Traffic Engineering and Highway Safety Bulletin 13-02

Road Safety Assessments

February 2013

Did You Know?

The Federal Highway Administration (FHWA) and SDDCTEA are strongly committed to continuous improvement in roadway safety. Similar to FHWA's Road Safety Audits, SDDCTEA conducts Road Safety Assessments (RSAs) to help identify roadway-related reasons for crashes, and to prioritize projects for improving roadway safety. However, SDDCTEA uses the term "assessment" rather than "audit" to build in study flexibility to focus on solutions to problems rather than the process as described by the FHWA Road Safety Audit Guidelines.

Our January 2013 *Traffic Engineering & Highway Safety Bulletin* on crashes included a discussion on crash countermeasures identified by the FHWA. These countermeasures include the edge of pavement safety edge, roundabouts, corridor access management, signal backplates with retroreflective borders, longitudinal rumble strips, enhanced friction and delineation on curves, medians and pedestrian refuge islands, the pedestrian hybrid beacon, and the "road diet." These crash countermeasures have been proven effective by FHWA. However, there are still other safety concerns that are not eliminated or mitigated by these contermeasures. The opportunity to correct these issues can often be brought to light through an RSA.

RSA Basics

What is an RSA?

An RSA is a formal safety performance examination of an existing or future roadway or intersection by an independent, multi-disciplinary assessment team. It is important that team members not have any familiarity

Multi-disciplinary teams are critical to performing RSAs

In This Issue...

Military Surface Deployment and Distribution Command, Transportation Engineering Agency (SDDCTEA)
1 Soldier Way • Scott Air Force Base, Illinois 62225-5006

with the project in order to eliminate conflicts of interest. Team members should have sufficient experience and expertise in the areas of road safety engineering and crash investigation and prevention, as well as traffic engineering and/or roadway design.

SDDCTEA frequently leads RSAs on military installations. RSAs are intended to increase roadway safety by identifying safety-related concerns, as well as improvement opportunities for the existing roadway. Improvements identified through an RSA are intended to be low-cost, and quick to implement items versus long-term improvements. These improvements are often related to signing and pavement markings, fixed objects, traffic signal operations, traffic control, and maximization of available sight distance. Even though RSAs are focused on short-term improvements, there may be long-term improvements identified, such as adding capacity or flattening roadway curves. Everyday users of a roadway may become accustomed to a situation, but minor issues could create serious problems for unfamiliar drivers and certain situations can create a greater hazard during nighttime hours or during inclement weather, as compared to daytime.

Although the bulk of RSAs occur on existing roadways, they can also be conducted on roadways during the design phase. An office-based review can identify safety-related issues with the roadway design, and provide opportunities to upgrade the design. This maximizes the efficiency in design since it is most cost-effective to correct issues before they are constructed.

RSAs are common in work zones. A roadway that is normally safe is temporarily changed while construction is occurring. Temporary traffic control can often be improved by an independent team's review.

For more information about Road Safety Assessments contact SDDCTEA.

Benefits of RSAs

The major quantifiable cost benefits of RSAs are:

- ✔ When RSAs of design plans occur, reconstruction costs are either avoided or substantially reduced when safety deficiencies are identified prior to roads being in service.
- ✔ Lifecycle costs are reduced since safer roadways often carry lower maintenance costs (e.g., flattened slope versus guardrail).
- ✔ Costs of collisions are reduced by safer roads and fewer, less-severe crashes.
- ✔ Liability claims, a component of both agency and societal costs, are reduced.

Other specific benefits of RSAs include the following:

- ✔ RSAs proactively address safety
- ✔ RSA-audited designs should produce fewer, less severe crashes.
- ✔ RSAs identify low-cost/high-value improvements.
- ✔ RSAs enhance consistency in how safety is considered and promote a "safety culture."
- ✔ RSAs provide continuous advancement of safety skills and knowledge.
- ✔ RSAs contribute feedback on safety issues for future projects.
- ✔ RSAs support optimized savings of money, time, and - most importantly - lives.

Legal Issues

Some agencies have been hesitant to conduct RSAs due to a fear that RSA reports may be used against them in tort liability lawsuits, lawsuits in which a plaintiff may sue for compensation for an injury resulting from a design or engineering flaw. Such a suit would assume that RSA documents could be cited as proof that the overseeing agency was aware of an unsafe road design or that the agency somehow contributed to an individual's injury.

Laws regarding sovereign immunity vary by state. Different states have different levels of sovereign immunity. Therefore, check to see how your state's laws are written. Even if the laws are not favorable, having a safety assessment in place can demonstrate a proactive approach to identifying and mitigating safety concerns.

RSA Process

SDDCTEA often conducts RSAs on military installations. In a stand-alone safety assessment study, a team of two engineers can perform an on-site assessment of several roadways throughout an installation in just a couple of days. In some cases, SDDCTEA can conduct this type of study at no cost to the installation. Safety assessments by an independent team such as SDDCTEA are advantageous in that a new set of eyes reviews the situation and independent expert opinions to remedy the situation are offered.

After the on-site assessment, the RSA team completes an analysis and prepares a report of their findings. The installation should evaluate the report recommendations as practical or feasible. Lower-cost improvements are emphasized to maximize the benefit of limited budgets.

If an installation plans to study a specific traffic engineering problem, it may be advisable to broaden the scope to include an RSA. Roadways and intersections with a crash history should be given priority consideration for safety assessments. Though it is recommended that military installations keep good crash records, crash data is frequently not available. If crash data is not available, there are other indicators for the need of an RSA; including a perceived safety issue or a history of near crashes and complaints from drivers or pedestrians.

RSA Focus Areas

There are many focus areas when conducting a safety assessment. Exhibit 1, shown on pages 4-6, gives real examples of these focus areas, along with the issue and suggested enhancements.

Example RSA Checklist

Exhibit 2, shown on page 7, is an example list of items to watch for when performing an RSA. Note that this is a basic list and is not necessarily inclusive of all possible issues. SDDCTEA can offer insight beyond what is shown.

Contact Us

We can perform roadway safety assessments for your installation.

Darren J. Guttmann, P.E.
Phone: 618-220-5218

David G. Kirkpatrick
Phone: 618-220-5252

Thomas J. Mannino, P.E., PTOE
Phone: 618-220-5249

Brenda K. Roth, P.E., PTOE
Phone: 618-220-5290

Mickeal D. Carda, P.E.
Phone: 618-220-5450

David F. Clark, Jr.
Phone: 618-220-7747

Military Surface Deployment and Distribution Command
Transportation Engineering Agency
1 Soldier Way
Scott Air Force Base, Illinois 62225-5006
DSN: 770-5252
Fax: 618-220-5125
E-mail: army.sddc.safb.traffic@mail.mil
Web Site: http://www.tea.army.mil for pamphlets, bulletins, and studies

Exhibit 1: RSA Focus Areas

Focus Area	Photo	Deficiency and Preferred Condition
Signing		The STOP sign and placard have a homemade appearance. The text is not centered on the sign, the 4-WAY placard is obsolete, and the STOP sign appears to be too small. Use professionally-fabricated signs, with legends in accordance with the Standard Highway Signs manual. Also, the placard should say ALL WAY and the STOP sign should use a minimum size of 30”x30” for conventional roads.
Pavement Markings		The crosshatching is sloped in the incorrect direction and the markings are faded. Crosshatch lines should be sloped so as to direct a motorist back into their travel lane. Also, upgrade the pavement markings to provide proper visibility by day and retroreflectivity by night.
Traffic Signals		There is only one signal head visible to traffic for this approach. Per the *Manual on Uniform Traffic Control Devices* (*MUTCD*), a minimum of two signal heads for every approach, regardless of whether or not it is a minor approach should be provided.
Pedestrian Safety		The sidewalk ramp does not have the appropriate detectable warning surface. Also, the crosswalk markings are too wide compared to the sidewalk and ramps. Although the curb ramp slopes and color distinction are correct, the detectable warning surface so blind people know they are entering a crosswalk should be provided. Also, the width of the marked crosswalk should be reduced to 6 feet to better match the width of the crosswalk and the guidance given in the *MUTCD*.

Exhibit 1: RSA Focus Areas (continued)

Focus Area	Photo	Deficiency and Preferred Condition
Pedestrian Safety		There are two crosswalks located very close to each other. Combine the two crosswalks so as to reduce the number of crosswalks. It is preferred to eliminate the mid-block crosswalks and have all pedestrians cross at the intersection.
Bicycle Safety		Bicyclists share the roadway with vehicular traffic. Although it is typically acceptable for vehicles and bicycles to share the roadway, consider providing a dedicated bike travel lane, if bicycle traffic is significant.
Fixed Objects		The sign post and bollard are located in front of the guardrail. A guardrail is intended to direct errant vehicles from impacting roadside hazards that cannot be otherwise relocated. In this case, the bollard appears to not be needed, and the sign post should be relocated behind the barrier.
Drainage		The ditch is located adjacent to the road edge and has a very steep sideslope. This ditch should be replaced with a closed drainage system with curb and inlets.

Exhibit 1: RSA Focus Areas (continued)

Focus Area	Photo	Deficiency and Preferred Condition
Edge Drop-Offs		Caused by resurfacing, an edge drop-off is present along this section of roadway. The road elevation is a few inches higher than the adjacent shoulder. Edge drop-offs can cause vehicles to temporarily lose control of their vehicles. Repair any drop-off greater than 4 inches.
Sight Distance		Sight distance is limited at this intersection. Trim vegetation that is obstructing the sight distance to maximize visibility.
Sight Distance		The side street has limited sight distance due to the crest curve. The crest curve should be flattened so as to maximize sight distance.
Lighting		The approach to this gate lacks sufficient lighting. Ensure that all gates have sufficient lighting, including the approach, access control, and response zones.

Exhibit 2: RSA Checklist

		YES	NO
Roadway Segment	1. Are there clear lines between the mainline road and side streets or driveways, or are there obstructions that may hinder visibility of conflicting flows of traffic?		
	2. Does the available stopping sight distance meet local or national stopping sight distance criteria for the speed of traffic using the roadway segment?		
	3. Is the horizontal and vertical alignment appropriate given operating speeds on the roadway segment?		
	4. Are passing opportunities adequate on the roadway segment?		
	5. Are all through travel lanes and shoulders adequate based on the composition of traffic using the roadway segment?		
	6. Does the roadway cross-slope adequately drain rainfall and snow runoff?		
	7. Are auxiliary lanes properly located and designed?		
	8. Are median and roadside barriers properly installed?		
	9. Is the median and roadside free from fixed objects and steep embankment slopes?		
	10. Are bridge widths appropriate?		
	11. Are drainage features within the clear zone traversable?		
	12. Are sign and luminaire supports in the clear zone breakaway?		
	13. Is roadway lighting appropriately installed and operating?		
	14. Are traffic signs appropriately located, correctly fabricated, and clearly visible to the driver?		
	15. Is pavement marking delineation appropriate and effective?		
	16. Is the pavement surface free of defects and does it have adequate skid resistance?		
	17. Are parking provisions satisfactory?		
	18. Are all road users safely accommodated (pedestrians, school children, bikes, transit)?		
	19. Is a safe, continuous pedestrian/bicycle network provided?		
	20. Are transit facilities and infrastructure conveniently located and safe?		
Intersections	1. Is appropriate sight distance available to all users on each intersection approach?		
	2. Is the horizontal and vertical alignment appropriate on each approach leg?		
	3. Are pavement markings and intersection control signing appropriate?		
	4. Are all approach lanes adequately designed based on the composition of traffic using the intersection?		
	5. Is the roadway cross-slope adequately draining rainfall and snow runoff?		
	6. Is the median, curbs, and channelization layout appropriate?		
	7. Are turning radii and tapers adequately designed based on the traffic composition using the intersection?		
	8. Is roadway lighting appropriately installed and operating?		
	9. Are traffic signs appropriately located and clearly visible to the driver on each approach leg?		
	10. Is the pavement free from defects and is there adequate skid resistance?		
	11. Are parking provisions satisfactory?		
	12. If the intersection is signalized, is traffic signal phasing and timing appropriate for turning traffic on each approach?		
	13. Are driveways and other access points appropriately located on each intersection approach leg?		
	14. Do pedestrian accommodations appear safe and correctly designed?		

MR. BRUCE A. BUSLER, SES
Director, Transportation Engineering Agency

DEPARTMENT OF THE ARMY
Military Surface Deployment
and Distribution Command
Transportation Engineering Agency
1 Soldier Way
Scott Air Force Base, Illinois 62225-5006

OFFICIAL BUSINESS

Reference List

- ✔ AASHTO, Highway Safety Manual - www.highwaysafetymanual.org/Pages/default.aspx
- ✔ CDC, Injury Prevention & Control: Motor Vehicle Safety - www.cdc.gov/motorvehiclesafety/
- ✔ CDC Injury Prevention & Control: Data & Statistics (WISQARS) www.cdc.gov/injury/wisqars
- ✔ Crash Modification Factors Clearinghouse - www.cmfclearinghouse.org
- ✔ FHWA, Safety Program - http://safety.fhwa.dot.gov/
- ✔ HQ Departments of the Army, Navy, Air Force, Marine Corps, and Defense Logistics Agency, Military Police Motor Vehicle Traffic Supervision, Army Regulation 190–5, OPNAV 11200.5D, AFI 31-218(I), MCO 5110.1D, DLAR 5720.1, 22 May 2006
- ✔ MTMCTEA, "Reauthorization Resource Paper, Department of Defense, Military Installation Road Category," July 2002
- ✔ National Cooperative Highway Research Program Synthesis 336: Road Safety Audits, 2004. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_336.pdf
- ✔ NHTSA, Fatality Analysis Reporting System (FARS) Encyclopedia - http://www-fars.nhtsa.dot.gov/Main/index.aspx
- ✔ NHTSA, Traffic Safety Facts Research Note, Motor Vehicle Traffic Crashes as a Leading Cause of Death in the United States 2008 and 2009, May 2012, DOT HS 811 620
- ✔ NHTSA, Traffic Safety Facts, 2010 Data, Overview, June 2012, DOT HS 811 630
- ✔ SDDCTEA, Traffic Engineering & Highway Safety Bulletin, Safety Audits, May 2005
- ✔ SDDCTEA, "Better Military Traffic Engineering, SDDCTEA Pamphlet 55-17, 2011

Continuing Education	Phone	Web Site
Pennsylvania State University;		
The Pennsylvania Transportation Institute	(814) 865-4700	www.pti.psu.edu
University of Maryland;		
MD Transportation Technology Transfer Center	(301) 403-4623	www.ence.umd.edu/tttc
Georgia Institute of Technology	(404) 385-3501	www.gatech.edu
Northwestern University Center for Public Safety	(800) 323-4011	www.northwestern.edu/nucps/index.htm
Texas A&M University	(979) 845-3211	www.tamu.edu
University of Washington; College of Engineering	(206) 543-2100	www.engr.washington.edu/epp