

Mn/DOT County Road Safety Plans

TZD Stakeholder Breakfast

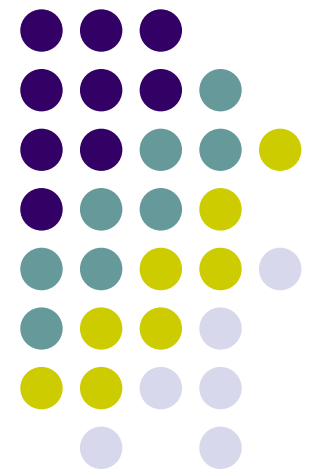
January 20, 2010

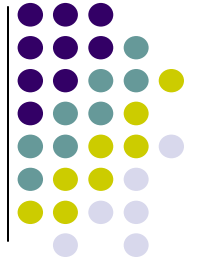
Howard Preston

Michael Barry

Loren Hill

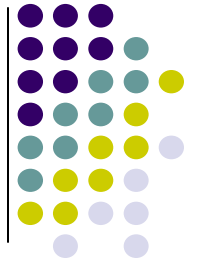
CH2M HILL, SRF Consulting Group, P.E. Services





Agenda

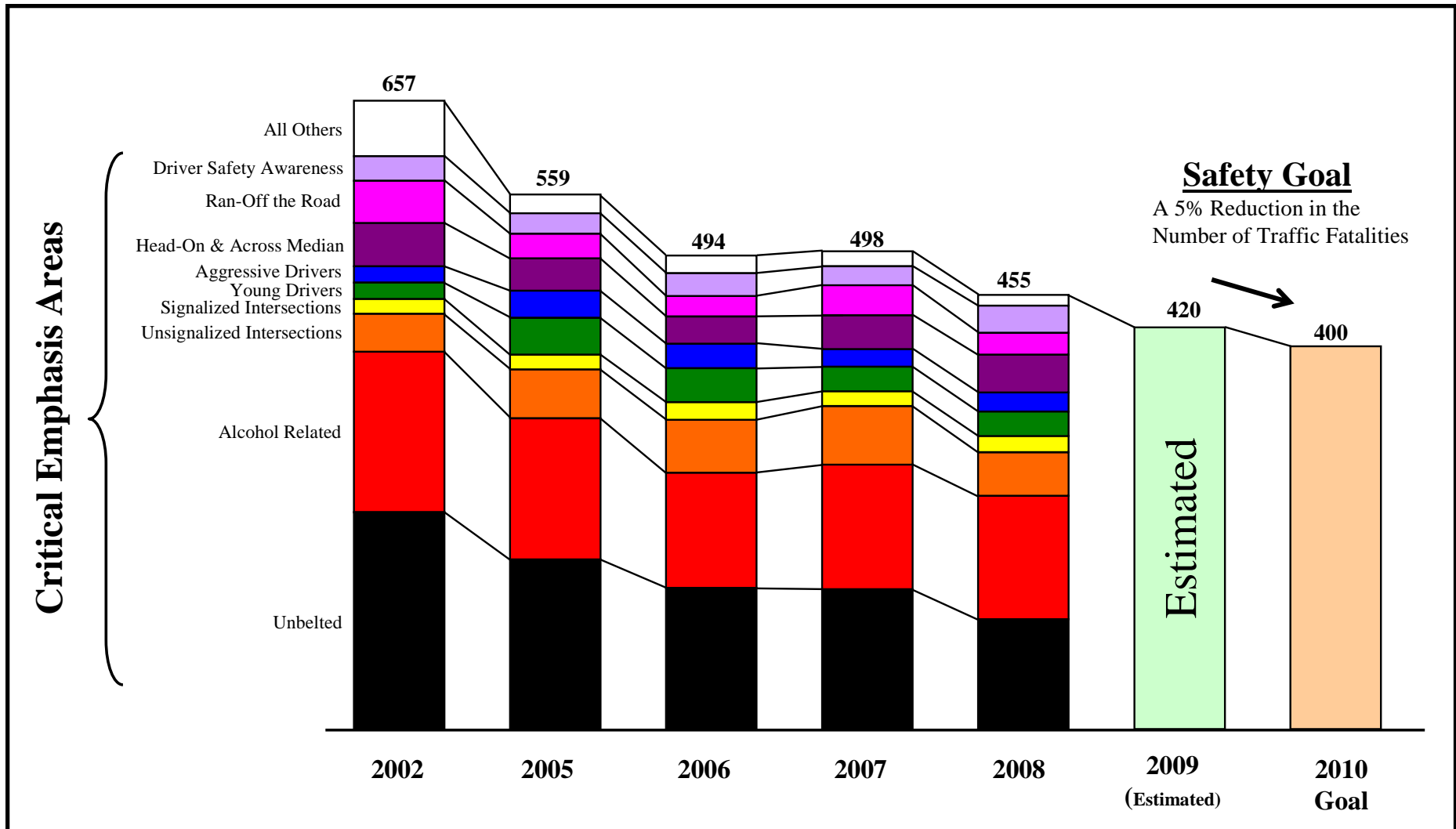
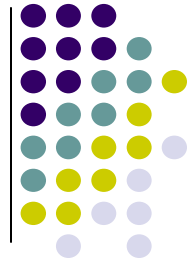
- Background, Goals & Objectives
- Project Overview
 - Schedule, Participating Counties, Approach
- Safety Emphasis Areas
- Safety Strategies
- Identifying At-Risk Locations
- Examples of Projects
- Next Steps/Comments
- Questions



Background

- Federal Highway Initiative
 - Changed national safety performance measure
 - Fatalities (severe crashes) as opposed to All crashes
 - Safety goals for every State
 - Data driven process
 - More effective safety investments
 - Better link between crash causation and implementation of safety strategies
 - Four Safety E's
 - All roads

Background



Roadway Segment Crash and Fatality Rates by Jurisdictional Class

Roadway Jurisdiction Classification	Miles	Crashes	Fatalities	Crash Rate*	Fatality Rate**
Interstate	914	9,689	43	0.8	0.3
Trunk Highway	10,956	22,583	196	1.1	1.0
CSAH /County Roads	44,997	22,768	185	1.6	1.3
City Streets	19,105	21,423	41	2.7	0.5
Other (Township, etc.)	59,387	2,282	29	1.9	2.4
State Total	135,359	78,745	494	1.4	0.9

* per million vehicle miles (MM)

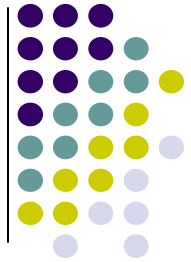
** per 100 million vehicle miles (100MM)

Source: Minnesota Motor Vehicle Crash Facts (2006)

Highlights

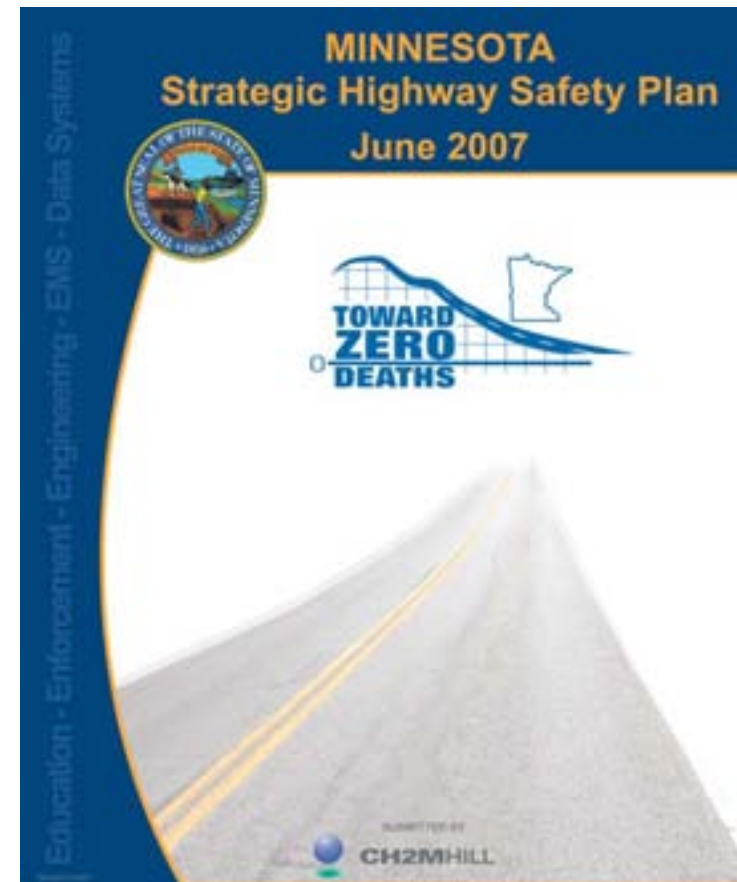
- As a class, interstates had lower crash and fatality rates than conventional roadways. This is likely due to three factors:
 - Interstates only serve a mobility function
 - Interstates tend to have a consistently high standard of design
 - Interstates have very strict control of access
- Of the conventional roadways, Trunk Highways had the lowest crash rate and the second lowest fatality rate.
- City streets had the highest crash rate and a low fatality rate.
- County and township roads had moderately high crash rates and the highest fatality rates.
- This distribution of crashes generally supports the idea that greater numbers of crashes occur in urban areas and greater numbers of fatal crashes occur in rural areas.
- Crash rates and fatality rates by roadway jurisdiction (and for the state as a whole) are interesting, however, there is a great deal of evidence to suggest that crash rates are more a function of roadway design than who owns the road.

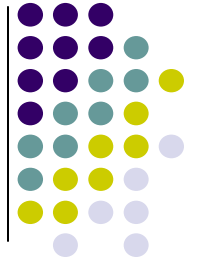




Background

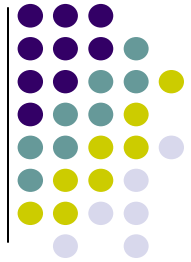
- Sponsored by...
 - Funding provided by the Minnesota Department of Transportation
 - Almost \$3.5 million made available to prepare County Safety Plans for 87 counties over three years





Goal and Objectives

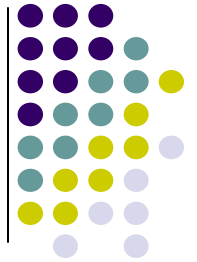
- Development of County Safety Plans
 - Create county crash goal
 - Establish safety emphasis areas
 - High priority safety strategies
 - At-risk locations
 - Safety investment options
- Identify high priority safety projects, both proactive and reactive.
- Position counties to compete for safety funds
 - Highway Safety Improvement Program
 - High Risk Rural Roads Program
 - Minnesota Central Safety Funds
- Foster safety culture among county stakeholders



Schedule of Delivery

- Phase I - October 15, 2009 to mid July 2010
- Phase II - July 2010 to April 2011
- Phase III - April 2011 to January 2012
- Phase IV - January 2012 to September 2012





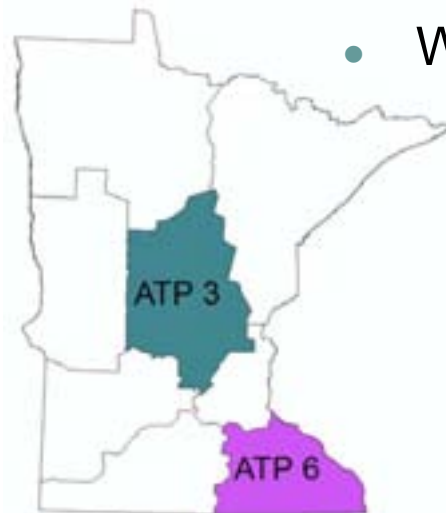
Participating Counties

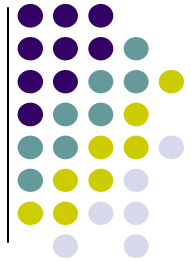
•ATP 3

- Benton – Robert Kozel
- Cass – David Enblom
- Crow Wing – Tim Bray
- Isanti – Richard Heilman
- Kanabec – Gregory Nikodym
- Mille Lacs – Bruce Cochran
- Morrison – Steve Backowski
- Sherburne – Rhonda Lewis
- Stearns – Mitch Anderson
- Todd – Loren Fellbaum
- Wadena – Joel Ulring
- Wright – Wayne Fingalson

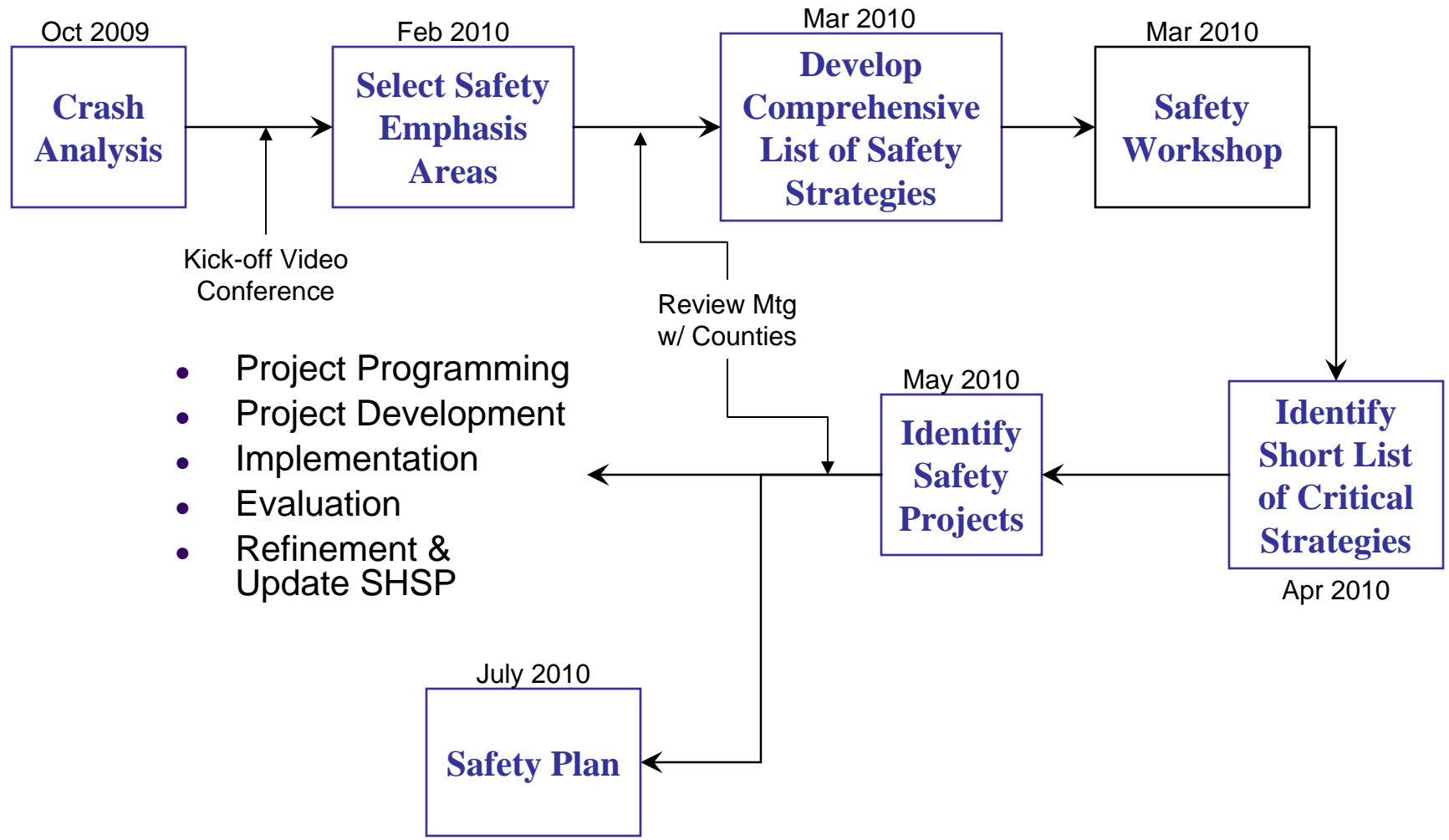
•ATP 6

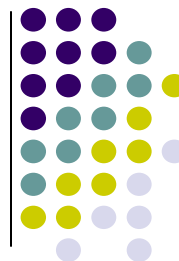
- Dodge – Guy Kohlnhofer
- Fillmore – John Grindeland
- Freeborn – Sue Miller
- Goodhue – Gregory Isakson
- Houston – Brian Pogodzinski
- Mower – Mike Hanson
- Rice – Dennis Luebbe
- Wabasha – Dietrich Flesch
- Winona – David Kramer





Project Approach – Phase I





Minnesota's Safety Emphasis Areas

Top 10 Emphasis Areas

CEAs in the Minn. SHSP	Top 10 Emphasis Areas (Based on 2004-2008 Minnesota Data)	1998-2002			2001-2005			2004-2008			2008		
		Related Fatal Crashes or Fatalities		Rank	Related Fatalities		Rank	Related Fatalities		Rank	Related Fatalities		Rank
✓	Increasing Seat Belt Usage and Improving Airbag Effectiveness	1,351 fatalities	53%	1	1,271	52%	1	999	50%	1	150	46%	3
✓	Improving the Design and Operation of Highway Intersections	1,013 fatal crashes	36%	3	1,004	33%	3	929	36%	2	166	36%	1
✓	Reducing Impaired Driving	1,020 fatal crashes	36%	2	1,068	36%	2	878	34%	3	163	36%	2
✓	Keeping Vehicles on the Roadway (combined with Minimizing the Consequences of Leaving the Road)	959 fatal crashes	34%	4	965	32%	4	805	31%	4	148	33%	4
✓	Curbing Aggressive Driving	675 fatal crashes	24%	7	850	28%	5	704	27%	5	125	27%	5
✓	Instituting Graduated Licensing for Young Drivers	705 fatal crashes	25%	5	718	24%	6	569	27%	6	81	18%	8
✓	Reducing Head-On and Across-Median Crashes	505 fatal crashes	18%	9	611	20%	7	556	27%	7	101	22%	6
	Sustaining Proficiency in Older Drivers	594 fatal crashes	21%	8	533	18%	9	488	19%	8	95	21%	7
	Keeping Drivers Alert	681 fatal crashes	24%	6	568	19%	8	431	17%	9	74	16%	10
	Making Truck Travel Safer	379 fatal crashes	14%	10	447	15%	10	414	16%	10	80	18%	9
✓	Increasing Driver Safety Awareness												
✓	Improving Information and Decision Support Systems												

Source: Minnesota Crash Records; not including fatalities due to the I-35W Bridge collapse.

1998-2002: 2,797 fatal crashes; 3,126 fatalities; 2,572 vehicle occupant fatalities

2001-2005: 2,701 fatal crashes; 3,008 fatalities; 2,429 vehicle occupant fatalities

2004-2008: 2,358 fatal crashes; 2,573 fatalities; 1,983 vehicle occupant fatalities

Safety Emphasis Areas— Greater Minnesota vs. Metro

	Total Fatalities	Driver Behavior Based Emphasis Areas				Infrastructure Based Emphasis Areas		
		Unbelted	Alcohol-Related	Speeding-Related	Young Driver Involved	Single Vehicle Run Off Road	Intersection	Head-on and Sideswipe
Statewide	3,008	1,271 (52%)	1,068 (36%)	850 (28%)	718 (24%)	965 (32%)	1,004 (33%)	611 (20%)
Greater Minnesota Districts (2001-2005 Fatalities)								
State Trunk Highway	1,089 (53%)	476 (49%)	284 (26%)	262 (24%)	224 (21%)	282 (26%)	360 (33%)	295 (27%)
Local Roads	974 (47%)	492 (63%)	460 (47%)	284 (29%)	263 (27%)	459 (47%)	298 (31%)	129 (13%)
Greater Minnesota Districts Total	2,063	968 (55%)	744 (36%)	546 (26%)	487 (24%)	741 (36%)	658 (32%)	424 (21%)
Metro District (2001-2005 Fatalities)								
State Trunk Highway	465 (49%)	162 (45%)	167 (36%)	145 (31%)	103 (22%)	108 (23%)	126 (27%)	112 (24%)
Local Roads	480 (51%)	141 (45%)	157 (33%)	159 (33%)	128 (27%)	116 (24%)	221 (46%)	76 (16%)
Metro District Total	945	303 (45%)	324 (34%)	304 (32%)	231 (24%)	224 (24%)	347 (37%)	188 (20%)

Source: Minnesota Strategic Highway Safety Plan

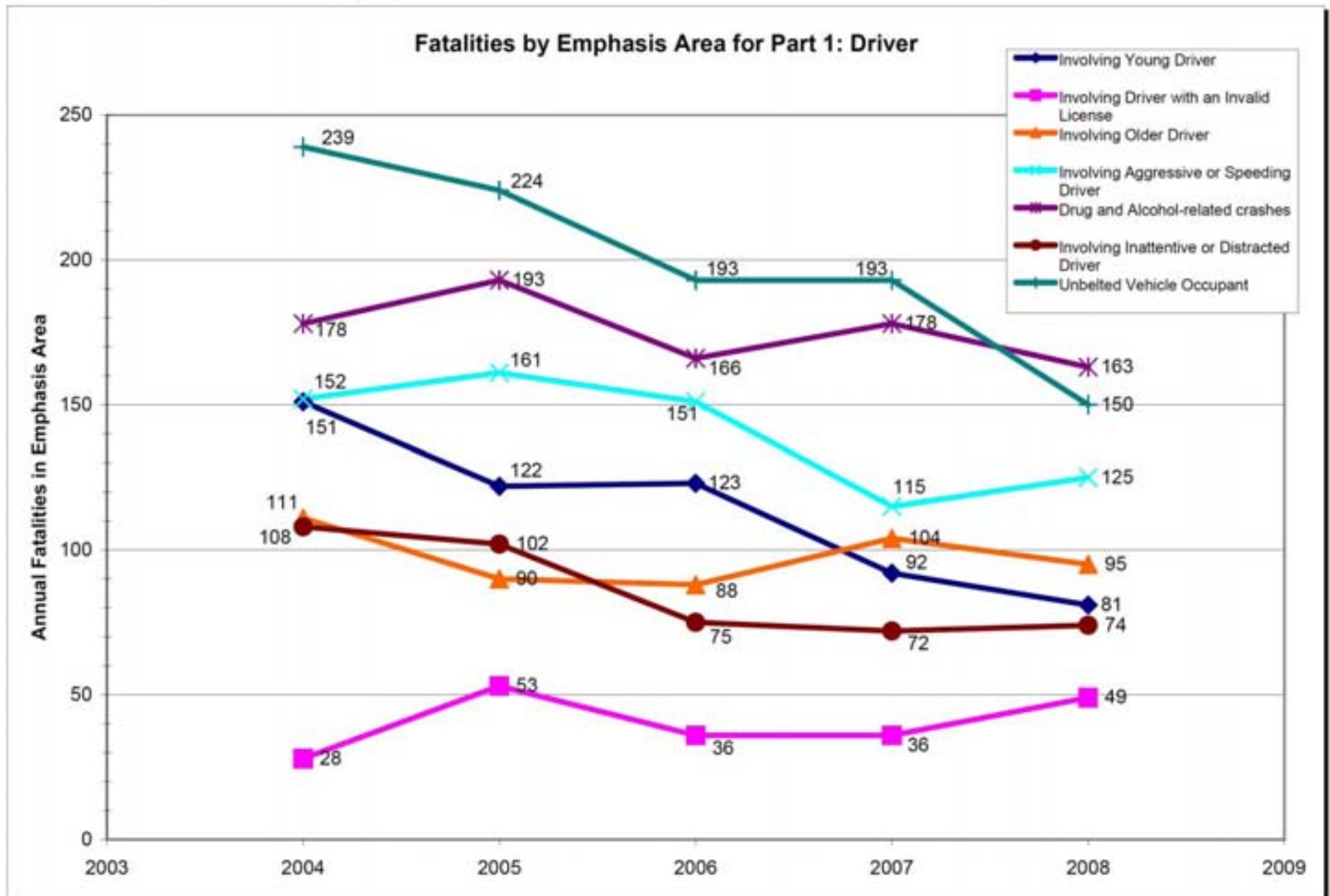
Represents at least 3% greater than statewide average

Highlights

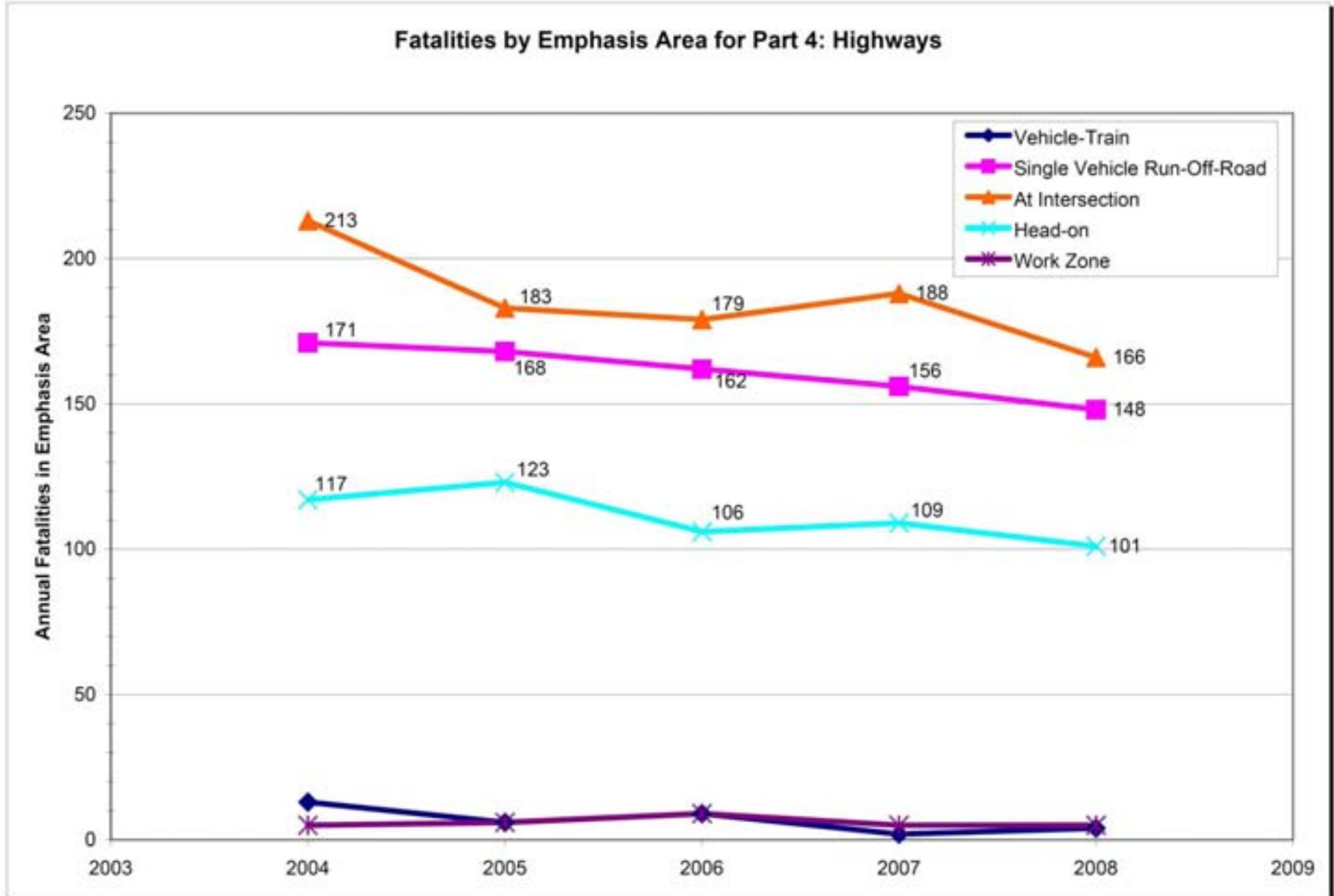
- Almost 70% of the fatalities in Minnesota are in the 79 counties outside of the 8 county Minneapolis – St. Paul Metropolitan Area.
- Fatal crashes are split almost evenly between the state and local roadway systems – which results in higher fatality rates on the local system.
- In Urban areas, the primary factors associated with fatal crashes are intersections and speeding.
- In Rural areas, the primary factors associated with fatal crashes are not using safety belts, alcohol, and road departure crashes.

Minnesota's Safety Emphasis Areas (2 of 2)

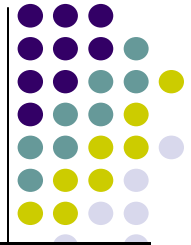
Statewide Emphasis Areas



Statewide Emphasis Areas



Critical Emphasis Areas



Winona County Emphasis Areas

Emphasis Area	Statewide Percentage	ATP 6			Group 7	Winona County			
		Interstate, US & TH	CSAH & CR	City, Twnshp & Other	CSAH & CR	Interstate, US & TH	CSAH & CR	City, Twnshp & Other	
Total Fatal and Serious Injury Crashes	10,172	475	433	272	86	65	38	30	
Drivers	Young drivers (under 21)	26%	24% (116)	28% (121)	34% (92)	27% (23)	26% (17)	32% (12)	43% (13)
	Unlicensed drivers	7%	5% (25)	6% (25)	7% (18)	6% (5)	9% (6)	8% (3)	7% (2)
	Older drivers (over 64)	13%	20% (96)	13% (56)	13% (34)	8% (7)	18% (12)	11% (4)	7% (2)
	Aggressive driving and speeding-related	22%	23% (108)	25% (107)	20% (54)	28% (24)	22% (14)	29% (11)	13% (4)
	Drug and alcohol-related	25%	15% (73)	29% (125)	21% (57)	31% (27)	20% (13)	34% (13)	17% (5)
	Inattentive, distracted, asleep drivers	21%	27% (130)	15% (63)	14% (38)	9% (8)	26% (17)	11% (4)	13% (4)
	Safety awareness	--	--	--	--	--	--	--	--
	Unbelted vehicle occupants	27%	28% (133)	31% (135)	25% (69)	30% (26)	29% (19)	29% (11)	13% (4)
Special Users	Pedestrians crashes	8%	4% (17)	3% (12)	10% (27)	5% (4)	3% (2)	0% (0)	13% (4)
	Bicycle crashes	4%	1% (6)	1% (6)	7% (18)	3% (3)	2% (1)	8% (3)	7% (2)
Vehicles	Motorcycles crashes	14%	16% (74)	18% (76)	8% (22)	21% (18)	12% (8)	21% (8)	7% (2)
	Heavy vehicle crashes	9%	14% (68)	5% (23)	7% (20)	1% (1)	23% (15)	3% (1)	7% (2)
	Safety enhancements	--	--	--	--	--	--	--	--
Highways	Train-vehicle collisions	0%	0% (1)	0% (2)	1% (3)	0% (0)	0% (0)	0% (0)	0% (0)
	Road departure crashes	27%	31% (149)	48% (207)	23% (63)	55% (47)	32% (21)	39% (15)	23% (7)
	Consequences of leaving road	--	--	--	--	--	--	--	--
	Intersection crashes	43%	37% (177)	26% (112)	50% (136)	17% (15)	29% (19)	26% (10)	43% (13)
	Head-On and Sideswipe (opposite) crashes	15%	17% (83)	19% (83)	12% (32)	26% (22)	22% (14)	13% (5)	10% (3)
	Work zone crashes	1%	2% (8)	1% (4)	0% (0)	1% (1)	0% (0)	3% (1)	0% (0)
EMS	Enhancing Emergency Capabilities	--	--	--	--	--	--	--	--
Management	Information and decision support systems	--	--	--	--	--	--	--	--
	More effective processes	--	--	--	--	--	--	--	--

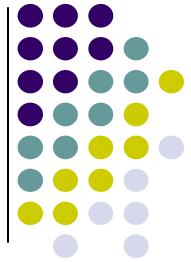
DPS Crash Data Records, 2004 to 2008

Winona County Critical Emphasis Areas (based on top 5 ATP numbers)

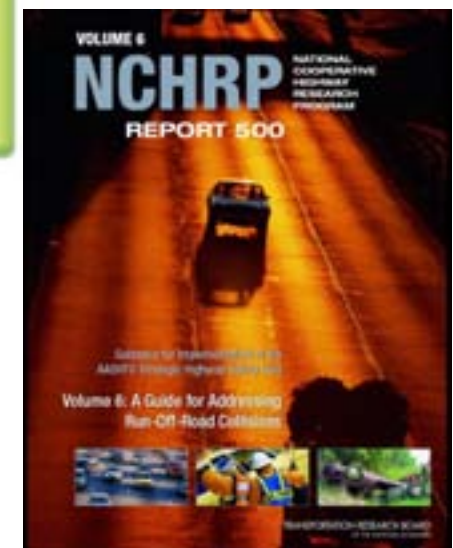
Note: Numbers are not additive, as one crash may involve a young driver at an intersection.

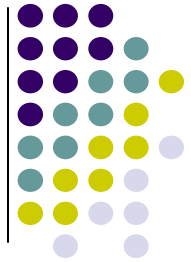
- Five Critical Emphasis Areas selected
 - Young Drivers (under 21)
 - Drug and alcohol-related
 - Unbelted vehicle occupants
 - Road departure crashes
 - Intersection Crashes

Safety Strategies Overview NCHRP Report 500

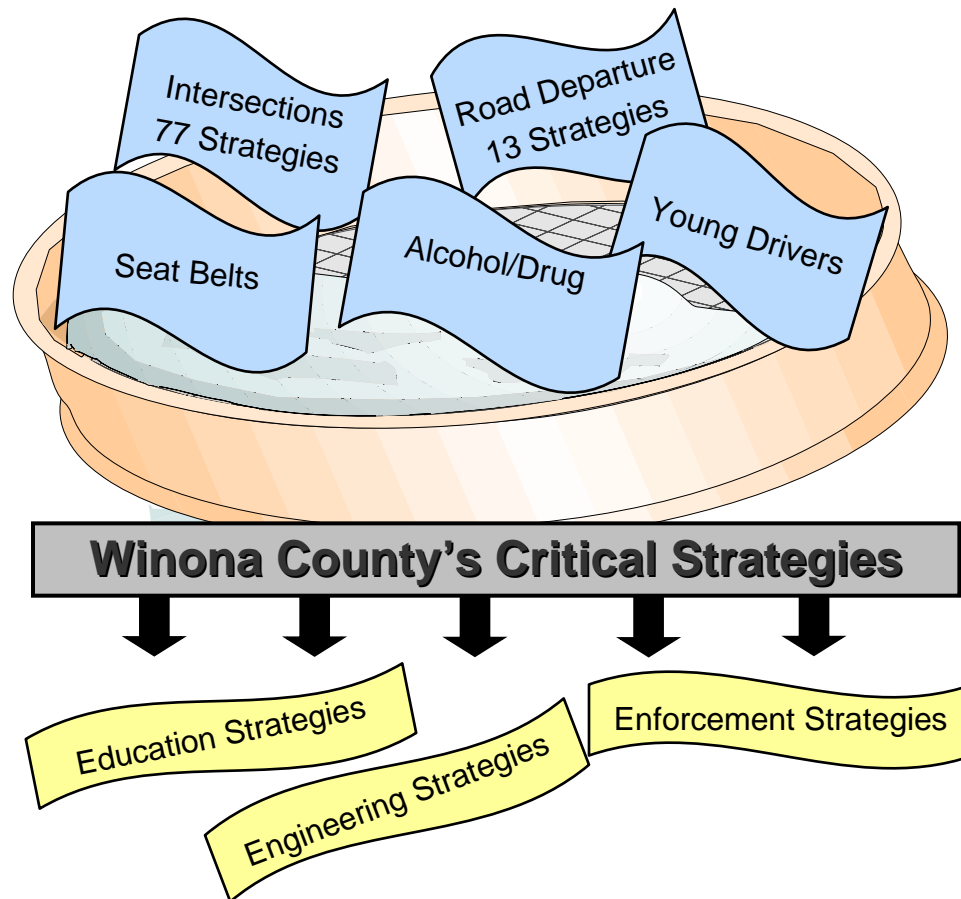


- A series of guides to assist state and local agencies in reducing injuries and fatalities in targeted emphasis areas
- The guides correspond to the emphasis areas outlined in the AASHTO Strategic Highway Safety Plan.
- Each guide includes a brief introduction, a general description of the problem, the strategies/ countermeasures to address the problem, and a model implementation process.





Screening - Initial Strategies

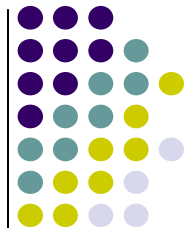


AASHTO's SHSP, NCHRP Report 500 Implementation Guidelines, NCHRP Report 622 and input from Safety Partners.

The strategies will be screened using:

- Crash data,
- Effectiveness,
- Cost, and
- Input from Safety Workshop.

The Critical Strategies should have the greatest potential to significantly reduce the number of traffic fatalities in Winona County.

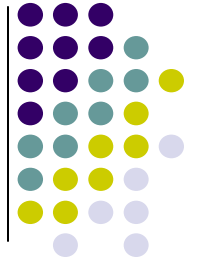


List of Road Departure Strategies

Objectives	Strategies	Relative Cost to Implement and Operate	Effectiveness	Typical Timeframe for Implementation	Workshop Strategy
15.1 A -- Keep vehicles from encroaching on the roadside	15.1 A1 -- Install shoulder rumble strips	Low	Proven	Short	✓
	15.1 A2 -- Install edgelines, edgeline rumble strips or modified shoulder rumble strips on section with narrow or no paved shoulders	Low	Experimental	Short	✓
	15.1 A3 -- Install centerline rumble strips	Low	Experimental	Short	✓
	15.1 A4 -- Provide enhanced shoulder or delineation and marking for sharp curves	Low	Tried / Proven	Short	✓
	15.1 A5 -- Provide improved highway geometry for horizontal curves	Moderate	Proven	Long	✓
	15.1 A6 -- Provide enhanced pavement markings	Low	Tried	Short	✓
	15.1 A7 -- Provide skid-resistance pavement surfaces	Moderate	Proven	Medium	X
	15.1 A8 -- Apply shoulder treatments *Eliminate shoulder drop-offs *Shoulder wedge *Widen and/or pave shoulders	Low	Experimental Proven	Medium	✓
15.1 B -- Minimize the likelihood of crashing into an object or overturning if the vehicle travels off the shoulder	15.1 B1 -- Design safer slopes and ditches to prevent rollovers	Moderate	Proven	Medium	✓
	15.1 B2 -- Remove/relocate objects in hazardous locations	Moderate to High	Proven	Medium	✓
	15.1 B3 -- Delineate trees or utility poles with retroreflective tape	Low	Experimental	Short	X
15.1 C -- Reduce the severity of the crash	15.1 C1 -- Improve design of roadside hardware	Moderate to High	Tried	Medium	X
	15.1 C2 -- Improve design and application of barrier and attenuation systems	Moderate to High	Tried	Medium	X

Source: NCHRP 500 Series

Short (<1 year)
Medium (1-2 years)
Long (>2 years)



Safety Workshop

- Date/Time: March 10th, 8:30AM to 3PM
- Location: Rushford Village Hall
- Agenda
 - 8:30 – Coffee and Registration
 - 9AM - Introductions
 - Background Information/Desired Outcomes
 - Breakout Sessions – Prioritize Strategies
 - 12PM – 1PM - Lunch
 - Report Back/Final Presentation
 - 2:45 – 3PM - Wrap-up



Strategy Voting Results



Priority List of Signalized Intersection Safety Strategies

Objectives	Strategies	Voting	Rank
	17.2 A4 -- Employ signal coordination along a corridor or route	12	5
17.2 E -- Improve driver compliance with traffic control devices	17.2 E2 -- Supplement conventional enforcement of red-light running with confirmation lights	17	2

Priority List of Unsignalized Intersection Safety Strategies

Objectives	Strategies	Voting Results	Rank
17.1 B -- Reduce the frequency and severity of intersection conflicts through geometric design improvements	17.1 B12 -- Restrict or eliminate turning maneuvers by providing channelization or closing median openings	3	12
	17.1 B16 -- Realign intersection approaches to reduce or eliminate intersection skew	1	15
17.1 E -- Improve driver awareness of intersections as viewed from the intersection approach	17.1 E2 -- Improve visibility of intersections by providing lighting	13	3
	17.1 E4 -- Provide a stop bar (or provide a wider stop bar) on minor-road approaches		
	17.1 E5 -- Install larger regulatory and warning signs at intersections and improve visibility of intersections by providing enhanced signing and delineation		
	17.1 E9 -- Provide pavement markings with supplementary messages, such as STOP AHEAD		
17.1 F -- Choose appropriate intersection traffic control to minimize crash frequency and severity	17.1 F3 -- Provide roundabouts at appropriate locations	1	15
17.1 G -- Improve driver compliance with traffic control devices and traffic laws at intersections	17.1 G1 -- Provide targeted enforcement to reduce stop sign violations	2	14
	17.1 G2 -- Provide targeted public information and education on safety problems at specific intersections		
17.1 H -- Reduce operating speeds on specific intersection approaches	17.1 H1 -- Provide dynamic speed feedback signs	0	
	17.1 H2 -- Provide traffic calming on intersection approaches through a combination of geometrics and traffic control devices	0	

Priority List of Road Departure Safety Strategies

Objectives	Strategies	Voting Results	Rank
15.1 A -- Keep vehicles from encroaching on the roadside	15.1 A1 -- Install shoulder rumble strips	19	1
	15.1 A2 -- Install edgelines "profile marking", edgeline rumble strips or modified shoulder rumble strips on section with narrow or no paved shoulders		
	15.1 A3 -- Install centerline rumble strips		
	15.1 A4 -- Provide enhanced shoulder or delineation and marking for sharp curves		
	15.1 A6 -- Provide enhanced pavement markings	3	12
	15.1 A8 -- Apply shoulder treatments *Eliminate shoulder drop-offs *Shoulder wedge *Widen and/or pave shoulders	7	8

Priority List of Seat Belt Usage Safety Strategies

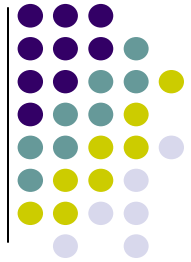
Objectives	Strategies	Voting Results	Rank
8.1 A- Maximize use of occupant restraints by all vehicle occupants	8.1 A4- Support Legislation to change seat belt usage from a secondary to a primary offense.	12	5
8.1 B- Insure that restraints, especially child and infant restraints, are properly used	Support legislation to improve child passenger safety laws	6	10

Priority List of Impaired/Aggressive/Young Drivers and Bicyclist Safety

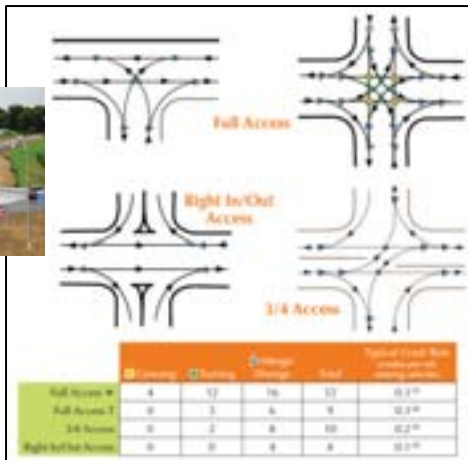
Objectives	Strategies	Voting Results	Rank
Ensuring Safer Bicycle Travel	Increase bicycle helmet usage	4	11
Prosecute, Impose Sanctions on, and Treat DWI Offenders	Support diversion programs to impaired driving offenses	0	
	Support legislation to require ignition interlocks as a condition for license reinstatement	0	
Public Outreach and Awareness Campaigns	Conduct educational and public information campaigns against aggressive driving	13	3
	Develop parent-teen driver's education presentations and handbook aimed at educating individuals on the risk of teen driving		
	Continue seat belt challenges among high schools to encourage teens to buckle up		

- Strategies Receiving Highest Votes
 - Install shoulder rumble strips
 - Conducting educational campaigns and develop parent-teen driver's education aimed at teen driving
 - Improving driver awareness of intersections

Example – Typical Intersection Strategies



Included Strategies:



Change Intersection Type



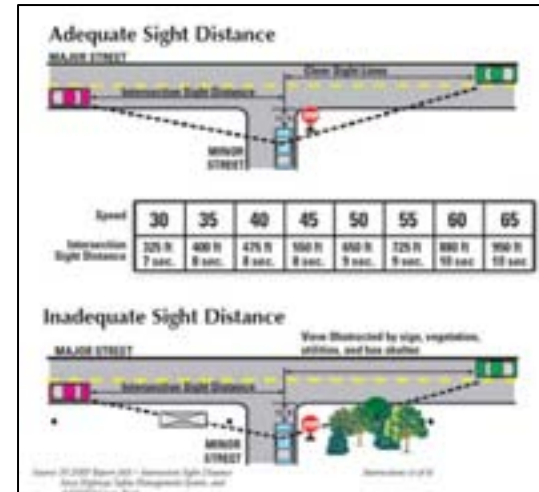
Street Lighting



Dynamic Warning Signs

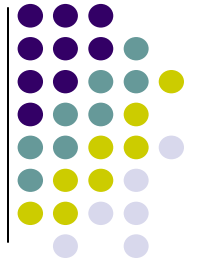


Enhanced Signing and Delineation



Improve Sight Distance

Example – Typical Run-Off Road Strategies



Lane Departure Crashes

Key Objectives:

Keep Vehicles in Their Lane

Key Strategies:

- Improved curve delineation
- Improved lane markings



Key Objectives:

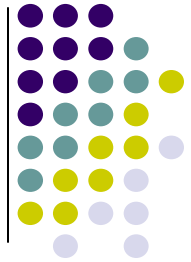
Improve Shoulders

Key Strategies:

- Safety edge
- Paved shoulders
- Shoulder rumble strips



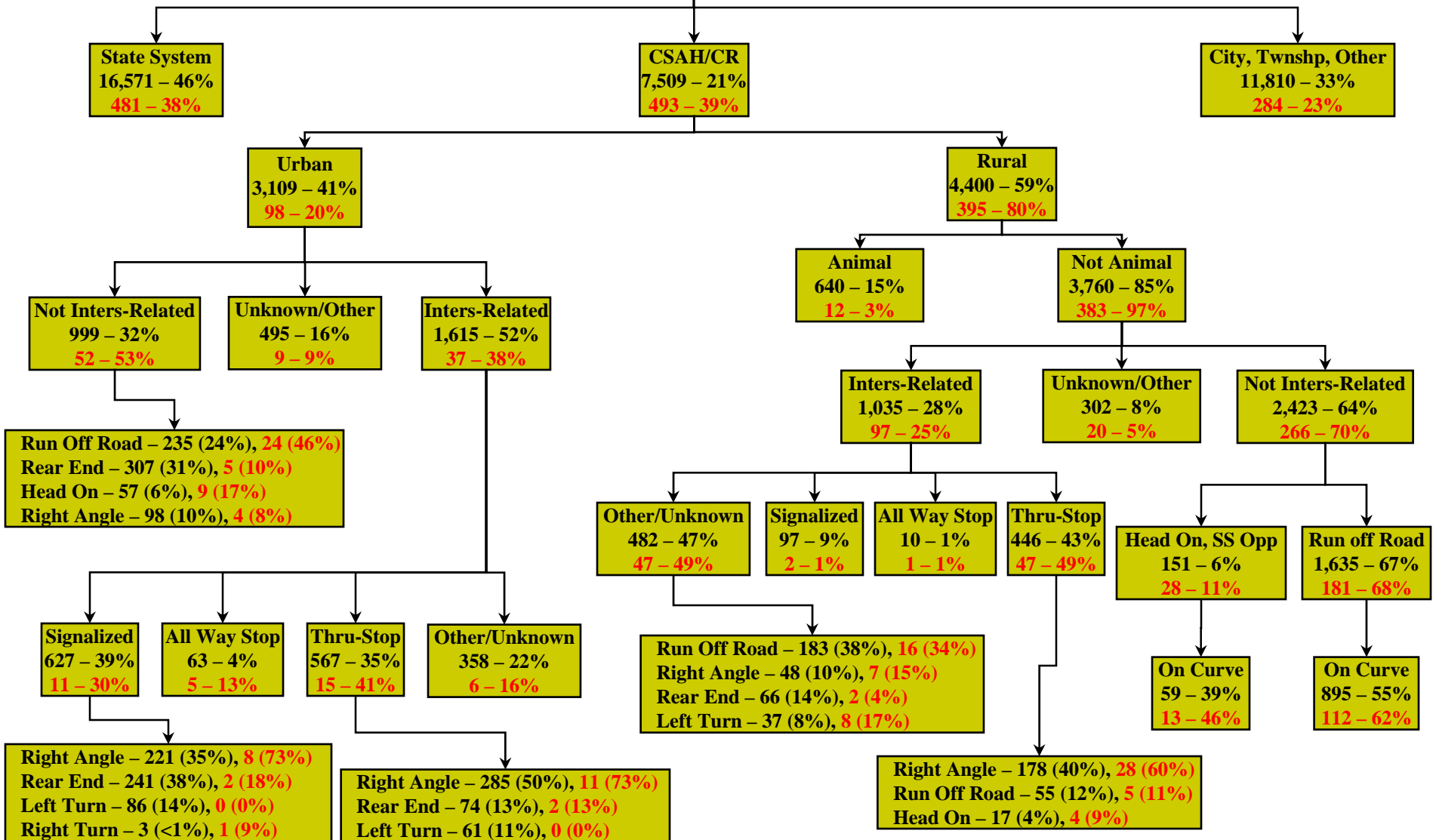
ATP 6 County Crash Data Overview



Source: MnCMAT Crash Data, 2003-2007
Severe is fatal and serious injury crashes (K+A).

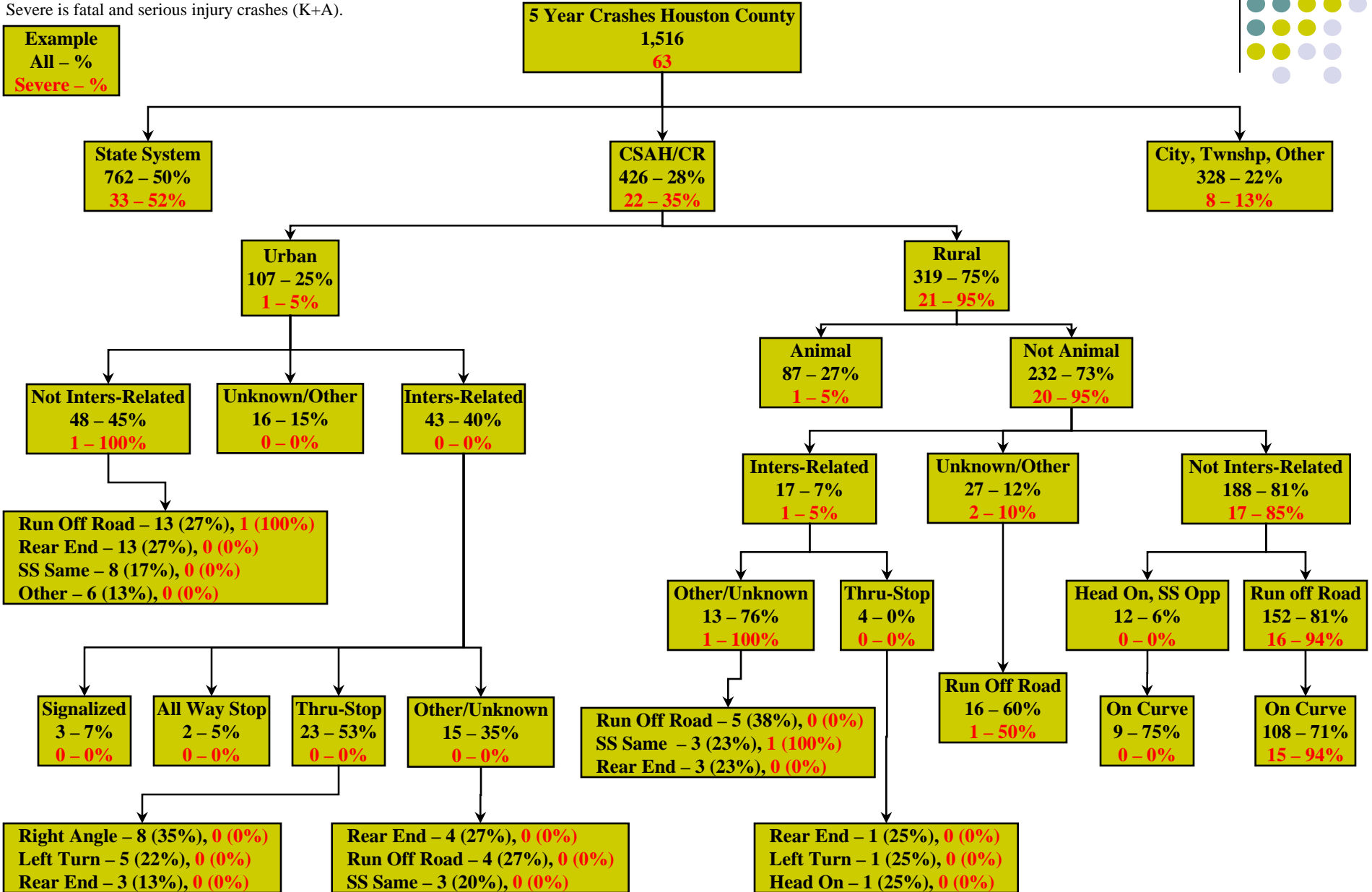
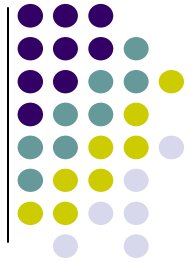
Example
All - %
Severe - %

5 Year Crashes ATP 6
35,890
1,258

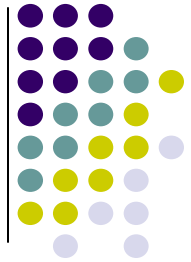


Houston County Crash Data Overview

Source: MnCMAT Crash Data, 2003-2007
 Severe is fatal and serious injury crashes (K+A).



Stearns County - Crash Data Overview



Source: MnCMAT Crash Data, 2003-2007
Severe is fatal and serious injury crashes (K+A).

Example
All - %
Severe - %

5 Year Crashes Stearns County
11,152
386

State System
4,038 - 36%
111 - 29%

CSAH/CR
3,213 - 29%
152 - 39%

City, Twnshp, Other
3,901 - 35%
123 - 32%

Urban
1,886 - 59%
55 - 36%

Rural
1,327 - 41%
97 - 64%

Not Inters-Related
531 - 28%
19 - 35%

Unknown/Other
276 - 15%
4 - 7%

Inters-Related
1,079 - 57%
32 - 58%

Animal
177 - 13%
3 - 3%

Not Animal
1,150 - 87%
94 - 97%

Rear End - 155 (29%), 4 (21%)
Run Off Road - 122 (23%), 8 (42%)
Right Angle - 43 (8%), 1 (5%)
Other - 38 (7%), 4 (21%)
Sideswipe (Opposing) - 18 (3%), 1 (5%)

Inters-Related
373 - 33%
25 - 27%

Unknown/Other
97 - 8%
5 - 5%

Not Inters-Related
680 - 59%
64 - 68%

Other/Unknown
160 - 43%
11 - 44%

Signalized
35 - 9%
1 - 4%

All Way Stop
8 - 2%
1 - 4%

Thru-Stop
170 - 46%
12 - 48%

Head On, SS Opp
46 - 7%
6 - 9%

Run off Road
462 - 68%
43 - 67%

Signalized
498 - 46%
12 - 38%

All Way Stop
31 - 3%
1 - 3%

Thru-Stop
289 - 27%
12 - 37%

Other/Unknown
261 - 24%
7 - 22%

Run Off Road - 63 (39%), 7 (64%)
Sideswipe (Same) - 11 (7%), 1 (9%)
Other - 8 (5%), 2 (18%)
Head On - 4 (3%), 1 (9%)

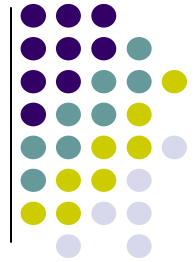
On Curve
19 - 41%
3 - 50%

On Curve
196 - 42%
23 - 53%

Right Angle - 60 (35%), 9 (75%)
Run Off Road - 24 (14%), 2 (17%)
Left Turn - 21 (12%), 0 (0%)
Head On - 7 (4%), 1 (8%)

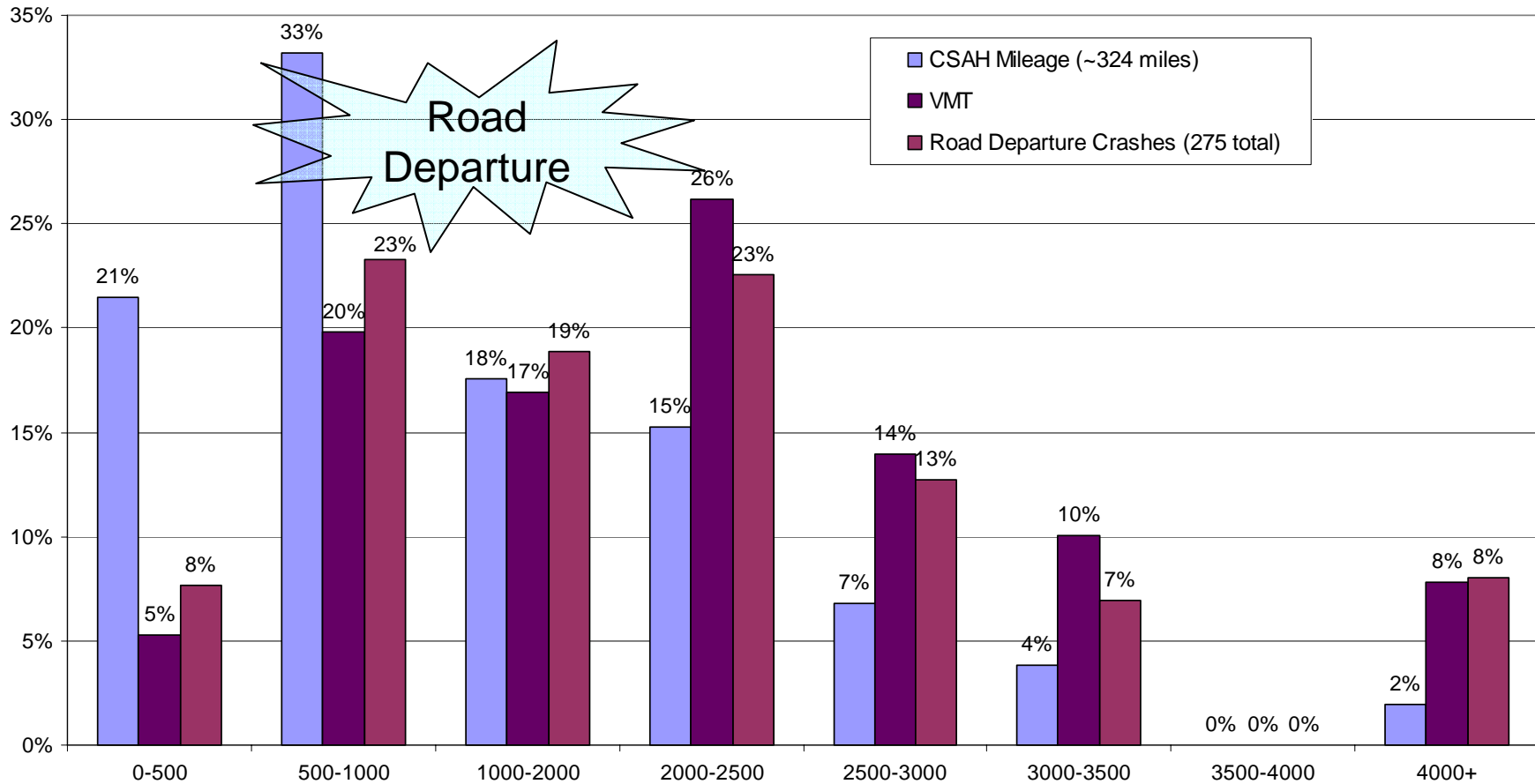
Right Angle - 141 (28%), 6 (50%)
Left Turn - 81 (16%), 2 (17%)
Other - 10 (2%), 2 (17%)

Right Angle - 153 (53%), 9 (75%)
Rear End - 42 (15%), 1 (8%)
Left Turn - 24 (8%), 1 (8%)



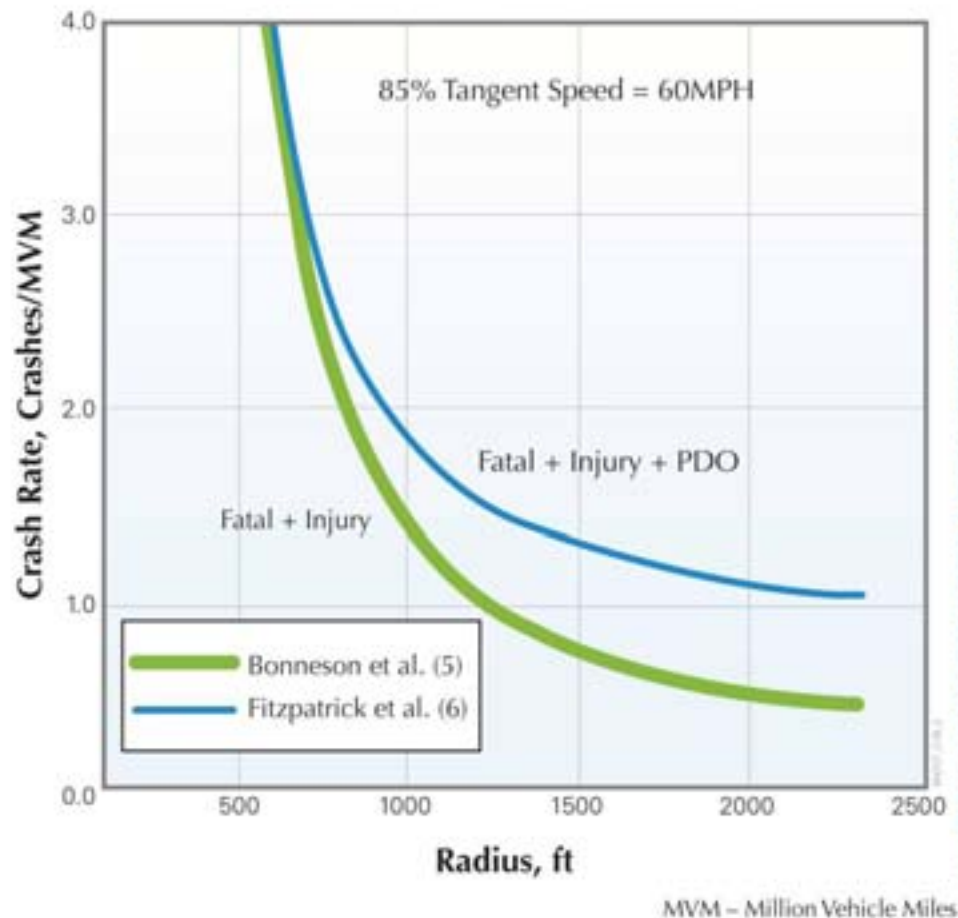
Rural Roadway Departure

- Are all 325 miles of rural roads equally at risk?



- Find volume categories where ^{ADT} road departure crashes are overrepresented when compared to VMT
 - 500 to 2,500 ADT categories

Horizontal Curves

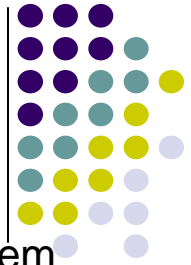


Highlights

- A number of previously published research reports have identified horizontal curves as at-risk elements of rural road systems, however, the degree of risk was not quantified.
- A recent report prepared by the Texas Transportation Institute (FHWA/TX-07/D-5439-1) related actual crash rates on rural roads to the radius of curvature. The results of this research indicates that the crash rate on curves with radii greater than 2,500 feet is approximately equal to the crash rate on tangent sections.
- On curves with radii of 1,000 feet, the crash rate is twice the rate on tangents and curves; curves with radii of 500 feet have crash rates eight times higher than on tangents.
- A number of safety studies that were focused on local, rural systems in Minnesota have found road departure crashes are overrepresented on horizontal curves – 40 to 50% of the road departure crashes in the selected counties occurred on curves, and curves made up less than 10% of the county's system.
- The same studies also documented that over 60% of the horizontal curves on the county system have radii less than 1,000 feet – from a system perspective, these curves are more at risk.

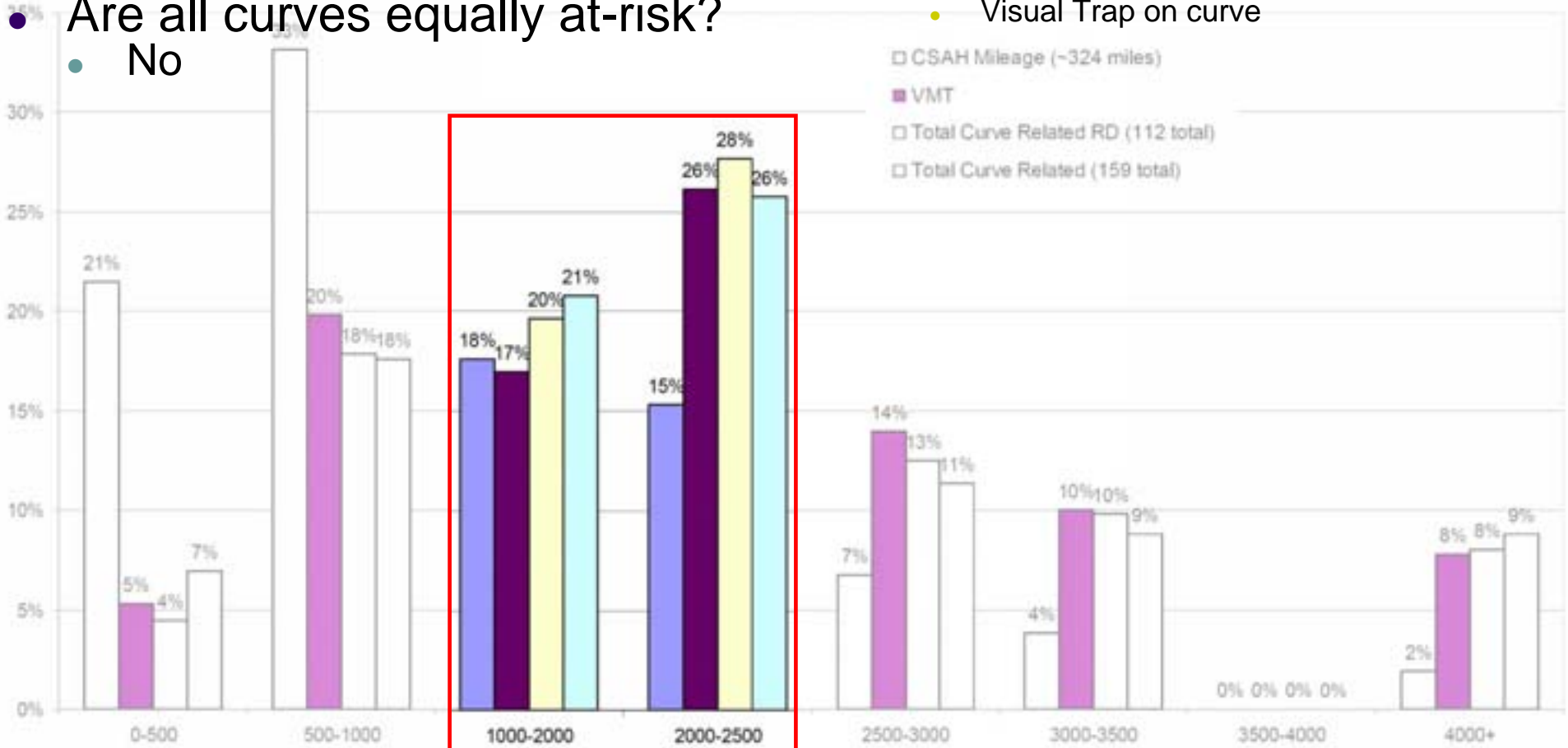


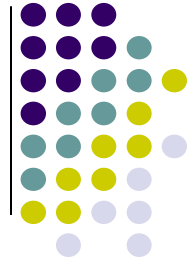
Source: Texas Transportation Institute (FHWA/TX-07/D-5439-1)
Roadside Safety Strategies (3 of 6)



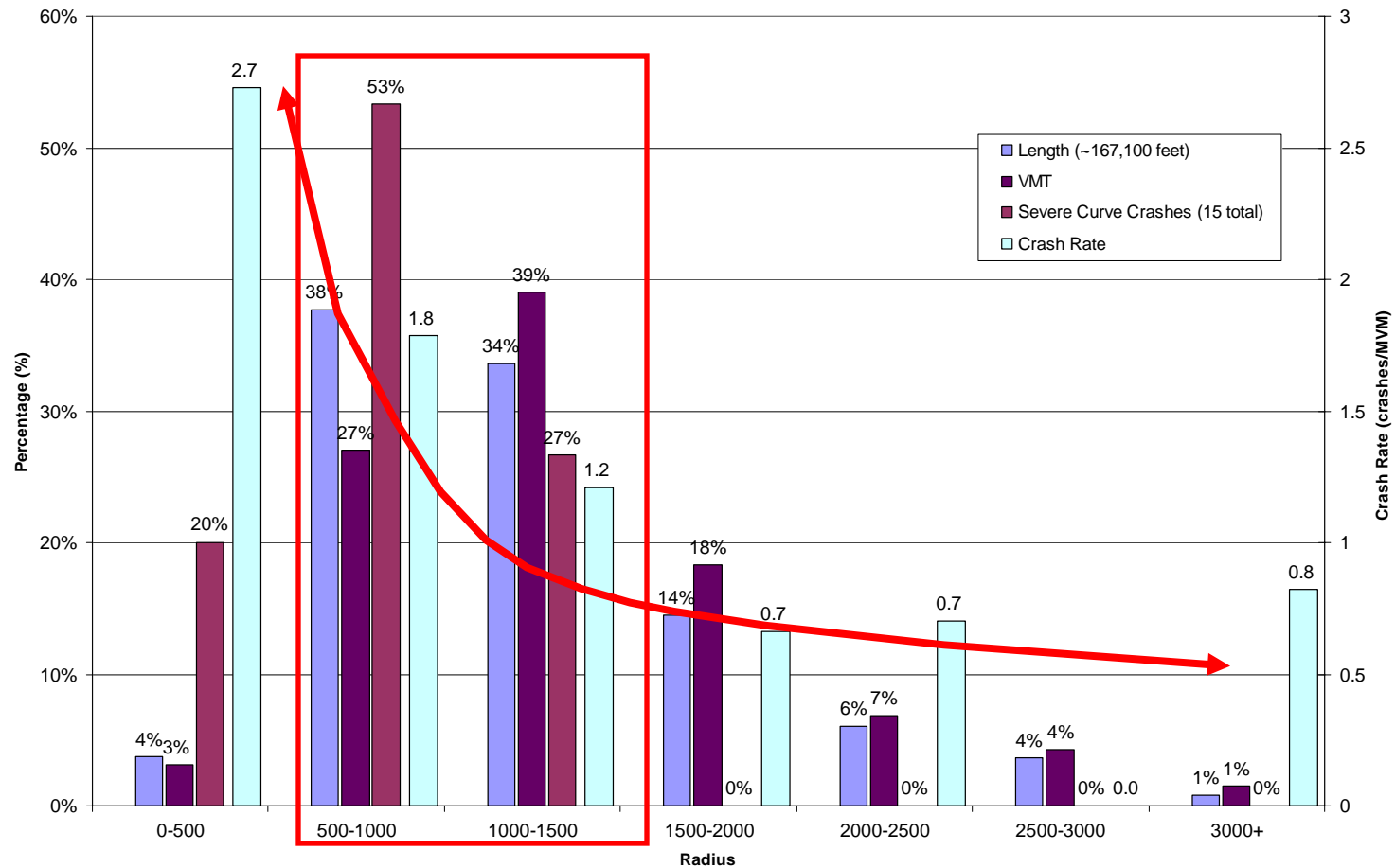
Curve-Related Roadway Departure

- Approximately 40% of roadway departure crashes are curve related
- 240 curves along rural corridors
- Are all curves equally at-risk?
 - No
- Ranked based on Checkmark system
 - 5 Checks
 - ADT Range – 1,000-2,500
 - Radius Range - 750-1,250 ft
 - Severe Crash on curve
 - Intersection on curve
 - Visual Trap on curve

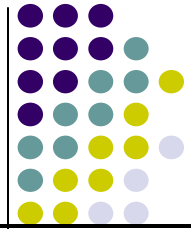




Curve-Related Roadway Departure



- Crash Rate increases as Radius decreases, with a sharp rise near 1,500'.
- Severe Crashes are overrepresented in mid-range radii, specifically between 750' and 1,250'
- Curves with a radius between 750' and 1,250' received a checkmark



Curve-Related Roadway Departure

Corridor	Segment	Description	Curve	Corridor		Crashes				Severe RoR		Radius	Length Curve	Intersection on Curve	Chevrons	Visual Trap	Rank
				Weighted ADT	K	A	B	C	PDO	K	A						
7	CSAH 3	Mower Co - CSAH 6	1	295	1	0	0	0	0	1	0	800	1,250			Yes	xxx
9	CSAH 4	CSAH 5 - CSAH 22	6	3,075	1	0	1	1	1	1	0	1,150	1,875	Yes			xxx
11	CSAH 8	CSAH 6 - CSAH 35	3	1,150			None			0	0	1,150	1,050	Yes		Yes	xxxx
18	CSAH 11	CSAH 36 - CSAH 2	2	1,500			None			0	0	900	725	Yes		Yes	xxxx
20	CSAH 2	36th Ave NE - TH 42	4	3,200			None			0	0	1,050	1,500	Yes		Yes	xxx
21	CR 133	55th St NW - CSAH 14	6	1,600	0	0	1	0	0	0	0	800	1,100	Yes			xxx
22	CSAH 3	CSAH 14 - CSAH 13	9	1,200	0	1	0	0	0	0	0	800	500				xxx
24	CSAH 12	US 52 - US 63	2	3,650	0	1	0	2	0	0	1	1,000	725	Yes			xxx
26	CSAH 5	Byron City Limits - Dodge Co (CSAH 17)	5	2,150	0	0	1	0	0	0	0	1,100	1,025			Yes	xxx
			6	2,150	0	0	0	0	1	0	0	0	1,150	325	Yes		
41	CSAH 34	US 14 - CSAH 3	3	2,100			None			0	0	1,850	800	Yes		Yes	xxx
42	CSAH 3	CSAH 6 - CSAH 4	5	1,000	0	1	0	0	2	0	1	850	1,350	Yes		Yes	xxxxx
			6	1,150			None			0	0	850	1,250	Yes		Yes	xxxx
44	CSAH 6	CSAH 3 - US 63	1	1,250	0	0	1	0	0	0	0	850	1,225	Yes		Yes	xxxx
			2	1,250			None			0	0	800	1,250	Yes		Yes	xxxx
52	CSAH 10	Chatfield City Limits - I-90	4	480			None			0	0	800	1,250	Yes		Yes	xxx
63	CSAH 25	CSAH 3 - CSAH 22	1	1,900	0	0	2	0	0	0	0	1,050	975	Yes			xxx
			3	1,900	0	0	1	0	0	0	0	1,150	1,075	Yes		Yes	xxxx
64	CSAH 23	CSAH 19 - TH 42	4	295			None			0	0	800	1,250	Yes		Yes	xxx
			5	295			None			0	0	800	1,200	Yes		Yes	xxx
65	CR 143	CSAH 11 - CSAH 19	3	350	0	2	0	0	0	0	1	1,000	375	Yes			xxx
71	CSAH 16	CSAH 1 - US 52	3	400			None			0	0	850	1,275	Yes		Yes	xxx
75	CSAH 18	CSAH 12 - Wabasha Co	4	1,200	0	0	0	1	0	0	0	1,300	600	Yes		Yes	xxx

- Summary of the high priority curves prioritization includes:
 - 23 curves received 3, 4 or 5 checkmarks (240 total)
 - 1 received 5 checkmarks
 - 6 received 4 checkmarks
 - 16 received 3 checkmarks
 - 10% of all curves
 - 18 different corridor segments across the county

Comprehensive Safety Improvement Process

Analytical Techniques

Black Spot Analysis



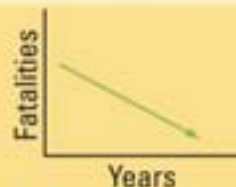
Reactive



System Wide Analysis



Proactive

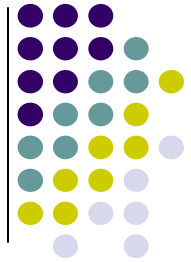


Comprehensive Safety Improvement Process

Implementation Strategies

Highlights

- For the past 30 years, most safety programs have been focused on identifying locations with a high frequency or rate of crashes – Black Spots – and then reactively implementing safety improvement strategies.
- The result of making Black Spots the highest priority in the safety program was to focus safety investments primarily on urban and suburban signalized intersections—the locations with the highest number of crashes. However, these Black Spot intersections were found to account for fewer than 10% of fatal crashes.
- A new, more systematic based analysis of Minnesota's crash data combined with the adoption of a goal to reduce fatal crashes has led to a more comprehensive approach to safety programming—a focus on Black Spots in urban areas where there are intersections with high frequencies of crashes and a systems-based approach for rural areas where the total number of severe crashes is high but the actual number of crashes at any given location is very low.



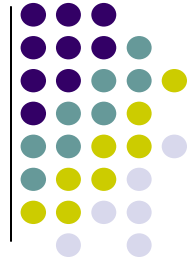
Examples of Projects

- Edgeline and/or centerline rumblestrips
- Enhanced pavement markings (6" or 4" wet reflective)
- Enhanced delineation for curves
- Median access management
- Confirmation light for enhanced enforcement
- Street lights and enhanced signs and markings
- Dynamic Mainline Intersection Warning



Indirect Turns





Project Summary

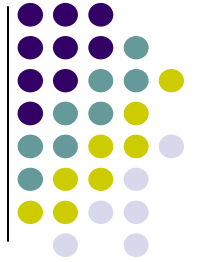
Infrastructure Based

• Edge line rumble stripE's	164 Miles	\$400,000
• Enhanced (6") edge lines	84 Miles	\$ 25,000
• Enhanced curve delineation	22 Curves	\$ 22,000
• Median/channelization	6 Intersections	\$450,000
• Signs, St. Lights & Dynamic Warning	25 Intersections	\$451,000
• <u>Enhanced Red Light Enforcement</u>	<u>28 Intersections</u>	<u>\$100,000</u>
• Total		\$1,447,000

Note: The value of this list of potential safety projects is greater than what Olmsted County can undertake in a single year based on funding limitations. The actual schedule for implementation will be a function of securing funding from the State's Highway Safety Improvement Program.

Driver Behavior Based

- Continued participation with SE Minnesota TZD and Safe Community Coalitions, including working on the Countywide Fatal Review Committee
- Continued coordination with the County Public Health Department and local law enforcement



Next Steps

- Phase I
 - March – Safety Workshops
 - May - Identify Safety Projects in each county
 - July – Deliver Safety Plans
- Phase II
 - July 2010 thru April 2011
- Phase III
 - April 2011 thru January 2012
- Phase IV
 - January 2012 thru September 2012

Questions?

