United Nations Road Safety Collaboration (UNRSC)

Pillar II ‘Safer Roads & Mobility’ Project Group
Bangkok, March 16-17, 2017

Minutes of Meeting

Refer also to Pillar 2 Meeting Outcomes powerpoint presentation delivered to full UNRSC

The meeting was attended by:
- Rob McInerney
- Geert van Waeg
- Dr Arif Mehmood
- Majeb Abed Al Katheeri
- Sami Abdul Qader Alhashmi
- Rod King
- Kaiwan Wattana
- Jesper Christensen
- Dr. Kunnawee Kanitpong
- Dr. Apiwat Ratanawaraha

Apologies received from:
- Susanna Zammataro
- Mike Dreznes
- Hilda Gomez
- Michael Tziotis
- Claudia Adriazola

1. Welcome and introduction

Welcome and introduction of all participants. Agenda for 24th meeting agreed.

2. Approval of minutes of Geneva Meeting (18 March 2016)

Revised Minutes of 23rd meeting on 18th November 2016 agreed.

3. Presentation of gTKP website for Pillar 2

Susanna Zammataro (by remote ☀️) provided a powerpoint presentation of the Beta version website that is under development and ready for deployment thanks to supporting funds from the World Bank.

4. Update on Case Studies

Following feedback from Geneva Meeting the first Case Studies of Pillar 2 action have been updated and prepared into a common format for use for more case studies in the future. The following case studies are now final and ready for inclusion on Pillar 2 website hosted by IRF / gTKP. (Refer attached case studies).

- Making Safety a Global Standard
5. Update on Bloomberg / EMBARQ activities in Thailand

Kaiwan Wattana and Dr Kunnawee Kanitpong provided an update on the Bloomberg Philanthropies supported work in Bangkok. This included a verbal presentation and update on:

- Details on the enhanced urban design guidelines
- Updates on the work with the municipal authorities to upgrade the roads
- Updates on the star rating assessments of the urban road network

6. Abu Dhabi Road Safety Strategy 2016-2020

Sami Almusawi Alhashmi, Municipality of Abu Dhabi presented an update of the Abu Dhabi Road Safety Strategy from 2016-2020 – refer to presentation “Abu Dhabi road safety strategy 2016-2020”. Key points included:

- Vision, Mission and Values
- Road Safety KPIs
- Collision Data and Analysis
- Priorities, Achievements and Results
- The future commitments and pledge

ACTION: Case Study of Abu Dhabi action to be prepared Sami Almusawi Alhashmi

7. Next Steps

Inclusion of the final outcomes of all the focus groups in the gTKP developed website is the priority for the group. Following completion of the website promotion of the resource centre across Pillar 2 stakeholders will be mobilised including promotion across all members of the UNRSC.

ACTION: Promotion of Pillar 2 Resource Centre when complete ALL

8. AOB

Nil
9. Closing

Meeting closed at 10:55am
Global Plan for Decade of Action

PILLARS

1. Road Safety Management
2. Safer Roads and Mobility
3. Safer Vehicles
4. Safer Road Users
5. Post-crash Response
Road Safety Management

Safer Roads and Mobility

Safer Vehicles

Safer Road Users

Post-crash Response
FOCUS AREA

01

Integrating Road Safety into Existing Systems and Policy

1. Introduction
2. UN Sustainable Development Goals and road safety
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3. National and sub-national policies on road safety
   3.1. Creating Safer Cities through Sustainable Mobility and Urban and Street Design
   3.2. Case Studies
      3.2.1. National
      3.2.2. Sub-national
4. Opportunities for development banks to influence road safety
   4.1. European Bank for Reconstruction Development
      4.1.1. EBRD Process
   4.2. European Investment Bank
      4.2.1. The EIB Action Plan for Road Safety
      4.2.2. Main EIB challenges towards 2020

FOCUS AREA

02

Road Safety Infrastructure Management: Tools and Methods
Celebrating success: Making Safety a Global Standard

UN Decade of Action for Road Safety
Case Study 1

Roads around the world have typically been built to a standard—a national or state-level standard that defines the standard cross-section of a road, the design of curves, the provision of facilities for vulnerable road users, pavement design and intersection design. These standards have typically focused on maximizing mobility, speed and volume of traffic.

With these design standards in place, global road networks have been established and expanded over the years providing the foundation on which all road users interact. Trucks, cars, pedestrians, cyclists, buses and motorcycles all interacting in the road space based on the road designs that have been provided for them. 1.2 million people were killed on the world’s roads in 2013 and an estimated 30-50 million injured.

From a pure safety perspective the historical design of roads has built in many deficiencies that lead to negative safety outcomes. The primary crashes that kill and injure are head-on crashes, run-off road crashes, intersection crashes and pedestrians and cyclists hit while moving along or crossing a road. An analysis of IRAP assessments from around the world provide the following snapshot of road condition. New and upgraded roads continue to build in these deficiencies.

The IWAR Road Safety Manual provides detailed advice on the key elements of safe road design, the systems to support safer roads, targeting of action and proven infrastructure treatments. The Manual highlights the need to link policies with standards and guidelines to ensure effective implementation. The UN Decade of Action for Road Safety Global Plan highlights the need to raise the inherent safety and protective quality of road networks for the benefit of all road users.

Star Ratings provide an evidence-based objective measure of crash risk to ensure that safety is built-in to designs for upgrades and new roads prior to construction. For governments and development banks, the process opens the opportunity to set performance-based targets for vehicle occupants, motorcyclists, pedestrians and cyclists that not only improve safety but create a high level of transparency and accountability. The impact of raising high-risk road networks to a 3-star or better standard will deliver long term savings in death and serious injuries, and hospital and insurance costs whilst also providing a positive way for Governments to track performance. Optimising investment to maximise travel on 3-star or better roads provides agencies with both the business case and metric to manage the safety of road infrastructure in their jurisdiction. The investment and actions needed to meet the UN SDG target to halve road deaths and injuries can be calculated, the return on investment determined, the roads upgraded and the lives saved.

Who is leading the way?

- New Zealand: 4-star roads of national significance; Wellington Gateway toll roads to be a minimum 4-star standard
- United Kingdom: 90% of travel on 3-star or better strategic road network by 2020, and 4 and 5-star motorways
- Malaysia: 75% of travel on 3-star or better high volume roads by 2020 (Malaysia MoT)
- Sweden: 75% of network at 3-star or better by 2020 and near 100% by 2025
- Netherlands: No 1 or 2-star roads by 2020
- Australia: Queensland target 85% of travel on 3-star or better roads by 2020; Tasmanian Midlands Highway 3-star minimum standard
- Chile: Autopista Central to road upgrade to meet minimum 3-star standard

International financial institution leadership

- Asian Development Bank: Recommendation for 4-star roads for pedestrians and cyclists in linear settlements and those carrying 50,000 vehicles and more, 3-star or better for all other road projects
- World Bank: Minimum 3-star roads for projects in India
- Millennium Challenge Corporation: Eliminating 1 and 2-star roads in Moldova, Philippines and El Salvador

For more information on the business case and policy opportunity for maximising travel on 3-star or better roads, see IRAP’s How 3-Star or Better Roads Can Cut Road Trauma brochure.

March 2017
Main Safety Indicators in Abu Dhabi

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Registered Vehicles</td>
<td>698,070</td>
<td>783,180</td>
<td>831,938</td>
<td>873,243</td>
<td>947,508</td>
<td>1,019,698</td>
<td>-46%</td>
</tr>
<tr>
<td>Total Number of Registered Drivers</td>
<td>907,107</td>
<td>994,242</td>
<td>1,075,233</td>
<td>1,151,879</td>
<td>1,234,009</td>
<td>1,307,430</td>
<td>-44%</td>
</tr>
<tr>
<td>Number of Fatalities</td>
<td>376</td>
<td>334</td>
<td>271</td>
<td>289</td>
<td>267</td>
<td>245</td>
<td>-35%</td>
</tr>
<tr>
<td>Pedestrian Fatalities</td>
<td>101</td>
<td>81</td>
<td>70</td>
<td>48</td>
<td>54</td>
<td>48</td>
<td>-52%</td>
</tr>
<tr>
<td>Total number of Injury Crashes (Fatal and Injury Crashes)</td>
<td>2,537</td>
<td>2,283</td>
<td>2,056</td>
<td>2,071</td>
<td>1,863</td>
<td>1,803</td>
<td>-29%</td>
</tr>
<tr>
<td>Rate of Fatalities per 10,000 Vehicles</td>
<td>5.4</td>
<td>4.3</td>
<td>3.3</td>
<td>3.3</td>
<td>2.8</td>
<td>2.4</td>
<td>-56%</td>
</tr>
<tr>
<td>Rate of Fatalities per 100,000 Capita</td>
<td>12.25</td>
<td>10.69</td>
<td>8.66</td>
<td>8.85</td>
<td>7.63</td>
<td>7.4</td>
<td>-40%</td>
</tr>
<tr>
<td>Rate of Injury Crashes per 10,000 Vehicles</td>
<td>36.34</td>
<td>29.15</td>
<td>24.71</td>
<td>23.72</td>
<td>19.64</td>
<td>17.7</td>
<td>-51%</td>
</tr>
</tbody>
</table>
24th UNRSC Meeting
Bangkok, 16-17 March 2017

A web-based knowledge tool to promote UNRSC work

Susanna Zammataro
Executive Director

International Road Federation
Geneva
UNITED NATIONS ROAD SAFETY COLLABORATION (UNRSC)
PILLAR 2 – SAFE ROADS & MOBILITY

• **FA1**: Successful integration of road safety into existing systems and policies.

• **FA2**: Road safety infrastructure management tools.

• **FA3**: ‘How-to’ road safety solutions.

• **FA4**: A model framework for road safety engineering capacity building
How can responsible authorities/agencies be encouraged to adopt proper RS policies?

How can development banks influence roads administrations to integrate and enhance road safety activities into their normal operations.
FOCUS AREA
01

Embedding Road Safety into existing systems

- **Case studies** - National and Sub-national level (Sweden Vision Zero, WHS, Abu Dhabi, ...)

- **Banks**: EBRD and EIB Cases
  (New requirements in lending policy, new internal procedures, new guidelines for project appraisal)
Overall aim:

Provide a **high level guideline** that identifies activities that need to be undertaken for effective road safety infrastructure management. What tools are available and how to determine which tool/method should be used and when.
## Entry to Tool and Method

<table>
<thead>
<tr>
<th></th>
<th>New Roads</th>
<th>Existing Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proactive approaches</strong></td>
<td><strong>Road Safety Impact Assessment</strong></td>
<td><strong>Maintenance Inspections</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Road Safety Audit</strong></td>
<td><strong>Star Rating (iRAP) – Existing Roads</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Star Rating (iRAP) – New Roads &amp; Schemes</strong></td>
<td><strong>Road Safety Inspection</strong></td>
</tr>
<tr>
<td><strong>Reactive approaches</strong></td>
<td></td>
<td><strong>Blackspot Analysis and Treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Route/Corridor Analysis and Treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Network/Area Analysis and Treatment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Road Safety Assessment</strong></td>
</tr>
</tbody>
</table>
Problems with definitions...

RS impact assessment
Road safety audits
RS Inspections
RS Rating
**Aim:** provide rapid reference sources and a convenient selection of solutions for measures that are proven, readily available and easily adaptable.

**Content:**

- Solutions for different road user safety problems
- Solutions for different type of crashes
- Monitoring and evaluation
3 Solutions for different road user safety problems

3.1 Pedestrian crashes

A detailed crash investigation is required to identify crash causation and crash severity factors. This information will form the basis for the selection of the targeted cost-effective remedial treatment options.

The solution selected will ultimately depend upon available budget, prevailing site factors, treatment cost, CRF or CMF and economic worth of the treatment.

The combined effectiveness of multiple remedial treatments is NOT additive. Refer to Section 1.4 for calculating the expected effectiveness of multiple treatments.

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Tmt Life (years)</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian crossing (un-signalised)</td>
<td>1-5</td>
<td>✓</td>
<td>$</td>
</tr>
<tr>
<td>Traffic calming (localised / threshold treatments)</td>
<td>10-20</td>
<td>✓</td>
<td>$</td>
</tr>
<tr>
<td>Hatched/painted medians</td>
<td>1-5</td>
<td>✓</td>
<td>$</td>
</tr>
<tr>
<td>Pedestrian crossing raised (un-signalised)</td>
<td>5-10</td>
<td>✓ ✓</td>
<td>$</td>
</tr>
<tr>
<td>Parking improvements²</td>
<td>5-10</td>
<td>✓ ✓</td>
<td>$</td>
</tr>
<tr>
<td>Pedestrian fencing</td>
<td>10-15</td>
<td>✓ ✓</td>
<td>$</td>
</tr>
<tr>
<td>Kerb extensions</td>
<td>5-10</td>
<td>✓ ✓</td>
<td>$</td>
</tr>
<tr>
<td>Traffic calming (treatments along a road segment)</td>
<td>10-20</td>
<td>✓ ✓</td>
<td>$$</td>
</tr>
</tbody>
</table>
Aim: Provide a **practical framework and model**, for improving and significantly scaling up road safety engineering capacity.

Content:

- Identify and list competences of RS professionals
- Required learning outcomes for training curricula
- Review of existing training offer
Objectives of PG2

- Not write another manual
- Use existing knowledge
- No duplication of efforts = point to other resources
- Wide audience: Engineers, road authorities, private sector, development banks, local governments
- Format: Web-based (easy to update/greater audience)
GTKP Website and Knowledge Centre

- 9 Themes
- 270 searchable Pages
- 2,300 documents
- ≈ 7,000 Subscribers
- Multiple languages
- Free access

www.gtkp.com

Better roads, better world
Why GTKP?

- **Existing tool** to promote the take-up, sharing and application of transport knowledge.
- It is an established **platform since 2005**
- It is a **comprehensive knowledge centre** covering 9 Themes (270 searchable pages, 2,300 knowledge items)
- In **several languages**
- With **regular subscribers** (more than 7,000) spread out across the globe
- It is **easy to add and update content** (this solves the problem of keeping information alive)
- **Users can submit knowledge** items (this facilitates engagement of audience).
Global Plan for Decade of Action
Global Plan for the Decade of Action for Road Safety

United Nations Road Safety Collaboration

In April 2004, the United Nations General Assembly resolution A/RES58/289 on “improving global road safety” invited WHO to act as the coordinator for road safety issues across the United Nations system. The World Health Assembly accepted this invitation in May 2004 and the WHO created the UN Road Safety Collaboration (UNRSC) in October 2004. To date, there are 85 members coming from United Nations and associated specialized agencies, governments, foundations and academic institutes, road safety nongovernmental organizations and private companies.

The Collaboration is an informal consultative mechanism whose members are committed to road safety efforts, particularly to the implementation of the recommendations of the World Report on Road Traffic Injury Prevention. The goal of the Collaboration is to facilitate international cooperation and to strengthen global and regional coordination among UN agencies and other international partners to implement UN General Assembly Resolutions and the recommendations of the World Report.

More information can be found on the UNRSC website here: www.who.int/roadsafety/en/

Decade of Action for Road Safety 2011-2020

On 11 May 2011, the Decade of Action for Road Safety 2011-2020 was launched in more than 100 countries, with one goal: to prevent five million road traffic deaths globally by 2020.

The UNRSC has developed a Global Plan for the Decade of Action for Road Safety 2011-2020 with input from many partners through an extensive consultation process through meetings and the internet. The Plan provides an overall framework for activities which may take place in the context of the Decade of Action for Road Safety.
The UNRSC has developed a Global Plan for the Decade of Action for Road Safety 2011-2020 with input from many partners through an extensive consultation process through meetings and the Internet. The Plan provides an overall framework for activities which may take place in the context of the Decade organized through 5 Pillars. Indicators have been developed to measure progress in each of these areas. Governments, international agencies, civil society organizations, the private sector and other stakeholders are invited to make use of the Plan as a guiding document for the events and activities they will support as part of the Decade.

1. Road Safety Management

2. Safer Roads and Mobility

3. Safer Vehicles

4. Safer Road Users

5. Post-crash Response
1 Road Safety Management

Contents

1 Introduction
2 Road Safety Institutional Arrangements and Processes
3 Road Safety Data Systems
4 Funding Road Safety
5 Country-Level, Regional, and International Road Safety Management Context

1 Introduction

Pillar 1 of the Global Plan for the UN Decade of Action for Road Safety focuses on the need to strengthen institutional capacity to further national road safety efforts. It includes activities such as putting into practice major United Nations road safety conventions, establishing a lead agency for road safety in the country involving partners from a range of sectors, developing a national road safety strategy, and setting realistic and long-term targets for related activities with sufficient funding for their implementation. It also calls for the development of data systems to effectively monitor and evaluate activities. Below, a list of important publications that can help road safety stakeholders address Pillar 1 are provided and are broken down into 4 main categories including “Road Safety Institutional Arrangements and Processes,” “Road Safety Data Systems,” “Funding Road Safety,” and “Country-Level, Regional, and International Road Safety Management Context.” It is important to note that many of these documents overlap into more than one of the categories defined, and therefore have been divided on the basis of each publication’s main focus. By utilizing the holistic approach provided by the documents in each of these sub-categories for road safety institutional management, road safety stakeholders and practitioners will be able to more effectively implement pillar 1 in their countries, thereby contributing to the achievement of the UN Decade of Action for Road Safety and the road safety targets in the recently approved Sustainable Development Goals.
2. Road Safety Institutional Arrangements and Processes

This section covers publications that provide both a focus on the institutional arrangements and processes around effective road safety management. These publications discuss issues such as the development of road safety national strategies, lead agencies, setting appropriate road safety targets, effective methods for implementing road safety interventions, and several other important topics related to effective road safety management.

**Global Status Report on Road Safety 2015:**

This joint World Bank and WHO report underscores that that unsafe road traffic systems are seriously harming global public health and development, and are preventable. Recommendations for preventing road traffic injuries are made, and many of these recommendations revolve around improvements in proper institutional road safety management capacity.


These guidelines from the Global Road Safety Facility and World Bank provide a pragmatic approach to overcoming road safety related institutional capacity barriers and to achieving positive and sustainable road safety outcomes.

**Road Traffic Injury Prevention Training Manual:**

This training manual is based on The World Report on Road Traffic Injury Prevention, and many sections of this manual deal with road safety management, including Units in the manual entitled, “Importance of Evidence as a Foundation for Prevention,” “Multisectoral Collaboration,” and “Formulating and Implementing Road Safety Policy.”

**Towards Zero: Ambitious Road Safety Targets and the Safe System Approach:**

The purpose of the report is to review the state of the art in improving road safety performance and examine the role of targets in raising the level of ambition and achieving effective implementation of road safety policies. It highlights the institutional management changes required in many countries to implement effective interventions through a strong focus on results and underlines the economic case for road safety investment.
Safer Roads and Mobility

Many road authorities do not have the staff resources or the expertise to fully understand and apply the best practice safety measures. In order to assist in adopt the vision and objects of Pillar II resources have been drawn together across four key areas, ‘focus areas,’ related to providing safe road infrastructure and safe travel across the road network.

The Pillar II provides the support and tools needed to achieve safety benefits. The take-up and application of information provided within each of the four key focus areas of Pillar II will assist Governments and road safety practitioners to achieve the goals of a Safe System.

The Focus Areas (FA) and their objectives are as follows:

- FA1: The Successful integration of road safety into existing systems and policies.
  *Objectives:* to outline key motivators/incentives to ensure that road safety is fully and successfully integrated into existing systems and policies within government, developments banks, etc., for road planning, design and construction.

- FA2: The identification and application of Road safety infrastructure management tools.
  *Objectives:* to identify and provide road safety practitioners with infrastructure management tools to assist them undertake road safety tasks, to enable them to evaluate, prioritize and monitor infrastructure and operational safety performance.

  *Objectives:* to provide governments and road safety practitioners with evidence based targeted crash countermeasures in a ‘how-to-tips’ manner.

- FA4: A model framework for road safety engineering capacity building.
FOCUS AREA

01

Integrating Road Safety into Existing Systems and Policy

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   2.1. Brasilia Declaration on Road Safety

3. National and sub-national policies on road safety
   3.1. Creating Safer Cities through Sustainable Mobility and Urban and Street Design
   3.2. Case Studies
      3.2.1. National
      3.2.2. Sub-national

4. Opportunities for development banks to influence road safety
   4.1. European Bank for Reconstruction Development
      4.1.1. EBRD Process
   4.2. European Investment Bank
      4.2.1. The EIB Action Plan for Road Safety
      4.2.2. Main EIB challenges towards 2020

FOCUS AREA

02

Road Safety Infrastructure Management: Tools and Methods
FOCUS AREA

01

Integrating Road Safety into Existing Systems and Policy

Authors: Claudia Adriaazola-Delgado, Ben Welle, Suzy Charman, Hilda Maria Gomez, Michael Tziotis, Susanna Zammataro, Per Mathiasen, Suprunenko Stanislav, Victoria Marlene Smith

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   3.2. Case Studies
      3.2.1. National
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4. Opportunities for development banks to influence road safety
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      4.1.1. EBRD Process
   4.2. European Investment Bank
      4.2.1. The EIB Action Plan for Road Safety
      4.2.2. Main EIB challenges towards 2020
1. Introduction

Historically, roads played a key role in the development of communities by providing required access to destinations, mobility, and transportation services. Therefore, from the social aspect, roads were considered as a source of social benefits, comfort, and income which often resulted in settlements along the main transport corridors. For a long time this situation was considered as acceptable in low- and middle-income countries with very low traffic and car ownership, and where majority of transit cargo was carried predominantly by rail transport. Under these circumstances, road safety was not considered as a significant social issue.

The situation is changing due to economic growth associated with the increased number of vehicles, growing transportation and travel demand, traffic density, speed levels, behavioral changes, etc. Road safety has become a significant issue for emerging economies as it negatively affects economic growth, public health, social development, and the environment. In many cases, low- and middle-income countries are unable to respond to these challenges due to chronic underinvestment of road infrastructure, especially those related to safety coupled with poor legal and regulatory mechanisms. Currently, road traffic injuries and fatalities cause economic loss of over 3 percent of global GDP. This is much higher in low- and middle-income countries at up to 5 percent of GDP. Furthermore, seriously injured people are more likely to be excluded from labor markets. Negative spillover effects are significant, i.e., not only lives of injured people are negatively affected, but also the lives of their spouses and children. Many victims are the main providers of household income and, when injured or killed, their families are often left without economic support (IFRC, 2013). There is evidence that following an accident which seriously injures a person of adult age (i.e., an income earner), 70 percent of families fall into long-term poverty and stay in that condition (Global Road Safety Partnership, 2007). These injuries and fatalities place substantial economic burden on developing countries. The economic cost globally is estimated at between $64.5 billion and $100 billion (Global Partnership for Road Safety, 2013). Hence, a direct link between road safety and poverty reduction can be assumed (IFRC, 2013). This indicates that reducing improving road safety will lead to higher economic growth. Considering the costs of lives, the burden on hospitals and health systems, and the impact on the youngest segments of the population, the majority of road safety investments are economically viable (i.e. typically, much higher than 10 per cent economic internal rate of return). Therefore, in theory, good government public policies should lead to greater public spending in road safety improvements.

2. UN Sustainable Development Goals and road safety

Road safety has become central to many international agendas including the UN Sustainable Development Goals (SDGs). In September 2015, world leaders adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 SDGs. World leaders have identified road safety and mobility as crucial components in achieving the overall aim of ending poverty, fight inequality and injustice, and tackle climate change by 2030. In the SDGs, Goal 3 states that we must ‘ensure healthy lives and promote well-being for all at all ages’. The importance of road safety is highlighted through Target 3.6 which states ‘by 2020, halve the number of global deaths and injuries from road traffic accidents’. Furthermore, Goal 11 states that we must ‘make cities and human settlements inclusive, safe, resilient, and sustainable’. Through Target 11.2, the new agenda urges the international community to ‘provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons by 2030’. The SDGs highlight the...
ROAD SAFETY INFRASTRUCTURE MANAGEMENT: TOOLS AND METHODS

Authors: Suzy Charman, John Barrell, Steve Lawson, James Bradford, Hans Vollpract, Michael Tziotis, Victoria Marlene Smith

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   6.2. Maintenance Inspections
   6.3. Network/Area Analysis and Treatment
   6.4. Road Safety Assessment
   6.5. Road Safety Audit
   6.6. Road Safety Impact Assessment
1. Introduction and Aims

There are a variety of infrastructure safety management tools and methodologies that have been developed to help evaluate, prioritise and monitor road infrastructure safety performance; however, there are limited guidelines available that describe how and when each tool should be used in order to support a robust road safety infrastructure management system.

These guidelines outline the road safety management activities that are needed to deliver the recommendations in the Global Plan and the tools/methodologies that can be used.

This guideline has been developed to be applied across all road types, urban, semi-urban and rural and to be applicable to the safety of all road user groups.

2. Safer Roads and Mobility Policy

Ensuring that the safety of road infrastructure is managed is a primary function of road authorities. The following is a suggestion for minimum requirements for road safety management:

- Review design options pre-feasibility stage to determine safety impact
- Undertake independent Road Safety Audit on all new roads and schemes (irrespective of size) at (at a minimum):
  - One stage prior to construction of the road
  - One stage following construction of the road
- Develop and follow Work Zone safety guidance
- Monitor all new road schemes post opening
- Identify the worst 10% of sites or sections across the network every year through the analysis of crash data (OR work with the Police to improve crash data so that this can be done) and develop targeted treatment programmes
- Undertake proactive Road Safety Inspections at least every 5 years, follow up with detailed Road Safety Assessments of high priority sections
FOCUS AREA

03

'How-to' road safety solutions

Authors: Michael Tziotis, Suzy Charman, Claudia Adriaizola-Delgado, Geert van Waeg, Steve Lawson, Mike Dreizes, Susanna Zammataro, Hans Vollpracht, Ceri Woolsgrove, Victoria Marlene Smith

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   2.1. Importance and use
   2.2. Casualty crashes and casualties
   2.3. Crash data sources

3. Solutions for different road user safety problems
   3.1. Pedestrian crashes
   3.2. Bicycle crashes

...
1. The Global Safety Problem

1.1 Treating ‘high’ crash locations

The objective in the treatment of crash location is to reduce the incidence and severity of crashes at high crash locations. Fundamental to this objective is the requirement that the treatments match the crash problem, and that the remedial measure/s are proven and cost-effective (forthcoming PIARC 2015).

1.2 Providing a Safe System Road Network

Identifying and treating road elements which may contribute to crash occurrence or crash severity is a major component of the safe system approach to road safety. Adopting a safe system approach to road safety recognises that humans, as road users, are fallible and will continue to make mistakes, and that the community should not penalise people with death or serious injury when mistakes do occur. In a safe system, therefore, roads (and vehicles) should be designed to reduce the incidence and severity of crashes when they inevitably occur.

The safe system approach requires, in part:

- designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury
- improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing ‘forgiving’ roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes
4.1 Intersection crashes

A detailed crash investigation is required to identify crash causation and crash severity factors. This information will form the basis for the selection of the targeted cost-effective remedial treatment options.

The solution selected will ultimately depend upon available budget, prevailing site factors, treatment cost, CRF or CMF and economic worth of the treatment.

The combined effectiveness of multiple remedial treatments is also NOT additive. Refer to Section 1.4 to calculate the expected effectiveness of multiple treatments.

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Tmt Life (years)</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection ‘Stop’ control sign from no control</td>
<td>1-5</td>
<td>✓</td>
<td>$</td>
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<tr>
<td>Intersection delineation</td>
<td>1-5</td>
<td>✓</td>
<td>$</td>
</tr>
<tr>
<td>Sight distance improvements / remove obstruction</td>
<td>10-15</td>
<td>✓</td>
<td>$$</td>
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<tr>
<td>One-way operation</td>
<td>20-30</td>
<td>✓</td>
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<tr>
<td>Parking improvements[12]</td>
<td>5-10</td>
<td>✓</td>
<td>$$</td>
</tr>
<tr>
<td>Intersection turn-lanes (sig/un-signalised) painted</td>
<td>1-5</td>
<td>✓</td>
<td>$$</td>
</tr>
<tr>
<td>Street lighting (rural)[13]</td>
<td>10-20</td>
<td>✓</td>
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<tr>
<td>Street lighting (urban)[14]</td>
<td>10-20</td>
<td>✓</td>
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<tr>
<td>Speed management (incl. review of speed limits)</td>
<td>5-10</td>
<td>✓</td>
<td>$$</td>
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<tr>
<td>Sealing shoulders/widening</td>
<td>5-10</td>
<td>✓</td>
<td>$$$</td>
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<tr>
<td>Improved skid resistance</td>
<td>5-10</td>
<td>✓</td>
<td>$$$</td>
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<tr>
<td>Intersection turn lanes (sig/un-signalised) built</td>
<td>10-15</td>
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<tr>
<td>Grade separation from un-signalised intersection</td>
<td>20-30</td>
<td>✓</td>
<td>$$$$</td>
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<tr>
<td>Intersection signals</td>
<td>10-20</td>
<td>✓</td>
<td>$$$$</td>
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<tr>
<td>Roundabout</td>
<td>10-20</td>
<td>✓</td>
<td>$$$$</td>
</tr>
<tr>
<td>Treatment</td>
<td>Cost Range</td>
<td>Crash Reduction</td>
<td></td>
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<tr>
<td>--------------------------------------------------------------------------</td>
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<tr>
<td>Parking improvements[12]</td>
<td>5-10</td>
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<tr>
<td>Roundabout</td>
<td>10-20</td>
<td>✔✔</td>
<td></td>
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</tbody>
</table>

- ✔ up to 15% reduction
- ✔✔ 15% to 30% reduction
- ✔✔✔ 30% to 60% reduction
- ✔✔✔✔ greater than 60% reduction

- $ less than US$25,000
- $ $ US$25,000 to US$50,000
- $$$$ US$50,000 to US$100,000
- $$$$$ greater than US$100,000

[12]Examples include parking bans and converting angle parking to parallel parking.
[14]Crash reduction expected during the night-time.

To assist identify the most appropriate cost-effective treatment refer to:
- iRAP Toolkit on Intersections
Road safety engineering capacity building

Authors: Steve Lawson, John Mumford, Suzy Charman, Michael Tziotis, Susanna Zammataro, Jean François Corté, Mike Dreznes, Victoria Marlene Smith

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   3.1. Road safety training should be available in all countries
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1. Careers, roles and positions in road safety engineering

1.1 Building capacity

Building capacity in road safety can be successful if those who will be attracted as practitioners can see and understand the range of roles that are available to them. Key roles or skills in many road safety engineering teams are listed below ("Roles in a mature organization"). Often, one person may cover more than one role or skill set.

The list below is a team set-up to aspire to – the reality in many Low and Middle-Income Countries (LMICs) is that only a few people will be shouldering the burden of road safety engineering. Often they are combining it with other duties, sometimes as varied as public transport operations or municipal drainage issues.

The role opportunities listed below can only apply to an organization when it is well developed and relatively mature in road safety activity. Initially, it is necessary to advocate for the introduction of positions specific to road safety engineering and for these roles to be alongside and in addition to the traditional positions in road design, maintenance and operations. Generally, the most needed positions are for engineers and technicians who can cover both:

- road safety and road safety inspections
- issues of crash and injury data collection and crash analysis

In many LMICs, young professionals from an engineering background are or have been taking further studies to specialize in road safety engineering. In high-income countries, those entering the field through crash data and its analysis typically come from a wider background, often with skills and knowledge developed from the behavioral, social or physical sciences and often with a good level of numeracy.

1.2 Roles in a mature organization

This list provides a target and an aide-memoire for those seeking to cover skill areas. A small number of individuals may together cover more than one role until the team is established and its value recognized.

a. The road safety engineer – typically the team leader is a professional engineer, usually from a civil engineering background, although many numerate graduates and other practitioners have made a successful transition from a different background into a road safety specialist. The road safety engineer will often be responsible for a programme of remedial
Thank You

Susanna Zammataro

szammataro@irfnet.ch
Celebrating Success

UN CASE STUDY SERIES
UN Decade of Action for Road Safety

Case study title:

Case study number (next number available in series as displayed on website):

Key pull-out point (i.e. brief few words to be highlighted):

Insert description of case (e.g. location, need and how met):

Key achievements (dot point list):

Saving lives into the future (potential and existing action that will positively influence future outcomes):
For more information (name, position, organisation, email, website):

Timeline for success (list by year in brief format):

Case study preparation date:
Roads around the world have typically been built to a standard - a national or state-level standard that defines the standard cross-section of a road, the design of curves, the provision of facilities for vulnerable road users, pavement design and intersection design. These standards have typically focused on maximizing mobility, speed and volume of traffic.

With those design standards in place, global road networks have been established and expanded over the years providing the foundation on which all road users interact. Trucks, cars, pedestrians, cyclists, buses and motorcyclists all interacting in the road space based on the road designs that have been provided for them. 1.2 million people were killed on the world’s roads in 2013 and an estimated 30-50 million injured.

From a pure safety perspective the historical design of roads has built in many deficiencies that lead to negative safety outcomes. The primary crashes that kill and injure are head-on crashes, run-off road crashes, intersection crashes and pedestrians and cyclists hit while moving along or crossing a road. An analysis of iRAP assessments from around the world provide the following snapshot of road condition. New and upgraded roads continue to build in these deficiencies.

The PIARC Road Safety Manual provides detailed advice on the key elements of safe road design, the systems to support safer roads, targeting of action and proven infrastructure treatments. The Manual highlights the need to link Policy with Standards and Guidelines to ensure effective implementation. The UN Decade of Action for Road Safety Global Plan highlights the need to raise the inherent safety and protective quality of road networks for the benefit of all road users.

Road Safety Audits provide an independent review of road designs by trained road safety auditors. The process involves a systematic and qualitative review of the design and can be undertaken at different stages of a project (e.g. concept, draft and detailed design). National road safety audit guidelines exist in many countries and a checklist approach helps guide auditors through the essential road safety needs of all road users.

The use of minimum star rating targets for new road projects (e.g. minimum 3 or 4-star standard for all road users) is also providing countries with the ability to provide an immediate and objective, evidence-based global standard for specifying minimum safety performance (refer Celebrating Success Case Study 6 - El Salvador). The star rating of designs enables an immediate confirmation of the safety of the road prior to approval and prior to construction. The star rating also allows the road safety outcomes to be incentivized during road project tender stage where the final star rating of the road (and associated expected crash costs) is included in the tender evaluation process.

Leading countries are now also adopting a Safe System approach to designing new roads. The premise is that humans make mistakes, the human body has a limited physical ability to tolerate crash forces and that the system designers have a shared responsibility to design a system that prevents crashes that kill and injure and all parts of the system must be strengthened such that if one part fails, road users are still protected (OECD, 2016).

CASE STUDY: 5-Star Safety Features on the Bruce Highway, Queensland, Australia

For more information on iRAP Star Rating Designs, visit http://irap.org/en/
Celebrating success
UN Decade of Action for Road Safety
Case Study 2

Global Policy

"At least 3-star safety on the highest risk roads by 2020 – no excuse”
Zoleka Mandela, Brazil 2015

Star Ratings provide an evidence-based objective measure of crash risk to ensure that safety is built-in to designs for upgrades and new roads prior to construction. For governments and development banks, the process opens the opportunity to set performance-based targets for vehicle occupants, motorcyclists, pedestrians and cyclists that not only improve safety but create a high level of transparency and accountability. The impact of raising high-risk road networks to a 3-star or better standard will deliver long-term savings in death and serious injuries, and hospital and insurance costs whilst also providing a positive way for Governments to track performance. Optimising investment to maximise travel on 3-star or better roads provides agencies with both the business case and metric to manage the safety of road infrastructure in their jurisdiction. The investment and actions needed to meet the UN SDG target to halve road deaths and injuries can be calculated, the return on investment determined, the roads upgraded and the lives saved.

Who is leading the way?

**New Zealand**: 4-star roads of national significance; Wellington Gateway toll roads to be a minimum 4-star standard

**United Kingdom**: 90% of travel on 3-star or better strategic road network by 2020, and 4 and 5-star motorways

**Malaysia**: 75% of travel on 3-star or better high volume roads by 2020 (Malaysia MoT)

**Sweden**: 75% of network at 3-star or better by 2020 and near 100% by 2025

**Netherlands**: No 1 or 2-star roads by 2020

**Australia**: Queensland target 85% of travel on 3-star or better roads by 2020; Tasmanian Midlands Highway 3-star minimum standard

**Chile**: Autopista Centrale toll road upgrade to meet minimum 3-star standard

International financial institution leadership

**Asian Development Bank**: Recommendation for 4-star roads for pedestrians and cyclists in linear settlements and those carrying 50,000 vehicles and more, 3-star or better for all other road projects

**World Bank**: Minimum 3-star roads for projects in India

**Millennium Challenge Corporation**: Eliminating 1 and 2-star roads in Moldova, Philippines and El Salvador

For more information on the business case and policy opportunity for maximising travel on 3-star or better roads, see iRAP’s [How 3-Star or Better Roads Can Cut Road Trauma](#) brochure.
Government agencies across India are investing in safer road infrastructure with the help of the World Bank, Bloomberg Philanthropies and iRAP.

**Key achievements**

Since 2010, IndiaRAP has driven major policy, road upgrade and public health outcomes including:

- iRAP Star Ratings and Safer Road Investment Plans have been used in World Bank funded projects across 10 states to assess road user risk, improve the safety of proposed road upgrades and build local road safety capacity.
- Star rating of 10,500km of existing roads.
- Use of iRAP Star Ratings to inform safe road design by several state Public Works Departments including Assam, Gujarat, Karnataka, Kerala, Rajasthan, Tamil Nadu and Uttar Pradesh. By measuring the impact on crash risk of various road design options, new roads are being built to minimum 3-star standard that saves lives.
- Post-construction assessments undertaken on roads upgraded with World Bank finance, including road safety demonstration corridors in Karnataka and Gujarat. In addition, 3,800km of the highest risk roads from Delhi-Mumbai-Chennai are currently being assessed, along with a further project on the Delhi-Chandigarh road.
- The Rajasthan Government is undertaking statewide assessments and the Government of Andhra Pradesh has an aspirational target for 4-star roads by 2025.

**Saving lives into the future**

- Discussions are underway to build a full IndiaRAP programme with local leadership, local research expertise and local energy to share experience and success across the whole country.
- A Road Safety Centre of Excellence is under development to guide policy and action across all 5 pillars of the UN Decade of Action.

- The IndiaRAP / AusRAP twinning agreement is up and running with a senior VicRoads engineer deployed to work with iRAP in India and connect road safety experts between the two countries.

**For more information**

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**TIMELINE FOR SUCCESS**

2010  First project: Assessment of ‘Safer Greener Highway Pilot’ NH-1 Delhi to Panipat, with National Highway Authority of India (NHAI)
2011  World Bank (WB) GRSF and Bloomberg Philanthropic support for India ‘4 states’ project: Assessment of safety of 3,000km of state highway and building of local capacity in Andhra Pradesh, Assam, Gujarat and Karnataka
2012  Star Rating of road designs used for first time: Karnataka, Assam and Gujarat
2013  Assessments in Kerala and Rajasthan plus additional surveys in Andhra Pradesh, Gujarat and Karnataka
2014  Local road safety engineer joins team to support IndiaRAP outcomes and Uttar Pradesh and Tamil Nadu assessments
2015  Bloomberg Initiative for Global Road Safety support leads to urban assessments in Mumbai. IndiaRAP Workshop hosted and builds local road safety capacity.
2016  Partnership with WB and NHAI to assess safety on Golden Quadrilateral. Agreement with NHAI to assess Panipat-Chandigarh national highway.
2017  Local IndiaRAP Programme planning begins

March 2017
ChinaRAP is a collaboration between iRAP and the Research Institute of Highway (RIOH), Ministry of Transport (MoT). Seed financial support has been provided through the World Bank Global Road Safety Facility by Bloomberg Philanthropies and now ten times that amount is mobilized by the Chinese Government.

**Key achievements**
With a team that has grown from 2 to 11 members, ChinaRAP has driven major policy, road upgrade and public health outcomes including the:

- Star rating of 150,000km of existing roads.
- Upgrade of 30,000km of high-risk roads already.
- Production of national guidelines on the ChinaRAP process and safety countermeasures for installation. The guide gives road authorities ‘permission’ to try countermeasures that go beyond traditional design standards.
- Safe road design training for over 2,000 engineers in 12 provinces.
- Assistance to 12 provinces to conduct risk assessments of more than 100,000km of roads, involving the mobilisation of more than 100 people in road surveys and 300 people in road attribute coding activities.
- An investment of US$1.8 billion in safety countermeasures over the next 5 years, including the expected treatment of high-risk sections on up to 65,000km of roads by the end of 2017.
- Receipt of the 2016 prestigious 5-Star Performer Award at the 9th Asia Pacific Road Safety Conference in Beijing.

An early aim of the ChinaRAP collaboration was to support the development and implementation of the second phase of the central government’s Highway Safety Enhancement Project (HSEP). The first phase (2004-2013) was perhaps the largest road infrastructure safety program in the world, involving the investment of US$5 billion to treat 366,000km of roads. ChinaRAP is now at the centre of a scaled-up HSEP branded as the ‘Highway Safety to Cherish Life’ project.

**Engaging internationally for success**
International engagement through project delivery and technical and knowledge exchange has been a critically important part of ChinaRAP’s development. The team has participated in World Bank and Asian Development Bank projects in China to build project delivery experience and demonstrate the applicability of risk assessments. Since 2012, the team has been involved in 13 projects with a combined value of more than US$2.4 billion. In addition, the RIOH team has contributed strongly to the innovative development of the iRAP Star Rating Demonstrator at the global level and provided project support in Cambodia, Australia, New Zealand and Yemen.

**For more information**
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**TIMELINE FOR SUCCESS**

- **2008** iRAP and MoT sign MOU
- **2009** MoT participate in global iRAP events (2009-2016) and join the Global Technical Committee
- **2009** Local pilot studies undertaken around Beijing
- **2010** World Bank GRSF and Bloomberg Philanthropic support allows scaling up of pilot study activity across a number of provinces (2010-2016)
- **2012** iRAP Regional Director for Asia Pacific based at MoT offices (2012-2016)
- **2014** China State Council announce multi-billion dollar Highway Safety to Cherish Life initiative
- **2015-2017** 150,000km of roads assessed and over 30,000km upgraded (2015-2016) and a further 35,000km of upgrades expected in 2017.

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March 2017
The UK is one of the leading countries in road safety performance, and large scale investments by Highways England and Department for Transport are now being prioritized using the Risk Mapping, Star Rating and Investment Plans as part of the EuroRAP programme led by the Road Safety Foundation. The robust policy and investment planning tools are helping target and shape multi-million pound investments across the country.

Key achievements
The work of the Road Safety Foundation in the UK has been central to significant policy, institutional, investment and programme success. In 2015, Highways England set a target to achieve 90% of travel on 3-star or better roads across the strategic road network by 2020. Recent achievements towards this goal have included:

- The Highways England Strategic Plan 2015-2020 details commitments to ensure that 90% of the network achieves the 3-star or better rating by 2020. The UK Government also announced a 15.2bn GBP investment in over 100 major schemes to help prevent 2,500 deaths or serious injuries on the network.
- Road cross section designs are being developed to ensure the desired star rating targets for each road type are met (e.g. 4 and 5-star smart motorways, 4-star expressways and 3 and 4-star trunk roads at a minimum), thereby delivering a system-wide change in road design standards.
- 44,400km of roads Risk Mapped on an annual basis.

Saving lives into the future
- The Road Safety Foundation and AGEAS partnership to consistently risk map and performance track the road network across the UK, delivers innovative new reporting themes each year. The 2016 launch of results focused on Making Road Travel as Safe as Rail and Air and challenged the culture around what is possible in road safety. The UK Government announced a £175m investment in England’s 50 most risky ‘A’ roads identified in the report.
- The operational inclusion of star rating targets and guidelines will ensure new road designs and upgrades achieve a minimum 3-star standard and save lives.
- Focus on the local economic cost of road crashes has now attracted the attention of central funding agencies looking to maximize the scale and return on road safety investment across England.

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The Millennium Challenge Corporation (MCC) is working in partnership with the Government of El Salvador to deliver the US$101.6 million Coastal Highway Expansion Project. The work is part of MCC’s $365.2 million El Salvador Investment Compact with the Government of El Salvador. As part of the project, the MCC is implementing road safety capacity building and Star Rating targets for the project building on similar success in the Philippines and Moldova.

The Coastal Highway Expansion Activity sought to relieve congestion at the most-trafficked segment of El Salvador’s coastal highway (CA-2). The CA-2 is one of the two most important logistical corridors in the country and connects El Salvador’s major logistical nodes, including its two sea ports and the country’s only international airport. The object of the project was to duplicate 24km of the road between Zacatecoluca and the Comalapa Highway and rehabilitate and improve 3km of the two lane segment between the Comalapa Highway and the intersection to La Libertad.

iRAP star rated the project’s detailed design drawings, proposed modifications to the design that would improve safety for road users, then worked closely with the road authority and designers to improve the safety of subsequent iterations of the design.

**Key achievements**

- The project resulted in a safer road design, particularly for vulnerable road users, lifting the original design from a largely 1-2 star rating, to a 2-5 star rating. It also lead to a better understanding within the road authority of road safety design principles.

**Saving lives into the future**

- The improved design will lead to a safer road that will save lives and reduce serious injuries for years to come.

**For more information**

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