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Taking Action to Reduce Intersection Fatalities

Ed Rice, FHWA

Intersections continue to be a major safety challenge due to their large numbers and increasing complexity with many potential conflicting movements. It is estimated that there are around 3 million intersections in this country, with 300,000 being signalized. A typical four-legged intersection,



for example, has 32 conflict points. This, coupled with increasing traffic volumes leading to wider intersections, an aging driver population, and the need to accommodate non-motorized modes, creates numerous opportunities for traffic crashes.

Some pertinent 2005 national intersection crash data is as follows, and is a combination of crashes at intersections or influenced by intersections (fatality data is from the Fatality Analysis Reporting System):

- Approximately 50% of all traffic crashes and 50% of injury crashes occur at intersections;
- In 2005 there were 9,188 intersection/intersection related fatalities in the country, or 21% of the highway fatality total of 43,443;
- The five-year average (2001-2005) of national intersection fatalities is 9,184 per year;
- Although only around 10% of all intersections are signalized, nearly 30% (2,744) of intersection fatalities occurred at signalized intersections;
- Approximately 950 (or, over 1/3) of signalized intersection fatalities involved red-light running;
- Over 59% of intersection fatalities occurred in urban areas, and 41% in rural areas;
- There were 1,156 pedestrian fatalities (13%) and 259 bicyclist fatalities (3%) at intersections;
- Approximately 27% (2,450) of intersection fatalities involved people 65 years of age or older;

Message From The FHWA Associate Administrator for Safety

Welcome to the second edition of the Safety Compass. We received a great response to the first issue and have compiled another issue packed with useful information on tools and success stories to help the safety community build effective highway safety programs. I continue to encourage all of you to submit information about your success stories and experiences, to help all of us improve our safety programs and reduce crashes and fatalities.

We talk a lot about the need to focus our efforts in highway safety – making sure that we are working on the most critical problem areas and locations, and investing our resources in solutions with the highest payoff. One of the featured articles in this issue concerns one of FHWA's three current safety focus areas – crashes at intersections, which account for approximately half of all crashes and more than 20% of all fatalities. In this article, you will learn more about the intersection safety problem, as well as some of FHWA's program activities designed to address this problem. Another of our feature articles this issue focuses on the successful use of road safety audits (RSA's) to identify safety problems and solutions on roadway segments or at specific locations. RSA's are an effective yet relatively inexpensive tool to focus attention on addressing critical highway safety problems. The article includes information on available technical resources to help get started to effectively using RSA's.

As always, please share the Safety Compass with others in your organization and let us know if you have any suggestions for improving its content and format. Likewise, if you have thoughts about actions the FHWA Office of Safety can take to support your efforts to improve highway safety, please share those as well.



Jeffrey Lindley
FHWA Associate Administrator for Safety

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Taking Action to Reduce Intersection Fatalities

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- 47% of intersection fatalities resulted from right-angle (front-side) collisions;
- 59% of intersection fatalities occurred during daylight hours; and,
- The highest hour for intersection fatalities was 5-6 PM, when 7% (661) of the fatalities occurred.

The Federal Highway Administration (FHWA) has identified gaps in knowledge and practice and is attempting to address them with programs and projects. Some of the activities either underway or planned by the FHWA Office of Safety include:

1. Provision of technical assistance to states and locals, particularly in the Intersection Focus States, in analyzing intersection crash data and developing goal-based intersection safety action plans.
2. Identification, documentation and marketing of intersection safety success stories.
3. Development of a technical summary design guide for roundabouts.
4. Development of outreach materials on intersection safety in general and on known, typically low cost, intersection safety countermeasures.
5. Development of a Strategic Highway Safety Program Guide to assist states and locals in developing programs to address intersection safety.
6. Compilation of known intersection safety countermeasure effectiveness information (accident modification factors/crash reduction factors) and presentation in updated Intersection Safety Issue Briefs.
7. Assessment of the implementation status of the strategies in the 2002 National Agenda for Intersection Safety to help determine future needs.
8. Marketing the best practices in the report 'Innovative Intersection Safety Improvement Strategies and Management Practices: A Domestic Scan.
9. Improvement of the FHWA intersection safety website using a topic-based format with expanded and enhanced information and,
10. Distribution of a field guide to determine the appropriate countermeasure(s) to use to address a red-light running problem.



It is estimated that there are around 3 million intersections in this country, with 300,000 being signalized.

The FHWA Office of Safety also has activities which address highway-rail grade crossing safety – a particular type of intersection where trains always have the right-of-way. Current or planned projects in this area include updating the Highway-Rail Grade Crossing Handbook, evaluating sensor-based technology to detect and warn drivers of low-clearance vehicles of humped crossings ahead, and enhancement of the highway-rail crossing portion of the FHWA Office of Safety website.

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Taking Action to Reduce Intersection Fatalities

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The FHWA Office of Safety, Turner Fairbank Highway Research Center (TFHRC), and the Resource Center work together in developing and delivering programs to address intersection safety.

TFHRC is involved in analyses of non-traditional intersection designs (such as the continuous flow intersection), development/enhancement of intersection safety analysis tools and models, updating the Roundabouts Informational Guide, evaluation of the safety effects of signal timing strategies, evaluation of the effectiveness of promising innovative countermeasures (such as the detection control system for rural signalized intersections), and many other activities. The Resource Center is very active in providing technical assistance to states and presenting workshops on intersection safety, signalized intersections, and roundabouts.

All of these FHWA offices are also participating in the USDOT's Cooperative Intersection Collision

Avoidance System (CICAS), which is developing vehicle-infrastructure cooperative systems that address intersection crash problems related to stop sign violations, traffic signal violations, stop sign movements, and unprotected signalized left turn movements (the latter two involving gap assistance). This is a four-year Intelligent Transportation System program partnership between USDOT, automobile manufacturers, and state and local departments of transportation. †

For more information on intersection safety, please visit the FHWA web site at <http://safety.fhwa.dot.gov/intersections/index.htm>.

For more information on CICAS, see <http://www.its.dot.gov/cicas/index.htm>. You may also contact: Ed Rice
FHWA Team Leader for Intersection Safety at:
(202) 366-9064 or ed.rice@dot.gov.



Saving Lives



A Vital Goal

VISION

The Best in the World

GOAL

To continually improve highway safety by reducing the number of highway fatalities and serious injuries. Ensuring safe travel on highways is a guiding principle throughout the FHWA.

FOCUS

Improve safety performance through program delivery, technical assistance, research, training, data analysis, and public information. The FHWA works with safety partners to heighten safety awareness within the highway community, business, industry, and travelers.

PRIORITIES

Reducing roadway departure, intersections, and pedestrian fatalities and serious injuries.

Recent Strides Made in Local RSA Programs From East to West

Louisa Ward, FHWA

Despite efforts to improve safety nationwide, the annual number of fatalities has essentially plateaued since the year 2000. In response to this, the transportation safety profession is being challenged to try something different. Road Safety Audits (RSAs) are a new way of doing business.

The Federal Highway Administration (FHWA) is promoting Road Safety Audits (RSAs) as a process to proactively reduce deaths and injuries on our nation's roadways. A Road Safety Audit (RSA) is a formal safety performance examination of an existing or future road or intersection by an independent audit team. RSAs are a comprehensive and effective tool for proactively improving the safety performance of a road while it is still in the planning or design stage, or for identifying and mitigating safety concerns on existing roads and intersections. Many agencies have made recent strides in promoting RSAs; this article highlights current efforts in Florida, Arizona, and Pennsylvania.

Florida: Collier County - The Collier County RSA program is both healthy and quite active, according to Michael Greene, RSA Coordinator. Collier County hosted its first RSA from October 30th through November 2nd, 2006. During this RSA, the review team assessed a road still in the design phase (60% plans for Oil Well Road) to gauge the road's safety performance as designed.

Michael Greene indicated that the County has been diligently promoting the concept of RSAs to other departments in the agency.

County departments provided a list of any potential existing or planned roadways that would be optimal candidates for RSAs. The RSA Coordinator has since created a work program from this comprehensive list; the work program was distributed to firms that can provide RSA services through their annual contracts. Michael Greene attributed the success of this cooperation to investing some time to explain the process of RSAs to the departments; these stakeholders clearly understood both the need for and the importance of RSAs once the process was outlined. The County expects to conduct between seven and 10 RSAs in the next year.



Florida DOT - District 7 of the Florida Department of Transportation (FDOT) has been busy with RSA activities around Tampa Bay, Florida. Mainly, the first RSA contract was executed by FDOT in August 2006. Before this RSA contract was executed, FHWA helped coordinate two RSA training sessions for FDOT, local county representatives, and engineering consultants; at this session, 70 people were trained.

FDOT District 7's RSA contract is a 2-year, \$300K Florida Highway Safety Plan funded contract.

FDOT worked with RSA consultants to select nearly 20 potential RSA tasks; the first task was to conduct RSAs on two intersections with safety issues in November 2006.

Hussein Sharifpour, an FHWA Safety Engineer in the Florida Division Office, plans to lead a special RSA team with members from the FDOT and Pasco County in early 2007. The team will conduct RSA field reviews for up to 10 two-lane highways intersections with safety issues in Pasco County to identify potential road safety improvement measures.

City of St. Petersburg - In June 2006, the City of St. Petersburg, Florida established an in-service RSA contract. According to Michael Frederick, RSA Coordinator, the study area in the contract was selected by City staff on the basis of the following criteria:

- Collision experience at adjacent signalized intersections
- Collision experience at mid-block intersections and commercial accesses
- Concerns for the safety of vulnerable road users (pedestrians), at existing, uncontrolled mid-block crossing locations
- Ongoing expansion and/or redevelopment of adjacent lands for commercial purposes, leading to an anticipated increase in traffic volumes and turning movements
- Known alignment, cross-section, and stopping sight distance constraints; and -
- Road user safety concerns expressed by elected officials, enforcement officials, and the public.

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Recent Strides Made in Local RSA Programs From East to West

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Hillsborough County - Hillsborough County, Florida established a county-wide RSA contract in September 2006, according to Pete Brett, Manager of the FDOT Traffic Engineering Division. The contract goals are to identify safety issues at pedestrian crosswalks and address ADA compliance.

Arizona: Arizona has made considerable leaps with advancing Road Safety Audits. (RSAs). Specifically, a statewide RSA program has been established through the Governor's Traffic Safety Advisory Council RSA Subcommittee. There is representation on the RSA Subcommittee from regional planning agencies, local jurisdictions, enforcement, academia, the Inter-Tribal Council of Arizona, State DOT, the Governor's Office of Highway Safety (GOHS), and FHWA.

Some of Arizona's major accomplishments thus far have been hiring an RSA Manager at the State DOT who will facilitate the development of RSAs statewide on all public roads. RSA training will be delivered throughout the state and the RSA Manager will work with the locals and tribes in implementing RSAs on non-state owned roadways. The RSA program will utilize HSIP and Section 402 funds, Highways for LIFE funds for marketing and the RSA Peer to Peer program.

Plans for the first year of the Arizona RSA program include conducting 15 RSAs on projects in various stages of development (e.g., scoping, design, construction, existing facilities) on local, state, and tribal roads.

An example of results from implementing RSA suggestion



Poor visibility and clear zone issues



Roadside & visibility improvements; guardrail and delineation improved

RSAs and training courses have been conducted in two tribal areas (i.e., Navajo and Tohono O'odham Nation). For the Navajo session, a Navajo Bureau of Indian Affairs representative from New Mexico was so impressed with the training that he intends to work with the New Mexico Division office on scheduling an RSA on a roadway in Navajo, NM. There also was an RSA presentation at the ITS Arizona Annual Conference.

Pennsylvania: Pennsylvania DOT (PennDOT) requested FHWA's assistance with resolving highway safety issues on an approximately six-mile stretch of the State Route 220 corridor from Jersey Shore, Pennsylvania to Williamsport, Pennsylvania. This four-lane expressway segment has a fatality rate which is three standard deviations higher than the statewide average for other similar expressway segments. Sixty-seven percent of the crashes are related to the median openings along the corridor. After preliminary discussions between PennDOT and FHWA, it was agreed by both agencies that an RSA be conducted on the SR 220 corridor. Fred Ranck, FHWA Safety Engineer in the Resource Center, led

the RSA team with other members from the Pennsylvania Division Office, the Human Centered Systems Team, FHWA Safety Research and Development, PennDOT, and a Pennsylvania State Police trooper.

PA 220 is a four lane divided expressway segment with a grass median; it stretches from east of Jersey Shore to west of Williamsport, and is classified as an Urban Principal Arterial with an average daily traffic of 20,000. This four-lane divided expressway connects I-180 to the east and a full access controlled section of PA 220 continues to the west. PA 220 eventually connects to I-80 to the west. PA 220 is within the corridor under consideration for a future new Interstate, I-99.

Overall, the team found that PennDOT District 3-0 is routinely monitoring the safety performance of the corridor and proactively addresses safety concerns. District 3-0 has implemented countermeasures over the past several years including new turn lanes, deceleration lanes, turn lane restrictions, and improvements to traffic control devices.

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Recent Strides Made in Local RSA Programs From East to West

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However, these measures were not enough to significantly reduce the high fatality rate in this location.

The RSA team identified several measures for PennDOT's consideration that may effectively reduce the high fatality rate. Suggestions included restricting of SR 220 access to right turns only and closing all existing median openings. In addition, the RSA team suggested that U-turn median openings be provided at locations where adequate sight distance and roadway geometry can be achieved to provide for access needs in that segment.

Since SR 220 is classified as a principal arterial and provides a high speed through route connection between Interstates 180 and 80. Therefore, the installation of lower speed limits and/or traffic calming measures can not be expected to result in speed reduction along the corridor. Based upon the RSA team's knowledge and research findings for other similar four-lane expressway segments, signalization of any or all of the median openings can be anticipated to increase the total number of crashes along SR 220, so signalization was not suggested for this segment.

Valuable Resources to Support Your RSA Program

FHWA offers two RSA training courses for transportation professionals in state and local transportation agencies and tribal governments. The first is a 2-day course, available through the National Highway Institute (NHI), called Road Safety Audits and Road Safety Audit Reviews, FHWA-NHI-380069.

Information on course scheduling can be found online at www.nhi.fhwa.dot.gov.

The second course, RSA for Locals, is geared toward local agencies, tribal governments, and Federal land management agencies.

This course is FREE and can be presented in 1 ½-day or 2-day formats, with the longer course including information on low-cost safety improvements and an RSA field exercise. To schedule a course contact Eloisa Raynault at: (202) 366-3499, email: Eloisa.Raynault@dot.gov.

RSAs can have an important impact on the safety of the nation's roads and intersections. To receive assistance in implementing an RSA program, contact your state FHWA division office, or: Louisa Ward, FHWA at: (202) 366-2218, email: Louisa.Ward@dot.gov.

For more information on:

Collier County RSA activities, contact: Michael Greene at: (239) 774-8192

Florida District 7 RSA activities, contact: Peter Hsu, FDOT at: (813) 975-6251

Arizona RSA activities, contact: Karla Petty, FHWA's Arizona Division, at: (602) 255-3216 or Mike Blankenship, ADOT RSA Program Manager, at (602) 712-7601.

Pennsylvania RSA activities, please contact Mike Castellano, a Safety Engineer at FHWA's Pennsylvania Division, at (717) 221-4517.

In the next Safety Compass issue, we will share with you what Tennessee is doing with their RSA program, so stay tuned. +

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Your comments and highway safety related articles are welcomed. This newsletter is intended to be a source to increase highway safety awareness, information and provide resources to help save lives. You are encouraged to submit highway safety articles that might be of value to the highway safety community. Send your comments, questions and articles for review (electronically) to: timothy.barkley@dot.gov.

Please review [guidelines](#) for article submittals.

If you would like to be included on the distribution list to receive your **free** issues, please send your email address to: timothy.barkley@dot.gov.

Presidential Recognition

Susan Binder, Deputy Associate Administrator for Policy and Governmental Affairs, Federal Highway Administration (FHWA), was recognized by Secretary Mary Peters at the Secretary's Awards Ceremony as the recipient of the Presidential Rank Award of Meritorious Executive. The President gives this Award to leaders who consistently demonstrate strength, integrity, industry, and a relentless commitment to public service. Susan was recognized for advancing the surface transportation reauthorization bill (SAFETEA-LU) and for her achievements in implementing internal strategic planning processes. Congratulations for a job well done!

National Work Zone Awareness Week 2007



Highway Safety Advocates Give Kentucky Their Highest Ranking

Recognition Based on Landmark Legislative Year in 2006

Kentucky earns a “green light” and is recognized as a top-performing state by a national highway safety advocacy group. Advocates for Highway and Auto Safety identified Kentucky as one of only 16 green light states and one of only four “Best Performance States” in its fourth annual highway safety report (the other top four ranking states were Delaware, Hawaii and Illinois). The ranking is based on the passage of at least two additional highway safety laws in 2006.

“From day one of this administration, a principal focus has been to save lives on Kentucky’s roadways,” said Transportation Cabinet Secretary

Bill Nighbert. “Governor Fletcher championed three critical pieces of highway safety legislation in 2006. We’re beginning to see the tangible results of the Governor’s leadership, with lower highway fatality numbers. Others around the nation are beginning to take note of Kentucky’s highway safety initiatives, too, and we’re very grateful for the recognition from Advocates for Highway and Auto Safety.”

“While there is still much work to do, Kentucky deserves special kudos for passing several important safety laws in 2006,” said Advocates President Judie Stone. “Paramount among them is primary enforcement of Kentucky’s seatbelt law and the excellent teen driving measures that were adopted. Kentucky now deserves our “green” rating. Congratulations, Kentucky.”

The “green” rating is the highest of three Advocates’ ratings based on a state’s adoption of optimal safety laws. A “yellow” Advocates rating signals the need for improvement in a particular state. A “red” rating is assigned when a state falls seriously behind in safety-related legislation.

Advocates for Highway and Auto Safety, based in Washington, D.C., is a coalition of insurance, consumer, health, safety and law enforcement organizations that work together to advance state and national highway and safety policies. The complete “2007 Roadmap to State Highway Safety Laws” report can be found at: www.saferoads.org. +

Find out more details, and what Kentucky is doing for highway safety, at:

<http://kentucky.gov/Newsroom/governor/20070109ranking.htm>.

Arizona: Safe Today, Safety Tomorrow

Karen King, FHWA

The Arizona Governor's Traffic Safety Advisory Council (GTSAC) hosted its third annual Safety Event at the Arizona Capitol on January 23, 2007. This event was an opportunity to educate the legislators, media, and general public about transportation safety issues that affect Arizona.

The Safety Event, sponsored by State Farm Insurance along with other transportation-related organizations, included a breakfast for legislators and their key staff including national and local speakers to address transportation issues affecting Arizona. Speakers included: National Highway Transportation Safety Administration (NHTSA) Western Region Administrator David Manning, Arizona Department of Transportation (ADOT) Director/ American Association of State Highway & Transportation Officials (AASHTO) National President Victor Mendez, DPS Director Roger Vanderpool, GOHS Director Richard Fimbres, Senate Majority Leader Thayer Verschoor and House Transportation Chairman Andy Biggs.

In 2004, Governor Janet Napolitano created the Traffic Safety Advisory Council via Executive Order 2004-18 to develop, promote, and implement cost-effective transportation safety strategies within Arizona. The Council, comprised of state and local agencies—lead by the directors of the Department of Transportation, Governor's Office of Highway Safety, and Department of Public Safety and administrators for Federal Highway Administration and Federal Motor Carrier Safety Administration—as well as more than a dozen public and private safety transportation organizations from around the state, is responsible for developing and implementing the Strategic Highway Safety Plan for Arizona.

You can learn more about GTSAC at: www.gtsac.org . +



Throughout the day, the legislators, media and general public learned more about public safety from the 30 information booths from GTSAC member organizations and other transportation partners. This gave visitors a chance to learn what they can do to help and inform motorists. Photo by: Dave McDarby, ADOT Photographer



ADOT Director and newly elected President of the AASHTO Victor Mendez, outlined AASHTO's Strategic Highway Safety Plan, a multi-pronged effort designed to significantly reduce highway deaths and injuries. Photo by: Dave McDarby, ADOT Photographer

The Safety Edge

Chris Wagner and Steve Moler, FHWA

A relatively easy and inexpensive countermeasure to pavement-edge drop off can save lives on rural two-lane highways.

The following scenario can be a frightening – and even fatal – driving experience: You’re cruising leisurely down a rural two-lane highway when suddenly your right-front tire slips off the pavement and onto an unimproved or deteriorating shoulder, causing your vehicle to lurch suddenly to the right, the steering wheel almost ripped out of your hands.

Startled, you struggle to maintain control. But then the trailing right-rear tire drops onto the shoulder and begins to “scrub” against the pavement edge, making a dangerous situation even worse. In an attempt to get back on the pavement and regain control, you jerk the wheel hard to the left. But as the right-front tire climbs back onto the pavement, the trailing right-rear tire catches the pavement edge, forcing your vehicle to yaw hard to the left and into a broadside skid.

A drop off of 5 inches or more is considered by experts to be unsafe

What the driver has experienced is a phenomenon known as pavement-edge drop off (PEDO), the uneven edge or vertical drop off between the paved travel lane and the unpaved shoulder. A drop off of 5 inches or more is considered by experts to be unsafe, especially if the edge is at a 90-degree angle to the shoulder surface. Many states try to maintain a drop off of 2 inches or less to circumvent a potential driving hazard.

Once a vehicle has slipped off the pavement and onto the unpaved or deteriorated shoulder, PEDO can make it difficult for a driver to reenter the paved travel lane. Studies show that when drivers encounter the effects of PEDO, they tend to attempt to return immediately to the paved travel lane. But in doing so, they tend to over steer when “scrubbing” – the intense rubbing of the right-side vehicle tires against the pavement edge – prevents the vehicle from climbing back onto the pavement. This over steering can cause loss of control at the moment when the right-rear tire climbs back onto the pavement, causing the vehicle to fishtail.

Whether the driver regains control or crashes depends on a variety of circumstances, including vehicle speed, steer angle, the vehicle’s departure and return angle, vehicle size, drop-off severity, driver skills, roadside obstacles, and whether another vehicle is coming in the opposite direction.

When PEDO-related crashes do occur, they are often more severe than other crash types, according to studies, primarily because the vehicle often leaves the roadway, rolls over, hits a roadside objects or is involved in a head-on collision. According to studies, an estimated 11,000 people suffer injuries and roughly 160 die annually in the United States in crashes related to unsafe pavement edges.

A Simple Solution

There’s a relatively easy and inexpensive countermeasure to PEDO. It’s called the Safety Edge,



A vertical drop off such as the one shown in this photo is estimated at about 4-5 inches, which is considered a hazard if a driver’s vehicle slips off the pavement and onto an unpaved shoulder.

a tapered – rather than vertical – transition between the paved surface and the unpaved shoulder of a paved two-lane highway. The recommended 30-35-degree tapered pavement edge or fillet can help drivers make a smoother, more controlled reentry back onto the paved travel lane than if there’s a more abrupt or vertical edge. The tapered edge helps prevent drivers from overcorrecting if they drift onto the shoulder, thus decreasing the likelihood of the vehicle crossing into opposing traffic or leaving the roadway.

PEDO is commonly caused by pavement-edge breaking, erosion, wear of the unpaved shoulders, inadequate maintenance, or when the shoulder is not flush with the pavement following a resurfacing project. Studies have shown that edge drop off is most commonly encountered around mailboxes, on the inside of curves, on steeper grades, at turnarounds, and along shaded areas. A combination of shoulder erosion and edge rutting caused by vehicles repeatedly leaving the paved travel lane are typically found at these locations.

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According to studies, an estimated 11,000 people suffer injuries and roughly 160 die annually in the United States in crashes related to unsafe pavement edges.

The Safety Edge

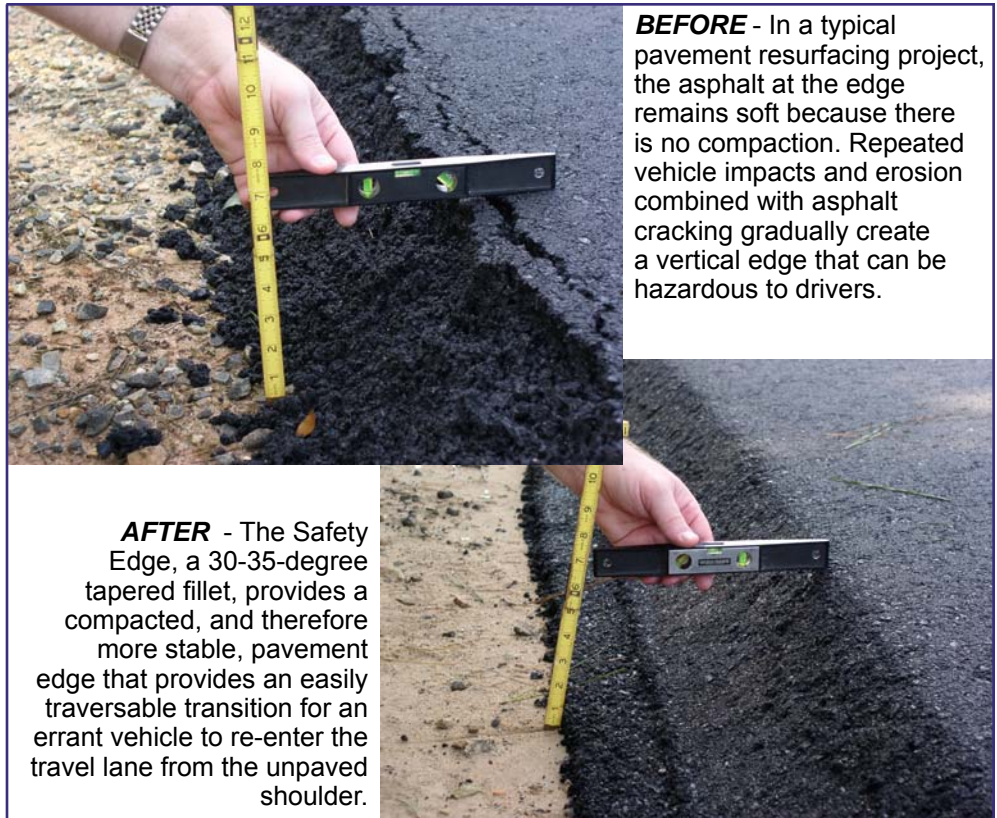
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In the case of pavement resurfacing projects, problems develop when the pavement edge begins to quickly crumble from the lack of compaction, creating a vertical drop. Edge rutting and soil erosion from repeated vehicle impact soon follow. Installing the Safety Edge along each side of the roadway in resurfacing projects is a simple and relatively inexpensive way to improve overall pavement edge safety.

Installing the Safety Edge – GDOT and More States Taking Action

The Safety Edge is installed during a resurfacing project using a special device attached to the end of the asphalt paver screed. The device creates a smooth and compacted wedge along the edge of the roadway. Two different devices have been developed – the Georgia Wedge and the Shoulder Wedge Maker.

The Georgia Department of Transportation (GDOT) developed its own “in-house” device known as the Georgia Wedge. Conceived by GDOT maintenance employee Lynn Bean, the wedge is essentially a modified strike-off bolted onto the screed end gate. The shoe of the end gate rides on the pavement shoulder and moves freely vertically, allowing it to continually adjust to height differentials. A rounded leading edge produces the smooth appearance.



BEFORE - In a typical pavement resurfacing project, the asphalt at the edge remains soft because there is no compaction. Repeated vehicle impacts and erosion combined with asphalt cracking gradually create a vertical edge that can be hazardous to drivers.

AFTER - The Safety Edge, a 30-35-degree tapered fillet, provides a compacted, and therefore more stable, pavement edge that provides an easily traversable transition for an errant vehicle to re-enter the travel lane from the unpaved shoulder.

In a 2004 GDOT demonstration project along a 13-mile section of Hwy. 88 just south of the town of Augusta, the Safety Edge was installed with little impact on production and a less than 1 percent increase in project cost. After one year, the Georgia study found no visible signs of deterioration and no expectations of any long-term degeneration along the Safety Edge sections.

However, the sections in the demonstration project without the Safety Edge had degraded to a near vertical edge after one year, with cracking developing near the edge. The Georgia study concluded that the Safety Edge showed “promise as a low-cost solution to mitigate pavement shoulder drop off....The implementation of the Safety Edge design would be most applicable to asphalt resurfacing projects on two-lane undivided roadways with limited paved shoulders.”

For these reasons and others the Safety Edge is now a standard feature of Georgia resurfacing projects.

TransTech Systems Inc. makes the only commercially manufactured Safety Edge device, called the Shoulder Wedge Maker. This device attaches to the screed face instead of the end gate. It has a self-adjusting internal spring that allows the device to follow the roadside surface independent of other paver components. The device has an angled surface that pre-compacts the asphalt as it enters the device while another fixed-angled surface forms the tapered edge. As the asphalt continues under the wedge-forming surface, the asphalt is smoothed to create a finished surface on the tapered edge.

A recent demonstration project in New York’s Schenectady County using the Shoulder Wedge Maker also showed positive results

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The Safety Edge

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similar to those in the Georgia demonstration. Each year since the Safety Edge was installed in 2004 along two rural roads, inspections showed that the Shoulder Wedge has held up exceptionally well, with no degradation of the edge. Additional analysis has shown no cracking or breaking away from the main rolled mat area.

An additional demonstration project has been completed in Indiana as part of the Federal Pooled Fund Study on Road Edge Drop-Off Mitigation, and pilot projects have been recently completed in Utah and Colorado. Minnesota and Tennessee are also implementing the Safety Edge.

PEDO Recommendations

Transportation agencies can adopt policies and recommendations dealing directly with problems associated with PEDO. For example:

- A 2006 American Automobile Association Foundation for Traffic Safety study on the safety impacts of PEDO recommended

that agencies adopt policies of requiring routine comprehensive sampling of PEDO on their roads, and any edge drop off of 2 inches or more should be promptly corrected. The report also recommended that agencies adopt a policy of providing paved shoulders with a minimum width of 2 feet wherever possible and incorporate the Safety Edge in all roadway resurfacing projects to prevent severe PEDO.

- The AAA Foundation study also recommended that agencies should review databases to assess how PEDO may have contributed to crashes and the agencies should conduct additional research on occurrences and hazards of PEDO specifically for local rural roads. And finally, agencies should provide specific training on the potential hazards of PEDO, with training geared to maintenance and construction staff, including private contractors.

- Although no national standards currently exist that recommend at what level edge drop off should be addressed, there are several national organizations providing various guidance on PEDO. For example, AASHTO's The Roadside Design Guide states:

"Desirably, no vertical drop-off greater than 50 mm, (about 2 inches) should occur...and pavement edge drop-off greater than 75 mm (about 3 inches) should not be left overnight."

- The Manual on Uniform Traffic Control Devices provides recommendations for signs used to warn of unexpected conditions. For example, if the pavement edge drop off is less than 3 inches, a "Low Shoulder" sign should be used. If the PEDO exceeds 3 inches, a "Shoulder Drop Off" sign is recommended.
- The AASHTO Green Book states that regular maintenance should provide for a shoulder that's flush with the pavement surface. Unstable shoulders, the Green Book states, generally undergo consolidation over time, and the elevation of the shoulder tends to sink below the paved travel lane. The resulting drop off can adversely affect drivers when they slip onto the shoulder.
- FHWA's Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects offers guidance on PEDO in work zones. The document states that when shoulder drop offs exceed 1.97 inches a "Low Shoulder" warning sign should be placed during construction. With drop offs greater than 3.94 inches, a 1:3 (18-degree) fillet with "Low Shoulder" warning signs should be provided.

WHAT DRIVERS SHOULD DO IF THEY EXPERIENCE PEDO

Safety experts recommend the following recovery strategies if your wheels drop off the pavement edge:

- Stay calm and react gently.
- Do not immediately try to forcefully steer back onto the pavement. Jerking the wheel hard could cause you to over steer and lose control.
- Instead, take your foot off the accelerator and slow down gradually to at least 30 mph.
- If braking is necessary, use a gentle braking action.
- Straddle the pavement edge while slowing.
- When traffic is clear in the both directions, turn the steering wheel gently one-quarter turn toward the pavement and reenter the pavement. If traffic is heavy, you may have to pull off onto the shoulder and stop.
- Carefully counter-steer to prevent veering into the opposite lane.
- As soon as you've fully recovered, accelerate to normal traffic speed.

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The Safety Edge

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Reducing Tort Liability

Another benefit of the Safety Edge, according to experts, is the potential for reduced tort liability. According to the FHWA 2004 report, *Construction of a Safe Pavement Edge: Minimizing the Effects of Shoulder Dropoff*, by FHWA pavements and materials engineer Chris Wagner and GDOT researcher Yeonsoo Stanley Kim, Ph.D., PEDO is a common source of tort claims against highway agencies. The authors cite court cases in two states, in which monetary judgments were awarded to motorists involved in crashes caused by PEDO. In these cases, the transportation agencies were found liable for creating an unsafe condition and not properly warning of the hazardous conditions.

The Safety Edge is indeed a cutting-edge technology that has proven it can save lives, reduce injuries, and minimize costly lawsuits.

For technical assistance and information about the Safety Edge contact:

Chris Wagner
Pavements and Materials Engineer
FHWA Resource Center
404-562-3693

Christopher.Wagner@dot.gov
or

Debra (Dee) Chappell,
Highway Engineer
FHWA Office of Safety Design
202-366-0087
Debra.Chappell@dot.gov.

More information about road departure issues and countermeasures can also be found at:

http://safety.fhwa.dot.gov/roadway_dept/index.htm. +

Policy, Legislation and Guidance

Motorcyclist Advisory Council (MAC-FHWA)

Pursuant to the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA - LU), the Motorcyclist Advisory Council to the Federal Highway Administration (MAC-FHWA), coordinates and advises the Secretary of the Department of Transportation, acting through the Administrator of the FHWA, on infrastructure issues of concern to motorcyclists, including:

1. Barrier design
2. Road design, construction, and maintenance practices
3. The architecture and implementation of Intelligent Transportation System technologies.

The MAC-FHWA does not exercise program management or regulatory development responsibilities, and makes no decisions directly affecting the programs on which it provides advice. The MAC-FHWA provides a forum for the development, consideration, and communication of information from a knowledgeable and independent perspective.

To understand more about the role of MAC-FHWA and how it might benefit your program, please visit: <http://safety.fhwa.dot.gov/mac/index.htm>.

You may also contact: Morris Oliver, FHWA by phone: 202-366-2251, or email: Morris.Oliver@dot.gov.

FHWA Road Safety Audit Guidelines

The Road Safety Audit (RSA) guidelines are intended to promote the implementation of RSAs in the United States. The primary purpose of this guideline is to provide a foundation for public agencies to draw upon when developing their own Road Safety Audit (RSA) policies and procedures and when conducting RSAs within their jurisdiction. The availability of a consistent guideline is anticipated to lead to a better understanding of the core concepts of RSAs and to promote their use.

Learn more about how you can embrace the usage of RSAs as part of your programs everyday practice at:

<http://safety.fhwa.dot.gov/rsa/rsaguidelines/html/index.htm>.

The Federal Highway Administration (FHWA) is promoting Road Safety Audits (RSAs) as a process to proactively reduce deaths and injuries on our nation's roadways.

RSAs are a comprehensive and effective tool for proactively improving the safety performance of a road while it is still in the planning or design stage, or for identifying and mitigating safety concerns on existing roads and intersections.

International Exchange

Learning From Others; Sharing Our Knowledge

Shirley Thompson, FHWA

Road safety is not only a challenging issue in the United States, it is a worldwide problem. The World Health Organization (WHO) estimates that each year across the world over 1 million people are killed and as many as 50 million are injured in road crashes. Sadly, without preventive intervention, it is projected there will be about a 65 percent increase in these statistics over the next 20 years. What can be done? The sharing of knowledge, or technology exchange, is an effective solution.

The Office of Safety, as well as other FHWA Headquarters and field offices, host visitors from other countries, participate in international scan tours, serve on World Road Association (PIARC) committees, support memorandums of cooperation between the United States and other countries, and promote international activities to exchange information and best practices. These interactions are definitely “two-way.” By visiting other high-performing countries, the highway safety community in the United States has accelerated adoption of valuable innovations including road safety audits, safety information systems, and overall safety performance measures. The extensive network of international activities also provides for valuable U.S. assistance to a number of countries.

The World Health Organization (WHO) estimates that each year across the world over 1 million people are killed and as many as 50 million are injured in road crashes.

The Hidalgo County Metropolitan Planning Organization is sponsoring a **Border to Border Transportation Conference** on April 17-19, 2007, in McAllen, Texas. A full-day of this conference is devoted to road safety and will include overviews of United States and Mexico safety initiatives, safety related activities, and safety planning tools and resources. For additional information, contact Jorge Castillo by email: jorge.castillo@fhwa.dot.gov.



**ROAD SAFETY
IS NO ACCIDENT**

First United Nations Global Road Safety Week, April 23-29, 2007, is the outcome of a resolution on improving global road safety adopted by the United Nations General Assembly. During this week numerous international, national and local events will be held around the

world to raise awareness about the impact and costs of road traffic injuries and to promote countermeasures, such as infrastructure improvements, speed management, seatbelt use, etc. The global theme for this week will focus on young road users. The U.S. emphasis will be teen driver safety. Participating Federal agencies include the Departments of State (DOS), Health and Human Services (HHS), Defense (DOD) and Transportation (DOT). The primary contact for DOT is Susan Kirinich in the National Highway Traffic Safety Administration, email susan.kirinich@dot.gov. Organizations, both governmental and nongovernmental, singularly or collaboratively, are encouraged to conduct public awareness activities.

Additional information plus a toolkit is available on the WHO website: www.who.int/roadsafety/en/. +

Two upcoming international events are the **Border to Border Transportation Conference** and **Global Road Safety Week**.

New Publication

Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects

Work Zone (WZ) Impacts Assessment is the process of understanding and managing the safety and mobility impacts of a road construction, maintenance, or rehabilitation projects. Assessing WZ impacts is important for developing effective transportation management plans (TMPs) that provide for safety, mobility, and quality while maintaining, rehabilitating, and rebuilding our highways. The guide presents a general approach for WZ impacts assessment, mirroring the typical program delivery process of transportation agencies. It also provides examples of how agencies are currently assessing and managing WZ impacts, as well as an overview of different traffic analysis tools that can be used for analysis of WZ impacts. The guide is intended to help transportation agencies in their efforts to make work zones work better and is the last of four guides to help agencies implement the Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J).

The guide is now available at:
http://www.ops.fhwa.dot.gov/wz/resources/final_rule/wzi_guide/index.htm

For additional information, please contact: Tracy Scriba, FHWA at 202-366-0855, or email: tracy.scriba@dot.gov

2007 National Roadway Safety Awards

Jointly sponsored by Federal Highway Administration (FHWA) and Roadway Safety Foundation (RSF).

Here's your opportunity to participate in the National Roadway Safety Awards program and have a chance to showcase and share "best safety practices" throughout the United States.

With the passage of SAFETEA-LU, Congress demonstrated its support for a safer transportation network through significantly increased funds for a new "core" safety program and a data-driven, results oriented approach to safety planning and investments. Recognizing exemplary projects that address the "4Es"—Education, Enforcement, Emergency Medical Services and Engineering—is another way to help state and local governments find models for improved safety programs. Please visit the following website to review the "2007 Nomination Application" packet, and the most recent award winners from 2005 National Roadway Safety Awards at: <http://www.roadwaysafetyawards.org/>.

For more information for the 2007 National Roadway Safety Awards submittals, please contact: Kathy Krause: phone 202-366-9265

New Training Course

Safety Considerations in Urban Streetscaping

"Streetscape" is a term that refers to how the design and appearance of a road impacts the surrounding area and populace. Streetscaping projects involve improving the landscaping, sidewalks, lighting, roadway cross section and/or roadside design elements.

While streetscaping can add considerable aesthetic and environmental value, some streetscaping choices have the potential to reduce the safety of road users. To preempt this, the Resource Center's Safety and Design Technical Services Team created a new "Safety Considerations in Urban Streetscaping" workshop. Its objective is to increase the awareness of environmental, landscaping and maintenance professionals so that their choices will also help to improve safety.

The workshop is available in both a 1-day long, instructor facilitated format or as a multiple-session "Webinar" delivered through the Adobe Connect Enterprise system.

For further information or to schedule a session, contact Chris Webster, FHWA at 404-562-3915 or email: Christopher.webster@dot.gov

National Conferences / Events / Meetings
2007

Dates	Location	Event
March 14-16	Washington, DC	National Bike Summit http://www.bikeleague.org/conferences/summit07/summit_eneews_011607.html
March 25-27	Chicago, IL	Lifesavers 25th National Conference http://www.lifesaversconference.org/
March 25-28	San Diego, CA	ITE 2007 Technical Conference and Exhibit http://www.ite.org/conference/
April 2-6	Kick-Off Site - TBD	National Work Zone Awareness Week
April 22-25	Branson, MO	AASHTO Standing Committee on Highway Traffic Safety http://www.transportation.org/?siteid=35
April 22-26	Milwaukee, WI	NACE National Association of Counties & Eng. http://www.countyengineers.org/
May 3-7	Phoenix, AZ	AASHTO Spring Meeting http://www.transportation.org/meetings/110.aspx
May 13-19	Detroit, MI	National Transportation Week http://www.ntweek.org/
May 15-17	Denver, CO	2007 Safe Routes to School State Coordinators National Meeting http://www.transportation.org/meetings/124.aspx
June 4-6	Palm Springs, CA	ITS America's 2007 Annual Meeting & Exposition http://www.itsa.org/annualmeeting.html
June 20-22	Lake Tahoe, NV	NCUTCD Mid-Year Meeting http://www.ncutcd.org/meetings-200706.shtml
June 23-27	Salt Lake City, UT	NSA National Sheriffs Association Annual Conference http://www.sheriffs.org/conf-annual.shtml
June 25-29	Baltimore, MD	National FHWA Safety & Operations Leadership Conference (Open <u>ONLY</u> to federal employees)
Jul 13-17	Richmond, VA	National Association of Counties Annual Meeting (NACo) http://www.naco.org/
Jul 22-26	St. Louis, MO	33rd International Forum on Traffic Records & Highway Safety Systems http://atsip.org/index.php/2007forum/index/
July 23-26	Chicago, IL	National Local Transportation Assistance Program (LTAP) http://www.ltapt2.org/conference/
Aug 5-8	Pittsburgh, PA	ITE Annual Meeting & Exhibit http://www.ite.org/annualmeeting/