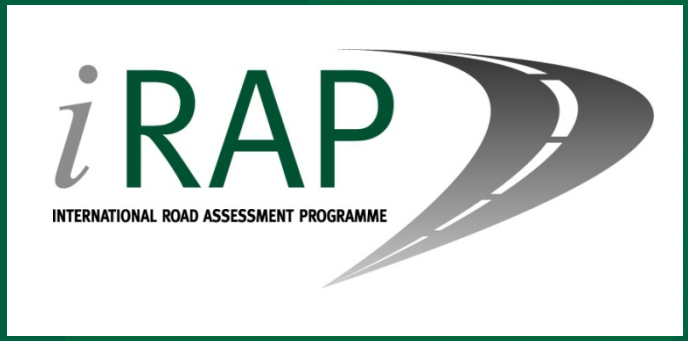
iRAP
Vaccines for Roads



Rob McInerney, CEO iRAP Asia Pacific

iRAP

1. **iRAP Background**
2. iRAP Malaysia Results
3. iRAP Toolkit
4. iRAP Worldwide

Vaccines for Roads

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INTERNATIONAL ROAD ASSESSMENT PROGRAMME

How many die?

Malaysia	17 people every day
Philippines	30 people every day
Vietnam and Thailand	35 people every day
Indonesia	83 people every day
China	250 people every day
WORLDWIDE	3,300 people every day

Vaccines for Roads

iRAP
INTERNATIONAL ROAD ASSESSMENT PROGRAMME

iRAP Background

EuroRAP
EUROPEAN ROAD ASSESSMENT PROGRAMME

AusRAP
Australian Road Assessment Program

usRAP
UNITED STATES ROAD ASSESSMENT PROGRAM

iRAP
INTERNATIONAL ROAD ASSESSMENT PROGRAMME

Low and Middle income Countries

FIA Foundation
for the Automobile and Society

Vaccines for Roads

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iRAP Aims

- Drive safety upgrading where large numbers are killed and seriously injured
- Global methodology to generate effective and economic countermeasure programmes
- Implement performance tracking methodologies for funding bodies to assess outcomes
- Provide the training, manuals and web tools to build and sustain national capability

Vaccines for Roads

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Three RAP International Protocols

1. Risk Mapping

showing outcomes - deaths/serious injuries

2. Performance Tracking

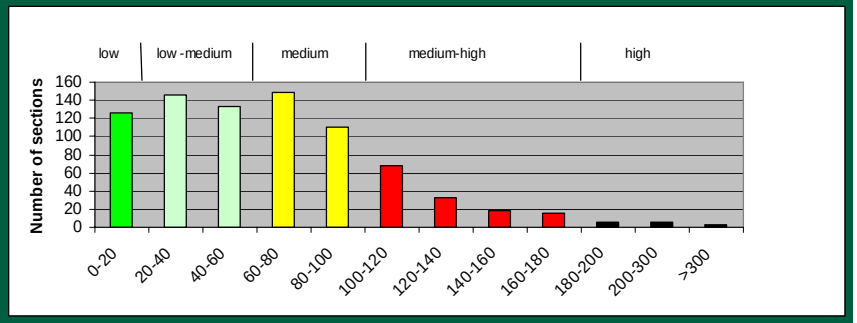
where have deaths been reduced?

how much has safety improved?

3. Star Rating & Countermeasures

assessment of infrastructure safety

road safety countermeasure program



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UK Performance Tracking

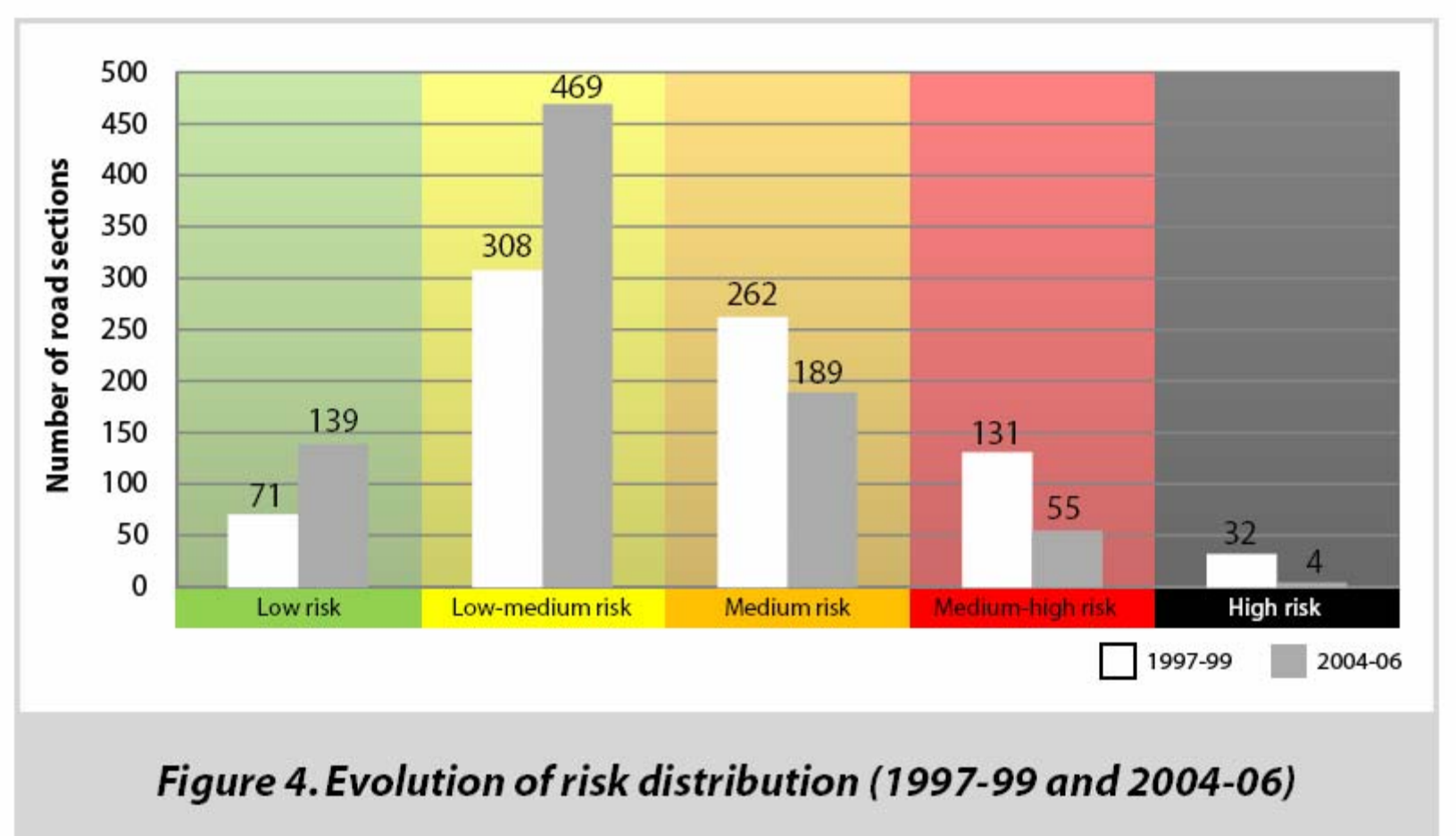

Figure 4. Evolution of risk distribution (1997-99 and 2004-06)

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iRAP Star Rating Model

- International team assembled research knowledge from around the world

- Safety of road for cars, motorcyclists, pedestrians and bicyclists

- Based on inspection data – over 30 attributes

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iRAP Focus: Crashes that kill

Motorcyclists and Vehicle Occupants

- Head-on crashes
- Brutal side impacts at intersections
- Hitting roadside hazards

Pedestrians and Bicyclists

- Crossing the road
- Moving along the road

Vaccines for Roads

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iRAP: Vaccines for Roads

Define the network

↓

Road Inspections

↓

RPS and Star Rating

↓

Apply Countermeasures

↓

Apply Economic Test

↓

Road Investment Program

Vaccines for Roads

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Malaysia – Road Safety Outline

- 17 fatalities per day
- 6,282 deaths in 2007
- 23 fatalities per 100,000 population
- Cost of crashes USD 3 billion
- 2-3% of GDP

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iRAP Malaysia

Safer Roads

A team approach

Vaccines for Roads

iRAP Malaysia Summary

THE STAR, TUESDAY 20 MARCH 2007 NATION N17

Experts study local roads

Safety survey to cover 3,000km

»Some roads are accident-prone because lampposts and trees on these stretches block the view of motorists«

AHMED ISKHAL AMIN

BUTTERWORTH: In the next two years a van being driven around with three close-circuit television (CCTV) cameras on its roof, do not be alarmed.

It is not the police trying to nab traffic offenders.

Those in the van are actually studying Malaysian roads by making video recordings, documenting and evaluating the safety features on selected highways, trunk roads and state roads.

Initiated by the Road Safety Department, the International Road Assessment Programme (iRAP Malaysia) will cover 3,000km of roads in the country.

The nine-week long programme is jointly organised by MIROS (Long Formerly known as the Association Road Research Board), the Malaysian Institute for Road Safety Research (Miros) and Automobile Association of Malaysia (AAM).

AAM road safety consultant member Ahmad Ismal Amin said that since the programme's launch in Pahang on March 14, the survey team had covered a stretch of 1,000km.

The survey is to identify the safety hazards along these stretches and give them star ratings.

"Some roads do not have proper pedestrian crossing, safety railings or traffic lights. Some roads are accident-prone because lampposts and trees on these stretches block the view of motorists," he said.

ARRB technical officer Paul Van Damme said ratings would be given based on 30 common road hazards. One star means that the road has very poor safety features while a five-star rating indicates that it has very good safety features.

Van Damme said he and three other colleagues – Rob Mckeeme, Richard Wix and Joseph Anam – would take about a month to prepare a report on their findings that would be presented to the Road Engineering Association of Malaysia.

Dato' Road Safety Department director Yeoh Hock Mat said Malaysia was the first Asian country chosen for the iRAP programme, adding that the programme had been carried out in Europe and Australia.

Similar pilot studies, she said were being conducted in Chile, Libya and South Africa.

A novelty: (Left) People milling around the van with three CCTV cameras in Butterworth yesterday. (Below) Van Damme and Road Safety Department assistant director Raymond Teoh Jee Hen showing a recording of a road.

- 3,700 kilometres of peninsula Malaysia assessed
- Media activities in every state
- ARRB Hawkeye 3 camera GPS-linked video system
- Images assessed every 100m

Vaccines for Roads

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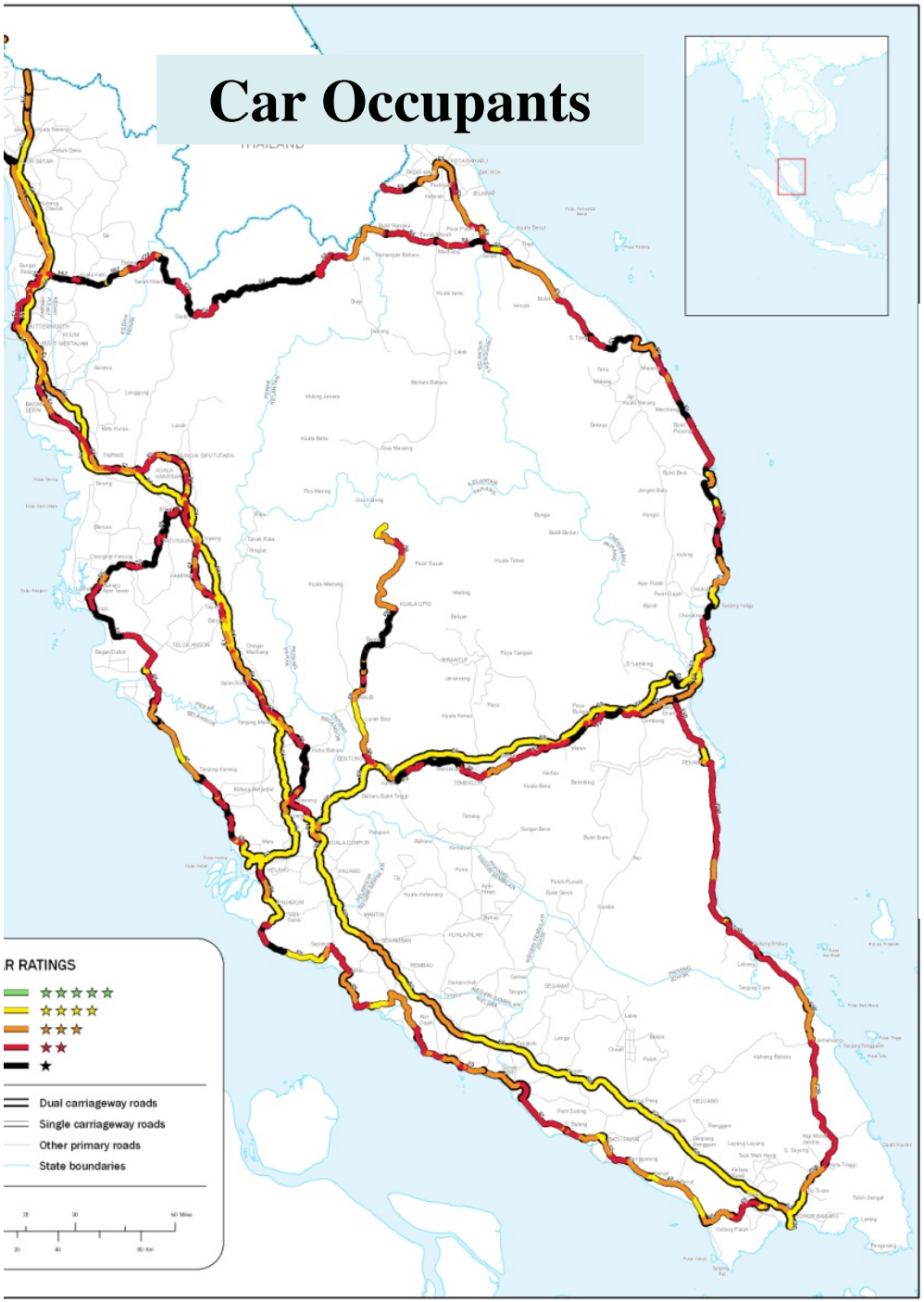

Star Rating

Star Rating	Car Occupants			
	Expressways		Federal roads	
	Length (km)	%	Length (km)	%
★★★★★	1.2 km	0.1 %	0 km	0 %
★★★★	924 km	87 %	239 km	9 %
★★★	130 km	12 %	822 km	31 %
★★	0 km	0 %	1,127 km	43 %
★	11 km	1 %	433 km	17 %
Total	**1,066 km**	**100 %**	**2,621 km**	**100 %**
Not rated				

Star Maps – Road User

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Top 8 Countermeasures

Countermeasure	Length	KSI's saved
Roadside Hazard Reduction	1,647 km	9,660
Central Hatching	13 km	40
Motorcycle Lanes	**268 km**	**875**
Intersection upgrades	381 sites	2,000
Additional lane / capacity upgrades	377 km	8,180
Shoulder widening	270 km	1,370
Improve delineation	126 km	420
Pedestrian Crossing	133 sites	340

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3 – Fatal Motorcyclist Crashes

Countermeasure	Motorcycle Lanes
Length	268 km
Cost	USD 5 million
Serious Injuries Avoided*	875
Program BCR	15

* Over 20 years

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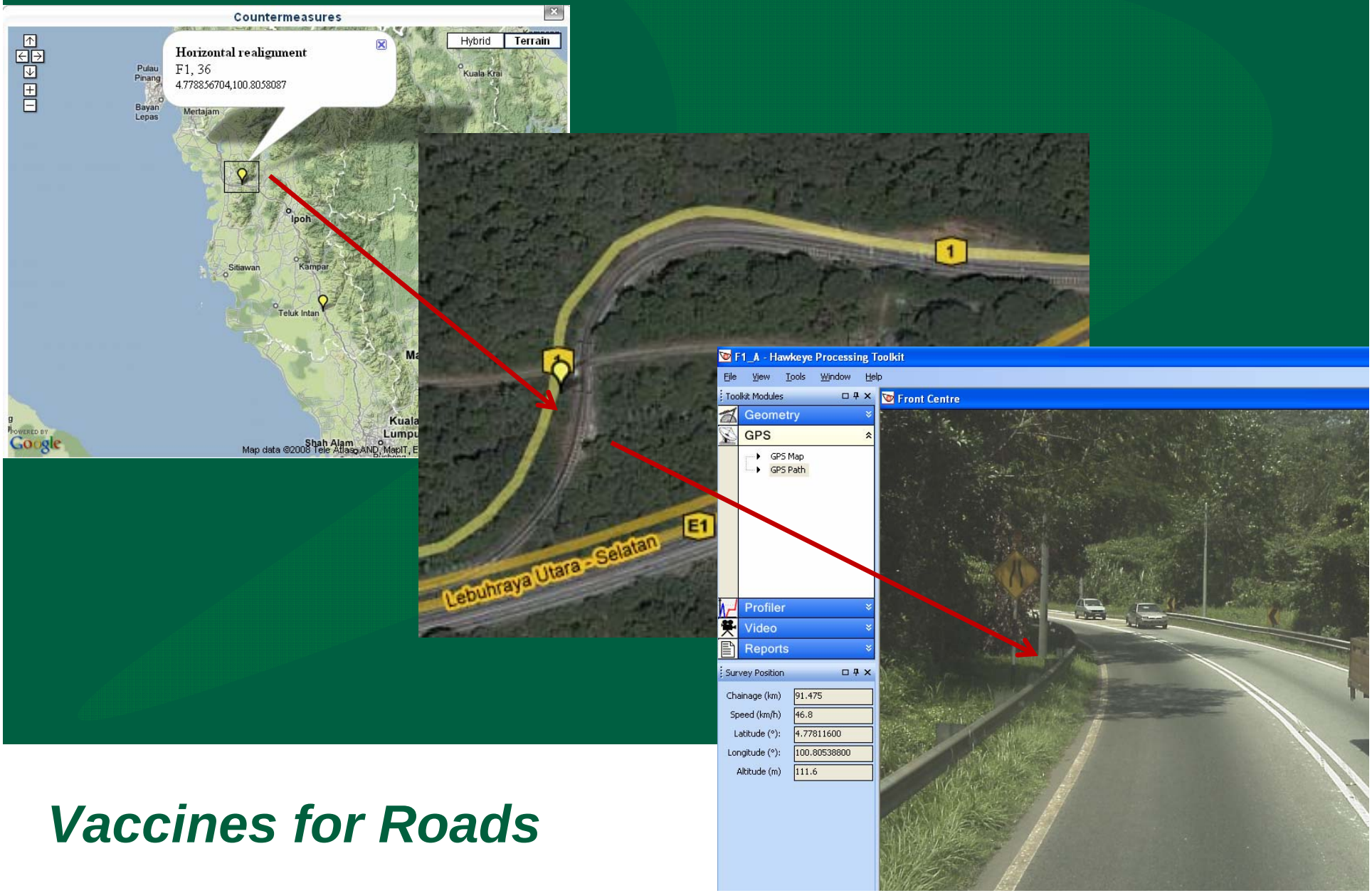
Mapping and Hawkeye Video Data



Vaccines for Roads

Investment Summary

- 3,700 km of road inspected with priority road safety interventions identified (5% of network)
- USD 170 million initial investment
- Save 2,900 lives and 29,000 serious injuries (20 years)
- 32% reduction in road trauma
- Program BCR of 16:1

2,900 lives saved

Vaccines for Roads

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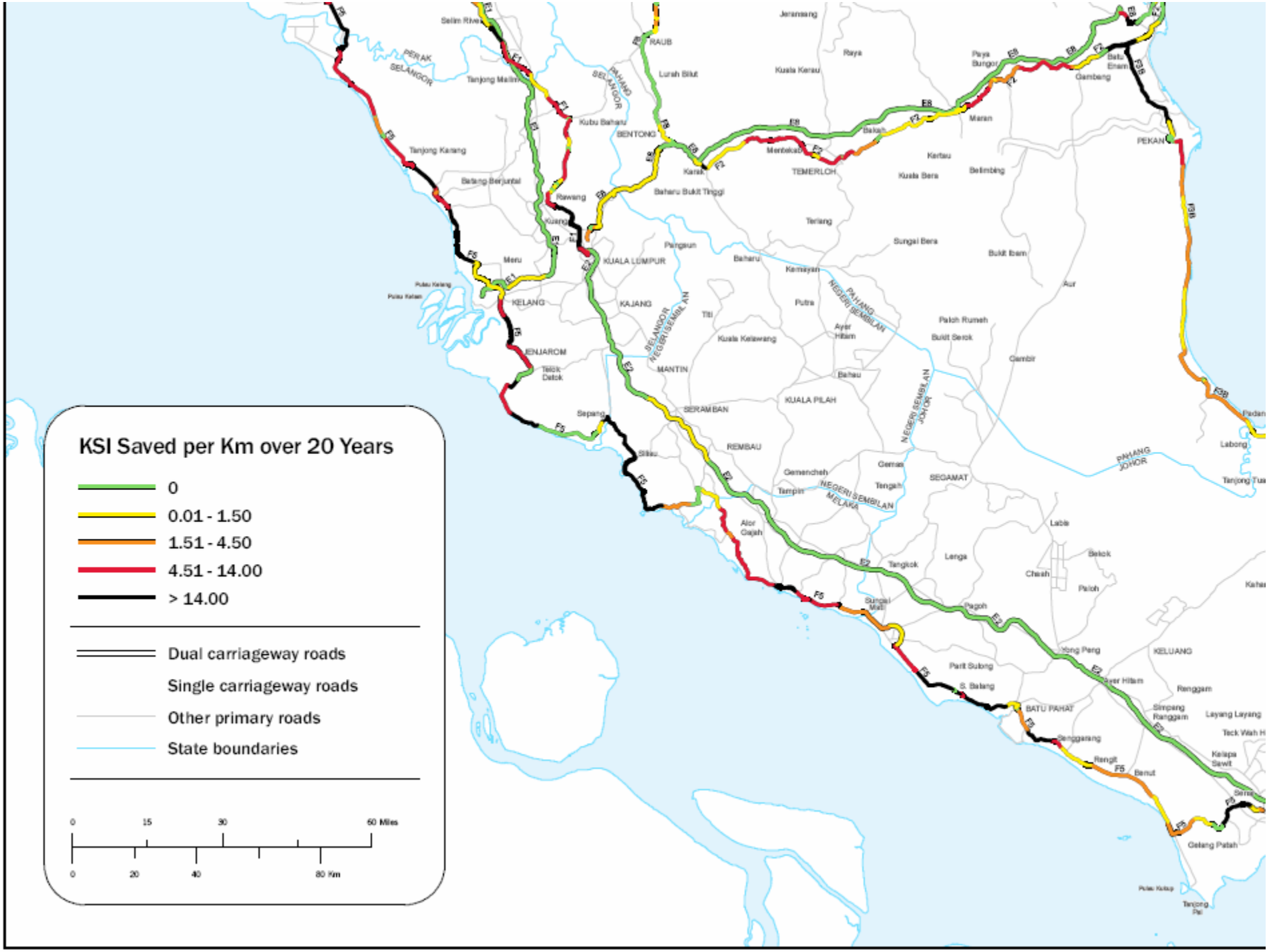
INTERNATIONAL ROAD ASSESSMENT PROGRAMME


KSI Saved per Km over 20 Years
0
0.01 - 1.50
1.51 - 4.50
4.51 - 14.00
> 14.00
Dual carriageway roads
Single carriageway roads
Other primary roads
State boundaries
0 15 30 60 Miles
0 20 40 80 Km
KUALA LUMPUR
SERAMBAN
KELANG
JENJAROM
KAJANG
MANTIN
REMBAU
SEGAMAT
BATU PAHAT
KUALA PILAH
TEMERLOH
BENTONG
PEKAN
RAUB
PERAK
SELANGOR
PAHANG
NEGERI SEMBILAN
JOHOR
MELAKA

iRAP Malaysia

- Target quick wins and demonstration corridor
- JKR to extend survey to rest of their network
- Major input to 10th Malaysia Plan (5 year investment strategy)
- iRAP an integral part of authority performance management

Vaccines for Roads

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3. **iRAP Toolkit**
4. iRAP Worldwide

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Road Safety Toolkit www.irap.net/toolkit

- Source of best practice for practitioners around the world – free access
- Developed by iRAP, ARRB and funded by gTKP
- Initial focus on engineering features – extended to road user and vehicle in the future

DEMO

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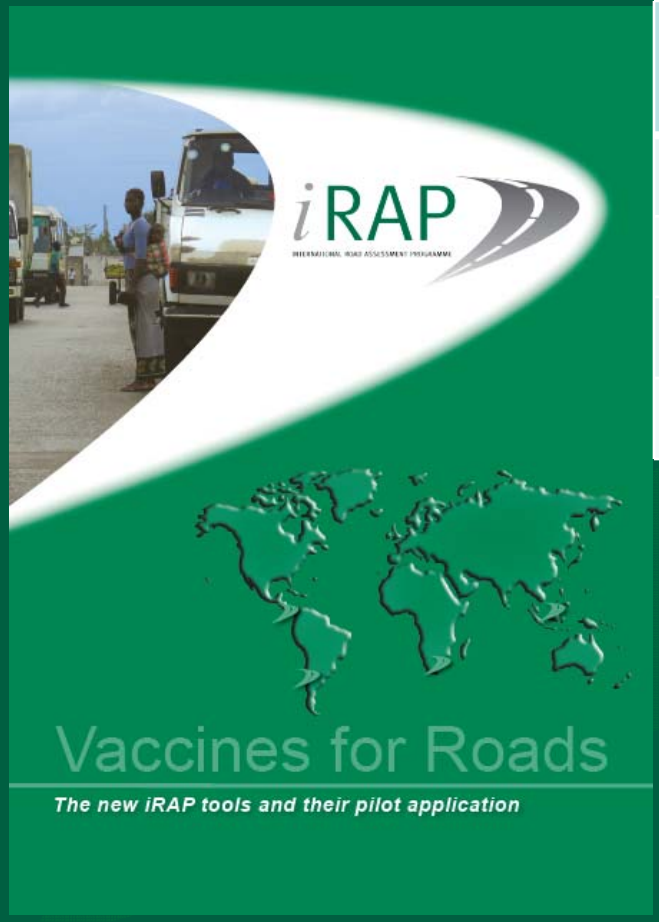
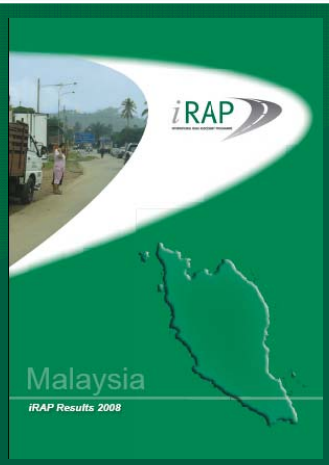
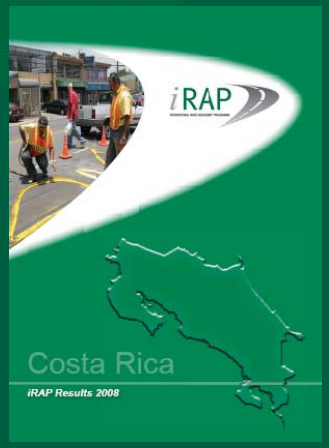
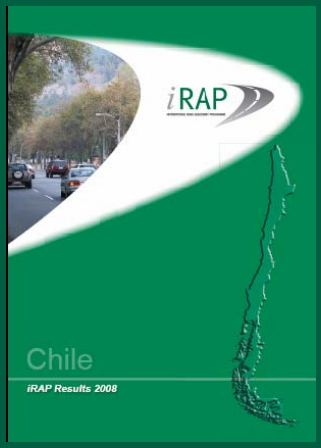
iRAP Reports



Country	Program BCR	KSI's saved	Casualty reduction
Malaysia	16	31,800	32%
Costa Rica	22	14,700	17%
Chile	32	19,400	44%
South Africa	12	6,900	12%







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Costa Rica: Top 5

Countermeasure type	Length or number of sites	Estimated initial construction cost/ US$	KSIs saved (20 years)	Value of safety benefit (20 years)/ US$	Cost per KSI saved (20 years)/ US$	Programme Benefit-Cost Ratio (BCR)
Pedestrian footpath	190 km	14 m	6,900	543 m	2,100	38
Pedestrian crossing	170 sites	9 m	2,500	200 m	4,200	19
Shoulder sealing/provision	180 km	6 m	1,500	121 m	4,400	18
Intersection - signalise	80 sites	9 m	900	68 m	9,800	8
Intersection - roundabout	230 sites	3 m	700	56 m	4,000	20

Pedestrian Footpath

iRAP and World Bank MoU

- World Bank GRSF MoU
- Serbia, Argentina, Peru, Kenya and Nigeria in 2008
- Vietnam (AusAID funded)
- 40 active countries by 2011

Vaccines for Roads

Safer Roads: The challenge

- > 1.2 million deaths every year
- Significant killer of people aged 10 to 24
- Economic cost of 2-3% of GDP

Vaccines for Roads

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Safer Roads: The opportunity

- Safer roads will save lives
- Improvement programs are high return
- Road owners can invest with confidence

Lives depend on it

Rob McInerney

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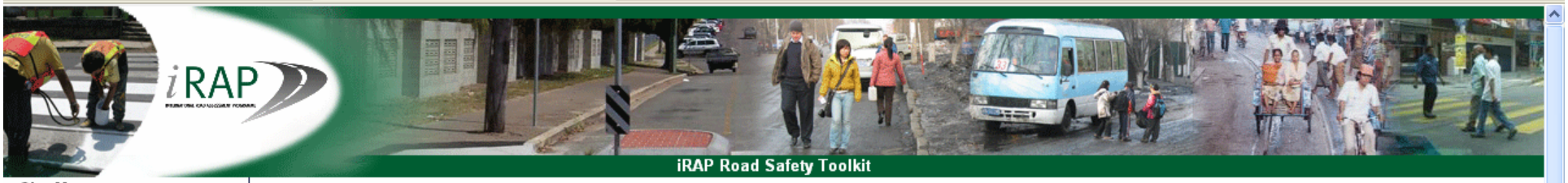
Vaccines for Roads

iRAP Road Safety Toolkit - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.irap.net/toolkit/

iRAP | iRAP Road Safety Toolkit



iRAP Road Safety Toolkit

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- Contacts
- Legal disclaimer
- Case study submission
- iRAP
- gTKP

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INTERNATIONAL ROAD ASSESSMENT PROGRAMME

Safer Roads Saves Lives

This website is currently under development. The development team is still actively working on content and functionality so not all aspects of the site will be operational until the official launch at the end of July. We hope the finished site will provide a great source of practical information for you and other road safety practitioners across the world. Any feedback can be sent via email to the development team (iraptoolkit@arrb.com.au)

The World Report on Traffic Injury Prevention that was published in 2004 drew attention to the urgent need for action to reduce road traffic injuries globally. Its key conclusion is that in order to achieve safer roads a "systems approach" is needed. This means that the road system should be designed to accommodate and compensate for human vulnerability and frailty. The systems approach requires an understanding of the system as a whole and the interaction between its elements, and the identification of priorities and potential for action.

An essential element of the safe systems approach is the development of a road safety management system that can deliver:

- Understanding of a country's road safety issues;
- Involvement of all stakeholders and the wider road user community;
- Comprehensive strategy with targets for casualty reduction;
- A programme of interventions to address identified problems;
- Reviews of performance;
- Capacity building and availability of funding.

An important step in the development of a systems approach to address the road safety problem in a country is the setting up of a lead agency to take responsibility for making roads safe. Key tasks will involve analysis of the casualty problem in terms of crash rates, road user types, locations, and contributory factors in order to establish priorities for action and development of a programme of interventions to deliver cost-effective casualty reductions.

This toolkit is designed to assist with the development of programmes of road safety measures within a prioritised action programme. It provides valuable information that will assist in the choice of effective ways to reduce road traffic injuries. Whilst it can be used on its own to select measures to address specific problems that have been identified, it is not a substitute for the more systematic approach to road safety management and casualty reduction that is recommended in the World Report. A forthcoming report from the OECD provides detailed guidance on the achievement of targeted casualty reductions using a systems approach.

SEARCH

gTKP
global Transport Knowledge Partnership

arrb

Collaborating with the Road Industry to turn knowledge into practice

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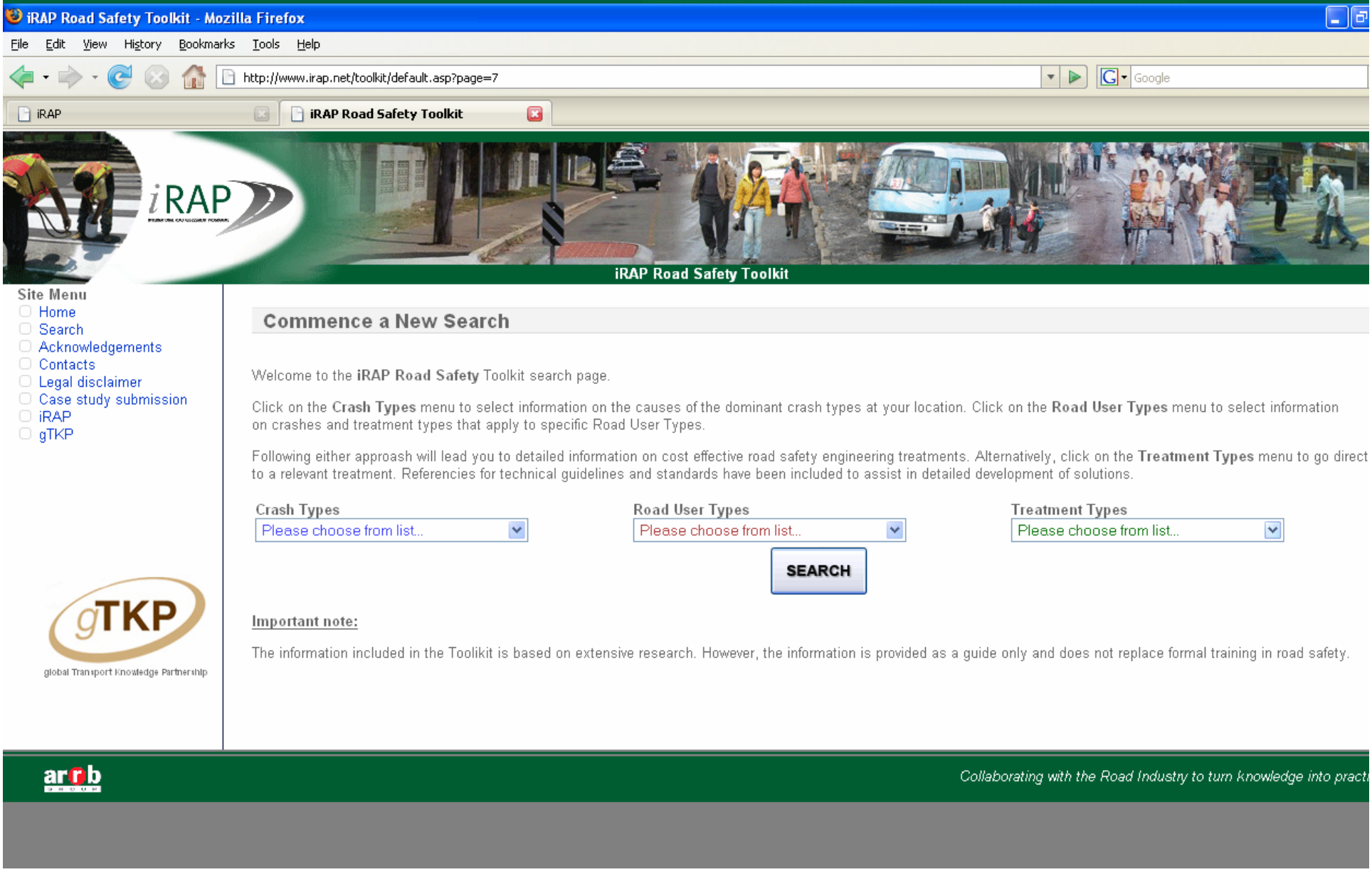

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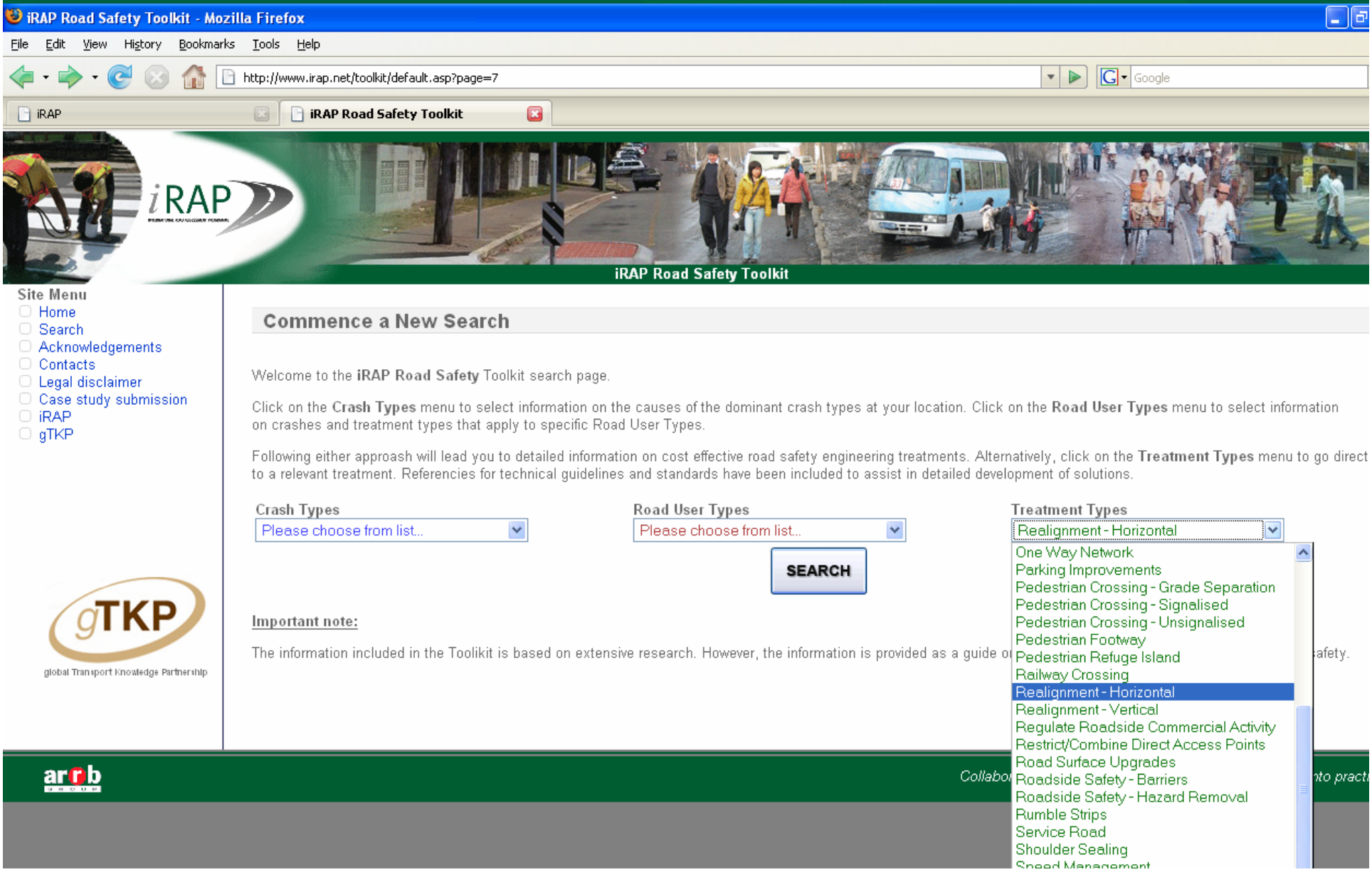

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iRAP Road Safety Toolkit

Treatment type: Realignment - horizontal

Description

This treatment is usually a long term, high cost alternative considered for improving the safety of a road section because it usually involves total reconstruction of that section.

There are several ways in which the horizontal alignment of a roadway may be modified to improve safety. These include increasing the radius, providing transition curves between the straight and the bend, eliminating compound curves and improving superelevation.
Vertical realignments include reduction of the grade, increasing the radius of the crest for adequate sight distance and minimising the vertical acceleration changes.

A combination of other safety strategies with carriageway realignment, including lane and shoulder widening, can provide additional safety benefits.

Benefits

Removing substandard horizontal or vertical road alignments can directly reduce the crash risk by making the driving task easier. The consequences of failing to reduce speeds at curves are reduced.

Some of the key benefits associated with these treatments include:

- reduced risk of head on crashes
- reduced risk of run off road crashes
- more uniform traffic flow

Implementation issues

Horizontal and vertical curve realignments require civil design and considerable construction effort. These projects may also require the purchase of additional land and environmental impact assessments. The planning, design and implementation timeframes are often more than 12 months.

Treatment summary

Cost: $ $ $ $ $
Treatment life:
Effectiveness:

Crash reduction effectiveness

5% adding transition curves50% for horizontal realignment

Technical references

Austroads Rural Road Design: A guide to the geometric design of rural roads (2003)

Road User Types influenced

- Car Occupants
- Heavy Vehicle
- Motorcyclist
- Public Transport Vehicle

Case Studies

Supported by gTKP

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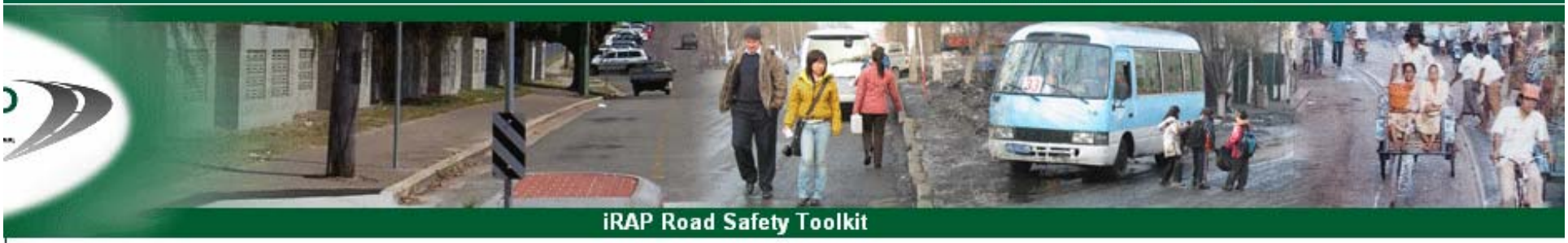

Commence a New Search

Welcome to the **iRAP Road Safety** Toolkit search page.

Click on the **Crash Types** menu to select information on the causes of the dominant crash types at your location. Click on the **Road User Types** menu to sel on crashes and treatment types that apply to specific Road User Types.

Following either approach will lead you to detailed information on cost effective road safety engineering treatments. Alternatively, click on the **Treatment Type** to a relevant treatment. References for technical guidelines and standards have been included to assist in detailed development of solutions.

Crash Types

Please choose from list...

- Please choose from list...
- Head on
- Intersections
- Lane Change
- Manoeuvring
- Rear End
- Run Off Road
- Vehicle - cyclist
- Vehicle - pedestrian

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Crash type: Vehicle – pedestrian

Description

Pedestrians are amongst the most vulnerable of road users. In many countries, collisions with pedestrians are a leading cause of death and injury. In some countries, over half of all road deaths are caused by collisions between vehicles and pedestrians.
Collisions between pedestrians and vehicles occur in a number of situations, including:

- walking in to the path of a vehicle, especially while trying to cross the road
- walking along the roadside, or on the road
- playing or working on the road
- on driveways or footpaths
- while boarding or leaving public transport vehicles.

The severity of pedestrian crashes is strongly dependent on the speed of traffic. Research shows that the chances of a pedestrian surviving an impact with a motorised vehicle reduces dramatically above 30 km/h, and even at lower speeds than this, serious harm can be caused, especially to elderly or child pedestrians.
The risk of pedestrian injuries is increased by a number factors that relate to the road environment, including:

- high speed of traffic
- inadequate crossing facilities
- lack of pedestrian crossing opportunities (gaps in passing traffic)
- number of lanes to cross
- complexity and unpredictability of traffic movements at intersection
- inadequate separation from traffic
- poor crossing sight distance.

Pictures

Image 1 of 4

Related road user ty

- Car Occupants
- Heavy Vehicle
- Motorcyclist
- Pedestrians
- Public Transport Vehicle

Road Safety Toolkit www.irap.net/toolkit

Treatment types

Suitable engineering countermeasures include:

	Cost	Effectiveness
Central Hatching	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Speed Management	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Parking Improvements	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Pedestrian Footway	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Regulate Roadside Commercial Activity	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Restrict/Combine Direct Access Points	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Shoulder Sealing	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Traffic Calming	$ $ $ $ $	♥ ♥ ♥ ♥ ♥
Service Road	$ $ $ $ $	♥ ♥ ♥ ♥ ♥

Alternative non-engineering measures

- Police enforcement of road crossing rules (especially where illegal pedestrian movements are observed)
- Speed limit enforcement (enforcement of the desired speed limit, especially during high-risk times) See the GRSP Speed Management Manual
- Speed media campaigns (promoting safe driver speeds, particularly in pedestrian areas) See the Speed Management Manual
- Road safety education and training (safe routes to school, education programs targeted at safe pedestrian behaviour and improving driver awareness of pedestrians)
- Blood alcohol / drug content testing for drivers (especially in entertainment areas or near to at-risk establishments) See the GRSP Drink Driving Manual

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Road Safety Toolkit www.irap.net/toolkit

Treatment type: Pedestrian Footway

Description

Pedestrian crashes are a major road safety problem in developing countries. Footways reduce crash risk by separating vehicles and pedestrians. In urban areas, raised footways are often part of the road cross-section. In rural areas footways are often not provided, even where pedestrian volumes are high.

Rural footways

A footway next to the road, or a wide flat road shoulder, can prevent pedestrian crashes. The safety benefits will be greatest if the footway is separated from the road (for example, by a drain, a grass verge or a barrier).

A rural footway can be made cheaply by using grader to flatten and clear one side, or preferably, both sides of the road. Pedestrian crossings are needed where rural footways pass through communities or trading centres (see pedestrian grade separation, pedestrian refuge island, pedestrian crossing - unsignalised, pedestrian crossing - signalised).

Urban footways

In urban areas inadequate footway space, street traders, parked cars or poor footway surfaces can force pedestrians onto the road. In some areas the existing footway may be widened to improve access. Physical barriers to prevent parking on the footway can be useful.

In central areas, streets can be closed to vehicles for part of the day or permanently.

Benefits

- Increased safety for pedestrians.
- Increased use of walking as transport (eased road congestion).

Implementation issues

- A maintenance program is needed to ensure that footways are kept clean and level, and that plants do not block the path.
- Signage should be used to warn drivers of pedestrians if the road shoulder is used as a footway.

Treatment Summary

Cost:
Treatment life:
Effectiveness:

Pictures

Image 1 of 5

Crash reduction effectiveness

10 - 25% reduction (estimate)

Technical references

Towards Safer Roads, p78 -81. DFID Highway Design Note 3/01: Vulnerable Road Users. See DesignNote 3/01.

Other treatments to consider

- Central Hatching
- Speed Management
- Parking Improvements
- Regulate Roadside Commercial Activity
- Restrict/Combine Direct Access