ROAD SAFETY AUDITS - TOWARDS A SAFER ROAD INFRASTRUCTURE

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1 INTRODUCTION

In order to meet the long term road safety policy goals laid down by the so called "Speerpuntenbeleid" (Spearhead Policy - Ministry of Transport, 1990), the Dutch Government launched the comprehensive "Sustainable Safety" (Duurzaam Veilig, SWOV 1992) programme in the early 1990's. To meet the road accident reduction goals, the programme was designed to be implemented in two phases. The first phase was formally launched in 1997 (Ministry of Transport, 1997) and has as aim a reduction of 25 per cent in injury accidents by the year 2000, using 1985 as the base year. The 2nd phase has targets of a 50 per cent reduction in fatalities and a 40 per cent reduction in injury accidents by 2010 and using 1986 as the base year.

The basket of implementation measures for phase one of Sustainable Safety were formulated in a document now known as the "Convenant" (Ministry of Transport 1997). This document sets out 24 implementation goals and strategies. To ensure that these would be realised the government used the "convenant" as the basis for a formal agreement between Central Government and the major stakeholders in road safety in the Netherlands, namely the Association of Dutch Local Authorities (VNG), the Union of Water Management Authorities (UvW) and the Interprovincial Consultation Body (IPO). The agreement to implement the described strategies was entered into in December 1997 and is now well advanced.

The primary effort of the first Phase of Sustainable Safety is on reclassifying the existing road network and adapting the road infrastructure to accommodate the concept of self-explaining roads. However, hand in hand with this, special attention is being paid to enforcement, legislation, information and education campaigns. Also supporting measures are being developed and implemented to enhance the overall effect of the programme on road safety. One of the supporting measures currently being developed in the Netherlands is the road safety audit.

2 BACKGROUND

Historically road traffic safety has been a high priority on the political agenda in the Netherlands. Consequently policy has been well supported by focused programmes which now manifest themselves in a continual downward trend in road accident fatalities (Figure 1). Serious injury accidents (Figure 2) have remained relatively constant over the same period. During the latter half of the 1980's it became apparent that the road safety targets (especially injury accidents) set by the Spearhead Policy would not be reached without an additional impulse. The result of this was the development of the sustainable safety programme. Furthermore, while overall reductions were still evident, analysis of accidents on certain parts of the road network reflected that remedial actions were necessary to reduce the large discrepancies in fatality and serious injury accident rates on the different road classes. Whilst freeways in the Netherlands were the safest roads, urban arterials and other urban roads were by comparison highly unsafe with rates almost seven times as high (Figure 3).

The intention of Sustainable Safety is to re-classify the road network into essentially three road categories, namely through roads (incl. freeways), distributors and access roads. To support the re-classification, the infrastructure for each road category will be unique in character. In this way each type will be instantly recognisable to the road user and thereby provoke the correct behaviour (the concept of self explaining and forgiving roads). In order to ensure that the road infrastructure is indeed as safe as it is intended, the road safety audit was recognised as a tool to enhance the road safety performance of the adapted road infrastructure.

Figure 1 : Fatal injury accidents (1986 - 1998)

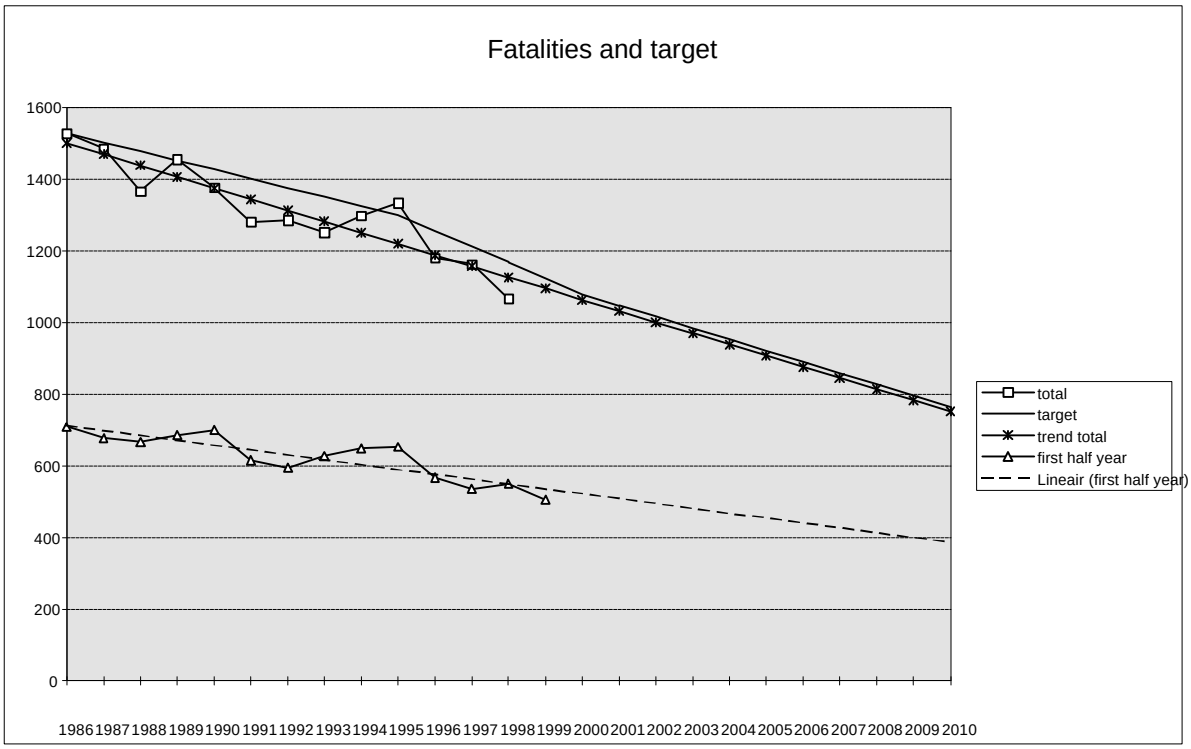

Figure 2 : Serious injury accidents (1990 - 1998)

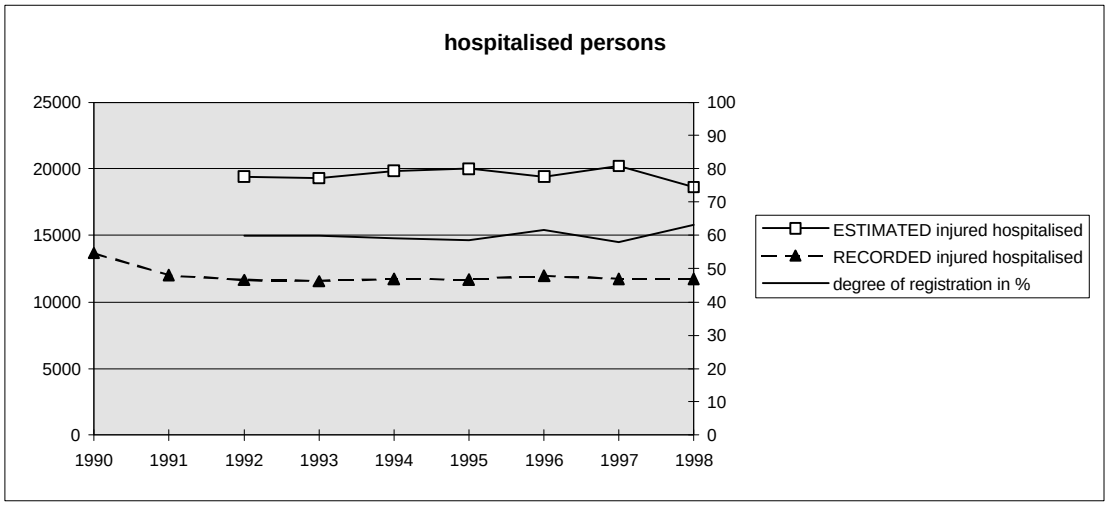

Figure 3 : Road accident casualties on different road classes in the Netherlands (1986, SWOV)

Road type	maximum speed	Mixed Traffic	At grade crossing/ median separation	Casualty rate (Casualties/10^6 km)
Residential	30	Yes	Yes	0,20
Urban collector	50	Yes	Yes	0,75
Urban arterial	50/70	Yes/No	Yes	1,33
2-lane rural roads	80	Yes	Yes	0,64
Undivided 2-way rural roads (ltd. access)	80	No	Yes	0,30
Motorways	100	No	Yes/No	0,11
Freeways	100/120	No	No	0,07

2.1 The importance of road safety audits

Road safety audit is a pro-active approach that allows deficiencies in road infrastructure planning, design, construction and operation to be identified before the facility is built or opened to traffic. The philosophy behind road safety audits originated in the early 1980's in the United Kingdom. Here the approach swung from the traditional (reactive) remedial treatment of high accident locations to (pro-actively) identifying safety deficiencies during the design and build process ("prevention is better than cure"). Since then audits have, in one form or another, been formally adopted in the UK (mandatory for trunk road schemes), Australia, New Zealand, Denmark and Norway. Other countries (France, Greece, the Czech Republic, Portugal and Spain) are currently developing road safety audit procedures for implementation (Safestar,1998). In practically all cases, with the exception of the UK and to an extent New Zealand, the audit is essentially a voluntary process supported by guidelines and procedures. The decision to apply audits as mandatory process rest on a number of factors which include cost considerations, legal implications, certification procedures etc. Opinions regarding this vary from country to country and the merits of a mandatory or a voluntary process can only be decided on the basis of local conditions and opinions.

The international development of the road safety audit resulted in a number of guidelines, supported by audit checklists and audit procedures being implemented and tested in each country. Essentially these were based on UK practice. In most countries where audits are applied the guidelines form the cornerstone for assessing the potential road safety performance of a new, reconstructed or existing road. Road safety audits are generally conducted throughout each stage of the road infrastructure life cycle (feasibility, preliminary design, detailed design, pre-opening, post opening and/or existing roads). In most countries the audits are conducted independently of the design team by qualified and impartial road safety specialists. In most cases the audit is a formal process where the audit results and recommendations are documented and presented to the client. Potential road safety deficiencies are pointed out and these are formally reacted upon by the client. Deviations from the audit findings/recommendations are motivated by the client. In this way the audit provides a unique tool for a qualified second opinion of the project, thereby ensuring that road safety is an integral part of the road infrastructure life cycle.

With the development of Sustainable Safety in the Netherlands it was felt that road safety audit could play an important role in the realisation of a so called "sustainable safe and forgiving road environment". Considering the scope of sustainable safety, audits could identify potential road safety deficiencies, both on the existing and the planned restructured road network. By independently assessing projects in the realisation of a safe sustainable road infrastructure has the added benefit of value addition in the design process. Ultimately

this leads to a growing awareness of (sometimes overlooked) road safety issues among designers. This in turn enriches the design philosophy and approach and ensures that design standards and guidelines are adapted timeously. Ultimately this should lead to significant reductions in the number of road accidents where the road environment is a major contributory factor. Clearly the number of high accident frequency locations should also be reduced.

3 DEVELOPMENT OF ROAD SAFETY AUDITS IN THE NETHERLANDS

As mentioned earlier, Road Safety Audits were identified as a supporting tool in the implementation of phase 1 of Sustainable Safety. Consequently, the Transport Research Centre (AVV) of the Ministry of Transport, Public Works and Water Management commissioned the SWOV in 1997 for the development of a road safety audit procedure or protocol.

Principally the road safety audit in the Netherlands has the following goals :

- to reduce the number of infrastructure related road accidents;
- to provide road infrastructure of the highest road safety standards;
- to keep standards and guidelines dynamic;
- to apply road safety experience in design and construction; and
- to create awareness among road designers of elusive road safety issues.

Considering that many overseas countries had extensive experience with road safety audit, the SWOV used this as a basis for developing a framework applicable to the Netherlands. Comparisons were made with regards to the definitions, the stages of audit, the actual audit process, the checklists, the legal status and the financial and other implications. This exploratory phase reviewed the development of road safety audits in Australia, New Zealand, the United Kingdom, Denmark, Norway and the United States of America (van Schagen, 1998)

3.1 Definition of Road Safety Audit in the Netherlands (van Schagen 1998)

A proposed definition for road safety audits in the Netherlands is :

"*a formal standard procedure in the different stadia of design and construction of the road infrastructure in order to come to an independent judgement of the possible consequences of the design for road safety*."

This definition is subject to review during the development cycle. The definition does not detract significantly from other international definitions with the emphasis on "independent judgement". Assumed in the definition is that the judgement is made by qualified persons.

3.2 The road safety audit protocol

Based on the overseas experience a road safety audit framework for the Netherlands was prepared under the technical direction of a steering committee. The document was published as a draft document in 1998 and in essence is a combination of Australian and UK practices. The checklists have been revised to reflect the Dutch situation and design practice.

The audit protocol developed by the SWOV applies to five design stages namely:

- Basic planning stage (concept categorisation plans);
- Preliminary design stage;
- Detailed design stage;
- Pre-opening stage; and
- Operational (existing roads) stage.

Audits in the Netherlands are intended to be applied as a voluntary procedure. The audit protocol (SWOV, 1998) outlines the process for initiating and executing an audit. The steps in the execution are :

- Identify the project and project scope. This step is initiated by the road authority or developer. Important in this phase is that the project area is not restricted to the immediate development area. The scope of the audit is extended to include potential road safety impacts on the surrounding area.

- Initiate the design process. The road authority appoints a design team responsible for further development of the road infrastructure project.

- Appoint auditor or audit team. Depending on the stage and extent of the project, the road authority appoints an independent, impartial and qualified auditor or audit team best suited to the specific project. The nature of the project determines the specific expertise required and on the basis thereof the auditors are selected. To assist in this an audit secretariat has been formed and it is tasked with administering and co-ordinating road safety audits nationally. The secretariat assists with the liaison between the auditors, road authority and designers.

- Inception meeting. A meeting is held between the road authority (client), the auditor/s and the design team. This meeting takes place early in the design process and serves to clarify the brief, the scope and the nature of the project. It also is intended to present relevant documentation to the audit team and to discuss possible areas of conflict and/or other potential problems arising from the project.

- Audit phase. The audit team makes an independent road safety assessment of the intended project. The actual audit entails a critical review of proposed designs (in whichever stage these may be) and relevant documentation, site visits during the day and night and where necessary further discussions with the designer and/or client.

- Drafting of an audit report. On the basis of the road safety assessment and evaluation of the proposed project a formal audit report is compiled. This contains an outline of the brief, description of the proposed development, outline of the study area, a detailed road safety assessment of the proposed project designs, conclusions and finally recommendations. Important to note is that the recommendations are not in the form of solutions but rather areas of possible concern to which the designer should pay specific attention.

- Formal reaction from the client. The audit report is submitted to the road authority and where necessary discussed with the road authority and the design team. The road authority drafts a formal (written) reaction to the proposed recommendations and the intended future course of action.

- Incorporate design changes. The road authority discusses the proposed recommendations with the design team and solutions to potential road safety constraints are developed and incorporated in the design.

As a follow-up phase to the development of a road safety audit protocol, a series of actions were formulated to gain experience in the procedures, to develop capacity with the audit and to refine processes and organisational issues with respect to future implementation of the audit.

4 CURRENT STATUS OF ROAD SAFETY AUDITS

Following the drafting of an audit protocol and audit checklists in the Netherlands, a pilot phase was initiated. However, before the pilot audits were realised a one day road safety audit course was developed (SWOV, 1998) to train future auditors. The course contained both theoretical and practical modules. Potential future auditors were identified and invited to attend the course. In addition, a series of workshops were organised to further increase awareness of the audit and to highlight their potential in improving the road safety performance of road infrastructure.

Following the training and workshops, four pilot audits were completed in 1998. A further 10 pilot audits will be conducted in 1999. For the pilot phase of the road safety audit development cycle, the government made available a subsidy of 50 percent, up to a maximum of *f*l5 000,00 (about R15 000,00), per completed audit.

To date road safety audits have met with mixed reactions, especially from the point of view of road authorities and, to a lesser extent, designers. A summary of the reactions to date include :

- An inherent fear appears to be the extra costs associated with the audit itself and with implementing changes on the basis of the audit recommendations.
- Evident is the belief that design standards and guidelines automatically incorporate road safety features and therefore new designs are automatically safe.
- Believing that standards and design practices are at an optimum can in certain situations lead to tensions between the road authority, the designer and the auditor. This may arise in situations where the professionalism and ability of the designer or auditor may be questioned.

It is anticipated that these issues will, with time, resolve themselves as the audit becomes more widely used and its benefits become more obvious.

5 THE WAY FORWARD

The road safety audit is still in a development phase in the Netherlands. At the completion of the pilot phase (anticipated at the end of 1999) sufficient experience will have been gained with the draft protocol and checklists to affect refinements and modifications. Furthermore, the pilot phase intends to test the acceptance of future users to the processes defined in the protocol. Based on the results of the pilot phase, a strategy for wider implementation will have to be developed and implemented. Resistance amongst road authorities will need to be overcome and it is anticipated that additional communication and training materials will be developed. Further research related to the benefits of road safety audits may form the basis for this.

It is anticipated that road safety audits in the Netherlands will remain a voluntary process. However, the legal implications of applying (or not applying) road safety audits need to be clarified to resolve uncertainties surrounding public liability. We have embarked on a journey with road safety audit, and as with most journeys one encounters many difficulties and challenges. However, we believe that road safety audits will be the tool with which we will ensure that the infrastructure we provide is safe and self-explanatory for our users, both now and in the future.

6 REFERENCES

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