)

FUTURE UPGRADES:
(223 KM)

PLANNED NEW ROUTES:
158 km

Future Deployment Of ETC/ORT

- Using the principle of tolling as a funding mechanism for the future phases of the GFIP will be re-evaluated
- Could be "tested" in terms criteria used for US report by the University of Minnesota

1. Efficiency

- ETC covers the cost imposed by each user on the road system
- As a result of road pricing, use is coming at a cost, resulting in less congestion
- ETC allows for differential pricing, discouraging users to travel inside peak hours
- Road pricing encourage the use of public transport either by mode shift, or the use of public transport at discounted toll tariffs
- New routes inside urban edge – road pricing discourage sprawl

2. Equity

- User pay (Less than 3rd of vehicle population use Gauteng freeways), not cross subsidised
- Users pay in accordance with distance travelled (use)
- Users pay in accordance with consumption of infrastructure – different vehicle classes

3. Revenue Adequacy

- Will be dependant on implementation cost of future phases of GFIP
- Impact of greater fuel efficiency, alternative fuels and new vehicle technologies does not impact on revenue
- Tolling provides a sustainable revenue stream

4. Environmental Sustainability

- In line with principles of using clean energy (not based on fuel sales)

- Encourage a shift outside peak hour use (higher emissions)

- Encourage Travel Demand Management (TDM)

- Open road tolling is environmentally friendly – does not require vehicles to stop

5. Feasibility

- ORT system developed for SANRAL – one of the most advanced systems (full interoperability, central clearing)

- As result of system design, low additional implementation cost, mostly infrastructure and lane equipment

- Increased operational efficiency due to higher transaction volumes

Conclusion

- Future GFIP phases will be required to achieve sustainable mobility
- Further development and improvement of public transport is essential
- GFIP is part of the transport solution for the movement of people
- Is essential for the movement services and goods
- ORT provides a mechanism to implement this infrastructure and also promote the objectives of transport efficiency, equitability and environmental sustainability

Thank You

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