

FA4: Safe Transport by Road

(INSTILLING A CULTURE OF SAFETY WITHIN THE WORKFORCE; AND
PERFORMANCE OF NATIONAL ROAD SAFETY AGENCIES)

EMBEDDING EFFECTIVE ROAD SAFETY PRACTICES IN ROAD AUTHORITIES

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1. INTRODUCTION

This paper sets out:

- A brief summary of the general background to, and importance of, road safety, as they relate to Road Authorities.
- Why a specific focus on road safety in a Road Authority is not just beneficial but essential, and requires a specialist technical group within the Road Authority structure.
- To distinguish between the various types of road safety assessment techniques.
- To identify key simple practical steps to establishing a road safety culture and practices in a Road Authority.

2. OVERVIEW OF THE IMPORTANCE OF ROAD SAFETY, WORLDWIDE

The background

Almost every person, anywhere in the world, interacts with a transport system every day, in cities or in the most rural and isolated of locations, from the equator to the polar ice caps. The needs and desires to travel are universal motivations, for work, social interaction, or to meet basic needs such as shelter, warmth, food, and clothing.

Vehicle use and ownership are increasing throughout the world, placing increasing pressures on:

- road networks and capacities, with fundamental differences in characteristics and approaches to urban and rural roads.
- all types of road users and their safety.
- management of road user movements, conflicts, controls, congestion, and enforcement.

- financial budgets.
- economic development.
- environment health.
- communities, their lifestyles, and how they change over time.

These pressures result in governments choosing to invest money in:

- new roads, and improvements to existing roads, in rural and urban areas.
- improvements to road management and maintenance.
- improvements to public transport.
- facilities and the environments for non-motorised walking and cycling.

Better road surfaces, and straighter alignments favour drivers and allow vehicles to be driven faster. Unless the project process introduces targeted measures to make the road environment safer, and/or restrain speeds, then the numbers and severities of crashes will increase, and the numbers of people injured and killed in traffic crashes will increase, sometimes dramatically.

And unless the project process recognises, and provides for, the importance and particular needs of public transport and non-motorised modes, then the people using these modes become marginalised afterthoughts in the project priorities to provide higher capacity and higher speeds for motorised vehicles.

Worldwide people continue to die, or live with and suffer serious injuries. Current estimates are that around 1.3 million people/year die as a result of crashes on roads, and 50 million/year are injured. Worldwide the need to improve road safety becomes ever more urgent. Worldwide, everyone supports the principle of improving road safety.

So why is more not done? Why is obtaining support and finance for specific measures so variable, with many reasons and objections - ranging from reasonable concerns to spurious blocking - raised against any specific measure. Why do decision makers assess the relative balance of risks and costs in ways which can profoundly, and often deliberately, ignore the dangerous consequences. For example, 1:4 embankment side slopes are “too expensive” or “not according to the standards”, but with little or no consideration of the counter-balancing costs of the consequent fatalities and serious injuries. Such thinking accepts road fatalities and injuries as “collateral damage”, with a profound disconnection between road safety principles, and the practices.

There are strategies and guidelines for addressing the problems, but they require coordinated, multi-disciplinary, multi-sector actions, in particular in the areas of: infrastructure; vehicle standards; education; enforcement; emergency and health services; and institutional structures and development. To be effective these

strategies require sustained efforts, and persistent champions, without which the problems remain.

Principles of the Safe System approach

Traditionally road safety has relied on the “three e’s”: **engineering** (of infrastructure and vehicles), **education**, and **enforcement**. Engineers who plan and design roads concentrate on the engineering aspects, and prepare the design primarily in accordance with design standards. Not only are these relied upon to deliver an adequate design, but they are often cited as justification for not considering road safety issues any further.

But design standards do not taken sufficient account of human fallibility, adverse behaviour, nor the physical tolerance of the human body to impacts. People can be educated to be careful, competent, and responsible, and they can learn to expect to be sanctioned if they are not. But too little attention has been given to what happens when people simply make “honest” mistakes. “That’s their fault and their problem for making a mistake” is a common response. But everyone makes mistakes. And the consequences of those mistakes can be anticipated with the aim of avoiding them, or mitigating the consequences.

In 1994 Sweden launched “**Vision Zero**” for roads, with the principle that “**No loss of life is acceptable**” and the aim of “**a transport system in which the *potential* for death or serious injury has been removed**”. This has evolved into “**The Safe System**”, which is designed with people - not vehicle movements - at its centre, taking into account human fallibility and vulnerability and the physical limits of the human body to withstand impact. Safe Systems accept that even the most conscientious person will make a mistake at some point, and the goal of safe systems is to ensure that these mistakes do not lead to a crash; or, if a crash does occur, it is sufficiently controlled to not cause a death or a life-changing injury.

These are not new or unachievable aims, they are already applied throughout air and rail transport systems. The difference with road networks is that the numbers of individual drivers making individual decisions are far greater, so the potential for mistakes is far more complex to control.

Even more, the Safe System has an underlying communal approach; responsibility is shared by everyone for the communal good. Policy makers, planners, engineers, vehicle manufacturers, fleet managers, enforcement officers, road safety educators, health agencies and the media are accountable for safety, and every road user, whether they drive, cycle or walk, is responsible for complying with the system’s rules. The Safe System also aligns directly with broader communal ethics and social and environmental goals associated with road traffic, such as congestion, noise, air pollution and lack of physical exercise.

The Safe System acknowledges that:

- people make mistakes, errors of judgement, that lead to crashes.

- there are limits to the forces that the human body can withstand without resulting in serious injury or death.
- these forces are the result of the type of crash and speeds of impact.
- the most vulnerable road users are the pedestrians - especially children and the elderly - cyclists, and motorcyclists.
- good road transport systems should be planned and designed to take account of these errors, forces, and vulnerabilities, so that collisions are survivable.

The 2010 UN Global Plan for Road Safety proposed a “five pillar” strategic approach to safe road systems, comprising:

- **Speed management**, including enforcement.
- **Safer roads, including roadsides** (often ignored by highway engineers, focussed on designing the alignment, for vehicles).
- **Safer vehicles.**
- **Safer road users** through education and training. In particular challenging the view that crashes are inevitable,
- **Effective post-crash response**, and emergency services.

Applying the Safer Roads Approach

Road Authorities must have a **duty of care**, specified in law, to provide a road network infrastructure management service which requires them:

- to take “all reasonable steps” to prevent or otherwise minimise road crashes and casualties.
- improve safe access to the highway for all, especially vulnerable road users.
- address road safety issues that affect quality of life in our communities.

“All reasonable steps” includes:

- road safety assessments, carried out by experienced road safety professionals.
 - safety remedial engineering schemes, designed by experienced road safety professionals.
- education, training and publicity programmes.

In order to achieve progress, the network safety management service must address:

- availability of detailed and reliable crash data.
- speed (and speed management).
- different needs of rural and urban roads, and main roads and local roads.

- the importance of protecting vulnerable road users, including perceptions of dangers, and community lifestyle issues.
- financial investment, and commitments at the highest levels of government.
- commitment to implementation of a detail practical Road Safety Action Plan.

And the measure of successful eventual outcome is very simple: reductions in the numbers of deaths and injuries on the road network.

3. CLARIFYING THE DIFFERENT TYPES OF ROAD SAFETY ASSESSMENT

Road safety assessment techniques can be divided into techniques for:

- **existing roads.**
- **proposed new road schemes**, including rehabilitation schemes, and traffic management changes.

For each of these areas there are two main approaches to assessment:

- a “**Reactive Approach**” using crash data to identify problems.
- a “**Proactive Approach**” by direct inspection, of the existing or proposed infrastructure.

The terminology is confusing, overlapping, and often misquoted. For **existing roads**:

- **Crash data analysis** is a desk-based process which reviews historical crash data to identify road safety remedial schemes. The most well-known of these is “**black-spots**”, but “route” and “area-wide” schemes can also be identified.
- **Road Safety Inspection (RSI)** is a detailed on-site reconnaissance along existing road infrastructure to identify practical safety problems.

For **proposed road schemes**:

- **Road Safety Impact Assessment (RSIA)** predicts area-wide changes in crash numbers and characteristics arising from the introduction of a road improvement. It can be used during the pre-feasibility stage to compare alternative schemes, but in practice is rarely used anywhere.
- **Road Safety Audit (RSA)** reviews the various stages of road design and construction of a new project, to identify possible improvements to safety. Any project which will alter traffic management in any way should be considered for RSA.

The different approaches to road safety assessment are applied to different stages of the project process of planning, design, construction, and operations and management as shown.

In practice RS Audit and RS Inspection require very similarly experienced road safety engineers - with several years' experience of crash analysis, and design and implementation of remedial measures and schemes - although the outputs of RSA and RSI take different forms, either recommendations for changes to proposed road designs, or practical remedial actions to existing road infrastructure.

iRAP (international Road Assessment Programme) is a particularly valuable computerised application of RSI, based on intensive video-based inventory data collection. It produces simple STAR safety ratings for roads, followed by an SRIP (Safer Roads Investment Plan), and is used widely throughout the world.

Box 1 *Approaches to road safety assessment*

New road proposals

Existing roads



-- RSIA -->
Impact Assess

----- RSA ----->
Audit

----- RSI ----->
Inspection
(including iRAP)

----- **Crash analysis** ----->
and remedial treatments

4. EMBEDDING ROAD SAFETY CULTURE AND PRACTICE IN A ROAD AUTHORITY

This section recommends six key steps that a Road Authority should take to establish good road safety practice in its Road Authority.

Figure 2 *Key steps to establish road safety practice in a Road Authority*

(1) Identify “champions”.

(2) Establish a national legal basis for a duty of care that requires the Road Authority to take “all reasonable steps” to prevent or otherwise minimise road crashes and casualties.

(3) Establish and empower a specialist Road Safety Unit within the Road Authority, and formalise protocols and procedures for that Road Safety Unit to require road safety assessments of all projects, and advise on the safety aspects of design standards.

(4) Contribute to a national strategy and Action Plan for road safety.

(5) Increase understanding of road safety issues, and road safety engineering capabilities, inside and outside the Road Authority.

(6) Establish a register of Road Safety Inspectors and Auditors and Inspectors.

(1) Identify “champions”

There is a need for high profile people to “champion” road safety.

This should start with a top political figure, possibly even the Head of State, Prime Minister, or Minister of Transport, who should be requested to issue a formal public statement of support and intent. The relevant UN Declarations by successive UN Secretary Generals provide the best example of what would be most useful.

This can encourage and empower people - at all levels in the various political, financial, and technical processes - to speak out robustly in support of road safety, reinforced by top-level support.

(2) Establish a national legal basis

The legal system should establish an enforceable “**duty of care**”, for all Road Authorities in the country to take all reasonable steps to investigate, maintain, and where necessary improve road safety. This should apply to existing roads, but also means that newly built roads must be in a “safe condition” when opened to use by the public.

The duty of care establishes that where a road safety hazard has been identified, on an existing - perhaps newly opened - road, and those responsible do not make a reasonable attempt to mitigate the hazard, then any of the Road Authority, their designer, consultant, or contractor, may be held partially or wholly responsible for any serious damage or injuries which are attributed to that hazard. If negligence is proven there may be professional, financial, legal, and criminal consequences, not only for the organisations, but also for individuals in those organisations.

(3) *Establish and empower a specialist Road Safety Unit within the Road Authority*

The Road Authority must seek to ensure that consideration of road safety issues, for all road users, is embedded throughout their thinking and activities, in the same way that geometry, pavement structure, bridges, drainage are fundamental considerations. Effective protocols and procedures must be formalised in the Road Authority to ensure that everyone understands that road safety considerations and activities are integral.

Road safety considerations need to be embedded in:

- project planning and execution of new projects from the very start of project planning.
- the management of existing roads.

The Road Authority should establish and empower a **Road Safety Unit** to provide a focus of professional competence. The Road Authority should establish a structure, responsibilities, duties, activities, and outputs, and ensure its continuing technical and financial viability.

The **Head of the Road Safety Unit** should take proactive responsibility for staff requirements, responsibilities, activities, and outputs, and securing adequate funding and resources from the Road Authority.

Figure 3 Typical areas of activities for a Road Safety Unit

Crash and traffic data, summaries, & GIS applications

Existing roads: RSI, Implement remedial engineering schemes

Emergency response & survival services

Road safety education, campaigns, & training

Road Safety Plan, Design Standards, & Research

Proposed roads: RSA, CTM, RSIA

A key protocol should require details of all proposed new projects, including traffic management schemes, to be referred to the **Road Safety Unit** at the very start of the project identification and planning process, to determine the requirements for road safety to be included in the project process. The Road Safety Unit should respond with their formal procedures and technical guidance for road safety reviews and assessments, including requirements for Road Safety Audits. If these requirements are to be addressed adequately during the project, the Road Authority must ensure that they are specified explicitly in Terms of Reference and Contract Documents.

The Road Safety Unit should also establish procedures and technical guidance for Road Safety Inspection of existing roads, and responding to problems identified.

Figure 4 *Ensure road safety is embedded in new projects from the start*

Feasibility Study stage: The Designers must:

- collect and analyse data on the number of crashes, number of deaths and injuries on the road network in the vicinity of the proposed project, for each of the previous three years.
- propose remedial actions to be included in the design.
- prepare a **Road Safety Impact Assessment**, which quantifies the road safety impacts of the road proposals on the wider road network.

Design stages: The Designers should ensure that the design contains appropriate safety measures intended to minimise the numbers and severities of crashes by addressing the common types and contributory factors of crashes, in particular:

- speed management, and overtaking behaviour,
- forgiving roadsides,
- meaningful protection of vulnerable road users.

The Design Reports must contain an assessment of the effectiveness of the proposed measures, and the envisaged impacts on crash numbers and severities.

Construction Traffic Management (CTM) must be addressed in the Contract Documents, which should require the Contractor to submit a CTM Plan, which must be approved before any construction works can be commenced on site.

Construction supervision site staff must be tasked with routine checking and reporting on CTM arrangements, and applying sanctions if justified.

Road Safety Audit: The Client must ensure that:

- all required Stages of Road Safety Audit are carried out.

- only accredited Auditors acceptable to the Client are commissioned.
 - each Audit recommendation is responded to, and agreed changes are undertaken.
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(4) Contribute to a national strategy and Action Plan for road safety

The typical areas of coverage of a national strategy and Road Safety Action Plan are set out below.

The Road Safety Unit should be the focal point of the Road Authority's contributions, advising and assisting with all these areas, in consultations and liaison with the other interested agencies.

Figure 5 Typical areas covered by a national strategy and Road Safety Action Plan

- 1 Road safety co-ordination and management. This should be addressed by the establishment of a broad consultative National Road Safety Council, with a secretariat which is responsible for preparing and implementing a National Road Safety Action Plan.
 - 2 Road safety funding
 - 3 Road crash data system
 - 4 Road safety research
 - 5 Planning, designing, constructing, and managing safe roads
 - 6 Greater protection for vulnerable road users
 - 7 Vehicle safety standards and compliance
 - 8 Public transport regulations and compliance
 - 9 Driver training, testing and licencing
 - 10 Legislation for road traffic and use of the road
 - 11 Enforcement of road traffic legislation
 - 12 Road safety awareness, in particular for children, the elderly, and people with disabilities
 - 13 Effective emergency and health services
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(5) Increase understanding of road safety issues, and road safety engineering capabilities

It is in the Road Authority's own interests to raise understanding of road safety issues, and improve road safety engineering capabilities, both inside the Road Authority among project directors and managers, and outside the Road Authority among designers, consultants, contractors, and the Traffic Police, and also among politicians and local communities.

It needs to be understood that a highway engineer cannot be transformed into a road safety engineer by a brief few days of training. A competent road safety engineer needs to have accumulated substantial experience - usually taken as at least two years full-time - of:

- crash data analysis, and an understanding of what contributes to the severity of crashes
- road safety engineering remedial scheme design, implementation, and monitoring.
- associated enforcement and education techniques.

The Road Authority should establish a regular programme of training workshops in road safety engineering and road safety assessment, internally for managers, and senior and junior professionals, and outside the Road Authority primarily targeting consultants, contractors, and the Traffic Police.

(6) Establish the Road Authority's own register of road safety Inspectors and Auditors

The Road Authority should:

- establish its own register of Auditors accredited by the Road Authority to carry out RSI and RSA on the Road Authority's network.
- set criteria for Auditors to be accepted onto the register, which should be divided into Team Leader (Senior), and Team Member (Junior) Auditors.
- establish an application procedure and scrutinise applications.

In order to gain accreditation **Audit Team Leaders and Members** must be able to demonstrate:

- appropriate levels of **education and training**.
- **substantial experience**.