Contents

• South African National Road Agency (SANRAL) Background

• Overview of SANRAL Freeway Management System (FMS)
  – ITS Extent in Gauteng

• Current FMS Focus
  – Gauteng Freeway Improvement Project (GFIP)
    • Traveller Information Strategies
    • Intervention Strategies
    • Control Strategies

• Future Initiatives

• Potential Benefits of ITS

• Traffic Incident Video Extracts
SANRAL Background

• The South African National Roads Agency Ltd (SANRAL) was established in April 1998 by an Act of Parliament as an independent statutory company in line with Government’s commitment to transform the public sector.

• SANRAL’s mandate is to develop and maintain South Africa’s expanding national road network, currently responsible for maintaining 16,150 km.

• Vision: To be recognized as a world leader in the provision of a superior primary road network in southern Africa.

• Mission: To be committed in achieving our vision for the economic benefit of the Southern African community through:
  • a highly motivated and professional team;
  • *state-of-the-art technology*;
  • proficient service providers; and
  • promoting the ‘user pay’ principle

• The implementation of the FMS is therefore aligned with SANRAL’s Mission in providing a transport network through “state of the art technology”.
ITS Background

- All, experience severe traffic congestion on a daily basis on the Freeway Network
  - N1 Freeway in Gauteng carries between 100 000- 180 000 ADT with
  - More than 6000 vph per direction on some sections
  - With peak periods extending to 3hrs
  - Average speeds of 20km/h
    - These factors impact our quality of life
    - Running vehicle costs
    - Stifles economic growth
    - Impacts environment (air quality)
    - Impacts productivity
- Intelligent Transport Systems (ITS) has therefore evolved in response to the challenges faced by road infrastructure implementing authorities in meeting increasing traffic demands
ITS Background cont.

- Historically, road authorities responded in supplying infrastructure in meeting growing these traffic demands

- There’s been a **Shift** in the traditional/conventional approach towards a Network Management and Operational focus with emphasis on **Network Optimization** by effectively utilizing existing capacity

- Internationally referred to as the “**Big Shift**” from a **Road Construction Only focus** to an integrated approach of **Road Network Optimization and Road Construction**

- This Optimization is realized through cost effective and smarter Traffic Management, Traveler Information and Incident Management strategies

- This refocus is consistent in developing sustainable transportation networks, critical to economic success and at the same time being environmentally sensitive
What is Intelligent Transport Systems (ITS):

- Draws upon traffic and transportation engineering principles
- Through the application of technologies of computing information, telecommunications and electronic technology,
- Implementation of procedures and response plans,
- For the **real time management** of vehicles and systems,
- To ensure an **efficient transportation system**
ITS IN GAUTENG

• Sanral implemented the 1st Freeway Management System (FMS) officially launched by Minister of Transport, Hon. Jeff Radebe – October 2006.

• Aim of FMS:
  – Improve Road Safety
  – Manage Traffic Flow
  – Manage Incidents
  – Inform road users with accurate and up-to-date information
  – Co-ordinate traffic operations amongst roleplayers through the application of ITS strategies
ITS network extent: 200 km of freeway network

- N1 Western Bypass from N12 to Buccleuch
- N1 Buccleuch to N4 east Donkerhoek
- N3 South Buccleuch to Heidelberg
- N12 southern bypass from N1 to N3
- N12 east from N3 to Snake Road
- N17 from N3 S to Rondebult Road
- M1 & M2 (JRA)

FMS components comprise of:

- Network Management Centre (NMC)
- Fibre communications backbone
- 220 CCTV cameras
- 60 Variable Message signs (VMS)
- Tactical Signs
- Ramp Metering
- Shoulder Lane Control
- Inductive loops
In addition SANRAL awarded:

- 9 contracts mid 2008 – Phase 1
- value of R11 billion
- to upgrade the Gauteng Freeway Network
- average 30 month construction periods
EXTENT: GFIP

GFIP Phase 1:
185 km

FUTURE UPGRADES:
(223 KM)

PLANNED NEW ROUTES:
158 km

FINAL SCHEME:
561 KM
GFIP IMPROVEMENTS

• Interchange (IC) Upgrades:
  – 7 Systems IC (additional lanes, directional ramps)
  – 21 Access IC (additional bridges, IC configurations)

• In general, freeways will be upgraded to 4 lanes per direction, some sections, up to 6 lanes per direction
  – Auxiliary lanes at on- and off-ramps

  – Cross road improvements

  – Provision of lighting

• Focus on promotion of Public Transport through provision of HOV and integration with other initiatives, i.e BRT and Gautrain

• Implementation of ITS
Persons in our Work Zones are at a high RISK of being killed due to exposure to the construction environment.

Challenge is applying ITS strategies given the environmental constraints to compliment/improve Safety?

Applying ITS strategies to better communicate/inform and calm user fears?
SANRAL FMS FOCUS

Focuses on ITS strategies applicable to the current network environment with specific reference to the construction works. These include implementation of:

1. **ITS TRAVELLER INFORMATION STRATEGIES**
   - VMS, sms, website, e-mail

2. **ITS CONTROL STRATEGIES**
   - Traffic monitoring and active Traffic management

3. **ITS INTERVENING STRATEGIES**
   - Incident management – coordination with traffic and emergency services
   - Speed management and enforcement
What are the GFIP Work zone challenges?

Common and some unique challenges to the Gauteng Freeway Improvement Project (GFIP) include:

1. Managing work zones in highly trafficked conditions
   - Flows in excess of 100,000 - 180,000 ADT

2. Managing work zones in a Dynamic Operating Environment
   - Traffic Accommodation Plans include:
     • Use of barriers reducing access to emergency lanes
     • Reduced/ changing lane configurations/cross-sections
     • Planned/ Unplanned Lane closures
What are the GFIP Work zone challenges cont.?

3. Incident Management
   - Managing emergency access within work zone given space constraints
   - Managing incident impact and the resulting construction and road user delays
     - A stranded vehicle on shoulder reduces freeway capacity by 26%
     - Accident blocking 2 lanes reduces freeway capacity by 79%
   - Managing the number of incidents/ notorious “hotspots” Rigel stretch

4. Compliance/ Non-compliance of road users
   - Compliance to Traffic Accommodation
     - Warning, Regulatory, Guidance info

5. Speed Enforcement
   - Cooperation from Traffic authorities
TRAVELER INFORMATION TOOLS
HOW EFFECTIVE ARE TRAVELER INFORMATION TOOLS?

What Do the Public Notice and Remember?

- Newspaper Articles: 78%
- TV News: 63%
- Freeway Signs: 50%
- Radio Traffic Reports: 42%
- Radio News Reports: 40%
- Word of Mouth: 37%
- Fold-Out Brochures: 32%
- Newspaper Ads: 15%
- Newsletters: 11%
- Billboards: 10%
- One-Page Flyers: 7%
- Banners: 6%
- Radio "Man in the Street": 5%
- Other: 4%
- Public Meetings: 12%

Imperative to identify key modes of information dissemination which yields greatest impact and add value.
ITS TRAVELLER INFORMATION TOOLS: VMS

- A powerful tool to Warn/Alarm/Inform/Regulate/Reroute users
- Through the provision of accurate and up to date traffic conditioning reports to improve traffic flow and to
- Reduce frustration and likelihood to experience resulting delay
- Can be Solar Powered/Power Supply
- Display both Text and Graphics
- Locally or remotely programmed or monitored
- Mobile Trailers can be easily installed

Studies indicate 30 – 90% of Travelers Notice VMS of which 40% change route
ITS TRAVELLER INFORMATION

TOOLS cont.

- **Short Messaging Services (SMS)/ e-mail**
  - Used to disseminate incident related information
    - 40- 50% incident related (stationery, stalled)
    - 60% accident related (multi-vehicle)
    - Slow traffic alerts

- **Media (print media, press releases, advertorials and commercial radio)**
  - Daily updates are disseminated to the media
    - Incident Information
    - Road Work Information
      » Lane closures
      » Blasting Notices
ITS TRAVELLER INFORMATION TOOLS cont. www.i-traffic.co.za

Work Zone Activities are regularly updated and mapped by NMC to indicate:

- Road Construction Activities
  - Lane Closures (partial and long term)
  - Blasting Notices
- Incident information and foreseeable impact (lane closures, expected delays)
- Real time video images (still images and streaming video)
- Future Functionality:
  - Colour coded mapping: Congestion levels - Real-time traffic flow information
  - Expected travel times between different sections on the freeway network
Communications Protocol

**NMC/GFIP: Lane Closure Procedure**

1. NMC shift supervisors for implementation
2. TSO’s communicate to NMC
3. VMS messages displayed
   - Per schedule
4. Regular updates by TSO
5. Confirm when lane closure is lifted
   - Immediate
6. Reset VMS
   - Immediate
INTERVENTION STRATEGIES
ITS INTERVENTION STRATEGIES cont:

Incident Management: CCTV cameras

Accident happens

Traffic flow disrupted

Accident reported to EMS

EMS dispatched

EMS arrives on scene

EMS leaves scene

Traffic flow normalised

Reduce length of Incident Timeline

BENEFITS:

- Immediate Incident Detection
- Prompt Notification to Dispatch Centres
- Enables informed decision-making for Mobilization
- Co-ordinated approach - achieved through collocated agencies
ITS INTERVENTION STRATEGIES: Speed Warning Signs

- Warns motorists of speeding once a preset speed threshold is exceeded
- Effective if used in conjunction with traffic enforcement
- Solar Powered
CONTROL STRATEGIES
ITS CONTROL STRATEGIES: Shoulder Lane Control (SLC)

Aim: Utilization of existing shoulder to provide additional road capacity with the system flexibility to manage operations warranted by specific traffic conditions

APPLICATION BENEFIT IN WORK ZONES:

- Reduces impact of lane closures
- Reduces incident impact
- Reduces traffic accommodation impact during congested conditions
ITS CONTROL STRATEGIES: Ramp Metering

• Aim: Achieve optimal utilization of the freeway network through breaking up of platooning effect of on-ramp merging with mainline flow.

• Implemented at 4 on-ramps:
  – Rooihuiskraal SB
  – Samrand SB
  – New Road SB &NB

• APPLICATION BENEFIT:
  – Measured- Reduced travel time 17- 28%
FUTURE INITIATIVES

• Deployment of CCTV cameras utilizing cellular-based communication systems

• Traveler Information Tools
  – Implementation of dedicated Traffic Information Number

  – Traffic Management Strategy
    • Short Term: Partner with providers utilizing in-vehicle tracking systems to determine speed conditions
    • Medium Term:
      – Capitalizing on future ORT/ITS synergies
        » Utilizing ORT technologies for Speed, Volume, Occupancy, Segment Speed/Travel Time data
      – Utilizing Cell phone probe based technologies
      – Network Role out of Ramp Metering
      – Deployment of SLC
FUTURE INITIATIVES cont.

Improving INCIDENT MANAGEMENT:
- Deployment of Incident Response and Incident Recovery Services

Improving ENFORCEMENT MANAGEMENT
- Deployment of dedicated freeway enforcement unit
  - Strategy includes implementation of 10 satellite service centres distributed along network
  - Partnering with Public/Private agents
FUTURE INITIATIVES cont.

Services will be managed by the NMC utilizing:
- Computer Aided dispatch (CAD) for emergency and enforcement vehicles
- Automated Vehicle Identification (AVI)
- Automated Vehicle Location (AVL)
- To effectively manage roadway and provide a safer and efficient network
ITS BENEFITS

• Provides users with pre-trip and en-route planning options

• Informs and increases awareness of impending traffic conditions/ impact of work zone activities

• Highly visible applications, ensures immediate, up-to-date and accurate messaging to road users

• Reduces driver frustration

• Increases road user compliance

• Enhances Safety through work zone

• Reduces potential for secondary incidents

• Reduces exposure of on-scene workers, responders and all road users
Optimal ITS benefits are dependant on the application and/or a combination of applications, the environment and the intensity of strategies. It therefore requires ongoing evaluation and monitoring to implement improved strategies.

**CCTV**
- Can reduce response times to incidents by up to 55% if combined with IMS

**Web-based pre-trip planning**
- Reduce travel time by 5-10% for travellers with the service

**VMS (Variable Messaging System)**
- VMS could lead to a 3 per cent decrease in accidents if combined with IMS
- Can reduce delay by up to 20 per cent when combined with ramp metering

**Shoulder Lane Control**
- Measured: Provided additional capacity of 1700vph
- Combined with a Speed Harmonisation Prog.- can decrease travel times up to 3 mins
- Can increase capacity up to 7- 22%

**Ramp Metering**
- Reduce accidents up to 20%
- 5-10% decrease in travel time
CONCLUSION

• Cost of congestion is too great to ignore

• ITS is a cost effective way to help optimize existing road infrastructure in order to reduce congestion, increase safety and provide more information to travellers

• ITS is an effective tool in addressing both recurrent and non-recurrent congestion but has it’s limitations

• ITS should therefore not be seen as the panacea in addressing capacity and congestion

• The construction of additional road space is therefore still required to address growing traffic demands

• As expected, a combination of both addresses user needs and achieves optimal network conditions.
INCIDENT VIDEO EXTRACTS

Intention is not to sensationalize these incidents but to highlight:

– Need for active Speed Management and Traffic Enforcement

– Need for co-ordinated Incident Management

– Realise benefits of visuals which can be used during debriefing sessions- lessons learnt
Thank You