Using Technology to understand and address Road Safety on Cape Town's Freeways

10 August 2016, by Randall Cable Pr. Eng
Contents

• **Road Safety**
  – Role of Infrastructure and Technology

• **Cape Town Freeway Management System**
  – Understanding the Road Safety Challenges
  – Evolving Function - Assisting Law Enforcement
National Road Network

• The +/- 22 000 km represents only 2.9% of the 750 000 km of RSA network
  – but carries 33,1% of all traffic, and
  – more than 70% of all long distance road freight.
National Road Network

• Continue to invest in our national asset
  – 2010/11 to 2015/16, SANRAL awarded >1000 contracts worth R76.7 billion for new works, rehabilitation and improvement, and various maintenance cycles
National Road Network

• Massive Infrastructure Investment
• Recognised Role of Infrastructure in Road Safety
• UN Decade of Action : Global Plan
  —Safe Systems Approach
Safe Systems Approach

- Despite all efforts to prevent crashes, road users will remain fallible and crashes will occur.
- Safe System approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury.
- It stresses that those involved in the design of the road transport system need to accept and share responsibility for the safety of the system, and those that use the system need to accept responsibility for complying with the rules and constraints of the system.
Safe Systems Approach

Role of System Designers

• Rules and Constraints
  – Human Error versus Human Fault
  – Compliant Society
  – Road Safety Competes on a Hierarchy of Social Needs

• What is the reality?

• Infrastructure supporting better road user compliance
“Conventional Road Safety Engineering Thinking”

- Road Environment Factors: 34%
- Human Factors: 93%
- Vehicle Factors: 13%
Important Role of Infrastructure

% of Fatalities Prevented Through Infrastructure Upgrades For Various Types of Crashes

Types of Crashes

- Pedestrians travelling along major roads: 92%
- Pedestrians crossing major roads: 49%
- Bicycles: 52%
- Run-off Road: 61%
- Head-on: 46%
- At intersections: 21%

Based on 7 country analysis of iRAP results covering approximately 60,000 km of road
Need for better understanding of pedestrian behaviour on freeways
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions

Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions

Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Interventions
Engineering / Infrastructure
Technology Complementing Infrastructure

• Freeway Management System (FMS)

• Background
  • Shift towards Network Management and Operations
  • Technology to Optimize use of the Network
    • Intelligent Transportation Systems (ITS)
    • Freeway Management System (FMS)
How does FMS works?

Real-time traffic data CCTV Surveillance

Information Dissemination
(www.i-traffic.co.za)
@CapeTownFreeway

Information is processed
FMS Operations Centre 24/7
Cape Town FMS Operations in Transport Management Centre (Goodwood)
TMC, Emergency Services
(SAPS, Metro Police, Traffic Services)
Traffic Signal Control
Coverage of the CT FMS
Overview of the CT FMS

Cape Town FMS

155 km
Welcome to the i-TRAFFIC and travel website. Check back often as the pages are updated frequently. Click on a region below to find incident alerts, construction updates, CCTV camera images and more travel information. Please provide feedback on our new site. See what’s coming soon.
www.i-traffic.co.za
Benefits of FMS

Reduce length of Incident Timeline

Crash happens --- Traffic flow disrupted
Crash reported
Emergency Services dispatched
Arrive on scene
Leave scene
Traffic flow back to normal

Life Death
Minimise Road User Costs

Incident Timeline
Data Benefits

• Benchmarking and Improving on Incident Management Systems
  – E.g. Accurate Measurement of Response Times for Emergency Vehicles
  – Accurate and comprehensive data collection
  – Video Archives useful Training Material, Legal, etc
Freeway Heavy Vehicle Crashes
June 2010 to June 2016

**NUMBER OF TRUCK CRASHES PER DAY OF THE WEEK**

**NUMBER OF TRUCK CRASHES PER HOUR OF THE DAY**
Freeway Heavy Vehicle Crashes
June 2010 to June 2016

Roadside recovery
- Radius, camber and Super-elevation
  - Case 1
  - Case 2

Road User #1
Road User #2

Intersection Control
- Case 1
- Case 2

Roadworthiness
- Case 1

Driver behaviour
- Angle 1
- Angle 2

Legend
- Truck Crash Road
Freeway Bus Crashes
June 2010 to June 2016

NUMBER OF BUS CRASHES PER DAY OF THE WEEK

NUMBER OF BUS CRASHES PER HOUR OF THE DAY
Freeway Bus Crashes
June 2010 to June 2016

Legend
- Bus Crash
- Road
## Pedestrian Crash Data

Total Crashes for Period 1 May 2010 to June 2016

<table>
<thead>
<tr>
<th></th>
<th>Vehicle Crashes</th>
<th>Pedestrian Collisions</th>
<th>Total</th>
<th>% Pedestrian fatalities of total</th>
</tr>
</thead>
<tbody>
<tr>
<td># Crashes</td>
<td>12 303</td>
<td>641</td>
<td>12 944</td>
<td>5,0%</td>
</tr>
<tr>
<td>Confirmed fatalities</td>
<td>324</td>
<td>250</td>
<td>574</td>
<td>44%</td>
</tr>
<tr>
<td>Percentage</td>
<td>2,6%</td>
<td>39,0%</td>
<td>4,5%</td>
<td></td>
</tr>
</tbody>
</table>
Pedestrian Crash Data

No. of Pedestrian Crashes per Month
(May 2010 to June 2016)
Pedestrian Crash Data

Number of Pedestrian Crashes per Year

- 2011: 55 (15 Fatal, 40 Non-Fatal)
- 2012: 99 (43Fatal, 56 Non-Fatal)
- 2013: 127 (52 Fatal, 75 Non-Fatal)
- 2014: 124 (46 Fatal, 78 Non-Fatal)
- 2015: 148 (56 Fatal, 92 Non-Fatal)
- 2016: 68 (28 Fatal, 40 Non-Fatal)

Legend:
- Blue: Ped Crash Not Fatal
- Orange: Confirmed On-scene Fatalities

Note: '2016' represents January to June 2016
Pedestrian Freeway Count

Crossings: Pedestrian Bridges versus At-grade
Interventions
Infrastructure Monitoring

- Monitor Pedestrian Activity Using Analytics
Interventions
Infrastructure Monitoring

• Monitor Pedestrian Infrastructure
  • Theft and Vandalism
Interventions
Infrastructure Monitoring

• Monitor Pedestrian Infrastructure
• Pedestrian Bridge Surveillance
Interventions
Infrastructure Monitoring

• Road Safety Campaigns
• Planning Road Safety Law Enforcement/Education
ASOD – ANPR
(Partnership with WCG)

• Speed Enforcement
(Collaboration with Law Enforcement)
  – Engineering Technology Working with Traffic Law Enforcement:
  – Average Speed Over Distance (ASOD)

\[ \begin{align*}
  \text{Passing A } @ & \text{ 12:00:00} \\
  \text{Fixed Distance} & \\
  \text{Passing B } @ & \text{ 12:30:12}
\end{align*} \]
Reduction in speeding on SLP

N2 Speed Exceeding 90km/h in Sir Lowry's Pass

ASOD Implementation
FMS and ASOD (ANPR) Partnership
ASOD - ANPR
Concluding Remarks

• Road Safety is one of the major challenges facing South Africa
• Infrastructure and technology plays a major role in supporting Law Enforcement
• Continue to share our knowledge and experiences and work together – all about partnerships......
• Fully support the Fleetwatch: Brake and Tyre Watch initiative.
Thank You For Your Attention!
Enjoy the course!
cabler@nra.co.za