




**SESSION 2.7 TECHNOLOGY AND USEFUL RESOURCES**

CONDUCTING ROAD SAFETY AUDITS & APPRAISALS
PRESENTED BY: RTS & AGTTC
6 – 7 June 2023



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**CONTENT**



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Content

1. Role of Technology in Road Safety
2. Available Technology
3. Application of Technology
4. Useful Resources

TECHNOLOGY AND USEFUL RESOURCES





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ROLE OF TECHNOLOGY IN ROAD SAFETY

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Role of Technology in Road Safety

How can technology contribute to the road safety audit process

- Capture status of road environment at a specific point in time.
- Ability to log information about large networks
- Database of road infrastructure/ furniture /crash data
- Scan networks for road safety hotspots



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Role of Technology in Road Safety

Risks of technology

- Only a snapshot in time
- Quality - garbage in – garbage out
- Reliability and calibration of algorithms
- Can be time consuming
- Information overload - not all data is equal

Incorrect application of technology - will probably have the same fatal result as texting and driving.



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Role of Technology in Road Safety

Warning

The is no substitute for an experienced Road Safety Engineer

Sophisticated systems will only identify potential hotspots – it still has to be confirmed.

The value of site visit(s) shall not be under estimated.









ROAD SAFETY AUDIT REPORT CONTENT AND STRUCTURE

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AVAILABLE TECHNOLOGY

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The Available Technology – the Basics



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The Available Technology – Dashcam sample video



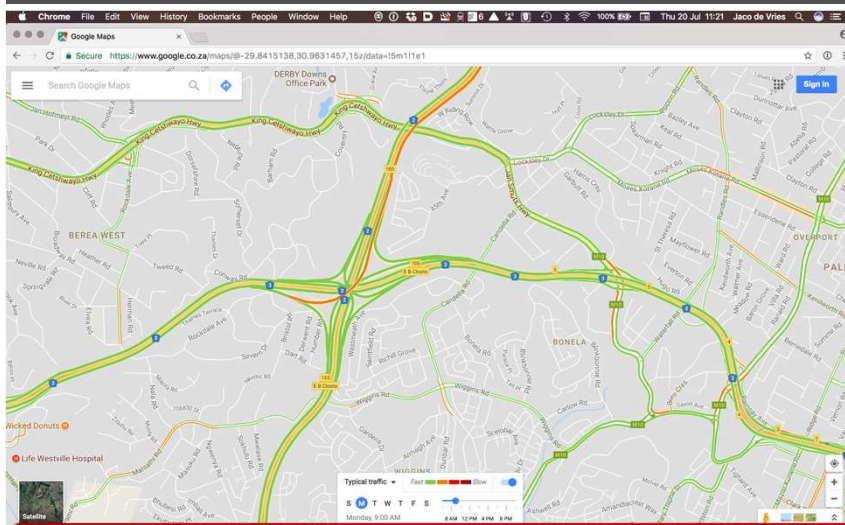
Video captured on site using a commercially available dashcam



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The Available Technology - Available internet resources



Google Traffic – provides general sense of flow and congestion



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The Available Technology - Available internet resources



Google Streetview – useful, often out of date. Audits cannot be done online!



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APPLICATION OF TECHNOLOGY

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Application of Technology– SANRAL NetSafe®

• **NetSafe®**

- Identify and prioritize locations where road safety improvements and/or interventions are likely to be most effective
- Locations for further investigations
 - Further safety investigations must be undertaken at a particular site in order to:
 - To identify appropriate safety improvements
 - Cost efficiency of safety improvements
 - Other remedial measures such as Road safety education and awareness, and traffic law enforcement, that could compliment engineering/infrastructure interventions

Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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TECHNOLOGY AND USEFUL RESOURCES

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NetSafe®



Risk Index

$$R_i = R_L + \frac{\sum R_p}{\Delta L}$$

- Where:
- R_i = Risk index per km road length
- R_L = Risk index related to length-based factors (per km)
- R_p = Risk Index related to point-based factors (e.g. intersections)
- ΔL = Length of section road (e.g. 10 m)

Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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NetSafe®



$$R_L = F_S \times R_{LO} \times F_{1L} \times F_{2L} \dots$$

- Where:
- R_L = Risk index related to length based factors
- F_S = Adjustment factor for accident severity
- R_{LO} = Baseline risk index per km road length
- F_{1L}, F_{2L} = Length based accident factors

$$R_p = F_S \times R_{PO} \times F_{1P} \times F_{2P} \dots$$

Where:

- R_p = Risk index related to point based factors
- F_S = Adjustment factor for accident severity
- R_{PO} = Baseline risk index per point
- F_{1P}, F_{2P} = Point based accident factors

Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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Application of Technology– SANRAL NetSafe®

NetSafe®



• Video Data Collection



Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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Application of Technology– SANRAL NetSafe®

NetSafe®

Clip slide

SECTION 1 (MAP 1, flat section)												
Chainage	Length	Speed	Gradient	Curve	Land Use	Verge	Guardrail	No of lanes	Shoulder	Barrier Line	Factor	Normalised
76152	5	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.00	0.00
76432	80	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.05	0.05
76432	80	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.05	0.05
76502	120	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.11	0.11
76513	159	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.17	0.17
76634	79	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.07	0.07
76604	30	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.03	0.03
76634	70	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.06	0.06
76684	70	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.06	0.06
76645	319	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.28	0.28
76709	240	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.23	0.23
76719	189	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.15	0.15
74886	149	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.14	0.14
74848	140	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.13	0.13
74717	129	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.14	0.14
74857	80	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.07	0.07
74507	150	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.16	0.16
74276	120	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.16	0.16
74208	189	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.21	0.21
74179	30	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.04	0.04
74149	30	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.04	0.04
73870	179	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.22	0.22
73880	80	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.09	0.09
73751	189	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.21	0.21
72680	20	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.02	0.02
72471	210	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.17	0.17
72732	738	1.00	1.00	1.00	1.00	0.87	1.00	1.00	1.00	1.00	0.59	0.59
72543	189	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.17	0.17
72473	70	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.05	0.05
72204	269	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.24	0.24
71696	558	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.48	0.48
71576	120	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.11	0.11
71507	70	1.00	1.00	1.13	1.00	0.87	1.00	1.00	1.00	1.00	0.06	0.06
71407	0	1.00	1.00	1.13	1.00	0.87	0.87	0.75	1.00	1.00	0.00	0.00

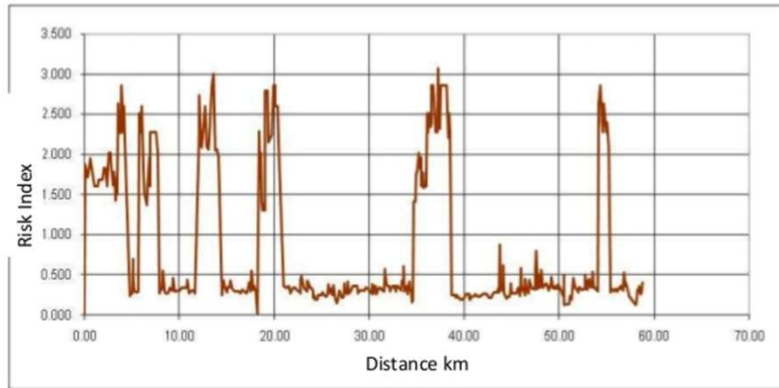
Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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Netsafe Results



Source: Randall Cable PrEng, SANRAL, Road Safety Tools for Authorities, SATC 2016



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Application of Technology– SANRAL NetSafe®

Identifies Hazardous Locations by analysing

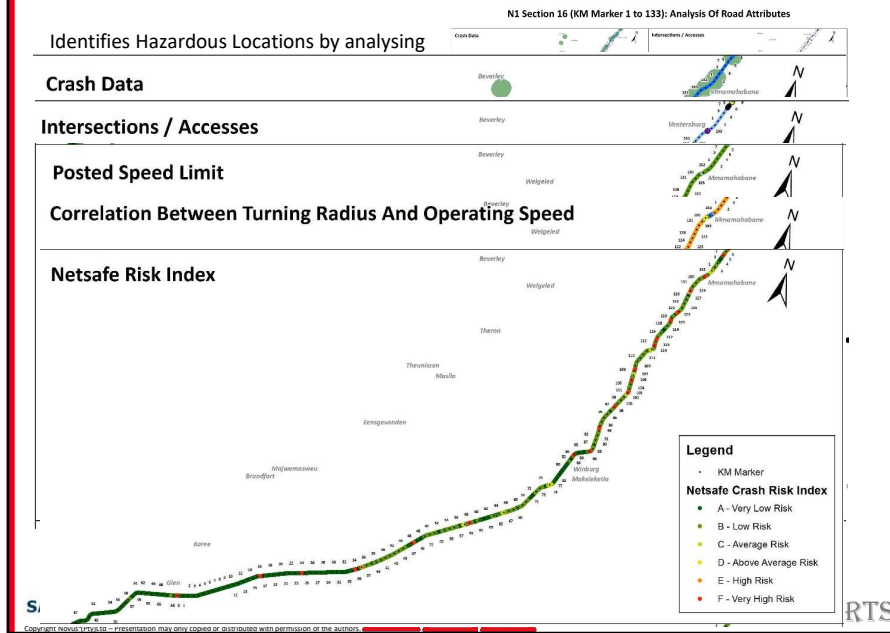
Crash Data

Intersections / Accesses

Posted Speed Limit

Correlation Between Turning Radius And Operating Speed

Netsafe Risk Index

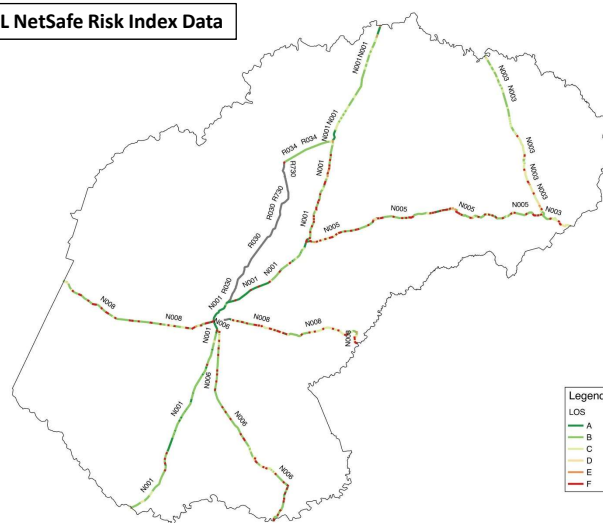


TECHNOLOGY AND USEFUL RESOURCES

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Application of Technology– SANRAL NetSafe®

SANRAL NetSafe Risk Index Data

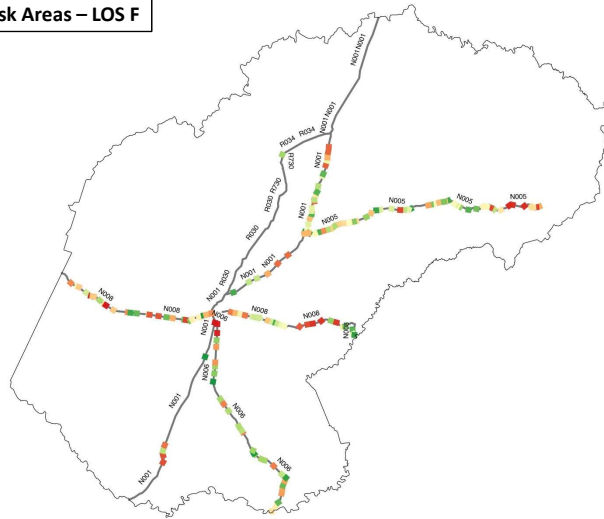


TECHNOLOGY AND USEFUL RESOURCES

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Application of Technology– SANRAL NetSafe®

High Risk Areas – LOS F

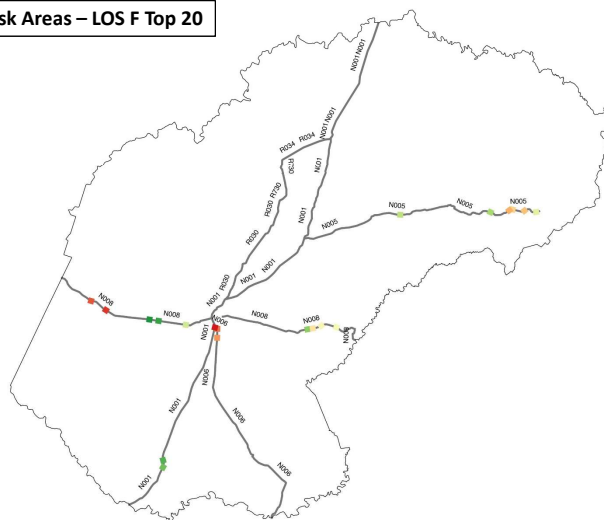


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Application of Technology– SANRAL NetSafe®

High Risk Areas – LOS F Top 20



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TECHNOLOGY AND USEFUL RESOURCES

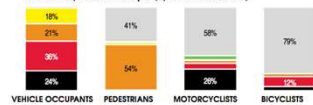
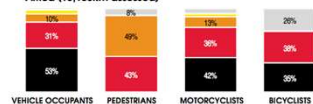
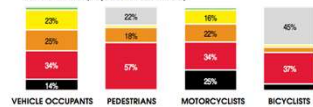
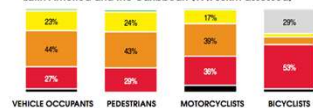


Inspections are especially useful when crash data is unavailable or unreliable.




AGTTC NOVUS³ RTS

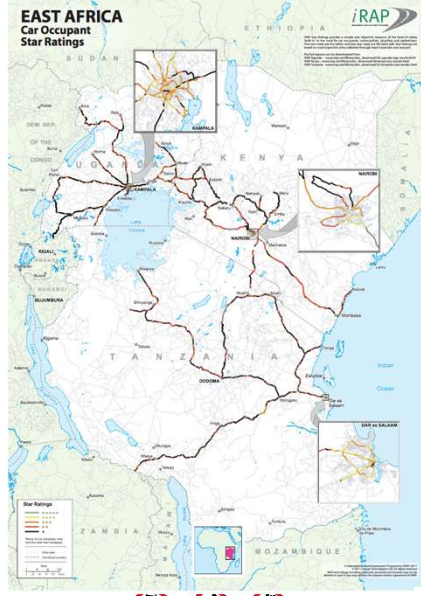
TECHNOLOGY AND USEFUL RESOURCES


AGTTC NOVUS[®] RTS


Application of Technology – iRAP




EAST AFRICA Car Occupant Star Ratings







TECHNOLOGY AND USEFUL RESOURCES



USEFUL RESOURCES

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Useful resources – ITE Vision Zero Toolbox

ite A Community of Transportation Professionals

www.ite.org/visionzero/toolbox/default.aspx

Vision Zero

Safety Resources Toolbox

GENERAL DESCRIPTION

The Safety Resources Toolbox is a collection of practice-ready resources intended to aid transportation professionals in managing their own safety planning and programming. These resources are all digitally accessible, and are curated from various organizations in the transportation profession in addition to ITE. Such items include technical reports, data analysis tools, on-demand webinars, and numerous other resources focused not just on Vision Zero, but also general safety improvement and countermeasure implementation.

This Toolbox is a dynamic resource, and will be updated regularly with new topics, resource links, and functionalities.

USAGE INSTRUCTIONS

To obtain a more tailored listing of safety resources for the intersection of interest, answer one or

A collection of practice-ready resources intended to aid transportation professionals in managing their own safety planning and programming.

<http://www.ite.org/visionzero/toolbox/>

Home

- ITE Vision Zero Task Force
- Vision Zero at the ITE Annual Meeting
- Vision Zero On-Demand Resources
- Vision Zero Upcoming Events
- Vision Zero Video Analytics
- Related Safety Links
- Contact Us

Safety Resources Toolbox

SARF **SANRAL** **AGITC** **NOVUS** **RTS**

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Useful resources – ITE Vision Zero Toolbox

ite A Community of Transportation Professionals

What is the mode of travel?

- ☐ CYCLING
- ☐ DRIVING
- ☐ GOODS TRANSPORTATION
- ☐ MOTORCYCLING
- ☒ WALKING
- ☐ OTHER
- ☐ TRANSIT

What is the road safety pillar?

- ☐ EDUCATION
- ☐ ENFORCEMENT/ADJUDICATION
- ☐ ENGINEERING
- ☐ EMS
- ☐ EVALUATION
- ☐ LEGISLATION
- ☐ OTHER

What region of the world?

- ☐ ASIA
- ☐ AUSTRALIA
- ☐ CANADA
- ☐ EUROPE
- ☐ NEW ZEALAND
- ☐ UNITED KINGDOM
- ☐ UNITED STATES
- ☐ OTHER

Resource	total
A Focused Approach to Safety Guidebook (FHWA)	2
AASHTO Strategic Highway Safety Plan (AASHTO)	2
All NCSA Publications by Document Type	2
City of New York Neighborhood Slow Zones	2
Comprehensive Human Factors Guidelines for Road Systems	2
Comprehensive Human Factors Guidelines for Road Systems	2
Crash Modification Factor (CMF) Clearinghouse (FHWA)	2
Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities	2
Emergency Transportation Operations: Resources Guide for Nchrp Report 525, Volume 6	2
FHWA Intersection Safety Webpage	2
FHWA Pedestrian and Bicycle Safety Website	2
FHWA Road Diet Informational Guide website	2
FHWA Road Safety Audit Guidelines	2
Guidance for Implementation of the AASHTO Strategic Highway Safety Plan, Volume 15: a Guide for Enhancing Rural Emergency Medical Services	2
Guidance for Implementation of the AASHTO Strategic Highway Safety Plan, Volume 5: a Guide for Addressing Unsignalized Intersection Collisions	2
Highway Safety Improvement Program Manual (FHWA)	2
Highway Safety Manual (AASHTO)	2

To obtain a more tailored listing of safety resources for the intersection of interest, answer one or

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Useful resources – FHWA

U.S. Department of Transportation
Federal Highway Administration
safety.fhwa.dot.gov

Search Safety

Review: how to meet minimum retroreflectivity requirements

Research: information about longitudinal pavement markings

Read up: on what's new with lighting technology

NIGHTTIME VISIBILITY

Office of Safety

Highway Safety Improvement Program

Intersection Safety

Guardrail Resources & ISPE

Roadway Departure Safety

SARF SANRAL AGTIC NOVUS RTS

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Useful resources – GRSP

GLOBAL ROAD SAFETY PARTNERSHIP
www.grsproadsafety.org

HOME ABOUT PROGRAMMES RESOURCES NEWS EVENTS

TOGETHER WE CAN SAVE MILLIONS OF LIVES

8th leading cause of death globally

1240000 Road traffic deaths every year

50000000 People are injured each year

It is estimated that 124 million people are killed each year taking an immeasurable toll on families and communities.

Up to 50 million people suffer serious, life-altering injuries which, in many low- and middle-income countries, directly contribute to the poverty cycle.

See GRSP programmes designed to meet the challenge

OUR MEMBERS

SARF SANRAL AGTIC NOVUS RTS

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Useful resources - iRAP Toolkit

The screenshot shows the iRAP Toolkit website. The header includes the title "Useful resources - iRAP Toolkit" and a browser address bar showing "toolkit.irap.org". The main navigation menu has tabs for "Crash Types", "Road Users", "Treatments", "Management", and "About". Below the navigation is a large image of a smiling child's face. A "Home" button and a search bar are visible. A "Quickfind" section lists various road safety topics: "Rumble Strips", "Roadside Safety - Barriers", "Central Hatching", "Seatbelts", and "Safe Speed". A paragraph describes the toolkit's purpose: "The Road Safety Toolkit provides free information on the causes and prevention of road crashes that cause death and injury. Building on decades of road safety research, the Toolkit helps engineers, planners and policy makers develop safety plans for car occupants, motorcyclists, pedestrians, bicyclists, heavy vehicle occupants and public transport users. The Road Safety Toolkit is the result of collaboration between the International Road Assessment Programme (iRAP) and the Global Transport Knowledge Partnership (GTKP)." Logos for SARF, SANRAL, AGTIC, NOVUS, and RTS are at the bottom.

- <http://toolkit.irap.org/>
- Provides free information on the causes and prevention of road crashes that cause death and injury.
- Not RSA data, but provides good info about the effectiveness of mitigating measures.

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Useful resources - iRAP Toolkit

The screenshot shows the "Safer Roads" section of the iRAP Toolkit. It features a table with three columns: "Safer Roads", "Estimated cost", and "Casualty Reduction". The table lists various road treatments and their effectiveness. A red dashed box highlights the "School Zones" row. To the right, there is a "Benefits" section with a list of bullet points. Below the table, there is a "School Zones" section with a table showing "Low to medium" cost and "10-25%" casualty reduction. Logos for SARF, SANRAL, AGTIC, NOVUS, and RTS are at the bottom.

Safer Roads	Estimated cost	Casualty Reduction
Central Hatching	Low	10-25%
Pedestrian Crossing - Unsignalised	Low	25-40%
Pedestrian Fencing	Low	25-40%
School Zones	Low to medium	10-25%
Skid Resistance	Low to medium	
Pedestrian Footpath	Low to medium	
Pedestrian Refuge Island	Low to medium	
Regulate Roadside Commercial Activity	Low to medium	
Parking Improvements	Low to medium	
Intersection - Signalise	Medium	
Shoulder Sealing	Medium	
Speed Management	Medium	
Street Lighting	Medium	
Pedestrian Crossing - Signalised	Medium	

Benefits

- School zones and crossing supervisors can reduce pedestrian risk.
- School zones help to moderate traffic speeds which can reduce injury severity.
- It has been shown that school zones can reduce crashes involving bicyclists.
- School crossing supervisors can help to control pedestrian crossing movements.
- School crossing supervisors provide a safe place to cross.

School Zones

Cost	Casualty Reduction
Low to medium	10-25%

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END OF LECTURE

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