



New Mexico DEPARTMENT OF
TRANSPORTATION
MOBILITY FOR EVERYONE

New Mexico

Highway Safety Improvement Program (HSIP) Road Safety Audit (RSA) Manual¹

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Overview

A road safety audit is an opportunity to improve safety for a given existing or planned roadway segment(s) or intersection(s). A road safety audit is a safety performance review conducted by consultants or agencies that are independent of the study funding agency (New Mexico DOT General Office, Traffic Technical Support Bureau) or the agency with jurisdictional authority over the transportation facility being studied. Road safety audits differ from conventional traffic safety studies in two key ways: road safety audits are often pro-active investigations, rather than reactive investigations of sites with histories of complaints or poor safety performance, and the investigation team is independent from the staff that is designing the project or maintains the road.

¹ Source note: Much of the text of this report is excerpted from Publication Number SA-06-06, FHWA Road Safety Audit Guidelines, written by Science Applications International Corporation (SAIC) under contract to the FHWA Office of Safety, February 2005.

Selection Criteria for Applications to Perform a Road Safety Audit

If historical crash data are available, the audit team should make use of them. However, one of the strengths of the audit process is it can find safety concerns before they contribute to crashes. Lack of data is a reason to use the audit process, rather than an excuse not to. RSA's can be proactive and not just reactive. RSA's consider the crash history at a location, but also proactively consider potential safety problems that might occur in the future, especially under different weather, lighting, and traffic conditions.

1. Criteria for Projects to be Audited

Transportation facilities that are subject to RSAs include any facility that accommodates motor vehicles, pedestrians, and/or cyclists. These facilities are typically roadways, sidewalks, and other mixed-use paths for pedestrians and cyclists. They may also include facilities such as: parking areas, driveways, loading/unloading or cargo transfer areas.

These transportation facilities may be audited at any time they are in operation.

The following criteria identify projects that should be audited:

An intersection or road segment that does not meet current design common practice (nominal safety issues) and also has a poor record of safety performance (substantive safety issues) should be considered a high-priority candidate for RSA as the potential for safety improvement, and the likelihood of its achievement, is also high.

An intersection or road segment that meets current design common practice (no nominal safety issues) but has a poor record of safety performance (substantive safety issues) should also be considered as a priority candidate for RSA as the potential for safety improvement, and the likelihood of its achievement, is significant.

An intersection or road segment that does not meet current common practice (nominal safety issues) but has a satisfactory record of safety performance (no substantive safety issues), should be considered as a lower priority candidate for an RSA relative to those above, which exhibit substantive safety issues, as the potential for safety improvement, and the likelihood of its achievement, is low to moderate.

The following are minimum transportation facility usage trip volumes below which a proposed RSA will not be conducted, because the potential hazard exposure level is too low.

- For roadways, an average daily traffic volume of 50 vehicles per day or less;
- For sidewalks or bikeways, an average daily trip volume of 5 pedestrians or 5 bicyclists or less.

However if there has been a relevant recent single fatal crash at a given site, an RSA could be eligible to be conducted, even if minimum dainty trip factor I not met. For example, road safety audit oriented to bike travel on US 70 NE of Las Cruces is current underway, due to a single recent past five year bike fatality on a bikeway corridor where the average daily bike travel varies from zero to possibly 10 per day.

There is a diversity of views and opinions about the appropriate scope, role, and application of RSAs. Recognizing that these differing views and opinions exist, public agencies in New Mexico participating in such RSAs need to customize the RSAs to work for them. Integrating RSAs within an existing design and safety management framework may require a different approach in each circumstance.

The aim of an RSA is to answer the following questions:

- What elements of the road may present a safety concern: to what extent, to which road users, and under what circumstances?
- What opportunities exist to eliminate or mitigate identified safety concerns?

Role of the RSA in the NM Highway Safety Improvement Program

For purposes of the New Mexico Highway Safety Improvement Program (HSIP) the RSA will be defined as the type where the NMDOT General Office Traffic Technical Support Bureau will contract with a consultant to perform a RSA at the location(s) cited in the safety project application in cooperation with staff and stakeholders from the application requesting agency, NMDOT, and the community of the location(s).

The NM HSIP will now accept direct applications requesting funding for a road safety audit where the submitting agency believes there is a significant transportation hazard or safety issue at a specific location or group of locations within their jurisdiction.

Although a RSA can also be done for other programs that do not involve the HSIP program, this manual will focus exclusively on the RSA as an optional tool to assist with the development of safety projects or safety programs that are eligible for HSIP funding for purposes of increasing transportation safety in New Mexico.

However, typically in such scenarios, there is a lack of relevant crash history or lack of other evidence data collected, to determine what type of safety countermeasures could be proposed and implemented. So a RSA report can provide the required evidence possibly to determine such an appropriate countermeasure.

An application for an RSA excludes any applications for a proposed project or program to address the same locations of the transportation hazard or safety issue in question. The NM HSIP is now budgeting for a significant increase in the number of such RSAs to be conducted annually throughout New Mexico, but generally capping the maximum cost of each RSA to be \$45,000 or less.

If such an application is approved by both the NM Safety Project Selection Committee and concurred for funding by FHWA, then the NMDOT General Office Traffic Technical Support Bureau will contract with a consultant to perform a RSA at the location(s) cited in the safety project application in cooperation with staff and stakeholders from the application requesting agency, NMDOT, and the community of the location. The purpose of such RSAs would be to reach a conclusion where a proposed safety countermeasure project or safety program could be conceptually described, including a rough estimate of the total cost to implement such a proposed safety project or program.

Each RSA set of results will be published in a report. It is recognized that the conclusion of the RSA could be that no such project or program can be recommended that could significantly address the safety issues in a manner that is feasible. Or the RSA report might only suggest a proposed safety countermeasure project or program that is not desirable by the agency having jurisdiction of the transportation facilities in question, and thus no follow-up proposed project or program would be recommended.

From the RSA results the lead agency in combination with other stakeholders and the NMDOT General Office, Traffic Technical Support Bureau may jointly decide what would most likely be an acceptable safety improvement project or program whose conceptual description will be documented in a NM HSIP Safety Project/ Program Application Form, including all agreed upon work improvement types to be implemented and the overall estimate cost and time period required. Upon review and concurrence by FHWA of this decision, project programming and implementation would begin immediately. However, as was stated above, some RSA results may not generate a jointly agreed upon proposed safety project, and, thus, no new safety project would be developed.

If all proposed countermeasures are determined by the agency having jurisdiction as not being desirable, then it will be up to that agency to seek other funding sources to address their perceived or actual safety problem and try to address it using other resources other than HSIP funds. For example, if a local municipal government felt that it had a safety hazard problem with pedestrians crossing a city street, and an RSA was performed which suggested improved crosswalks, warning signs and median fencing as proposed safety countermeasures. However, all of these proposed countermeasures were rejected by the local municipality having jurisdiction, and instead the municipality wanted to have a grade separated pedestrian overpass constructed. Therefore, it would be recommended that the municipality pursue other funding to try to get the proposed overpass constructed project developed and implemented.

Also, the NMDOT General Office, Traffic Technical Support Bureau may choose to perform an RSA or other special safety studies on its own initiative.

The Basic RSA Purpose

What is the purpose of an RSA on existing roads?

- Evaluate all roadway and roadside features, design elements and local conditions (glare, night visibility, adjacent land uses, etc.) that would increase the likelihood and severity of a crash.

- Review firsthand the interaction of the various design elements with each other and the surrounding road network.
- Observe how road users are interacting with the road facility.
- Determine if the needs of all road users have been adequately and safely met.
- Explore emerging operational trends or safety issues at that location.

Essential Elements of an RSA

An RSA possesses some similar qualities to other types of reviews, but to be considered an RSA, the process should contain several essential elements. They are:

Formal Examination - RSAs are a formal examination of the design components and the associated operational effects of an existing roadway or other surface transportation mode facility from a safety perspective.

Team Review - RSAs are performed by a team (at least three auditors) who represent a variety of experience and expertise (design, traffic, maintenance, construction, safety, local officials, enforcement personnel, first-responders, human factors) specifically tailored to the project.

Independent RSA Team - The audit team members must be independent of the potential future design consultant or other design agency team subsequently charged with the development of a safety improvement project from a conceptual project description that is the deliverable product of the RSA task. Both the independent on-call consultant and the NMDOT Traffic Technical Support Bureau RSA Program Leader should be independent of the facility owner agency. Nevertheless, engineering, maintenance, and other representatives of the facility owner may and should participate provided they haven't been involved in prior decisions on the project. This independence insures a fair and balanced review.

Qualified Team - The auditors must have the appropriate qualifications specific to the RSA.

Focus on Road Safety Issues - The principal focus of the RSA is to identify potential road safety issues caused by the design, or by some operational aspect of the design. The RSA should not focus on issues such as standards compliance unless non-compliance is a relevant road safety issue.

Includes All Road Users - The RSA should consider all appropriate vehicle types/modes and all other potential road users (elderly drivers; pedestrians of different age groups,

including children and the physically-challenged; bicyclists; commercial, recreational, and agricultural traffic, etc.).

A reactive approach to road safety is associated with the identification of locations experiencing safety problems (screening), problem definition (diagnosis), and the identification and implementation of countermeasures. A proactive approach to road safety is associated with the prevention of safety problems before they manifest themselves in the form of a pattern of crash occurrence. Both prevention and cure should be inherent elements of an overall road safety management system.

A reactive approach to road safety is based on the analysis of existing crash data. Road safety improvements proposed are considered in reaction to identified safety problems brought to light by crashes that have occurred after the road has been designed, built, and opened to the traveling public. Traditional reactive road safety engineering processes include such activities as information collection and management (crash information systems), identification of problem locations on the road network, analysis, development and implementation of countermeasures. Past issues of the New Mexico HSIP Transparency Report or other reports featuring lists of locations of roadway segments or intersections of high frequency crashes, especially severe injury or fatal crashes are examples of reactive approaches to crash frequency and/or severity reduction.

Limitations of the reactive approach are as follows:

- It requires the identification of high crash locations before improvement plans may be developed and implemented;
- The supporting crash data is often dated, incomplete and/or insufficient to support accurate diagnosis and intervention; and
- It may also be more costly, since improvement plans are necessarily implemented on a road already built and open to public.

Despite these limitations, no road safety management system can be considered complete without a reactive component as it is a powerful tool for addressing existing safety problems.

Team Leadership - Within the team, there should be a leader who is thoroughly knowledgeable in the RSA process, capable of directing the other team members, and able to communicate effectively with the facility owner agency.

Local Representatives - An audit team should have an individual knowledgeable of the project location. Representatives of State or local law enforcement or leaders of local organizations (a traffic safety task force or bicycle/pedestrian committee) may be considered for this role, or may be used as a special resource while not necessarily being a team member.

Roles and Responsibilities of the NMDOT Traffic Technical Support Bureau RSA Program Leader

The NMDOT Traffic Technical Support Bureau RSA Program Leader is a representative of the State of New Mexico. For the RSA process to function properly there has to be the highest level of commitment from the top administration within the public agency. The NMDOT Traffic Technical Support Bureau RSA Program Leader must also work to make sure that key RSA features, such as the formality of the RSA, the use of a qualified, independent multi-disciplinary RSA team, and the inclusion of all road users are part of and remain part of all RSAs.

The NMDOT Traffic Technical Support Bureau RSA Program Leader may have the most important role in that he or she is the single point of contact for the public agency for all activities related to overseeing the implementation of the RSA task.

To perform well in this role the NMDOT Traffic Technical Support Bureau RSA Program Leader must balance the proposed scope of work activities of the independent on-call consultant leading the RSA team with the information requirements and the desired final output of the RSA task. The independent on-call consultant cannot think of the RSA process as some sort of “rubber stamp.”

The NMDOT Traffic Technical Support Bureau RSA Program Leader must explain to the independent on-call consultant the importance of the RSA process, and he or she must assure the facility owner agency that the RSA is not being conducted to monitor performance or criticize efforts.

One of the main roles of the NMDOT Traffic Technical Support Bureau RSA Program Leader is to provide the proper information to the independent on-call consultant and the rest of the RSA team (recent time period crash data, recent motor vehicle, pedestrian, and bicyclist traffic volume data, plans, aerial photos, environmental documents, etc.) and to arrange for objective and careful consideration of the RSA team input.

Once a RSA task is identified, the NMDOT Traffic Technical Support Bureau RSA Program Leader should help establish clear parameters for the RSA. The parameters should define the following:

- Scope.
- Schedule for completion.
- Team requirements.
- Audit tasks.
- Formal audit report contents and format.
- Response report expectations.

The RSA team must remain independent and not be directed by the facility owner agency staff.

The scope of the RSA should be defined in terms of the geographical area, the aspects of the facility to be reviewed, and what is considered to be out of scope.

Road Safety Audit Process

Typical RSA steps include:

Step 1: Identify project or existing road to be audited

As a result of this step, the project or existing road to be audited is determined and the parameters for a RSA are set.

Step 2: Select RSA Team

As a result of this step, an independent, qualified, and multidisciplinary team of experts suitable for the specific RSA stage is selected.

Step 3: Conduct a pre-audit meeting to review project information

The meeting brings together the project owner, the design team and the audit team to discuss the context and scope of the RSA and review all project information available.

Step 4: Perform field reviews under various conditions

The objective of project data review is to gain insight into the project or existing road, prepare for the field visit and identify areas of safety concerns. The field visit is used to get further insight into the project or existing road and to further verify/identify areas of safety concern.

Step 5: Conduct audit analysis and prepare report of findings

As a result of this step, the safety issues are identified and prioritized and suggestions are made for reducing the degree of safety risk. The RSA results are then succinctly summarized in the formal RSA report.

Step 6: Present audit findings to Facility Owner Agency

In this step, audit team orally reports the key RSA findings to the Facility Owner Agency in order to facilitate the understanding of RSA findings.

Step 7: Prepare formal response

Once submitted, the formal response becomes an essential part of the project documentation. It outlines what actions the project owner and/or design team will take in response to each safety issue listed in the RSA report and why some of the RSA suggestions could not be implemented.

Step 8: Incorporate findings into the project when appropriate

This final step ensures that the corrective measures outlined in the response report are completed as described and in the time frame documented.

The RSA Report

Upon completion of the RSA analysis, the audit team leader is ready to write the RSA report. In some instances, the RSA report will need to be written immediately after completion of the site visit, such as in a pre-opening RSA. Other RSAs are typically completed within a relatively short timeframe (two weeks).

The report should be concise. Where possible, the report should include pictures and diagrams as may be considered useful to further illustrate points made. The audit team should number each safety issue identified and, as appropriate, provide a map indicating its location. References to other reports, standards, policies or published research on road safety may also be made within the RSA report.

In the introduction, there should be a brief description of the project, including the scope and objectives and any special issues raised by the project owner or design team.

Characteristics of RSAs of Existing Transportation Facilities

RSAs of existing transportation facilities rely mainly on the site visit, as-built design drawings (if kept up to date), and other project data (e.g., previous reports) to determine what safety issues are expected to arise at the site. This will provide the RSA team with an accurate picture as to the level of safety on the road. For this reason, RSAs are proactive as they can identify where crashes will likely occur and what will be their resultant severity. Crash data, if available, should be used to supplement any findings made as a result of the site visit and review of project data. However, the RSA team may choose not to examine the crash history until after the project data review and site visit have been completed so that their evaluation is not biased by the crash data. Also, crash data is often dated and does not always help in determining emerging operational trends or safety issues at a location.

The following project data may be provided to/requested by the RSA team:

- As-built design drawings (noting whether these accurately reflect existing conditions).
- Previous crash investigations conducted.
- Crash data (by location, crash type, and severity).
- Volume data.
- Speed data.
- Signal timing plans (if applicable).
- Roadway functional classification.
- Existing policies, standards, and guidelines.
- Previous audit reports.

RSAs of existing roads may vary in scope. Three different, commonly-conducted types of RSAs on existing roads are as follows:

- RSAs of specific locations.
- RSAs of an entire highway section, freeway section, or road network.
- RSAs of a specific feature or design element within an entire highway section, freeway section, or road network.

The RSA team should observe the various road features and how they complement each other but also see how road users are interacting with the road facility. They may observe incidents of driver behavior that suggest something inherently wrong, misleading, or absent in the road design.

Vulnerable road users (e.g. elderly drivers or pedestrians, visually impaired pedestrians, children) may be observed having particular difficulty negotiating through a site being investigated. Alternatively, they may observe motorists committing traffic offenses (e.g. excessive speed, red light running, failing to yield to pedestrians) and may suggest an enforcement or education-based treatment.

The RSA team should also observe physical evidence of past crashes and off-road excursions, such as:

- Damage to curbs, roadside barriers, trees, utility poles, delineator posts, and signs.
- Scuff marks on curbs and concrete barriers.
- Skid marks, broken glass, oil patches on the road.
- Vehicle tracks or rutting in the ground adjacent to a roadway

Such evidence will assist in diagnosing possible areas of elevated safety risk. Where damage has occurred such that a roadside feature has been compromised, this should be noted and reported in the audit as a maintenance concern. Unless otherwise directed by the project owner, all roadway and roadside features or elements are to be considered as within the scope of the RSA. The RSA team will want to consider whether the road facility under review has the same function and classification as it did when it was originally designed and constructed. Changes in traffic volume, vehicle mix, increased presence of vulnerable road users, or adjoining land use developments may have rendered the original classification and design of the facility obsolete. Standards, policies and guidelines may be a starting point for the RSA team in identifying roadway/roadside elements or features that are no longer consistent with the function and classification of the road, and are potentially posing a risk to road users.

Procedures for Conducting and Documenting a RSA

Roadside Site assessment

Kick-off Meeting

Traffic Volume and Crash data collection

Initial Scoping Field Observation

48 hours traffic count task

12-hour intersection turning movement count task

Follow-up daytime field observation

Follow-up Nighttime field observation

Intersection Analysis

Conceptual intersection/ roadway layouts and implementation costs

Road Safety Audit Analysis

Write Draft RSA Report

Quality Control and Review of Report

Final Report Briefing meeting with whole community of stakeholders and the site owner