Hey, that road isn't dangerous – why are you spending money there?

SE TZD Workshop
May 03, 2018

Mark Vizecky
Programs Engineer
MnDOT – State Aid

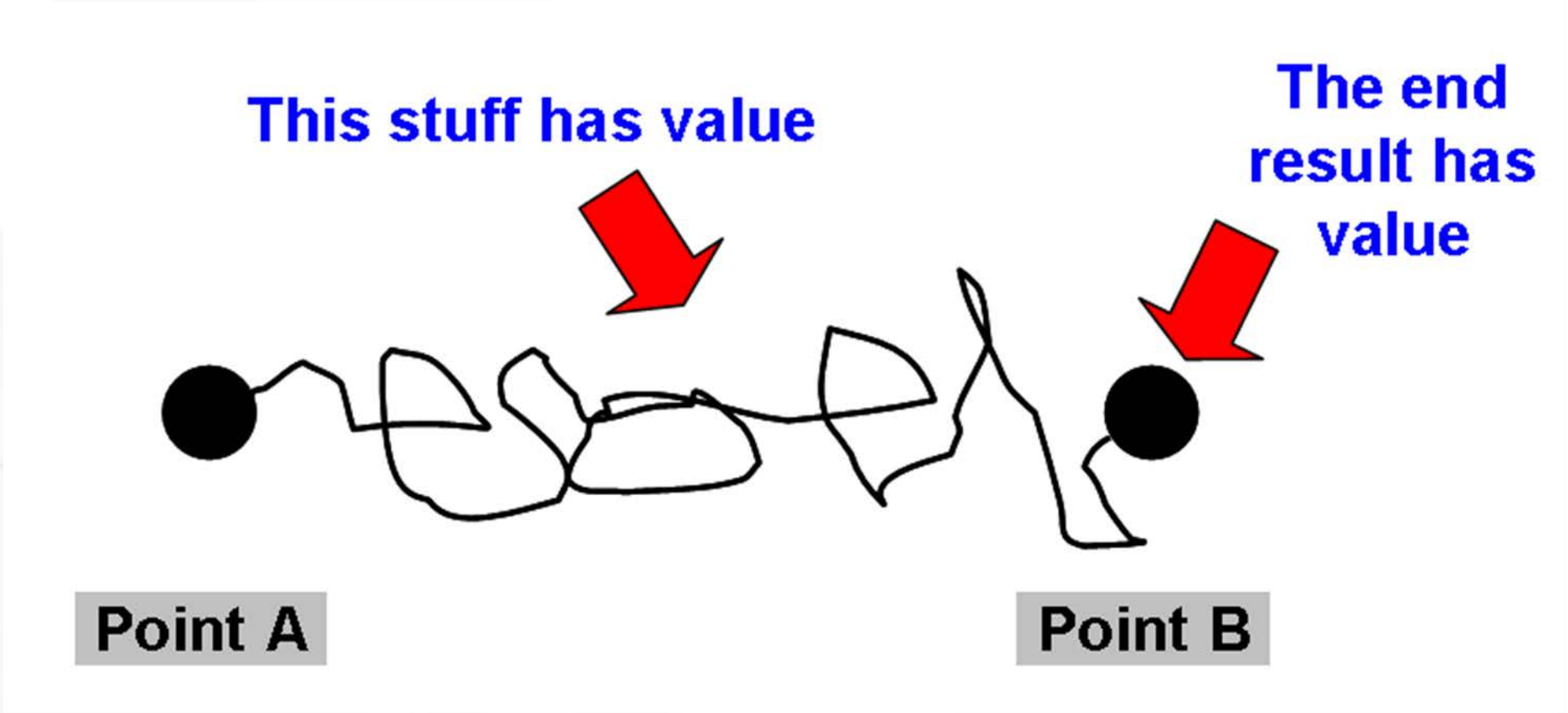
TOWARD ZERO DEATHS
15 YEARS

How are Safety Project Chosen?

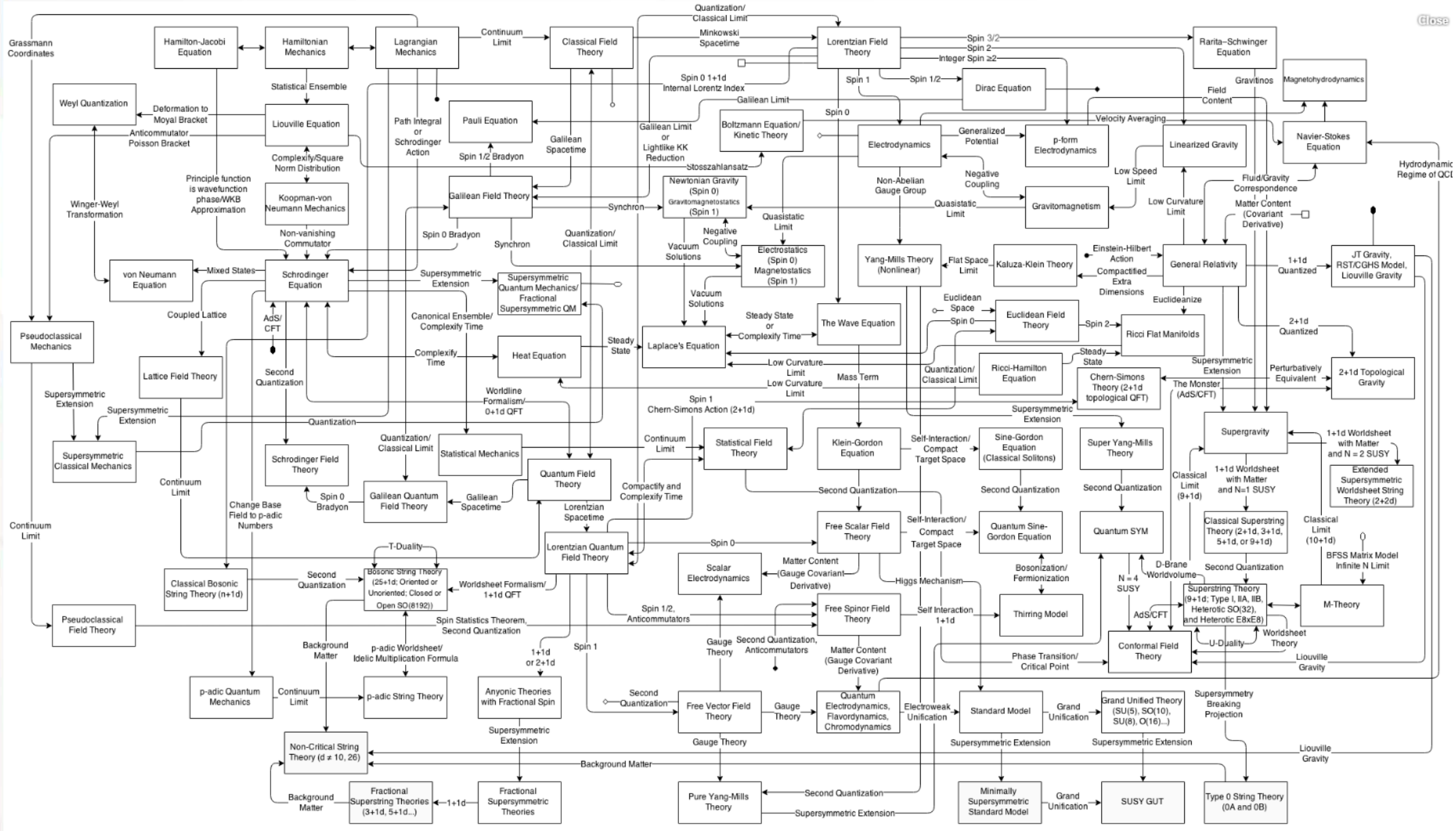
- What we did do
- What we changed
- What it looks like now

TOWARD ZERO DEATHS
15 YEARS

A Circuitous Path to Road Safety



TOWARD ZERO DEATHS
15 YEARS



TOWARD ZERO DEATHS
15 YEARS

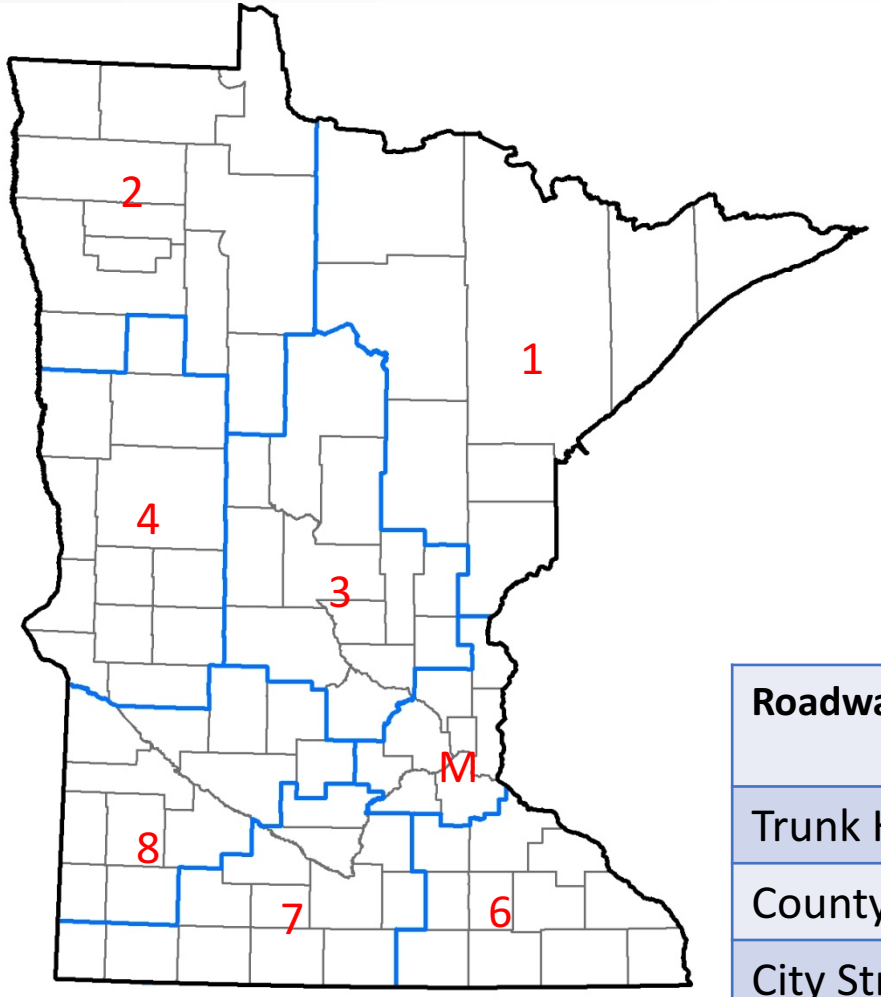
TOWARD ZERO DEATHS
15 YEARS

Existing Safety Program

- Total Crashes
  - Black spot
  - B/C at great than or equal to 1
  - Fatal and Severe injury crashes are random

TOWARD ZERO DEATHS
15 YEARS

Minnesota



141,000 miles of Roadway

- 900 miles of Interstate
- 11k miles of Trunk Highway
- 45k miles of County Road
- 22k miles of City Streets
- 62k miles of Township/Other roads

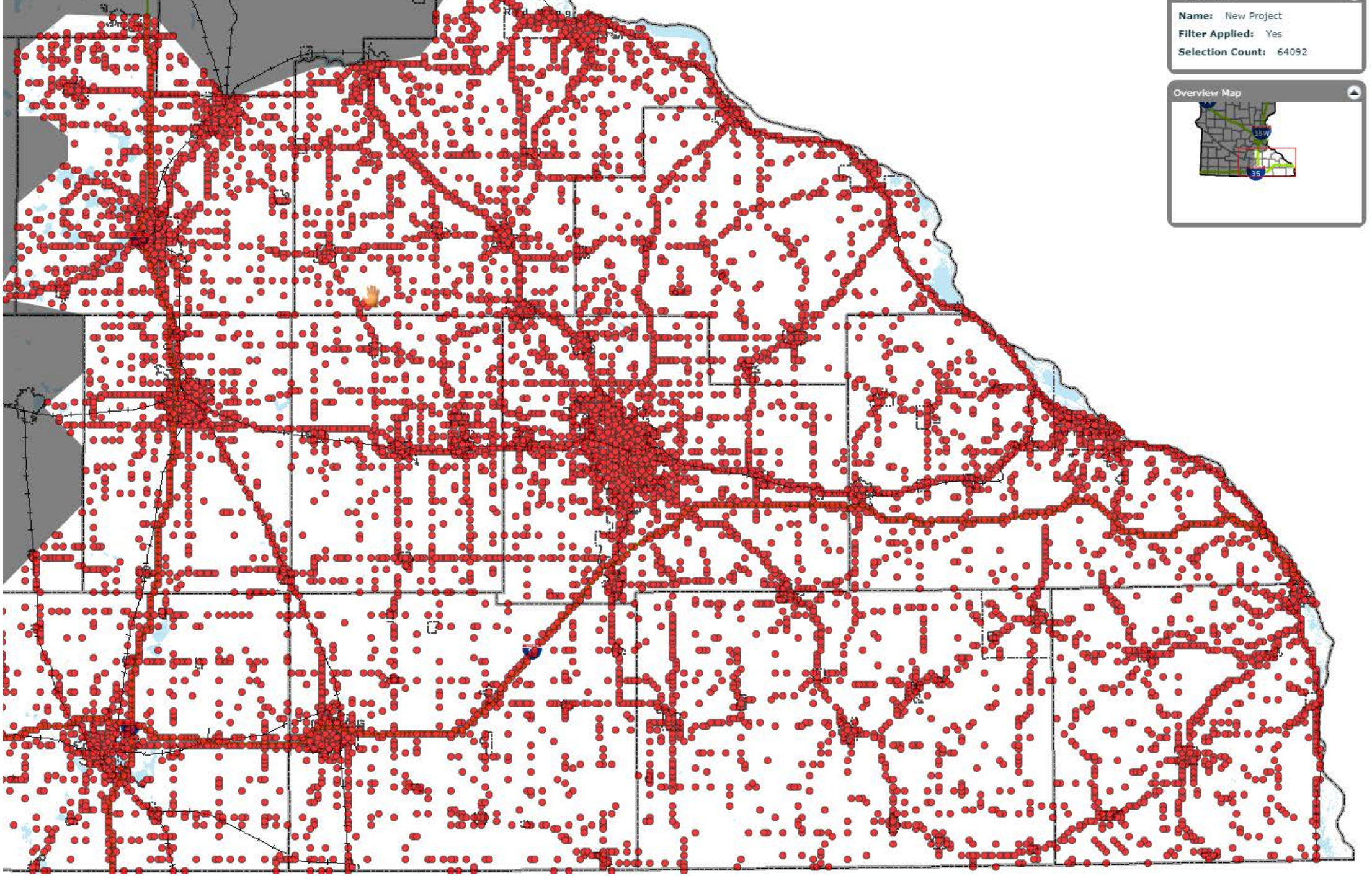
2002 K Crashes

- 657 Fatalities (Ks)

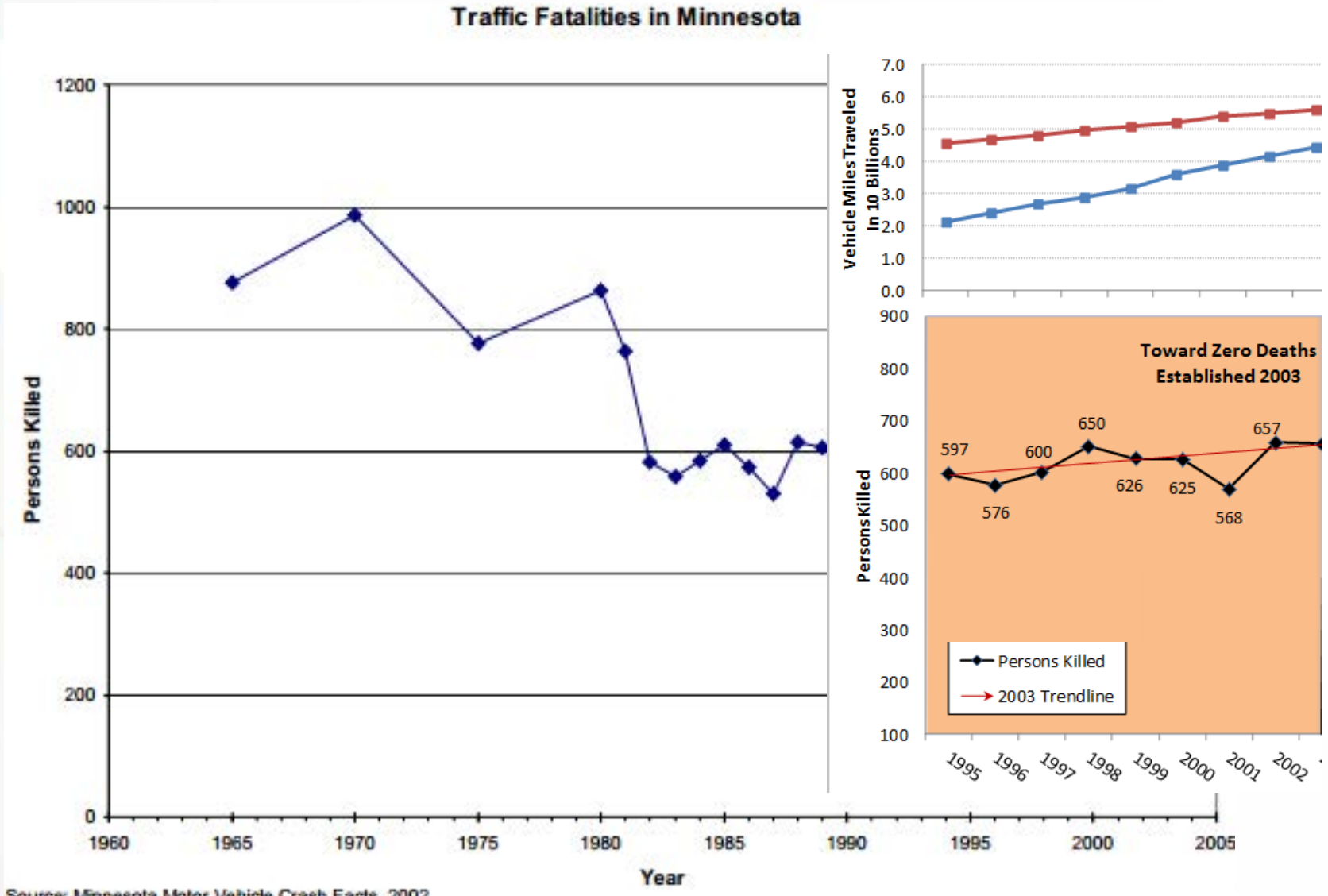
Roadway	Fatal Crashes	% Fatal Crashes
Trunk Highway	254	49%
County Highways	201	39%
City Streets	41	8%
Other Roads	24	4%

51%

TOWARD ZERO DEATHS
15 YEARS


Name: New Project
Filter Applied: Yes
Selection Count: 64092
Overview Map

Existing Safety Program



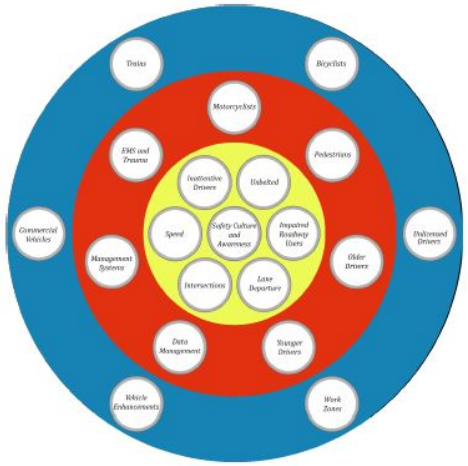
Source: Minnesota Motor Vehicle Crash Facts, 2002

TOWARD ZERO DEATHS
15 YEARS

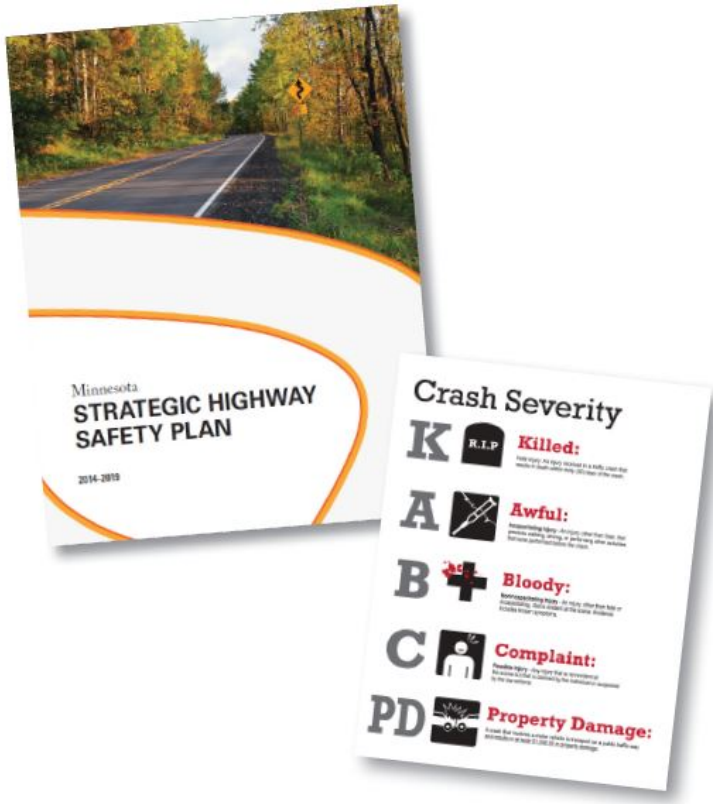
TOWARD ZERO DEATHS
15 YEARS

It's Time to Change

- The SHSP adopts severe crashes – those involving fatalities and incapacitating injuries as the safety performance measure in Minnesota.
- It adopts a long-term goal of ZERO fatalities and identifies changing the safety culture as a fundamental safety focus area.
- 4E's – Engagement, Enforcement, Education and Engineering

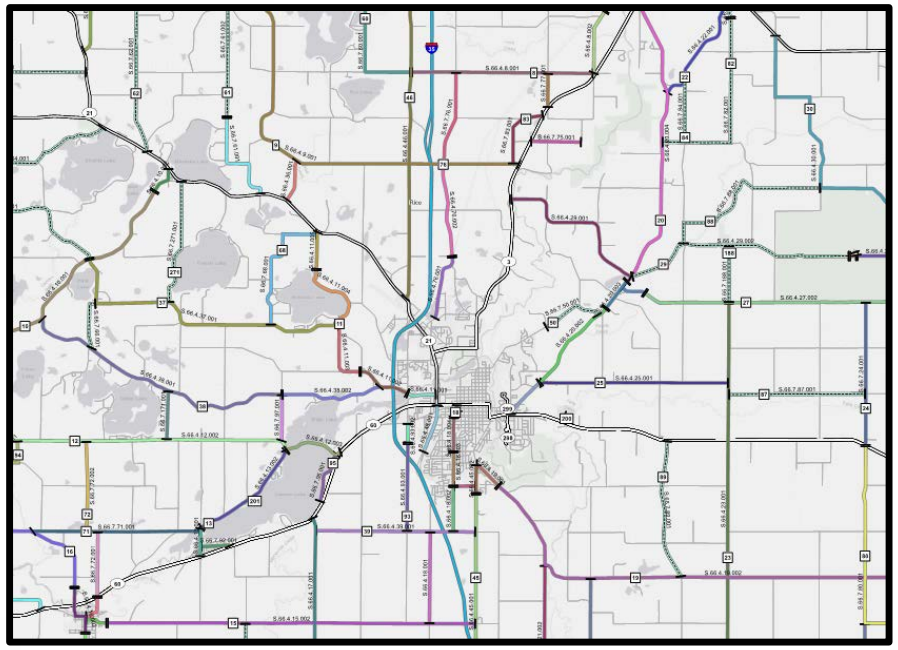


2014-2019 Minnesota Strategic Highway Safety Plan, Data 2008-2012



TOWARD ZERO DEATHS
15 YEARS

It’s Time to Change



Old Approach

Crashes = Risk & No Crashes = No Risk

The key questions:

- Is every element of the system equally at risk?
- Where to Start?
- A new approach to safety planning

New Approach

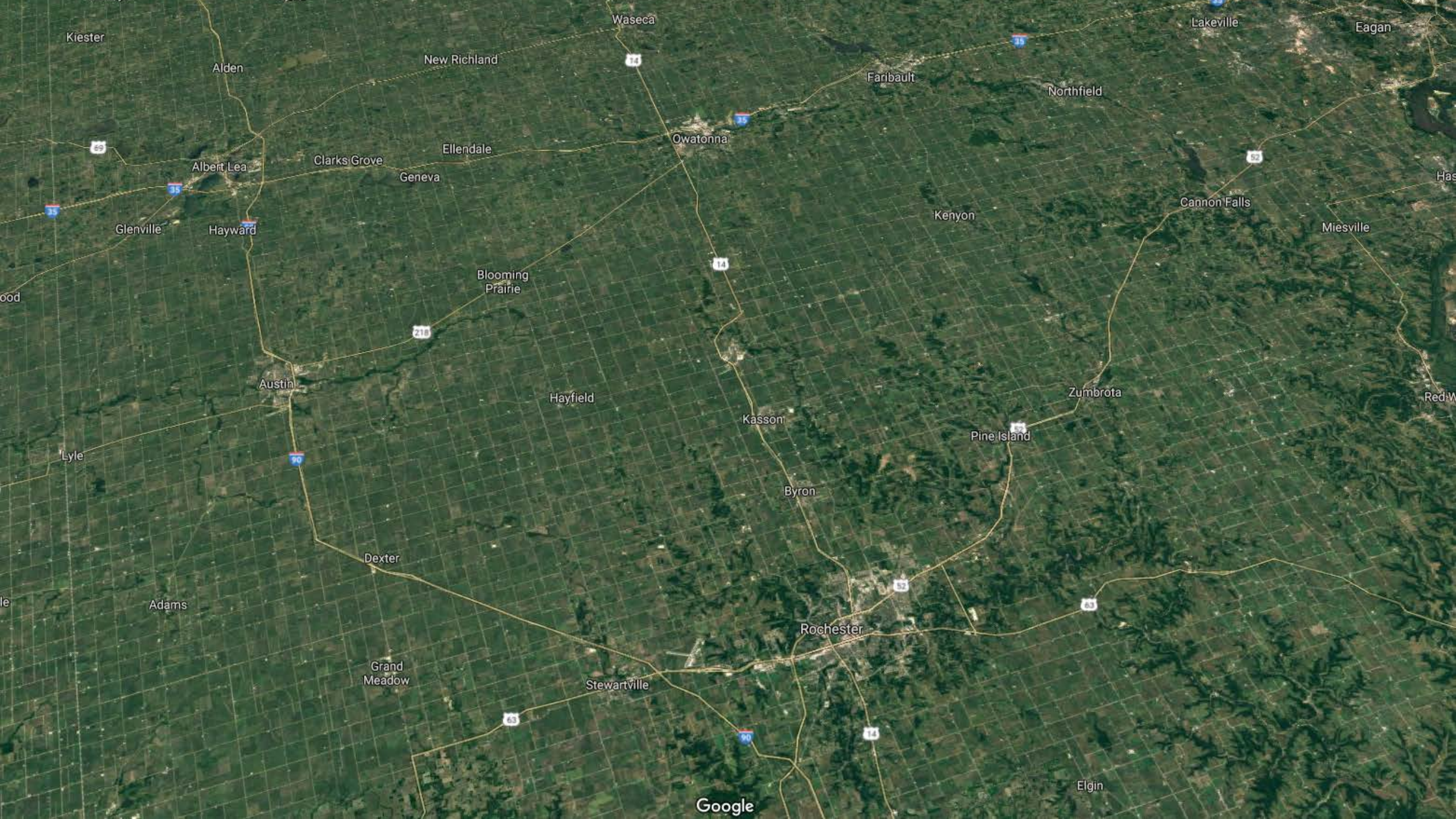
No Crashes ≠ No Risk

Use characteristics of crashes (roadway, traffic and crash) to identify risk and prioritize

TOWARD ZERO DEATHS
15 YEARS

Risk Factors

TOWARD ZERO DEATHS
15 YEARS


Kiester
Waseca
Lakeville
Eagan
Alden
New Richland
Faribault
Northfield
Owatonna
Albert Lea
Clarks Grove
Ellendale
Geneva
Glenville
Hayward
Kenyon
Cannon Falls
Miesville
Blooming Prairie
Austin
Hayfield
Zumbrota
Kasson
Pine Island
Lyle
Byron
Dexter
Adams
Rochester
Grand Meadow
Stewartville
Elgin
Google

TOWARD ZERO DEATHS
15 YEARS

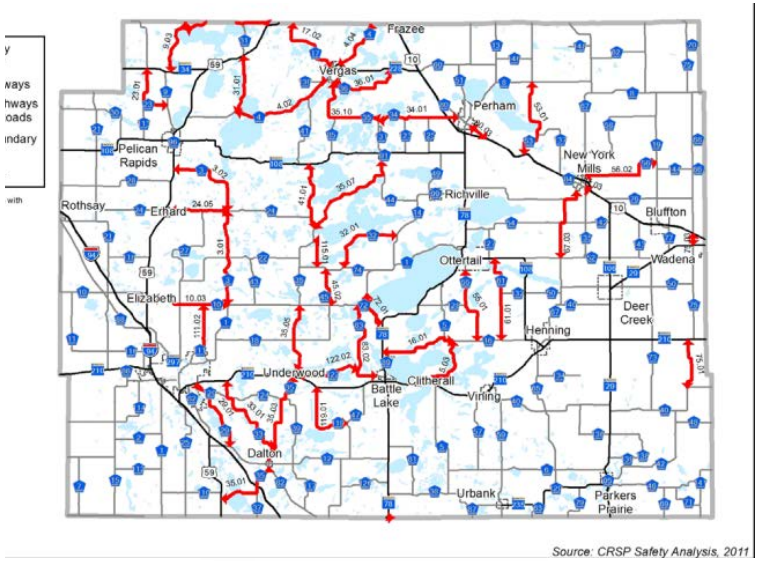
DEATHS

Fishing vs FISHING

TOWARD ZERO DEATHS
15 YEARS

What Data-Driven Safety Analysis?

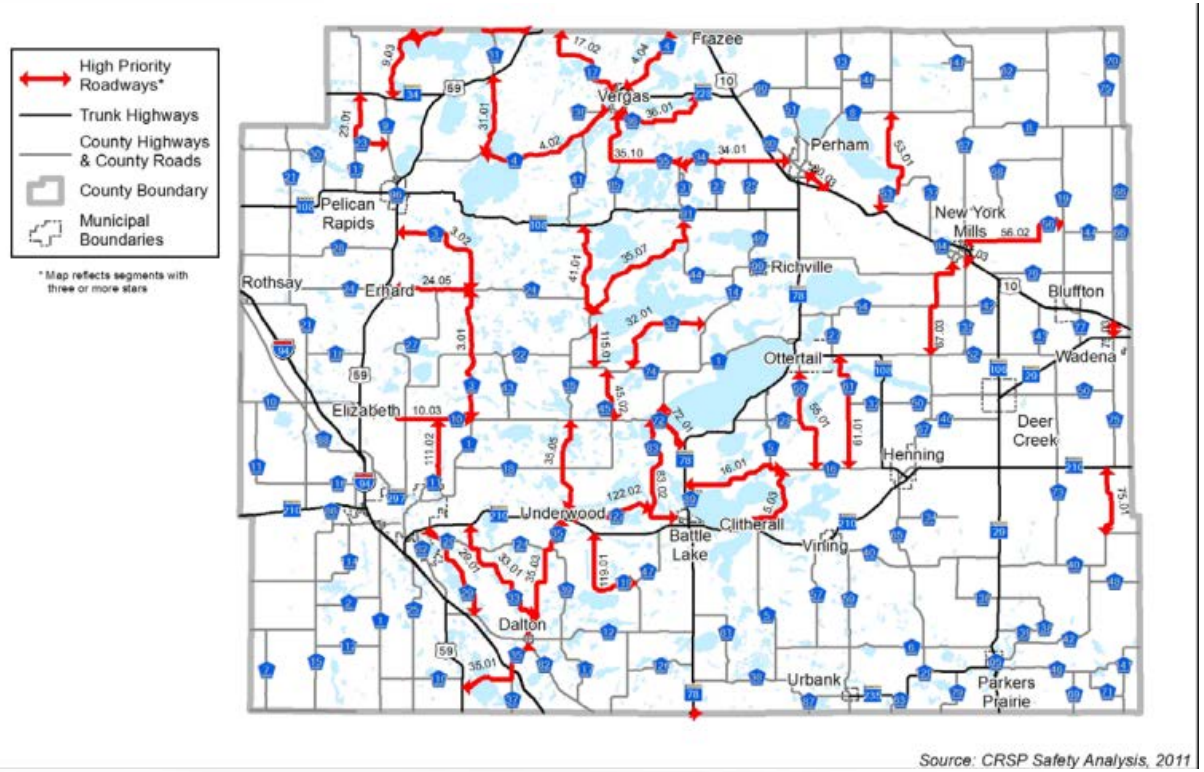
leployment of low cost
ecific severe crash types.



TOWARD ZERO DEATHS
15 YEARS

ATP 6 - Segments

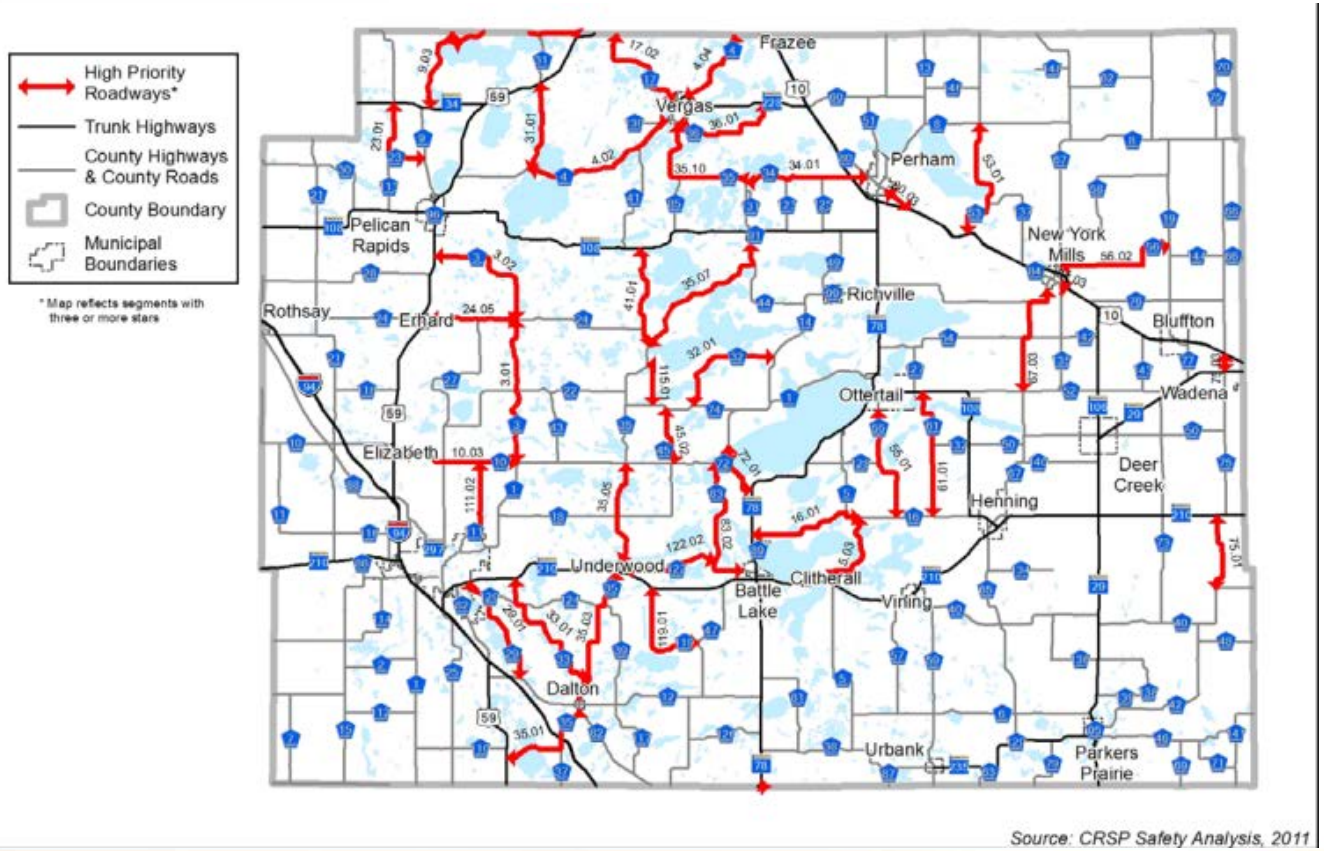
- Risk Criteria
  - Traffic Volume
  - Rate/Density of Road Departure Crashes
  - Curve (Critical Radius) Density
  - Edge Risk Assessment



TOWARD ZERO DEATHS
15 YEARS

What Data-Driven Safety Analysis?

- An approach to safety involving a wide deployment of low cost projects on high-risk roadways tied to specific severe crash types.

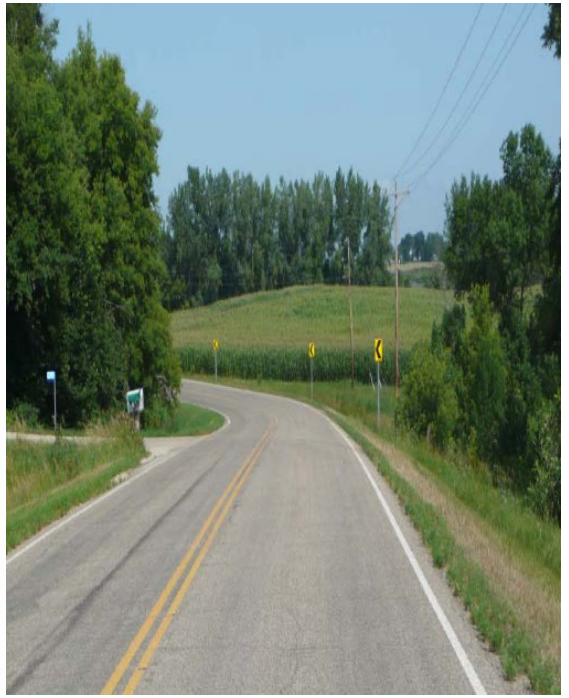


TOWARD ZERO DEATHS
15 YEARS

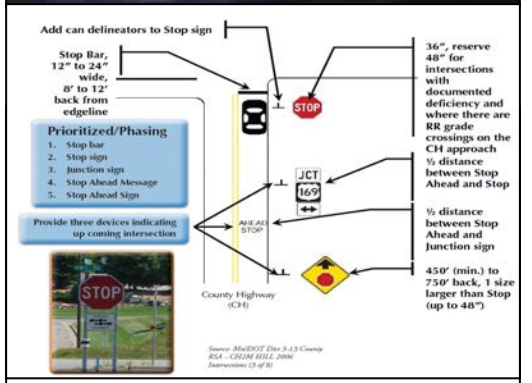
Typical Low Cost Strategies

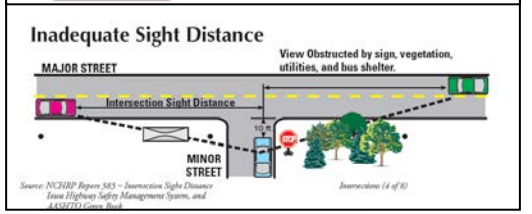
Segments

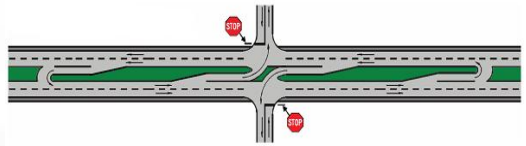
Curves



Intersections



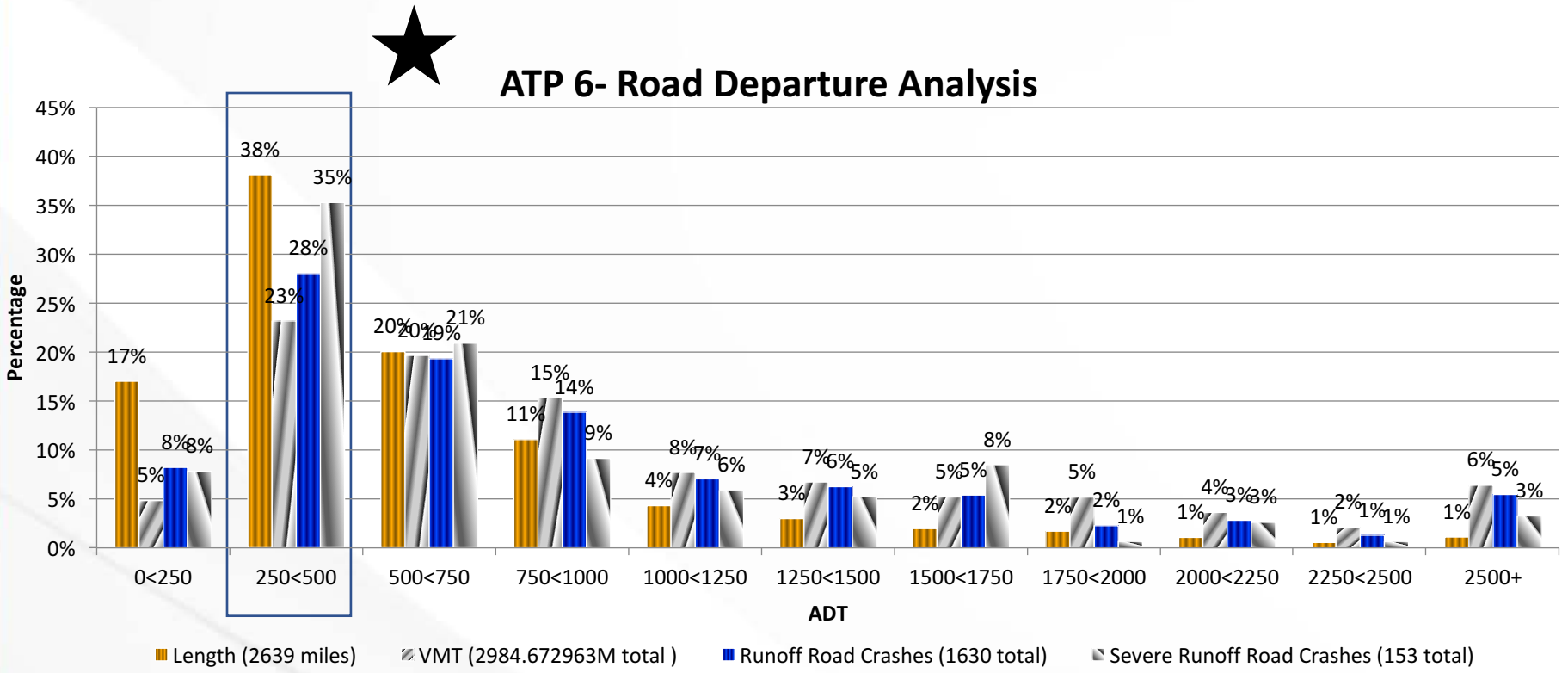




TOWARD ZERO DEATHS
15 YEARS

Where, When and What

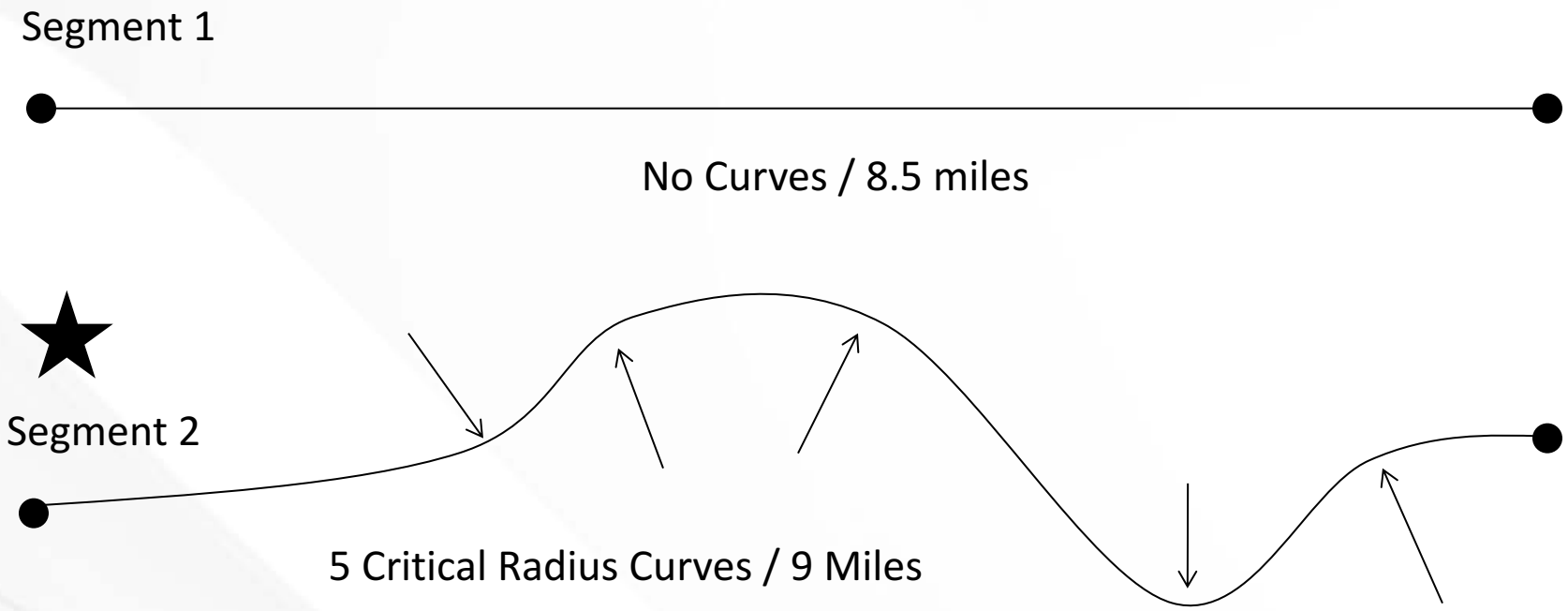
ATP 6 – Segment Traffic Volume



- Roads with 250 to 500 ADT had the highest percentage of severe road departure crashes.

TOWARD ZERO DEATHS
15 YEARS

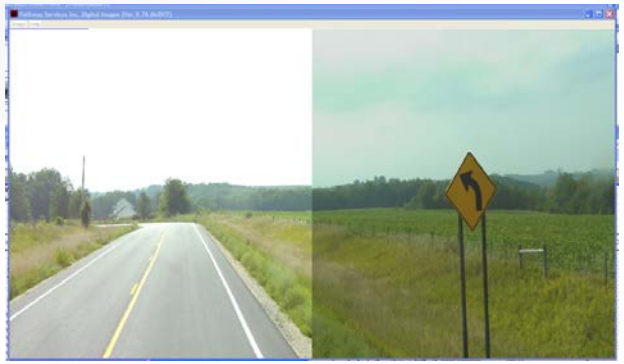
ATP 6 – Curve Density



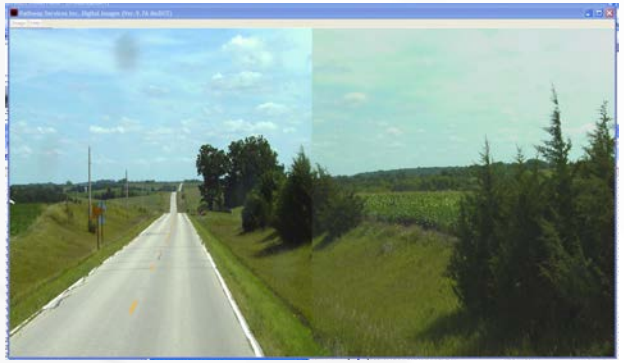
- 62% of severe road departure crashes were curve-related
- Segments with a Critical Curve Density higher than the average received a ★

TOWARD ZERO DEATHS
15 YEARS

ATP 6 - Edge Risk Assessment

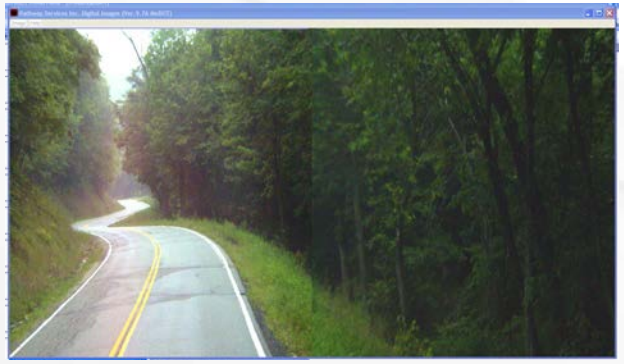


1 – Good Edge, Good Clear Zone



★

2 – No Edge, Good Clear Zone



★

3 – No Edge, No Clear Zone

County Segment Prioritization

Rank	Corridor	Route	#	Start	End	Length	ADT Range	RD Density	RD Rate	Curve Critical Radius Density	Edge Risk	Totals	Tiebreakers	
													Edge Risk	RD Density
1	12.04	CSAH	12	CSAH 1	Speed Limit 30	1.7	★	★	★	★	★	★★★★★	3	0.35
2	3.01	CSAH	3	CSAH 12	US 61	4.3	★	★	★	★	★	★★★★★	3	0.23
3	23.01	CSAH	23	CSAH 25	US 14	5.2	★	★	★	★	★	★★★★★	2	0.31
4	25.03	CSAH	25	CR 110	US 61	13.2	★	★	★	★	★	★★★★★	2	0.23
5	8.01	CSAH	8	CSAH 11	CSAH 5	3.8	★	★	★	★	★	★★★★★	2	0.21
6	20.02	CSAH	20	CSAH 25	US 14	2.9	★	★	★	★	★	★★★★★	2	0.21
7	17.01	CSAH	17	Waldo Rd	CSAH 12	2.2	★	★	★	★	★	★★★★★	2	0.18
8	101.01	CR	101	Start	CSAH 12	1.2	★	★	★		★	★★★★	3	0.33
9	11.01	CSAH	11	Houston Co Line South	CR 103	1.8	★		★	★	★	★★★★	3	0.11
10	5.01	CSAH	5	Houston Co Line South	CSAH 12	5.7	★	★	★		★	★★★★	2	0.21
11	30.01	CSAH	30	Wabasha Co Line West	CSAH 31	6.5	★		★	★	★	★★★★	2	0.15
12	19.01	CSAH	19	begin pavement	MN 43	4.1	★		★	★	★	★★★★	2	0.15
13	1.01	CSAH	1	CSAH 12	Houston Co Line South	6.9	★		★	★	★	★★★★	2	0.12
14	43.01	CSAH	43	Fillmore Co Line South	CSAH 6	1.9	★	★	★	★		★★★★	1	0.53
15	26.01	CSAH	26	Wabasha Co Line West	MN 74	4.5	★	★	★	★		★★★★	1	0.27
16	7.01	CSAH	7	CSAH 12	Pickwick	4.5	★			★	★	★★★	3	0.09
17	17.02	CSAH	17	CSAH 12	Winona CL South	6.0		★		★	★	★★★	2	0.43
18	105.01	CR	105	Start Paved	Winona CL South	2.3		★		★	★	★★★	2	0.17
19	25.01	CSAH	25	Fillmore Co Line South	CSAH 12	9.3			★	★	★	★★★	2	0.11
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
59	10.01	CSAH	10	Olmsted Co Line West	MN 74	0.5							1	0.00
60	37.01	CSAH	37	US 14	CSAH 24	5.9							1	0.00
61	108.01	CR	108	CSAH 39	CSAH 37	1.2							1	0.00
62	106.01	CR	106	CSAH 29	CSAH 25	2.3							1	0.00
					Total Stars --		22	25	29	27	28			
					% That Gets Star --		35%	40%	47%	44%	45%			

- Is the entire system at-risk?
  - No – about 1/3 of system is High Priority

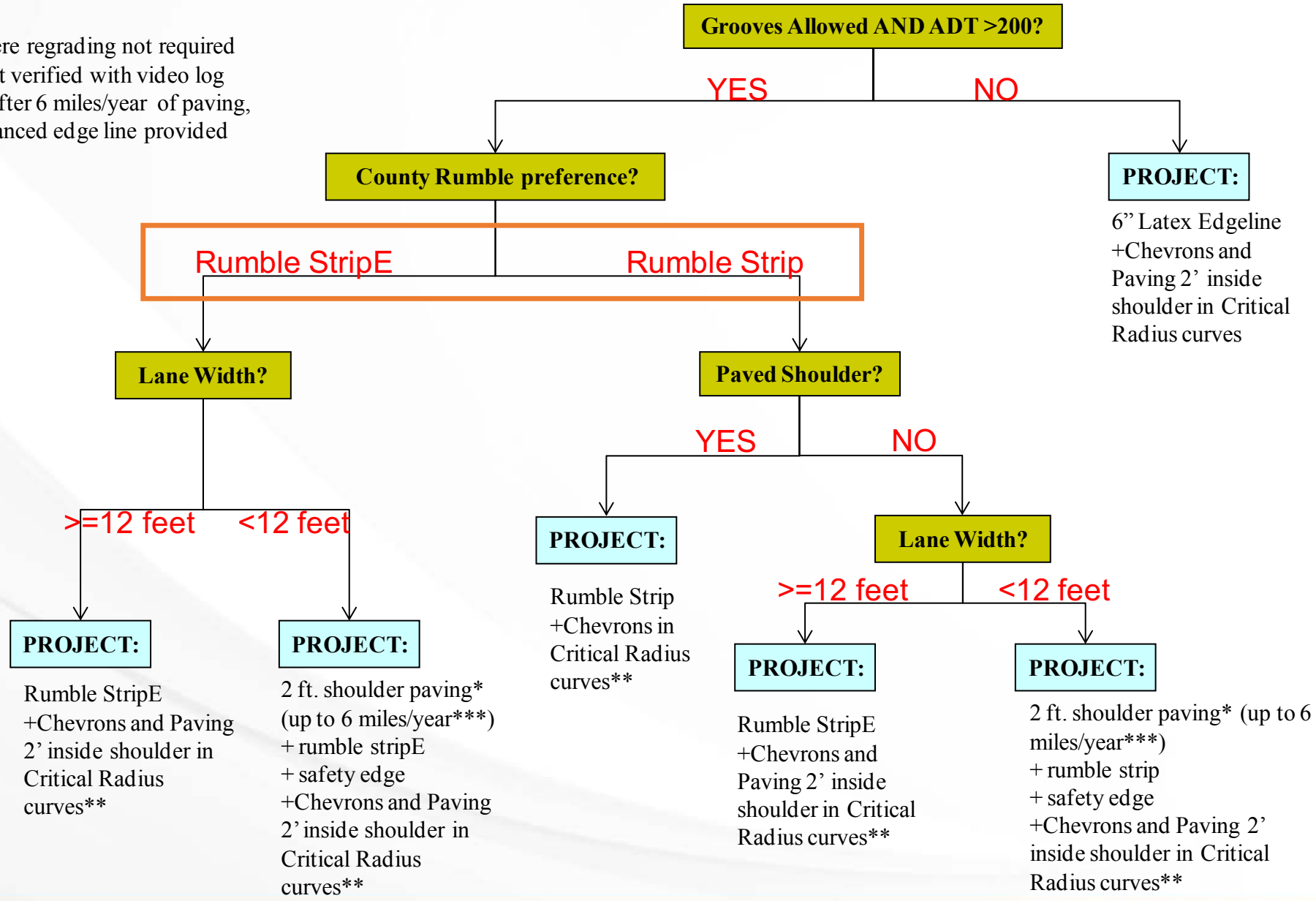
Totals

Stars	#	%	Miles	%
★★★★★	7	11%	33.3	11%
★★★★	8	13%	32.6	11%
★★★	8	13%	45.1	15%
★★	15	24%	58.1	20%
★	10	16%	50.7	17%
-	14	23%	77.2	26%
	62	100%	297	100%

TOWARD ZERO DEATHS 15 YEARS

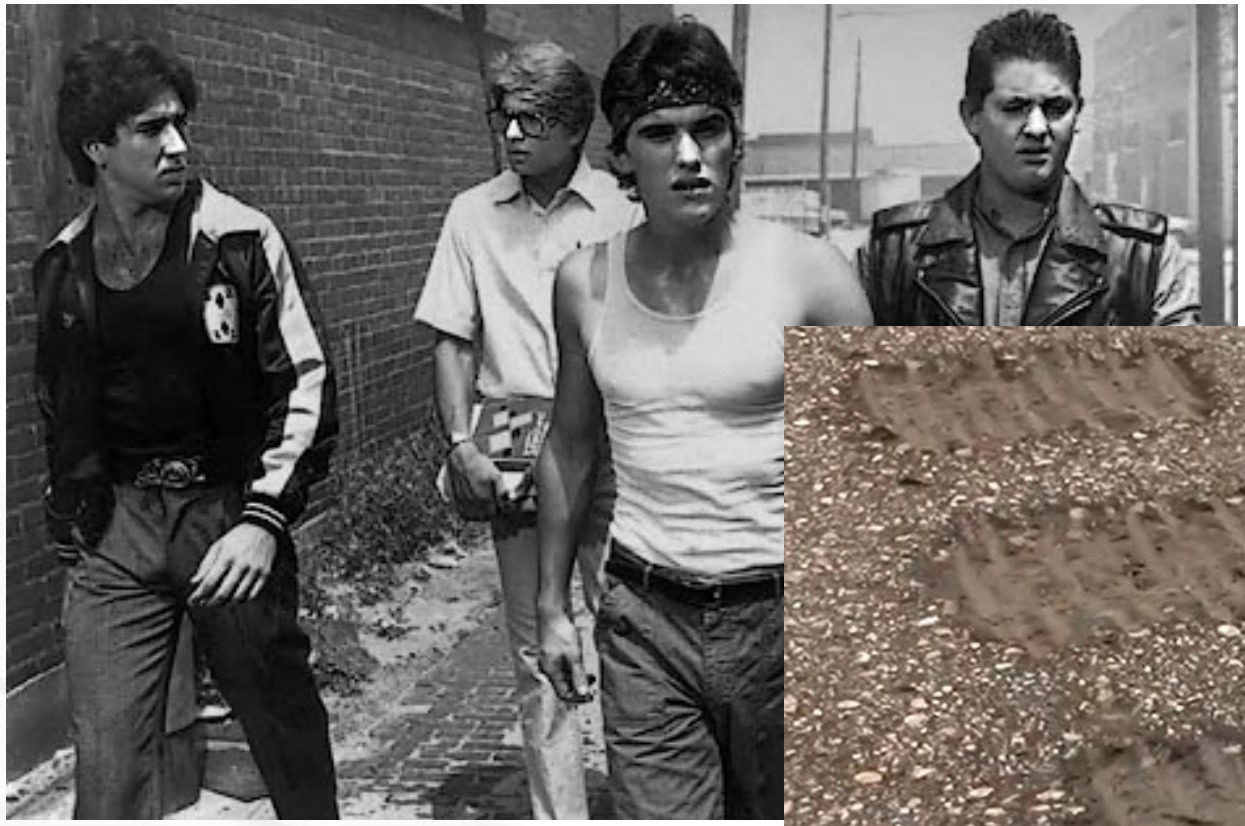
When and What

* Where regrading not required
** Not verified with video log
*** After 6 miles/year of paving, enhanced edge line provided

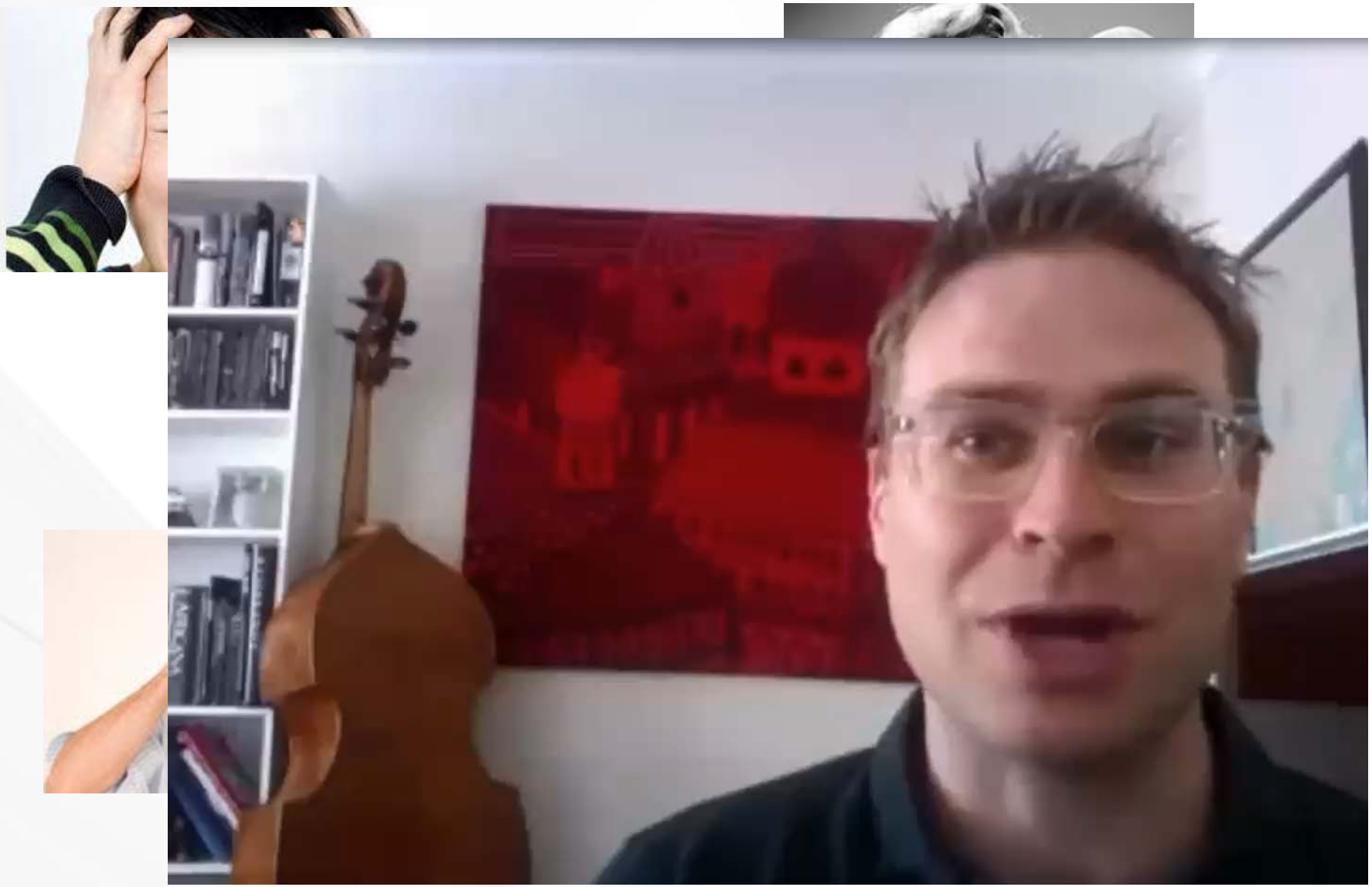


TOWARD ZERO DEATHS
15 YEARS

Rumbles



TOWARD ZERO DEATHS
15 YEARS



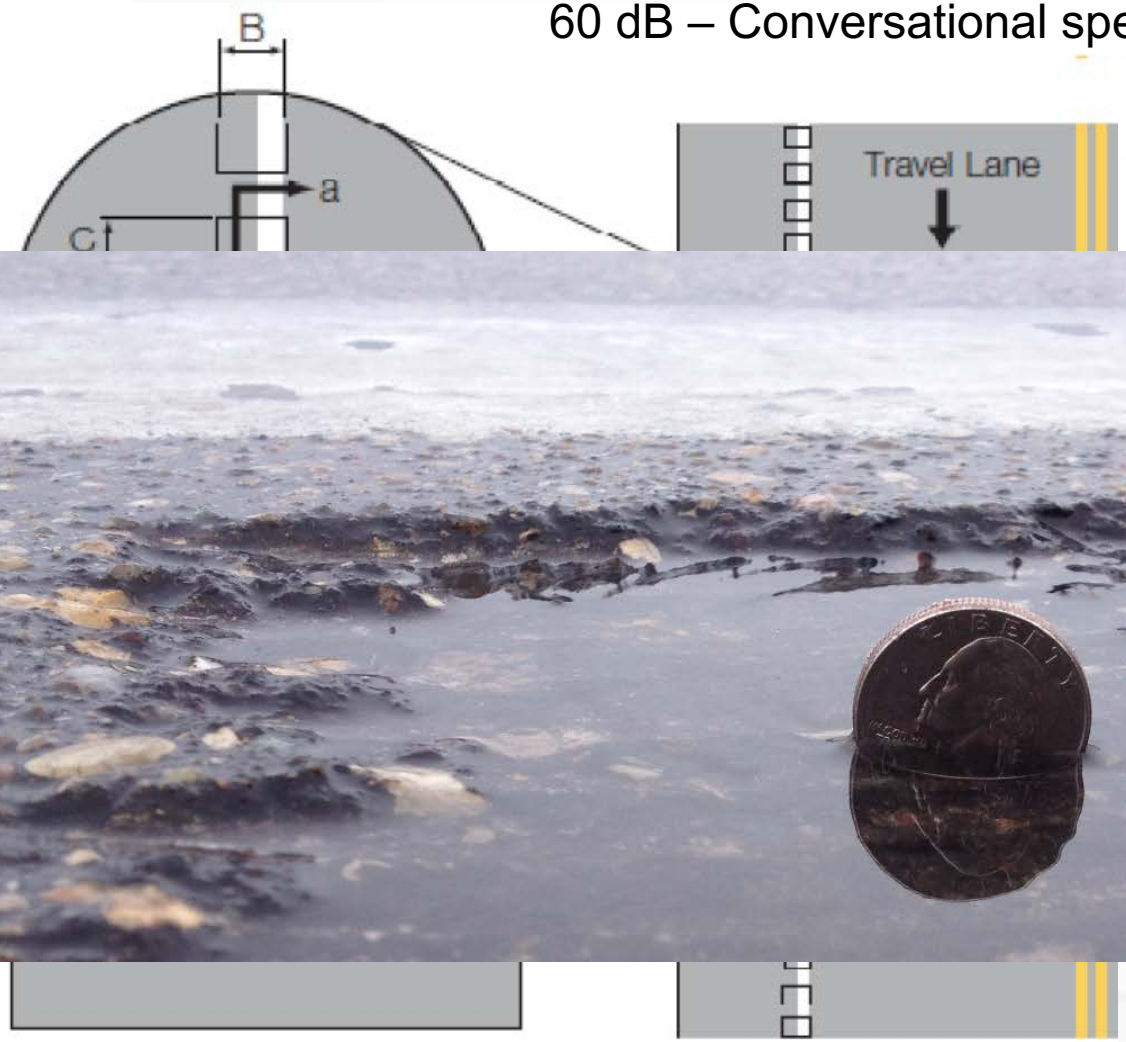
Rumble Strips and Stripes

Bench Mark

80 dB – Heavy truck traffic
70 dB – Business office
60 dB – Conversational speech

MnDOT Noise Evaluation

50’ away 82 dB
100’ away 75 dB
200’ away 67 dB
300’ away 62 dB

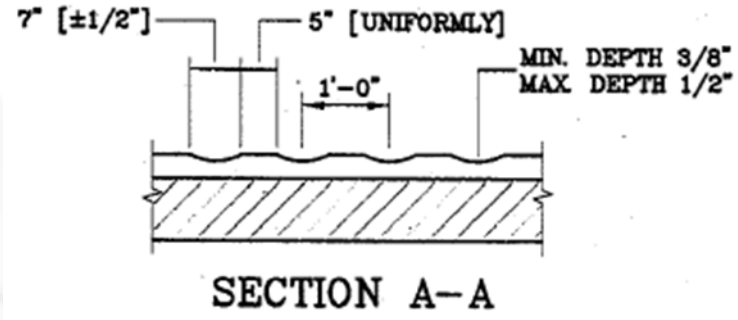


TOWARD ZERO DEATHS
15 YEARS

Rumbles and Installation

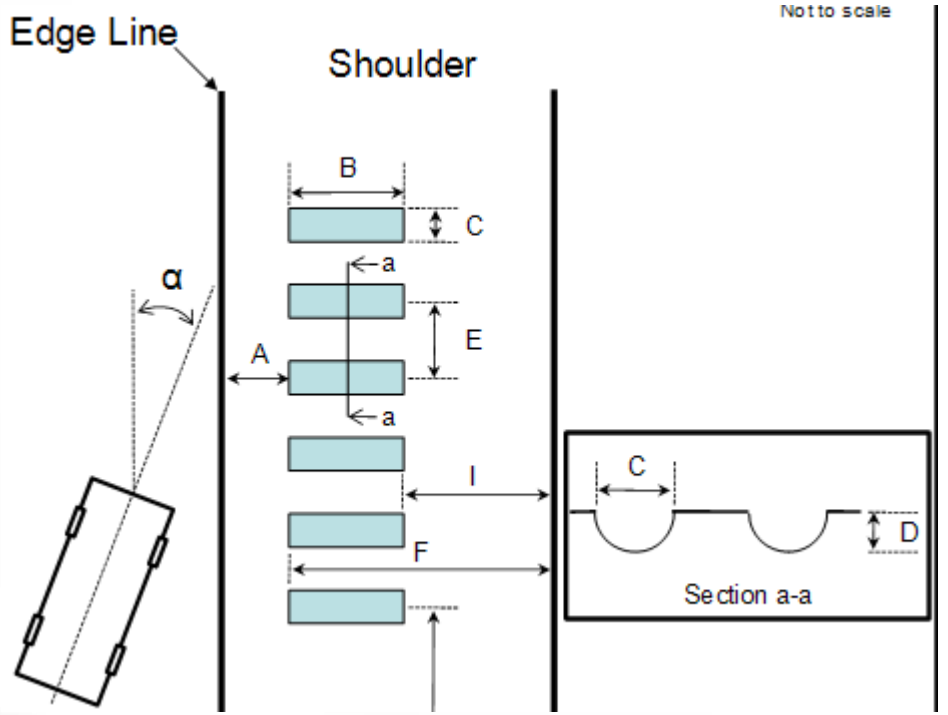
NCHRP 641 Summary of Noise Prediction Models

- Unit increases in length, width, and depth dimensions increase noise levels in passenger compartment
- Unit increase in space dimension decreases noise level in passenger compartment



Primary Rumble Strip Dimensions

B – Length
C – Width
D – Depth
E – Spacing



Rumbles and Noise

Hit Rate 0.5 -1.0%

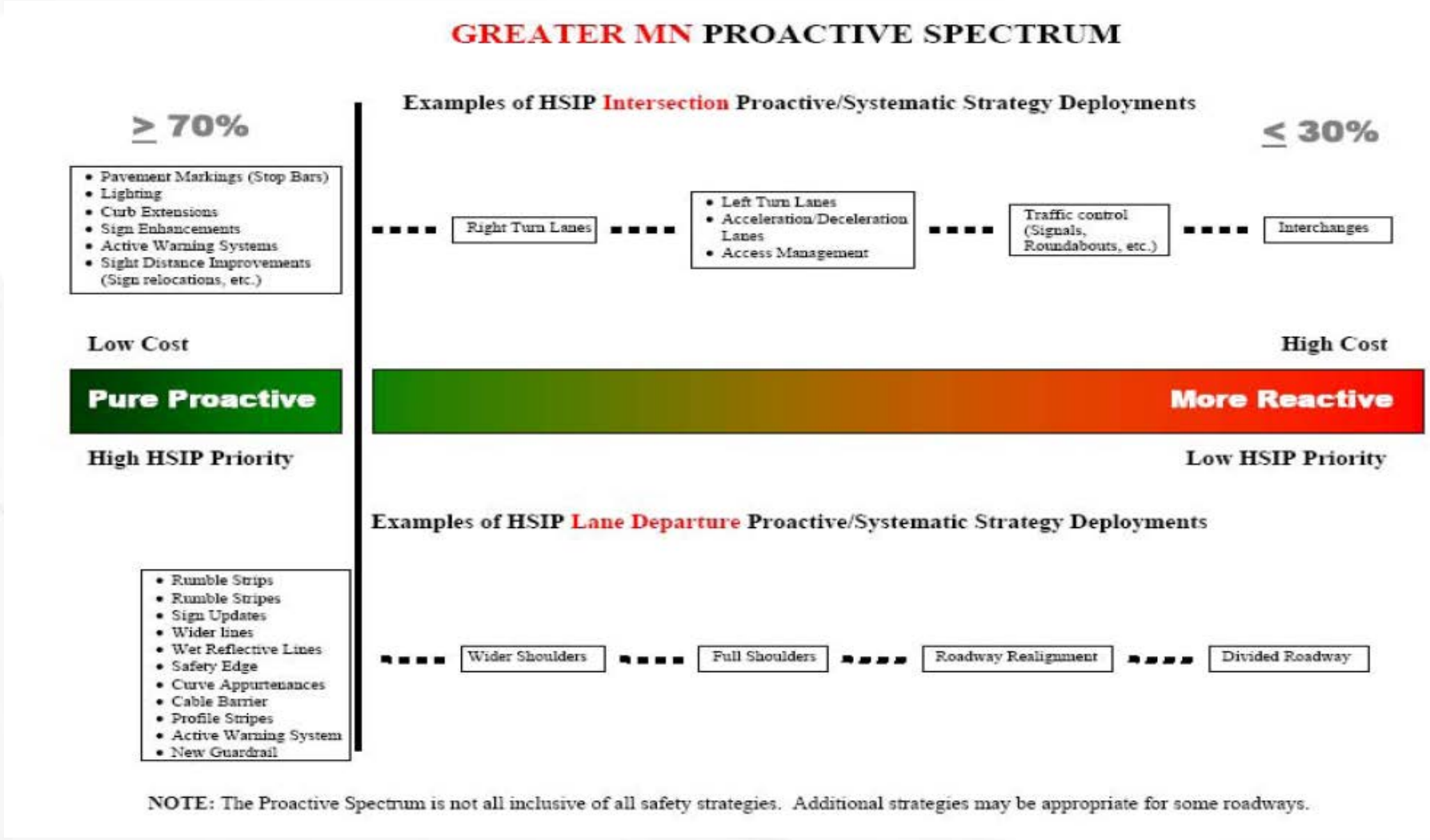
Approx. Hit Rate 5.0%

Lateral displacement of vehicle: Approx. 7” (Institute for Transportation, ISU)
http://www.dot.state.mn.us/stateaid/sa_safety_strategies.html

Decibel equivalent to heavy truck: 82 dBA @ 50 ft from edge of road (MnDOT)
http://www.dot.state.mn.us/trafficeng/safety/rumble/index.html

TOWARD ZERO DEATHS
15 YEARS

So what are we doing now?



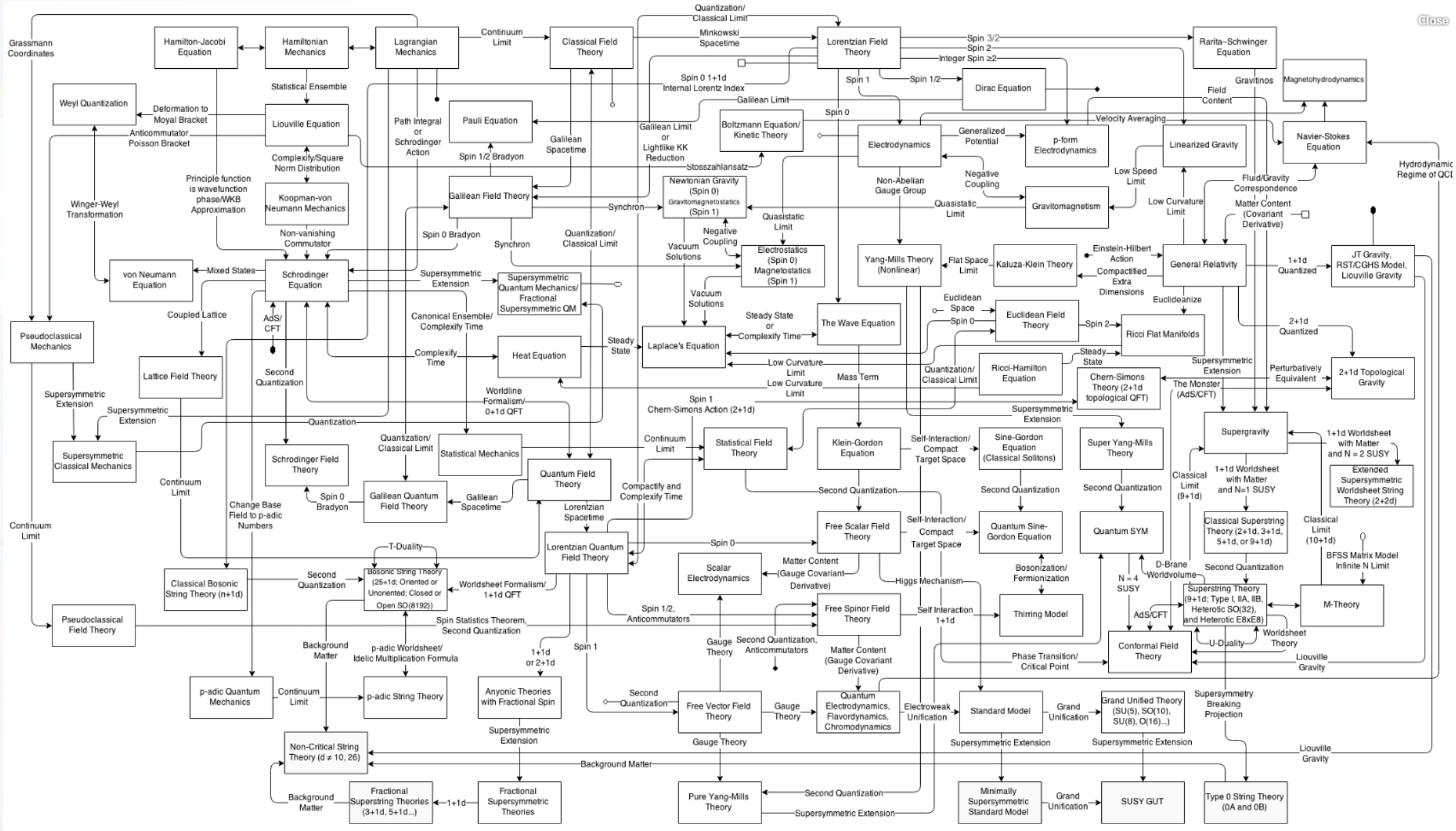
TOWARD ZERO DEATHS
15 YEARS

So what are we doing now?

TOWARD ZERO DEATHS
15 YEARS

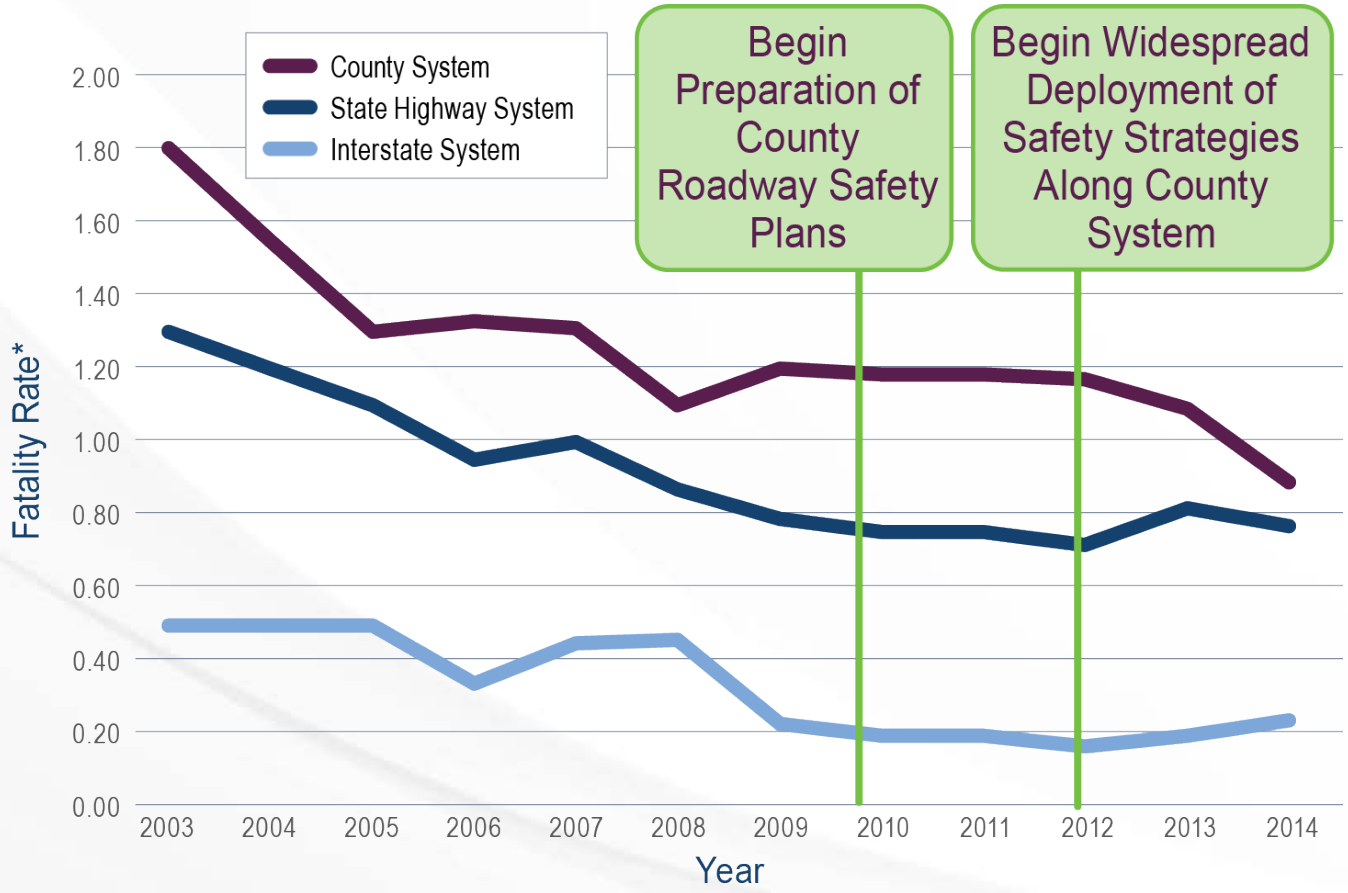
A sample of HSIP projects for across MN

Projects	Cost	Total
Segments		
Edgeline Rumble Strips/Stripes	$3,336,000.00	
Enhanced Edgelines	$12,391,000.00	
Pave Shoulder & Edgeline Rumble Strips/Stripes	$3,322,000.00	
Pave Shoulder & Embedded Markings	$250,000.00	
Embedded Markings	$1,246,000.00	$20,545,000.00
Curves		
Chevrons	$3,591,000.00	
Pave Shoulder & Edgeline Rumble Strips/Stripes	$289,000.00	$3,880,000.00
Intersections		
Upgrade Traffic Signs & Markings	$419,000.00	
Street Lights	$2,711,000.00	
Street Lights & Signs & Markings	$606,000.00	
Rural Intersection Collision Warning System	$488,000.00	
Turn Lanes	$1,017,000.00	
Roundabout	$465,000.00	
Red Light Confirmation Lights	$84,000.00	
Dynamic Speed Feedback Signs	$59,000.00	$5,849,000.00
TOTAL of ALL		**$30,274,000.00**



Local Road Safety Improvements = **Results!**

From 2012 to 2014, Minnesota's county system fatality crash rate decreased by 25%



Questions?

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TOWARD ZERO DEATHS
15 YEARS

Traffic Safety Fundamentals Handbook

Minnesota Department of Transportation
Office of Traffic, Safety and Technology
Revised June 2015
Prepared by CH2M, Inc.

TOWARD ZERO DEATHS
15 YEARS