Lesson 1.5 Introduction: Road Safety Audits and Appraisals

Conducting Road Safety Audits & Appraisals

Presented by: RTS & AGTT

January 2022

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INTRODUCTION TO ROAD SAFETY AUDITS AND APPRAISALS

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ROAD SAFETY MANAGEMENT

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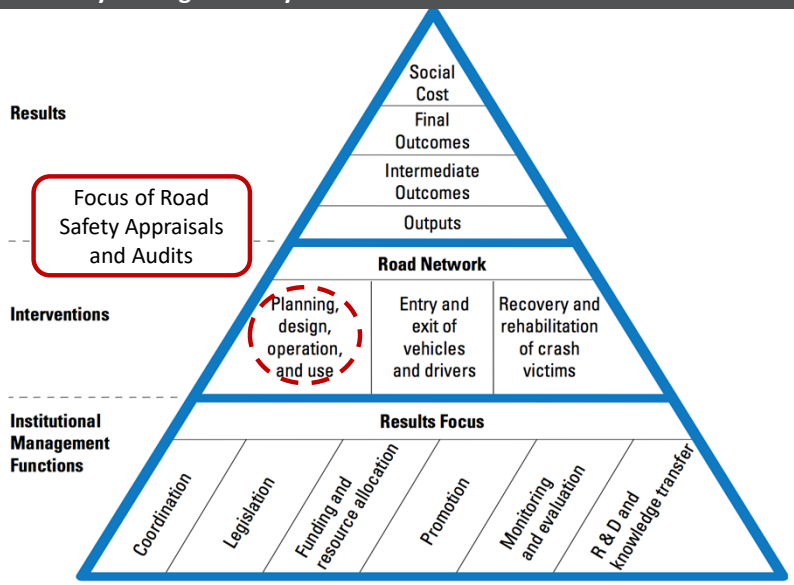
Road Safety Management System



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Road Safety Management

Road Traffic Safety Management aims to integrate all activities affecting road safety.

Road authorities need to:

- Develop a road safety strategy
- Demarcate road management areas.
- Develop safety plans for each area.
- Consider all road users, especially vulnerable road users.
- Coordinate efforts towards achieving objectives of the road safety plans.

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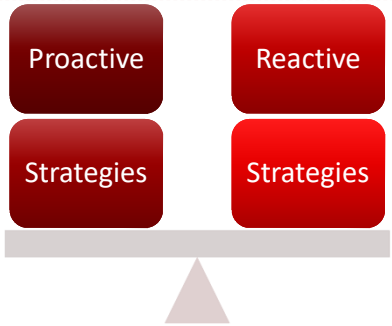
Road Safety Management

Effective road safety management programs should achieve a balance:



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Road Safety Management

A **proactive approach** to road safety:

- **prevention** of safety problems before they manifest themselves in the form of a pattern of crash occurrences.

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Proactive approach to road safety

Proactive approach:

- knowledge about the safety implications of **road design** on the **behaviour** of road users and the road operations.

A **Road safety audit** is an example of a proactive road safety strategy.

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Proactive approach to road safety

The advantages of a proactive approach include:

Crash prevention: implement measure **before** crash occurs.

Lower costs: changes during design and construction **cost less**.

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Road Safety Management

Reactive approach to road safety:

- **Screening:** identification of locations experiencing safety problems
- **Diagnosis**: problem definition,
- **Cure**: identification and implementation of countermeasures

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Road Safety Management

Reactive approach

Mitigate HazLocs

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Reactive approach to road safety

Reactive approach is based on the analysis of existing crash data.

Reactive road safety engineering processes includes:

- *Collect crash data (**crash information systems**)*
- *Identification of **hazardous locations** on the road network;*
- *Analysis, development and implementation of **remedial measures**.*

Propose improvements to road safety risks in areas with high crash rates.

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Reactive approach to road safety

Limitations of the reactive approach are as follows:

*Requires the identification of locations with extraordinary **crash history.***	*Crash **data is often out of date, incomplete** and/or **insufficient**.*	*May be **expensive** to mitigate.*

Despite these limitations, a reactive approach as it is **a powerful tool** for addressing **existing safety** problems.

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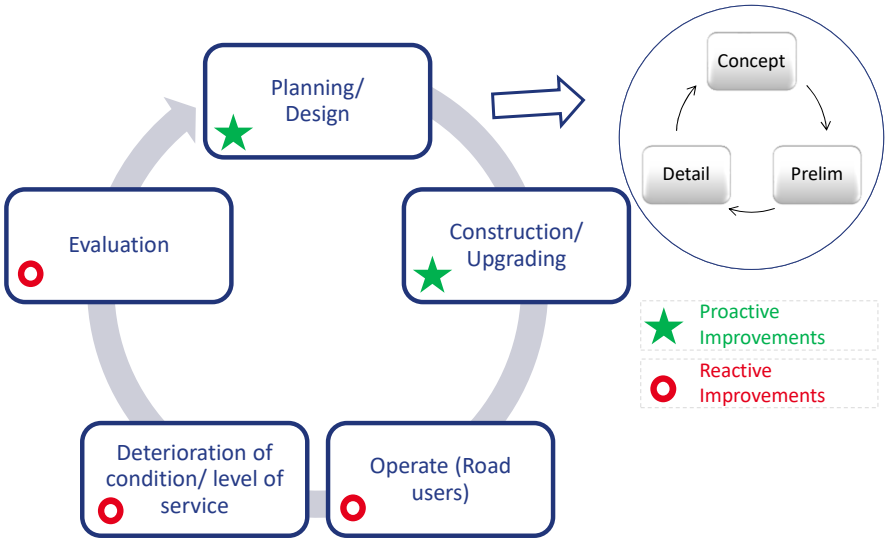
Road Safety Management



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RELEVANT RSA GUIDELINE DOCUMENTS

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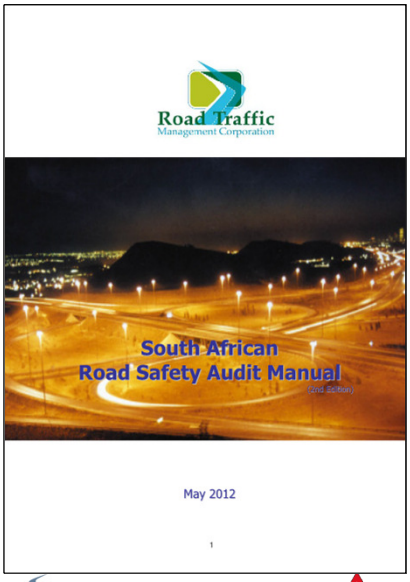
Relevant Guideline Documents in South Africa



ISBN 978-0-626-27351-4

SANS 3000-2-2-1:2012
Edition 1
RSR 2-2-1:2012
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

Railway safety management

Part 2-2-1: Technical requirements for engineering and operational standards — Track, civil and electrical infrastructure — Level crossings

WARNING — Can only be read in conjunction with SANS 3000-2-1 and SANS 3000-2-2.

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DEFINITIONS

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Definitions

Crash
SARSAM 2012

A rare **random multifactor event** always preceded by a situation in which one or more road users have **failed to cope** with the road environment

Source: SARTSM, RTMC, 2012

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INTRODUCTION TO ROAD SAFETY AUDITS AND APPRAISALS

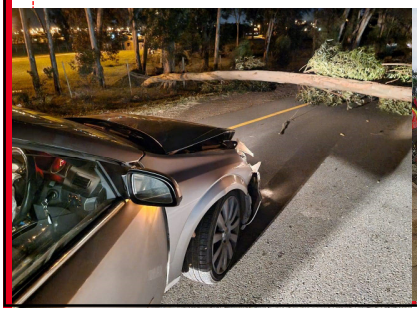
Definitions

Crash: A rare **random multifactor** with negative consequences that happen when the sum of all the contributing factors exceeds a critical value.

An accident happens when a vehicle hits a person, an object, or another vehicle, causing injury or damage

Accident: An undesirable or unfortunate happening that occurs unintentionally and usually results in harm, injury, damage, or loss; casualty; mishap: automobile accidents.

Law. such a happening resulting in injury that is in no way the fault of the injured person for which compensation or indemnity is legally sought.



INTRODUCTION TO ROAD SAFETY AUDITS AND APPRAISALS

Definitions

Road safety engineering assessment	The **screening process** to establish the road safety status of sections of an **existing** road network resulting in a list of prioritised **locations** that should be **further investigated**.
Road safety appraisal	A systematic examination of **an existing road location**, in which an independent and qualified team **reviews on-site conditions** and **historical evidence** to identify existing or potential **road safety problems** and suggest measures to **mitigate** those problems.
Road safety audit	A **formal examination** of a **new road** or **upgrading project**, in which an independent and qualified team **identifies potential road safety problems** and **suggest** measures to **mitigate** those problems.

Source: SARTSM, RTMC, 2012

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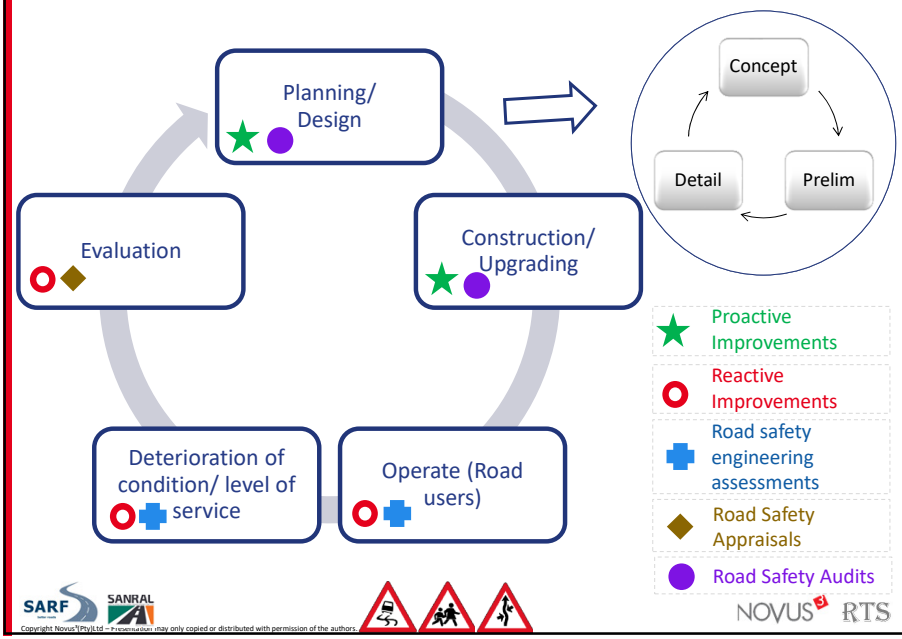
Road Safety Management



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Road Safety Engineering Assessments

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Road Safety Engineering Assessments

Road safety Engineering Assessments

The **screening process** to establish the road safety status of an **existing** road network resulting in a list of prioritised **locations** that should be **further investigated**.

An appraisal therefore:

- Scan of the road network.
- Identify high risks areas.
- Could include investigations to determine the scope of road safety appraisals

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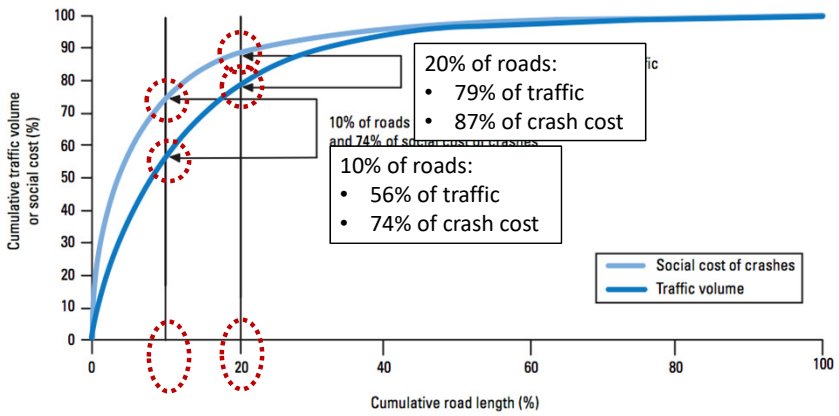
Road Safety Engineering Assessments



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Road Safety Engineering Assessments: Example SANRAL Netsafe

Identifies Hazardous Locations by analysing

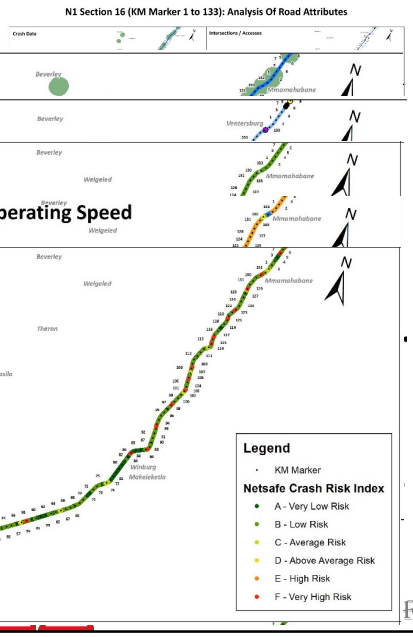
Crash Data

Intersections / Accesses

Posted Speed Limit

Correlation Between Turning Radius And Operating Speed

Netsafe Risk Index



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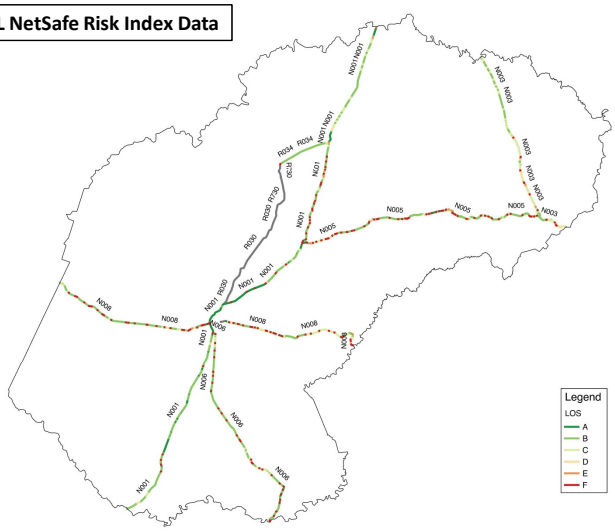
Road Safety Engineering Assessments: Example SANRAL Netsafe

SANRAL NetSafe Risk Index Data



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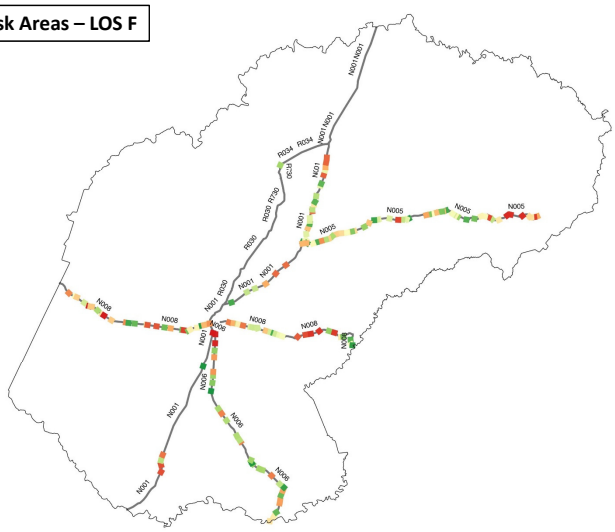
Road Safety Engineering Assessments: Example SANRAL Netsafe

High Risk Areas – LOS F



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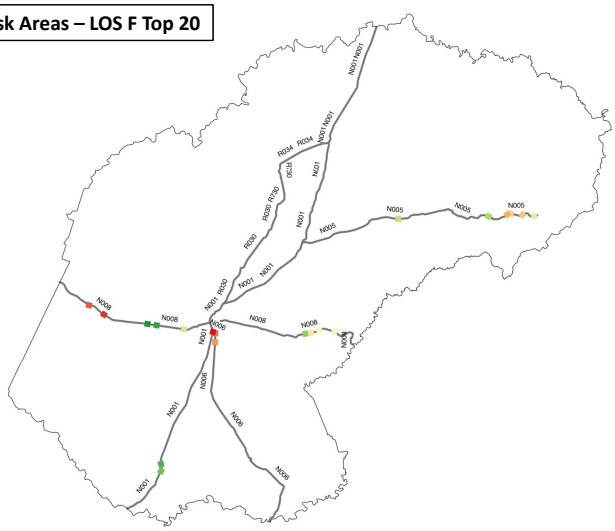
Road Safety Engineering Assessments: Example SANRAL Netsafe

High Risk Areas – LOS F Top 20



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ROAD SAFETY APPRAISALS

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Road Safety Appraisals

Road safety appraisal	A systematic examination of **an existing road location**, in which an independent and qualified team **reviews on-site conditions** and **historical evidence** to identify existing or potential **road safety problems** and suggest measures to **mitigate** those problems.

An appraisal therefore:

- Focusses on historical evidence (crashes)
- Identify causes.
- Propose solutions.
- Needs to be followed by design and implementation.

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Road Safety Appraisals

SARTSM states that:

- the lack of coordination of road safety studies
- with road rehabilitation projects,
- results in the failure to implement road safety measurements recommended by road safety appraisals.

Road Safety Appraisals should precede resurfacing or upgrading projects.

Will ensure that road safety appraisals can make a difference in the safety performance of such a road.

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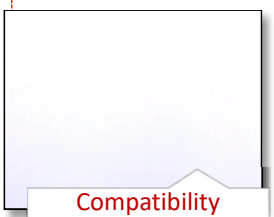
Road Safety Appraisals

The objectives of the Road Safety Appraisals on existing roads are :



Compatibility between the safety features and the functional classification of the road;

Identify any feature that create a safety problem over time – vegetation blocking a sign;

Identify all features in the road environment that pose a safety hazard to any of the road users.

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ROAD SAFETY AUDITS

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Road Safety Audits

Road safety audit	A **formal examination** of a **new road** or **upgrading project** where interaction with road users takes place, in which an independent and qualified team **identifies potential road safety problems** and **suggest** measures to **mitigate** those problems.

A road safety audit therefore:

- Focusses on reviewing the design of a new/upgrading project.
- Identify defects or features of the design which might contribute to fatal or severe crashes.
- Is not a review of design standards.
- Is not a health and safety review.

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Road Safety Audits

The success of a road safety audit depends on:

- The independence of the road safety audit team.
  - Avoids favouring a solutions which the design team is keen to implement.
  - Line managers of the design team should not be involved in audits.
  - Critical that the audit team reviews the design with "fresh eyes".

Audit team must be qualified and experienced to conduct audits.

- Includes crash investigation and road safety engineering experience
- Previous road safety audit experience or skills
- Knowledge of the latest developments in road safety engineering

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Road Safety Audits

The objectives of the road safety auditing **process** are:

- To **minimise** the severity and crash risk of crashes
- To **minimise** the need for remedial measures after the opening of a new road project;
- To **reduce** the full life-cycle cost of a road project
- To create **awareness** of safe design practice.

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ROAD SAFETY AUDIT STAGES

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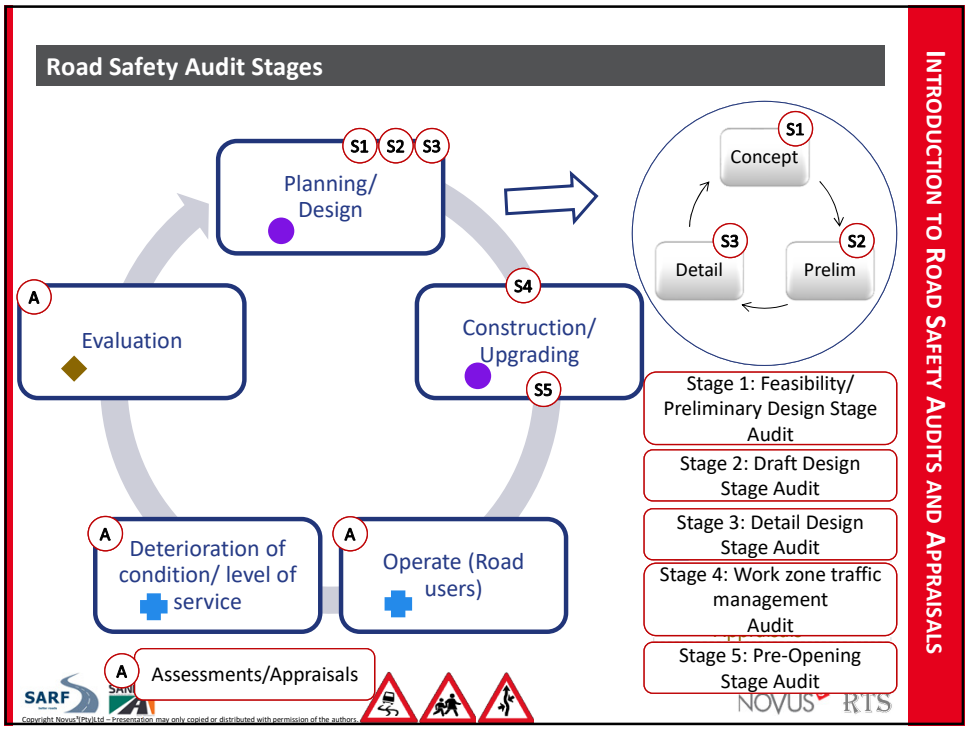
Road Safety Audit Stages
Planning/ Design
S1
S2
S3
Construction/ Upgrading
S4
S5
Operate (Road users)
A
Deterioration of condition/ level of service
A
Evaluation
A
Assessments/Appraisals
Concept
S1
Prelim
S2
Detail
S3
Stage 1: Feasibility/ Preliminary Design Stage Audit
Stage 2: Draft Design Stage Audit
Stage 3: Detail Design Stage Audit
Stage 4: Work zone traffic management Audit
Stage 5: Pre-Opening Stage Audit
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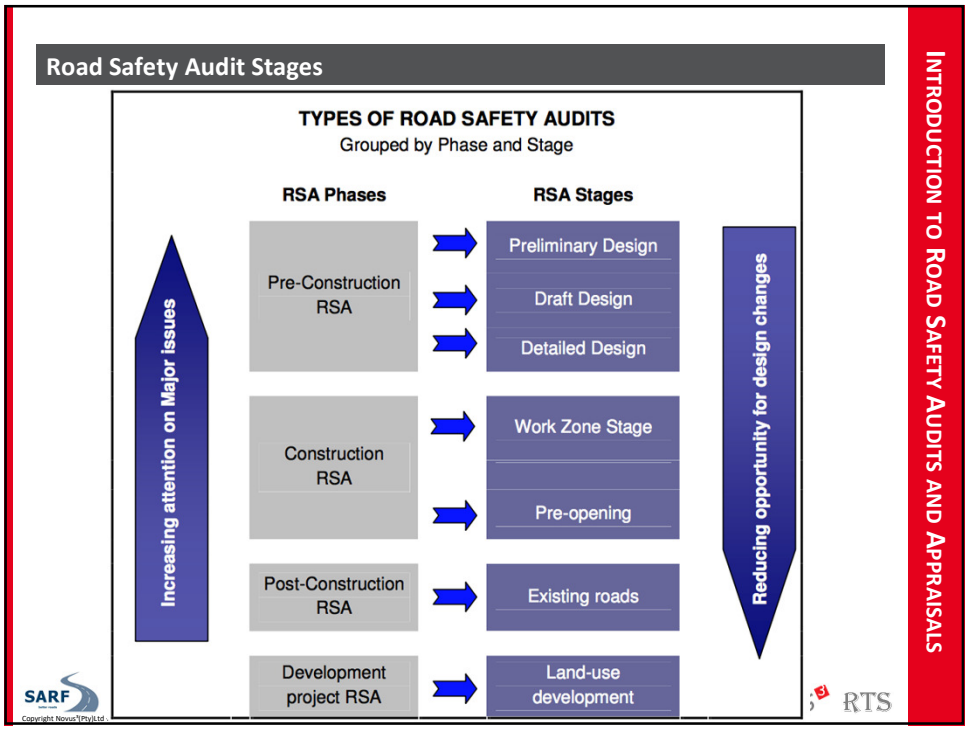
Road Safety Audit Stages
TYPES OF ROAD SAFETY AUDITS
Grouped by Phase and Stage
RSA Phases
RSA Stages
Pre-Construction RSA
Preliminary Design
Draft Design
Detailed Design
Construction RSA
Work Zone Stage
Pre-opening
Post-Construction RSA
Existing roads
Development project RSA
Land-use development
Increasing attention on Major issues
Reducing opportunity for design changes
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Road Safety Audit Stages

Stage 1 Feasibility/ Preliminary Design Stage Audit

Road safety audit at the stage when the project scope and identification are considered - the client the opportunity to consider road safety implications.

Objectives:

- To identify the potential safety problems that can influence the:
  - Project scope
  - Choice of route, layout and /or treatment
  - Design standard selection
  - Impact on the adjacent road network
  - Access Control: Provision of accesses /intersections /interchanges
  - Continuity of routes
- To consider the design and operating speeds;
- To assess the relative safety performance of various alternatives for the road project.

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Road Safety Audit Stages

Stage 2 Draft Design Stage Audit

Done after completion of a draft design, including all alternative schemes developed for public consultation.

Objectives:

- **Consider Stage 1 Road Safety Audit requirements** if the Stage 2 Road Safety Audit is the first audit of the road project.
- Address the design standards utilised for the draft design;
- Evaluate if deviations from guidelines and standards would impact safety negatively;
- Consider safety impact of staged implementation;
- Consider the following:
  - Alignment (horizontal, vertical);
  - Sight distances;
  - Layout of intersections and configuration of interchanges;
  - Lanes and shoulder widths;
  - Cross-section and super elevation of pavement;
  - Location of accesses;
  - Provision for different road user groups: Pedestrians, Cyclists, Heavy vehicles, etc.

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Road Safety Audit Stages

Stage 3 Detail Design Stage Audit

The Audit normally takes place after completion of the detailed design but before the contract documents are prepared.

Objectives:

- To consider:
  - Changes since the Stage 2 Audit;
  - Road traffic signs and markings;
  - Road lighting;
  - Intersection detail;
  - Roadside hazards (clear zones, traffic barriers, fixed objects etc.);
  - Needs and requirements for Special Road Users (pedestrians, cyclists, universal access, heavy vehicles, etc.)
  - Accommodation of traffic during construction
  - Drainage
  - Landscaping
  - Cross-section and side-slopes, etc.
- To review those findings of earlier stages and the implementation of mitigating measures;
- To **consider the Stage 1 and Stage 2 Road Safety Audit requirements** if the Stage 3 Road Safety Audit is the first audit of the road project.

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Road Safety Audit Stages

Stage 4: Construction work zone traffic management audit

Conducted during the construction stage to audit the Contractors Traffic Management proposals.

Objectives:

To evaluate the traffic management proposals of the contractor, taking into account the changed conditions as experienced on the works, considering:

- Rapid changing conditions on a construction site;
- It is not always practical to audit against the traffic management proposals as proposed during Stage 3;
- The contractor's safety plan in terms of the safety regulations applicable to construction work zones will shall be monitored by the Engineer.

Any ad-hoc safety inspections during the construction period may be conducted as Interim road safety audits

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Road Safety Audit Stages

Stage 5: Pre-opening Stage Audit

Conducted before the opening of a road scheme to traffic but not before substantial completion of the project. If after opening, it should be within one month, with approval of the client.

Objectives:

- Evaluate intersections and tie-ins with the existing network.
- A night time site visit is important.
- Changes at this stage would be limited in scope.
- Confirm removal of temporary signage, markings, construction equipment, etc.
- Assess measures agreed upon during previous audits.

- Need to walk, drive, cycle, etc. the project to assess:
  - Provision made for all road users;
  - Protection of roadside hazards;
  - Safety of design changes;
  - Road signs and markings, lighting and other night-time related issues;
  - Consider Stage 1, 2 and 3 requirements if the Stage 5 Audit is the first audit of the road project.

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ROAD SAFETY PROCESS

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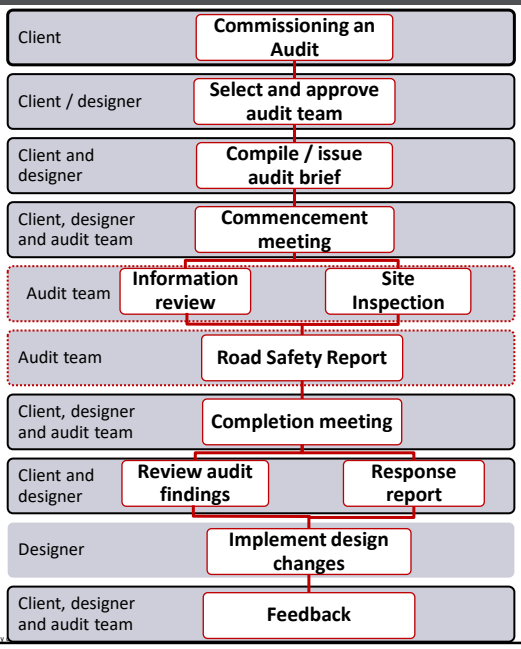
Road Safety Audit Process



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THE KEY QUESTIONS OF A ROAD SAFETY AUDIT

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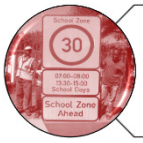
Key questions which the auditor has to ask

Key questions which auditors should ask:

"Who can be hurt in a crash on this part of the road/ project and how might that happen?"



"Does the road environment communicate the correct message to the road users?"

"What can be done to reduce the potential for that crash, or to limit its consequences?"

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