Roadside Hardware on Local Roads

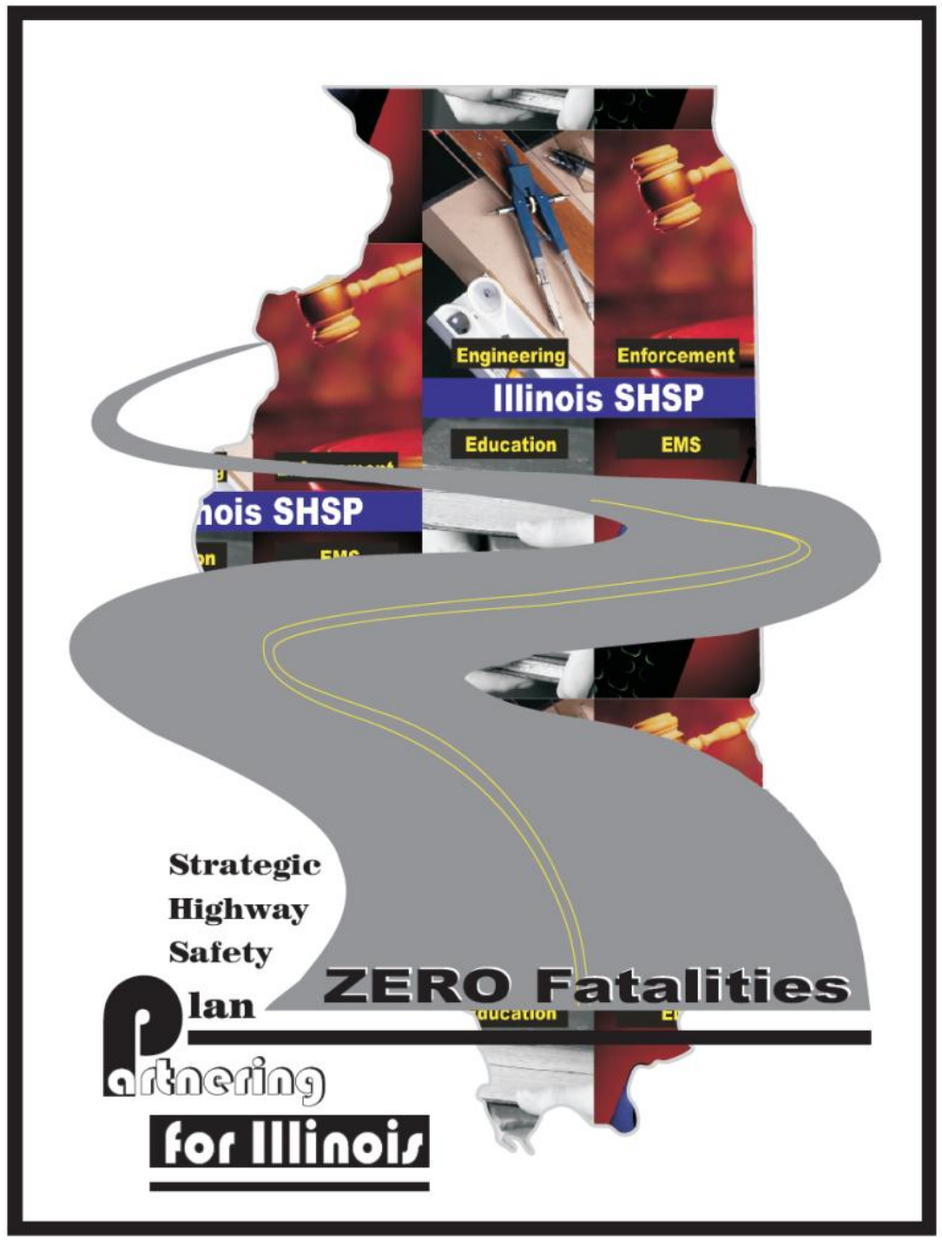
Why it's important

Making it work

Funding

Illinois SHSP: Success to Safety

- Zero Fatality Goal
- Increased Emphasis on Local Roads
- Severe Crashes
- Safety Performance
- 4E Multi-Discipline Partnerships
- System-wide Improvements
- Data Driven: Improved Data and Safety Analysis Tools

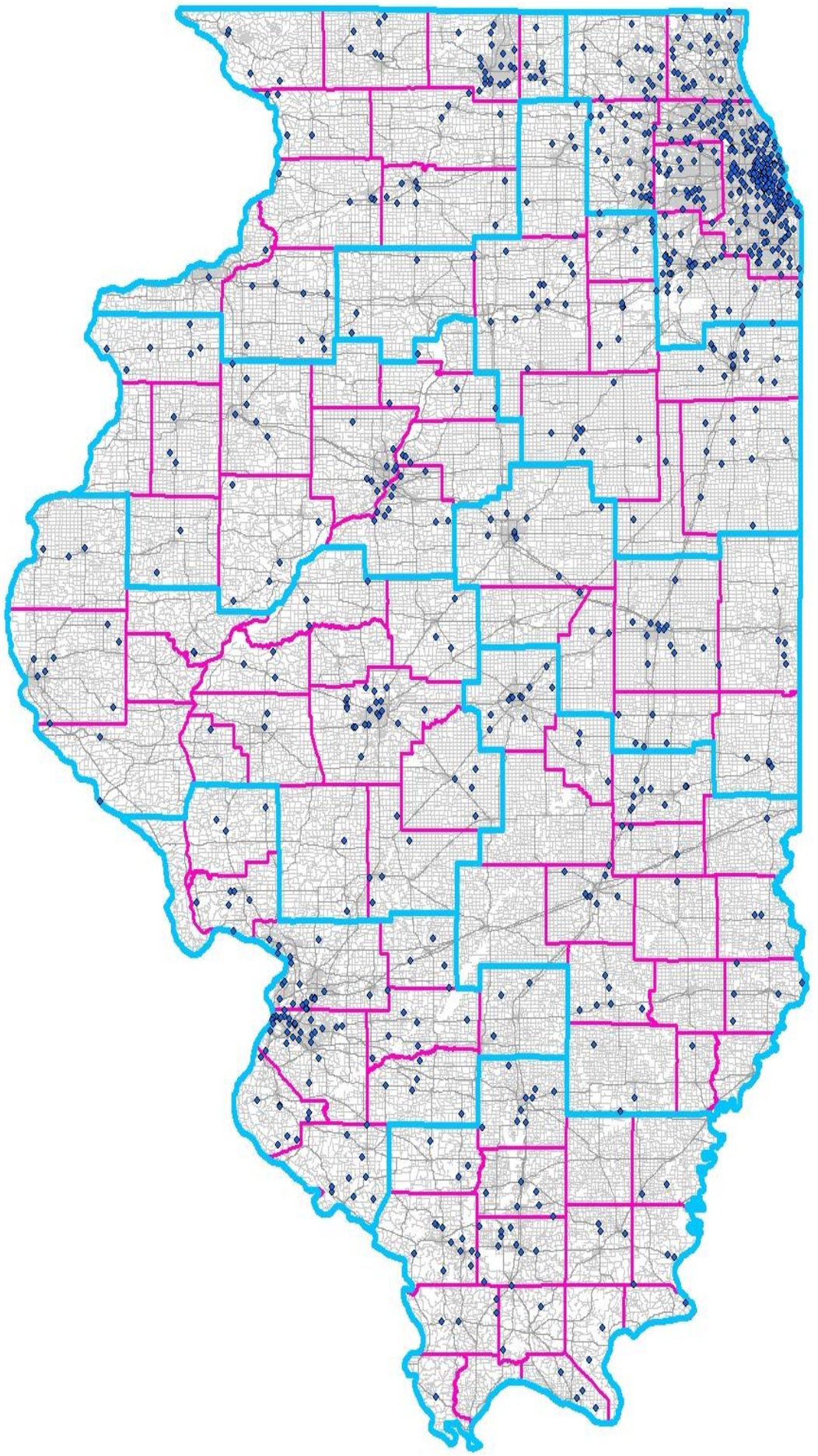


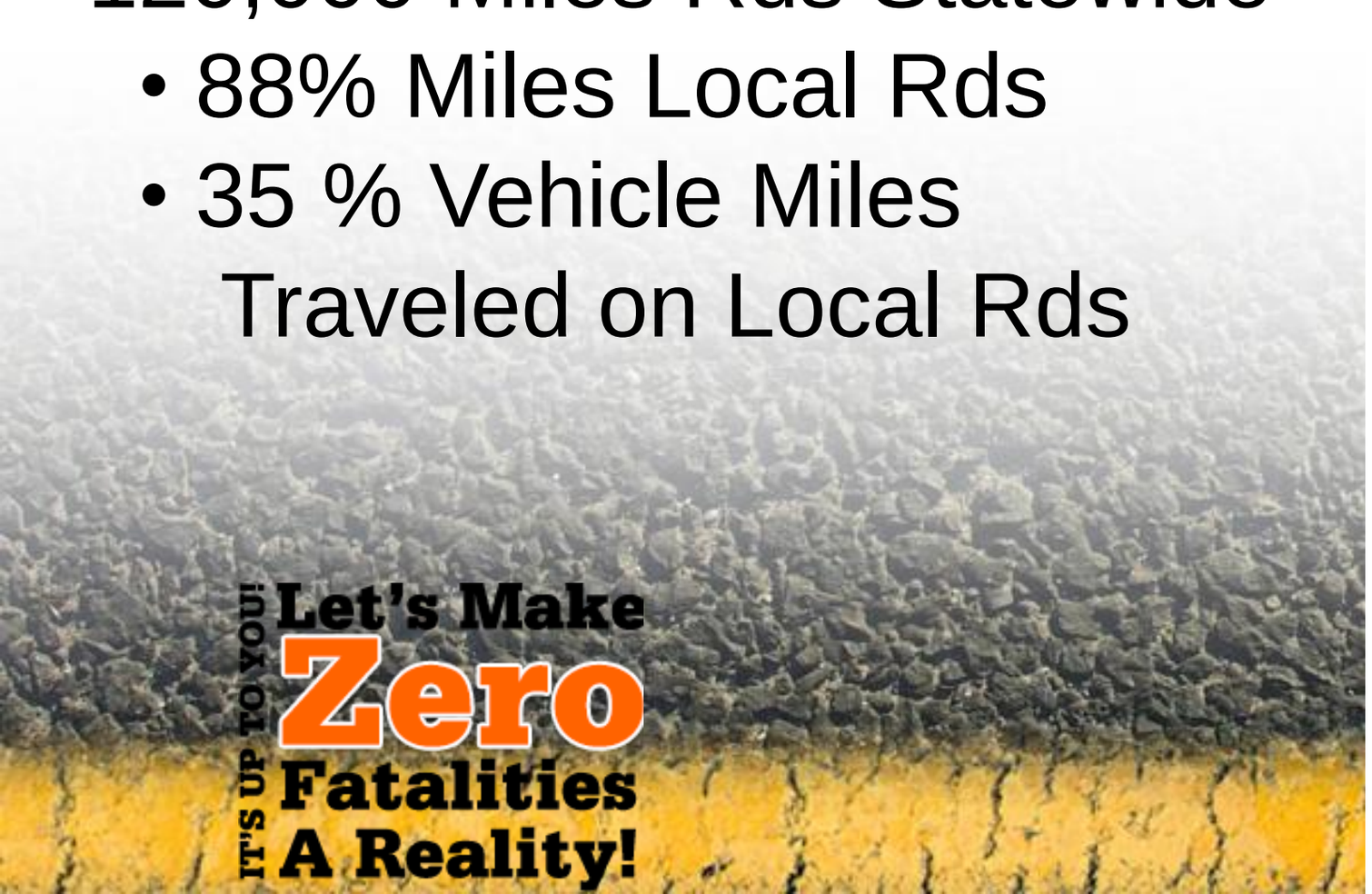
Driving Zero Fatalities to a Reality

Illinois Stats

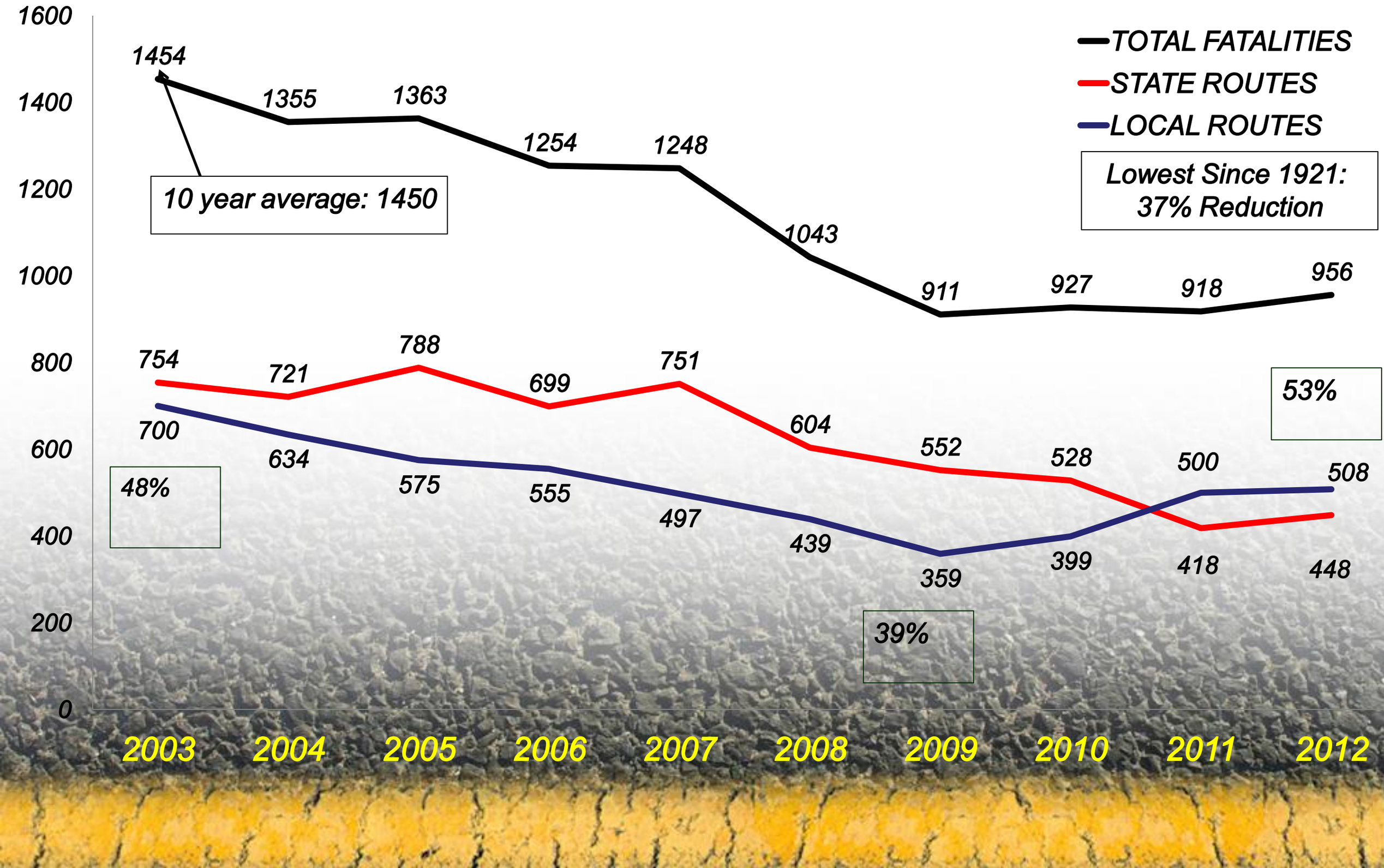
- 5 IDOT Regions; 9 Districts;
  102 Counties

- 120,000 Miles Rds Statewide
  - 88% Miles Local Rds
  - 35 % Vehicle Miles
    Traveled on Local Rds

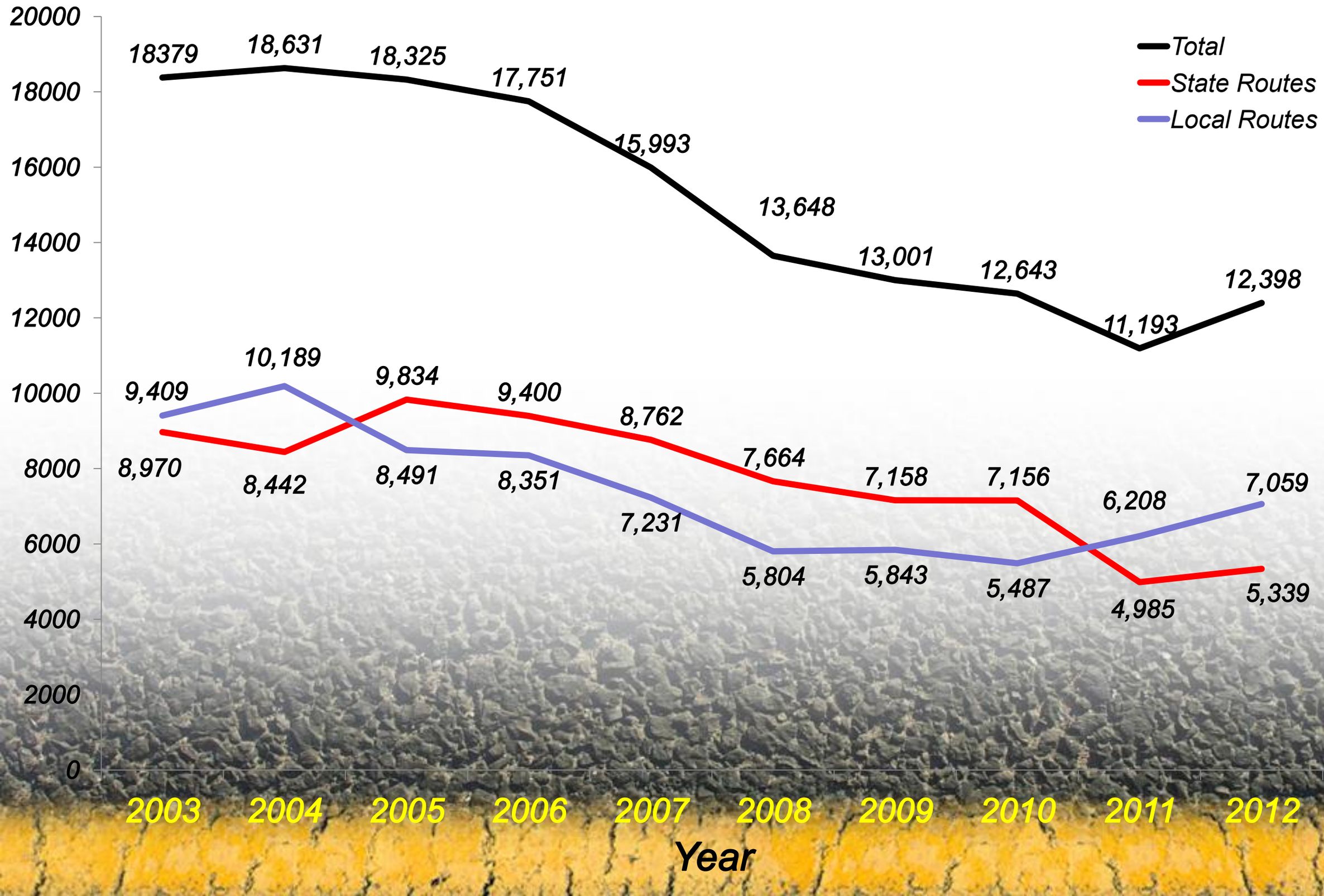




Illinois Fatalities



Illinois Serious Injuries



IL SHSP Emphasis Areas

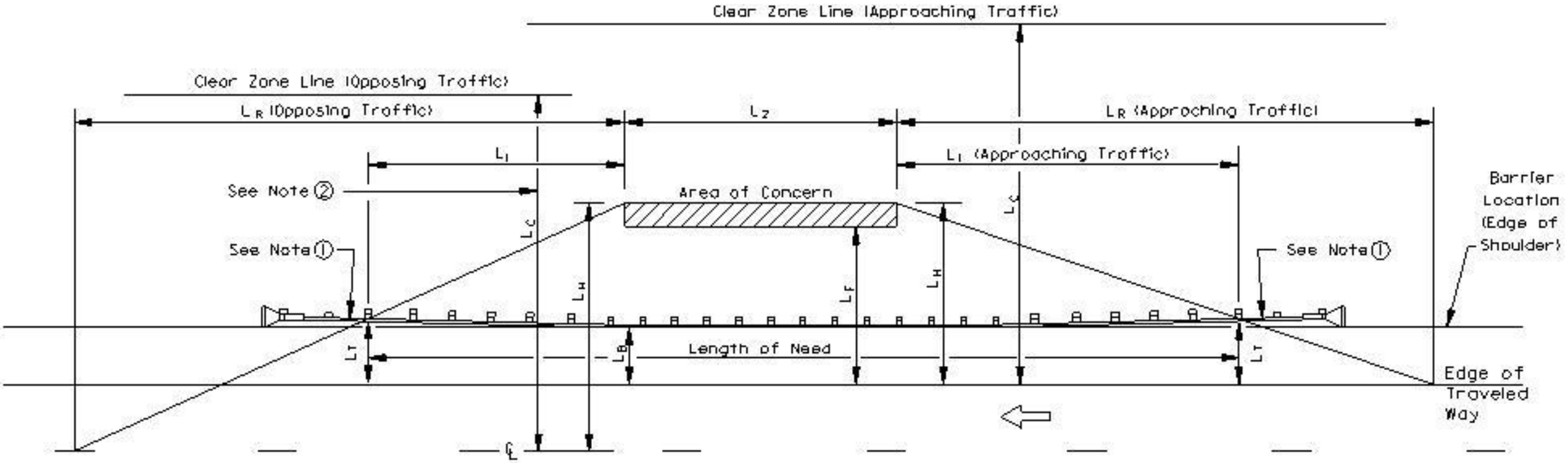
- Alcohol/ Impaired Driver
- Driver Behavior/Awareness
- Highway/Railroad Grade Crossing
- Information Systems
- Intersections
- Large Trucks
- Roadway Departure
- Safety Belts/Occupant Protection
- Vulnerable Users
- Work Zones

IT'S UP TO YOU! Let's Make Zero Fatalities A Reality!

Roadside Hardware Issues

- *How guardrail works*
  - *Intercept (layout)*
  - *Engage (height and design)*
  - *Strength (resist and redirect)*
    - *Crashworthy anchor (terminals)*
- *How guardrail fails*
  - *Hardware issues*
  - *Placement issues*

Layout to Intercept



Put the barrier between the vehicle and the hazard.

Runout length criteria have been <u>REDUCED!</u>

Consider AASHTO Roadside Design Manual Guidance for Runout Length (L_R)

Design Speed		Traffic Volume (ADT)*							
		Over 6000		2000-6000		800-2000		Under 800	
		Runout Length L_R		Runout Length L_R		Runout Length L_R		Runout Length L_R	
Mph	(km/h)	ft	(m)	ft	(m)	ft	(m)	ft	(m)
60	(100)	425	(130)	400	(120)	345	(105)	330	(100)
55	(90)	360	(110)	345	(105)	315	(95)	280	(85)
50	(80)	330	(100)	300	(90)	260	(80)	245	(75)
45	(70)	260	(80)	245	(75)	215	(65)	200	(60)
40	(60)	230	(70)	200	(60)	180	(55)	165	(50)
35		200		185		165		150	
30	(50)	165	(50)	165	(50)	150	(45)	130	(40)

**Based on a 10 year projection from the anticipated date of construction.*

RUNOUT LENGTHS FOR BARRIER DESIGN

Figure 35-4G

AASHTO Roadside Design Guide (2011) and IDOT BDE Runout Lengths

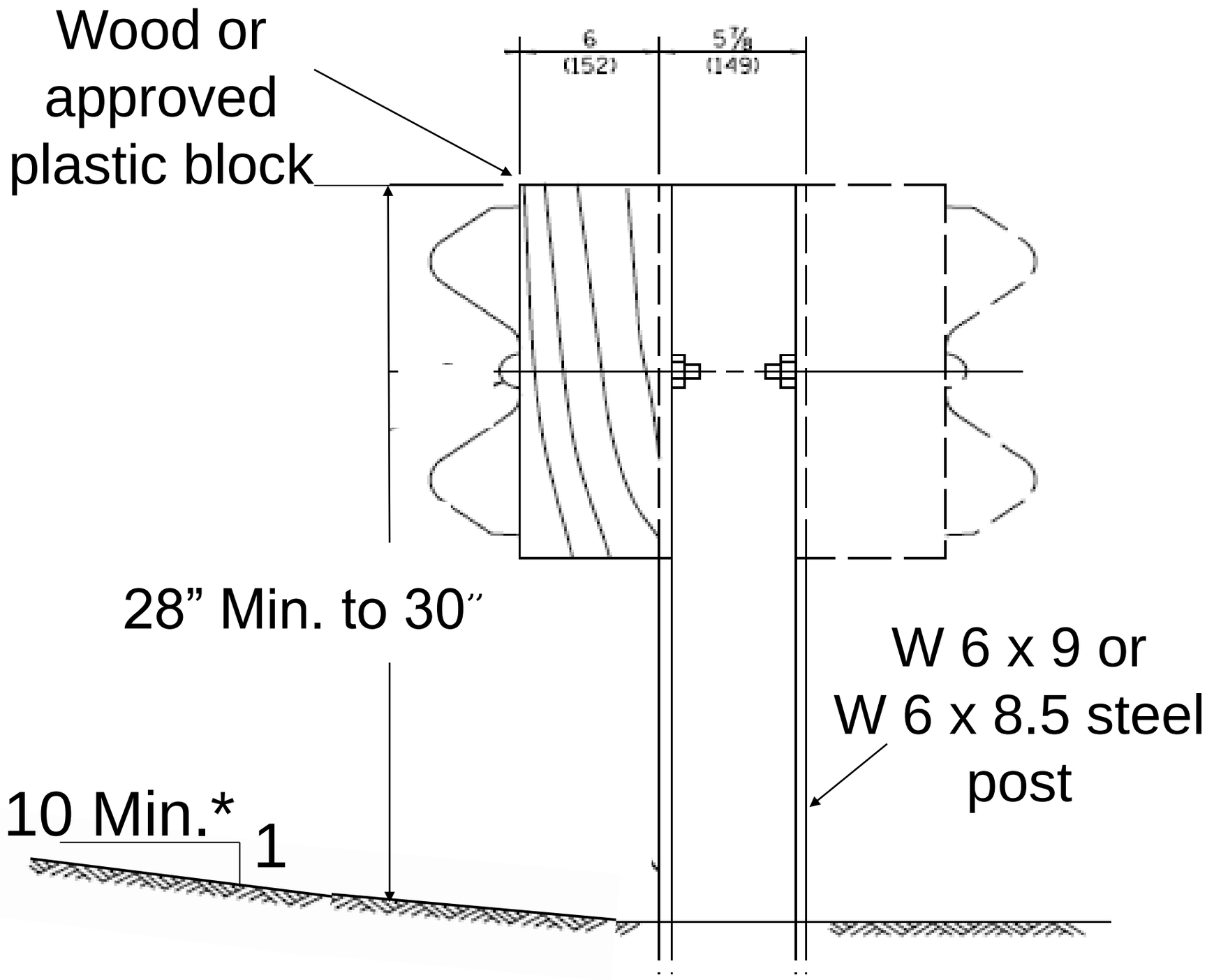
Design Speed		Traffic Volume (ADT)*							
		Over 10,000		5000-10,000		1000-4999		Under 1000	
		Runout Length L_R		Runout Length L_R		Runout Length L_R		Runout Length L_R	
mph	(km/h)	ft	(m)	ft	(m)	ft	(m)	ft	(m)
70	(110)	360	(110)	330	(101)	290	(88)	250	(76)
60	(100)	300	(91)	250	(76)	210	(64)	200	(61)
55	(90)	265	(81)	220	(67)	185	(57)	175	(54)
50	(80)	230	(70)	190	(58)	160	(49)	150	(46)
45	(70)	195	(60)	160	(49)	135	(42)	125	(38)
40	(60)	160	(49)	130	(40)	110	(34)	100	(30)
30	(50)	110	(34)	90	(27)	80	(24)	70	(21)

**Based on a 10 year projection from the anticipated date of construction.*

RUNOUT LENGTHS (L_R) FOR BARRIER DESIGN

Figure 38-6.E

Critical Dimensions for Guard Rail

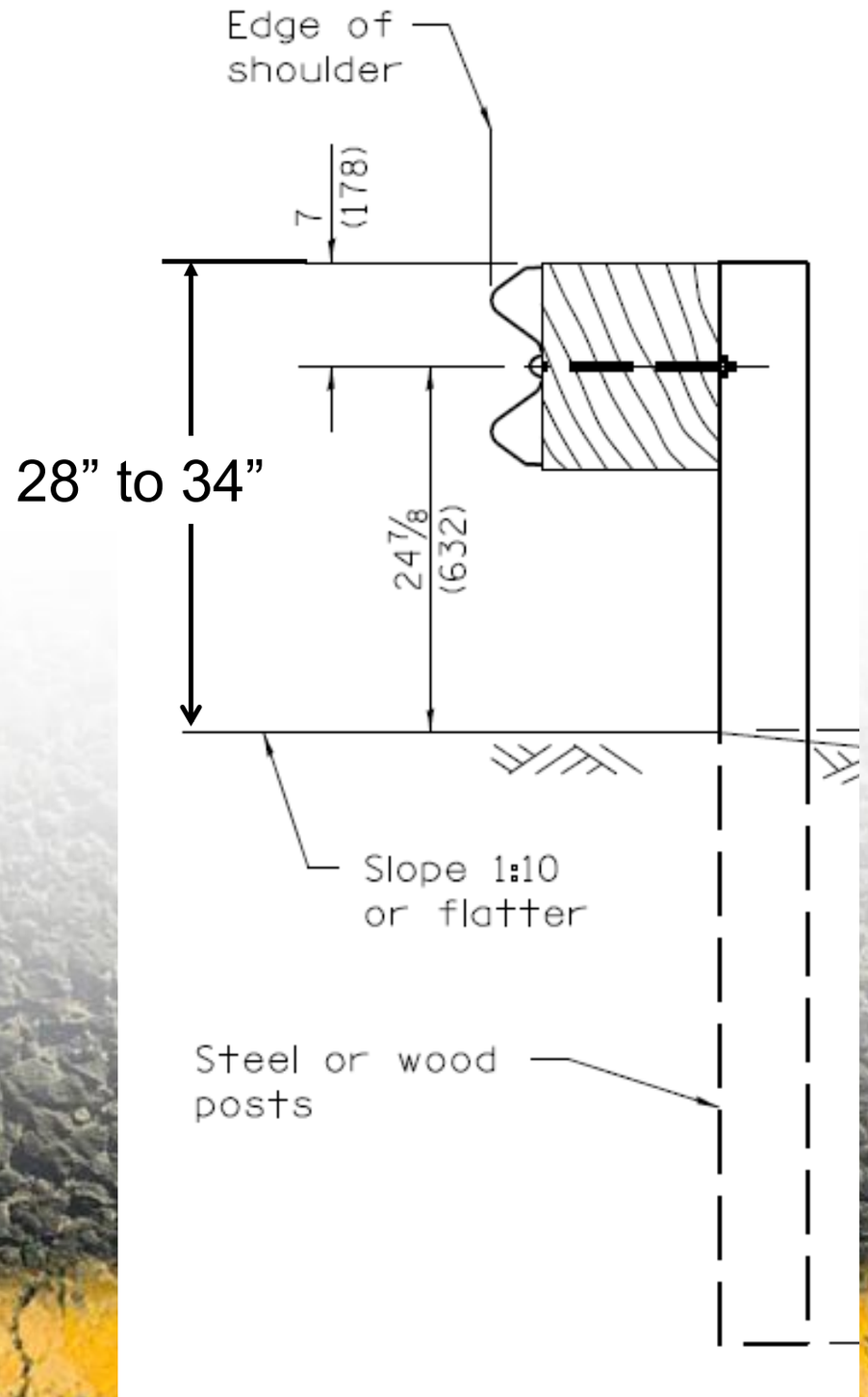


- Measure guard rail height from 10:1 maximum slope at the face of rail or from a projected line at this slope from the edge of the pavement.

Critical Dimensions for Guard Rail

Using Highway Standard 630001.

There is an approved version <u>without blockouts</u>. Contact BSE.



Length of Need

Intercept

Height

Engage

Alignment

Engage, Strength

Continuity and Strength

Strength

Anchorage

Crashworthy Anchor, Strength

Attachment to Culvert

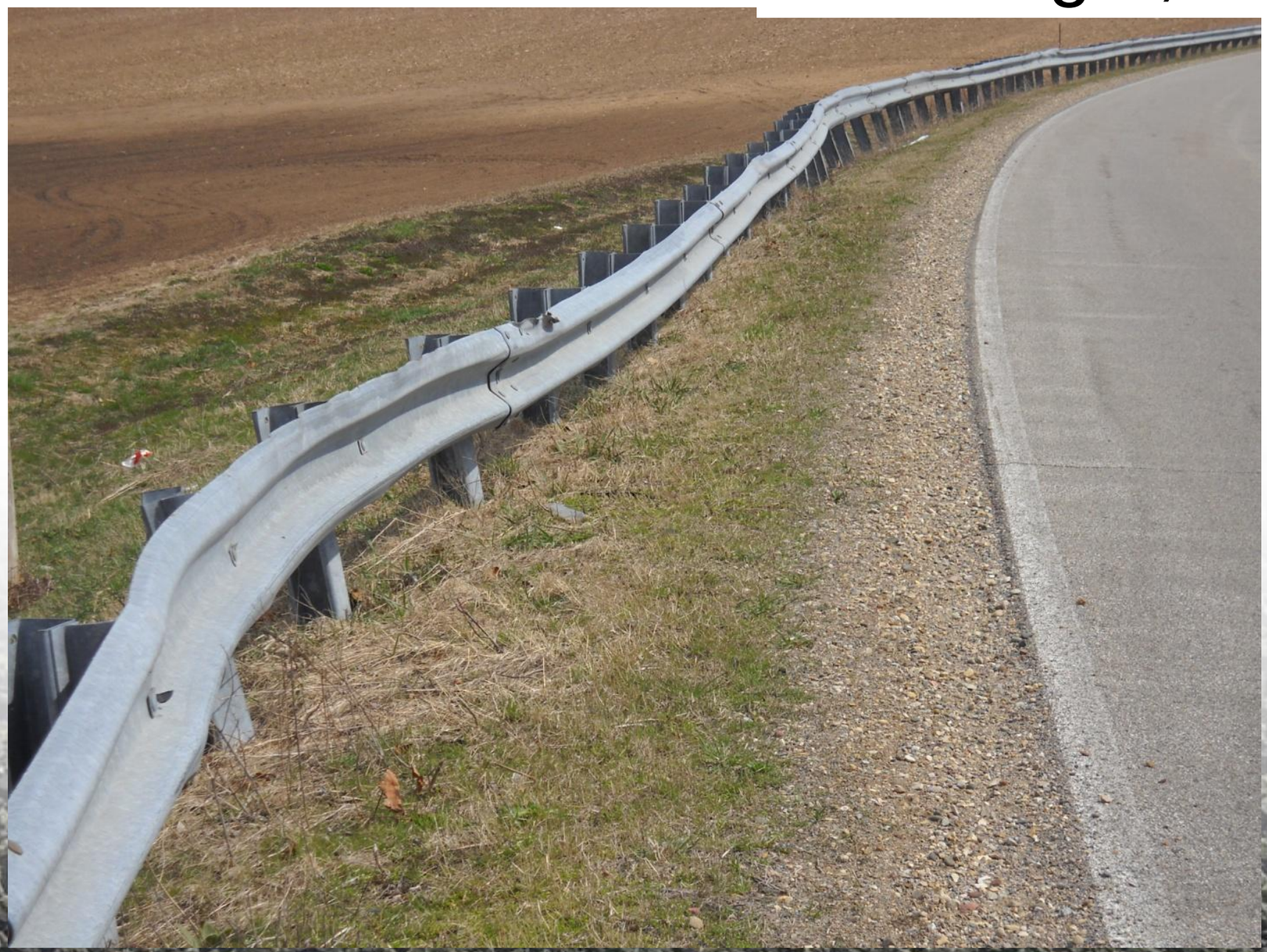
Obsolete

Curb on a High Speed Road

Engage

Damage

Strength, Engage



Damage

Crashworthy Anchor

Deflection

Strength

Is it Needed?

Intercept?

“Narrow” Embankment Top

Engage

Blunt End

Crashworthy Anchor

Obsolete Hardware “C” Posts

Obsolete

Obsolete Hardware Washer Holds Rail to Posts

Obsolete, Strength

Posts in Paved Surface

Strength

Posts in Paved Surface

Strength

Posts in Paved Surface

Strength

Short Radius (<150 ft) Guard Rail

Strength

Slopes at Guard Rail

Engage

Steel Blockouts

Obsolete

Strength of Attachment

Stress Concentration Tearing at Splice on Post

Strength

Stress Concentration Tearing at Splice on Post

Strength

Turned Down Ends

Crashworthy Anchor

The “Type 1A” Breakaway Cable Terminal with Less than 4 ft Parabolic Flare

Crashworthy Anchor

The “Type 1A” Breakaway Cable Terminal with Less than 4 ft Parabolic Flare

The “Type 1A” Breakaway Cable Terminal with Less than 4 ft Parabolic Flare

Crashworthy Anchor

The “Type 1A” Breakaway Cable Terminal with Less than 4 ft Parabolic Flare

Crashworthy Anchor

Type 5A

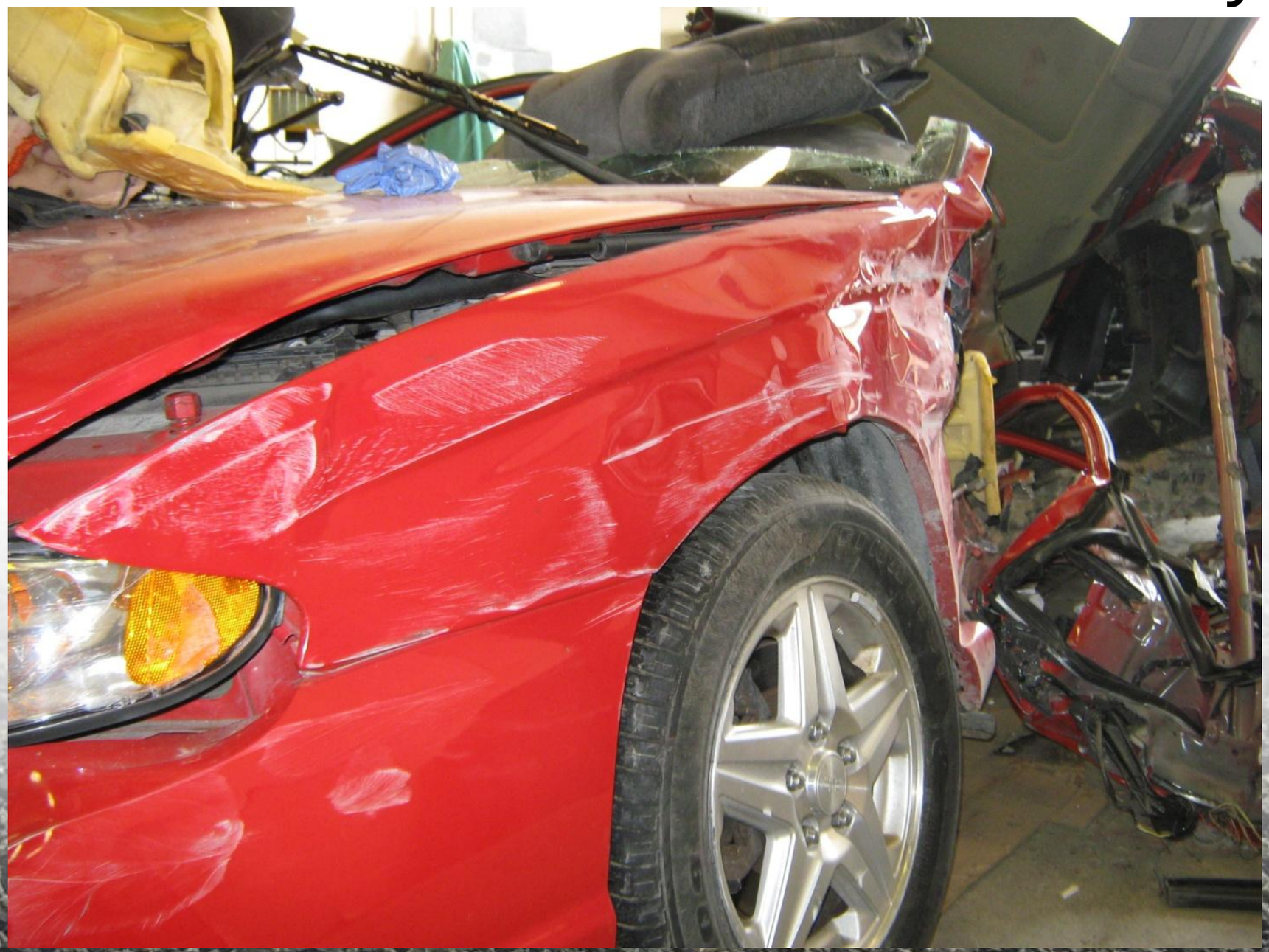
Crashworthy Anchor

Type 5A

Crashworthy Anchor

Type 5A

Crashworthy Anchor



Intercept

Intercept, Engage

Obsolete

Engage, Strength, Crashworthy Anchor

References

- *FHWA Repair guidelines for guardrail:*
- *http://safety.fhwa.dot.gov/local_rural/training/fhwasa08002/fhwasa08002.pdf*
- *Cost-Effective Treatments for Low Volume Roads*
- *http://mwrsf.unl.edu/researchhub/files/Report8/TRP-03-222-12.pdf*

FHWA Guardrail Repair Guidelines

STANDARD SECTION OF W-BEAM			
EXTENT OF DAMAGE			**FUNCTIONALITY**
RAIL ELEMENT SEPARATED			1
RAIL ELEMENT TORN			1
TOP OF RAIL HEIGHT < 28”			1
RAIL ELEMENTS INTACT FULL SPLICES TOP OF RAIL HEIGHT ≥ 28”	AMOUNT OUT OF ALIGNMENT	AMOUNT OF BROKEN/BENT OR SEPARATED POSTS	
	<6”	0	3
		1-2	2
		≥3	1
	6” – 12”	0-2	2
		≥3	1
	≥18”	NOT APPLICABLE	1

Cost-Effective Treatments for Low Volume Roads

- *Midwest Pooled Fund for Roadside Safety*
- *Midwest Roadside Safety Facility (MwRSF)*
- *Examines:*
  - *Culverts*
  - *Trees*
  - *Slopes*
  - *Ditches*
  - *Bridges*
- *Example warrant chart on next slide*

Culvert Drop 4 ft to 7.9 ft. Roadway width 32 ft to 33.9 ft.

B/C Cutoff Ratio 2.00	Culvert Length: ≤ 4 ft						
	Side Slope Rate						
Traffic Volume	1.5:1	2:1	3:1	4:1	6:1	8:1	Flat
50							
100							
150							
200							
250							
300				*			
350				*			
400				*			
450				**			
500				**			

Table A-1. Key for Constant Slope Culvert Recommendations

	Do Nothing
	Remove Deficient System
	Install Guardrail
	Install Culvert Grate
*	Install culvert grate if wingwalls are previously constructed; else, remove deficient system
**	Install culvert grate if wingwalls are previously constructed; else, install guardrail

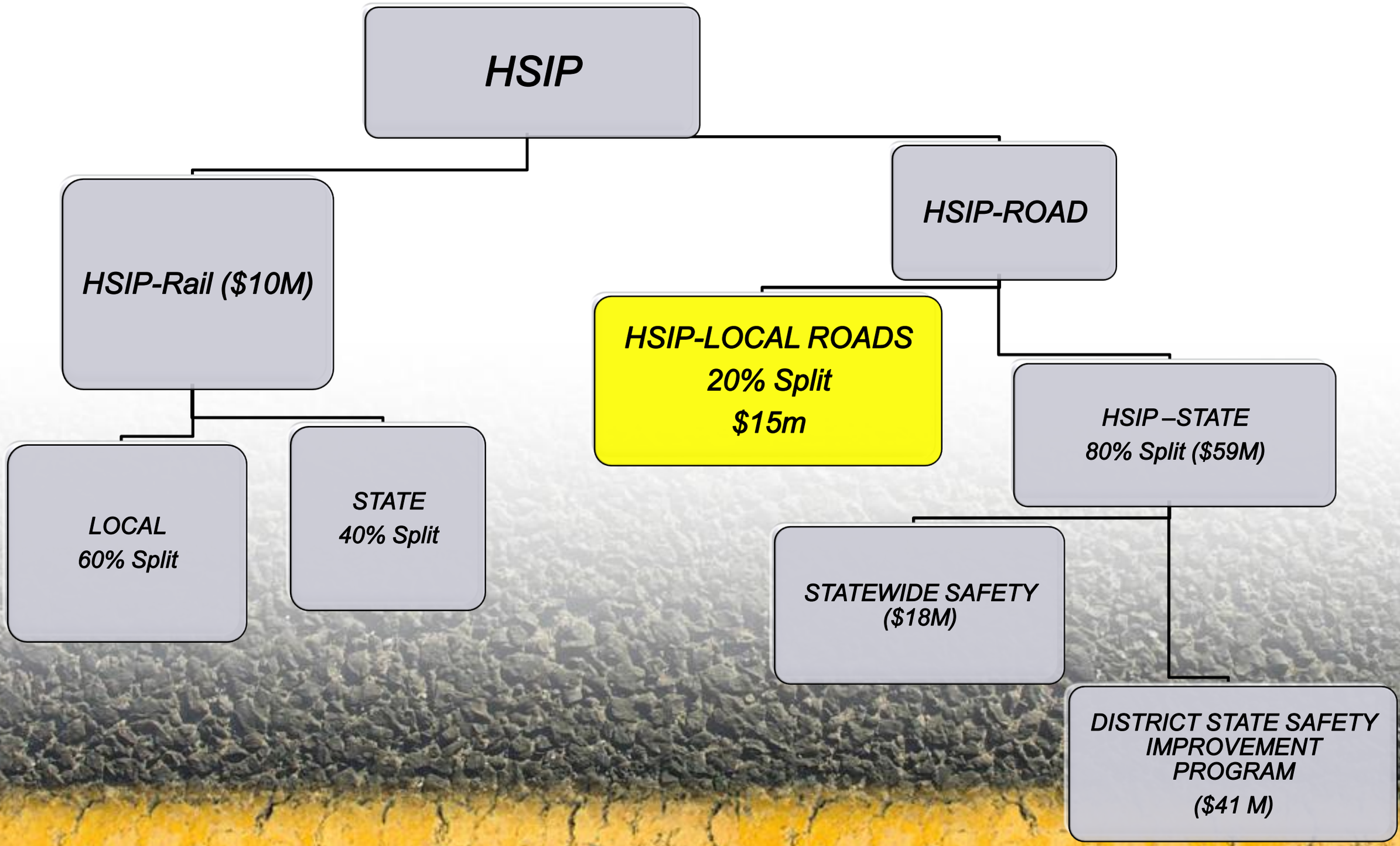
LITTLE EGYPT
NEW CAMP

Before

After

Post Embedment

Highway Safety Improvement Program (HSIP) Funding



IDOT BSE Web Page

TRAVELING PUBLIC | MAPS | PROJECTS | ROAD CLOSURES | NEWS | DOING BUSINESS | LE

THANKS IN ADVANCE!

Most Requested ...

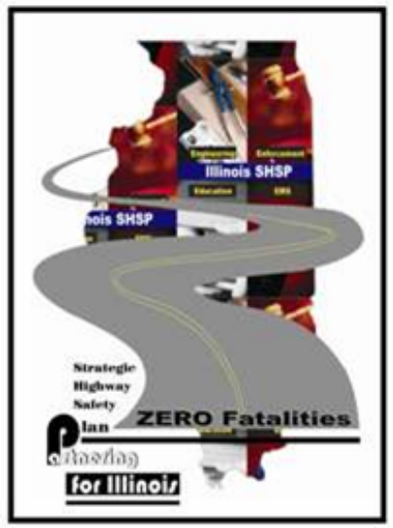
State Links ...

OTHER RESOURCES

- Accountability
- Amtrak
- Bicycling
- Chief Procurement Office
- County Engineers
- Events
- Environment
- High Speed Rail
- IDOT Safety
- Illiana Corridor
- Inspector General
- IPASS
- Diversity Matters!
- Motorcycling
- Office of Business & Workforce Diversity
- Office of Quality Compliance & Review
- Planning and Programming
- Procurement
- Communications
- Public Partners
- Public Transportation
- Secretary of State
- Truckers

Illinois Strategic Highway Safety Plan

Highway Safety Improvement Program



Illinois Department of Transportation
Division of Highways
Bureau of Safety Engineering

Contact:
Priscilla Tobias
State Safety Engineer
(217)782-3568
DOT.IllinoisSHSP@illinois.gov

Strategic Highway Safety Plan (SHSP)

HSIP Policy: Safety 1-06

HSIP Candidate Field Conventions

Crash Modification Factors Clearinghouse

Appendix

A. Allocation of Federal HSIP Funds Flow Chart
B. Project Selection Process
C. Peer Groups & References on Counter Measures
D. Guidelines to Counter Measure Effectiveness & Crash Reduction Factor
E. Guidelines to Counter Measure Service Life
F. HSIP Candidate Form
G. Example of Submittal Package (14 mb)

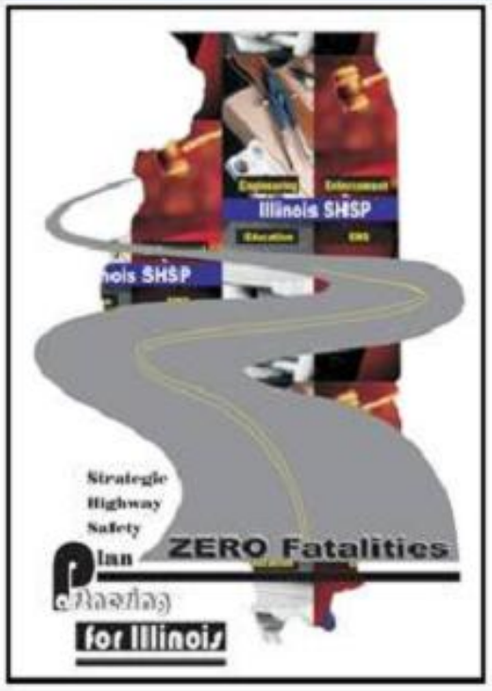
Download Entire Policy

Circular Letter

Safety Analysis Tools

- Benefit-to-Cost Tool
  Benefit Cost Tool User Guide
- Enhanced NCHRP 17-38 Spreadsheet Tool (updated 2/4/13)
  Spreadsheet Tool User Manual (NEW)
- Enhance Interchange Safety Analysis Tool (ISAT) (updated 2/4/13)
  ISAT User Manual
- Overrepresentation Tool
- Interchange Highway Safety Design Model (IHSDM)

Illinois Department of Transportation



Start B/C tool

nefit/Cost Tool

Input Data | Output Data

Step 1	Step 2	Step 3
Project Type	Project Information	Project Input
Step 4	Step 5	Optional
ata	Countermeasure Selection	User-Defined Countermeasure

nefit/Cost Tool

Input Data | Output Data

Calculate B/C | Summary Table

Export Data | Clean All Sheets

HSIP Project Applications include BC analysis

Benefit – Cost Tool incorporates HSM procedures

IT'S UP TO YOU!

Let's Make Zero Fatalities A Reality!

Illinois Dept. of Transportation

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