Systemic Safety Implementation Peer Exchange

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Salt Lake City, Utah

Summary Report

U.S. Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
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Introduction

Systemic safety involves the use of countermeasures that are widely implemented based on high-risk roadway features correlated with particular severe crash types. Data shows that a majority of fatal crashes occur on rural roads. However, these crashes are not evenly distributed across the many miles of rural roadways, making it difficult to isolate high-crash locations for safety improvements. Systemic safety is a proactive approach that helps agencies broaden their safety efforts and consider risk as well as crash history when identifying where to implement low-cost safety improvements.

To assist agencies with advancing the implementation of the systemic approach to safety, especially at the local level, the FHWA Office of Safety hosted a Systemic Safety Implementation Peer Exchange on September 17 and 18 in Salt Lake City. The peer exchange provided a forum for participants to discuss and exchange ideas on the application of systemic safety analysis, how their agencies are implementing a systemic safety program, and the systemic countermeasures being used.

Thirty six attendees participated in the peer exchange with Federal, State, and local representatives from Arizona, Kansas, Nevada, North Dakota, Oklahoma, Utah, and Washington in attendance. The peer exchange was formatted to provide a mix of presentations, facilitated roundtable discussions, and breakout sessions. This structure provided attendees with several opportunities to collect information from their peers to advance the implementation of systemic safety. Each State was encouraged to share their noteworthy practices and strategies as well as challenges and barriers experienced with the systemic approach.

Each State delegation spent time developing Action Plans at the end of the peer exchange. A virtual peer exchange will be coordinated within the next year to follow up with attendees on their progress.

Key Takeaways

Attendees identified the following key takeaways from the peer exchange.

- A funding exchange program can be used by States to get safety funds to local agencies to avoid the rigorous requirements associated with federal funds. States need to work with their Division Offices to determine if this is feasible.
- States can provide summary data for each local agency and highlight where the funds would be best used based on that data. This can help locals identify and prioritize systemic safety projects.
- Developing Local Road Safety Plans with identified projects can be beneficial as there will be a list of projects ready to go when funding is available.
- Effectively advancing systemic safety requires involving the locals, giving them guidance, training and identifying funding.
- Following up with peers is essential to learn more about successful programs/practices.

- Locals want the ability to implement projects rather than going through the required bidding/application process.
- It is necessary to get elected officials on board with systemic safety.

The following suggestions were offered by attendees for resources/tools FHWA can provide to assist agencies with implementing systemic safety.

- FHWA-sponsored webinars on systemic safety.
- FHWA can support attendees with selling systemic safety to their leadership.
- FHWA videos on effective countermeasures that locals can implement. There are some videos of this nature already available (i.e., roundabouts and cable median barrier).
- Continue peer exchanges.

Welcoming Remarks

Carlos Braceras, Utah DOT Executive Director, welcomed the group to the peer exchange and provided opening remarks.

Utah DOT has four strategic goals and everything the Department does is focused on these four goals.

1. Preserve infrastructure
2. Optimize mobility
3. Zero fatalities
4. Strengthen the economy

The State's population and vehicle miles traveled (VMT) are climbing, but fatalities have been decreasing since 2001 (by 40%). This decrease is due to a lot of factors and to get to zero fatalities everyone must be involved and responsible.

Following are some of the initiatives Utah is using to improve highway safety.

- Installation of cable barriers in a systemic way based on success with reducing cross-median severe crashes in a spot location.
- Every new driver in Utah attends a New Driver Orientation. The orientation is 90 minutes and young drivers attend with a parent. The orientation includes discussion about the five deadly behaviors and what drivers can do to get to zero fatalities. This is making a difference at a younger level.
- A truck campaign helps truck drivers understand safe driving behavior. It also educates other motorists to understand the special circumstances for trucks (e.g., larger blind spots and longer stopping distances).
- A 2014 Superbowl seat belt advertisement[1] promotes the importance of drivers and passengers using seat belts. Utah does not have a primary seat belt law. UDOT signed a contract with Fox news channel that included 450 safety advertisements for $150k. For $10k additional, UDOT ran ads during the Superbowl. Mr. Braceras met with Utah legislators ahead of the advertisement so they knew in advance it was going to air.

[1] View the 2014 Superbowl ad at http://ut.zerofatalities.com/.

Arlene Kocher, FHWA Utah Assistant Division Administrator, also provided opening remarks. She emphasized that even though transportation agency staff might not be in positions to be able to implement changes such as primary seat belt laws or helmet laws, they can *influence* them. These types of laws help get to zero fatalities and we cannot get to zero fatalities without them. These laws are part of systemic safety.

After welcoming remarks, self-introductions were conducted. As attendees introduced themselves, they also stated their expectations for the peer exchange. A complete list of all peer exchange attendees is included in Appendix A. Table 1 summarizes attendees' expectations.

Learn what other agencies are doing with systemic safety.
Identify strategies/initiatives to bring back to home agencies.
Get ideas for expanding a systemic program.
Validate that what agencies are currently doing in regards to systemic safety make sense.
Learn how to measure the success of a systemic program.
Learn about good systemic projects that can be promoted within a State.
Engage in discussion with other attendees.
Learn strategies to improve driver behavior.
Learn how local agencies, LTAPs, and MPOs interact and are structured and how they relate to each other.
Learn how agencies are structured as well as how safety staff are structured and how they interact with others within a State DOT.
Gain insight on how to communicate with other staff in the State DOT to convey the importance of systemic safety.
Learn about project prioritization and how to get the best value with available funding.
Learn how to address roadway departure crashes using a systemic safety approach.
Learn how to program systemic projects from a planning perspective.
Learn what does and does not work with systemic safety.
Learn how to develop a more comprehensive systemic safety plan.
Learn if State DOTs are working with their Cities on systemic safety.
Learn about maintenance costs for systemic safety countermeasures.
Learn about countermeasures/strategies – what does and does not work.
Learn about more powerful projects (not the low-hanging fruit such as striping and signing).
Learn about streamlined processes for getting funding to the locals.
Learn how agencies are keeping administrative costs down.
Learn about available resources.
Share agency results with systemic safety.

Table 1. Attendee peer exchange expectations.

Overview of the Systemic Approach to Safety

Dave Engstrom, FHWA Resource Center
Karen Scurry, FHWA Office of Safety

Systemic safety countermeasures can be high or low cost. Most systemic safety improvements are low-cost. An example of a high-cost systemic treatment is a roundabout.

The following systemic safety countermeasures are working.

- Cable Median Barrier
  A lesson learned in Oklahoma is to develop a warrant analysis for this countermeasure. Cable median barrier is so well liked that there is a higher likelihood for widespread implementation. It is expensive to maintain and it becomes difficult to keep up with the maintenance the more that it is installed.
- Rumble Strips and Stripes
  While effective, some agencies receive noise complaints.
- Edge Line Pavement Markings
- Chevrons on Curves
- Signal Upgrades
- Countdown Pedestrian Indications

The following systemic safety countermeasures are trending and show promise.

- High Friction Surface Treatments
- Safety Edge
- Alternative Intersection Design (J-turns, roundabouts)

Data is another important factor for systemic safety implementation. The more data an agency has, the better its decisions will be. The third wave of Every Day Counts[2] innovations was recently announced and data-driven safety analysis is one of the innovations. This is the application of two science-based analysis approaches into two common transportation processes which leads to more informed decision making and better targeted investments.

Gaps in systemic safety implementation include the following.

- Enforcement Countermeasures
- Pedestrian/Bicycle Countermeasures
- Better Roadway Data
- Better Crash Data
- Public/Political/Management Support

The following feedback was provided by attendees on resources needed to advance the implementation of systemic safety.

[2] For more information on Every Day Counts (EDC) and complete information on EDC innovations, visit http://www.fhwa.dot.gov/everydaycounts/.

- Regularly scheduled webinars (perhaps on a quarterly basis).
- FHWA support with promoting systemic safety, especially to upper management.
  An outsider can make a bigger impression when selling systemic safety. Having an FHWA staff person come into the State to assist is beneficial. Requests for FHWA support can be channeled through the Resource Center or the Roadway Safety Peer Assistance Program. States should initiate requests with their FHWA Division Office Safety Engineer who will know all of the resources.
- Simplifying processes for local agencies.
  For example, less paperwork for smaller funds. Local agencies will not go through an extensive paperwork process for $100k in funding, but they will for $2m.

Additional information on systemic safety is available at http://safety.fhwa.dot.gov/systemic/.

Analysis Approaches

Washington State, Thurston County (Washington), and Utah gave presentations on their systemic safety programs and the analysis approaches they use to support systemic safety implementation efforts. Following is a summary of the information they shared as well as the roundtable discussion that took place after the presentations.

Washington State

Mike Dornfeld, Washington State DOT (WSDOT)

- WSDOT is decentralized so the regions have control.
- Prior to 1993, WSDOT implemented spot safety improvements with repaving projects. This allowed them to stretch their safety funds for additional stand-alone projects.
- Between 1993 – 2012 WSDOT used spot safety and low-cost improvements
- WSDOT is now implementing more systemic safety projects.
- Most funding goes to SHSP Priority Level One crashes. For example, impaired driving and run-off-the-road.
- Historical systemic safety treatments in Washington have included rumble strips, cable guard rail, and cable end treatments.
- Current systemic safety efforts include the following.
  - Larger curve warning and chevron signs
  - Wrong way signing and striping
  - Low-cost signing and striping at stop controlled intersections
- Future efforts will include the following.
  - Wider edge lines at targeted locations.
  - High friction surface treatments. WSDOT is beginning initial applications this fall to see if they make a difference. They hope to broaden use in the future and will use Highway Safety Manual (HSM) tools to determine the benefits.
  - Dynamic intersection warnings. The Regions are considering this countermeasure and WSDOT is looking at how to identify locations. Implementation would include using cross-street detectors that warn main line drivers as well as testing warnings to cross-street drivers.

    - Low-cost compact roundabouts. These are bigger than mini-roundabouts, but are built with existing pavement. They include a center island.
- Washington has experienced some pavement failure when rumble strips are installed on chip seal. They are not using chip seal on Interstates yet, but it has been discussed.
- WSDOT is monitoring retroreflectivity of pavement markings on chip seal. Some states are seeing/hearing issues with this.
- WSDOT uses the HSM to fine-tune crash diagnosis and countermeasure application. The manual provides a more consistent approach.
- WSDOT also uses Safety Analyst. The 2015 version will include a systemic safety module.

Question from Arizona:	How frequently does Washington re-screen for systemic treatments?
Washington's Answer:	Three years is better than five years. With the Safety Analyst Module, WSDOT hopes to be able to re-screen more often.

Thurston County, Washington

Scott Davis, Thurston County

- In Thurston County, there is not a sustained occurrence of crashes on rural roadways.
- The County uses systemic safety because it is proactive and they do not want to chase crashes.
- Using the systemic safety process is low-tech.
- Thurston County used an 8-step process for implementing systemic safety. This is a repeatable process.
    - Step 1 –Held stakeholder meetings to establish and build relationships.
    - Step 2 – Identified focused crash types. Thurston County used local data provided by WSDOT and quickly focused on horizontal curves. From 2006 – 2010, 45% of severe crashes were recorded on horizontal curves.
    - Step 3 – Identified risk factors. The County used data they already had (such as lane width, speed limit, and traffic volumes). They also collected data such as speed differential, sign types, edge clearance, and street lights.
    - Step 4 – Collected network data. Thurston County has a linear referencing system for the entire county road system and extracted this information. They collected information on signed curves (270 signed curves inventoried), used roadway video (which they already had), and used GIS.
    - Step 5 – Analyzed risk factors. The County used pivot tables in Excel to manipulate the data and build charts. They compared Federal Functional Class vs. Collision History and created a scoring system. A high confidence in results resulted in the highest score. Roadway Class, Intersections, Traffic Volume, Edge Clearance, Shoulders (paved $\geq$ 4 feet) became risk factors (each had 1 point). Minor risk factors (which had ½ point) included Speed Differential, Visual Traps, Vertical Curves, and Windy Roads.
    - Step 6 – Ranked sites. The County identified locations and gave each a risk score.
    - Step 7 – Selected countermeasures. The County considered >25 countermeasures. The final countermeasure list included rumble strips, guardrail, reflective RPMs, barrier delineation, wider edge lines, extension lines at intersections, chevrons/large arrows,

and larger advance curve warning signs. These countermeasures were selected based on the following questions.
    - Can it be maintained once installed?
    - Is it low cost?
    - Is there a documented crash reduction (i.e., is it a proven countermeasure)?
  - Step 8 – Implementation. Over 1,000 curve warning signs have been installed; 16 miles of 8" edge lines; 20,000 lineal feet of dotted extension lines; 40 miles of shoulder/center rumble strips; and 85,000 lineal feet of barrier delineation.
- Following are Thurston County's keys to success with implementing systemic safety.
  - Dedicated local program staff at WSDOT. This is key to delivering projects.
  - Data analysis support from WSDOT.
  - Stakeholder involvement.
  - Management support.
  - Staff training.
  - HSIP funding.
- More recently (in 2014), Thurston County looked at candidate sites for high friction surface treatments using a data-driven analysis to determine locations for implementation.
- A benefit of systemic safety is being able to respond to public questions asking what is being done to prevent fatalities.
- Using 8" edge lines was a hard decision because of the increased cost (including increased maintenance costs).
- When using Federal funds for systemic safety countermeasures, local agencies must contract out the projects because of the competitive bid requirement.
- The county has not yet performed evaluations because they are just now finishing up installations.

Utah

Scott Jones, Utah DOT (UDOT)

- A few years ago, there was a realization that many departments within UDOT were duplicating efforts with data collection. As a result, they developed a Master Plan for a one-pass data collection effort. The cost of the effort was shared across UDOT Divisions with a majority of funding from Systems Planning & Programming, Central Maintenance, and Central Traffic & Safety.
- Data was collected with Mobile LiDAR. This system collected everything within the field of vision (such as surface area, median details, pavement markings, signals, and drainage).
- UDOT uses Google Earth's street view to collect roadway data on county roads.
- UDOT now owns a lot of data and makes it available at data.udot.utah.gov. The UDOT Data Portal is available online to anyone.
- One of UDOT's first systemic treatments was cable median barrier.
- Systemic safety is a data-driven approach, but it applies the data differently and relies on proven safety countermeasures.
- UDOT looked at three different systemic safety tools: FHWA's Systemic Safety Tool, usRAP Tools, and Utah Crash Prediction Model.

- The FHWA Systemic Safety Tool gives you a crash tree, which UDOT really likes. It requires very little roadway data, can target crash types and risk factors, and provides a great visual representation of key risk factors.
- usRAP is a software tool. The premise is that drivers should be able to choose a road to travel based on its safety rating; just like choosing a car based on its safety rating. Properties of usRAP include Risk Maps and Star Maps. Star maps indicate routes with engineering features that make the roadway safer. UDOT is using usRAP to create a Safer Road Investment Plan. usRAP helps UDOT prioritize and plan for projects to be able to spend the State's HSIP funding. usRAP is quantitative and based on a benefit-cost analysis. It considers a full range of countermeasures and explicitly considers risk to vulnerable users and vehicle occupants.
- The Utah Crash Prediction Model uses a predictive Bayesian crash model. The model is custom built around Utah's data and needs, uses a cutting edge statistical model, and develops local knowledge and expertise. Utah built this model, but another State could replicate it.

Roundtable Discussion on Analysis Approaches

- A successful strategy is to work with your local university to develop a State specific analysis tool.
- There was discussion about service fees for using usRAP. The AAA Foundation for Traffic Safety is the sponsor in the United States for usRAP. However, they do not want to be the administrators of usRAP long term and are looking for a more permanent home. All usRAP services are free. MRI Global is paid by the AAA Foundation to provide technical services so the service is free to State agencies. With the AAA Foundation sponsorship coming to an end, Utah is now writing their own contract with MRI Global.
- Regarding liability, Utah heavily leverages 409 protections. Utah is not a tort liability State. There is an increased push for transparency so data is becoming more accessible.

Systemic Safety Countermeasures

Kansas, Oklahoma, and Nevada gave presentations on the systemic safety countermeasures being used in their States. Following is a summary of the information they shared as well as the roundtable discussion that took place after the presentations.

Kansas

Ron Seitz, Kansas DOT (KDOT)

- KDOT uses engineering judgment and knowledge of their roads to identify the biggest problems and decide the low-cost countermeasures to use.
- The initial approach through the High Risk Rural Roads Program (HRRRP) was to address locations that had a severe crash rate higher than the statewide average.
- Kansas has 120,000 miles of roads under local jurisdiction and vast majority are low-volume roads. Crashes are scattered and finding two severe crashes in the same location is hard to do. The causes also vary; some are at intersections, some are animals, some are run-off-the-road.

- Data showed that lane departure crashes were causing 2/3 of all fatalities. The data also validated that more crashes occur in a rural setting. This awareness helps Kansas know where to focus their dollars.
- The data led Kansas to identify roadway departure collisions with fixed objects to be where they could get the best bang for their buck.
- In 2011, KDOT developed a program for the systemic approach to use HRRRP funds.
- Low-cost improvement options used by KDOT include the following.
  - Safety Edge and Clear Zone Improvements (e.g. removing trees and ineffective barriers and extending culverts/culvert modifications) to make the roadside more forgiving.
    - Ineffective barriers include guardrails that were installed years ago and have not been maintained and never been hit so they might not be necessary. It is also important to ensure that a crash with a guardrail is better than a crash with the object it is protecting.
    - KDOT allowed counties to use HRRR funds to purchase Safety Edge shoes.
  - Pavement markings, improved signing/delineation, high friction surfacing at curves, and rumble strips/stripes to keep vehicles on the road.
- Kansas is now looking at corridors, not just spot locations, to incorporate smaller improvements over a greater distance.
- KDOT sends out a call for projects every year and they promote systemic low-cost improvements. They are not really getting spot improvement applications anymore. Sometimes the projects that are selected are political to ensure the money is spread across the State.
- KDOT has started a Practical Road Safety Assessment modeled after Road Safety Audits. A lot of projects are starting to come out of this approach to assessing roads.
- KDOT is beginning County Road Safety Plans which will help generate and prioritize projects.
- Kansas State University is looking at applying usRAP on county roads which might help with project prioritization.

Oklahoma

Matt Warren, Oklahoma DOT (ODOT)

- Systemic treatments in Oklahoma have been used to combat intersection crashes, roadway departure crashes, and median crossovers.
- ODOT is developing a curve delineation program and the installation of retroreflective back plates on signals.
- Oklahoma participated in an FHWA-sponsored intersection improvement program.
- Oklahoma's first explicitly systemic safety project included signing and marking improvements at stop-controlled intersections. The project used 48" stop signs, oversized stop-ahead and intersection ahead signs, cross traffic does not stop placards, and 24" stop bars.
- Oklahoma is using delineation and advanced warning signs at horizontal curves. Devices include oversized, fluorescent yellow chevrons; reduced chevron sign spacing; and 6" edge markings.
- The third major systemic project is retrofitting signals with 2" retroreflective borders on the backplates. (ODOT replaces the entire backplate.)
- ODOT has recognized the following systemic safety challenges.

    - Setting project scope to establish how many locations are going to receive the treatment.
    - Getting funding for the projects is difficult.
    - Site selection; locations that were ranked 5 years ago, might not be ranked now.
    - Site scoping; deciding which sites to include. This takes a bit of work because sometimes the data might be inaccurate (i.e., the data indicates an intersection is not signalized, but it actually is).
    - Maintenance; a low-cost safety improvement might not be considered low-cost to maintenance. For example, a sign is a low-cost safety improvement, but when it has to be replaced, it is not considered low cost to maintenance.
    - Keeping track of the locations is difficult. For example, rumble strips are installed and then they get covered up later with an overlay.
- Projects are funded using HSIP funds. However, not much HSIP funding is shared with the locals in Oklahoma.

Nevada

P.D. Kiser, Nevada DOT

- Over 200 Road Safety Audits have been performed in Nevada. NDOT policy is to perform an RSA on every 3R project at least one year in advance so that recommendations can be incorporated into the design.
- Nevada has 3,000 miles of centerline rumble strips. This is now a design standard at NDOT.
- Three roundabouts have been completed and two are currently being designed. Depending on PROAG regulations, there could be a requirement for signals at crosswalks for multi-lane roundabouts.
- Pedestrian improvements are planned for five locations in Las Vegas.
- Nevada is using high friction surfacing treatments in Nevada.
- There has been 80 miles of shoulder widening and slope flattening. NDOT tries to incorporate these initiatives into already-planned projects.
- Flashing yellow arrows are being used at over 500 intersections. This replaces the green ball with a yellow flashing arrow, which is more indicative to drivers that they need to be cautious and pay attention. This also has capacity benefits by giving flexibility for left turns during high-peak times.
- Solar powered beacons are being used at rural, T-intersections and transverse rumble strips are being used at over 200 intersections. The Districts have pushed back on the beacons because they have to be maintained when there is no extra budget or staff.
- The Safety Edge is now a design standard.

Roundtable Discussion on Systemic Countermeasures

- Cable Median Barrier
    - Nevada has issues with emergency vehicles not being able to cross over for turn-arounds on State Highways.
        - Washington overlaps the barrier and leaves a gap so EMS/law enforcement can get through.
        - Oklahoma leaves a space every 2.5 miles.

- Oklahoma was an intersection focus state and received FHWA technical assistance. In Oklahoma, the original list of intersection locations came from data. The data was not bad, but algorithms had to be developed because the roadway element data was incomplete. This caused ODOT to put more effort into site selection. The prioritized list was subsequently modified to exclude some of those sites for a variety of reasons [i.e., the site was already scheduled for an improvement, or the site was signalized (when the data indicated it was not signalized)].
- Road Safety Assessments are performed out of KDOT's Local Project Office. The State Safety Engineer participated in first assessment.
- Attendees identified the following countermeasures as most effective.
  - Cable median barrier
  - Centerline rumble strips
  - Roundabouts
  - Road Diets/Complete Streets
  - Chevron signs
  - Speed enforcement
  - Shoulder rumble strips
  - Protected left turns
  - Lighting for improved pedestrian safety
  - Signing
  - Utah – cable barrier
  - Edgeline markings
- Attendees identified the following countermeasures as least effective.
  - Guideposts (the grass grows too tall and too fast around these devices)
  - Raised pavement markers (due to maintenance)
  - Pedestrian countdown signal heads. There is some skepticism that they help reduce pedestrian crashes. Drivers watch the timers to know if the signal is going to turn yellow. One study showed that pedestrian crashes went down and motorist crashes went up. The Turner-Fairbank Highway Research Center is conducting research now on the effectiveness of pedestrian countdown signals.
  - Posted speed limit change
  - Traffic signals (based on cost)
  - Overhead intersection beacons (red/yellow flashing beacons)
  - Speed feedback signs
- Attendees listed the following countermeasures as those their agencies would consider for their systemic program.
  - Cable barriers
  - Centerline rumble strips
  - Chevrons
  - Pavement markings
  - Pedestrian countdown signals
  - Recessed pavement markers
  - Signal upgrades (retroreflective backplates, flashing yellow arrow)
  - Access management

Breakout Session – Regional and Local Perspectives

Attendees divided into three groups to discuss regional and local perspectives on implementing systemic safety. Groups discussed how local and regional agencies are using the systemic approach and the challenges these agencies have in advancing the systemic approach to safety and implementing strategies systemically. A representative of each group provided a summary of their discussion to all of the attendees. A summary of reach group's report is provided below.

Nevada/Utah Group

- The group identified the following initiatives to have a better systemic program at the local level.
  - Road Safety Audits
  - Safety Summits – This is a strategy used in Nevada that engages the locals.
  - MPO Safety Plans
- Lack of data is an impediment. Most locals can locate crashes with a linear system, but roadway data is missing which is needed for a systemic approach. Locals need better roadway data.
- There is a need to educate locals about safety; sometimes local officials do not fully understand the importance of safety and methods to address crash problems.
- Combine local projects to make them bigger to get Federal funding. This approach requires a champion who can facilitate this for the neighboring counties.
- Streamline the process for local agencies to be able to access Federal funding.

Arizona/Washington Group

- Washington gives 70% of their HSIP funds to the locals; they break out their local funding between city and county.
- Arizona gives 20% of their HSIP funds to the locals.
- Locals do not have staff and resources so they do not know what to do.
- Developing safety plans with the locals is a strategy that State DOTs can use.
- Tribal issues; 20% of the land area in Arizona is tribal and they have data issues.
- Maintenance is an issue for many countermeasures. For example, guardrail is installed but not maintained.
- WSDOT provides training and technical assistance to the locals.
- It is important to evaluate projects to determine what is effective.

Kansas/North Dakota/Oklahoma

- For Kansas, the systemic approach provides the locals with an opportunity to get safety funds for projects.
- In Oklahoma, the locals do the best they can do with implementing safety improvements but does not get funding from the State DOT.
- In North Dakota, the State DOT is funding the development of Local Road Safety Plans for each county. The State gives 50% of their HSIP funding to the locals.
- To reduce crashes/fatalities, agencies must address the local system.
- In Kansas, locals see the benefit of the systemic approach with addressing roadway departure crashes.

- In Kansas and North Dakota, there are a lot of counties, but very few county engineers. Most staff at the county level are not familiar with project development.
- It is difficult to get County Commissioners to understand the benefit of moving away from a crash location approach to a risk factor reduction approach.

Day 1 Recap

The peer exchange started with an overview of the systemic approach. Feedback during this presentation included attendee requests for regularly scheduled webinars on systemic safety.

Question: Will FHWA be asking agencies to provide evaluation results in a few years to document the effectiveness of proven countermeasures?
Answer: FHWA does not require States to provide evaluation results, but they are expected to evaluate the effectiveness of their highway safety improvement projects to determine if the countermeasure produces the expected benefits. The current list of proven safety countermeasures is the second wave and FHWA will likely evaluate the list again in the future and modify a third time.

After the systemic safety overview, attendees heard from States on the different analysis approaches being used. This was followed by a roundtable discussion.

The next group of presentations focused on systemic safety countermeasures. There was a roundtable discussion on this topic as well.

Question: Is there a list of countermeasures for gravel roads?
Answer: Iowa State has conducted a study in this area.
North Dakota uses signing and reworks curves as options.
Question: It is possible that there will be a Pooled Fund Study for gravel roads?
Answer: Attendees who are interested in participating in the PFS should contact Rosemarie Anderson (rosemarie.anderson@dot.gov).

A breakout session at the end of the day allowed attendees to discuss advancing systemic safety at the local level. There was noteworthy feedback from Kansas that they realized the data requirement to get HRRRP funding for projects was prohibiting locals from submitting projects for funding. The systemic approach changed that.

Comment: In Oklahoma, systemic safety treatments are isolated to the State highway system. Based on information learned at this peer exchange, Oklahoma DOT will speak to the Local Government Coordinator and see if they can rearrange some of their funding.

Advancing Implementation of Systemic Countermeasures

Arizona, North Dakota, and Washington State gave presentations on how they are advancing the implementation of systemic safety countermeasures. Following is a summary of the information they shared as well as the roundtable discussion that took place after the presentations.

Arizona

Richard Weeks, Arizona DOT (ADOT)

- ADOT used the following process to implement countermeasures.
  - Identified an implementation team responsible for identifying projects.
  - Identified policies, procedures, and guidelines.
  - Identified an effective way to prioritize projects.
  - Evaluated projects.
- The Implementation Team consisted of staff from the ADOT Traffic Safety Section and consultants. The management consultant was responsible for coordinating the efforts of the regional consultants and developing the report to FHWA. They also led a review of ADOT policies, guidelines, and procedures; identified what other States were doing; and made recommendations. A methodology was then developed to prioritize projects.
- The regional consultants went through the list of recommended locations for treatments and determined if the sites were still applicable.
- Arizona has a Roadway Departure Safety Implementation Plan. The following list of countermeasures came out this plan.
  - Tree removal
  - Centerline rumble stripes
  - Edgeline rumble strips and stripes
  - Curve signing and marking
  - Delineation and lighting
  - High friction surface treatments
  - Guardrail upgrades
  - Cable median barrier
- One of the issues ADOT encountered was developing governmental agreements for segments that crossed tribal lands.
- Progress to date with countermeasure implementation:
  - There are tree removal projects either under construction or in design.
  - Longitudinal rumble strip projects are in the scoping phase in all 9 Districts.

Mazen Muradvich, Maricopa County DOT (MCDOT)

- The Maricopa County Strategic Plan has a goal to evaluate all intersections and run-off-the-road fatal and serious injury crash locations by 2015.
- The following countermeasures are used by MCDOT at run-off-the-road locations.
  - Transverse rumble strips (They do not install them on shoulders due to bicyclists.)
  - Oversized signs and chevrons (These have had great results.)

  - Pavement markings
  - Speed feedback signs
  - Street lighting
  - Delineators and RPMs
  - Guardrail
  - Remove, relocate, or protect roadside hazards
  - Improve sight distance
  - Improve the condition/width of shoulders
  - Safety Edge
- MCDOT uses the following funding sources for countermeasures.
  - Short term countermeasures are immediately implemented with available funding from the MCDOT annual TIP budget that includes about 3% for safety-related projects.
  - Long term countermeasures are programmed into MCDOT's TIP.
  - Some projects are eligible for HSIP funding.
  - Roadside barrier installation, upgrades, and repairs can be done using MCDOT Operations and Maintenance Division funding.
- The MCDOT Roadway Safety Management Program incorporates low-cost countermeasures and prioritizes locations based on fatal and serious crashes.
  - Project Example: A two-lane curved intersection had 18 crashes between 2008-2010. Fifteen of those crashes were run-off-the-road and 17 of the crashes occurred at night. Countermeasures that were implemented included upgraded chevrons, installation of oversize signs, and lighting. Since the countermeasures were implemented, there has only been one run-off-the-road crash to date with property damage only.

North Dakota

Shawn Kuntz, North Dakota DOT

- North Dakota has 53 counties, 12 cities, 4 Tribes, and one National Park.
- North Dakota has dedicated 50% of their HSIP funds to local projects.
- North Dakota DOT is funding the development of Local Road Safety Plans for each county. This is being done in four phases. The counties included in Phases 1 and 2 are complete and the plans are available online.[3] Phase 3 is underway now and Phase 4 will be complete by April 2015. Every county is getting a plan. What they do with it is up to them.
- Each county plan includes project sheets that the counties can use to submit projects for funding.
- A decision tree helps identify high priority rural intersections and projects to improve them.
- The counties will design and manage their projects that are using HSIP funds from the North Dakota DOT. Most will be assisted by consultants.
- Nearly 50% of North Dakota's severe crashes occur on local roads. A crash data analysis revealed that over 60% of severe crashes on the local system occur on rural roadways. Data also showed that the majority of severe crashes occur on curves with 500' to 1200' radii.
- North Dakota DOT developed a list of roadway departure strategies. They also developed strategies for intersections, which includes changing the intersection type (i.e., roundabouts), enhancing signing and delineation, installing dynamic warning signs, and street lighting.

[3] http://www.dot.nd.gov/divisions/safety/trafficsafety.htm

Washington State

Matthew Enders, WSDOT

- In Washington, HSIP safety funding is split so that 70% goes to local agencies and 30% goes to the State. Of the 70% for locals, 57% goes to cities and 43% goes to counties.
- The HRRRP was the first time that Washington did something that looked like systemic safety.
- The State's 2014 County Safety Program includes $28m in available funding and all 39 counties are eligible. Funding levels are based on fatal/serious crash frequency. To qualify for funding, projects must be risk-based, low-cost and have a widespread approach. The definition of low cost is broadening because many locals have already done all of their signing, marking, and other low-cost safety improvements.
- Counties cannot apply for funding without developing a Local Road Safety Plan. To help counties develop a plan, WSDOT provided summary data to all the counties and conducted workshops. The counties were not required to go collect new data; they could use what they already had. The plans had to include the following elements.
  - Set priorities for crash types (using the summary data provided by WSDOT).
  - Identify key factors related to severe crashes.
  - Prioritize the network using key factors.
  - Identify countermeasures to address priority crash types.
  - Prioritize list of projects using network rankings and countermeasures
- The summary data provided by WSDOT was organized by different categories and highlighted to help draw attention to the crash types that stuck out to WSDOT. It took three weeks to put all of the data together for the counties.
- The counties had to submit applications and plans about four months after the workshops (they were due June 30 and workshops were held January – March). Matthew personally reviewed all of the plans to ensure they were reasonable. There was some back and forth with a few of the counties on content in their plans.
- Counties had to prioritize their projects in their plan. The plans ranged from as few as one priority to as many as 18 priorities. WSDOT saw several data improvement projects, which were approved for funding. WSDOT was able to fund the top end of every county's plan. Projects that were funded were based on a mix of the county's priority level, effectiveness of the countermeasure, and funding availability.
- Thirty counties ended up applying.
- Counties in Washington are certified to manage Federal safety projects so they manage them after they awarded (WSDOT provides oversight).

Roundtable Discussion on Implementation

- Arizona – Outreach and assistance to the local agencies is something being done in Arizona and there are opportunities to improve even more.
- Kansas – Not sure they are getting the best projects out of the locals, but something is better than nothing.
- North Dakota – As a result of the Local Road Safety Plans, counties will be able to review the projects they have implemented to determine what is working.

- Arizona – Finds that RSAs are very beneficial.
- North Dakota – RSAs take a lot of resources and being able to implement recommendations is challenging due to a lack of resources.
- North Dakota – Sees that locations come off the priority lists based on anecdotal input (someone sees a location and removes it because someone in the field office does not personally recall a crash at the site in several years).
- It is challenging to convince Commissioners and maintenance staff of the value of safety projects.

Breakout Session – Funding Sources

Attendees divided into three groups to discuss funding sources for systemic safety. Groups discussed challenges with funding the implementation of systemic strategies, tradeoffs in funding spot location improvements versus systemic improvements, and how funding is allocated in their State for systemic safety improvements. A representative of each group provided a summary of their discussion to all of the attendees. A summary of the discussion is provided below.

- The following funding sources were identified for implementing systemic safety projects.
  - HSIP
  - CMAQ
  - Federal Land Highway (for Tribes)
  - STIP
  - (Old) HRRRP
  - Local funds (gas tax)
  - State funds
- The following funding challenges were identified.
  - Locals understanding the Federal funding process. Federal/State rules make it difficult for the locals to go through the process of getting funds.
    - One suggestion for get funding to the locals is to use Federal Fund Exchange money. For example, KDOT gives locals the State money and the State uses Federal funds on the State roads.
  - The local match.
  - Having funds to maintain the treatments after they are installed. Maintenance is an increased cost.
  - Locals do not have enough staffing/resources.
  - Lack of understanding by locals of what is eligible for funding and what is not.
  - Locals want flexibility, but lack resources. Local agency staff wear multiple hats and safety is just one. Not having a plan and limited resources make it difficult to access funds.
  - The LPA process can be a challenge.
  - 90-day STIP process.
  - It is difficult to bundle multiple county projects to leverage a higher amount of funding.
  - Not enough money.
  - Countermeasures that are selected.

    - Decentralization of authority in States.
    - Construction on the county side.
    - Local agency staff have multiple roles and might not have the skill set/knowledge for securing funds to implement systemic safety.
- The group identified the following trade-offs/benefits of funding systemic improvements versus spot improvements.
    - In Oklahoma, funding systemic improvements is more tolerable at the State DOT level.
    - Arizona prefers to fund systemic improvements and will use remaining funds for spot improvements.
    - Utah funds systemic improvements and funds spot improvements as they come up. Many times spot improvements are political.
- Other discussion about funding.
    - Local Road Safety Plans include project sheets. If a local has a plan, it is easier to identify and justify projects.
    - One of the benefits of funding systemic projects is that it allows an agency to tell people they are being proactive. Focusing on the proactive approach is key to convincing elected officials of the value of systemic safety.
    - Most States are funding systemic projects as the norm and funding spot locations as they come up. Often, spot locations are political.
    - States can use funding as an incentive to get locals to incorporate systemic projects.
    - If a State DOT has a framework, it allows the local agency staff to "blame" systemic projects on the State when talking with their elected officials. (i.e., "This is the only thing the State DOT will fund.")

Action Plans

Attendees divided into their State delegations and created a list of actions they would undertake as a result of the information learned during the peer exchange. Following below is a summary of each State's strategies for advancing systemic safety.

Washington

- Incorporate new tools into existing processes at the State level.
  - Safety Analyst which will have a systemic safety model.
  - A curve risk assessment tool is being developed that can be incorporated.
- Complete a systemic safety analysis for all public roads.
- Identify and bring along additional partners into systemic safety.
- Publicize and encourage use of new countermeasures.
- Streamline the environmental approval process for projects.

Arizona

- Incorporate the SHSP Emphasis Areas into the Highway Safety Implementation Plan.
- Use data from the SHSP's development and evaluate down to the jurisdictional roadway level to focus on fatal/serious injury crashes.
- Use proven and effective countermeasures identified in the clearinghouse.
- Conduct District-level meetings as part of the HSIP process. This can help get the systemic safety message to the locals and clarify the process for District-level staff.
- Evaluate the State's allocation of resources; right now there is an 80/20 HSIP funding split.
- Determine how systemic projects fit with spot improvements because ADOT knows they will continue to have spot improvement projects.
- Review the eligibility and application process.

North Dakota

- Follow through with counties as they get their plans and apply for HSIP funds. Champion: DOT local government office and association of county engineers
- Identifying and bundling projects from multiple counties. Champion: DOT local government office
- Continued push with local agencies to focus on implementing countermeasures with planned projects.
- Use extra funds from oil to meet the required local match for Federally funded projects.
- Encourage counties to submit projects while HSIP funding exists.

Nevada

- Prepare a Safety Transportation Plan.
- Monitor safety improvements. This requires GIS data and creating a regional database.
- Use GIS that are in RSA recommendations.
- Provide safety education for decision makers.
- Improve crash data accuracy and timeliness.

Oklahoma

- Compile data and figure out where crashes are happening on the local system.
- Conduct a mid-level meeting between ODOT, FHWA, and locals after compiling the data.
- Develop a conceptual program/plan that details what ODOT will do for their local partners.
- Coordinate an FHWA workshop to promote systemic safety to County Commissioners, ODOT senior staff, LTAP, and TTAP.
- Visit with select senior staff at ODOT to discuss the benefits of systemic safety.
- Pursue reallocation of funding so that some is designated for the locals.
- Adopt more proven countermeasures.
- Reallocate resources to be able to deliver assistance to the locals.

Kansas

- Use the Safety Circuit Rider to get information out to the counties.
- Pilot Local Road Safety Plans. Projects submitted that are part of a Local Road Safety Plan will receive priority.
- Initiate something similar to Washington's summary data spreadsheet (with highlighting).
- Move to a three year program plan.
- Continue to push for more funding for local roads.
- Education to the counties so they understand the systemic approach and encourage them to incorporate that approach.
- Evaluate systemic improvements.

Utah

- Provide crash trees (or similar ways of presenting data) to the locals. Local governments want the data in this type of formatting.
- Create spreadsheet tools to customize data for the locals.
- Show locals targeted crash types.
- Bring other safety staff at UDOT up to speed on the systemic safety approach so they can discuss it with the locals as well. This takes advantage of established lines of communication and relationships.

Appendix A – List of Attendees

Agency	Name
Arizona Delegation	
FHWA Arizona Division Office	Kelly LaRosa
Arizona DOT	Ron Foluch
Arizona DOT	Trent Thatcher
Arizona DOT	Richard Weeks
Maricopa County Department of Transportation	Mazen Muradvich
Kansas Delegation	
Kansas DOT	Ron Seitz
Kansas DOT	Nelda Buckley
Barton County Engineering Department	Clark Rusco
Kansas Association of Counties	Norman Bowers
Nevada Delegation	
FHWA Nevada Division Office	Juan Balbuena
Nevada DOT	P.D. Kiser
Nevada DOT	Ken Mammen
Regional Transportation Commission - Reno	Julie Masterpool
Regional Transportation Commission of Southern Nevada	Mohammad Farhan
North Dakota Delegation	
North Dakota DOT	Bryon Fuchs
North Dakota DOT	Donovan Slag
North Dakota DOT	Shawn Kuntz
Cass County	Jason Benson
Oklahoma Delegation	
FHWA Oklahoma Division Office	Huy Nguyen
Oklahoma DOT	Matt Warren
Oklahoma DOT	David Glabas
Oklahoma DOT	Tarek Maarouf
City of Norman	Angelo Lombardo
Utah Delegation	
FHWA Utah Division Office	Roland Stanger
Utah DOT	Scott Jones
Utah DOT	Anne Ogden
Utah DOT	Robert Dowell
West Valley City	Erik Brondum
Cache MPO	Jeff Gilbert

Washington Delegation	
Washington State DOT	Matthew Enders
Washington State DOT	Mike Dornfeld
Klickitat County	Gordie Kelsey
Thurston County	Scott Davis
FHWA	
FHWA Headquarters	Rosemarie Anderson
FHWA Headquarters	Karen Scurry
FHWA Resource Center	Dave Engstrom
Leidos (contract support)	Heather Rigdon

Appendix B – Agenda

Wednesday, September 17

8:00 AM **Welcome**

- Carlos Braceras, Executive Director, Utah DOT
- Arlene Kocher, Assistant Division Administrator, FHWA Utah Division

Peer Exchange Objectives

Introductions/Expectations

9:00 AM **Overview of Systemic Approach to Safety**

Background, Implementation status, resources, state experience

- *Dave Engstrom, FHWA Safety & Design Technical Services Team*
- *Karen Scurry, FHWA Office of Safety*

10:00 AM **Break**

10:15 AM **State Presentations: Analysis Approaches**

- Using the HSM to support systemic safety analysis
  - Mike Dornfeld, Washington State DOT
- Application of the Systemic Safety Project Selection Tool
  - Scott Davis, Thurston County, Washington
- Compare/Contrast of FHWA Systemic Tool, usRAP and Homegrown Model
  - Scott Jones, Utah DOT

11:45 AM **Lunch on your own**

12:45 PM **Roundtable Discussion: Analysis Approaches**

1:30 PM **State Presentations: Systemic safety countermeasures**

- Roadway departure mitigation measures for locals
  - Ron Seitz, Kansas DOT
- Low-cost intersection improvements
  - Matt Warren, Oklahoma DOT
- Evaluation of systemic safety countermeasures
  - P.D. Kiser, Nevada DOT

2:30 PM **BREAK**

2:45 PM **Roundtable Discussion: Systemic Countermeasures**

3:45 PM **Breakout Discussion by State(s): Regional & Local Perspectives**

4:30 PM **Report back**

5:00 PM **Wrap-up/Adjourn**

Thursday, September 18

8:00 AM **Recap of Day 1**

8:30 AM **State Presentations: Advancing Implementation of Systemic Countermeasures**

- Roadway Departure Implementation Plan
  - Richard Weeks, Arizona DOT
  - Mazen Muradvich, Maricopa County DOT
- Local Road Safety Plans and HSIP Manual Updates
  - Shawn Kuntz, North Dakota DOT
- County Road Safety Call for Projects
  - Matthew Enders, Washington State DOT

9:30 AM **Roundtable Discussion: Implementation**

10:15 AM **Break**

10:30 AM **Breakout Discussion: Funding sources**

11:15 AM **Report back**

11:30 AM **Key Takeaways**

12:00 PM **Lunch on your own**

1:00 PM **State Breakout Discussions: Action Plans**

- Including Roles and Responsibilities

2:15 PM **Report back**

2:45 PM **Wrap-up/Next steps**

3:00 PM **Adjourn – Safe travels!**