Development of Iowa Road Safety Assessment (RSA) Guidelines

February 2018

Iowa
LTAP
Local Technical Assistance Program
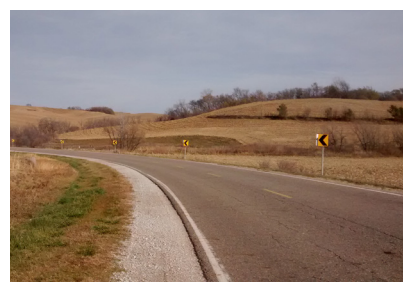
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16. Abstract

A road safety audit or assessment (RSA) is a formal review of the safety performance and features of a site by a multidisciplinary team with no prior experience with the site. RSAs are an effective tool for improving roadway safety. Federal Highway Administration (FHWA) guidelines for RSAs have existed since 2006, and most states have adopted those guidelines with modification to meet local needs.

This project reviewed current national and state RSA literature and surveyed a small sample of states on their RSA practices to define RSA guidelines and practice. That information, as well as the current approach to RSAs in Iowa, was used to develop a suggested RSA process for the future in the state.

The literature review found that states generally follow the 2006 FHWA eight-step RSA process. The eight steps in the FHWA process include project identification, team selection, pre-meeting, field review, analysis and report preparation, presentation of findings, preparation of formal response, and incorporation of findings. Some variations in the process are in use by some states, but these are largely related to the expansion of specific steps.

An in-depth review of RSA processes in four states (Nevada, Ohio, South Dakota, and Virginia) found that each state generally followed the FHWA guidelines.

The RSA approach suggested for Iowa is based on a process that has evolved to meet the needs of those requesting the assessment. The eight steps suggested for Iowa RSAs include (1) Project Identification, (2) Team Development, (3) Background Data Compilation, (4) Pre-Assessment Meeting, (5) Field Review, (6) Memorandum Development, (7) Memorandum Delivery, and (8) Incorporation of Suggestions. Changes, updates, or revisions to the Iowa process can and should be incorporated as necessary in the future, as the need arises.

Report appendices highlight data and sources, checklists of items for field reviews, a sample field note sheet, and a suggested memorandum template. This information is intended to support and guide an RSA team throughout the assessment process. The approach outlined in this document can be employed by any group that conducts an RSA in Iowa. This will result in consistency between RSAs, regardless of who conducts them.

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DEVELOPMENT OF IOWA ROAD SAFETY ASSESSMENT (RSA) GUIDELINES

Final Report
February 2018

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EXECUTIVE SUMMARY

A road safety audit (RSA) (also sometimes referred to as a road safety assessment) is a formal review of the safety performance and features of a site(s) by a multidisciplinary team with no prior experience with the site. RSAs have been found to be an effective tool for improving roadway safety. Federal Highway Administration (FHWA) guidelines for RSAs have existed for some time, and many states have adopted and modified all or part of those guidelines.

The research discussed in this report reviewed current national and state RSA literature, as well as the results from a survey of a small sample of state practices, to identify existing RSA guidelines and practices. That information, as well as the current approach to RSAs in Iowa, was used to suggest an RSA process for the state. That process is the result of what has been learned over time from conducting RSAs in the state.

The literature review found that there was a clear difference between the RSA processes/steps used before and after the FHWA guidelines were released in 2006. Before the 2006 guidelines, the process at the national level consisted of 10 or more steps, while at the state level processes were 6 or fewer steps. All the processes employed the same core approach and included developing an RSA team, reviewing relevant data, performing field reviews, developing recommendations and reports, and presenting the findings to the owner. Following the release of FHWA's guidelines, an eight-step RSA process was established and is followed by most states. Some variations in the process were identified in some states, but these were largely related to expanding the FHWA guidelines. Additional review found that limited software has been developed to assist in the RSA process. In the US, that software provides users with a means to record site information, check for issues through the use of prompt lists, etc.

A review of RSA processes in four states (Virginia, South Dakota, Nevada, and Ohio) found that each state generally followed the FHWA guidelines. Some minor differences were found, such as who led RSAs (e.g., the department of transportation [DOT] staff or Local Technical Assistance Program [LTAP] staff), team size and composition, the formal presentation of findings and the response from the roadway owner (or exclusion of this step), and report content or length. However, as the literature review found, each state generally followed the FHWA RSA approach in terms of the overall process.

RSAs in Iowa are based on a suggested process that was developed to meet the needs of those requesting the assessments. These steps generally follow the FHWA approach. The eight proposed steps for Iowa RSAs include the following: (1) Project Identification, (2) Assemble RSA Team, (3) Compile Background Data, (4) Pre-Assessment Meeting, (5) Field Review (and post-assessment team meeting), (6) Develop Memorandum, (7) Memorandum Delivery, and (8) Incorporation of Suggestions. The process also includes a few minor alterations to the FHWA approach. For example, the team does not typically make a formal presentation of its findings and suggestions to the roadway owner. In addition, a brief memorandum of findings and suggested improvements/countermeasures, rather than a full report, is provided to the agency that requested the RSA. Also, the roadway owner is not required to make a formal written response to

the RSA team regarding the findings and suggestions in the memorandum, but it is suggested that they have that document in their internal files.

In addition to the development of the suggested process, report appendices provide different materials to assist in conducting RSAs. This includes examples of different data and sources that can be used to develop background information on the site for the RSA team. Prompt lists of items to evaluate and review during the field review are provided for reference, as is a sample field note and observation sheet for data recording. Finally, a suggested RSA memorandum document is presented that can serve as a general template for teams to follow.

Based on the work completed as part of this project, several conclusions and recommendations can be drawn. The eight-step RSA process developed in Iowa is similar to that outlined by the FHWA. The Iowa process has evolved and changed to meet the needs of those requesting RSAs in the state, and this evolution will likely continue in the future. The Iowa RSA process is flexible. Consequently, changes, updates, or revisions to the process can and should be incorporated as necessary in the future. The approach outlined in this report can be employed by any agency that conducts an RSA in Iowa. The application of this approach should result in more consistency between RSAs, regardless of who conducts them and the agency with jurisdiction along a given roadway.

CHAPTER 1. INTRODUCTION

A road safety audit- (RSA) (also sometimes referred to as a road safety assessment) is a formal review of the safety performance and features of a site(s) by a multidisciplinary team with no prior experience with the site. RSAs can be performed at any stage of roadway development from planning through maintenance.

RSAs have been found to be an effective tool for improving roadway safety. The Federal Highway Administration (FHWA) has previously included RSAs as one of their nine proven safety countermeasures (FHWA 2014a). RSAs are conducted across the country and within Iowa.

Project Goal and Objectives

As noted, the application of RSAs is relatively commonplace in Iowa and many other states. FHWA guidelines for RSAs have existed for some time, and individual states have also adopted and modified their own guidelines. The goal of this project was to review other guidance and develop and document a suggested RSA process for use in Iowa.

This project had two objectives. The first objective was to review current national and state RSA literature, as well as survey a small sample of states about their practice. The second objective was to develop and document a suggested RSA process specifically for Iowa.

Document Content

This document consists of five chapters. Chapter 1 provides an introduction and overview of the project. Chapter 2 presents the results of a literature review of national and state documentation on RSAs. Chapter 3 discusses information related to the specific RSA processes being used in four states (Virginia, South Dakota, Nevada, and Ohio) that were of interest to the technical committee. Chapter 4 presents the suggested RSA process for Iowa, and Chapter 5 presents conclusions and recommendations based on the work.

CHAPTER 2. LITERATURE REVIEW

An RSA is defined as a formal safety performance examination of a planned or existing roadway segment or intersection by an independent multidisciplinary audit team that considers the safety of all road users, qualitatively estimates and reports on observed safety issues, and identifies opportunities for safety improvement (Synectics et al. 2006). An RSA can be performed at any stage in the development of a roadway from planning to maintenance. RSAs are conducted across the country and within Iowa. However, Iowa has no formal guidelines for the application of RSAs.

Both the FHWA and state departments of transportation (DOTs) have developed guidelines for performing RSAs. The current FHWA guidelines, developed in 2006, include information on why RSAs are conducted, when they can be applied, and processes for RSAs conducted during different phases of roadway development (Synectics et al. 2006). The guidance also includes a brief outline of an RSA report but does not go into detail or give an example report. States such as Massachusetts have developed their own state guidelines. The guidelines in that state include information on the process for conducting an RSA as well as steps for writing an RSA report (MassDOT 2015). The Massachusetts guidance also includes examples of emails to invite participants, example RSA schedules, and a template for the report. In the Midwest, no state has published guidelines, but the Minnesota Department of Transportation (MnDOT) provides examples of RSA memos and letters of interest.

The purpose of this project was to develop RSA guidelines specifically for use in Iowa. To accomplish this objective, it was necessary to understand what other agencies are doing. Part of that understanding was obtained through a review of the existing literature that summarizes RSA guidelines established by the FHWA and other states. The following sections provide a summary of the processes being used to conduct RSAs, as well as differences (if any) that might exist between those processes. The summary also includes the guidelines/processes used at the federal/national level, state-level guidelines, and an overview of RSA software.

Federal and National Guidelines/Practices

The RSA process at the national level currently is focused on the FHWA guidelines released in 2006. Prior to that date, different pieces of literature discussed RSA processes with one or two steps that differed among them. After that date, the process has followed the FHWA's guidance.

Institute of Transportation Engineers

As part of its 1999 Traffic Safety Toolbox, the Institute of Transportation Engineers (ITE) included a discussion of an RSA process based on an approach developed in Australia. That process consisted of nine steps (ITE 1999):

1. Select the audit team
2. Provide the background information

3. Hold a commencement meeting
4. Assess the documents
5. Inspect the site
6. Write the audit report
7. Hold a completion meeting
8. Write the response
9. Implement the changes

Some of these steps closely match those in the 2006 FHWA guidance discussed later is this document.

Wilson and Lipinski Process for Urban Streets

Wilson and Lipinski (1999) discussed an RSA process to apply along urban streets. The steps that were presented were a derivative of those outlined by ITE (ITE 1999). The series of 10 steps discussed by the authors included the following (Wilson and Lipinski 1999):

1. Select the audit team
2. Provide background information
3. Hold a commencement meeting
4. Assess documents
5. Inspect the site
6. Write the audit report
7. Hold a completion meeting
8. Write a response to the audit report
9. Implement agreed-to changes
10. Incorporate feedback from knowledge gained

Although the title of some steps slightly differs from the ITE RSA process, the only notable difference is the addition of the final step (incorporating feedback from knowledge gained).

National Cooperative Highway Research Program Synthesis 321

National Cooperative Highway Research Program (NCHRP) Synthesis 321, which discussed roadway safety tools for local agencies, included a discussion of RSAs, as well as an approach for a road safety audit review (RSAR). The distinction made between an RSAR and an RSA was that an RSAR is only for an existing roadway (Wilson 2003). The general RSA process outlined by the synthesis consisted of 11 steps, including the following (Wilson 2003):

1. Select the team
2. Provide relevant data and documents
3. Hold a kickoff meeting
4. Assess data and documents
5. Inspect the site

6. Discuss safety issues with the designer or client
7. Write the RSA report
8. Hold a completion meeting
9. Respond to the report (client)
10. Implement agreed-to changes
11. Share lessons learned

The primary difference between this and the two approaches outlined thus far is the inclusion of a step (Step 9) to discuss safety issues with the client following the field review.

National Cooperative Highway Research Program Synthesis 336

NCHRP Synthesis 336, Road Safety Audits, provided a summary of the state of the practice on RSA applications in North America before 2004. The synthesis included a summary of when RSAs can be conducted (i.e., the planning stage, draft design stage, design stage, traffic control device construction planning stage [an addition to lists presented elsewhere], construction stage, and on an existing roadway) (Wilson and Lipinski 2004). However, the steps for the RSA process outlined in this document were the same as those previously listed in NCHRP Synthesis 321.

Federal Highway Administration

The RSA document that defined the formal process in the US was the FHWA 2006 Road Safety Audit Guidelines report (Synectics et al. 2006). That document, at the time, noted that "there is currently a diversity of views and opinions about the appropriate scope, role, and application of RSAs" (Synectics et al. 2006). In other words, at that time, a specific process had not been established for agencies to follow when completing an RSA. The proposed FHWA process consisted of eight steps. However, depending on the type of RSA being conducted (during planning/preconstruction versus on an existing roadway facility), these steps may entail slightly different activities. The steps in the FHWA process include the following:

1. Identify the project or existing road to be audited. This step establishes the overall aspects of the audit, including scope and schedule, team requirements (including size and qualifications), tasks, report content, report format, and report response expectations (Synectics et al. 2006).

2. Select an RSA team. This is the selection of an independent, multidisciplinary team to conduct the audit. The multidisciplinary team should be comprised of members with backgrounds in engineering, planning, maintenance, enforcement, and, depending on the type of project, specialized areas such as bicycles and pedestrians, transit, etc. Project owners can include members from within their agencies, but these members must be impartial. Best practice is to use a smaller RSA team, because larger teams can be less effective (Synectics et al. 2006).

3. Conduct a pre-audit meeting to review project information and drawings. This step brings together the roadway owner, audit team, and others as needed to discuss the scope of the audit and review all information that is available. This information can include design plans, crash data/records, traffic data, aerial photos, and environmental records (e.g., weather, topography, etc.) (Synectics et al. 2006).

4. Conduct a review of the project data or a field review. The project data review examines design drawings in detail to imagine how the road would appear to future users in order to identify potential safety issues (Synectics et al. 2006). Field reviews examine existing roadways (including those still under construction) to identify issues having a potential impact on the safety of roadway users (Synectics et al. 2006). This includes a review of conditions at night.

5. Conduct an audit analysis and prepare a report of the findings. This step involves a debriefing of the audit team following the data or field review to discuss the safety issues identified, prioritize items (if needed), and develop suggestions for addressing each issue. Based on this discussion, the audit team leader will write an RSA report, which should be concise and include pictures, diagrams, and maps. The outline of the document suggested by the FHWA includes an introduction of the scope and purpose of the RSA, the background of the audit team, the data used during the process, findings and observations, suggestions covering each safety issue point by point, and a formal statement from the RSA team indicating agreement with the content of the document (Synectics et al. 2006).

6. Present the audit findings to the project owner/design team. This step is a presentation by the audit team to the project owner of the key findings from the audit report. This presentation allows the owner to provide informal feedback and allows the RSA team to clarify its findings and suggestions, when necessary (Synectics et al. 2006).

7. Prepare a formal response. The project owner/design team provides a written response to the audit report during this step, documenting the team's response to the RSA's findings and suggestions. The project owner/design team can agree with a suggestion from the audit team and commit to its implementation, disagree with a suggestion and commit to an alternative, or choose not to implement any improvement due to project or other constraints (Synectics et al. 2006). When a suggestion is not implemented, the reasoning behind the decision should be documented.

8. Incorporate the findings into the project when appropriate. This final step seeks to incorporate the findings of the RSA and implement them when appropriate. At this point, the project owner/design team can also review the RSA process to aid in future refinements (Synectics et al. 2006).

The FHWA process document mentions an owner/agency contacting an "RSA coordinator" to summon the audit team to study the road in question. However, no discussion was made as to who that coordinator should be within a state or agency. This is a point to consider for the application of a process in Iowa.

Gibbs et al. on Federal Highway Administration Case Study Program

Gibbs et al. (2006) discussed the lessons learned from nine pilot RSAs conducted by the FHWA in 2006. The pilot audits were completed for all types of projects (e.g., during the planning, preliminary design, and detailed design stages and on in-service roadways) and followed the steps established by the FHWA that were discussed previously. A number of lessons were learned from the pilot studies, including points to consider when establishing or following the RSA process/guidelines. For example, an RSA team needs to have a clear understanding of the project/roadway background and its constraints (Gibbs et al. 2006). In addition, on design-level audits, the team needs to work cooperatively with designers to understand why elements have been designed the way they have been, and a local champion is needed to assist in the development of the RSA, particularly to aid in implementing the suggested changes (Gibbs et al. 2006). Finally, the RSA field visit should be planned to coincide with important site conditions (e.g., during the peak hour of traffic volume for the day) (Gibbs et al. 2006).

Federal Land Management Agencies and Tribal Governments

In 2010, an FHWA document outlined an RSA toolkit for federal land management agencies (FLMAs) and Tribal governments (Nabors et al. 2010). The approach in the document was the same eight-step process outlined by the FHWA in 2006. However, a specific discussion addressed the unique circumstances or characteristics that FLMAs and Tribal land agencies might need to consider or incorporate. For example, in Step 1 of the FHWA guidelines (i.e., Identify Project), a discussion indicated that FLMAs or Tribal land agencies may want to conduct an RSA on a facility owned by a separate agency (e.g., state or local), which would require contact with that owning agency to begin the RSA process. Guidance is also given to FLMAs and Tribes that representatives from various other stakeholder groups (e.g., FHWA, Bureau of Indian Affairs) be included on the RSA team.

Federal Highway Administration Model RSA Policy

In 2014, the FHWA also provided a model RSA policy that outlined the eight-step process previously developed. The purpose of this document was to assist road owners with the development of their own policies consistent with specific processes, practices, and budget constraints (FHWA 2014b). The document does not provide any new or revised steps to the RSA process. The document does provide, among other things, suggestions of text and items for consideration when an agency develops its program, the times when RSAs should be performed, and elements that should be considered.

State Guidelines

Some of the processes used by different states have also been documented in literature. The processes outlined, however, appear to have changed to follow the FHWA guidelines after they were published in 2006. This section describes the processes followed by several states.

Pennsylvania

A 2000 white paper documented the early (circa 2000) Pennsylvania DOT (PennDOT) experiences with the RSA process. PennDOT's RSA efforts date back to 1997, and the process employed was shorter than the FHWA guidelines in 2006. PennDOT's process was based on elements used in Australia, New Zealand, and Canada and consisted of the following steps (Pieples 2000):

1. Select team members
2. Select project(s)
3. Review available data
4. Conduct audits
5. Document and communicate results
6. Incorporate improvements

One interesting aspect noted in this document was the financial cost of RSAs. Based on their experience at the time (2000), the cost to complete an RSA in Pennsylvania was $2,000 to $5,000. It was recommended that audits be performed during the planning, design, and construction/pre-opening stages of a roadway rather than on existing roads (although RSAs on the latter were not excluded from being performed).

A report from Pietrucha et al. (2000) also discussed a pilot of the PennDOT RSA program about the same time. The approach these authors used was slightly different from that outlined for PennDOT above. The steps used in the pilot program included the following (Pietrucha et al. 2000):

1. Select RSA team members (four members per team from DOT planning, construction, maintenance, and traffic backgrounds)
2. Select project(s) to audit (preliminary design and construction/pre-opening stages)
3. Hold a pre-meeting
4. Conduct field visits
5. Develop/communicate findings and recommendations

Notably absent from this process, particularly given the process outlined in the Pennsylvania white paper, was a response from the roadway owner to the recommendations made and the implementation of suggested improvements.

Virginia

The Virginia DOT (VDOT) uses a variation of the 2006 FHWA guidelines in conducting its RSAs. The general steps are the same, but a separate step has been added to conduct a crash analysis and collect background information before the kick-off meeting occurs (VDOT 2008). It was indicated that the reason this additional step was added was to identify locations, factors,

and operational and conflict issues that should be focused on before the kick off meeting occurs. The process will be described in more detail in the following chapter.

Arizona

A 2010 report on Arizona's RSA program, which began in 2006, summarized the common issues identified and recommendations made by the assessments (which is what Arizona calls its audits) that had been completed, as well as lessons learned (Kar and Blankenship 2010). The approach employed in Arizona generally follows the FHWA guidelines, although one slight difference was noted. In Arizona, the crash data analysis occurs after the day and night field review steps are completed. The lessons learned from conducting RSAs in Arizona included recognizing that multidisciplinary teams provided a well-rounded perspective, pre-audit coordination with the roadway owner helped identify issues and guide the team selection, the nighttime audit component was important in identifying time-of-day issues, and the proactive use of RSAs, as opposed to being reactive to a problem, helped to identify and prevent issues.

South Dakota

South Dakota's 2010 Local Rural Road Safety Audit Guidelines and Case Studies document is used to conduct RSAs in that state (Mahgoub and Marshall 2010). This guide follows the 2006 FHWA process, but the findings/recommended improvements step is separated into four categories. These categories include immediate improvements (e.g., vegetation removal), low-cost improvements that should be considered over a reasonable period of time (e.g., the use of larger signs), high-cost improvements that should be considered when funds become available (e.g., during major rehabilitation projects), and design recommendations (e.g., access management) (Mahgoub and Marshall 2010). In addition to this information, experiences with conducting audits on local roads in the state indicated that there was a potential need for local agency RSA training to explain the process and demonstrate its application (Mahgoub and Marshall 2010). South Dakota's RSA process is also discussed in more detail in the following chapter.

Idaho

The Idaho Transportation Department's (ITD's) 2011 RSA manual describes the guidelines that the state follows, which are based on the FHWA's 2006 guidelines/process. One topic in this manual that was not found elsewhere in the literature was a draft RSA report outline. The suggested sections for an RSA report that were in the ITD's 2011 guidelines included the following:

- Introduction
- Scope/Background
- Objectives
- RSA Process
  - Briefing meeting discussions

- o Field review
- o Debriefing meeting discussions
- o Observations and recommendations
- o Significant comments, directions and/or suggestions from report presentation
- Summary of Recommendations
- Cost estimates
- Approval/disapproval/comments

Missouri

The 2014 Missouri DOT (MoDOT) Safety Handbook for Locals included a chapter that discusses RSAs (University of Missouri-Columbia 2014). The state follows the FHWA 2006 guidelines, but the chapter also indicated the possibility that RSAs may increase tort liability. The idea noted was that an RSA report could be used to show that a facility was unsafe and that corrective measures were not taken. The document, however, indicates that the legal doctrines of sovereign immunity and rules of discovery could protect against liability or exclude RSA evidence from being used in litigation (University of Missouri-Columbia 2014). It was noted that some states (Kansas was specifically listed) limit RSA reports "to internal staff use only" to avoid raising these legal issues.

Rossy et al. (2010) also discussed the lessons learned from two early RSAs conducted in Missouri (Rossy et al. 2010). For these case studies, it was stated that the NCHRP Synthesis 336 guidelines were used (which match the FHWA's 2006 process). Several lessons learned that may be of interest to this project were discussed. It was noted that background information, including crash data, construction plans, traffic control device locations, future development plans, and interviews with agency staff, was crucial to identifying issues that were not necessarily evident during the field review. The importance of this background information underscored the need for advance preparation before the pre-meeting. In some cases, it was also noted that it was useful to make day and night site visits as well as visits during weather events such as rain (i.e., because safety-related drainage issues were identified during one RSA). The development and use of strip maps for team members to draw on in the field rather than drawing sketches was also found to be useful.

Massachusetts

The Massachusetts DOT (MassDOT), as part of its 2015 RSA guidelines, indicated that RSAs are required for projects that include roadway or signal improvements within a high-crash corridor, projects that are adjacent to a high-crash corridor or are anticipated to impact its operations, or Highway Safety Improvement Program (HSIP) projects (MassDOT 2015). The approach used by MassDOT to complete audits generally follows the FHWA guidelines, although there are fewer steps in the process and the order of steps differs. The overall process employed consists of the following (MassDOT 2015):

1. Prepare background materials

2. Assemble the audit team
3. Conduct the pre-audit meeting
4. Conduct the field visit
5. Hold a post-audit meeting to confirm issues and identify countermeasures
6. Prepare and deliver the final RSA report

At no point in the process does there appear to be any presentation of findings and recommendations to the roadway owner/agency or a requirement for a response to the final RSA report recommendations.

Kansas

An undated pamphlet from the Kansas DOT (KDOT) describes a process that could be considered an abbreviated version of an RSA (KDOT n.d.). That process, which appears to have been initiated by the Bureau of Transportation Safety and Technology within the DOT, consists of the following steps (KDOT n.d.):

1. Office review of crashes along all state routes in a county to identify locations and patterns of concern that may be corrected by geometric or traffic control changes.

2. Field review, where an engineer (note that the document only lists a singular person making a field visit) drives the roadways of interest to observe and record information on roadway characteristics, geometry, signing, etc. This step could also include visits with local personnel to gain additional information and insights on specific locations.

3. Development of a final report, which is distributed to road owners for potential implementation of recommendations.

This pamphlet remains posted on the KDOT website.

Other States

Although not discussed in detail here, literature and presentations from other states, including Michigan, Montana, and Oregon, were also identified and reviewed. All of these documents indicated that the respective states use the FHWA guidelines for their RSAs. The documents did not discuss any additional information or details.

RSA Software

A search of the literature for software that assists/facilitates the RSA process yielded limited results. The FHWA offers RSA software, although the ability to directly download this software does not seem to be possible. The software asks for information about the project (e.g., roadway name, speed limits, facility type) and prompts users through a series of checklists to cover issues that should be commented on by team members as they complete the RSA (FHWA n.d.). At the

completion of the review, the software allows the findings for each issue to be accepted and allows for export of that information to a Word file for use in the formal RSA report.

Outside of the US, the Australian Road Research Board (ARRB) has developed RSA software for Austroads (the Australian transportation agency) (ARRB 2010). Similar to the FHWA tool, the software prompts users through checklist questions related to the project/roadway, records those responses and other information, directs users to relevant publications for different issues that are identified, and exports recorded information to assist in report generation. The software has been developed for use on Australian and New Zealand roadways and requires a user fee for international use.

Summary

This chapter summarized information about RSA guidelines at the national and state level. The primary conclusion drawn from this review is that there was a clear distinction between the RSA processes/steps used before and after the 2006 FHWA guidelines. Before the 2006 guidelines, the process at the national level consisted of a large number of steps (e.g., 10 or more), while at the state level processes were shorter (e.g., 6 or fewer). In general, however, all the processes employed the same steps: develop an RSA team, review relevant data, perform field reviews, develop recommendations and reports, and present findings to the owner.

Following the release of the FHWA guidelines in 2006, a clear shift occurred to the eight-step process that the FHWA established. At the state level, the literature also showed that some variations in the RSA process existed in some cases, but these variations were largely related to specific steps in the FHWA process being expanded upon. More commonly, the states followed the FHWA guidelines with no changes.

A limited number of software applications to assist in the RSA process were also identified. In the US, software has been released by the FHWA to guide the conduct of RSAs. This software provides users with a means to record site information, check for issues through the use of prompt lists, and export data to assist in report development. Internationally, Australia has also developed similar software for use in its RSAs.

The results of this literature review were used to gather more detailed information from four state RSA implementation guidelines and/or policies. The objective was to gather more information to assist in the development of an Iowa-specific RSA process/guidelines. The results of these discussions with the states are presented in the next chapter.

CHAPTER 3. FOUR STATE RSA GUIDELINE DETAILS

In addition to the literature review previously described, the project team interviewed representatives from four different states to gather more information about their RSA guidelines and/or policies. The states identified by the technical advisory committee (TAC) for further investigation included Nevada, Ohio, South Dakota, and Virginia. Information from these states was largely obtained though telephone interviews, although in one case (Virginia) the RSA process was available in a dedicated document. This chapter presents the results of this process.

Virginia

As noted in the literature review chapter, VDOT uses a variation of the 2006 FHWA RSA guidelines (VDOT 2008). Virginia conducts RSAs at any time in the development of a roadway (preliminary engineering through post-construction) but focuses on existing roadways.

The RSA process in Virginia begins with the identification of the project or roadway that will be assessed, when a request is made for that assessment by a sponsoring agency (typically a VDOT regions, because the state owns the majority of the roadway system). Virginia's RSA sites are mainly along highway safety corridors and at high-crash locations. In addition, candidate sites are typically identified and prioritized by VDOT regional staff through a review of crash rates and severe crash densities. The VDOT Transportation and Mobility Planning Division is the lead coordinating unit for conducting the RSA process as part of its Strategic and Targeted Roadway Solutions (STARS) program.

The second step in the Virginia RSA process is the selection of team members. The team is comprised of independent, multi-disciplinary, and qualified members from different backgrounds in engineering, design, and maintenance. Law enforcement and local government staff (e.g., public works) may also be included at the discretion of the agency that requested the RSA. This is a notable difference from RSAs conducted in other states.

Next, background information is collected and a crash analysis is completed. The RSA requestor/sponsor collects this background information and provides it to the RSA team prior to the initial kick-off meeting and field review. Background information can include site maps, aerial photos, as-built plans, traffic data and movements (if at intersections), and the crash analysis results. The crash analysis provides detailed crash information for the site/corridor.

The fourth step in the Virginia RSA process is the kick-off meeting (this is equivalent to what other entities, including Iowa, call a pre-meeting). This meeting, which is typically held on the same day as the field review, brings together the RSA team to review the information related to the site, ask questions that might not be answered by that information, and discuss potential issues that should be considered during the field review (VDOT 2008).

The kick-off meeting is typically followed that same day by the field review. In Virginia, the recommended practice is to review a site during more than one time of day. These times of day

can include the morning and afternoon peak and off-peak travel periods and/or day and night. The team members evaluate the site to determine compliance with current design standards and identify additional treatments to improve safety. A series of checklists to assist with the field review have been incorporated into Excel spreadsheets. Items that do not appear in these lists are noted and sketched by team members. All possible improvements are noted during the field review.

The sixth step in the VDOT RSA process is the analysis of findings to identify issues/concerns observed during the field review and develop countermeasures to address them. The countermeasures identified by the RSA team are grouped into short-, intermediate-, and long-term implementation periods.

The countermeasures identified in the prior step are also used in the seventh step of the process. This step includes the development of the RSA report and a completion meeting. This formal report discusses the review, its findings, and proposed treatments/countermeasures. The content in the report includes an overview of the corridor/site, aerial photos and/or sketches of important features, table summaries and collision diagrams of crashes, site-specific issues observed, proposed safety improvements, and a recommended plan for implementing the improvements, including an identification of potential funding sources (VDOT 2008).

The eighth step in the VDOT RSA process is to present the report to the requesting agency at a completion meeting. The report is presented by the entire RSA team at this meeting. The team and affected agencies review the recommendations together and determine which ones should be priorities for implementation. The countermeasures that are prioritized are assigned to a responsible group (VDOT 2008). A plan to track/provide data to evaluate the effectiveness of the countermeasures is an additional product of this meeting.

The final step in the VDOT RSA process is the implementation of the prioritized projects. This step needs to be performed by the roadway owner, which is often VDOT. All the countermeasures implemented in Virginia are monitored to determine their effectiveness.

South Dakota

In South Dakota, the RSA process generally follows the approach in the 2006 FHWA guidelines, with a few minor differences (Reuer 2017). The RSA process in South Dakota begins with the receipt of a request. Requests for state highways are directed to the state safety engineer, and requests for the local system (county and city) are directed to the South Dakota Local Technical Assistance Program (SDLTAP). In each instance, the entity that receives the request takes the lead in conducting the audit (i.e., serves as the team leader). To date, all RSAs in South Dakota have been on the state system.

The second step in the RSA process in South Dakota is the assembling of an audit team. In South Dakota, RSA teams are generally comprised of four to six members, and experience has shown that four to five members are preferable (Reuer 2017). Typically, the team consists of someone

from the office that received the request (i.e., the state traffic engineer's office or SDLTAP), a member from the local FHWA division office, local law enforcement from the area (e.g., state patrol, county sheriff, or city police), and a representative from the state DOT's Office of Road Design or a local highway official who is unfamiliar with the roadway being audited.

Next, a pre-inspection meeting is held with the roadway owner. This meeting includes a discussion of the roadway that will be visited, and the owner provides background, highlights, and concerns for the site. Relevant information, such as crash history at the site, is also reviewed at this time. Following this meeting, the roadway owner is excused so that the field assessment can be conducted by the team.

The pre-meeting is followed by the field review. The team visits the site and conducts its review. An initial drive-through of the site is made in one direction. After turning around to approach the site, the review of the roadway begins. Some of the different aspects that are evaluated include whether pavement edge drop-off is present, the presence of abrupt culvert ends, vegetation and erosion control, sideslopes, sight distance, pavement marking and sign conditions, curve signing and delineation, and the presence of mailboxes. South Dakota uses prompt lists that are similar to those provided in the 2006 FHWA guidelines to address these conditions and to review other aspects of the roadway and its environment. During the course of the field review, pictures are taken for later reference. The site reviews have typically only been performed during the day. However, a night component might be added in a case where there is a perceived or known nighttime issue at a site.

Immediately following the field review, the members of the RSA team have a closeout meeting with the roadway owner to discuss what they observed. This meeting is followed by the development of the formal RSA report by the team leader. When developing suggestions for improvements, no thought is given to budget or costs, and the focus is on alternatives that are available to address the problems identified. In South Dakota, the improvements suggested in an RSA report are summarized according to three categories: low-cost safety improvements, intermediate safety needs, and long-term (i.e., high-cost) improvements. The length of the reports has generally been 10 to 12 pages. It is expected that the length of the report will increase in the future due to the ease of taking photos.

In South Dakota, RSA reports/findings are not formally presented to the roadway owner/agency. In addition, no formal response to any of the recommendations or suggestions provided is required from the entity that requested the RSA. Roadway owners are free to pursue or disregard any of the recommendations that are made at their discretion.

Nevada

The Nevada DOT (NDOT) follows the FHWA guidelines when conducting its RSAs (Tuddao 2017). Typically in Nevada, RSAs are requested by roadway designers in the NDOT Design Division who want to have their projects reviewed. These requests are made during the project design phase in order to identify safety needs before a road or intersection is built/reconstructed. RSA requests have come in from other entities, such as the regional transportation commissions

or cities, but these are less common. In Nevada, all RSA requests are submitted to the Senior Traffic Safety Engineer in the NDOT Traffic Safety Engineering Division. A determination is then made whether the RSA will be performed in-house by the NDOT's Traffic Safety Engineering Division or whether it will be performed by a consultant.

Once it is determined who will be completing the RSA, the team members are selected. The RSA team consists of members from multidisciplinary backgrounds, including engineering, law enforcement, and planning. The team is provided with data and documents relevant to the project (in most cases, design plans that are at the 30 percent stage of completion) before the briefing meeting. The team then meets with the designer (or entity making the RSA request) to receive project background information and ask questions about the site.

Following the briefing meeting, the "field visit" is conducted. When the assessment is requested by a designer, this consists of a review of the roadway plans/design to determine whether anything present in the design could present a safety concern. This type of assessment identifies any improvements that the design could incorporate as the plan progresses. When a field review is conducted, the team identifies features that may lead to crashes as well as countermeasures and improvements to address safety at the site. The members of the RSA team then have a debriefing meeting following the completion of the review to discuss their findings.

At the end of the field review, a draft RSA report is developed by the RSA team. This draft report is then presented to the roadway designer (or other entity) who requested the assessment. The team discusses its findings and recommendations with the requestor (as opposed to making a formal presentation) and revises the report based on the results of the meeting. Once the revisions are completed, the RSA team submits the final document to the designer (or other entity), who then acts on the recommendations. The length of this final document can range from 20 to 50 pages, depending on the safety issues identified. It includes photos associated with most of the identified safety issues (either related to issues in the design plan or photos from a site visit). The report's length does not include supplemental materials such as appendices, which contain crash data summaries, maps, crash modification factors or crash reduction factors, and other related documents specific to the particular RSA.

Ohio

The Ohio RSA process is based on the FHWA approach, but it was modified to allow for direct funding applications for recommended improvements (Beale 2017). This modification allows local agencies that have engaged in the RSA process to pair the recommended improvements with safety improvement funding applications and helps suggested improvements be implemented. A number of RSA requests are received, but only two to four RSAs are completed each year. RSAs are usually performed by the Ohio Local Technical Assistance Program (Ohio LTAP), which is housed within the Ohio DOT (ODOT). However, with more recent FHWA RSA training, state safety engineers, metropolitan planning organizations (MPOs), and others will now be able to conduct RSAs (Beale 2017).

The first step in the Ohio RSA process is project identification. However, the Ohio RSA process works differently than that of other states in terms of how a project is initially identified. In some cases, a local agency identifies a roadway segment or intersection that it would like to have assessed. In most cases, however, Ohio LTAP reviews high-crash location maps for a county and identifies segments where an audit should occur. This approach is called the Rural Road Safety Audit Assistance (RRSAA) Program. When Ohio LTAP has identified a segment to be audited, it approaches a county to participate in the audit as part of the RRSAA program. The RSA is not conducted unless the agency/agencies agree to participate. Many of the RSAs conducted in Ohio involve multiple corridors.

Once an RSA project has been identified, members of the RSA team are identified in the second step of the process. A total of three to five members comprise the RSA team, based on FHWA guidance. The team members generally include people with backgrounds in engineering, planning, and law enforcement and first responders.

For the third step, a team launch meeting is held before the site visit is conducted. The purpose of this meeting is to provide team members with a packet of information for the site(s) being considered. The information provided includes crash data by year, severity, hour, day, month, type, lighting, condition, location, and geometry. Engineering guides (e.g., the Ohio Manual on Uniform Traffic Control Devices and Ohio's Traffic Engineering Manual) are also provided. This information is used by the team in the field.

The fourth step in the Ohio RSA process is the site visit. Visits are conducted based on what the crash data indicate (Beale 2017). In other words, if the crash data only show that a daytime crash problem exists at a site, a nighttime visit is not performed. However, if the data do indicate that a nighttime review is necessary, then one could be conducted. In addition to the observations made during the visits, a video is recorded as the team drives through each site/segment in both directions. This video provides a record of each roadway that can be referred to later.

Following the site visits, the information collected by each team member is summarized. In this fifth RSA step, the team works together to use this information to synthesize the data they collected and to begin documenting recommendations to address the issues identified.

The sixth step in the process is the development of the draft recommendations report. Recommendations are based on the observations of issues made in the field and can range from low to high cost. The draft report is compiled by one person from the RSA team and then provided to the team members for review and revision. If substantial changes are made by any of the team members, then a team meeting may be held to work out any discrepancies that exist in the draft report (ODOT n.d.). Once the team is in agreement and no further revisions are needed, the recommendations document is finalized.

The seventh step of the Ohio RSA process is the submission of the recommendations document to the ODOT Office of Traffic Safety for funding through the Highway Safety Improvement Program (HSIP). This is a key difference between the Ohio process and the process in other states. Because the Ohio RSA process is conducted with the intent of obtaining funding for local

agencies, the recommendations document is sent directly to the Office of Traffic Safety with supporting application materials. This step assists the local agency in that it reduces the time and effort required to submit the application as a separate process.

The final step in the Ohio RSA process is for Ohio LTAP staff to work with the county (or other local agency) to guide it through the funding award process, including the paperwork required to obtain federal authorization for projects when necessary (Beale 2017). The RSA process also involves documenting project completion and submitting the final report to the ODOT Office of Traffic Safety.

Summary

The Iowa process currently in use and suggested in the next chapter is similar to the processes/approaches used by the states reviewed in this chapter. These processes begin with project/site identification and team development. Then, data collection is performed, pre-meetings are held, and field analysis is completed. The process concludes with the development of findings/recommendations by the RSA team and the delivery/presentation of those findings to the roadway owner.

The state RSA programs summarized in this chapter were split in terms of the agencies leading the RSAs. In Virginia and Nevada, RSAs were led by the DOT, while South Dakota and Ohio RSAs were often led by the LTAP. All states were similar in terms of the size and composition of RSA teams, with teams comprising four to six members. Virginia was unique from a team composition perspective in that law enforcement was included in the process only on a case-by-case basis.

While similarities in RSA processes were found, some minor differences were identified among the states. For example, Virginia and Nevada RSA teams present their RSA findings/recommendations to the roadway owner, while South Dakota and Ohio RSA teams do not. Most state processes rely on the roadway owner identifying the site(s) to be reviewed, while ODOT identifies sites for local agencies. The Ohio process also is tied to state safety funding grant applications, with agencies receiving assistance in preparing their funding applications as part of the RSA.

Based on the information presented in this chapter, no additional approaches or steps were identified that might be added to the Iowa process. Rather, the conclusion that can be drawn from a review of these four state RSA processes is that the FHWA process is largely being followed with some minor modifications based on unique situations. That same flexibility has been employed in the Iowa process and will be discussed in the next chapter.

CHAPTER 4. SUGGESTED IOWA RSA PROCESS

The purpose of this project was to develop and document a process for conducting RSAs in Iowa. The process suggested in this chapter was developed based on past experience in Iowa and the results described in previous chapters. It is recommended that the RSA process presented in this chapter be followed by all entities conducting an RSA in Iowa. That will produce consistency in how RSAs are completed and the deliverables that result from them.

The focus of RSAs in Iowa should continue to result in a brief memorandum to the requesting agency that covers the observations of the RSA team and their suggestions for safety improvements. The terms assessment and audit have been used interchangeably in this report. In Iowa, the term road safety assessment has generally been used in recent years. This approach is less formal and only includes some of the 2006 FHWA guidelines.

This chapter identifies and explains the steps in the assessment process conducted in Iowa. Appendix A presents a summary of what the Iowa RSA process does and does not do. This appendix can be provided to agencies for questions related to RSAs and for an overview of the process.

Iowa RSA Process

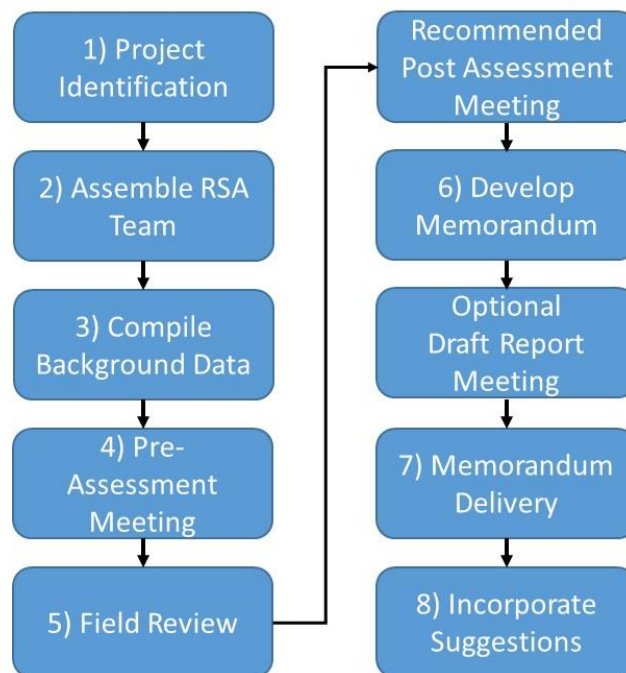The proposed Iowa RSA process consists of eight steps (see Figure 1).

Figure 1. Iowa RSA process

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The agency making the request is largely responsible for Step 1 and Step 8, while the RSA team completes Steps 2 through 7.

Step 1: Project Identification

This first step in the RSA process for Iowa involves the roadway owner identifying the need for one or more intersections, segments, or projects to be assessed. Historically, assessment requests have been for an individual site (i.e., one intersection or a short roadway segment), but an RSA can also be performed for multiple sites. Alternatively, an assessment can also be conducted for a project under design or construction.

The scale and scope of an RSA should not be overwhelming for an RSA team. In other words, the number of locations or length of a segment being reviewed should remain manageable enough for the RSA team to complete their work in one day (including any potential nighttime review). Large sites or groups of sites should be broken into smaller, separate assessments.

With an assessment site or sites identified, the roadway owner will contact an entity that completes RSAs to begin the next steps of the assessment process.

Step 2: Assemble RSA Team

Once a request for an RSA has been submitted, a multidisciplinary assessment team is assembled. At a minimum, the assessment team should include non-local members with experience in traffic safety/engineering, planning, and law enforcement. Representatives from the Iowa DOT, Iowa Governor's Traffic Safety Bureau (GTSB), and Iowa Local Technical Assistance Program (LTAP) have commonly been involved in the past.

In general, the size of the assessment team should be kept small, with about four to six members. The team members typically should have no prior experience with the site, in order to provide an "outsider's" perspective.

Some locations may include aspects that suggest the need for specialized expertise on the team, such as an emergency responder, a safe routes to school/pedestrian safety specialist, or a public health representative. This additional expertise might be needed on an RSA team that is assessing a site with a high occurrence of impairment crashes, for example. A team member from these types of fields may or may not be from the local area where the assessment has been requested, depending on availability. However, care should always be taken to avoid the inclusion of team members who may bring bias to the assessment.

The RSA team leader contacts the potential team members to determine dates that they are available for the assessment. With this information, a pre-meeting with the requesting agency will be scheduled, along with the field review (normally both conducted during the same day).

Step 3: Compile Background Data

Next, the team leader compiles relevant background information for the assessment site(s). This information typically includes the multi-year crash history (commonly 5 to 10 years worth), crash diagrams and turning movement diagrams (for intersections), aerial images and site photos (typically from an online website such as Google Maps), traffic volume data, and other information when necessary (e.g., construction plans). This information is provided to the assessment team to evaluate the history of the site, its crash patterns, and its general layout prior to the field assessment. Appendix B includes an example of RSA background data and provides the sources from which these data can be obtained.

Step 4: Pre-Assessment Meeting

The pre-assessment meeting is held prior to the field review of the site(s). The purpose of this meeting is to bring the assessment team and the RSA requestor together to discuss the site characteristics, crash history, etc., and to discuss the field review activities that will follow.

The RSA requestor may arrange for other interested parties or stakeholders (e.g., local jurisdiction law enforcement, neighborhood group representatives) to be present at this meeting if they would like. However, the overall group that meets should be kept relatively small and focus on the facts and background of the site. The meeting also covers information that should be taken into consideration during the site visit and the development of suggested improvements.

The compiled background data are distributed to attendees at this pre-assessment meeting. Historical crash information is typically presented as a map, with a diagram of the manner of collision at intersections provided when applicable (see Appendix B), along with a tabular summary of crash characteristics for the intersection/segment (e.g., severities, collision manner, major cause). This information provides the team and meeting attendees with an initial indication of crash trends at the site and possible issues to consider while conducting the field review.

The pre-assessment meeting generally lasts 30 to 60 minutes and is followed by the site visit. In most cases, the requestor and other non-RSA-team members present at the meeting should not travel to the site(s) for the field review. However, this is not a set rule, and staff such as a city/county engineer, an engineer's assistant, and local law enforcement (e.g., city police, county sheriff) may participate in the field review, but generally only to answer questions raised by the RSA team.

Step 5: Field Review

The field review consists of the site visit and assessment by the RSA team. Team members should first drive through the site and make observations from an in-vehicle perspective. This should be followed with a walk-through of the site to make observations related to different aspects of the roadway and roadside. Photos, measurements (e.g., lane widths, shoulder widths), and/or video should also be collected. In the case of intersections, team members should walk

each approach. However, for assessments conducted along roadway segments that are several miles long, it will likely be necessary to stop at multiple points along the segment and conduct more localized assessments in addition to the drive through. Video should be collected from one end to the other for any roadway of significant length.

Team members may also be provided with prompt lists, presented in Appendix C of this document, to lead them through the various checks that should be made in the field. Team members should be provided a field note/observation sheet on which to record their safety-related observations of the roadway, roadside, pavement markings, signing, and other features at the site. Data sheets such as the example provided in Appendix D may be provided to team members. Team members can provide their notes to the RSA team leader or they may keep their notes for later reference and provide the team leader with a scanned/copied version.

It is also suggested that RSA team members (particularly the RSA team leader) bring along electronic or physical copies of relevant documents to assist in answering questions in the field. These include the Manual on Uniform Traffic Control Devices (MUTCD), the Iowa DOT Design Manual, the Roadside Design Guide, and similar documents.

Time durations for field reviews are not defined. The team should review the site for as long as it takes to thoroughly identify all safety concerns, collect data (measurements, photos, etc.), and observe driver behavior and traffic movement through the location. Field reviews are generally conducted during the day. However, nighttime reviews should be completed when crash experience or requestor input indicates it is necessary.

A post-assessment meeting immediately following the field review is also recommended (as noted in Figure 1). This allows for the RSA team members to talk to each other about what they observed in the field and to suggest potential safety improvements. This meeting should be held in an office setting, rather than along the roadway, as it is safer and facilitates a more interactive exchange of ideas. If scheduling and logistics dictate it, the meeting can be held at a later time, perhaps via teleconference.

Step 6: Develop Memorandum

Following the field review, the draft memorandum of findings and suggestions is developed. The RSA team leader typically develops the draft memorandum based on the field notes collected and discussions with the team at the post-assessment meeting.

A general template for the RSA memorandum that a team leader should follow is provided in Appendix E. This document consists of the following sections:

- Introduction/background of RSA request
- Overview of current site conditions and crash data
- Discussion/comments on suggested site improvements
- Prospective funding sources

- Conclusions

The first section of the memorandum provides a background of the RSA request (i.e., who made the request and why) and a general overview of current conditions or characteristics of the site. The second section includes the basic geometric description of the site, traffic volumes, traffic control, and crash history (if available). The third section is a description of the safety-related issues and observations made by the RSA team at the site and any suggested safety improvements that may have been identified.

All safety improvements are presented in the memorandum, regardless of cost. The objective is to provide all ideas to the requestor that might improve safety in the short, medium, or long term. The requestor will determine which options to pursue.

The suggested improvements presented in the memorandum range from basic, low-cost signing and pavement marking additions to potentially high-cost roadway section or intersection reconstruction (e.g., intersection redesigns, realignments). The suggested improvements may also have potential timeframes indicated. For example, signing and marking improvements might be classified as short-term, while the addition of paved shoulders and rumble strips might be medium- or long-term. Suggestions may also include the need to complete specific engineering studies (e.g., curve speed study, sight distance study, origin-destination studies) or designs (e.g., alternative cross section analysis). These types of studies and designs are beyond the scope of an RSA.

Following a description of the issues and suggested improvements identified for the site, a brief summary of programs that may be available to assist in helping to fund the improvements carried forward by a requestor are provided. These might include grant programs such as the Iowa DOT's Sign Replacement Program for Cities and Counties or the Traffic Safety Improvement Program (TSIP).

If further, in-depth traffic studies (beyond the scope of an RSA) are recommended, information regarding Iowa DOT's Traffic Engineering Analysis Program may be provided. When a law enforcement component is suggested (e.g., targeted speed enforcement, impairment enforcement), funding programs from the GTSB may also be suggested.

Finally, the memorandum finishes with some overall conclusions and general findings that provide guidance on how the requestor should use the memorandum.

The audience for the RSA memorandum (the requestor) is typically a professional engineer. The overall objective of the memorandum is to present the team's findings in a concise manner, without extensive descriptions or specifics that would already be understood by an engineer.

In general, an RSA memorandum does not include conceptual designs or examples of design alternatives for a site unless those alternatives are not well known. Further, references should be provided only where needed to provide additional detail.

The memorandum should generally be kept short. For example, a basic RSA for one intersection should result in a memorandum of 10 or fewer pages. A more extensive RSA covering a five-mile roadway segment should result in a longer memorandum of 10 to 20 pages. In neither of these cases should a memorandum get into minute detail regarding the specifics of the site, given the requestor is usually very familiar with the site and more interested in the team's suggested improvements to address the issues identified.

Once the RSA team leader has developed the draft memorandum, it should be sent to the RSA team for comment and input. Following the receipt of comments, necessary revisions are made, and the memorandum is finalized.

Step 7: Memorandum Delivery

This step involves the electronic delivery of the final memorandum to the RSA requestor. The target delivery date is typically one month after the field review. As part of the correspondence, the RSA team leader should convey that the requestor may wish to add a printed copy to their files and respond internally to each of the suggestions made via notes in that document. That response would show how the roadway owner intends to incorporate the RSA suggestions or why they were not implemented.

It must be noted that Section 409 of the United States Code "expressly forbids the discovery or admission into evidence of reports, data, or other information compiled or collected for activities required pursuant to several Federal highway safety programs, or for the purpose of developing any highway safety construction improvement project, which may be implemented utilizing federal aid highway funds, in tort litigation arising from occurrences at the locations addressed in such documents or data" (Synectics et al. 2006). However, having an internal, documented response to the suggestions made in the RSA memorandum may prove useful in showing the agency was being proactive in improving safety at a site.

RSAs in Iowa do not typically include a meeting with the requestor to present and discuss the team's findings and suggestions. The memorandum should provide a straightforward summary of the issues identified and the range of options suggested. Experience has shown that requestors (e.g., engineers) are often looking for an unbiased review of the site that provides a range of improvement options that they may or may not have already considered.

Step 8: Incorporate Suggestions

Following receipt of the RSA memorandum, the requestor may or may not incorporate the team's suggestions, at their discretion. While the requestor does not need to formally respond to the RSA team, it is encouraged that they provide a written response to each suggestion to be kept in a project file. For example, a note in response to a suggestion to add a paved shoulder and rumble strips along a horizontal curve might indicate that it will be considered, or built in the near term as part of an upcoming/scheduled repaving project.

Summary

This chapter has outlined a suggested approach to RSAs in Iowa. It is based on a process that has been implemented to meet the needs of clients (counties, cities, Iowa DOT) that typically request RSAs in the state. It should allow an RSA to be conducted in a timely manner while accommodating the demands of the RSA team members.

The Iowa approach follows the FHWA guidelines, with a few minor differences. Those differences include the fact that a post-assessment meeting does not necessarily need to be conducted. In addition, the team does not make a formal presentation of its findings and suggestions to the requestor. A brief memorandum of findings and suggested improvements/countermeasures is provided rather than a full report. Finally, the requestor is not required to make a formal response to the RSA team regarding their actions connected to the memorandum, but an internal written response is encouraged.

Although there is no overall timeframe for the completion of the entire RSA process, the objective is to develop the memorandum and deliver it to the roadway owner within one month.

CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS

This project examined national and state-level RSA practices and developed a suggested approach for use in Iowa. The project tasks included a literature review, a summary of four state RSA practices, and creation of a suggested Iowa RSA approach. The conclusions and recommendations based on the results of these tasks are described below.

Conclusions

The following conclusions were developed from the completion of the tasks included in this project.

- There was a clear difference in the RSA processes being used before and after the 2006 FHWA guidelines. Pre-2006, RSA processes consisted of six to 10 steps, depending on the agency. Post-2006, RSA processes generally consisted of eight steps, with some variations from the FHWA approach seen at the state level.

- A limited number of software applications were identified that will help facilitate the completion of RSAs. In general, the software that is available are fee-based or spreadsheet-based. The software guides RSA team members with checklists and prompt lists of items to examine in the field.

- A survey of Nevada, Ohio, South Dakota, and Virginia RSA practices found that they generally follow the framework of the FHWA process to varying degrees. The FHWA guidelines are not used verbatim, but many of its components appear in some manner.

- State RSA processes have been adapted over time to meet the needs of the specific state. This illustrates the flexibility that exists in conducting RSAs.

- An eight-step process similar to that outlined by the FHWA has been used in Iowa to date, with some adaptations made based on local needs.

- The steps in the suggested Iowa RSA process include project identification, RSA team assembly, background data compilation, pre-assessment meeting, field review, memorandum development, memorandum delivery, and incorporation of suggestions.

- The Iowa process developed and presented in this document has evolved through application to meet the needs of various requesting agencies in the state.

Recommendations

The following recommendations were developed from the completion of the tasks included in this project.

- The eight-step approach that is suggested in this document has evolved through application. It has worked well historically and should continue to be employed in future RSAs. This type of evolution should continue when needed in the future.

- The approach outlined in this document should be employed by any agency that conducts an RSA in Iowa. This type of application should result in a consistency among RSAs in Iowa.

- The current Iowa process is flexible. Consequently, changes, updates, or revisions to the Iowa process can and should be incorporated as necessary in the future.

- The RSA memorandum should generally be completed within one month following the conclusion of the field review. This may vary depending on the complexity of the assessment conducted and team member schedules.

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APPENDIX A: SUMMARY OF THE IOWA RSA PROCESS

A road safety assessment (RSA) is a formal review of the safety performance and features of a site(s) by a multidisciplinary team with no prior experience with the site. RSAs have been conducted for counties, cities, and the Iowa DOT on Iowa roadways for many years and encourage safety improvements to be implemented. The following is an overview of the RSA process, its value, and what the RSA team does and does not do.

The Iowa RSA Process

1. Project Identification – Roadway owner identifies site(s) to assess and makes RSA request.

2. RSA Team Development – Team is assembled that generally consists of engineers, planners, law enforcement, and other specific disciplines as needed (i.e., pedestrian or bike experts, etc.).

3. Background Data Compilation – Relevant data to the site(s) is collected (crash records, traffic, etc.).

4. Pre-Assessment Meeting – A meeting with the roadway owner for background information about the site(s) and to discuss the crash data, etc.

5. Field Review – A site visit(s) and review by the team follows the pre-assessment meeting. Typically this is performed during the day, but a nighttime review is also recommended when necessary. A post-assessment meeting between RSA team members is also suggested as part of this step.

6. Memorandum Development – A summary is created of the safety issues identified by RSA team during the field review, suggested safety improvements, and potential funding sources.

7. Memorandum Delivery –The memorandum document is provided to the requestor.

8. Incorporate Suggestions – The RSA team improvement suggestions selected by the requestor are implemented at their discretion.

The Value of the RSA Process

- Proactive approach to safety addressing potential issues before they result in crashes.

- Unfamiliar, impartial observers to identify issues that may have been overlooked.

- Mechanism to lend support/justification to Traffic Safety Improvement Program (TSIP) and Highway Safety Improvement Program (HSIP) applications.

What the RSA Team Does

- Reviews sites regardless of crash history (or lack thereof) to identify safety issues that appear present.

- Multidisciplinary backgrounds look at site safety from multiple perspectives.

- Offers a wide range of solutions to the safety issues identified (e.g., low to high cost).

- Provides a summary of issues identified, potential countermeasures, and possible funding sources.

APPENDIX B: EXAMPLE OF RSA BACKGROUND DATA

The following are examples of background data typically collected prior to an RSA pre-meeting, along with the sources of that data.

Crash Data

Iowa DOT SAVER - https://saver.iowadot.gov/

Iowa Traffic Safety Data Service - http://www.ctre.iastate.edu/itsds/
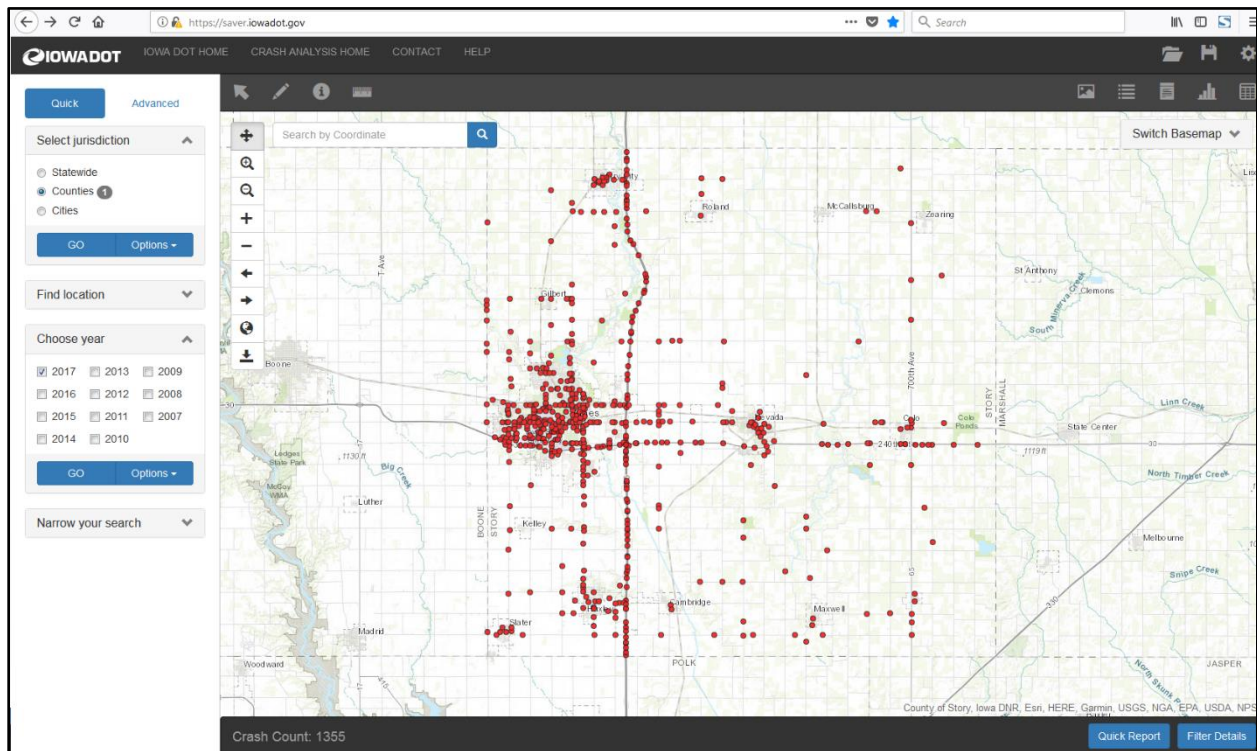
Intersection Crash Diagrams

Iowa Traffic Safety Data Service - http://www.ctre.iastate.edu/itsds/
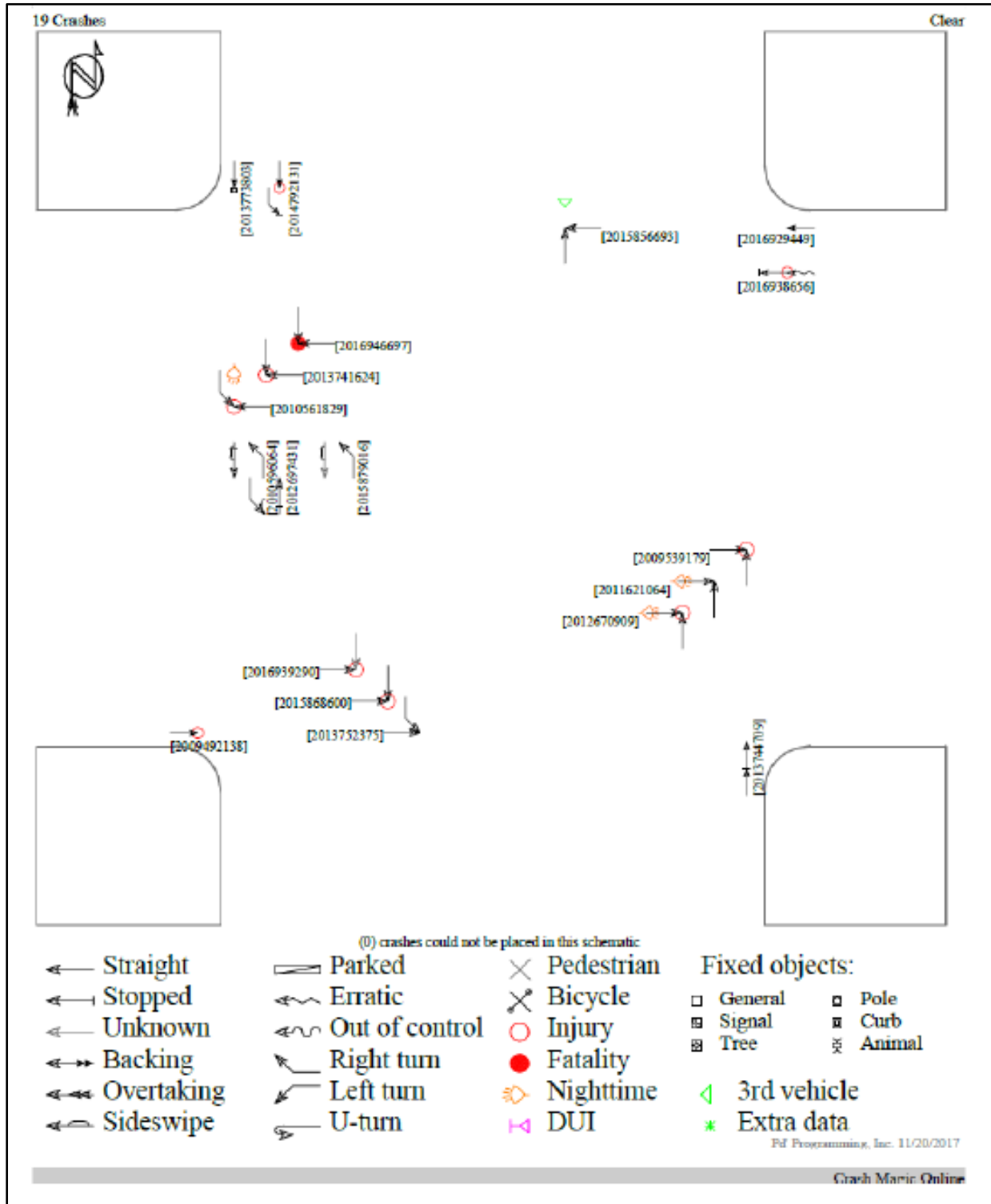
Traffic Count Data

Iowa DOT traffic counts: http://iowadot.maps.arcgis.com/apps/MapSeries/index.html?appid=0cce99afb78e4d3b9b24f8263717f910

Iowa DOT turning movements: http://iowadot.maps.arcgis.com/apps/Viewer/index.html?appid=a29e44be6e314799b612335342a13f62
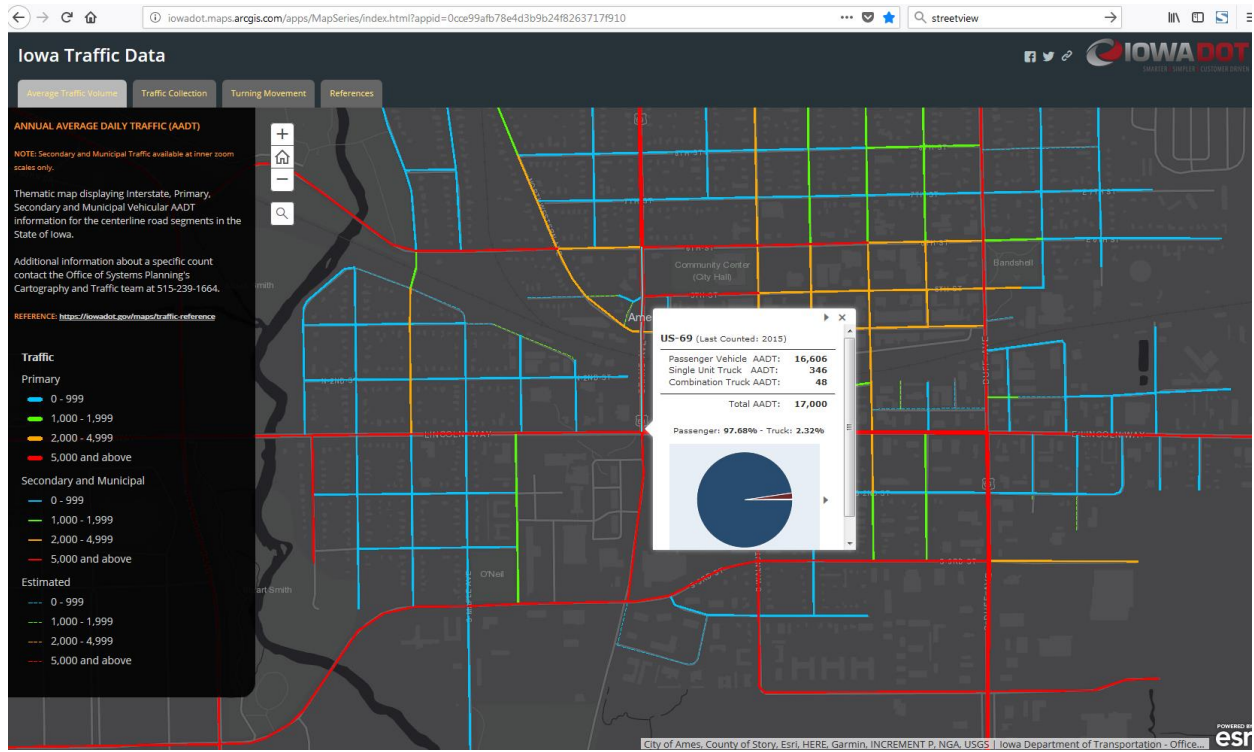
APPENDIX C: RSA PROMPT LISTS

The following are examples of prompt lists that those conducting RSAs in Iowa should use in the field during site visits. These are based on the FHWA Road Safety Audit Guidelines, available at: https://safety.fhwa.dot.gov/rsa/guidelines/promptlist6.htm.

Road Function, Classification, Environment	Interchanges
• General notes on site	• Visibility, sight distance
Road Alignment and Cross Section	• Lanes, shoulders
• Visibility, sight distance	• Signing, marking, delineation
• Design speed	• Pedestrians, bicyclists
• Speed limit/speed zoning	• Lighting
• Passing	**Signs and Lighting**
• "Readability" (perception) of the alignment by drivers	• Lighting
• Human factors	• General signs issues
• Widths	• Sign legibility
• Shoulders	• Sign supports
• Cross slopes	**Marking and Delineation**
• Side slopes	• General issues
• Drains	• Centerlines, edgelines, lane lines
• Combinations of features	• Guideposts and reflectors
Auxiliary Lanes	• Curve warning and delineation
• Tapers	**Barriers and Clear Zones**
• Shoulders	• Clear zones
• Signs and markings	• Barriers
• Turning traffic	• End treatments/Crash cushions
Intersections	• Pedestrian railing
• Location	• Visibility of barriers and fences
• Visibility, sight distance	**Traffic Signals**
• Signing and marking	• Operations
• Layout and "readability" (perception) by drivers	• Visibility
• Pedestrians, bicyclists	• Placement of signal heads
• Lighting	

Pedestrians and Bicyclists	Heavy Vehicles
• General issues	• Design issues
• Pedestrians	• Pavement/shoulder quality
• Bicyclists	**Floodways and Causeways**
• Public transport	• Ponding and flooding
Older Drivers	• Safety of devices
• Turning operations (receiving lane widths, radii)	**Other Safety Issues**
• Channelization, opposing left turn lanes	• Landscaping
• Sight triangles	• Temporary works
• Signing, marking and delineation	• Headlight glare
• Traffic signals	• Roadside activities
Bridges and Culverts	• Signs of possible problems (pavement, roadside)
• Design features	• Rest areas
• Barriers	• Environment
• Pedestrian and recreational facilities, delineation	• Median curbing
Pavement	
• Pavement defects	
• Skid resistance	
• Ponding/icing/snow accumulation	
• Loose stones/material	
• Manholes	

APPENDIX D: FIELD NOTES AND OBSERVATIONS SHEET

Intersection/Segment:_____

Date:_____   Time of Day:_____

Field Notes/Observations

Roadway Conditions

Roadside Conditions

Signing and Pavement Marking Conditions

Road User Conditions

APPENDIX E: SUGGESTED RSA MEMORANDUM TEMPLATE

The following text is a suggested template for RSA teams to follow when compiling an assessment memorandum. The memo can be modified as needed to meet the needs on a particular RSA.

<div align="center">

TECHNICAL MEMORANDUM

</div>

To: RSA requestor

From:	RSA Team
CC:	
Date:	Date of transmittal
Re:	Subject

<div align="center">

SAFETY ASSESSMENT

Location

Date assessment completed

</div>

Introduction

This section of the memorandum provides a general introduction about the RSA. This includes information on what agency made the assessment request, the agency staff who made the request, the RSA team composition, information on the pre-assessment meeting that was held (time, location, attendees), and when the field review was conducted. This section also includes a general map of the location(s) assessed, as a separate figure.

Review of Site Characteristics

This section of the memorandum covers a general overview of the site, including its layout, number of lanes, intersection control (if an intersection), traffic counts, speed limit(s), etc. Crash data are reviewed in detail, including number of crashes, common patterns, time of day, and day of week, etc. The intent of the crash data review is to establish what, if any, common patterns are occurring at a site that might point to suggested improvements that could be made. (This part of the discussion also ties into the field observations discussed in the next section.) An aerial image of the site is provided in this section to orient the reader, as are digital images taken by the team members during the site visit.

Discussion/Observations and Suggestions

This section of the memorandum presents the observations of safety issues made in the field, as well as suggested improvements that might be pursued to address them.

The first portion of text in this section should discuss the observations made by team members in the field regarding different aspects of roadway safety. This is followed by the suggested improvements that the team has identified to address these issues. These suggested improvements should be presented as a bullet point list (possibly in order of most immediate items to address/implement first) that succinctly describes the action(s) that should be taken.

This list is followed by a table that categorizes the suggested improvements by implementation timeframe and cost. That table is presented below, with examples of potential suggestions that would fall within a category.to

Relative Cost	Timeframe			
	Immediate	Short-Term	Intermediate-Term	Long-Term
Low Cost	e.g., sign repair, vegetation removal	e.g., additional signage	e.g., shoulder maintenance	e.g., alternative pavement markings
Moderate Cost	Not applicable	e.g., addition of destination lighting	e.g., addition of paved shoulders	e.g., Relocation of roadside utility poles
High Cost	Not applicable	e.g., addition of turn lane(s)	e.g., intersection collision warning system	e.g., intersection redesign

Conclusion

The final section of the memorandum discusses where the roadway owner can obtain funding in pursuit of different suggestions, as well as direction to resources in completing more detailed studies (such as traffic engineering items). The text also indicates that not all of the suggested improvements are compatible with one another, and it remains at the engineer's discretion to select those that are most appropriate.

Finally, the roadway owner is encouraged to document the impacts that any changes have after implementation, as well as to develop an internal response (preferably written) that addresses why each of the suggestions may or may not be implemented and when that may occur. Text that may be used for this final section includes the following:

Funding programs are available from the Iowa Department of Transportation, such as the Sign Replacement Program for Cities and Counties (SRPFCC, http://www.iowadot.gov/traffic/signreplacementprogram.htm), the Highway Safety Improvement Program – Secondary (HSIP – Secondary, https://iowadot.gov/traffic/sections/HSIP),and the Traffic Safety Improvement Program (TSIP, http://www.iowadot.gov/tsip.htm) to assist in the application of many of the measures listed above. For example, these programs could be mechanisms used to fund basic sign additions and enhancements. The Iowa DOT also offers the Traffic Engineering Assistance Program (TEAP, https://iowadot.gov/traffic/traffic-and-safety-programs/traffic-engineering-assistance-program-teap) to provide traffic engineering expertise and assistance in traffic studies, etc. when needed.

The modifications and improvements suggested in this document should be considered, evaluated and reviewed as potential short- and long-term adjustments that could be implemented. The suggestions in this memorandum are not a complete or comprehensive list of the options available. In some cases, suggested improvements could conflict with one another, and only one alternative should be pursued.

Many of these suggested changes are low-cost modifications that can be accomplished in a rather short timeframe. Others will require longer term planning and prioritization.

When any changes are made at any site, the impact of those changes should be carefully monitored through review of crash data, operational observations, and feedback from agency staff. In addition, it is suggested that the agency create a copy of this memorandum for their files and respond to each of the suggested improvements with notes regarding whether they may or may not be pursued and what the timing of improvements might be.

When the memorandum is transmitted to the requestor, it is suggested that they be reminded that while no response to the RSA team is required, they may want to make an internal response to the suggestions that were made in the document for their records.

Roadway Owner Notes

A final section of the memorandum should be left blank to provide space for the roadway owner to record notes related to the different improvement suggestions made by the RSA team.

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