Roadway & Lane Departures EA Team Meeting Report
Thursday, April 5, 2018, 9:30 a.m.

Participants

Name	Agency/Organization
Rebecca Wells, Team Leader	TxDOT - ATL
Raul Avelar Moran	TTI
Tim Barrette	TTI
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Mihn Le	TTI
Darren McDaniel	TxDOT
Danny Magee	TxDOT- Laredo
Ken Mora	TxDOT
Yang Ouyang	North Texas Tollway Authority
Marcie Perez	TTI
Danny Plumer	Dallas Sheriff's Office
Stephen Ratke	FHWA
Maryam Shirinzad	TTI
Eva Shipp	Texas A&M Transportation Institute
Veronica Solis	TxDOT
Robert Wunderlich	TTI

Action Plan Development

During the Traffic Safety Conference participants had the opportunity to prioritize the countermeasures in each of the seven emphasis areas. The top 3-5 countermeasures in each emphasis area were presented during the facilitated discussion sessions and preliminary action plans for some of the prioritized countermeasures were developed. Most of these action plans are incomplete and require more consideration by EA team members.

Through a collaborative process EA team members reviewed, revised and/or confirmed the countermeasure rankings and identified all needed action plans based on the following guidelines:

- Action Plan is not needed for every countermeasure
- All strategies must have at least one countermeasure with an action plan.
- Ensure that all EA team priorities are addressed.
- Countermeasures can be combined when appropriate (some were already combined about the conference).

Roadway & Lane Departure Strategies and Countermeasures - Revised

Strategy #1: Analyze run off the road and head-on crashes and roadway characteristics using the new safety methodologies (e.g., Highway Safety Manual and systemic approaches)

Countermeasures and Programs

1a Improve data systems for targeting locations with a high probability for roadway departure crashes by: road type, geometric characteristics, vehicle type, and area type.

Strategy #2: Keep vehicles from encroaching on the roadside or opposite lane

Countermeasures and Programs

2a Revise roadway configuration to provide additional paved recovery area (e.g., convert four lane roadways to three lane roadways with design features compatible with surrounding land use context).

2b Provide additional positive guidance (i.e., rumble strips, stripe lines, raised pavement markings, chevrons including LED chevrons, curve delineators, speed feedback signs, edge line and center lines, wider edge lines) and conduct public information campaigns to explain the purpose and how to navigate the roadway safely.

2c Establish target speeds and use engineering techniques to manage speeds in areas experiencing or susceptible to roadway and lane departures.2g Disseminate information on the connection between urban form (driveway density, setbacks, pedestrian scale frontage, roadway design speeds, etc.) and safety outcomes. Encourage incorporation into local land use planning and review.

Strategy #3 Minimize the consequences of vehicles leaving the road

3a Implement barriers, median treatments and forgiving roadside objects (e.g., median barriers, safety treat fixed objects, establish safe clear policies, and improve slopes) with consideration given to land use context.

Strategy #4: Minimize the likelihood of crashing in adverse conditions

Countermeasures and Programs

4a Identify locations subject to nighttime crashes.

Examples: Develop and use screening and systemic crash analysis tools to identify locations; provide additional roadway delineation; and provide roadway lighting.

4b Identify and address locations subject to wet weather run off the road crashes.

Strategy #5: Identify and address behavioral characteristics associated with roadway departure

Countermeasures and Programs

5a Develop and implement strategies to encourage drivers to adjust speeds appropriately to roadway conditions: wet weather speed advisories, speed feedback signs, and speed advisories for nighttime conditions.

5b Provide consistent curve treatments and advisory speeds for similar conditions.

5c Encourage adoption of laws that allow automated speed enforcement.

5d Encourage adoption of laws that change medical card requirements for truck drivers.

5e Encourage adoption of laws that require automated recording systems for trucks to monitor driving hours.

5f Encourage adoption of truck driver health check-ups and driving restrictions.

Strategy #6: Improve emergency response time in rural areas

Countermeasures and Programs

6a Provide resources to decrease emergency air flight response time.

6b Provide resources to increase the availability and use of advanced life support equipment to first responders.

6c Implement measures to provide faster crash notification.

Roadway & Lane Departures Countermeasures and Current DRAFT Action Plans

Strategy #1

1a Improve data systems for targeting locations with a high probability for roadway departure crashes by: road type, geometric characteristics, vehicle type, and area type.

Draft Action Plan

EA Working Group: Srinivas Geedipally, Jeanne Tarrants, Mayam Shirinzad, Karen Dixon
Status: Contact David McDonald and Marco Cameron

Steps for implementation:

Step 1: Identify critical information such as position prior to crash, and position of point of impact to accurately identify the roadway departure crashes and the actions that contributed to these crash types. (Lead organizations: TTI, TxDOT)

Step 2: Enhance the CR-3 reporting process by including the identified critical information. (Lead organizations: TxDOT, DPS)

Step 3: Provide training to the Peace Officers about the additional information in the CR-3. (Lead organizations: TTI, TxDOT)

Step 4: Identify a list of roadway characteristics by road type and area type to use the methodologies documented in the standard manuals such as Texas Roadway Safety Design Handbook, Highway Safety Manual, FHWA's Systemic Safety Project Selection Tool, and Roadside Design Guide. (Lead organizations: TTI, TxDOT)

Step 5: Prepare a guidebook and provide training on how to collect the additional roadway characteristics that are not in the existing databases but are needed for using the methodologies presented in the standard manuals (Lead organizations: TTI, TxDOT)

Step 6: Prioritize the counties and roadway types for identifying the problematic areas (consider pilot) (Lead organizations: TTI, TxDOT)

Step 7: Collect the roadway characteristics needed for using the methodologies (Lead organizations: TxDOT, counties)

Step 8: Analyze data by using the advanced methods to identify prioritized specific locations by vehicle type (Lead organizations: TTI, TxDOT)

Step 9: Disseminate data analysis results (Lead organizations: TTI, TxDOT)

Effectiveness: ***
Cost to implement: $$$
Time to implement: Long (More than 5 years)
Barriers:

- Resistance to change the CR-3 reporting process
- Personnel needed to collect required roadway characteristics data
- Inconsistent results among various methodologies for prioritizing the locations
- Funds to collect additional variables

Strategy #2

2b Provide additional positive guidance (i.e., rumble strips, stripe lines, raised pavement markings, chevrons including LED chevrons, curve delineators, speed feedback signs, edge line and center lines, wider edge lines) and conduct public information campaigns to explain the purpose and how to navigate the roadway safely.

Draft Action Plan

EA Working Group: Rebecca Wells, Karen Dixon
Status: add acronym list; hot mix modification

- RPM –CMF ranges from 33% reduction to 43 % increase in nighttime crashes - 672 6006 $2.50/EA, 672 6010 $3.00/EA
- Edge lines – HSIP WC 402 0.25, 2 years, CMF 8% reduction all crash types with 11% to 13% reduction run-off-road crashes - $0.43/LF
- Wide edge lines – 6" CMF 12% to 37% reduction in all crash types - $0.60/LF
- Center lines – HSIP WC 404 0.65, 2 years, CMF crash reduction minimal but where placed in conjunction with edgelines, approximate 24% reduction in all crash types - $0.40/LF
- Milled Edgeline rumble strip – HSIP WC 532 0.5, 10 years – CMF 16% to 17% reduction for all crash types - 533 6003 $.15, 6005 $0.59
- Profile edgeline marking - HSIP WC 533 0.6, 5 years – 666 6283 $0.38/LF (4"); $0.62/LF (6")
- Raised edgeline rumble strips – HSIP WC 534 0.6, 2 years - 6056 6001 $2.75/LF
- Milled centerline rumble strip – HSIP WC 542 0.35, 10 years CMF 14% to 15% reduction for all crash types – 533 6004 $0.11
- Profile centerline marking - HSIP WC 543 0.35, 5 years – 666 6287 $0.40/LF (4"); $0.64/LF (6")
- Raised centerline rumble strips – HSIP WC 544 0.35, 2 years – 6056 6002 $2.75/LF
- Transverse rumble strips – HSIP WC 545 0.15, 5 years, CMF at approach to intersection 33% reduction to 33% increase for all crash types - 6056 6001 $2.75/LF
- Delineators – HSIP WC 113 0.3, 2 years, CMF installed in combination with edgeline and centerline marking results in 45% reduction in all crash types - 658 2292 $45/EA

Effectiveness: **
Cost to implement: $
Time to implement: short
Barriers:

- Funding, many of these items not only have an initial cost, but also to keep them maintained will add cost to an overall budget.
- In locations of annual ice/snow some of these items are harder to maintain due to plowing operations.

- Chevrons – HSIP WC 137 0.25, 10 years, CMF installed with curve warning signs results in 31% to 44% reduction in all crash types – 644 6007 $650/EA
- LED flashing chevrons – HSIP WC 136 0.35, 10 years – 6068 6001/6002 $4500/EA
- Advance warning signals - replace signs with signals HSIP WC 123 0.1, 10 years – 685 6004 $5250/EA
- Install advance warning signals and signs – HSIP WC 125 0.15, 10 years, CMF 26% to 30% reduction in all crash types – 685 6004 $5250/EA
- Install advance warning sign – HSIP WC 130 0.05, 6 years – 644 6004 $575/EA
- Driver feedback signs –

Effectiveness: **
Cost to implement: $$
Time to implement: medium
Barriers:

- Funding, many of these items not only have an initial cost, but also to keep them maintained will add cost to an overall budget.
- These devices are not needed at every location, but should be included in higher crash locations.

- Install Median Barrier – HSIP WC 201 0.55, 20, CMF any type of median barrier can result in up to a 24% increase in total crashes, but will reduce fatal crashes by up to 43% and injury crashes by up to 30% – varies depends on concrete, cable, etc.
- Install raised median – HSIP WC 203 0.25, 20, CMF urban areas: 14% to 71% reduction in all crash types – varies depend on work
- Flatten Side Slope – HSIP WC 204 0.46, 20, CMF for cross median, fixed object, run-off-road, or other crash types in rural areas: 9% reduction up to a 9% increase in all levels of severity – varies depends on how much
- Modernize bridge rail and approach guardrail - HSIP WC 205 0.15, 10
- Improve guardrail to design standards - HSIP WC 206 0.35, 10 – estimated $110/LF
- Safety treat fixed objects – HSIP WC 209 0.5, 20, CMF remove or relocated fixed object associated with a 38% reduction in all crash types – varies depending on work items
- High friction surface treatment (curve) - HSIP WC306 0.45, 3014 6001 $28/SY
- Widen lane – HSIP WC 502 0.3, 10, CMF widening rural lane widths from 11 feet to 12 feet result in a 5% reduction in all crash types – depends on how much and type of work
- Widen paved shoulder (to 5ft or less) – HSIP WC 503 0.25, 20, CMF effectiveness varies by width, but generally expected to reduce all rural crash types by 18% up to 38% – depends on how much and type of work
- Construct paved shoulder (1-4ft) – HSIP WC 504 0.25, 20, CMF results in approximately a 19% reduction in all crash and injury types – depends on how much and type of work
- Widen paved shoulders (to > 5ft) – HSIP WC 536 0.4, 20, CMF from 3ft to 6ft: 7% to 18% reduction in all crash types and severity types; widening greater than 6ft results in increased reductions up to 8ft – depends on how much and type of work
- Construct paved shoulders (>= 5ft) – HSIP WC 0.4, 20 – depends on how much and type of work

- Road Diet - Revise roadway configuration to provide additional paved recovery area (e.g., convert four lane roadways to three lane roadways with design features compatible with surrounding land use context). CMF 19% to 25% reduction in urban crashes; approximate 47% reduction in suburban crashes]

Effectiveness: ***
Cost to implement: $$$
Time to implement: long
Barriers:

- May require ROW
- Plans more detailed including drainage, roadway items,
- More expensive

Strategy #3

3a Implement barriers, median treatments and forgiving roadside objects (e.g., median barriers, safety treat fixed objects, establish safe clear policies, and improve slopes) with consideration given to land use context

Draft Action Plan

EA Working Group: Eric Hemphill, Minh Le Yang Ouyang
Status: Draft from 2017 Traffic Safety Conference

Facilitated Discussion Group Notes:
Step 1: HSIP
(Lead organizations: TxDOT)
Step 2: different issues
(Lead organizations: MPOs and city governments)

Effectiveness: ***
Cost to implement: $ (currently being implemented within HSIP)
Time to implement: medium
Barriers:

- Municipalities have issues with this because they don't have the flexibility that TxDOT has

Strategy #4

4a Identify locations subject to nighttime crashes.

Draft Action Plan

EA Working Group: Tim Barrette, Minh Le, Danny Magee
Status: Ready for review

Steps for Implementation:

- Develop program analogous to TxDOT Wet Surface Crash Reduction Program (formerly WWARP) specific to nighttime crashes

- Encourage the use of network screening techniques, such as those outlined in the *Highway Safety Manual (HSM)*, to identify locations with high rates of nighttime crashes.
    - Identify and publicize existing training materials regarding HSM usage (Highly effective at identifying high-risk locations but does not fix the problem, low cost, immediately implementable, may be inhibited by data availability, TxDOT would lead)
    - Develop new training materials, modules, etc. as needed specifically to address nighttime crashes (Highly effective at identifying high-risk locations but does not fix the problem, low cost, immediately implementable, may be inhibited by data availability, research agency/university would lead)
- Automate the network screening process via Excel Macro or software tool *SafetyAnalyst*
- Apply a systematic process to diminish relying on public to identify traffic safety issues

Effectiveness: *** (Automation will allow TxDOT employees to function more efficiently)

Cost: $$ (Working within an Excel framework may be cost effective but an external software tool may be more costly)

Time to implementation: ** (Need to tailor existing software to do what we need to do)

Lead agency: TxDOT hires contractor to develop software

4b Identify and address locations subject to wet weather run off the road crashes.

Draft Action Plan

EA Working Group: Tim Barrette, Minh Le, Danny Magee
Status: Edit & revise

Steps for Implementation:

- Review and synthesize existing adverse condition crash countermeasures, such as high-friction pavements and high visibility markers (Highly effective at identifying possible solutions, low cost, impeded by limitations in the link between weather and safety data, around 1-2 years to implement, research agency/university would lead) District Wet Surface Crash Reduction Program, Nighttime ID
    - WSCRP is already effective
    - Obligated to fix high-crash locations with low friction
    - Increase frequency of crash review while maintaining current policy regarding friction review
    - Continue to fund research focused on identifying lane markers such as paint, tape, and raised pavement markings (RPMs) that are effective in adverse weather and resilient to winter maintenance activities (Highly effective, moderate cost, research may not yield a truly effective countermeasure for specific situations, 2-3 years to implement, TxDOT has FY19 RFP for RPMs in winter weather)

- Continue to deploy/use stationary and portable Dynamic Message Signs (DMS) advising motorists of weather-related roadway conditions (Effectiveness probably higher for secondary crashes, Moderate-high cost, immediately implementable, potentially inhibited by rare and random nature of crashes compared to stationary sign location, TxDOT/Counties/Cities would lead)
- Adapt methods and information to apply regionally, for on-system and city/county roads.

Lead agency: TxDOT

Time to implement: Short (review low friction crashes more frequently)

Effectiveness: High-improve already high-functioning strategy

Cost: Low (Person-hours of staff querying and reviewing crashes)

Strategy #5

5a Develop and implement strategies to encourage drivers to adjust speeds appropriately to roadway conditions: wet weather speed advisories, speed feedback signs, and speed advisories for nighttime conditions.

Draft Action Plan

EA Working Group: Darren McDaniel, Lisa Johnson, Yang Ouyang, Minh Le
Status:

Steps for Implementation:

Step 1: Identify problem locations (District Wet Surface Crash Reduction Program, Nighttime ID) (Lead organizations: TxDOT, TTI)

Step 2: Prioritize locations by developing preliminary estimates and establishing a cut-off threshold to fund safety improvements such as surface treatments and lighting. (Lead organizations: TxDOT, cities and counties)

Step 3: Explore automotive and connected infrastructure advancements (Lead organization: NHTSA, FHWA)

Step 4: Installation of safety devices / safety technology (Lead organizations: TxDOT, cities, counties and vehicle manufacturers)

Step 5: Post data analysis and reporting (Lead organizations: TTI)

Effectiveness: ***

Cost to implement: $$$

Time to implement: Medium (1-5 years)

Barriers:

- Funding to construct safety improvements (surface treatments or lighting)
- Discovering new technologies
- Fleet turnover
- Technology of predicting the weather conditions within segments

5b Provide consistent curve treatments and advisory speeds for similar conditions.

Draft Action Plan

EA Working Group: Darren McDaniel , Lisa Johnson, Yang Ouyang, Minh Le
Status: Ready for review

Steps for Implementation:

Step 1: Analyze vehicle speed data on horizontal curves (Lead organizations: TxDOT, TTI)

Step 2: Update GPS Method System for determining advisory speed and margin of safety (Lead organizations: TxDOT, TTI)

Step 3: Develop Curve Handbook and implementation tools (e.g. , Atlanta District) (refer to FHWA proven countermeasures) (Lead organizations: TxDOT, TTI)

Step 4: Present findings to TxDOT Districts, cities and counties (Lead organizations: TxDOT, TTI)

Step 5: Conduct curve studies and apply consistent treatments (Lead organizations: TxDOT, cities and counties)

Effectiveness: ***

Cost to implement: $$

Time to implement: to medium (1-5 years) to implement Curve Handbook and long- more than 5 years study and install consistent curve treatments

Barriers:

- Equipment required for curve studies
- Personnel needed to conduct curve studies
- Funds to construct curve treatments

5c Encourage adoption of laws that allow automated speed enforcement.

Draft Action Plan

EA Working Group: Darren McDaniel , Lisa Johnson, Yang Ouyang, Minh Le
Status: Ready for review

Steps for Implementation:

Step 1: Gather data from other states that use automated speed enforcement including public opinion/acceptance, safety effectiveness, and Texas State Law. (check NTSB report) (Lead organizations: TxDOT, TTI)

Step 2: Conduct public opinion poll in relation to automated speed enforcement. (Lead organizations: TxDOT, TTI)

Step 3: Develop informational packet on benefits of automated speed enforcement. (Lead organizations: TxDOT, TTI)

Step 4: Present findings to Legislative Affairs Office at TxDOT (Lead organizations: TxDOT, TTI)

- Legislative Affairs Office at TxDOT
- City Government Affairs departments
- Texas Municipal League
- Safety advocates
- Legislative Transportation Committee
- Legislators willing to champion a bill

(Lead organizations: TxDOT, Cities, Law Enforcement Agencies, and Safety Advocates)

Step 5: Statewide legislation (possibly as pilot program) (Lead organizations: Texas Legislature)

Step 6: Evaluation (Lead organizations: TxDOT, TTI)

Effectiveness: ***

Cost to implement: $$

Time to implement: medium (1-5 years)

Barriers:

- Legislative
- Privacy issues
- Need for Speed mentality

Strategy #6

6c Implement measures to provide faster crash notification.

Draft Action Plan

EA Working Group: Danny Magee, Lucille Maes, Rebecca Wells
Status: Ready for review

Steps for Implementation:

Step 1: Develop coalition by region between TxDOT, DPS, Local Law Enforcement, EMS, 911 System, cities and counties, and Texas Department of Health Services (DSHS) to create lines of communication between entities (Lead organizations: EMS, DSHS)

- 1a Develop a system to be used by all departments involved for reporting areas of safety concerns (EMS, DSHS)
- 1b TxDOT, cities or counties will then analyze the locations reported and implement safety measures as warranted (Lead organization: TxDOT)

Step 2: Streamline current 911 dispatch protocol (Lead organization: 911)

Step 3: Increase law enforcement presence on rural road
(Lead organizations: DPS, Local Law Enforcement)

Step 4: Look into new technologies such as Onstar , Waze and/or App to notify EMS of potential crashes (Lead organization: EMS)

Step 5: Look for Grant funding to improve EMS response services (Lead organization: EMS)

Effectiveness: EMS response will improve tremendously by having equipment and qualified personnel to respond to crash site in rural areas

Cost to Implement: $$$

Time to implement: Medium (More than 1 year but less than 5 years)

Barriers:

- Lack of funding for equipment and personnel– Apply for available Grants
- Volunteer Training - Find hospitals and other EMS agencies that will provide free training to EMS offices located in rural areas
- Volunteer Availability - Have funding necessary to have full staff available 24X7

Next Steps

- Revise and Complete Action Plan drafts as discussed
- Review completed Action Plans

Upcoming Meeting Dates

- Regional Workshops
  - Houston - May 1
  - San Antonio – May 3
  - Dallas/Fort Worth – May 15
  - Midland/Odessa – May 17
- August 8-10, 2018 – Traffic Safety Conference, Sugarland