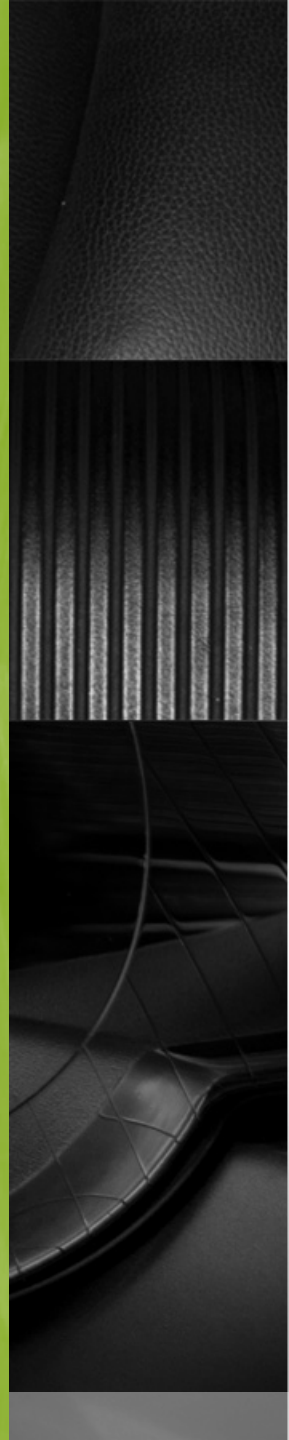


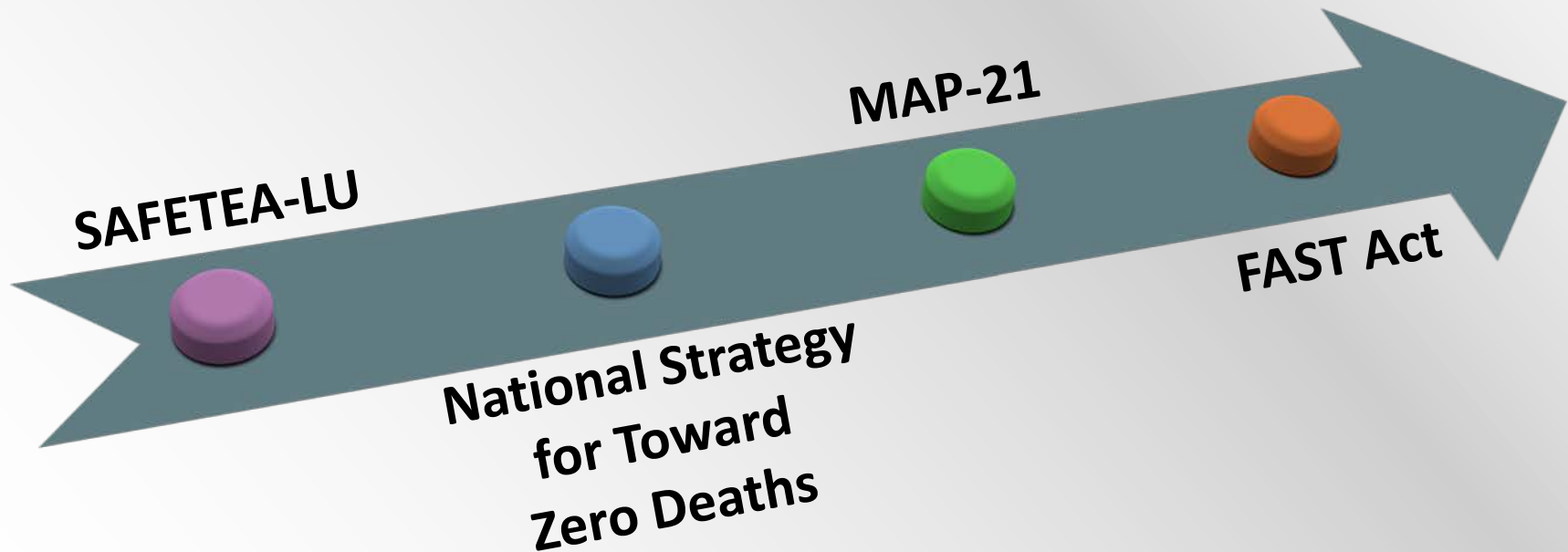
Wednesday, February 17th, 2016

“Integrating Safety into the Transportation Decision Making Process”

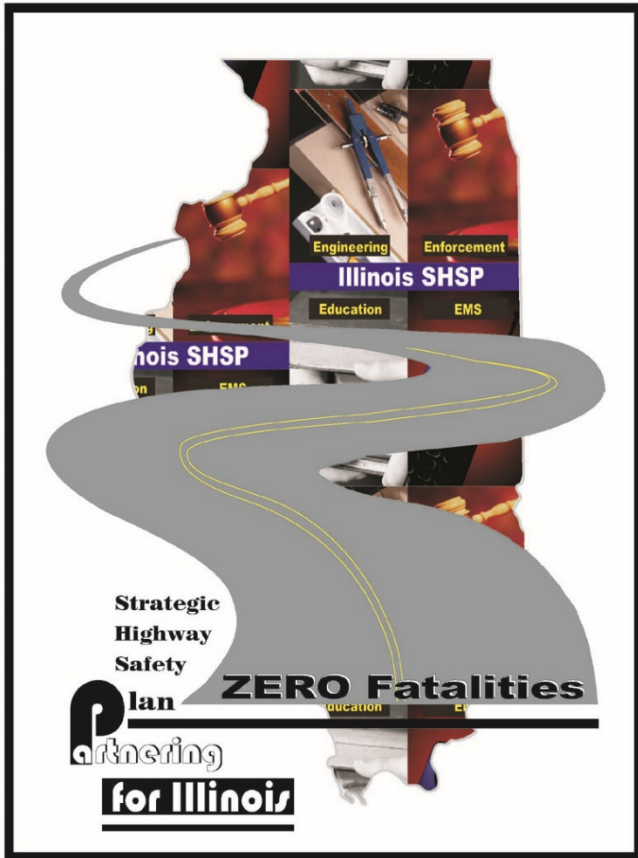
Priscilla Tobias, PE
State Safety Engineer
Illinois Department of Transportation



Increased Focus of Safety Nationally



Strategic Highway Safety Plan



SHSP

- Number of Fatalities & Serious Injuries
- Fatalities & Ser. Injury Rate
- Zero Fatality Goal

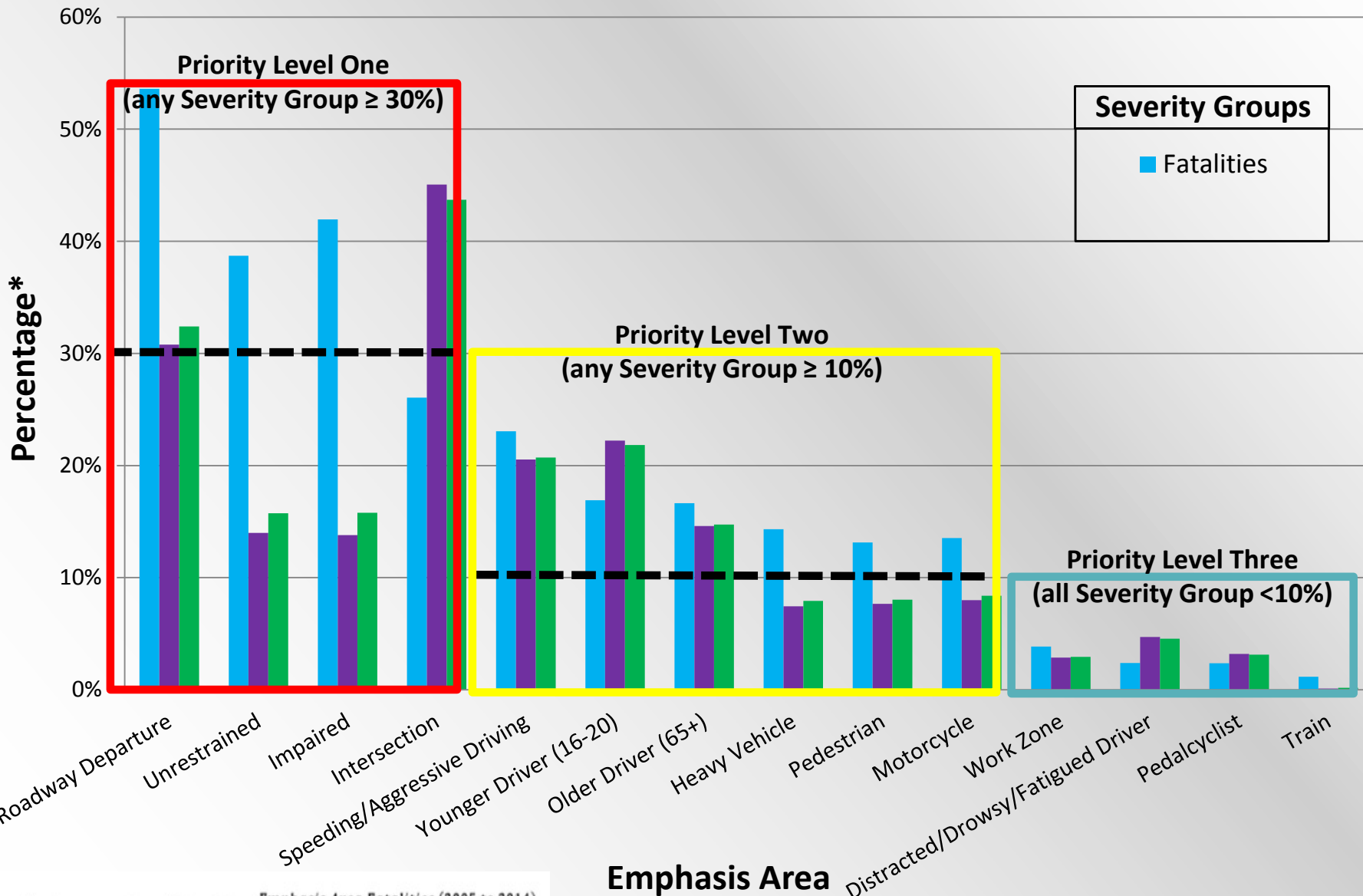
Emphasis Areas

- State and Local Roadways
- Urban/Rural
- Data Driven Priority 1,2, and 3

Strategies

- Engineering
- Enforcement
- Education
- EMS

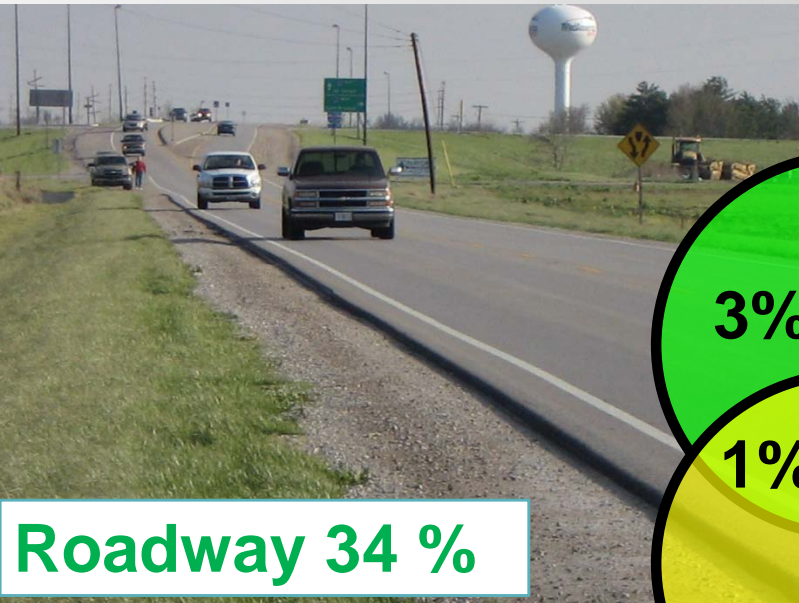
Percentage of Severity Group By Emphasis Area: Fatalities and A-Injuries, 2005-2014



* $Emphasis\ area\ Fatalities\ \% = \frac{Emphasis\ Area\ Fatalities\ (2005\ to\ 2014)}{Total\ Fatalities\ (2005\ to\ 2014)}$

Emphasis Area

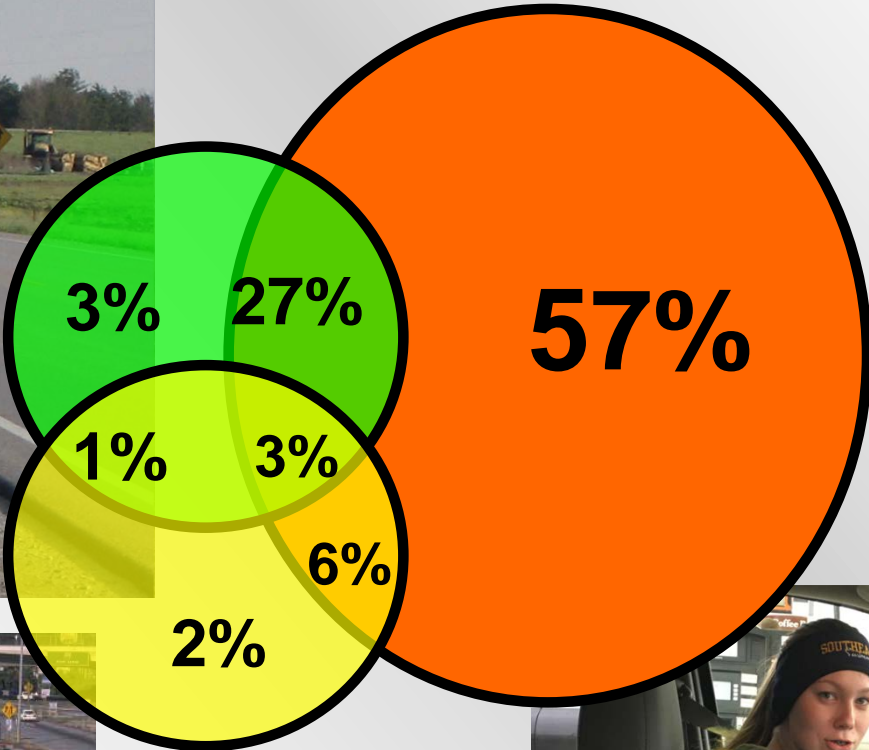
Typical Reported Crash Causes



Roadway 34 %



Vehicle 12%

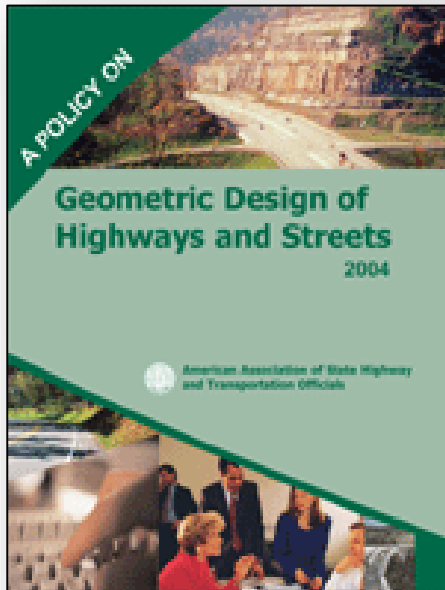


Driver 93 %

The HSM is a Tool to Change How We Consider Safety

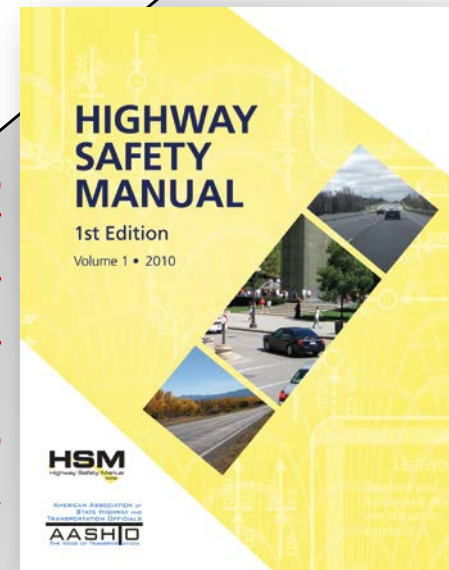
*Nominal
Safety*

*Substantive
Safety*



Examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures

The expected or actual crash frequency and severity for a highway or roadway



Driving Zero Fatalities to a Reality
Partnering for Illinois



Driving Zero Fatalities to a Reality
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Driving Zero Fatalities to a Reality
Partnering for Illinois



Driving Zero Fatalities to a Reality
Partnering for Illinois

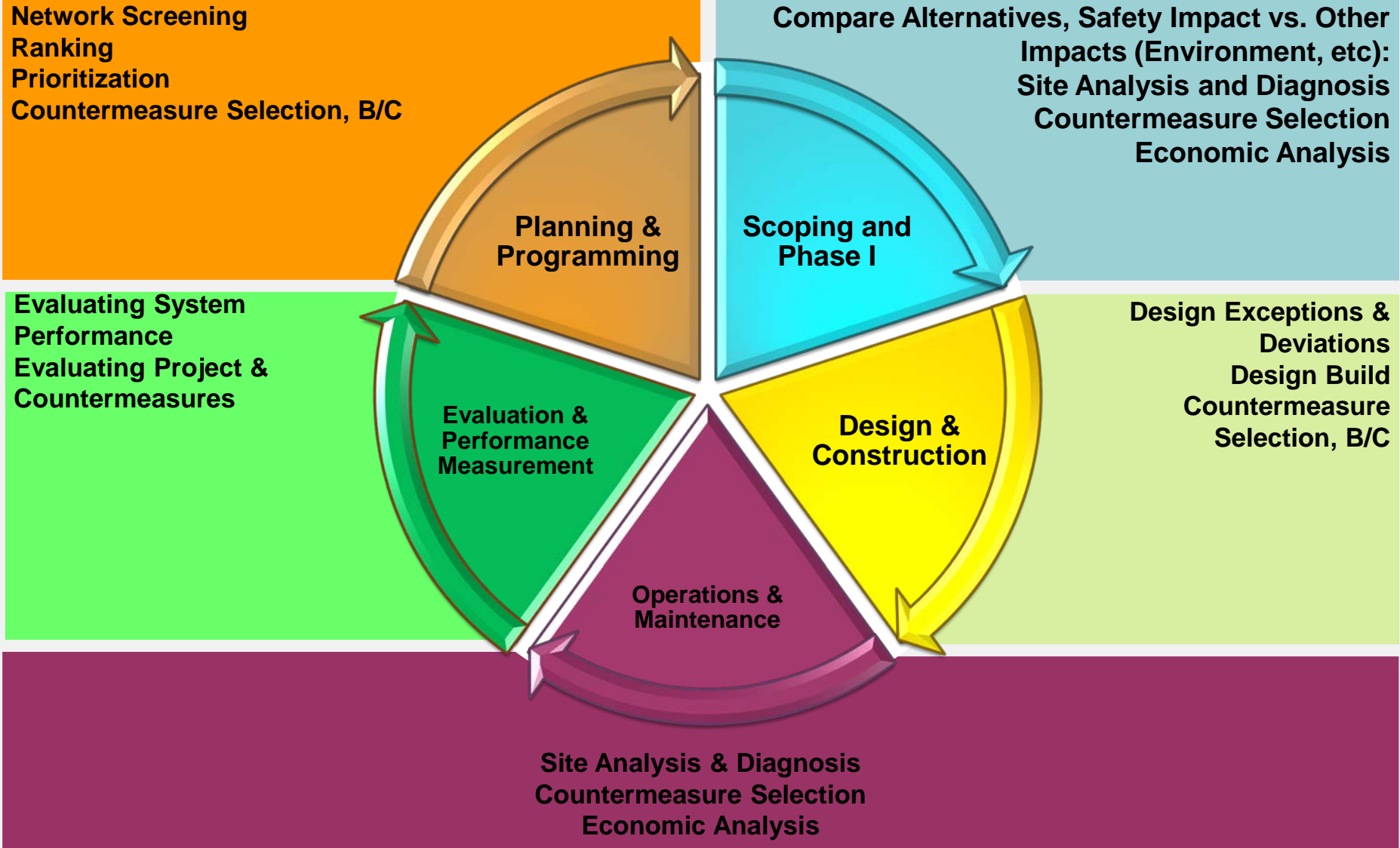


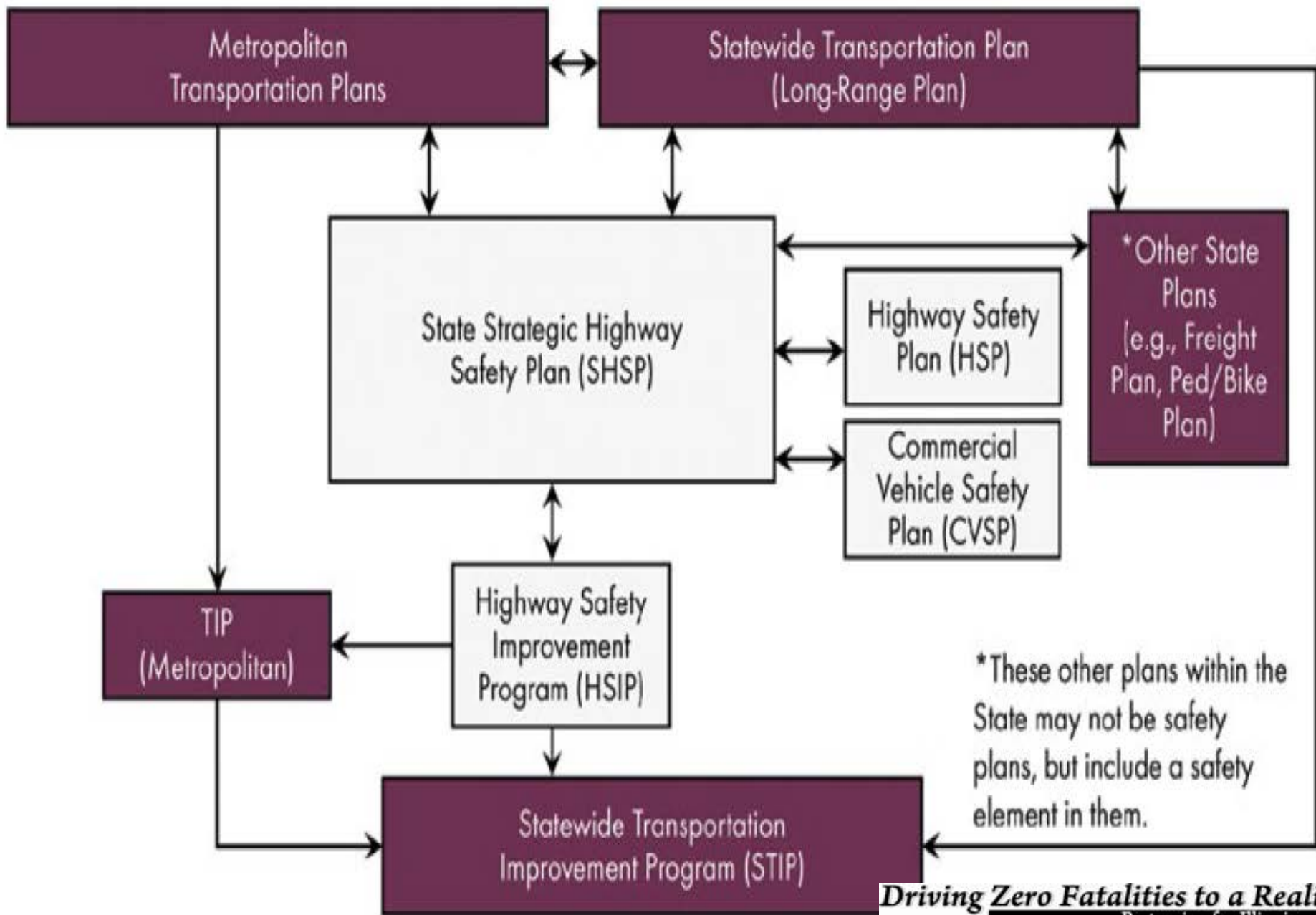
Driving Zero Fatalities to a Reality
Partnering for Illinois



Driving Zero Fatalities to a Reality
Partnering for Illinois

Safety & Transportation Management Process







POLICY

**Improve
Transportation Safety**

**ACTION
ITEMS**

1. Enhance coordination between the Safety Plan, Long-Range Transportation Plan, Statewide Programs and Metropolitan Transportation Improvement Programs and Plans.
2. Implement the existing Safety Plan and develop innovative programs to enhance transportation safety.
3. Establish procedures and utilize technology to explicitly incorporate safety into the transportation management process to evaluate and improve transportation safety performance.
4. Partner with local, statewide, and federal agencies to monitor and manage the safety performance of the statewide freight system.
5. Promote the funding that incorporates clear and measurable traffic safety provisions for all modes.
6. Provide annual report on safety performance, safety programs initiated, and priority recommendations to the Secretary by the first Tuesday in November (prior to MYP program development cycle start).

Network Screening Evolution

2004-5

- HALIS—Fortran Based, Frequency Driven

2006

- Maps—Fatal/Serious Injury Crash by Collision Type

2007

- 5% List & Crash Weighting Method

2008

- Safety Performance Functions (SPF)

2014

- Local 5% List

2015

- Safer Roads Index (SRI): Safety Tiers

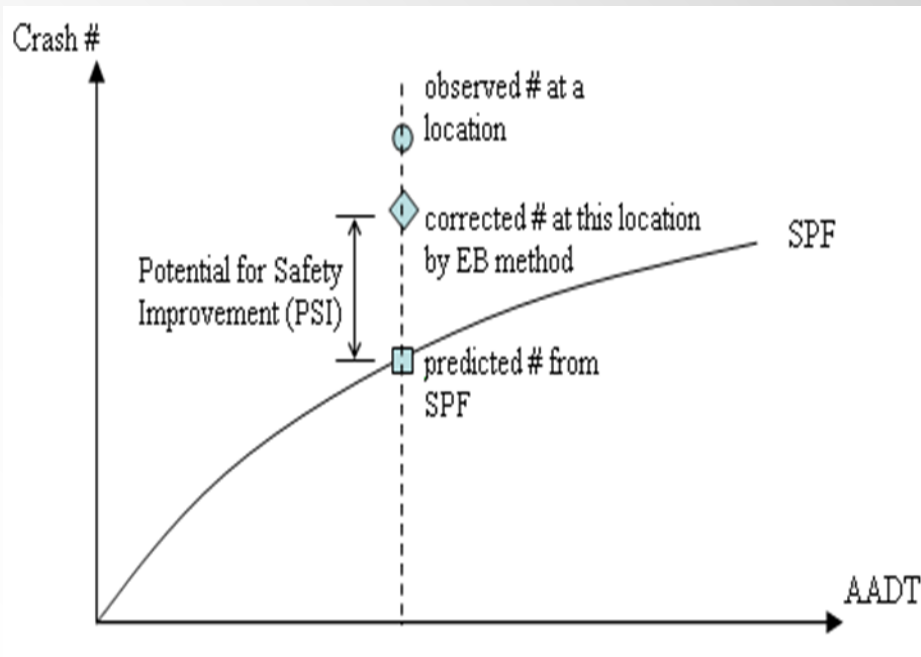
IDOT Network Screening HSM Part B

Potential for Safety Improvements(PSI)

How much a site's safety performance exceeds the predicted

Roadway Segments: PSI represents the excess losses per mile for 5 yr period

Intersection: PSI represents the excess losses at given intersection for 5 yr period



Weighted PSI:

Default values of weights:

Fatal-K (25), Injury-A (10),
Injury-B (1)

Empirical Bayesian (EB)

Find a weighted average of
the predicted and observed
numbers of crashes

IDOT Network Screening

- SPFs Developed
 - Illinois Center for Transportation
 - UIUC
- State Route System
 - Five years of KAB Crashes (108K)
 - 16K miles of roadway
 - 55K intersections
- Models
 - Negative Binomial
 - Based on AADT and Length
 - 12 segment peer groups
 - 8 intersection peer groups

Roadway Segment Mileage Analyzed by Peer Group

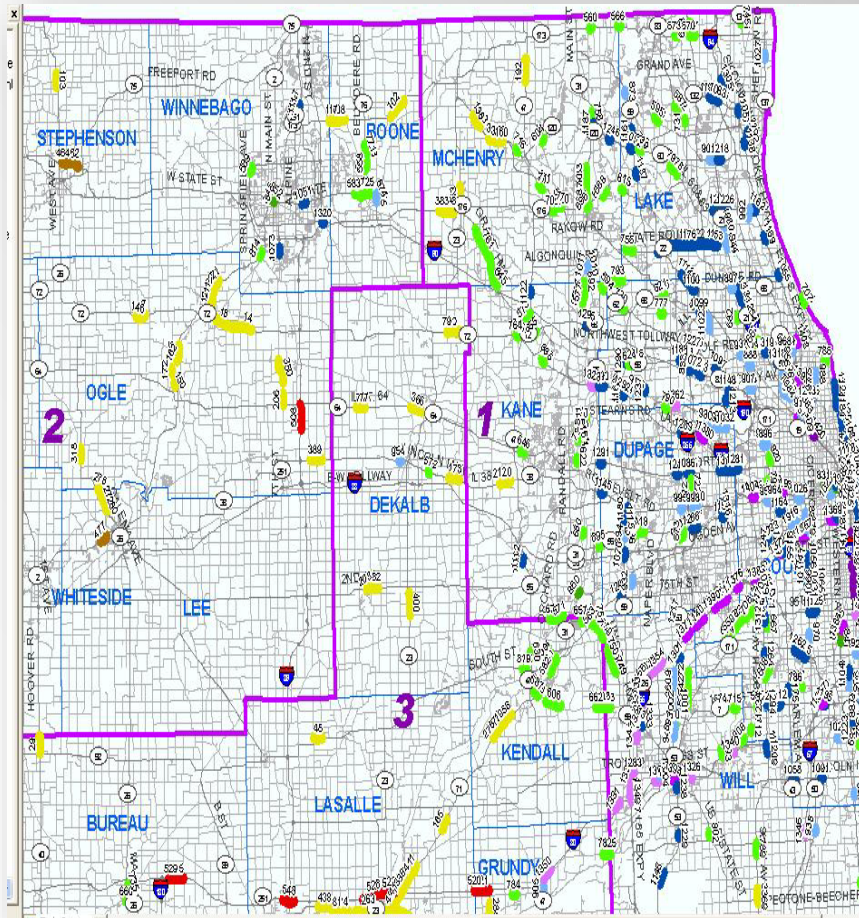
Roadway Segment Peer Groups	Mileage Analyzed By Peer Group
1. Rural 2-Lane Highway	9,586
2. Rural Multilane Undivided Highway	40
3. Rural Multilane Divided Highway	341
4. Rural Freeway, 4-Lanes	1,429
5. Rural Freeway, 6+ Lanes	32
6. Urban 2-Lane Highway	2,000
7. Urban One-Way Arterial	187
8. Urban Multilane Undivided Highway	771
9. Urban Multilane Divided Highway	1,247
10. Urban Freeway, 4-Lanes	441
11. Urban Freeway, 6-Lanes	282
12. Urban Freeway 8+ Lanes	64
Total	16,421

Number of Intersections Analyzed by Peer Group

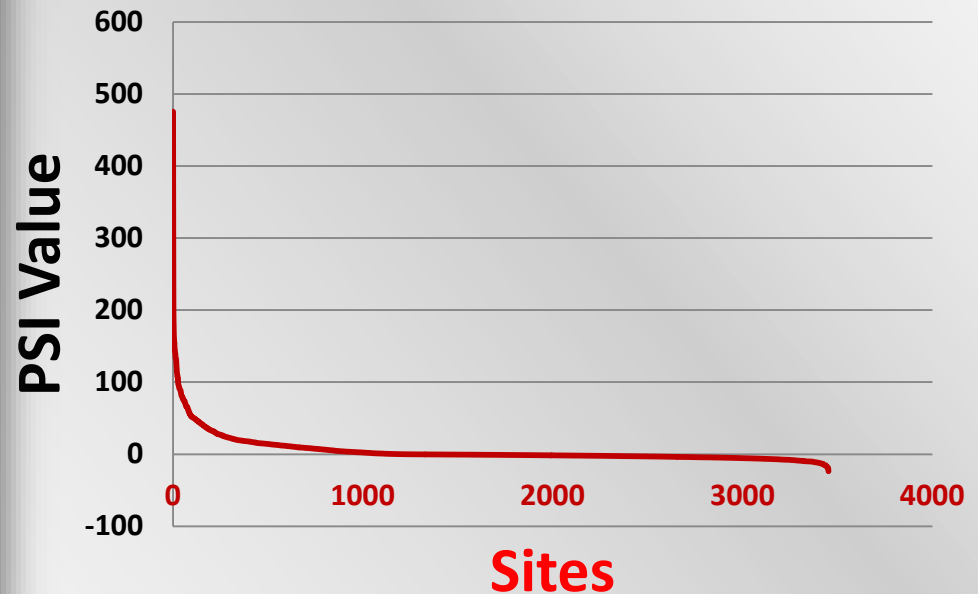
Intersection Peer Groups	Number of Intersections Analyzed by Peer Group
1. Rural Minor Leg Stop Control	16,498
2. Rural All-Way Stop Control	369
3. Rural Signalized Intersection	202
4. Rural Undetermined Intersection	7,361
5. Urban Minor Leg Stop Control	17,737
6. Urban All-Way Stop Control	242
7. Urban Signalized Intersection	6,057
8. Urban Undetermined Intersection	6,414
Total	54,880

High Potential for Safety Improvement

- Lists of high priority locations (5% location and Critical PSI)
- Statistics that identify areas for potential enforcement



PSI - Urban Multilane Divided
2010 Reporting, IL DOT
State Jurisdiction Highways



Five Percent Reporting

TABLE D-9a Selected Segment Crash Experience—State and US Highways

Peer Group 9—Urban Multilane Divided Highway

SegmentID	District	Length	Total Crashes	Crashes per Mile	PSI	Crashes by Severity			Crash Type							
									Head-On and Opposite Direction		Fixed Object and Overturned		Angle and Turning		Rear End and Same Direction Sideswipe	
						K	A	B	Number	Percent	Number	Percent	Number	Percent	Number	Percent
09-0686	1	0.40	14	35.26	219.19	2	4	8	1	7%	2	14%	3	21%	8	57%
09-0687	1	0.26	26	99.04	216.10		7	19		0%	19	73%	2	8%	4	15%
09-0689	1	0.44	23	51.86	200.64	1	7	15	1	4%		0%	14	61%	6	26%
09-0690	1	0.49	46	94.13	188.29		14	32	1	2%	5	11%	19	41%	19	41%
09-0691	1	0.39	49	125.57	188.07		17	32		0%	3	6%	29	59%	12	24%
09-0692	1	0.31	25	81.12	184.27		11	14	1	4%		0%	15	60%	9	36%
09-0693	1	0.51	33	64.15	169.96		10	23	1	3%	5	15%	8	24%	18	55%
09-0694	1	0.72	33	45.99	167.70		9	24		0%	1	3%	16	48%	4	12%
09-0697	1	0.48	64	133.72	160.83	1	13	50	1	2%	3	5%	35	55%	12	19%
09-0698	1	0.31	55	177.59	152.35	1	7	47	1	2%	28	51%	6	11%	19	35%

PSI = 152

Fixed Object and Overturn = 51%

Rear End and Same Direction Sideswipe = 35%

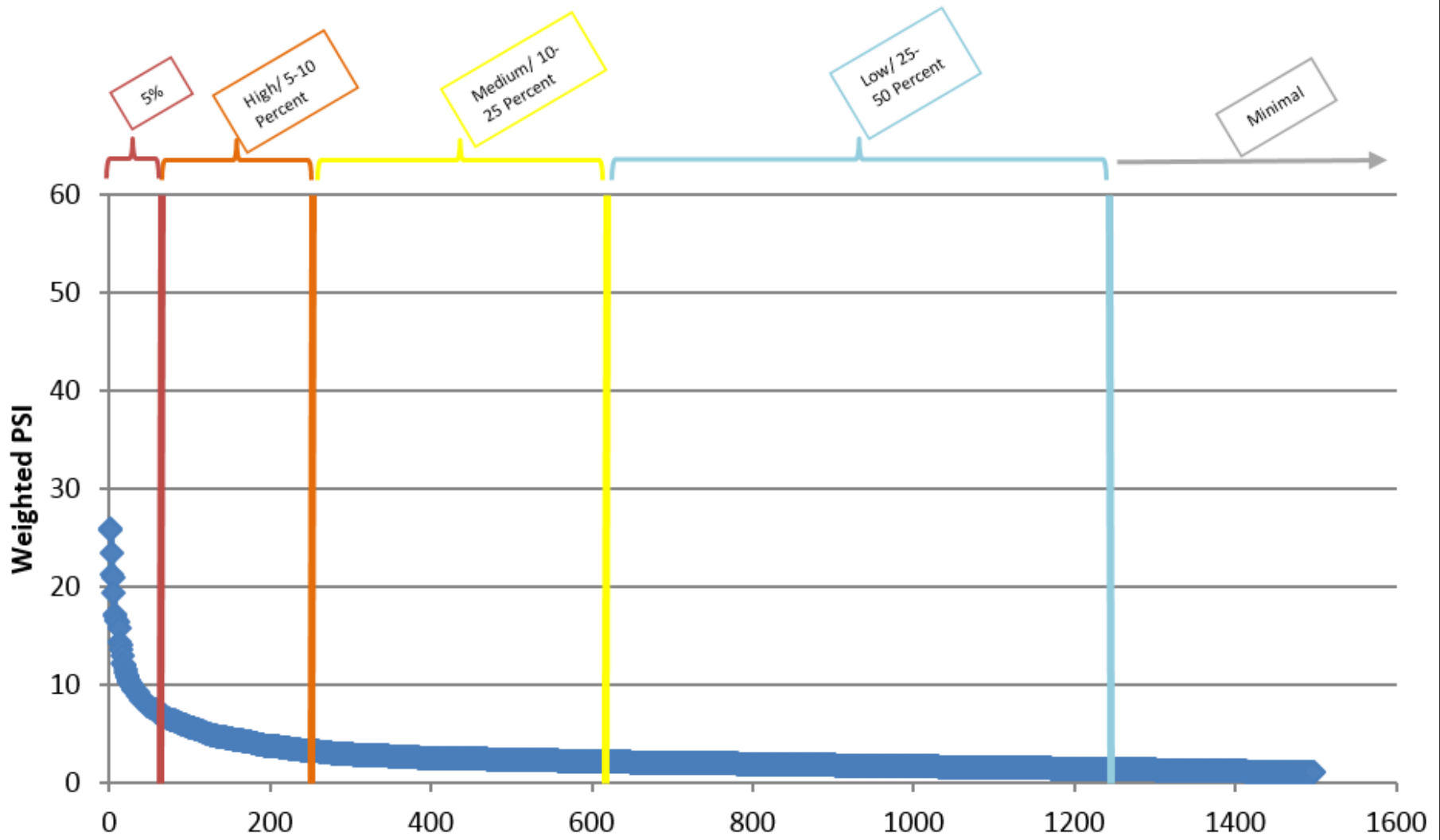


Safer Roads Index (SRI) & Safety Tiers

- **Tiers based on:**
 - Potential for Safety Improvement (PSI)
 - Fatal and A-Injury crashes
- **Performance metric for programming process and project selection**
 - Used like construction management & pavement/bridge/infrastructure condition evaluation and maintenance
- **First provided in 2015 FIVE PERCENT Report**
 - Goes beyond the simple Yes/No answer of being a FIVE PERCENT location

Intersections and Safety Tiers

Peer Group 1 - Rural Minor Leg Stop Control



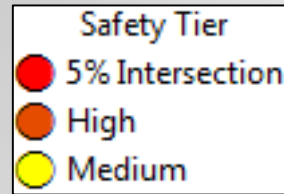
Roadway Segments and Safety Tiers

2015 FIVE PERCENT Report: Segment Safety Tiers

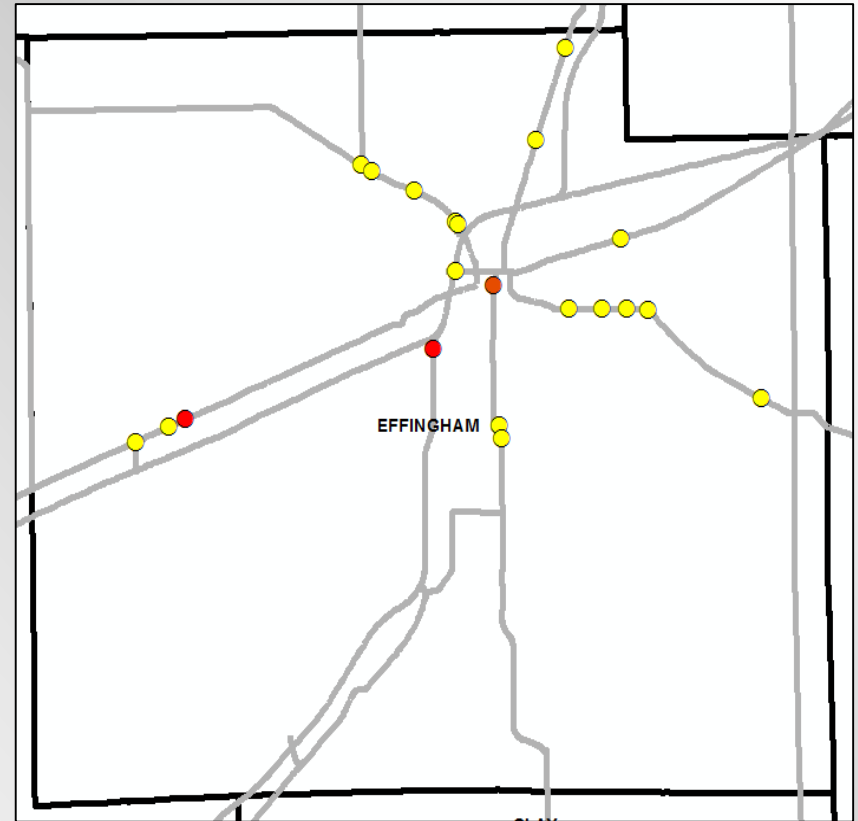
Peer Group	Tier	Max. PSI	K+A	Σ K+A	Σ K+A %	Tier Mileage	Tier Mileage %	Σ Mileage	Σ Mileage %
1: Rural 2-Lane	5%	70.0	748	748	25.9%	422	5.1%	422	5.1%
	High	40.5	128	876	30.3%	431	5.2%	853	10.2%
	Medium	14.0	348	1,224	42.3%	1,281	15.3%	2,134	25.5%
4: Rural Freeway 4 Lanes	5%	54.0	457	457	15.8%	76	5.1%	76	5.1%
	High	24.0	221	678	23.4%	73	4.9%	149	10.1%
	Medium	16.0	111	789	27.3%	224	15.2%	373	25.2%

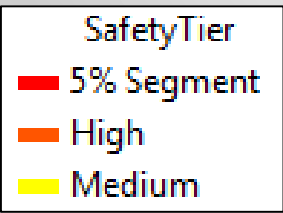


Intersections Before



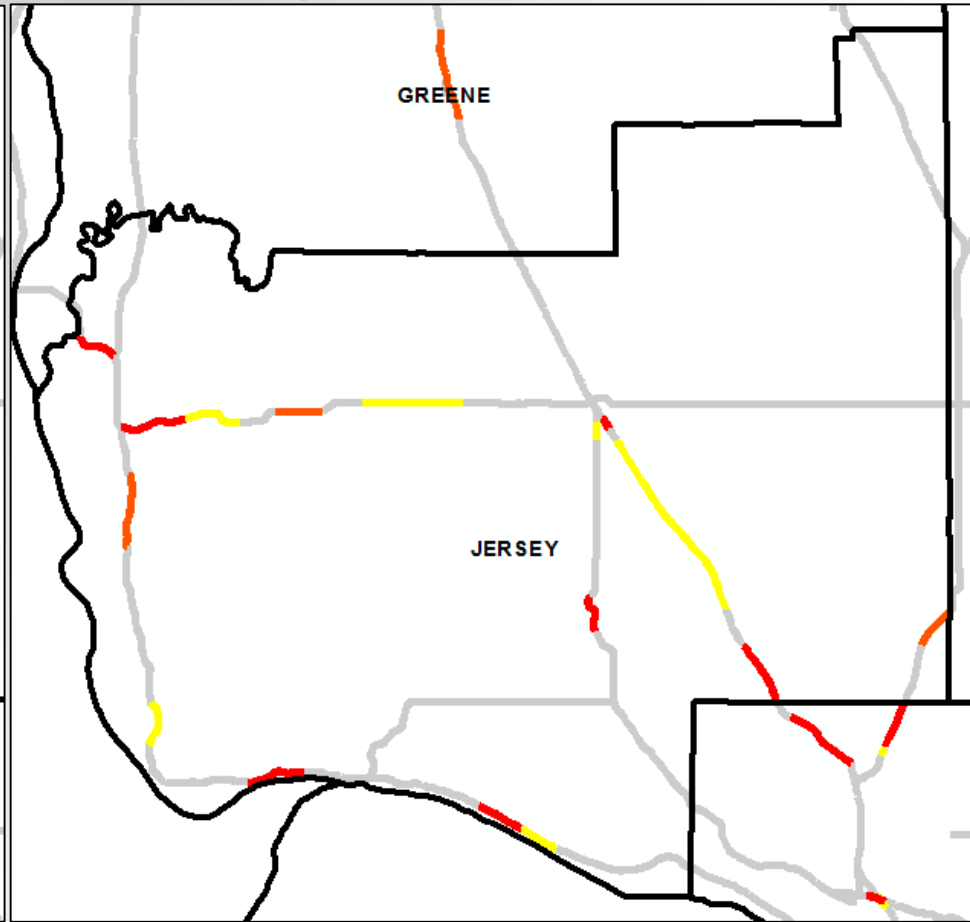
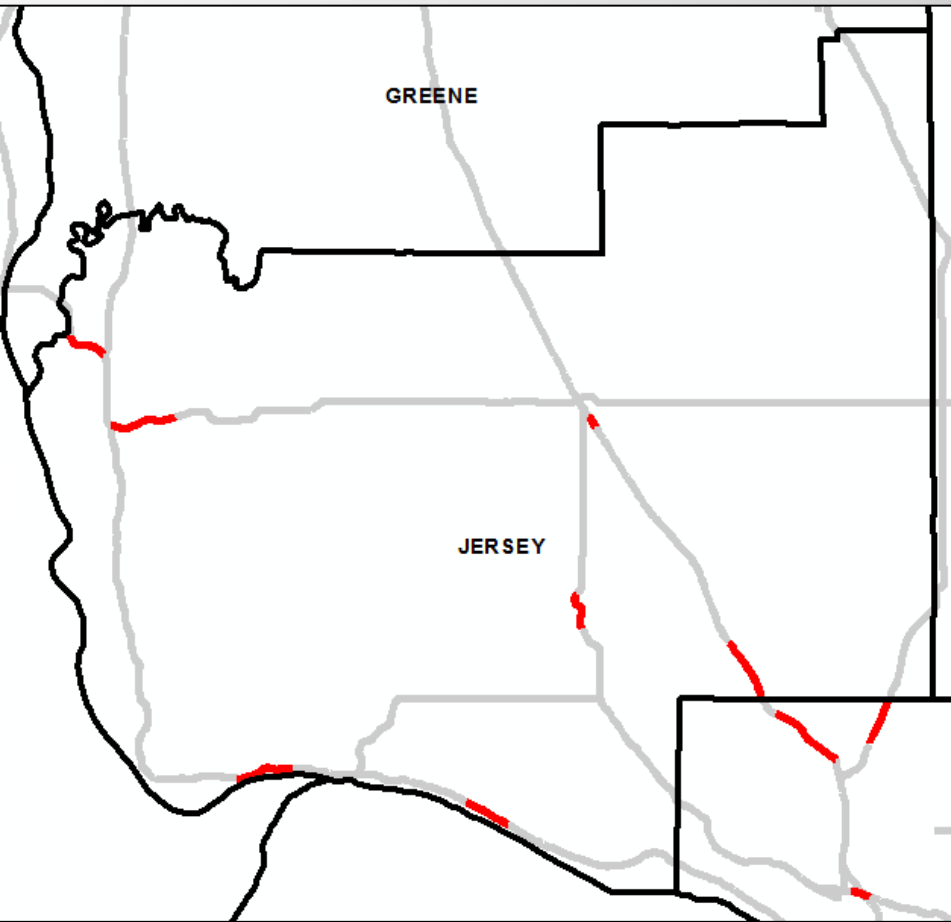
Intersections After





Segments Before...

Segments After...



IDOT Performance Measures

- **Condition Rating System (CRS) –
Structural:**

Loss of load carrying capacity or structural breakdown

- **International Roughness Index (IRI)–
Functional/Surface:**

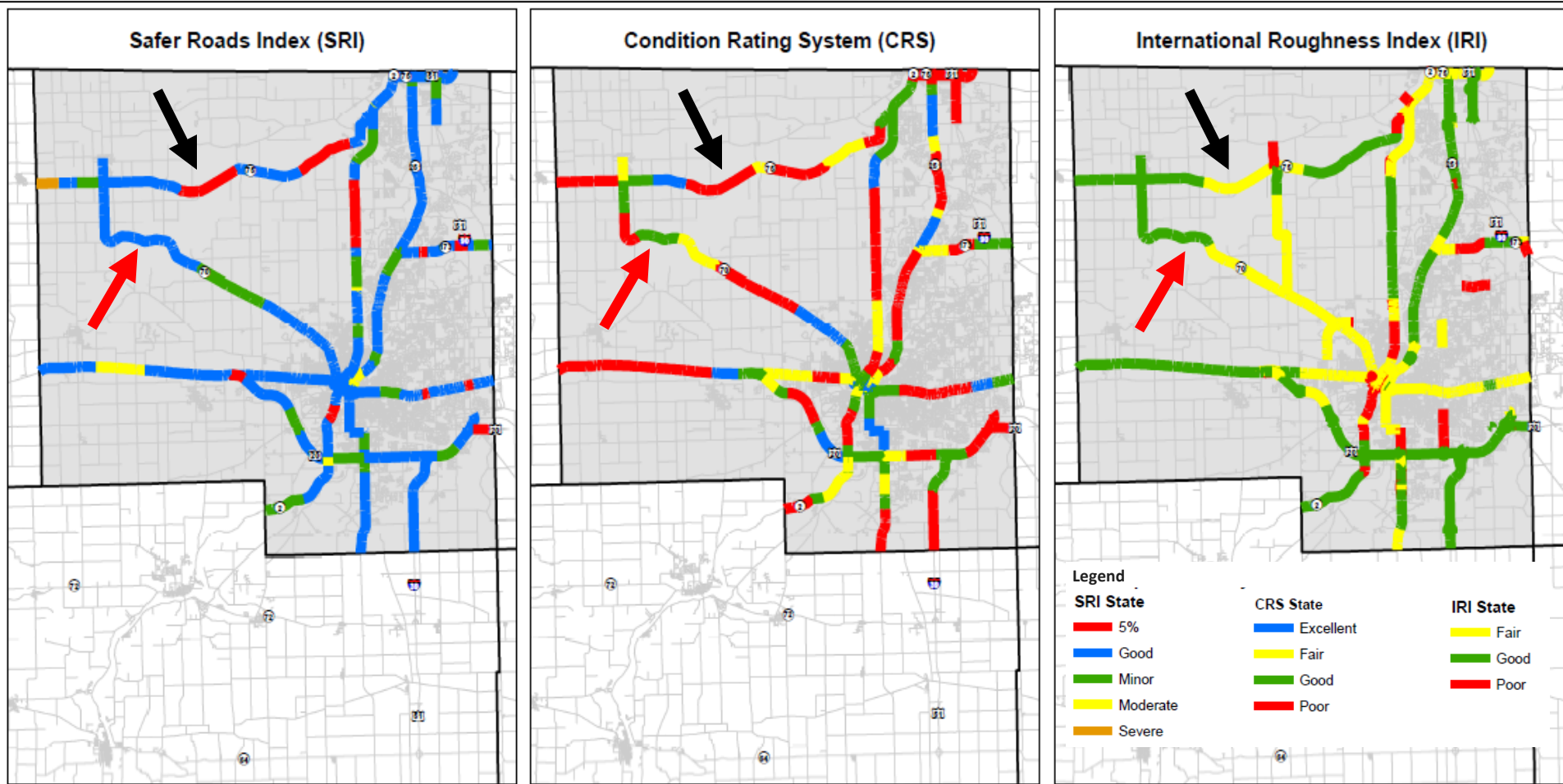
Excessive roughness impacting functional usability and causing drive discomfort

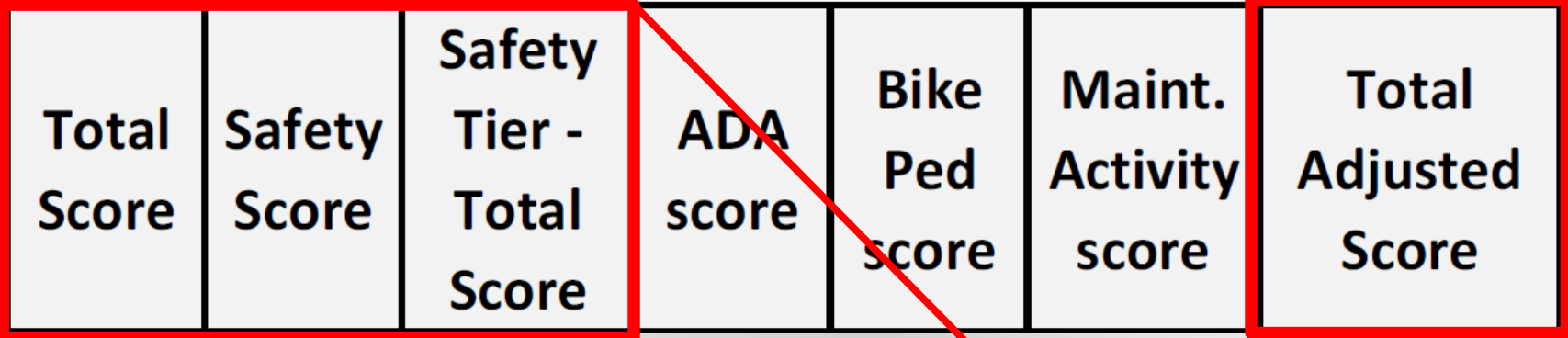
- **Safer Roads Index (SRI)–
Safety Performance (PSI):**

Establishes safety risk based on historical severe crashes and exposure

	State of Repair
CRS Range	
9.0 to 7.6	Excellent
7.5 to 6.1	Good
6.0 to 4.6	Fair
4.5 to 1.0	Poor
IRI Range (in/mi)	
1 to 94	Good
95 to 177	Fair
> 177	Poor
SRI Range	
Minimal	Good
Low	Minor
Medium	Moderate
High	Severe
5%	5%

Transportation System & Performance Measures





PPS Number	Marked Route	Street Name	Location	Program Cost	AADT Score	FC Score	NHS Score	CRS Score	Truck % Score	IRI Score	Rut Depth Score	Distress Score	Backlog Score	Total Score	Safety Score	Safety Tier - Total Score	ADA score	Bike Ped score	Maint. Activity score	Total Adjusted Score	Surface Year	Comments
5530240000	US 150	PROSPECT AVE	BLOOMINGTON RD TO SPRINGFIELD AVE IN CHAMPAIGN	1,125,000	2000	1250	500	2000	0	500	0	550	1250	8050	1500	0	100	0	0	9650	2014	Intermittent Inlay
5529990000	US 45	NEIL ST	SPRINGFIELD AVE IN CHAMPAIGN TO CURTIS RD IN SAVOY	3,491,000	2000	1250	500	1250	0	250	0	300	1000	6550	2000	0	100	0	750	9400	2007	Worksheet Complete
5530270000	US 150		PROSPECT AVE TO UNIVERSITY AVE IN CHAMPAIGN	1,050,000	1500	1250	500	0	0	0	0	0	2500	5650	2000	350	100	100	750	8950	2005	Need estimate
5530430000	I 55 BUS	VETERANS PKWY	CLEARWATER AVE TO I-55	6,125,000	2000	1250	500	500	0	250	1000	0	1250	6750	1500	0	100	0	0	8350	1998	Worksheet Complete
5529740000	ILL 9		ILL 122 TO I-74 IN BLOOMINGTON	3,100,000	1250	1250	500	500	0	0	0	300	2000	6150	1000	1000	0	0	0	8150	2003	Worksheet Complete
5539430000	US 45		US 36 AT TUSCOLA TO COLES CO LINE	3,666,000	500	500	0	1250	0	250	0	0	1250	5700	1000	500	100	100	750	8150	2010	Worksheet Complete
5535300000	US 150		MANSFIELD TO MAHOMET	2,350,000	500	250	0	2000	0	250	0	250	2500	5350	1000	1000	100	100	0	7550	2002	Worksheet Complete
5530080000	US 51 BUS	CENTER ST	US 51 BYP (N) TO US 51 BYP (S) IN CLINTON	1,330,000	1000	1250	500	500	0	250	0	1200	1250	5950	1000	200	100	100	0	7350	2004	Worksheet Complete

Safety Scoring

Safety Mark	Safety Tier - Shldr mark 1, 2, or 3	Safety Tier - Centerline mark 1, 2, or 3	Safety Tier - Curve score mark 500	Safety Tier - Pedestrian score mark 500	Safety Tier - Total Score	Mark x if ADA	ADA score	Mark x if Bike/Ped	Bike/Ped score2	Mark x if LOS = D,E, or F	LOS score	Enter Maint. Activity	Maint. Activity score	Total Adjusted Score
h	1500	0	0	0	0	x	100	0	0	0	0	0	0	9650
	0	2	250	3	100		350	0	0	0	0	0	0	7700
	0	2	250	3	100	x	350	100	0	0	0	0	0	7550
h	1500	0	0	0	0	x	100	0	0	0	0	0	0	8350

I 055 B ST: STS: A TP: S VLD: I D YR: 2018 P YR: 2019

Hide	Type	County/Muni/Urban/Rep/Sen/Congress/Mayoral	Source
<input type="checkbox"/>	CNTY	057-McLean	IRIS
<input type="checkbox"/>	MUNI	0540-Bloomington	IRIS
<input type="checkbox"/>	URBN	0540-Bloomington	IRIS
<input type="checkbox"/>	LEGR	88th Representative District	IRIS
<input type="checkbox"/>	LEGR	105th Representative District	IRIS
<input type="checkbox"/>	LEGS	44th Senatorial District	IRIS
<input type="checkbox"/>	LEGS	53rd Senatorial District	IRIS
<input type="checkbox"/>	LEGC	18th Congressional District	IRIS

Calc Accompl Struct Count: 0 Struct Count: 0 Struct AADT: 0

Over Accompl Struct Count: Struct Count: Struct AADT:

Move Unfunded Project To BPT

Structure # Feature Crossed BCC Cost Plan CBA Suff Rtg AADT +

Hide	Date/Owner	Comment
<input type="checkbox"/>	2/1/2016-DO	ADA @ 68 locations
<input type="checkbox"/>	2/5/2015-DO	5% & CPSI Location
<input type="checkbox"/>	2/25/2014-DO	Safety: Curve priority 7

Current Amount: \$6,576,000 Accumulated Amount: \$6,576,000

Base Cost: Restricted: Unrestricted

Contracts and Obligations

Dist Use 1-4: D082

Type	Fund Source	Cat	Restricted	Amount
IN	D03-STP-Urb 5-200K-S	F	No	\$165,000
IN	063-State Match	S	No	\$41,000
RD	D03-STP-Urb 5-200K-S	F	No	\$5,096,000
RD	063-State Match	S	No	\$1,274,000

Dist Use 5: Extract to PCS

Est Amt Date: 2/11/2016 Type: Programming Cost: \$6,576,000

PCL: A01-Urban Rsurf Responsible District: 5

Linked PPS# Type Linked Projects +

Code	Improvement	Fnd Tp	Requirements	BCC
131	Resurfacing (3P)	RD	Miles	
535	ADA Improvements	IN, RD		

Hide Type Code MYP/Annual Footnote +

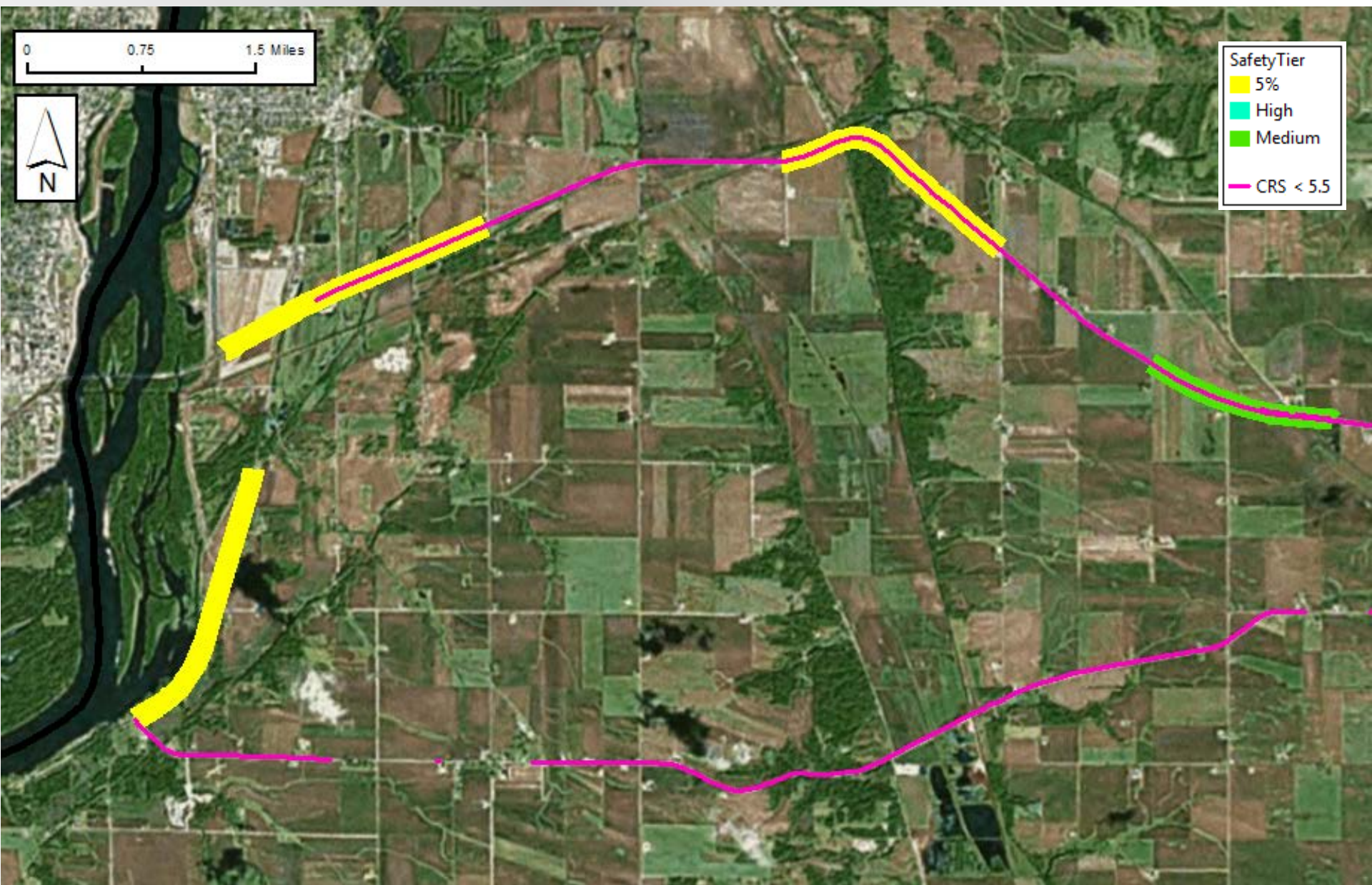
Group Code Group Name Tracking Code Tracking Code Name +

Hide Type Code Year FTR Footnote +

Code	Type	Special ID Number	Source
SJ	State Job #	C-95-020-14	Project
SN	Section #	(1,2)RS-2	Project

Date/Type Committed To Committed By +

Hide Crossing # Railroad Name Street/Road Name Source +





4 A-Injury Crashes
2 Roadway Departure
1 Rear End
1 Animal

0 K+A Crashes

1 A-Injury Crash
1 Rear End

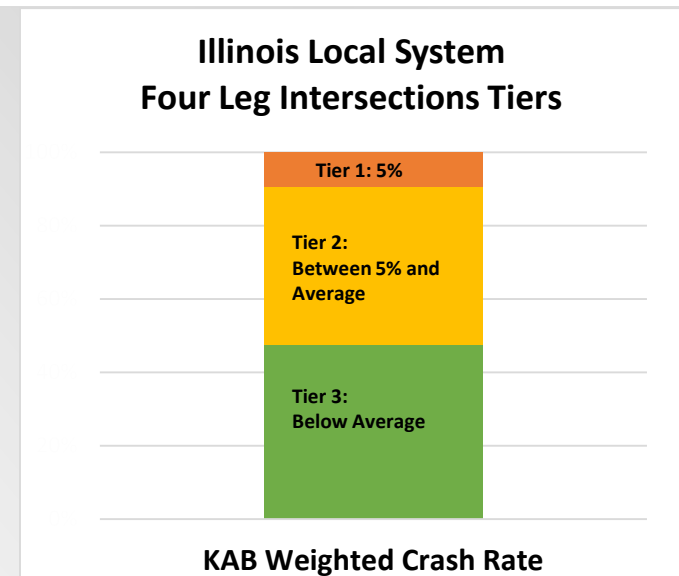
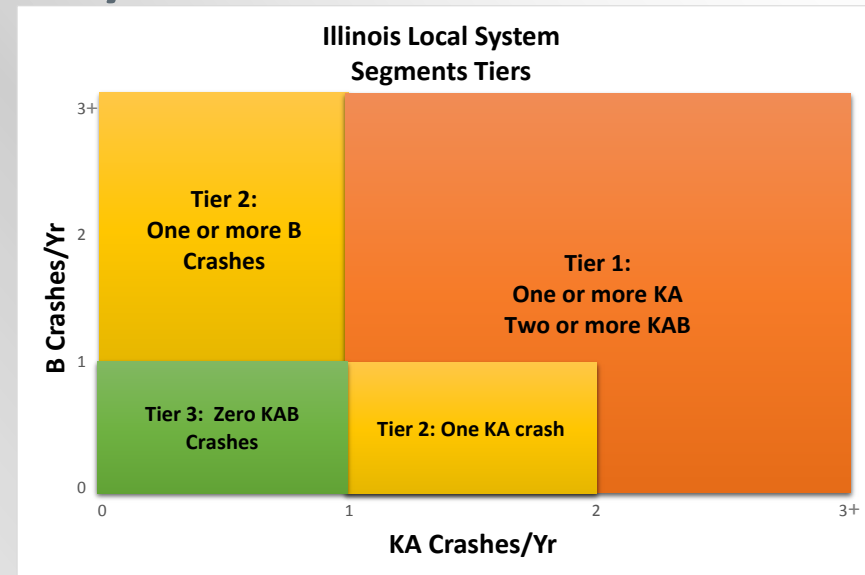
3 A-Injury Crashes
2 Roadway Departure
1 Rear End

1 Fatal Crash
1 Head On

Local FIVE PERCENT Safety Tiers

- Segment Safety Tiers based on:
 - Frequency of KA and KAB crashes
 - Entire local system divided into three tiers

- Intersection Safety Tiers based on:
 - KAB weighted and KA crash rates
 - Ranked from high to low, first by KAB weighted crash rate, then by KA crash rate
 - Four leg intersections divided into three tiers





Next Steps

- Incorporate SRI/Safety Tier PSI into IDOT's Roadway Inventory System (IRIS) and Program Planning System (PPS).
- Identify those roadway and geometric features that contribute to the occurrence of severe crashes.
- Incorporate Systemic Safety Improvements into programming process and make changes to design and operation policies.
- Expand Network Screening SPFs to local roadway system and develop a SRI

Toward Zero Deaths



Driving Zero Fatalities to a Reality
Partnering for Illinois