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Road Safety Audit

What is a road safety audit?

A road safety audit is a formal procedure to assess the accident potential and likely safety performance of a specific road design or traffic scheme. It can be applied to a new construction or to an alteration of an existing road.

Audits are intended to identify potential road problems that can put safety at risk by looking at the scheme as if through the eyes of the potential users, and to make suggestions for solving eventual problems applying the principles of road safety engineering.[1] It is important to minimise the accident risk at the design stage already in order to decrease the likelihood of having to take accident remedial measures later. Thereby the whole-life cost of the scheme can be reduced.

Road safety audits are therefore a tool to prevent accidents on new or modified roads. They often complement low-cost measures to reduce accidents on existing roads.[2]

Where are safety audits carried out?

Mandatory safety audit procedures programmed at well-defined stages during the planning, design and construction of road schemes have been used in the UK, Denmark, Australia and New Zealand for several years. They have contributed to identifiable improvements in road safety.

In the U.K. audits have been compulsory since 1991 on trunk roads and motorway schemes. However, the guidelines on safety audits, produced by the Institution of Highways and Transportation (IHT) in 1990, were also adopted by many local authorities who started to carry out safety audits on local roads. Currently, over 10,000 road safety audits are conducted every year in the UK alone, suggesting that they have become a well-accepted practice in reviewing the road network.

In Germany, first experiences with road safety audits have been promising. Audits are now compulsory on national roads, and 7 out of the 15 Länder implement internal audits on their regional network. These are based on a set of guidelines published in 2002.

Who carries out the audits?

It is essential that road safety audits are carried out independently of the design team. They should be undertaken by people who have experience and up-to-date expertise in road safety engineering and accident investigation.

It is preferable to hire a small auditing team rather than a single auditor. This is because a team can jointly offer more skills than an individual, and a team can operate its own system of checks and balances.

The auditing process

The process of carrying out an audit for an individual road scheme can comprise up to five stages,[3] some of which can be combined for smaller schemes:

1. The feasibility stage	**The nature and extent of the scheme are assessed, and the starting points for the actual design are determined, including route options, the relevant design standards, the relationship of the scheme to the existing road network, the number and type of intersections, and whether or not the new road will be open to all kinds of traffic.**
2. The draft design stage	**Horizontal and vertical alignments and junction layout are broadly determined.**
3. The detailed design stage	**Layout, signing, marking, lighting, other roadside equipment and landscaping are determined.**
4. The pre-opening stage	**Immediately before the opening, a new or modified road should be driven, cycled and walked. It is advisable to do this under different conditions such as darkness and bad weather.**
5. Monitoring of the road in use	**When a new or improved road has been in operation for a few months, it is possible to assess whether it is being used as intended and whether any adjustments to the design are required in the light of the actual behaviour of the users.**

The results of the audit will be documented and reported at each stage to the design team and the client of the scheme. They will usually include recommendations for improvements to the design.

Safety audits on existing roads

The development of safety audits, and especially the fifth stage of monitoring the road in operation after some months, raises the question of whether safety audits or analogous safety checks should not be done also on existing roads. It is obvious that an independent assessment of existing roads is likely to reveal deficiencies and indicate the scope for cost-effective measures additional to the accident remedial measures that are routinely identified by investigation of accident occurrence. Yet the task of checking all existing roads is demanding, in terms of resources.

The issue of safety checks on existing roads has been investigated in France by means of a pilot study covering nearly 2,000 km of roads ranging from motorways to local roads. The experts recommended that such checks be carried out highlighting the complementarities between safety checking and accident analysis, the range of deficiencies which could be checked, and ways of prioritising among the different types of road sections.[4]

Are safety audits cost-effective?

The cost-effectiveness of road safety audits is at present difficult to quantify rigorously. Nevertheless, there is evidence that audits are highly cost-effective.

The costs of carrying out the auditing procedure are fairly easy to determine. It has to be borne in mind, however, that the costs of a safety audit are not only those involved in completing the audit itself. In those cases where a design change is recommended, the cost of the design changes will also have to be taken into account. The extent of these changes depends upon the quality of the original design.

Experience from the U.K. has shown that some redesign was required in about half of the schemes audited. It has been estimated that the costs of redesign ranged from about 0.5 to about 3% of a scheme's total costs, depending on the size of the scheme.[5] Australian and New Zealand experience suggests that safety audit adds about 4 percent to road design costs.[6]

To calculate the potential benefits of road safety audits, an estimate has to be made of the difference in the accident costs of schemes which have been subject to a safety audit, compared with the costs of similar schemes which have not.

The main immediate benefits of the procedures will be accident savings. In addition, there are also other, longer term and more broadly based potential benefits such as improvements to the management of design and construction, reduced whole-life cost of road schemes, the development of good safety engineering practice, the explicit recognition of the safety needs of road users, and the improvement of design standards for safety.[7]

Regarding the immediate road safety benefits, a study was undertaken in England in 1994 in which two groups of matched schemes, one group having been audited and the other not, were compared.[8] This study revealed a reduction of about 1 accident per site per year for audited schemes, compared with the schemes that were not audited. The accident costs saved in each scheme are well in excess of the cost of auditing the scheme. [9]

Estimates have also been made of the benefits to a local highway authority of applying road safety audits to all of its road schemes.

The Lothian Regional Council (a former local highway authority in Scotland) counted about 3,000 injury accidents per year. It has been estimated that the consistent application of road safety audits would yield a 1 percent accident saving, and that such a saving would represent a benefit to cost ratio of about 14:1.

In New Zealand a potential benefit to cost ratio of 20 has been estimated for the application of road safety audit procedures.

There is sufficient evidence to warrant the EU and Member States taking measures leading to routine application of safety audits to schemes for new road construction and modification of existing roads. Regarding the costs of such audits, experience has shown that the saving of only one injury accident will more than repay these costs, even if both the audit and any subsequent redesign are taken into account.

EU activities related to road safety audits

The Trans-European Road Network (TERN) provides an opportunity for the EU to promote road safety audits. In July 1996, a decision by the Council of Ministers and the European Parliament authorised the European Commission to propose guidelines such that the TERN should "guarantee users a high, uniform and continuous level of services, comfort and safety" on this network[10]. This legal obligation, together with the considerable growth in international transport in recent years, makes it necessary to improve the safety of the Trans-European Road Network. The European Commission, in its Third Road Safety Action Programme (3RSAP) has committed to propose a framework Directive on road infrastructure safety. This would introduce, inter alia, road safety audits for roads on the Trans-European Road Network. The Commission is expected to issue a proposal for a Directive as part of the mid-term review of the 3RSAP to be published in autumn 2005.

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