Leveraging MoDOT Safety Data Resources

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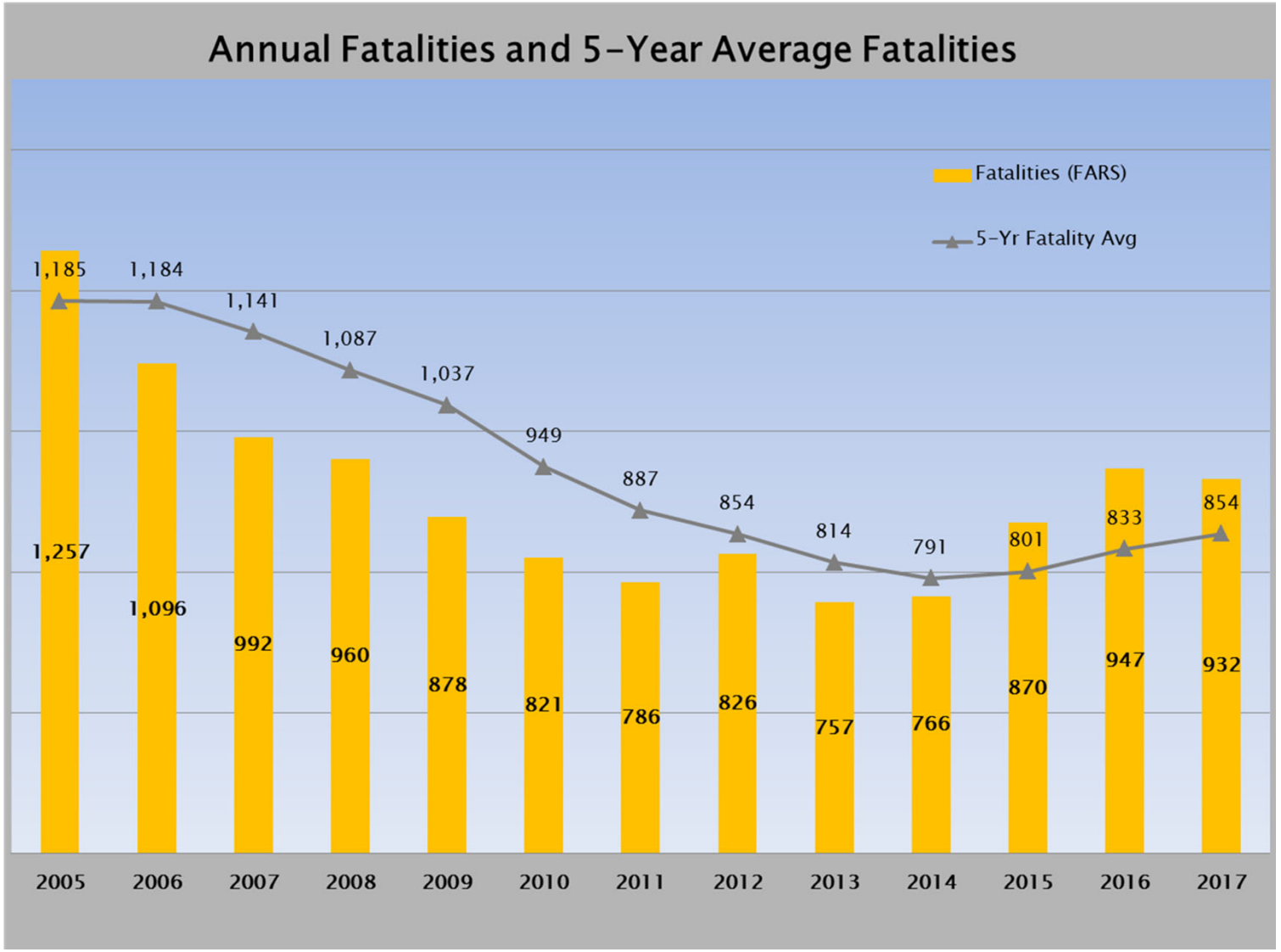
Statewide Planning Partner Meeting

February 8, 2019

What If Overnight…

- 18,000 more miles of shoulders and rumbles
- 1,000 curves improved
- 20 new J-turns
- **Save 225 lives/year**

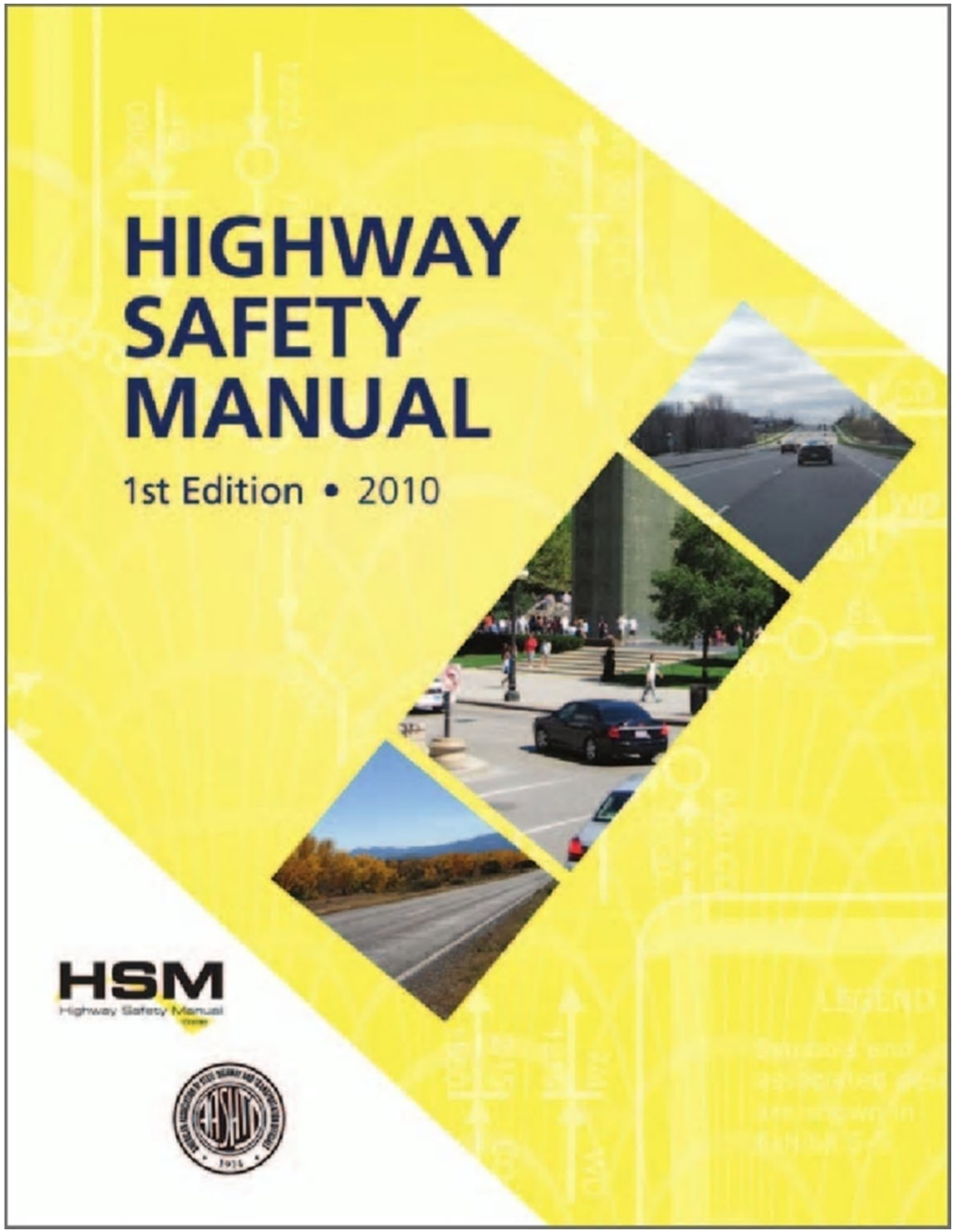

Annual Fatalities and 5-Year Average Fatalities
Fatalities (FARS)
5-Yr Fatality Avg
1,185
1,184
1,141
1,087
1,037
949
887
854
814
791
801
833
854
1,257
1,096
992
960
878
821
786
826
757
766
870
947
932
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

Data Driven Safety Analysis

Source: FHWA

Level of Analysis

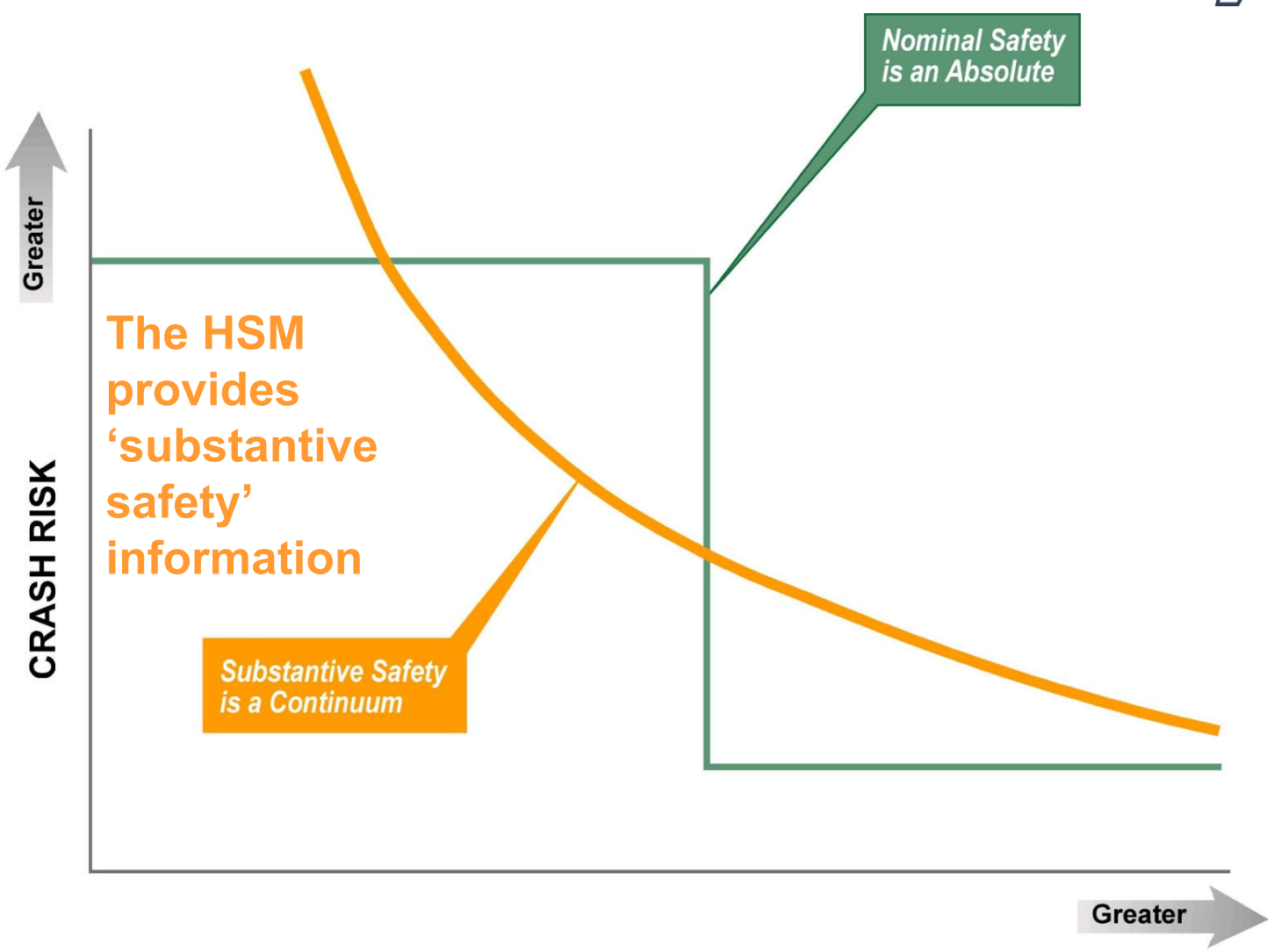
- Average Crash Frequency
- Crash Rate
- Equivalent Property Damage Only (EPDO) Avg Crash Frequency
- Severity Index
- Predicted Crash Frequency
- Expected Average Crash Frequency
- Level of Service of Safety (LOSS)


HIGHWAY
SAFETY
MANUAL
1st Edition • 2010
HSM
Highway Safety Manual

The HSM summarizes best science and research in quantitative safety

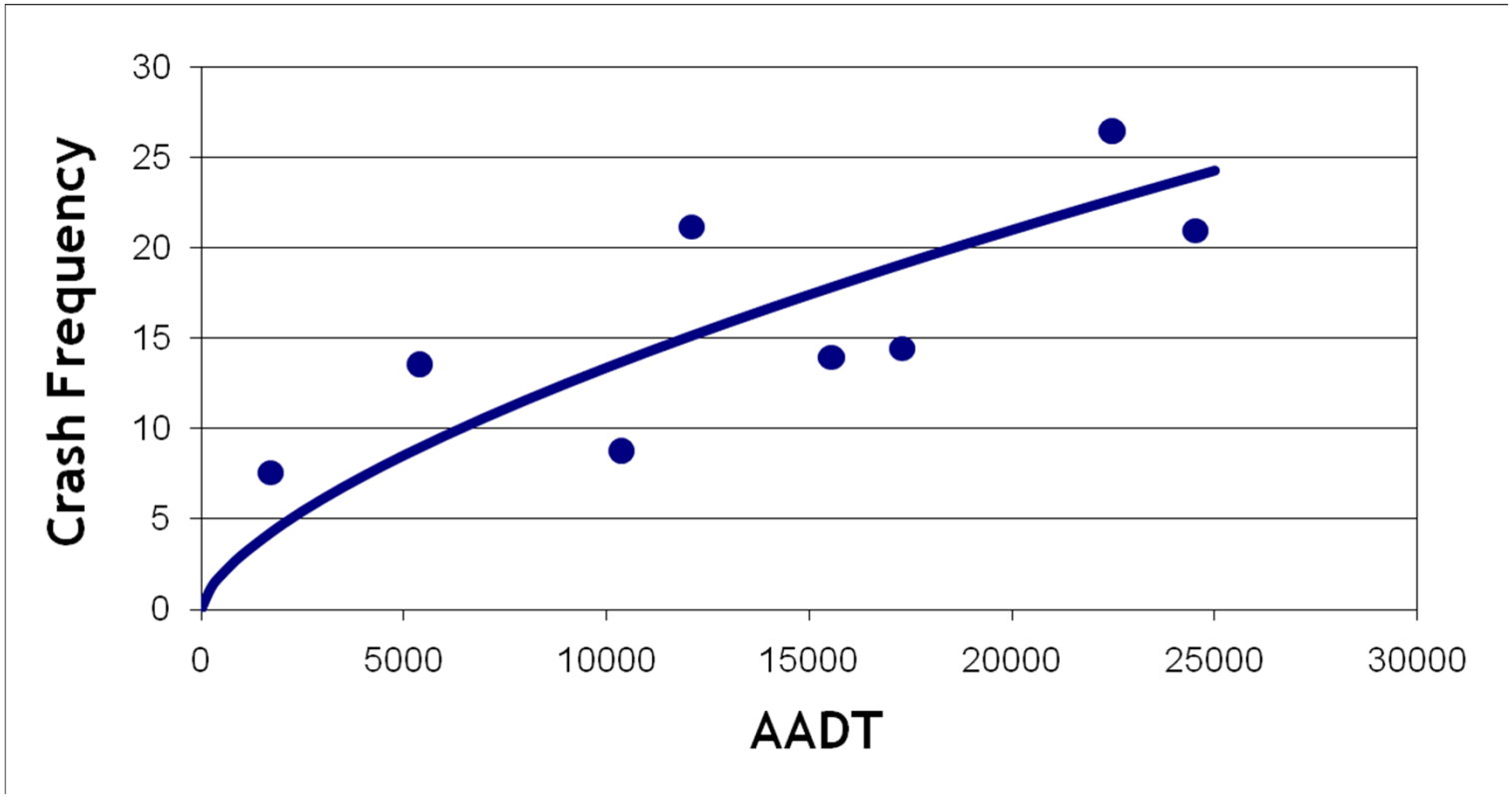
HIGHWAY SAFETY MANUAL

- Synthesis of previous research
- New research commissioned by AASHTO and FHWA (peer reviewed through the National Academies)


Nominal Safety is an Absolute
Greater
CRASH RISK
The HSM provides 'substantive safety' information
Substantive Safety is a Continuum
Greater
DESIGN DIMENSION
(Lane Width, Radius of Curve, Stopping Sight Distance, etc.)

Safety Performance Functions (SPF)

- Mathematical model that estimates the expected average crash frequency for a base condition

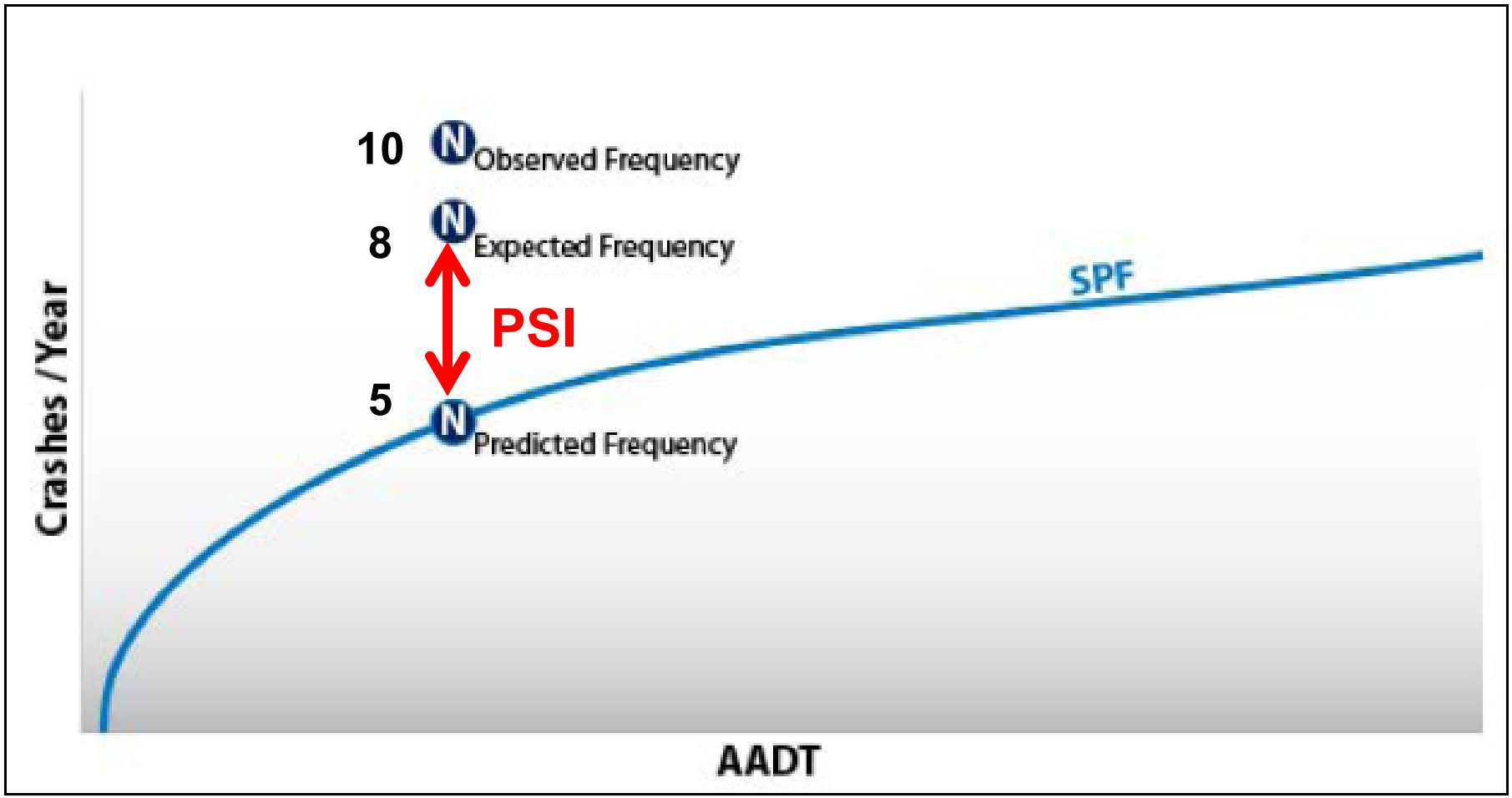


Predicting Safety Performance

$$N = AADT \times L \times 365 \times 10\text{-}6 \times e(-0.312)$$

CMFs for the following:

- Lane Width
- Shoulder Width and Type
- Curve Length and Radius
- Presence of Spiral
- Superelevation
- Grade
- Roadside Design
- Driveway Density
- Centerline Rumble Strip
- Passing Lanes
- Two-way Left turn Lane
- Lighting
- Automated Speed Enforcement


10
Observed Frequency
8
Expected Frequency
PSI
5
Predicted Frequency
SPF
Crashes /Year
AADT

Example Scenario

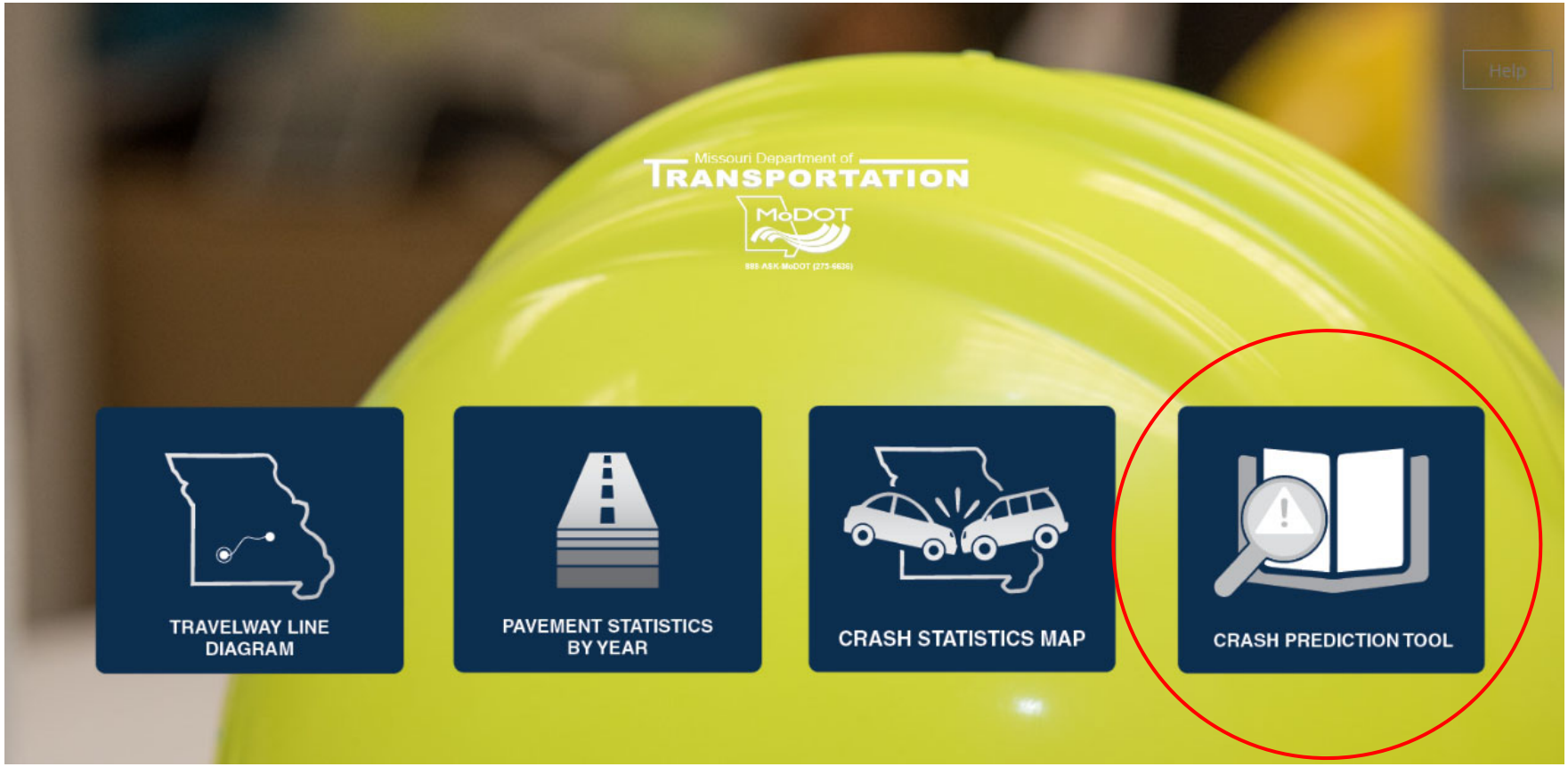
	Intersection A	Intersection B
Expected	10	20
Predicted	4	22
Potential Safety Improvement (PSI)	6	-2 (0)

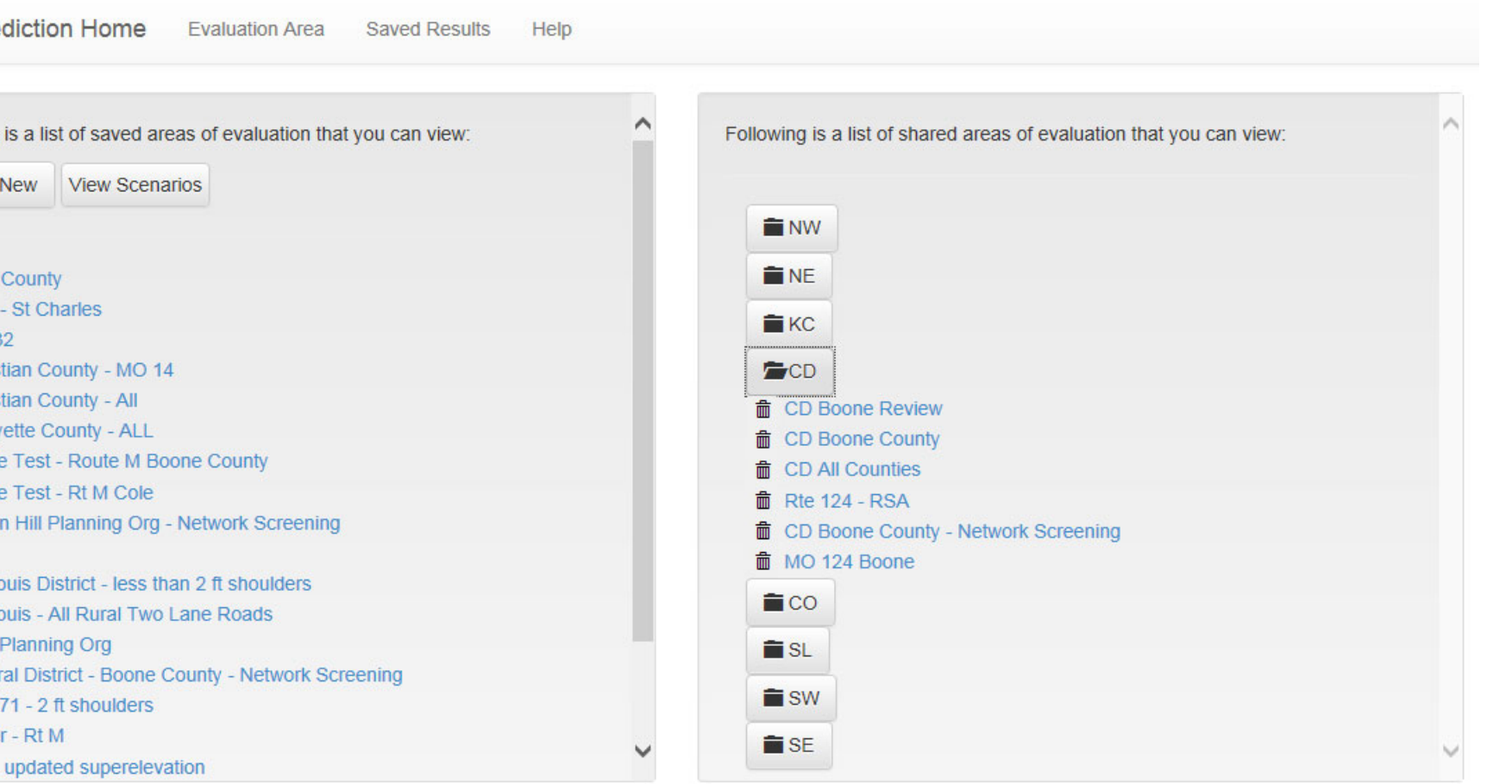
HSM Spreadsheets Limitations

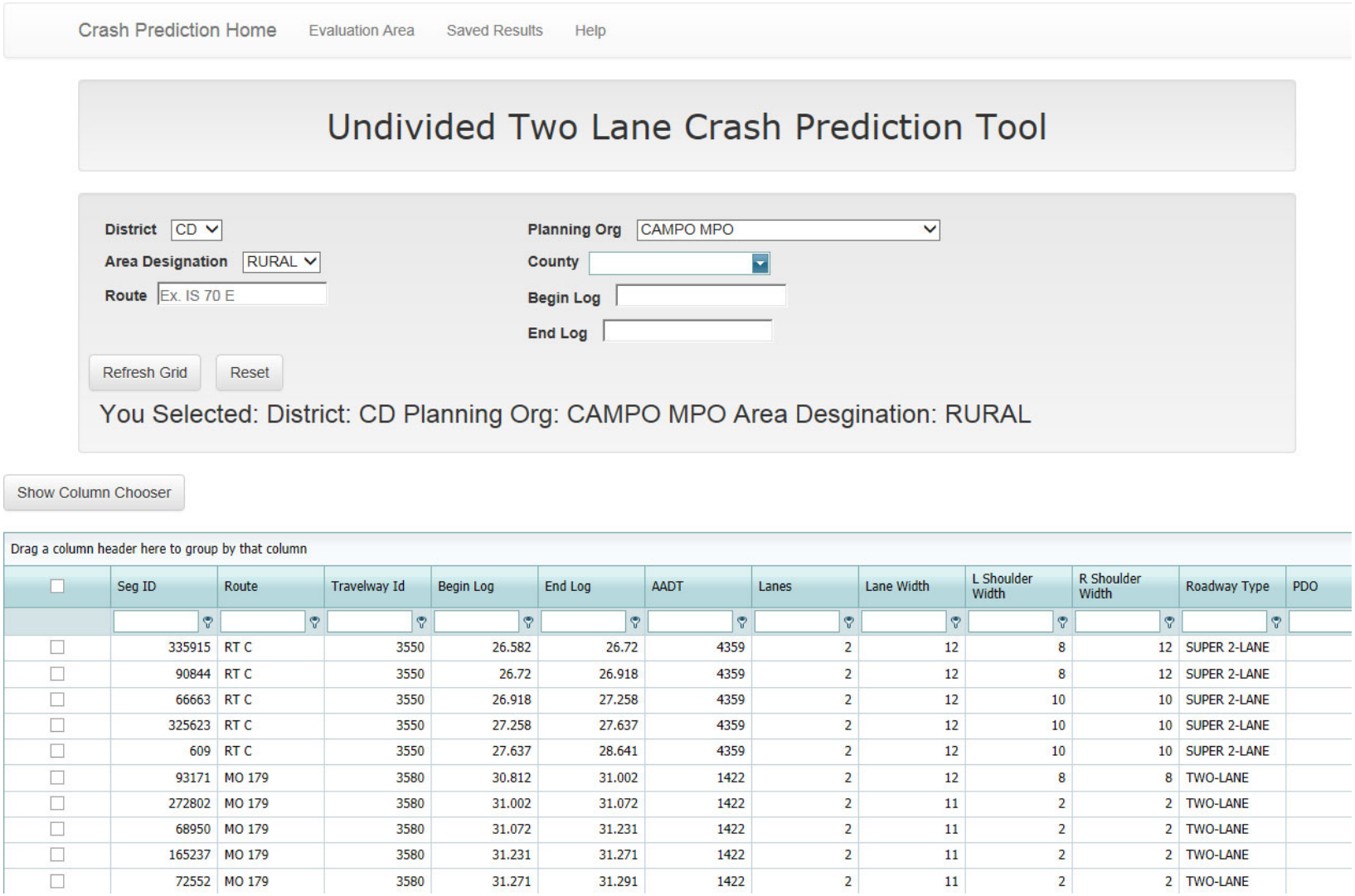
- Segmentation
- Data Intensive
- Alternative analysis
- Time

Crash Prediction Tool

- Rural Two-Lane Highways Only
- Network Screening and Project Analysis
- Utilizes TMS Data
- Automates analysis


Help
Missouri Department of
TRANSPORTATION
MoDOT
888-ASK-MoDOT (275-6636)
TRAVELWAY LINE DIAGRAM
PAVEMENT STATISTICS BY YEAR
CRASH STATISTICS MAP
CRASH PREDICTION TOOL


Crash Prediction Home
Evaluation Area
Saved Results
Help
Following is a list of saved areas of evaluation that you can view:
Create New
View Scenarios
Cole County
Rt N - St Charles
MO 32
Christian County - MO 14
Christian County - All
Lafayette County - ALL
Curve Test - Route M Boone County
Curve Test - Rt M Cole
Green Hill Planning Org - Network Screening
test
St. Louis District - less than 2 ft shoulders
St. Louis - All Rural Two Lane Roads
SE - Planning Org
Central District - Boone County - Network Screening
Mo 371 - 2 ft shoulders
Butler - Rt M
test - updated superelevation
Following is a list of shared areas of evaluation that you can view:
NW
NE
KC
CD
CD Boone Review
CD Boone County
CD All Counties
Rte 124 - RSA
CD Boone County - Network Screening
MO 124 Boone
CO
SL
SW
SE


Crash Prediction Home
Evaluation Area
Saved Results
Help
Undivided Two Lane Crash Prediction Tool
District CD
Area Designation RURAL
Route Ex. IS 70 E
Planning Org CAMPO MPO
County
Begin Log
End Log
Refresh Grid
Reset
You Selected: District: CD Planning Org: CAMPO MPO Area Desgination: RURAL
Show Column Chooser
Drag a column header here to group by that column
Seg ID
Route
Travelway Id
Begin Log
End Log
AADT
Lanes
Lane Width
L Shoulder Width
R Shoulder Width
Roadway Type
PDO
335915 RT C 3550 26.582 26.72 4359 2 12 8 12 SUPER 2-LANE
90844 RT C 3550 26.72 26.918 4359 2 12 8 12 SUPER 2-LANE
66663 RT C 3550 26.918 27.258 4359 2 12 10 10 SUPER 2-LANE
325623 RT C 3550 27.258 27.637 4359 2 12 10 10 SUPER 2-LANE
609 RT C 3550 27.637 28.641 4359 2 12 10 10 SUPER 2-LANE
93171 MO 179 3580 30.812 31.002 1422 2 12 8 8 TWO-LANE
272802 MO 179 3580 31.002 31.072 1422 2 11 2 2 TWO-LANE
68950 MO 179 3580 31.072 31.231 1422 2 11 2 2 TWO-LANE
165237 MO 179 3580 31.231 31.271 1422 2 11 2 2 TWO-LANE
72552 MO 179 3580 31.271 31.291 1422 2 11 2 2 TWO-LANE

Predicted	Expected	Potential for Safety Improvement
Total: 77.78	Total: 95.73	Total: 17.948
Fatal/Injury: 25.35	Fatal/Injury: 32.18	Fatal/Injury: 6.829
Property Damage: 52.43	Property Damage: 63.55	Property Damage: 11.119

Crash Data Analysis: 2014 - 2016

Segments

Export To Csv

Raw | Traffic Info Seg Id | Curve Id

Drag a column header here to group by that column

#	County	Traffic Info Seg ID	Route	Begin Log	End Log	Predicted Total	Predicted Fatal/Injury	P P D	Total Potential for Safety Improvement	Fatal/Injury Potential for Safety Improvement	Property Damage Potential for Safety Improvement
☐	COLE	729858	RT B	2.134	4.743	6.2812124	2.3240486		8.171	3.023	5.148
☐	COLE	729860	RT B	4.778	8.565	4.5993727	1.7017684		3.835	1.419	2.416
☐	COLE	729996	MO 179	31.444	36.51	4.3713115	1.6173849		2.756	1.020	1.737
☐	COLE	729904	RT M	5.032	8.003	5.36789	1.9861193		2.650	0.981	1.670
☐	CALLAWAY	727485	RT AA	1.197	2.741	1.9206468	0.7106396		2.553	0.945	1.609
☐	COLE	729920	RT W	0	2.715	1.9303944	0.7142459		1.862	0.689	1.173
☐	COLE	729902	RT M	0	5.032	3.3875169	1.2533806		1.380	0.511	0.870
☐	CALLAWAY	727527	RT OO	0	1.619	0.8017882	0.2966617		0.821	0.304	0.517
☐	CALLAWAY	727699	MO 94	2.477	3.617	0.6760556	0.2501406		0.395	0.146	0.249
☐	COLE	729862	RT B	8.565	8.677	0.1261511	0.0466759		0.383	0.142	0.241
						Sum=40	Sum=14.8		Sum=24.240	Sum=8.969	Sum=15.271

Intersections

Raw

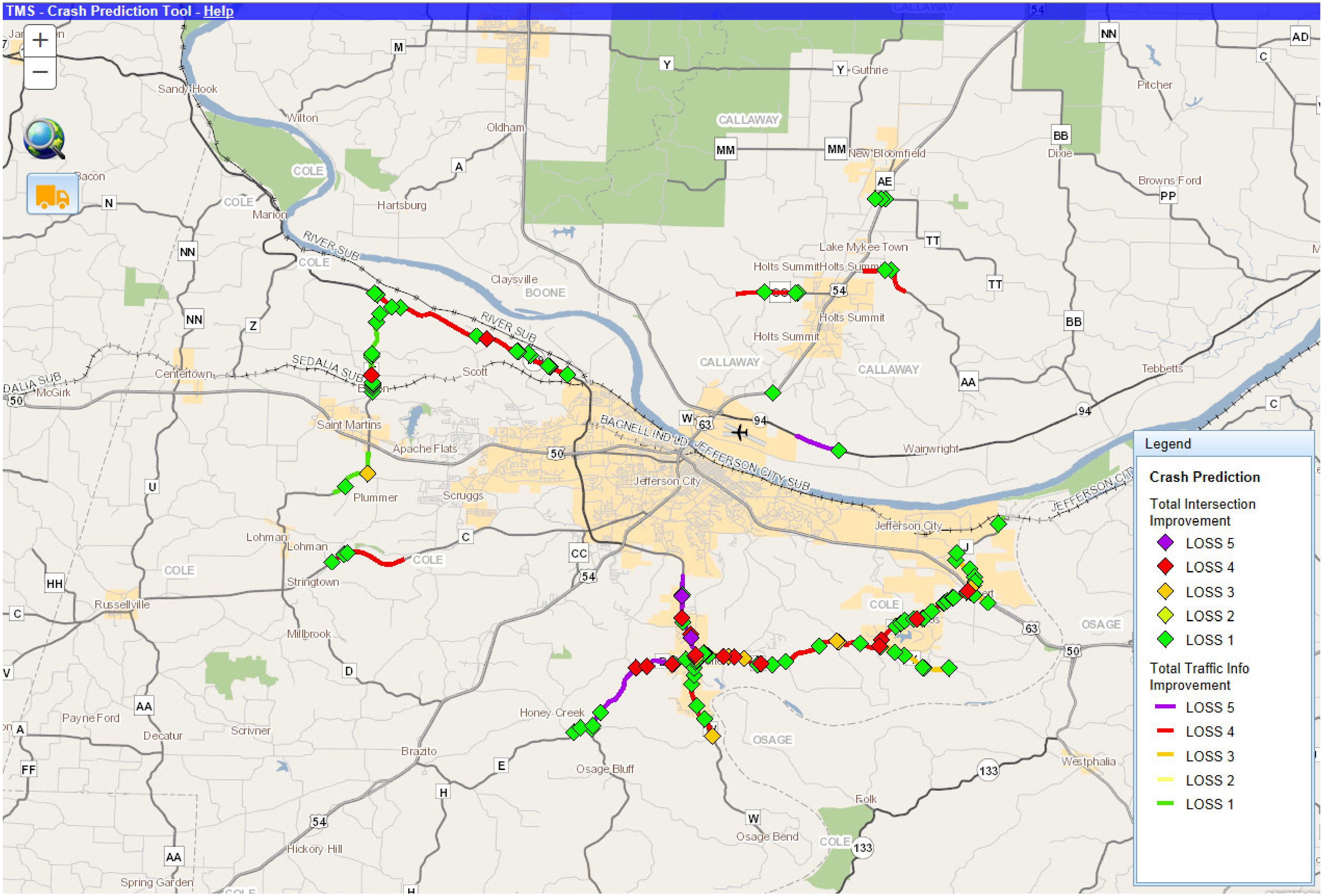
Drag a column header here to group by that column

#	County	Intersection ID	Tway ID	Route	Log	Predicted Total	Predicted Fatal/Injury	Total Potential for Safety Improvement	Fatal/Injury Potential for Safety Improvement	Property Damage Potential for Safety Improvement
☐	COLE	323006	7379	RT B	4.134	0.5557835	0.133	1.158	0.279	0.879
☐	COLE	994049	7379	RT B	2.774	0.5434723	0.130	1.150	0.277	0.873
☐	COLE	322769	7379	RT B	4.021	0.5613692	0.1	0.685	0.165	0.520
☐	COLE	324542	7379	RT B	4.708	0.5408699	0.130	0.681	0.164	0.517
☐	COLE	317784	7079	RT J	3.313	0.3212604	0.077	0.575	0.138	0.436
☐	COLE	325582	7379	RT B	6.11	0.1575732	0.037	0.375	0.090	0.284
☐	COLE	325280	7083	RT M	1.753	0.0782088	0.018	0.329	0.079	0.249
☐	COLE	285398	3580	MO 179	34.103	0.1158613	0.027	0.298	0.072	0.226
☐	COLE	323788	7083	RT M	5.032	0.4090743	0.098	0.236	0.057	0.179
☐	COLE	323063	7083	RT M	5.236	0.2965329	0.071	0.228	0.055	0.173
						Sum=37.78	Sum=1	Sum=-6.291	Sum=-2.140	Sum=-4.152

Page 1 of 12 (119 items) [1] 2 3 4 5 6 7 ... 10 11 12 Page size: 10

Selected count: **0**

Map Selection


TMS - Crash Prediction Tool - Help
Legend
Crash Prediction
Total Intersection Improvement
LOSS 5
LOSS 4
LOSS 3
LOSS 2
LOSS 1
Total Traffic Info Improvement
LOSS 5
LOSS 4
LOSS 3
LOSS 2
LOSS 1
Jefferson City
Holts Summit
Lake Mykee Town
New Bloomfield
Guthrie
Pitcher
Dixie
Browns Ford
Tebbetts
Wainwright
Claysville
Hartsburg
Oldham
Wilton
Sandy Hook
Marion
Bacon
Centertown
McGirk
Saint Martins
Apache Flats
Scott
Plummer
Scruggs
Lohman
Stringtown
Russellville
Millbrook
Payne Ford
Decatur
Scrivner
Brazito
Honey Creek
Osage Bluff
Osage Bend
Folk
Westphalia
Hickory Hill
Spring Garden
CALLAWAY
BOONE
COLE
OSAGE
RIVER SUB
SEDALIA SUB
BAGNELL IND LD
JEFFERSON CITY SUB

Level of Service for Safety (LOSS)

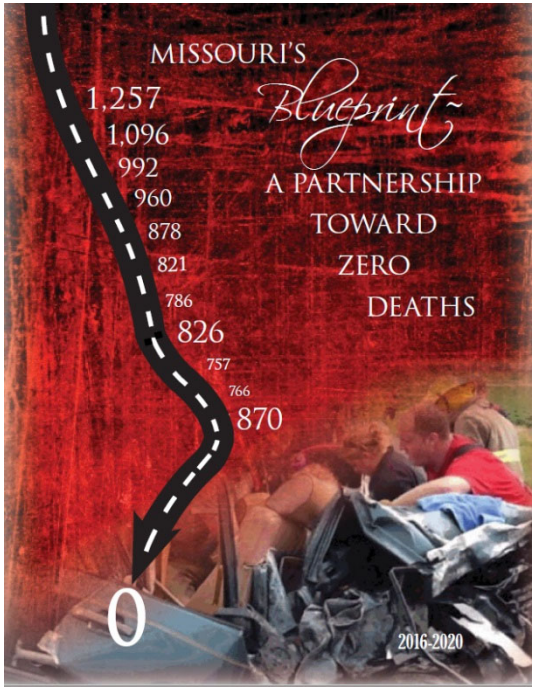
- LOSS 1: PSI <= 0
- LOSS 2: PSI 0 - 10%
- LOSS 3: PSI 10% - 50%
- LOSS 4: PSI 50% - 90%
- LOSS 5: PSI 90% - 100% (Top 10% Statewide)

Additional Features

- Edit Existing Roadway Data
  - Shoulder Width / Type
  - AADT
- Scenario Analysis

Other Resources

- SHSP (Blueprint)
- Crash Summary/Browser
- Crash Statistic Map
- Traffic Safety Lists
- Systemic Improvements (in progress)
- Road Safety Assessments



FHWA Proven Safety Countermeasures

ROADWAY DEPARTURE

1. EnhancedDelineation and Friction for Horizontal Curves

2. Longitudinal Rumble Strips and Stripes

3. SafetyEdge$_{sm}$

4. Roadside Design Improvements at Curves

5. Median Barriers

PEDESTRIANS/BICYCLES

13. Leading Pedestrian Intervals

14. Medians and Pedestrian Crossing Islands in Urban and Suburban Areas

15. Pedestrian Hybrid Beacons

16. Road Diets/Reconfigurations

17. Walkways

Source: FHWA

FHWA Proven Safety Countermeasures

INTERSECTIONS

6. Backplates with Retroreflective Borders

7. Corridor Access Management

8. Left-and Right-Turn Lanes at Two-Way Stop-Controlled Intersections

9. Reduced Left-Turn Conflict Intersections

10. Roundabouts

11. Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections

12. Yellow Change Intervals

CROSSCUTTING

18. Local Road Safety Plans

19. Road Safety Audits

20. USLIMITS2

Source: FHWA

The Right Solution

- Be diligent. Let data lead you to the answer.
- Goal: *Maximum* reduction in fatalities and serious injuries

Considerations

- You only have so much money.
- Data driven analysis doesn't have to be complicated.
- Data driven analysis isn't a promise.
- Traffic and roadway data matters (not just crash data).
- What's best for one region may not be best for another.
- Be critical of a B/C less than 6:1 (using updated crash costs).
- Consider maintenance costs

Access to TMS

- TMS DataZone Website:
- Available to external customers: http://datazone.modot.org/
- Safety Data Access:
- Contact Mike Henderson or Eva Voss, MoDOT Transportation Planning
- Contact Information:
- Ray Shank
  - (573) 526-4293
    raymond.shank@modot.mo.gov