ROAD SAFETY AUDITS: THE WAY FORWARD

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ABSTRACT

The South African Road Safety Manual (SARSM) was published in 1999 and includes guidelines on road safety audits (RSA). The development of SARSM was a proactive process for improving the road environment with respect to road safety but was never formally implemented in South Africa. This paper assesses recent international developments pertaining to road safety auditing and reports on a review of the experience by road safety practitioners in South Africa. It concludes with recommendations on the updating of the guidelines for road safety auditing in South Africa.

1 INTRODUCTION

Reducing the accident rate of the country has been a longstanding priority of government and it is an important focus for the operational aspects of road safety engineering and related activities. Through campaigns like “Arrive Alive” the emphasis is on the development of accident remedial measures for, amongst others, high accident frequency sites. The most strategic approach to road safety management is to also focus on accident prevention, i.e. ensuring that the design of new roads and/or traffic schemes will provide a high level of safety - thus attempting to prevent accidents from happening, or at least to ensure that any accident effects are minimised. Whilst accident reduction is a continuous effort, accident prevention via, amongst others, Road Safety Audit is generally considered an important aspect of road safety management throughout Australia, New Zealand, Great Britain, Canada, Malaysia, South Africa, the United States and several other countries.

South Africa’s earlier efforts to progress in making roads safer culminated in the publishing of the SARSM in 1999 as a draft guideline document. It had been developed with the intention of being a best practice guideline on road safety and succeeded in bringing together a vast amount of road safety knowledge into a single publication. It was basically a collection of the latest published information on road safety at that time and had been the first such manual on road safety. Since 1999, extensive attention had been given to road safety by research organisations in the major developed countries. For example, the World Road Association (PIARC) published a Road Safety Manual, Austroads is publishing road safety guides in various volumes and the Transportation Research Board (TRB) is developing a US Highway Safety Manual. All these organisations are committed to the development and the regular review of their respective documents based on the latest research on road safety.

The South African Road Traffic Management Corporation (RTMC) was established in 2005. One of the functional areas of the RTMC is that of traffic engineering and infrastructure safety audits. In the 2008 RTMC strategic plan, the need to review the SARSM was recognised. It was decided to start this review with a review of Volume 4 of the SARSM, which deals with Road Safety Audit (SARSM_4). This review was commissioned in 2009 and encompassed a literature review of some of the latest

international road safety audit manuals and the experience of South African road safety practitioners. Based on this information a position paper was prepared to guide the updating of the South African road safety audit guidelines. This position paper was distributed to road authorities and road safety practitioners for comment. The intent of the review process was to also improve the buy-in of industry into the revised guidelines.

2 INTERNATIONAL DEVELOPMENTS

The following road safety audit guidelines were reviewed in the above-mentioned study:

- Road Safety Audit, HD19/03, forming part of the UK Design Manual for Roads and Bridges, November 2003;
- FHWA Road Safety Audit Guidelines, Publication No. FHWA-SA-06-06, 2006;
- Institution of Highways and Transportation, Road Safety Audit, October 2008;
- Austroads, Guide to Road Safety Part 6: Road Safety Audit, Austroads publication No. AGRS06/09, January 2009;
- Road Directorate, Ministry of Transport, Denmark; Manual of Road Safety Audit, 2nd edition, 1997;
- Road Safety Audit for Roads: An Operational Tool Kit, Asian Development Bank, Manila, June 2003;
- PIARC Technical Committee on Road Safety (C13) Road Safety Manual, Version 1, 2003;
- Road Safety Audits, National Roads Authority, Ireland, July 2004;
- Department for Transport, Manual for Streets, First edition, 2007, and
- Road Safety Audit Manual for Dubai, Draft First edition, 2008.

The objectives of the literature review phase of the study were:

- to identify the extent to which the current SARSM_4 was in coordination with the international guidelines;
- to analyse areas where international development deviated from the principles and process advocated in the SARSM_4, and
- to synthesise international developments that might be incorporated into a revised SARSM_4.

The review of the SARSM_4 and benchmarked against other guideline documents confirmed the soundness of the road safety audit principles it contained. It was nevertheless clear that various aspects need to be addressed in SARSM_4 in order to update the guidelines and bring it in line with the latest developments. These aspects include the following:

- Setting of a road safety audit policy that clearly identify:
  - when road safety audits should take place;
  - when mandatory road safety audits should be conducted prior to allowing a subsequent phase in the project life cycle to commence;
  - the importance of the exception report as a response to the road safety audit report;
  - communication between role players in the road safety audit process, and
  - procedures to address conflicting viewpoints between audit and design teams.
- Consideration of the legal issues surrounding delictual liability in conducting road safety audits;

- Reconsideration of the role of the road safety audit of existing roads as a post-construction action or as a pre-design requirement;
- Reconsideration of maintenance issues in road safety audit reports;
- Consideration of the inclusion of recommendations for remedial action as a requirement in design phase road safety audits;
- Consideration of introducing risk assessment as a means of prioritising road safety concerns and to improve the coordination between the severity of the problem and the proposed solution;
- Reconsideration of the focus of construction stage road safety audits;
- Consideration of introducing a formal monitoring stage road safety audit as a post-construction task, and
- Consideration of utilising road safety audit findings as a feedback process towards improving design and implementation practices.

3 PRACTITIONER EXPERIENCE

The experience of South African road safety practitioners was solicited by means of a comprehensive questionnaire that reviewed all aspects of the road safety audit process as indicated in the SARSM. The questionnaire was divided into five parts that addressed the following broad areas of interest:

- Institutional issues;
- The Road Safety Audit Concept;
- The Road Safety Audit Methodology;
- Management of the Road Safety Audit Process, and
- Implementation of Road Safety Audit Findings.

Part 1: Institutional issues

Responses received clearly indicated the limited extent to which road authorities have a formal road safety management policy. The road authorities do not require road safety to be formally assessed during planning or conceptual stages of a project. Some degree of formal assessment is required during draft and detail design stages. Road safety audits have been done by various road authorities, but mainly on existing roads and not during the design phases of projects.

Although there were no identified institutional barriers, the lack of capacity, funding, time constraints and the lack of support were cited as institutional constraints. It was clear from the respondents that the exposure to road safety audit training was also limited.

Part 2: Road safety audit concept

Road safety audit definition

All, but one, of the respondents commented on the onerous requirement set by the definition in requiring a qualified examination team. This was particularly set against the limited number of trained road safety auditors and the lack of mandatory requirement to conduct road safety audits on new work.

Feasibility of road safety auditing

All respondents concurred that road safety auditing is a pro-active tool to improve road safety. This was qualified in certain instances to clarify that it is not a network based tool and that the process should be more refined. Respondents also agreed that road safety auditing can identify accident potential and safety performance of a project, albeit with a degree of uncertainty because of the extent of non-exactness in the process.

The road safety audit team
There is general agreement that a team is required to do a road safety audit, because of the combination of skills that this would offer. Certain projects, nevertheless, may not require a team but could suffice with a single auditor. Respondents agree that training is essential. This may be formal training, road safety audit training (desirable) or road safety engineering training. Although experience is considered important, the combination of training and experience is preferable.

The need to have an independent team received varying responses. The need to qualify independence as meaning no vested interest was raised. It was indicated that independence was desirable, especially from the side of the audit team leader.

There was a clear response that the audit team need not be made up of only members totally independent of the client or design organisations. Allowance was made that independence could mean that the team leader had no prior involvement in that project but could be from the client or design organisation. Contrary to the current audit guidelines the respondents felt that members of the client or design organisations could be members of the audit team. This response is contradicting the response on the general independence required of the audit team.

The road safety audit report
The principle that the road safety audit report represented a “final” report was generally supported. The process to come to the final report was not agreed by all. There is support for the report to be presented to the client organisation as a draft document that could be commented upon by the client prior to finalisation.

Identification of remedial measures
The current guidelines very clearly stipulate that the road safety audit report shall refrain from recommending remedial actions other than merely “basic recommendations on the direction of the solution”. Such remedial actions should be described in a separate remedial measures report that shall only be prepared for existing road projects and on specific instruction of the client.

The respondents showed strong disagreement with this principle and felt that the audit team should identify appropriate remedial actions. The audit team should also not be restricted from commenting on strategic issues or maintenance issues. The audit team need not develop the remedial actions in detail and would not be expected to prepare cost estimates for such solutions.

The current guidelines require that the road safety audit report classify identified problems in terms of their seriousness. Respondents did not experience that this was done regularly, or that similar findings were classified consistently. There was also a belief that this classification was not appropriate for Planning and Design Stage road safety audits. Respondents felt that the classification was guided by the ease of implementation of remedial actions. Some respondents supported a classification whereby findings should be classified or prioritised in terms of exposure to the risk of crashes and/or the potential severity of crashes.

Response to the road safety audit report
There was a great deal of support that the client organisation should respond formally to the audit team on the possible implementation of the suggested remedial measures. There was lesser support for the need to also report the response to a centralised organisation.

The respondents generally agreed that the response phase would provide sufficiently to document possible disagreements between the audit team and the design organisation.

Part 3: Road safety audit methodology

Staging of road safety audits

The current South African RSA guidelines were the first to suggest that road safety audits be done at six stages. The respondents were unanimous in declaring that it was not essential to conduct road safety audits at all these stages. Only in highly exceptional or very complex cases would this be necessary. It was also indicated that this would be nice to have, but that it would impact negatively on timelines and affordability.

The Detail Design stage was the only stage where all respondents considered it essential that a road safety audit be conducted. Only one respondent considered it necessary to conduct RSA at the conceptual or feasibility stage. The majority agreed that a road safety audit was required at the preliminary or draft design stage and at pre-opening. One respondent indicated that a road safety audit was not required during the construction stage. This was qualified by an explanation that circumstances change so frequently on construction sites that more than one road safety audit would be required.

Road safety audits on existing roads

Responses on the need to conduct road safety audits on existing roads varied from “no” and “not feasible on the entire network” to “particularly important in the South African environment”. Based on these responses the triggers to initiate a road safety audit on an existing road would be accident or incident history; input into major maintenance or upgrading; changes in traffic or usage patterns; at regular time intervals or in response to complaints from the public (in this order).

Checklists

The current guidelines caution against the shortening of the checklists that are provided, but does not restrict the road safety auditor to make extensive use of knowledge or prior experience to carry out the audit. Respondents are largely in agreement that road safety audits should not be conducted purely based on the checklists and that the audit team could assess other issues relevant to the audit being conducted. The respondents concurred that it would be impossible to expand the checklists to encompass all possible aspects that could be addressed in an audit and were in agreement that a reduced or consolidated prompt list be retained in the Manual as guidance to the audit team.

Illustrative examples

The current guidelines contain an appendix of illustrative examples of certain road safety issues that occur on existing roads and construction sites are highlighted by photographs. The respondents are divided on the necessity to highlight specific types of problems in this way to focus attention on only certain deficiencies. Respondents more experienced in road safety auditing did not find such inclusion necessary.

Traffic accident data

There is no agreement by the respondents on the exclusion of road accident data in the road safety audit. The point is well made by some respondents that the road safety audit is a pro-active tool specifically established to identify possible areas with higher potential for crashes. There is, nevertheless, agreement by the respondents that there are no specific occasions where they would prefer that road accident statistics be assessed in a road safety audit.

Part 4: Management of the road safety audit process

The road safety audit client

Respondents were unanimous in advising that the relevant road authority should also be the client organisation for a road safety audit and that an independent central organisation should not be the client. The use of such a central organisation could, nevertheless, improve standardisation and better use of scarce resources.

Most of the respondents considered it advisable that the road safety overseeing function be separated from the design and implementation responsibility and were confident that this could be possible in their respective organisations. One particular exception to this finding was SANRAL, which employs Route Managers to oversee all maintenance and safety aspects on a particular route and under the supervision of a specific project manager in the SANRAL regional office.

The audit process

The respondents agreed with the road safety audit process as far as the initial steps of inception, inspection and reporting were concerned. The latter steps in the audit process lead to different approaches. The respondents were divided on the issues of holding a completion meeting, preparing a response report and responding formally to the audit team.

Funding of the RSA

Most of the respondents indicated that the funding process in their organisations was inappropriate and that the amount provided for road safety auditing was insufficient.

Appointment of road safety auditors

The appointment of consultants using expertise based tendering or as direct appointments from a short list or a two-envelope tendering system based on expertise and financial proposals would provide the opportunity to appoint appropriately qualified road safety auditors.

In general auditors are required to comply with the requirements for experience and training as set out in the current guidelines. Respondents were in agreement that field work pertaining to a road safety audit should not be done by lesser experienced personnel under the indirect supervision of the road safety audit team leader. They also agreed that the lack of accredited training for road safety auditors and an accreditation process are some of the constraints on the delivery of proper RSA investigations.

Specialist advice to the RSA team

Respondents agreed that RSA teams be allowed or encouraged to use the services of a specialist advisor in the case of particularly complex projects or where the audit would require special attention to an aspect that the RSA team might be less familiar with. These specialist advisors need not participate fully in the rest of the audit.

Close-out process

Notwithstanding the requirement of a completion meeting and the preparation of a response report in the current road safety audit guidelines, the responses clearly indicated a lack of any formal close-out process for the road safety audit as well as the non-preparation of a response report.

The non-preparation of these response reports means that no formal recognition is given to the potential risk as advised by the audit team. It also means that the possibility exists that neither the top management of these road authorities nor the political functionaries had been advised of any increased risk exposure on the roads so audited.

Part 5: Implementation of road safety findings

Implementation of planning phase audit findings

Very few planning phase audits have been reported and even fewer findings have been implemented.

Implementation of post-construction phase audit findings

Two respondents indicated that findings of construction stage audits or audits on existing roads had been implemented, albeit on a very small scale.

4 ADDITIONAL COMMENTS

The respondents used the opportunity to record various aspects that they felt could improve the broader road safety improvement process. The following aspects were raised:

- Decision makers should be sensitised to road safety in general to ensure that road safety improvement is tackled over a wide front. Better coordination between Infrastructure and Traffic Management divisions in road authorities should be pursued.
- Road safety audits are non-exact and can only give indication of the risk.
- The current RSA guidelines are too onerous and too complicated and therefore not practical. Simplification and institutionalisation (i.e. countrywide implementation) would ensure that results will be informed by experiences on the ground.
- The lack of properly trained auditors is particularly serious. Tiered training to improve the understanding of road safety auditing for decision makers and detailed training of road safety auditors would improve the situation. This should be followed by accreditation of road safety auditors. Proper training and accreditation of road safety auditors would improve the quality of audits.
- The reliance on checklists in a recipe-driven approach to road safety auditing should be abandoned.
- The road safety manual should be written as a reference text and not as material for training auditors. The difference between road safety assessments and road safety audits should be explained in particular.
- Road safety auditing should become mandatory and could be included as part of the brief for design and construction of road projects, subject to possible client or independent review. It may be introduced in the scope of these works in a similar way that environmental impact analyses are done.
- Road design should address the consistency in operating conditions in general, rather than only speed domain. Operational and safety design issues should be addressed in a more integrated manner and the role of signs and markings re-assessed to reflect actual conditions.
- Greater emphasis should be put on the interaction of road infrastructure and human factors to ensure that driver work load over extended distances will be tempered. The effect of roadside conditions on driver expectancy and behaviour and the reduction in monotony should receive more attention.
- Recognise the lack of reliable accident information and the need to proceed with a road safety improvement effort with incomplete data.

5 PROPOSED REVISIONS TO THE ROAD SAFETY AUDIT GUIDELINES

The results of the literature review of the international road safety audit guidelines documents were juxtaposed with the experience of the road safety practitioners and then also discussed in a workshop under the chairmanship of the RTMC. A final position paper with possible revisions to the SA Road Safety Audit guidelines was prepared and distributed to respondents and participants in the workshop as well as representatives of road and local authorities.

The primary changes proposed to the road safety audit guidelines are the following:

General:
That the South African Road Safety Audit Guidelines:

- Introduce the principles of Road Safety Audit as a means of creating a safer South African road network;
- Identify road safety auditing as part of the design, implementation and maintenance process during the entire life cycle of a road or transportation related project;
- Promote the use of road safety audits to remedy existing hazardous locations and to prevent the introduction of hazardous practices in new projects;
- Establish a policy framework for the application of road safety auditing as part of the road life cycle in all road and local authorities, and
- Encourage the mandatory application of road safety auditing on new roads and on major upgrading projects.

Definition of the road safety audit
That the definition be revised to:

- Include new roads projects and road upgrading projects during the design and construction phases;
- Include existing roads as part of the design process towards upgrading;
- Include the need to identify remedial measures, and
- Retain the principle of independence and appropriately qualified audit teams, but that the description of independence be qualified to enable audit team members to be drawn from within the design organisation or from another organisation.

Objectives and purposes for road safety auditing
That the objectives and purposes be extended to:

- Include the identification (but not the design) of possible remedial measures that would improve the safety of the project, and
- Call on the design team to recognise possible road safety risk conditions during the design process and introduce remedial measures to counter such risk conditions.

Audit team
That the revised road safety audit guidelines provide clear directions for the requirements expected of the members of the audit team pertaining to:

- Road safety audit competence and continuous development;
- Registration or accreditation as road safety auditors;
- Independence from prior decision making in the project under review;
- Broad based experience, and
- Specialist advisors.

That registration or accreditation requirements take into account that road safety auditors might not always be engineers, and
That the guidelines also make recommendations on an objective process to procure the services of a road safety auditor for a project.

That the revised road safety audit guidelines also:

- Provide clear directions for the responsibilities of the client, design team and audit team allowing;
- Appointment of the audit team by the client or the design organisation;
- Preparation of the response report by the design organisation for submission to the client;
- Clarify the responsibility and accountability for the identification of road safety issues to the audit organisation or audit team leader, and
- Recognise the complexity of Design-and-Build type of contractual arrangements and provide directions for the responsibilities where an organisation acts as road authority under a concession agreement.

Stages in road safety auditing
That the revised guidelines:

- Allow for road safety audits to be conducted under the following situations:
  - Pre-construction phase
    - At the feasibility stage;
    - At the completion of the draft design;
    - At the completion of the detailed design stage.
  - Construction phase
    - Work zone traffic management during construction;
    - Pre-opening audits.
  - Post-construction phase
    - Monitoring the effect of road safety remedial works;
    - On existing roads prior to major upgrading as an input into the design of the upgrading.
  - Development projects
    - Land use development.
- Promote the use of the road safety audit principles as part of an internal review process prior to closing out on a particular road design phase.
- Introduce the principle of road safety advice or Interim Road Safety Audits to be conducted by the audit team when the client or design organisation believes that the need for specialist road safety advice exists, but taking care that the audit team does not become an extension of the design team and thereby losing its objectivity and independence from the design team.
- Recommend how road safety audits should be staged for projects of varying complexity.

Road safety audit methodology
That the revised road safety audit guidelines:

- Discuss the requirements for different road safety audit stages in the following phases: Pre-Construction, Construction and Post-Construction road safety audits;
- Describe the basic methodology for all road safety audits in a generic way;

- Describe the differences between successive stages with the objective of giving clear guidelines on which types of problems require attention at each stage;
- Clarify the requirements using practical examples more often;
- Provide a “model” Road Safety Audit report as an example on the structuring of the report findings and recommendations;
- Provide a “model” response report of different basic responses.

Construction phase road safety audit
That the revised road safety audit guidelines:

- Provide for a Construction Phase in the audit programme and that this consist of two stages:
  - Traffic Management during Construction;
  - Pre-opening Stage.
- Introduce the principle of road safety advice or Interim Road Safety Audits, where an Audit team or a road safety specialist may be used by the client, or the supervision consultancy, or the contractor to advise on road safety aspects in a way similar to the use of a Health and Safety inspection, but focusing on the safety of the road user, rather than the employee on-site;
- Recognise the implications of design changes during construction;
- Provide for the use of Safety Advice or an Interim Road Safety Audit as a means to assess the road safety implications of design changes during the construction phase of a project;
- Recognise the possible overlap in responsibilities between the road safety auditor and the health and safety inspector;
- Clarify the responsibility of the road safety auditor as far as activities during the construction phase are concerned, and
- Provide guidelines for the work of the road safety auditor during the construction phase.

Road safety audits on existing roads
That the revised road safety audit guidelines:

- Re-classify road safety auditing on existing roads as a Pre-Construction stage with the objective of identifying possible hazards that should be addressed in the design phase of an imminent project;
- Do away with the road safety auditing of existing roads as described in the current SARSM,, and
- Provide guidelines for conducting a road safety review of existing roads instead of a formal road safety audit on existing roads as a post-construction road safety action.

Monitoring stage
That the revised road safety audit guidelines:

- Introduce a Monitoring Stage road safety audit in conclusion of the road safety audit process, and
- Provide guidelines for conducting the Monitoring Stage road safety audit.

The use of checklists
That the revised road safety audit guidelines:

- Retain checklists but simplify these as broad based prompt (or reminder) lists identifying areas where specific attention would be required if the conditions during an audit would be more favourable than those to which the road user may be subjected;
- Allocate the responsibility for addressing road safety issues in an appropriate and encompassing manner to the Audit Organisation/ Audit Team Leader, and
- Clarify that completed checklists should not form part of road safety audit reports.

The road safety audit report
That the revised road safety audit guidelines require the road safety audit report to:

- Be structured similarly to the current SARSM guidelines;
- That possible safety problems related to the design or fitness for purpose of the facility:
  - be identified individually (Or grouped together based on the level of detail and the extent of the safety deficiency);
  - that each problem be associated with a potential type of accident;
  - that each problem be associated with a recommendation for an appropriate, proportionate and viable remedial measure, and
  - that consideration be given to the classification of the importance of implementation of such a remedial measure in terms of the risk that such a safety issue would hold.
- That a draft report be submitted to and/or discussed with the Client in order for the Audit Team to ensure that all relevant information that might influence the decision to record its findings have been considered prior to formulating final findings and recommendations, and
- That any revisions to recommendations in the report that the client representative and the audit team mutually agree to, be incorporated in a final audit report.

Post-audit process
That the revised road safety audit guidelines provide clear directions for the post-audit process including:

- The need for an audit close-out process that include a formal response to an audit report;
- Reviewing road safety audit reports to identify issues that are over-represented in these reports;
- Disseminating the knowledge gained from road safety audits for the wider benefit of road authorities and road and traffic project designers, and
- Disseminating the results of road safety audits and response reports to relevant political office bearers to improve the participation of political role players in the improvement of road safety.

Response report
That the revised road safety audit guidelines strongly recommend that all client organisations that conduct road safety audits:

- Review the road safety audit report as a matter of urgency (i.e. with diligence);
- Assess the risks identified in the road safety audit report;
- Prepare a response report that:
  - Responds to each finding recorded in the audit report;
  - Documents the client organisation’s acceptance or rejection of the finding;

  - Documents the client organisation's acceptance, modification or rejection of a proposed remedial measure;
  - Documents possible remedial measures to be implemented as an interim solution, and
  - Indicates a possible time scale in implementing agreed remedial measures.
- Submit this response report for acknowledgement to the relevant political office bearer, either on an individual basis or as part of the regular (annual) feedback report, and
- Recognise that the close-out process generally would be a necessary and sufficient process to resolve possible differences between the audit team and the design team.

Risk assessment
That the revised road safety audit guidelines describe a risk assessment process as a means to assist the client authority in developing the audit response report.