

# A Comparative Review of Road Safety Audit Guidelines of Selected Countries

Ishtiaque Ahmed<sup>a\*</sup>, Othman Che Puan<sup>a</sup>, Che Ros Ismail<sup>a</sup>

<sup>a</sup>Faculty of Civil Engineering, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia

\*Corresponding author: ishtiaque@utm.my

## Article history

Received :10 May 2013  
Received in revised form :  
25 September 2013  
Accepted :15 October 2013

## Graphical abstract

Country	Name/Agency/ Year of Publication (Latest Revision)
Bangladesh	Guidelines for Road Safety Audit, Roads and Highways Department, May 2005
India	Manual on Road Safety Audit, Indian Roads Congress, November 2010
Ireland	National Roads Authority, Dublin, March 2007
Malaysia	Guidelines for the Safety Audit of Roads in Malaysia, Public Works Dept. (Roads Branch), 1997
Nepal	Road Safety Audit Manual, Department of Roads April 1997
UK	Guidelines for Road Safety Audit, Institution of Highways and Transportation, November 1996
USA	FHWA Road Safety Audit Guidelines, US Department of Transportation, 2006

## Abstract

Road safety is a global crisis and one of the proactive preventive measures for accidents is the Road Safety Audit (RSA). The benefits of RSA are numerous. RSAs have been practiced in many countries following the guidelines of their own. The objective of this study was to compare the contents of the guidelines of selected seven (07) countries. The documents were reviewed and compared in terms of seven (07) critical parameters. The definition of the term “RSA” varied among guidelines. The RSA process was required for different stages of a project in different countries. The attached check lists or forms also varied in terms of contents and in terms of the coverage. The qualifications of auditors or team requirements were unequally emphasized in the documents. The legal liability aspects were not given any emphasis in three of the seven guideline documents. Two country documents did not contain any sample RSA report or any sample case study. Some country documents have good emphasis on some parameters while those lack in other aspects. No RSA guideline document can be called as the best one, as those were prepared considering the local conditions and requirements. Recommendations were made to improve the guideline documents.

**Keywords:** Road safety audit; RSA guidelines; RSA procedures; comparison of RSA

© 2013 Penerbit UTM Press. All rights reserved.

## 1.0 INTRODUCTION

Road safety is a global socio-economic problem. In the developing countries, accidents and fatalities are increasing in an alarmingly rate. In economic terms, the cost of road crash injuries is estimated at roughly one percent (1%) of gross national product in low-income countries, one and a half percent (1.5%) in middle income countries and two percent (2%) in high-income countries<sup>1</sup>. According to the World Health Organization<sup>2</sup>, road traffic injuries will take the third position in 2020 among all causes in terms of loss of Disability-Adjusted Life Year (DALY), deteriorating from the ninth position in 1990. The Highway Safety Manual<sup>3</sup> indicates that thirty-four percent (34%) of all the crashes are caused partially or fully due to Roadway Factors. There exist two types of internationally recognized engineering approaches to counter road safety problem- the Proactive and the Reactive approach. In the Reactive Approach, safety improvement interventions are taken after many accidents have already occurred. In many countries, adoption of reactive approach could not gain significant success due to the absence of standard requirements needed for such approach<sup>4</sup>. The Proactive Approach encompasses accident prevention and adoption of corrective measures before accidents can take place. One of the proactive interventions is the Road Safety Audit (RSA) and that is a relatively new tool in the developing countries<sup>5</sup>. RSAs are in essence, a crash prevention tool. The benefits of RSA are numerous though it is difficult to quantify. Studies that have attempted to quantify the benefits of

audits have yielded impressive results. In the United Kingdom, a local authority has estimated the benefit-cost ratio of an RSA to be 15:1, while TRANSIT New Zealand has estimated the benefit to cost ratio as 20:1. Cost-benefit analysis of safety audited projects in Denmark yielded an expected average first year rate of return of 146 percent<sup>6</sup>.

The first road safety audits were conducted in the 1980's in the United Kingdom and in the early 90's RSAs were conducted in Australia and New Zealand. However, RSAs were not conducted in many developed countries including the United States until 1996<sup>7</sup>. Through the 1990s, RSAs were introduced to other countries such as Denmark, Canada, the Netherlands, Germany, Switzerland, Sweden and South Africa. In recent years, RSAs have been actively implemented in the developing countries such as Malaysia, Singapore, Bangladesh, India, Mozambique and United Arab Emirates. Currently the World Bank and European Transport Safety Council are actively promoting as part of national road safety programs<sup>8</sup>. RSAs have been practiced in a number of countries following the guidelines of the individual countries (their own guidelines). The objective of this study was to compare the contents of the guidelines of a selected countries representing low, middle and high income level of economies. A total of seven (07) countries were selected, depending on the availability of the RSA document. The review included the following parameters of the RSA guidelines of the studies:

- a) Definition of RSA in the guidelines
- b) Stages of a project -when RSA is recommended
- c) Road Safety Check Lists/Forms attached to the document
- d) Other important parameters of a guideline document
  - (i) Qualification Requirements and Composition of the Audit Team
  - (ii) Consideration of Legal Liability Aspects in RSA
  - (iii) Inclusion of Work Flow Charts of Audit in the document
  - (iv) Inclusion of Sample Reports and/or Case Studies on Overall Process and/or Various Stages of RSA

## 2.0 DATA COLLECTION AND METHODOLOGY

Road Safety Audit (RSA) Guideline documents were collected in either hard copies or soft copies from the highway agencies of the respective countries or downloaded from the respective websites. The reviewed country guideline documents are listed in Table 1. Three (03) countries represented comparatively low-income economic conditions. Those countries are i) Bangladesh ii) India and iii) Nepal. One of the countries represented the middle-income scenario i.e. Malaysia. Remaining three (03) countries represented the developed world i) Ireland ii) The United Kingdom (UK) and iii) The United States of America (USA).

**Table 1** List of the reviewed RSA guideline documents

Country	Name/Agency/ Year of Publication (Latest Revision)
Bangladesh	Guidelines for Road Safety Audit, Roads and Highways Department, May 2005
India	Manual on Road Safety Audit, Indian Roads Congress, November 2010
Ireland	National Roads Authority, Dublin, March 2007
Malaysia	Guidelines for the Safety Audit of Roads in Malaysia, Public Works Dept. (Roads Branch), 1997
Nepal	Road Safety Audit Manual, Department of Roads April 1997
UK	Guidelines for Road Safety Audit, Institution of Highways and Transportation, November 1996
USA	FHWA Road Safety Audit Guidelines, US Department of Transportation, 2006

The study included comparisons among selected guideline documents with respect to selected parameters or aspects which were identified to be significant for an RSA document in general. Those parameters were as listed in the previous section. The parameters which were compared were selected based on the understanding of the basics of an RSA in general from the literature review. Individual RSA document was reviewed thoroughly to understand the characteristics of the document with respect to the studied parameters. This included contents of the texts and overall coverage of the guideline document. The individual parameters were compared one by one on an apple to apple basis, so that limitations or strengths of any guideline document could be easily identified. This method enabled to identify the shortcomings of any guideline document and any potential improvements that could be recommended through this study.

### 2.1 Road Safety Audit-As Defined in the Guidelines

The first studied factor was “how the Road Safety Audit (RSA) is defined” in the reviewed documents. It was identified that three (03) terms were important and critical in the definition. Those are related to stating that an RSA is-

- a) A formal examination or procedure that makes it different from general safety surveys.
- b) Conducted by independent and qualified professionals
- c) Conducted before, during and after a project is completed.

The review process identified the adequacies and deficiencies of the definitions of each reviewed guideline in terms of the above three (03) terms or wordings. The initial process was to extract the

definition texts from the individual guideline documents and carefully reviewing in terms of the above critical parameters. The major findings of the comparison in terms of the three (03) terms are included in Table 2. Major findings of the comparison are shown in Table 3.

### 2.2 Stages of the Projects-When an RSA is Required Per the Guidelines?

Road Safety Audit (RSA) Guidelines include explanations on what stages of a project an RSA is to be conducted. This may start from the very beginning of the project. Generally, it is rare to have an RSA during the Pre-feasibility Stage or During the Concept Stage. However, the review process was started with an assumption that an RSA is required from the Feasibility Study stage of a project. RSAs are often carried out on existing highways. Based on the above assumptions the guideline documents were compared. Basically, three (03) major categories were considered. Those are i) Pre-Project Stage ii) During the Construction Stage and iii) Post Completion Stage. The developed countries are expected to conduct RSAs more frequently with greater coverage due to more awareness on the benefits and also due to well-developed systems and less limitation of the available resources. Least developed countries in general tend to skip activities other than actual construction works. The study included comparisons among countries with variable level of resources and the information extracted from the individual guidelines on the list of stages when an RSA is required is presented in Table 4 and the findings from the comparisons are listed in Table 5.

Table 2 Definitions of RSA in reviewed Guideline Documents

Country	Definition
Bangladesh	A road safety audit is a <b>formal examination</b> of an <b>existing or future road</b> or traffic project or any project which interacts with road users, in which <b>independent, qualified team of examiners</b> look at and report on the project's or the road's accident potential and safety performance.
India	Road Safety Audit (RSA) is a <b>formal procedure</b> for assessing accident potential and safety performance in the provision of <b>new road schemes and schemes for the improvement and maintenance of existing roads</b> .
Ireland	The evaluation of road schemes <b>during design and construction</b> to identify potential safety hazards which may affect any type of road user before the scheme is opened to traffic, and to suggest measures to eliminate or mitigate those problems. This is a <b>formal process</b> involving signed written reports.
Malaysia	Road Safety Audit may be defined as the <b>formal examination</b> of the <b>planning, design and construction of a road project, and of the characteristics and operation of an existing road</b> , by <b>independent and qualified examiners</b> , to identify any potentially unsafe feature or operational arrangement that may adversely affect the safety of any road user.
Nepal	An RSA is a <b>systematic method</b> of checking the safety aspects of the road schemes in order to detect potential safety hazards <b>before the road is open to traffic</b> .
UK	Road safety audit is a <b>formal procedure</b> for assessing accident potential and safety performance in the provision of <b>new road schemes, and schemes for the improvements and maintenance</b> of existing roads.
USA	An RSA is a <b>formal safety performance examination</b> of an <b>existing or future road</b> or intersection by an <b>independent audit team</b> . It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users.

Table 3 Findings on the "Definition of RSA" in reviewed guideline documents

<p><b>Critical Wordings in the Definition:</b></p> <ol style="list-style-type: none"> <li>A formal examination or procedure that makes it different from general safety surveys.</li> <li>Conducted by independent and qualified professionals.</li> <li>Conducted before, during and after the project is completed.</li> </ol> <p><b>Findings-</b></p> <p><b>Bangladesh</b></p> <ol style="list-style-type: none"> <li>A "formal examination" is mentioned</li> <li>By "independent, qualified team of examiners" is included.</li> <li>An "existing or future road" is specified.</li> </ol> <p><b>India</b></p> <ol style="list-style-type: none"> <li>A "formal procedure" is mentioned.</li> <li>No term related to "<b>independent and qualified examiner</b>".</li> <li>Clearly mentioned that "new road schemes and schemes for the improvement and maintenance of existing roads".</li> </ol> <p><b>Ireland</b></p> <ol style="list-style-type: none"> <li>A "formal process and signed written reports" is included.</li> <li>No term related to "<b>independent and qualified examiner</b>".</li> <li>It is mentioned that "road schemes during design and construction".</li> </ol> <p><b>Malaysia</b></p> <ol style="list-style-type: none"> <li>A "formal examination" is mentioned.</li> <li>By "independent and qualified examiners" is included.</li> <li>"The planning, design and construction of a road project, and of the characteristics and operation of an existing road" is included.</li> </ol> <p><b>Nepal</b></p> <ol style="list-style-type: none"> <li>A "<b>systematic method</b>" term is included but an informal method can also be a systematic one.</li> <li>No term related to "<b>independent and qualified examiner</b>".</li> <li>Specifies that "detecting potential safety hazards <b>before the road is open to traffic</b>" only. Significant information is missing.</li> </ol> <p><b>UK</b></p> <ol style="list-style-type: none"> <li>A "formal procedure" is mentioned</li> <li>No term related to "<b>independent and qualified examiners</b>".</li> <li>Clearly mentioned that "new road schemes and schemes for the improvement and maintenance of existing roads".</li> </ol> <p><b>USA</b></p> <ol style="list-style-type: none"> <li>A "formal safety performance examination" is included.</li> <li>An "independent audit team" is mentioned. No mention about the "<b>qualification</b>" of the examiners.</li> <li>Clearly mentioned that "an existing or future road".</li> </ol>
---

### 2.3 Prescribed Forms/Check Lists Included in the Guidelines

An RSA process generally requires comprehensive field surveys. The topics considered in the surveys and items are important parameters. Appropriate check lists are to be developed by additions and modifications of the standard guidelines<sup>5</sup>. Guideline documents have different forms or check lists and sometimes those are known as “Prompt Lists”. Lists of prescribed forms or Check Lists are included in Table 6 and the findings of the review are included in Table 7.

### 2.4 Other Parameters Studied and the Findings of the Review Comparisons

The review process included identification of four (04) other important parameters and comparing among the guideline documents. The selected other parameters were:

- a) Qualifications of the Auditors and Size of the Audit Team
- b) Legal Liability of RSA issues
- c) Workflow Chart for the audit activities
- d) Sample RSA Reports/ Case Studies

Above parameters were selected considering their importance and convenience to the agencies involved in the audit process.

**Table 4** Comparison on stages of the project-when an RSA is required?

<p><b>Bangladesh</b> Applicable audit stages- divided in to two (02) broad categories:</p> <ol style="list-style-type: none"> <li>a) Pre-construction stage/Under-construction stage             <ol style="list-style-type: none"> <li>i) Safety audit for all feasibility study, preliminary designs, detailed design, under-construction schemes/projects.</li> <li>ii) Safety audit for Schemes of Traffic Control and Management during construction of large projects.</li> </ol> </li> <li>b) Construction completed Roads/Existing Roads             <ol style="list-style-type: none"> <li>i) Safety audit for all large construction schemes/ projects (valued over Taka 50 million i.e. approximately US\$ 0.6 million) at completion of construction before hand-over or opening to traffic.</li> <li>ii) Safety audit for all existing roads in priority order.</li> </ol> </li> </ol> <p><b>India</b> Safety Audit is divided in to two (02) basic categories- New Roads and Existing Roads:</p> <ol style="list-style-type: none"> <li>a) New construction             <ol style="list-style-type: none"> <li>i) During Feasibility Study</li> <li>ii) During Preliminary Design</li> <li>iii) Completion of Detailed Design</li> <li>iv) During Construction Stage</li> <li>v) Completion of Construction (Pre-opening)</li> </ol> </li> <li>b) Existing Roads             <ol style="list-style-type: none"> <li>vi) On Existing Roads (Monitoring)</li> </ol> </li> </ol> <p><b>Ireland</b> RSA and subsequent actions are classified in to four (04) specific stages.</p> <ol style="list-style-type: none"> <li>a) Stage F: Route Selection Stage</li> <li>b) Stage 1: Completion of preliminary design prior to land acquisition procedures</li> <li>c) Stage 2: Completion of detailed design, prior to tender of construction contract.</li> <li>d) Stage 3: Completion of construction (prior to opening of the scheme to traffic)</li> </ol> <p><b>Malaysia</b> RSA and subsequent actions are classified in to five (05) specific stages:</p> <ol style="list-style-type: none"> <li>a) Stage 1: Planning and Feasibility Stage</li> <li>b) Stage 2: Preliminary (Draft) Design Stage</li> <li>c) Stage 3: Detailed Design Stage</li> <li>d) Stage 4: During Construction or Pre-Opening of a New Project</li> <li>e) Stage 5: Audit of Existing Roads</li> </ol> <p><b>Nepal</b> Applicable audit stages- four (04) stages are included:</p> <ol style="list-style-type: none"> <li>a) Feasibility Study</li> <li>b) Draft Design</li> <li>c) Detailed Design- the main audit</li> <li>d) Pre-opening</li> </ol> <p>In practice, and until staff resources increase, it is assumed to be the best to limit safety audit to the larger projects and the more important roads. Minor projects, where safety clearly an issue, such an alternations to a busy intersection, should also be audited.</p> <p><b>UK</b> Applicable audit stages- four (04) stages are included:</p> <ol style="list-style-type: none"> <li>a) Stage F: Feasibility/ Initial Design Stage</li> <li>b) Stage 1: Preliminary Design/ Draft Plans</li> <li>c) Stage 2: Detailed Design</li> <li>d) Stage 3: Pre-opening</li> </ol> <p><b>USA</b> Safety Audit is divided in to four (04) basic Phases:</p> <ol style="list-style-type: none"> <li>a) Pre-construction Stage RSA including i) Planning ii) Preliminary Design iii) Detailed Design</li> <li>b) Construction Stage RSA i) Work Zone Stage ii) Construction Stage iii) Pre-opening Stage</li> <li>c) Post-construction Stage RSA of Existing Roads</li> <li>d) Development Project RSA – For Land Use Developments</li> </ol>
---

#### 2.4.1 Qualifications of the Auditors and Size of the Audit Team

In countries where RSA is an established practice, an auditor must be a qualified practitioner with experience in road design, traffic engineering, safety engineering and other related discipline<sup>9</sup>. A Road Safety Audit (RSA) may be carried out by one appropriately skilled person or by a team of professionals bringing together a range of skills and experience. It is not very common for a person being expert on all topics of the audit process. Therefore, formation of an audit team is naturally common. Now, what should be the composition of the team? How many personnel should work on an RSA? As the extent and type of the projects vary, what should be the minimum requirements of skill of individuals? Whether there is any requirement of the accreditation or training in the RSA process specified in the guideline is an important consideration. These questions are very relevant to the users of a guideline. The study reviewed and compared extracting information from the guideline documents whether the minimum qualification of the auditors and the composition of the teams for different stages of audit are adequately discussed and specified in the guideline documents. The findings of the review comparison are tabulated in Table 8 (Parameter 4A).

#### 2.4.2 Legal Liability Issues in Road Safety Audits

The issue of public authority liability for acts of negligence is a new and evolving area especially in the developing and middle-income countries. In order to understand the liability of a road agency in terms of an RSA, and how this matter would affect the “Tort Liability” aspect, is an important area of consideration. However, this issue is often neglected in many countries especially in under-developed countries. The findings of the review are included in Table 8 (Parameter 4B).

#### 2.4.3 Workflow Chart on the Procedure

A Road Safety Audit (RSA) is a systematic and of course a “formal” procedure involving step-wise and inter-related activities. The procedure can be graphically presented using a flowchart or flowcharts. The presentation can be separate for different types of audits or just one presentation for the overall work procedure. Any systemic and/or inter-related activities are better presented with flow charts. The study reviewed the guideline documents to compare among the ways how the procedures for the audits are illustrated in the individual documents. The findings of the review comparisons are tabulated in Table 8 (4C).

**Table 5** Findings on-At What Stages RSAs are required?

<p><b>Bangladesh</b> Divided in to two (02) broad categories covering feasibility stage to existing roads (<u>in Priority Order</u>).</p> <p><b>India</b> Divided in to two (02) basic categories- New Roads and Existing Roads covering feasibility study to existing roads for (<u>Monitoring purposes</u>). The recommended stages for different schemes are limited to Pre-Opening stage only.</p> <p><b>Ireland</b> Classified in to four (04) specific stages covering up to “Completion of Construction (prior to opening of the scheme to traffic) only. The recommended stages for different schemes are limited to Pre-Opening stage only.</p> <p><b>Malaysia</b> Classified in to five (05) specific stages starting from the Planning stage and with broad coverage including Audit of Existing Roads.</p> <p><b>Nepal</b> Four (04) applicable audit stages, covering up to Pre-Opening only for larger projects and the more important roads. And Minor projects, where safety is clearly an issue because of the resource constraints.</p> <p><b>UK</b> Four (04) applicable audit stages, covering up to Pre-Opening only. The “rule of thumb” table on the stage of audit by scheme type is includes up to Pre-Opening stage only.</p> <p><b>USA</b> Safety Audit is divided in to four (04) basic Phases with broader coverage, starting from the Planning Stage and finishes with Audit of the Existing Roads.</p>
---

**Table 6** Prescribed forms/ check lists included in the guidelines**Bangladesh**

RSA Forms attached-

- A. Master Check List to be applied before applying detailed questionnaire/check list during i) Pre-construction and ii) Post-construction safety audits.
- B. Pre-Construction Safety Audit
  - 1. Pre-Construction Audit
  - 2. Audit of Traffic Management Scheme During Construction
- C. Post-Construction Safety Audit
  - 1. Pre-Opening/Hand Over Stage Audit
  - 2. Existing Roads Audit
- D. Safety Inventory and Survey Formats
  - 1. Road Inventory and Survey Form
  - 2. Road Sketch as per Field Condition Form
  - 3. Traffic Signs Investigation Form
  - 4. Road Markings Investigation Form
  - 5. Road Junctions Investigation Form
  - 6. Bazar/Development Area Investigation Form
  - 7. Bridge Culvert Investigation Form

**India**

RSA Check Lists attached-

Eighteen (18) checklists are attached for different stages and specific items. Those are

- a) Check Lists for Stage 1 to Stage 6 Audits.
- b) Check Lists for the followings:
  - 7. Planning
  - 8. Alignment
  - 9. Cross Section
  - 10. Intersection and Interchanges
  - 11. Road Signs
  - 12. Road Markings
  - 13. Lighting
  - 14. Roadside Hazards
  - 15. Roadside Facilities
  - 16. Vulnerable Road Users
  - 17. Development Proposals
  - 18. Maintenance Work

**Ireland**

RSA Check Lists attached-

Four (04) checklists are attached for different stages only. Those are -Check List for Stage F through Stage 3 Audits.

**Malaysia**

RSA Check Lists attached-

Checklists are attached for individual stages. Those are -Check List for Stage 1 through Stage 5 Audits.

**Nepal**

RSA Forms attached-

- a) Basic Check List is prepared for three (03) different categories of roadways
  - (i) National Highways with AADT greater than or equal to 1000.
  - (ii) National Highways and Feeder Roads with AADT less than 1000 but greater than or equal to 150.
  - (iii) Feeder Roads and other Rural Roads with AADT less than 150.
- b) Detailed Check Lists on:
  - 1. Planning
  - 2. Cross-section
  - 3. Alignment
  - 4. Roadside Communities and Facilities
    - a. Junctions General
    - b. Junctions General
    - c. Junctions- additional checks for roundabouts
    - d. Junctions- additional checks for signal controlled junctions
  - 5. Special Road Users
  - 6. Signs, Markings and Lightings
  - 7. Roadside Hazards

**UK**

RSA Forms attached-

- (i) Checklist 1- Preliminary Design
- (ii) Checklist 2- Detailed Design
- (iii) Checklist 3- Pre-opening

**USA**  
 RSA Check Lists attached-  
 Seven (07) checklists in the form of “Prompt Lists” are attached for different stages and specific items. Those are:

- a) Planning Stage Audit
- b) Preliminary Design Stage Audit
- c) Final Design Stage Audit
- d) Work Zone Traffic Control Plan Audit
- e) Pre-Opening Stage Audit
- f) Existing Road Audit
- g) Land Use Development Proposal Audit

**Table 7** Findings on the prescribed forms/ check lists

**Bangladesh**  
 A General Master Check List is included. Check lists for stages from starting to finishing of the project are included. Safety Inventory and Survey Formats for special features or specific type of locations are attached.

**India**  
 No General Master Check List is there but Check lists for stages from starting to finishing of the project are included. Safety Inventory and Survey Formats for a number of special features or specific type of locations are attached.

**Ireland**  
 RSA Check Lists for Stage F through Stage 3 Audits. No form for the Existing Roads or Post Construction exists. No Safety Inventory and Survey Formats for special features or specific type of locations is attached.

**Malaysia**  
 Checklists are attached for individual stages for all stages including the Existing Road and Post-construction stages. However, no Safety Inventory and Survey Formats for special features or specific type of locations is attached.

**Nepal**  
 RSA Forms include Basic Check Lists those are for three (03) different categories of roadways according to traffic volumes. Safety Inventory and Survey Formats for a number of special features or specific type of locations are attached.

**UK**  
 RSA Check Lists for different stages and up to Pre-opening only exists. No form for the Existing Roads or Post Construction exists. No Safety Inventory and Survey Formats for special features or specific type of locations is attached.

**USA**  
 Seven (07) checklists in the form of “Prompt Lists” are attached for different stages and specific items.

**Table 8** Other parameters studied and findings

Parameters	Parameter Details	Bangladesh	India	Ireland	Malaysia	Nepal	UK	USA
4A	Qualifications of the Auditors and Size of the Audit Team- Specified?	NS	WS	WS*	WS	SR	SR	SR
4B	Legal Liability of RSA –Discussed?	ND	ND	SD	SD	ND	SD	SD
4C	Workflow Chart for Audit –Attached?	NA	SW	OA	NA	OA	NA	OA
4D	Sample RSA Reports/ Case Studies- Attached?	NA	NA	SC	GC	SC	SC	GC

**Notes:**

Parameter 4A: NS- Not Specified, WS- Well Specified, SR- Some Recommendations Provided  
 Parameter 4B: ND- Not Discussed, SD- Some Discussion Exists  
 Parameter 4C: NA- Not Attached, SW- Attached-Stage wise, OA- Attached-Overall Activity  
 Parameter 4D: NA- Not Attached, SC- Attached with Some Coverage, GC- Attached with Good Coverage

**2.4.4 Sample Documents/Case Studies Attached to the Guidelines**

Any activity or procedure becomes easier when sample reports of previously carried out activity reports are available. This helps to clarify the procedures for a new team of auditors and also facilitate maintaining uniformity in the report styles and formats. Case

studies can help to understand when and how to conduct an audit activity. Report templates can also be helpful in writing any report. The check list, which plays an important role in RSA and is used in many stages of the implementation process, was devised by road traffic organizations in the UK, Australia and New Zealand, where RSA was first introduced<sup>10</sup>. However, in at least some of the countries, there remains an uncertainty and legal questions about



the perfection of any previously carried out reports prior to attaching to a standard guideline document. In the developing countries where RSAs are carried out as a part of the new foreign aided projects, the formats and styles of the reports also vary. Therefore, it becomes a challenge to choose any best fit RSA report representing audit at any stage of the project. The sample RSA reports and Case Studies attached to the reviewed guidelines were compared and the findings are tabulated in Table 8 (Parameter 4D).

### 3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the comparative review among the selected seven (07) country RSA guideline documents, the following conclusions are drawn and recommendations are made:

a) The root of the process- “The Definition” of RSA itself varies from document to document. One of the basic characteristics is that an RSA is to be conducted by independent and qualified professionals. However, four (04) of the reviewed seven (07) country documents (India, Ireland, Nepal and UK) do not mention this requirement in the definition. The RSA is a formal safety audit process that makes it different from other safety surveys but the definition of RSA in the guidelines of Nepal does not specify this “formal” term. Consistency in the definitions is the prerequisite for setting the procedure of a detailed program of works among countries. Therefore, each important and critical term is recommended to be included in the definitions. The guideline documents missing the important term in the RSA definition should include all the necessary terms to clarify scope and coverage.

b) The RSAs are needed to be carried out at different stages of the project starting from the feasibility study stage to post-construction stage and also for the existing roads. However, RSA guideline document for Nepal recommends audits for up to the pre-opening stage of larger projects only and for more important minor roads due to resource constraints and provides explanations and justifications for this recommendation. Country guideline documents for Ireland and UK cover the audits up to pre-opening stage only. However, these documents do not provide any justification why the RSA for existing roads is missing. This study recommends that RSA guideline should address and provide guidance on the audit procedure for the existing roads as well.

c) Some of the country guideline documents include a detailed list of forms/check lists/prompt lists for various stages of audits and for a number of specific features (e.g. alignment/ cross-section) and specific locations (e.g. bridge/culverts). The documents from Bangladesh, India, and USA are good examples of detailed check lists. The document from Malaysia has a very good list of checklists for each audit stage but does not include any separate form for specific design feature or special complex location. The documents from Ireland, Nepal and UK do not contain any form for the audit of existing roads. Therefore, it is recommended that an individual agency should include forms/check lists for various stages of audit and special features of design and special forms for audit in unusual circumstances in their guideline documents.

d) The minimum qualifications and specialization of the auditors and the composition of the audit team are important elements of an RSA guideline. However, the Bangladesh document does not have any guidance on this. The documents from Nepal, UK and USA have partial coverage on the topic and more specific requirements on the qualifications of the auditors are recommended to be specified in the documents.

e) The documents from the developing countries (e.g. Bangladesh, India, Nepal) do not contain any information on the legal aspect of the RSA. Documents reviewed from other four (04) countries provide at least some basic information about the legal issues. The study recommends that RSA guideline documents should address the legal liability issues and should provide reference to appropriate documents for detailed information.

f) The documents from Bangladesh and Malaysia provide no flow chart on activities to be conducted in an RSA process. The document from India is a good example of flowcharts for each stage of audits. The Ireland, Nepal and USA documents include flowcharts showing the overall steps for the audit process. The study recommends that, an overall or stage-wise flowchart (depending on the overall structure of the document) of the audit activities to be included in the guideline document to provide a clear picture of the steps to be followed in the audit process.

g) The review found that documents from Bangladesh and India do not include any sample RSA report or sample case study document. This might be because of the legal issue and questions and concerns about the perfection and accuracy of any previously carried out RSA activity. However, this study recommends to include case study reports or/ sample RSA reports in the appendix section of the guideline document to facilitate clarification about the main texts of the guideline document.

### Acknowledgement

The Author 1 is grateful to the Research Management Center (RMC) of the Universiti Teknologi Malaysia (UTM) and the Ministry of Higher Education (Malaysia) for providing support through the UTM PAS Research Grant (00K18).

### References

- [1] Jacobs, G., Aeron-Thomas, A., Astrop, A. 2000. Estimating Global Road Fatalities. Crowthorne, Transport Research Laboratory, (TRL Report, No. 445).
- [2] World Health Organization and The World Bank. 2004. World Report on Road Traffic Injury Prevention. Geneva.
- [3] American Association of State Highway and Transportation Officials (AASHTO). *Highway Safety Manual*. 1<sup>st</sup> Edition. 2010 Washington, DC.
- [4] Roads and Highways Department (RHD), Ministry of Communication, Bangladesh. Guidelines for Road Safety Audit. May 2005. Dhaka.
- [5] Hoque, M. M., Sudipta, S., Debnath, P. 2006. *Road Safety Audit: Its Role and Systematic Implementation in Developing Countries*. Proceedings of the International Conference on Road Safety in Developing Countries. Accident Research Center (ARC), Bangladesh University of Engineering and Technology. Dhaka.
- [6] Institute of Transportation Engineers (ITE), U. S. Department of Transportation, Federal Highway Administration. Road Safety Audits: An Emerging and Effective Tool for Improved Safety. Retrieved from: [www.ite.org/technical/IntersectionSafety/RSA.pdf](http://www.ite.org/technical/IntersectionSafety/RSA.pdf) accessed on 3<sup>rd</sup> July, 2013.
- [7] National Cooperative Highway Research Program (NCHRP).2003. *Road Safety Tools for Local Agencies: A Synthesis of Highway Practice*. NCHRP Synthesis 321. Transportation Research Board. Washington, DC.
- [8] US Department of Transportation. 2006. FHWA Road Safety Audit Guidelines. Washington, DC.
- [9] Yordphol, T., Taneerananon, P., Srisakda, L., Charoensawan, W., Kunathammarak, P., Jiwattanakulpaisarn, P. 2003. Implementing Road Safety Audit in Thailand. *Journal of the Eastern Asia Society for Transportation Studies*. 5.
- [10] Hirasawa, M, Asano, M, Saito, K. 2005. Study on Designing and Introduction of a Road Safety Management System as a New Road Safety Policy. *Journal of the Eastern Asia Society for Transportation Studies*. 5.