MDOT Streamlined Systemic Safety Program

Finding Locations For Treatments

October 2018
“Solutions - looking for safety problem locations”

Turning the traditional approach—reactive spot analysis—around

Instead of:

Systemic – start with a countermeasure, find locations that can be helped with that treatment
Types of Eligible Projects

- Horizontal curve delineation
- Rumble strips
  - Shoulder
  - Center
- Edgeline pavement marking
- Stop-controlled intersections
Systemic Implementation

• This “family” of treatments is low-cost, they can be applied in a systemic approach

• Particularly applicable when crashes are widely scattered over many locations (e.g., in very rural areas)

• Rather than implement after a severe crash has occurred (reactive), a systemic approach implements based on the presence of certain risk factors (proactive)
Identification of Potential Project Locations

• Network screening
  • Institutional knowledge/maintenance staff
  • Public concerns/complaints
  • Law enforcement, EMS, wrecker services?
  • Network screening with crash data – frequency, crash mapping, and equivalent property damage only (Roadsoft)
  • Network screening with crash data and volumes – crash rates (RS)
  • Network screening utilizing software - Roadsoft
  • Network screening by systemic analysis
Reading the Road
Clues
Finding Locations using Systemic Safety

• Identify locations for improvement by reviewing crash risk factors and scoring them

• Risks: geometrics, crash experience, roadway characteristics

• Limited risk data

• Crash performance is one measure of risk
Prioritization Strategies

- By road class, i.e.,
- Ranking by risks (systemic)
- Functional class
- Corridor

Ranking by risks (systemic)
Stop-controlled Intersection Upgrades

• What types of treatments
• How to find locations
• Policy/strategy
• Crash types addressed
  • Right angle
Stop Sign Treatments

Target crash types at stop-controlled intersections

• **Right angle crashes** – stop-related crashes fall into two types:
  - Driver does not stop at stop sign (disregard TCD)
  - Driver stops but makes poor choice of gaps (failed to yield).

• Distinguishing between these crash conditions may require review of UD-10 crash reports
Locate Stop-controlled Intersections with Safety Issues

Software - network screening w/Roadsoft
  • Review Roadsoft maps
  • Run intersection ranking report
  • Select a manageable number of locations
  • Review Roadsoft collision diagram
  • Make brief field visit

Systemic approach
Summary: Find Stop-controlled Project Locations

- Review local knowledge of system
- Review Roadsoft maps
- Run Roadsoft intersection ranking report
- Select a manageable number of locations
- Review Roadsoft collision diagram
- Make brief field visits
Roadway Departure Crashes

• Strategies
  • Keep vehicles on roadway
  • Provide safe recovery
  • Reduce crash severity

Lane departure crashes defined in Michigan data

• Four treatments addressing lane departure crashes:
  • Horizontal curve signing
  • Centerline rumble strips
  • Shoulder rumble strips/stripes
  • Edgeline pavement markings
Shoulder Rumble Strips

13 - 51% Reduction

Crash types/factors addressed:

- Single vehicle, run-off-road fatal and injury crashes
Centerline Rumble Strips

44 - 64% Reduction

Crash types/factors addressed:

- Head-on, sideswipe opposite-direction, and fatal and injury crashes
Rumble Stripes

Rumble stripes daytime (left) and at night in the rain (right). Note the brightness of the rumble stripe at night, as compared to the normal pavement marking to the left of the rumble line. The double edge line is shown only for the purpose of comparing the two types. Michigan DOT (by permission)
Edgeline Markings

- Finding locations
- Crash types/factors addressed
  - Night wet crashes
  - All crash types & severities

Local agency safety funding is only available for striping edgeline pavement markings on roadways where these markings do not currently exist. Safety funding is not available for re-striping of pavement markings.
Curve Treatments

- Horizontal curve signing
- Centerline rumble strips
- Shoulder rumble strips/stripes
- Centerline and shoulder rumble strips/stripes
- Edgeline pavement markings
Enhanced Curve Delineation

• Find locations
• Crash types addressed

SAFETY BENEFITS
Chevron signs:
• 25% reduction in nighttime crashes
• 16% reduction in non-intersection fatal and injury crashes
Crash Types Associated with Curves

• Single vehicle
  • Fixed object
  • Overturn

• Multi-vehicle
  • Head-on
  • Sideswipe opposite

Night crashes
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**Count of 115 Segments Ranked**

- **Trunkline Road**
- **County Road 687**
- **County Road 687**
- **County Road 687**
- **County Road 687**
- **E Red Arrow Hwy**
- **E Saint Joseph St**
- **Paulson Rd**
- **Paw Paw Rd**
- **Paw Paw Rd**
- **Red Arrow Hwy**
- **Red Arrow Hwy**
- **Shaw Rd**
- **Shaw Rd**
- **Silver Lake Rd**
- **Sister Lakes Rd**
- **Stapleton Rd**
- **Territorial Rd**
- **W Red Arrow Hwy**
- **W Red Arrow Hwy**
- **W Red Arrow Hwy**

**Advanced Filters**
- Animal Crashes: Excluded
- Start Date: 1/1/2013
- End Date: 12/31/2017
- Minimum Length (mi): 0

**Searchable Roadways:**
- County Local or County Primary
- Single Vehicle
- Curved Road, Not Related to Others
- Dark, Unlighted or Dawn or Dusk
Systemic - Roadway Departures

Some curve risk factors

- Curve radius
- Speed differential (from tangent approach)
- Visual trap
- Intersection in a curve
- Traffic volume
Summary: Finding Curve Treatment Sites

• Use your local knowledge of the network

• Review Roadsoft map for curve-related crashes

• Roadsoft – filter lane departure crashes
  • Segment Ranking Report
  • Curve Ranking Report

• Improve curve delineation
  • Signing
  • Rumble strips
  • Edgeline pavement markings
Lane Departure on Tangent Section

Crash types: lane departure crashes (‘run off road’ on right side)

- Single vehicle

‘Run off road’ on left crossing centerline:
  - Head on and sideswipe opposite

Corridor vs. spot treatment
# Roadsoft Corridor Crash Map

![Map Image]

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Case Study 1 – Douglas County Georgia

• Developed a county curve action plan
• Lack of comprehensive data so relied on staff, enforcement, public
• Treatments: upgrade all curve signing, RPMs
• Added “Curve Ahead” markings with arrows – it worked!
Case Study 2 – Minnesota

Purpose: identify where crash types most frequently occur

- Crash analysis of county road system in Minnesota
- More crashes on county system, majority rural road departure greater than 50% on curves
- Rural intersections – crashes primarily at through-stop-controlled intersections – right-angle crashes
- Urban – signalized intersections – most common: right angle
Case Study 3 – Minnesota DOT

- A star (*) indicates corresponding risk factor is present
- More stars identify locations as higher priority candidates for safety investment

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Summary

• You can get funding for 4 types of simple safety projects with minimal time and effort

• Use your knowledge of your system to make good project choices

• Roadsoft can provide visual information as well as ranking reports to help identify locations

• Locations can be selected based on “risk’ in a “pro-active” fashion