

Mn/DOT County Road Safety Plans

Phase II Kickoff

ATP 4 and ATP 8 Counties

August 12, 2010



Agenda

- Introductions & Opening Remarks
- Project Overview
 - Goals, Objectives
 - Team, Schedule, Process
 - County Participation and Opportunities
- Data Needs
- Safety Emphasis Areas
- Safety Strategies
- Safety Workshop
- Safety Projects
- Next Steps
- Questions/Comments



Introductions and Opening Remarks



- Introductions
- Welcome – Brad Estochen/Mark Vizecky, Mn/DOT
Welcome - Howard Preston



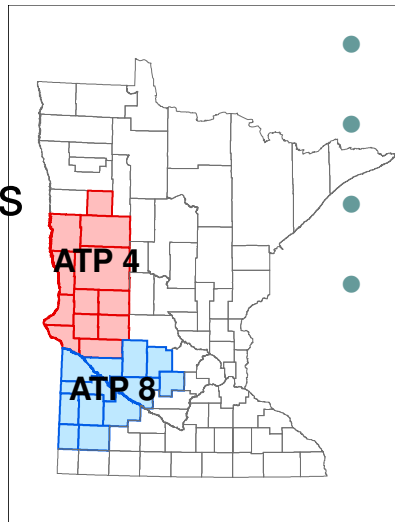
Participating Counties

•ATP 4

- Becker – Brad Wentz
- Big Stone – Nicholas Anderson
- Clay - David Overbo
- Douglas - David Robley
- Grant – Luthard Hagen
- Mahnomen – Jon Large
- Otter Tail – Richard West
- Pope – Brian Noetzelman
- Stevens – Brian Giese
- Swift – Andy Sander
- Traverse – Larry Haukos
- Wilkin – Tom Richels

•ATP 8

- Chippewa – Steve Kubista
- Kandiyohi – Gary Danielson
- Lac Qui Parle – Steve Kubista
- Lincoln – Lee Amundson
- Lyon – Sahail Kanwar
- McLeod – John Brunkhorst
- Meeker – Ronald Mortensen
- Murray – Randy Groves
- Pipestone – David Halbersma
- Redwood – William Rabenberg
- Renville – Marlin Larson
- Yellow Medicine – Andy Sander



County Road Safety Plans

- 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

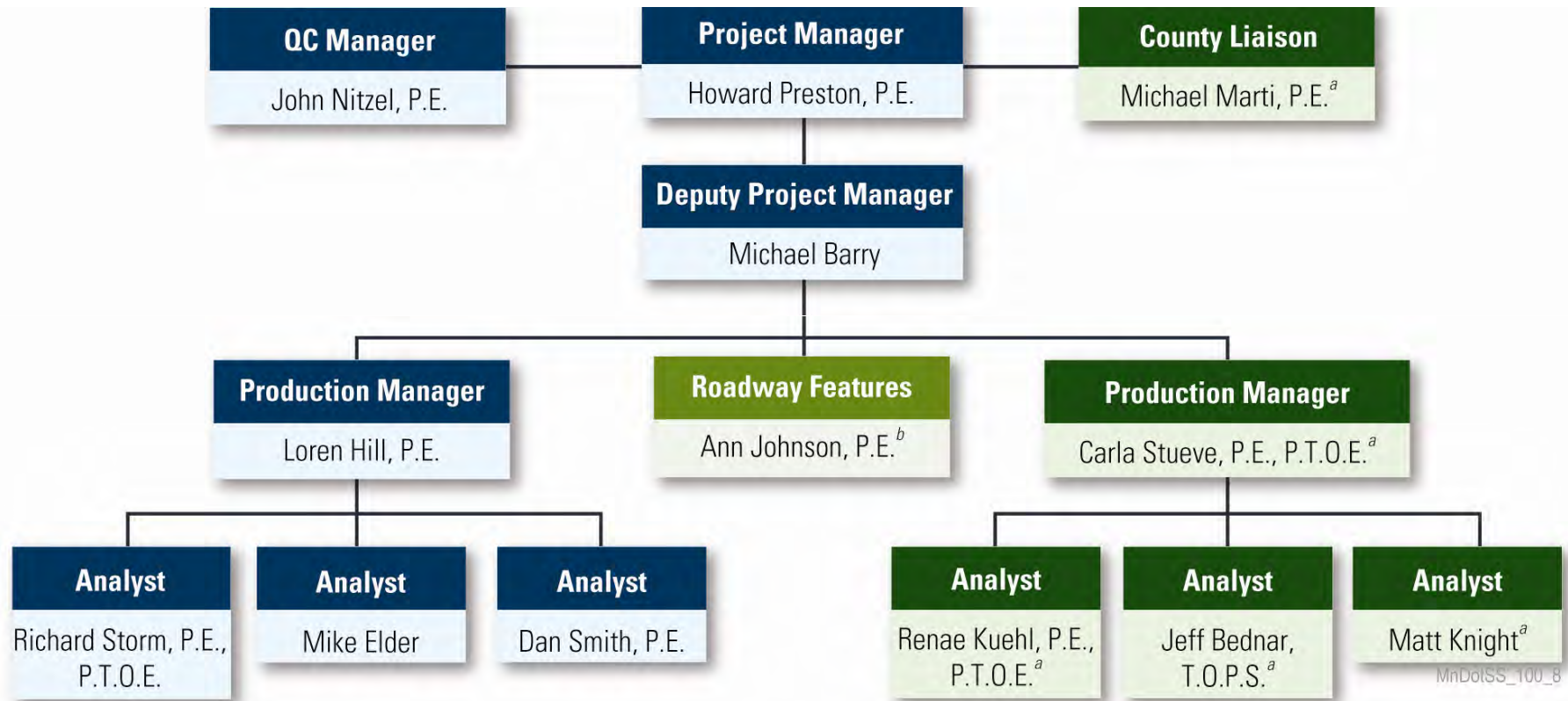




Goals and Objectives

- Development of County Safety Plans
 - 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

Project Team

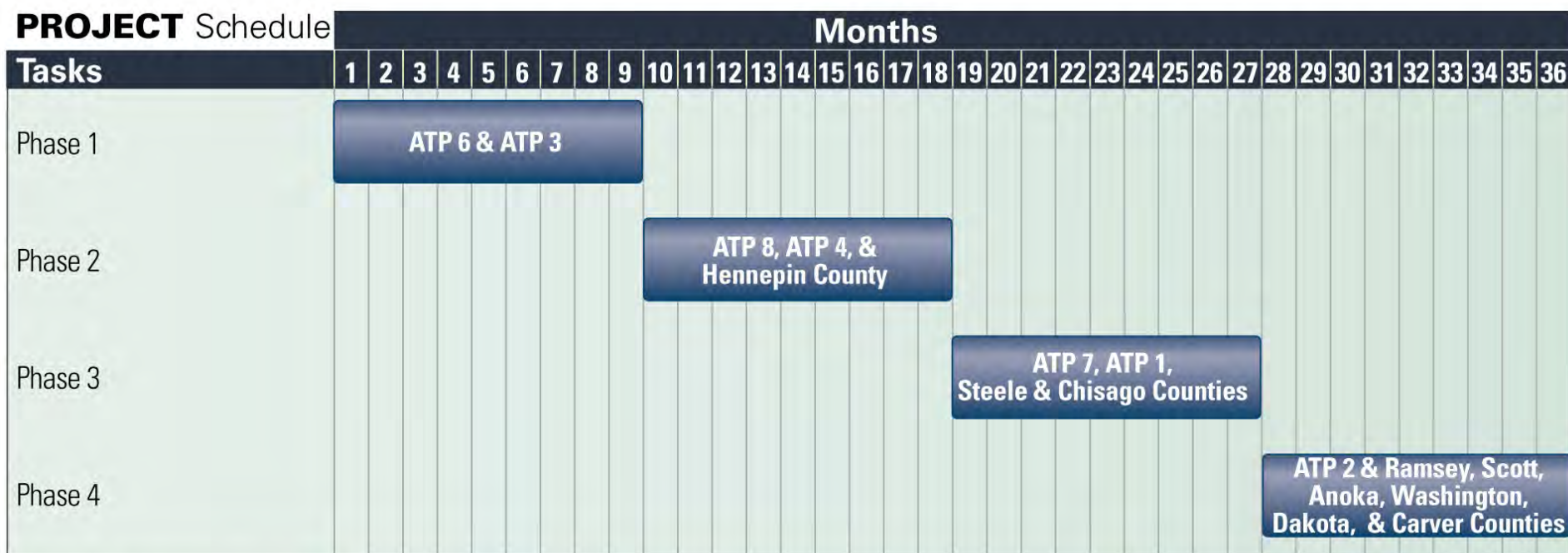


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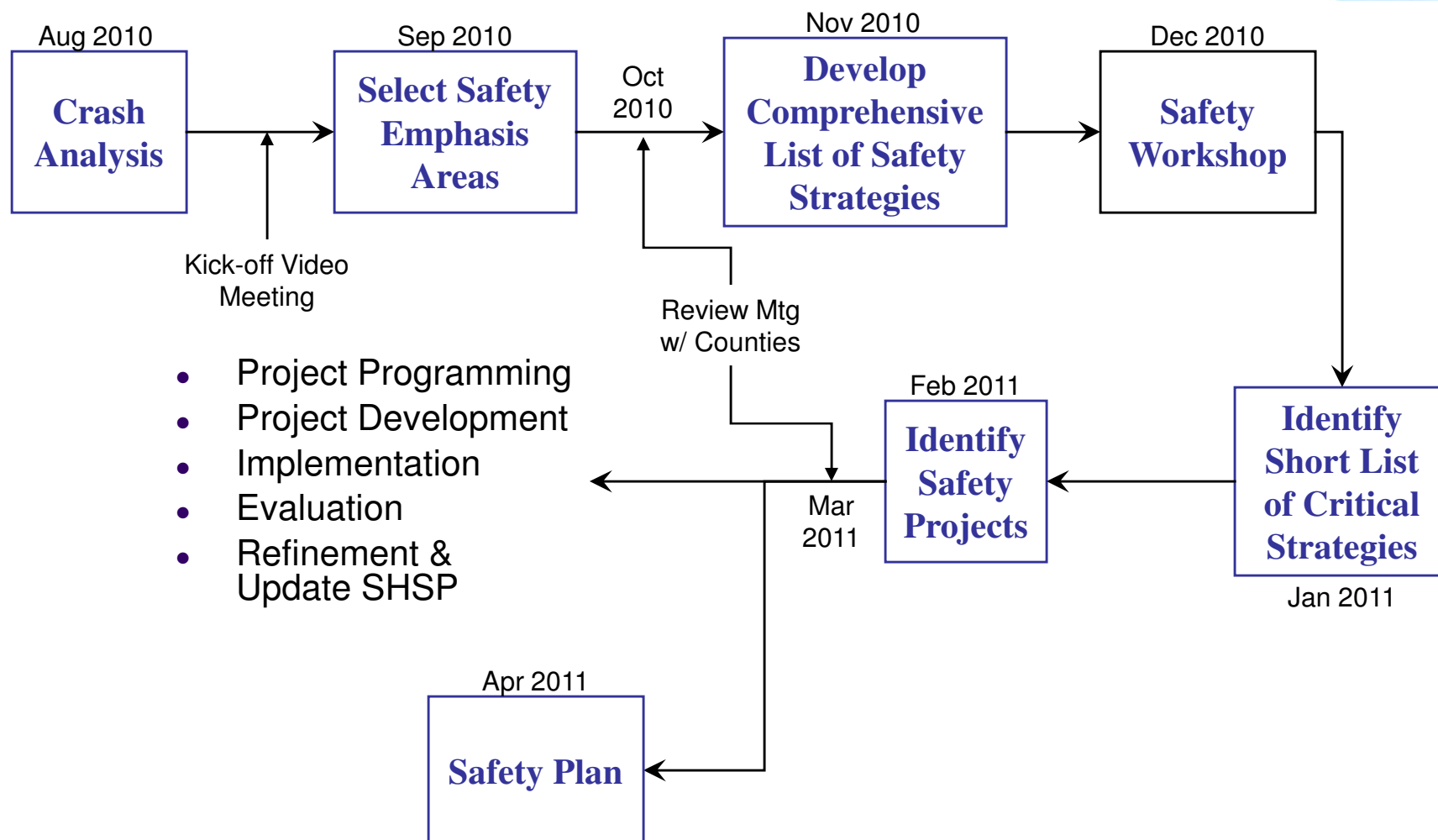
Schedule of Delivery

- Phase I – November 2009 to August 2010
- Phase II – August 2010 to May 2011
- Phase III – May 2011 to February 2012
- Phase IV – February 2012 to October 2012





Project Approach – Phase II



- Project Programming
- Project Development
- Implementation
- Evaluation
- Refinement & Update SHSP

County Participating and Opportunities



•Participation

- Data gathering – assist in developing roadway segmentation and features for your system
- Review materials (unique for each county) – safety emphasis areas, safety strategies, safety projects
- Attend (2) review meetings
- Workshop – secure a facility, invite stakeholders (engineering community, safety community, law enforcement, first and emergency response, elected officials), provide refreshments/meals (if needed) for meetings

•Opportunities

- Build relationships with stakeholders throughout the county (EMS, Sherriff, etc)
- Safety training - learn more about safety planning process
- County Transportation Plans – identify safety emphasis areas and strategies that can be added to your Comprehensive Plan
- Technical analysis – understand the characteristics and factors contributing to crashes on your system
- Safety projects – obtain a prioritized list of safety projects that can be added to your Capital Improvement Plan
- Actively participate in moving Minnesota Towards Zero Deaths



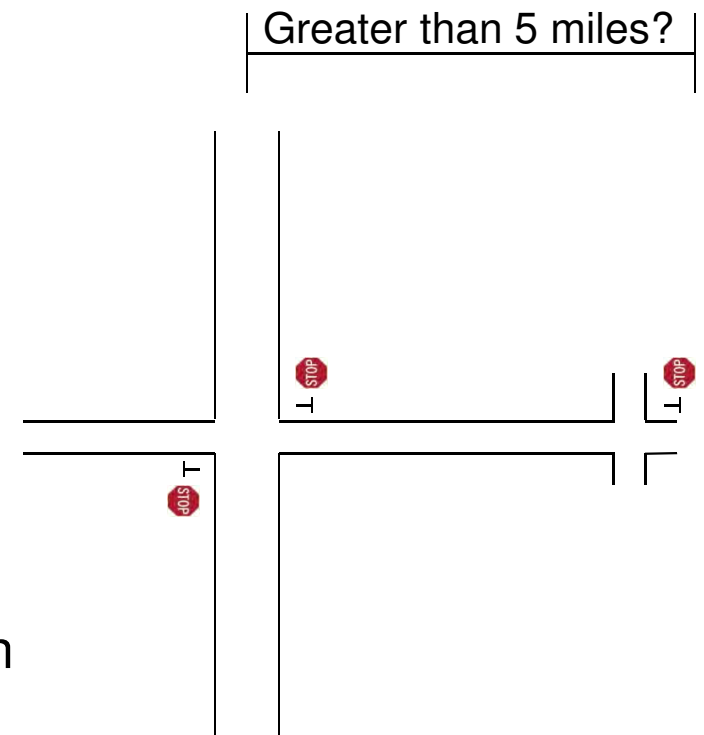
Data Needs

- We suggest a division of your system into intersections and segments, you review and concur/edit.
 - Intersections
 - Traffic control devices
 - Street lights
 - Distance to previous STOP sign
 - Segments
 - Logical termini
 - Facility type (2-lane, 4-lane, etc)
- Ann Johnson has sent each of you a preliminary list of your Intersections, Segments and Curves. Please review these lists and get revisions back to Ann by August 26th.

Distance to previous STOP sign



- Example
 - Why is this important?
 - Distance to previous STOP sign has been identified as a risk factor associated with STOP-controlled intersections.
 - For Thru-STOP and All-way STOP intersections, we are interested in knowing if any of the STOP-leg approaches has an uncontrolled approach of more than 5 miles.
 - Not an exact science, if it's close to 5 miles or greater, fill in the box with 'Yes'



Minnesota's Safety Emphasis Areas



Top 10 Emphasis Areas		1998-2002			2001-2005			2004-2008			2005-2009			2009	
CEAs in the SHSP	(Based on 2005-2009 Minnesota Data)	Related Fatal Crashes or Fatalities			Related Fatalities			Related Fatalities			Related Fatalities			Related Fatalities	
				Rank			Rank			Rank			Rank		Rank
✓	Increasing Seat Belt Usage and Improving Airbag Effectiveness	1,351 fatalities	53%	1	1,271	52%	1	999	50%	1	891	49%	1	131	3
✓	Improving the Design and Operation of Highway Intersections	1,013 fatal crashes	36%	3	1,004	33%	3	929	36%	2	873	36%	2	157	1
✓	Reducing Impaired Driving	1,020 fatal crashes	36%	2	1,068	36%	2	878	34%	3	841	35%	3	141	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	751	31%	4	117	4
✓	Curbing Aggressive Driving	675 fatal crashes	24%	7	850	28%	5	704	27%	5	638	26%	5	86	6
✓	Reducing Head-On and Across-Median Crashes	505 fatal crashes	18%	9	611	20%	7	556	27%	7	532	22%	6	93	5
✓	Instituting Graduated Licensing for Young Drivers	705 fatal crashes	25%	5	718	24%	6	569	27%	6	495	20%	7	77	8
	Sustaining Proficiency in Older Drivers	594 fatal crashes	21%	8	533	18%	9	488	19%	8	461	19%	8	84	7
	Making Truck Travel Safer	379 fatal crashes	14%	10	447	15%	10	414	16%	10	397	16%	9	66	9
	Keeping Drivers Alert	681 fatal crashes	24%	6	568	19%	8	431	17%	9	386	16%	10	63	10
✓	Increasing Driver Safety Awareness														
✓	Improving Information and Decision Support Systems														

Source: 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
 2005-2009: 2,209 fatal crashes; 2,427 fatalities; 1,824 vehicle occupant fatalities

ATP 4 & ATP 8 – Safety Emphasis Areas



Emphasis Area		Statewide Percentage	ATP 4			ATP 8		
			Interstate, US & TH	CSAH & CR	City, Twtnshp & Other	Interstate, US & TH	CSAH & CR	City, Twtnshp & Other
Total Fatal and Serious Injury Crashes		10,172	274	240	101	214	231	125
Drivers	Young drivers (under 21)	23%	24%(65)	15%(36)	27%(27)	26%(55)	28%(65)	22%(27)
	Unlicensed drivers	7%	6%(16)	7%(16)	8%(8)	5%(10)	6%(14)	4%(5)
	Older drivers (over 64)	12%	22%(60)	14%(34)	9%(9)	20%(43)	15%(35)	10%(12)
	Aggressive driving and speeding-related	19%	18%(50)	26%(62)	21%(21)	10%(22)	23%(53)	18%(22)
	Drug and alcohol-related	23%	19%(51)	37%(89)	30%(30)	19%(40)	31%(72)	22%(28)
	Inattentive, distracted, asleep drivers	18%	21%(58)	18%(43)	16%(16)	17%(36)	16%(36)	12%(15)
	Safety awareness	--	--	--	--	--	--	--
	Unbelted vehicle occupants	23%	28%(78)	36%(87)	29%(29)	31%(67)	41%(95)	38%(48)
Special Users	Pedestrians crashes	7%	4%(10)	3%(7)	7%(7)	3%(7)	3%(6)	6%(7)
	Bicycle crashes	3%	0%(0)	2%(5)	6%(6)	2%(4)	0%(0)	4%(5)
Vehicles	Motorcycles crashes	13%	8%(23)	17%(41)	17%(17)	9%(19)	10%(22)	9%(11)
	Heavy vehicle crashes	8%	17%(47)	7%(16)	2%(2)	23%(50)	6%(14)	10%(12)
	Safety enhancements	--	--	--	--	--	--	--
Highways	Train-vehicle collisions	0%	1%(2)	0%(0)	6%(6)	0%(0)	0%(0)	2%(2)
	Road departure crashes	25%	25%(69)	47%(113)	29%(29)	22%(48)	48%(111)	28%(35)
	Consequences of leaving road	--	--	--	--	--	--	--
	Intersection crashes	38%	31%(84)	34%(82)	35%(35)	40%(85)	32%(74)	40%(50)
	Head-On and Sideswipe (opposite) crashes	13%	20%(54)	23%(54)	12%(12)	21%(45)	19%(45)	6%(8)
	Work zone crashes	1%	1%(3)	1%(2)	0%(0)	0%(1)	1%(3)	0%(0)
EMS	Enhancing Emergency Capabilities	--	--	--	--	--	--	--
Management	Information and decision support systems	--	--	--	--	--	--	--
	More effective processes	--	--	--	--	--	--	--

DPS Crash Data Records, 2005 to 2009

Top 5 Emphasis Areas by Jurisdiction

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

The numbers represent severe crashes (Fatal and A-type Injury crashes)

Greater Minnesota Crash Data Overview

Source: MnCMAT Crash Data, 2004-2008
Severe is fatal and serious injury crashes (K+A).



Example
All - %
Severe - %

-ATP's 1, 2, 3, 4, 6, 7, and 8 - NO Metro

5 Year Crashes
165,739
5,770

State System
76,992 - 46%
2,362 - 41%

CSAH/CR
39,073 - 24%
2,242 - 39%

City, Twnshp, Other
49,674 - 30%
1,166 - 20%

Urban
14,599 - 37%
382 - 17%

Rural
24,474 - 63%
1,860 - 83%

Not Inters-Related
5,271 - 36%
199 - 52%

Unknown/Other
1,880 - 13%
23 - 6%

Inters-Related
7,448 - 51%
160 - 42%

Animal
4,407 - 18%
74 - 4%

Not Animal
20,067 - 82%
1,786 - 96%

Run Off Road - 1,283 (24%), 74 (37%)
Head On - 361 (7%), 27 (14%)
Rear End - 1,315 (25%), 21 (11%)
Right Angle - 529 (10%), 18 (9%)

Inters-Related
5,938 - 30%
535 - 30%

Unknown/Other
1,502 - 7%
66 - 4%

Not Inters-Related
12,627 - 63%
1,185 - 66%

Other/Unknown
2,755 - 47%
248 - 46%

Signalized
249 - 4%
5 - 1%

All Way Stop
199 - 3%
19 - 4%

Thru-Stop
2,735 - 46%
263 - 49%

Head On, SS Opp
821 - 7%
129 - 11%

Run Off Road
8,367 - 66%
790 - 67%

Signalized
2,189 - 29%
36 - 22%

All Way Stop
438 - 6%
6 - 4%

Thru-Stop
2,810 - 38%
70 - 44%

Other/Unknown
2,011 - 27%
48 - 30%

Run Off Road - 1,047 (38%), 93 (38%)
Right Angle - 297 (11%), 50 (20%)
Head On - 119 (4%), 26 (11%)
Left Turn - 186 (7%), 20 (8%)

On Curve
284 - 35%
47 - 36%

On Curve
3,550 - 42%
399 - 51%

Right Angle - 651 (30%), 20 (56%)
Rear End - 753 (34%), 5 (14%)
Left Turn - 361 (17%), 4 (11%)
Head On - 70 (3%), 2 (6%)

Right Angle - 1,359 (48%), 41 (59%)
Head On - 70 (3%), 7 (10%)
Left Turn - 283 (10%), 4 (6%)
Rear End - 368 (13%), 4 (6%)

Right Angle - 968 (35%), 145 (55%)
Run Off Road - 360 (13%), 23 (9%)
Left Turn - 183 (7%), 11 (4%)
Rear End - 287 (11%), 8 (3%)

ATP 4 County Crash Data Overview

Source: MnCMAT Crash Data, 2005-2009
Severe is fatal and serious injury crashes (K+A).



Example
All - %
Severe - %

5 Year Crashes ATP 4
16,311
524

State System
10,123 - 62%
251 - 48%

CSAH/CR
3,527 - 22%
206 - 39%

City, Twnshp, Other
2,661 - 16%
67 - 13%

Urban
820 - 23%
23 - 11%

Rural
2,707 - 77%
183 - 89%

Not Inters-Related
345 - 42%
11 - 48%

Unknown/Other
98 - 12%
2 - 9%

Inters-Related
377 - 46%
10 - 43%

Animal
585 - 22%
5 - 3%

Not Animal
2,122 - 78%
178 - 97%

Inters-Related
609 - 29%
61 - 34%

Unknown/Other
134 - 6%
3 - 2%

Not Inters-Related
1,379 - 65%
114 - 64%

Run Off Road - 62 (18%), 5 (45%)
Rear End - 89 (26%), 0 (0%)
Head On - 23 (7%), 4 (36%)
Right Angle - 37 (11%), 1 (9%)

Other/Unknown
336 - 55%
33 - 54%

Signalized
5 - 1%
0 - 0%

All Way Stop
17 - 3%
4 - 7%

Thru-Stop
251 - 41%
24 - 39%

Head On, SS Opp
79 - 6%
20 - 18%

Run off Road
930 - 67%
72 - 63%

Signalized
88 - 23%
1 - 10%

All Way Stop
28 - 7%
0 - 0%

Thru-Stop
156 - 41%
5 - 50%

Other/Unknown
105 - 28%
4 - 40%

Run Off Road - 152 (45%), 21 (64%)
Right Angle - 30 (9%), 1 (3%)
Rear End - 39 (12%), 1 (3%)
Left Turn - 25 (7%), 2 (6%)

On Curve
31 - 39%
8 - 40%

On Curve
421 - 45%
44 - 61%

Right Angle - 32 (36%), 1 (100%)
Rear End - 18 (20%), 0 (0%)
Left Turn - 13 (15%), 0 (0%)
Head On - 3 (3%), 0 (0%)

Right Angle - 74 (47%), 4 (80%)
Rear End - 15 (10%), 0 (0%)
Left Turn - 10 (6%), 0 (0%)
Head On - 4 (3%), 0 (0%)

Right Angle - 91 (36%), 14 (58%)
Run Off Road - 35 (14%), 2 (8%)
Left Turn - 14 (6%), 0 (0%)
Rear End - 27 (11%), 0 (0%)

ATP 8 County Crash Data Overview

Source: MnCMAT Crash Data, 2005-2009
Severe is fatal and serious injury crashes (K+A).



Example
All - %
Severe - %

5 Year Crashes ATP 8
13,298
561

State System
7,318 - 55%
244 - 43%

CSAH/CR
3,413 - 26%
233 - 42%

City, Twnshp, Other
2,567 - 19%
84 - 15%

Urban
1,051 - 31%
22 - 9%

Rural
2,362 - 69%
211 - 91%

Not Inters-Related
421 - 40%
15 - 68%

Unknown/Other
81 - 8%
0 - 0%

Inters-Related
549 - 52%
7 - 32%

Animal
376 - 16%
8 - 4%

Not Animal
1,986 - 84%
203 - 96%

Run Off Road - 99 (24%), 8 (53%)
Rear End - 88 (21%), 1 (7%)
Sideswipe Same - 51 (12%), 0 (0%)
Right Angle - 43 (10%), 1 (7%)

Inters-Related
621 - 31%
68 - 33%

Unknown/Other
88 - 5%
6 - 3%

Not Inters-Related
1,277 - 64%
129 - 64%

Other/Unknown
285 - 46%
30 - 44%

Signalized
5 - 1%
1 - 1%

All Way Stop
11 - 2%
1 - 1%

Thru-Stop
320 - 52%
36 - 53%

Head On, SS Opp
59 - 5%
7 - 5%

Run off Road
912 - 71%
87 - 67%

Signalized
92 - 17%
0 - 0%

All Way Stop
42 - 8%
0 - 0%

Thru-Stop
275 - 50%
1 - 14%

Other/Unknown
140 - 25%
6 - 86%

Run Off Road - 113 (40%), 9 (30%)
Right Angle - 53 (19%), 13 (43%)
Rear End - 23 (8%), 0 (0%)
Left Turn - 19 (7%), 4 (13%)

On Curve
9 - 15%
1 - 14%

On Curve
323 - 35%
34 - 39%

Rear End - 30 (33%), 0 (0%)
Right Angle - 27 (30%), 0 (0%)
Left Turn - 22 (22%), 0 (0%)
Sideswipe Same - 5 (6%), 0 (0%)

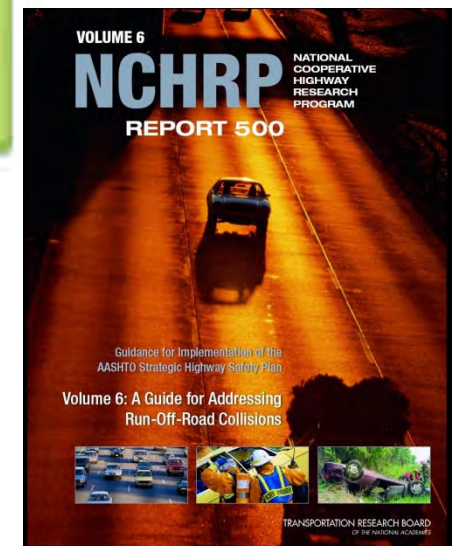
Right Angle - 114 (41%), 1 (100%)
Rear End - 37 (14%), 0 (0%)
Left Turn - 22 (8%), 0 (0%)
Sideswipe Same - 15 (5%), 0 (0%)

Right Angle - 116 (%), 20 (%)
Run Off Road - 54 (%), 3 (%)
Rear End - 33 (%), 4 (%)
Left Turn - 12 (%), 0 (%)

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.





List of Road Departure Strategies

List of Road Departure Strategies

Objectives	Strategies	Relative Cost to Implement and Operate	Effectiveness	Typical Timeframe for Implementation
15.1 A -- Keep vehicles from encroaching on the roadside	15.1 A1 -- Install shoulder rumble strips	Low	Proven*	Short
	15.1 A2 -- Install enhanced pavement markings, edgeline rumble strips or modified shoulder rumble strips on section with narrow or no paved shoulders	Low	Experimental/ Tried	Short
	15.1 A3 -- Install centerline rumble strips	Low	Proven*	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	High*	Proven	Long
	15.1 A8 -- Apply shoulder treatments *Eliminate shoulder drop-offs *Shoulder edge *Widen and/or pave shoulders	Moderate*	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 to High*	Proven	Medium
	15.1 B2 -- Remove/relocate objects in hazardous locations	Moderate to High	Proven	Medium

Source: NCHRP 500 Series (2003)

Short (<1 year)

Medium (1-2 years)

Long (>2 years)

Low (<\$10,000/mile)

Moderate (\$10,000-\$100,000/mile)

High (>\$100,000/mile)

*Updated by CH2M HILL

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

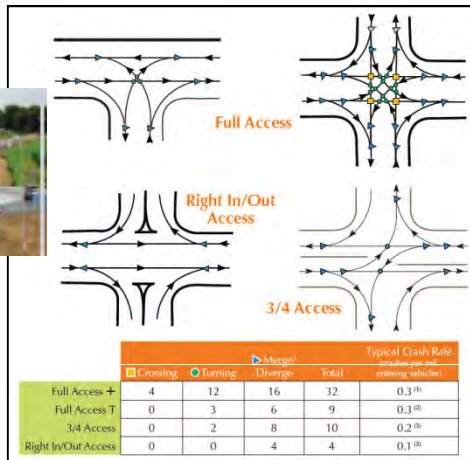


Example – Typical Intersection Strategies

Included Strategies:



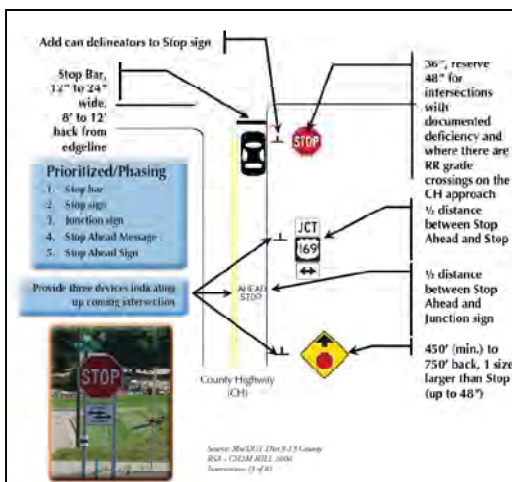
Change Intersection Type



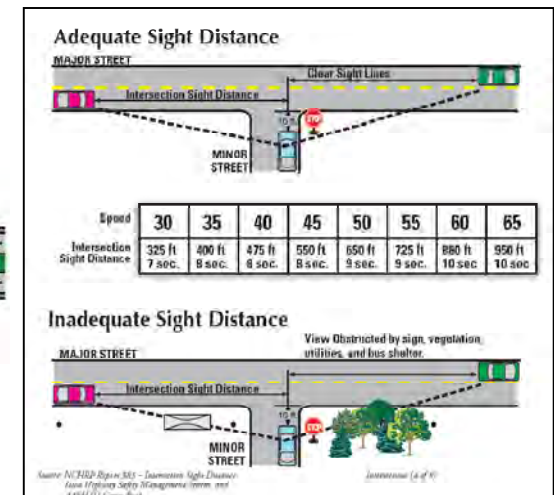
Street Lighting



Dynamic Warning Signs



Enhanced Signing and Delineation



Improve Sight Distance

Safety Workshop

Objective: Multidisciplinary discussion of a short list of safety strategies (Note: there is no discussion of specific locations.)

- Date/Time: To be determined
- Location: To be determined
- Agenda
 - 8:30 – Coffee and Registration
 - 9AM – Introductions
 - Presentations – Law Enforcement and/or Local Safety Advocates
 - Background Information/Desired Outcomes
 - Breakout Sessions – Prioritize Strategies
 - 12PM – 1PM - Lunch
 - Report Back/Final Presentation
 - 2:45 – 3PM - Wrap-up



Phase I - Workshops



ATP 3: Grp 1; March 3, 2010	Lakewood Health Systems Hospital, Staples	44 Attendees
ATP 3: Grp 2; March 8, 2010	Mn/DOT Training Center, St. Cloud	60 Attendees
ATP 3: Grp 3; March 9, 2010	Kanabec Courthouse, Mora	39 Attendees
ATP 6: Grp 5; March 25, 2010	Cove Golf Course, Albert Lea	58 Attendees
ATP 6: Grp 6; March 11, 2010	VFW, Zumbrota	54 Attendees
ATP 6: Grp 7; March 10, 2010	Rushford Village Hall, Rushford	38 Attendees

TOTAL WORKSHOP ATTENDEES: 293
TOTAL EVALUATIONS RECEIVED: 158

- Completed 6 workshops with nearly 300 attendees



Phase I - Workshops

- Voting Results
 - Infrastructure
 - Edgeline Rumble Strips/StripEs 161
 - Street Lights 103
 - Red Light Confirmation Light 95
 - Enhanced Shoulder or Delineation on Curves 90
 - Driver Behavior
 - Seat Belt Enforcement Campaigns 142
 - Conduct DWI Saturations 125
 - GDL Enforcement Campaigns 120
 - Speed Enforcement Campaigns 106



Suggested Grouping for Safety Workshops



Available Dates

- Nov 22:

- Dec 1:

- Dec 2:

- Dec 3:

- Dec 13:

- Dec 14:

- Dec 15:

- Group 4A
 - Becker
 - Clay
 - Douglas
 - Otter Tail
- Group 4B
 - Grant
 - Mahnomen
 - Traverse
 - Wilkin
- Group 4C
 - Big Stone
 - Pope
 - Stevens
 - Swift

- Group 8A
 - Kandiyohi
 - McLeod
 - Meeker
 - Renville
- Group 8B
 - Chippewa
 - Lac Qui Parle
 - Redwood
 - Yellow Medicine
- Group 8C
 - Lincoln
 - Lyon
 - Murray
 - Pipestone

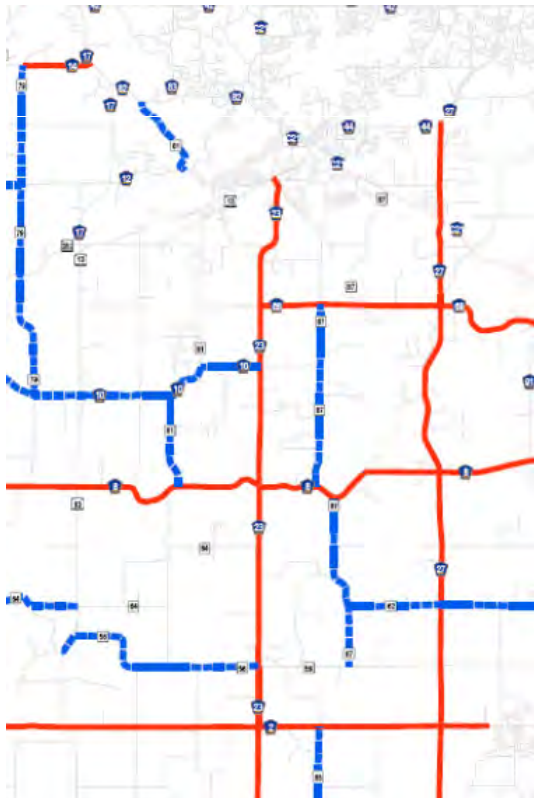
Safety Workshop – County Assignments



- August
 - Confirm groups and select group leaders
 - Prioritize dates
- October
 - Secure Location
 - 50-100 people
- November
 - Arrange refreshments/meals (The cost up to \$12/person will be charged to the project)
 - Send invites (we will provide examples and sample invite list)

Project Development

- Reactive Approach – Identifying Black Spot locations with crash rate above the critical crash rate and/or experienced multiple severe crashes in the 5-year study period.
 - In ATP 3 & ATP 6, a total of 9 Black Spots were identified.
- The Systemic Approach – Applying high priority/low cost safety strategies at the at-risk locations across each county's system of highways.



- The key questions:
- Is every element of the county system equally at risk?
- Where to Start?
- A new approach to safety planning

Old Approach

Crashes = Risk & No Crashes = No Risk

New Approach

No Crashes ≠ No Risk

Use surrogates of crashes (roadway and traffic characteristics) to identify risk and prioritize – the 5 ★ (or 6) Ranking System



ATP 6 - Segments

- 9 counties in ATP 6
 - 2,707 total miles
 - Road Departure Crashes
 - 1,731 total, 159 severe
- Segment Ranking Factors
 - Traffic Volume
 - Rate/Density of Road Departure Crashes
 - Curve (Critical Radius) Density
 - Edge Risk Assessment

County	Total Miles	All Road Departure	Severe Road Departure
Dodge	227	117	9
Fillmore	295	153	16
Freeborn	412	164	18
Goodhue	354	348	26
Houston	199	153	12
Mower	354	104	8
Rice	335	323	44
Wabasha	233	132	13
Winona	298	237	13
Total	2707	1731	159

ATP 6 - Edge Risk Assessment



- 1 – Good Edge, Good Clear Zone

- ★ 2 – No Edge, Good Clear Zone

- ★ 3 – No Edge, No Clear Zone

Winona 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%				

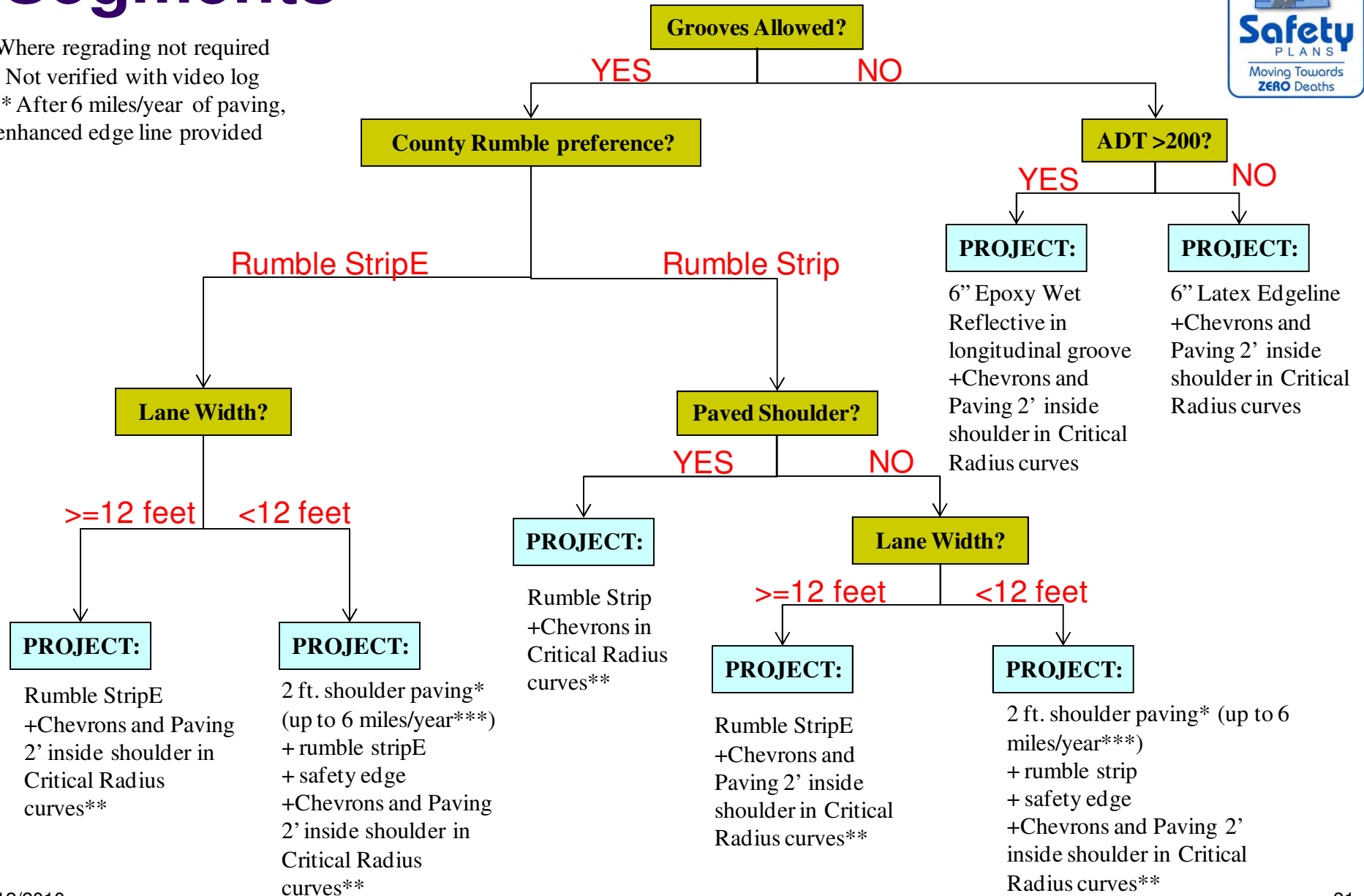
- Is Winona County's entire system at-risk?
 - No – about 1/3 of their system is High Priority

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%

Project Development – High Priority Segments



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



ATP 6 – Segments Project Summary



ATP 6	2' Shoulder Pave+RS+Safety Wedge	Rumble Strip	Rumble StripE	6 inch edgelines	Ground In Wet- Reflective Markings	Total Project Value
Dodge	18	0	60	3	20	\$1,073,012
Fillmore	4	9	34	10	12	\$425,388
Freeborn	25	0	116	1	6	\$1,412,603
Goodhue	17	20	38	2	19	\$952,470
Houston	15	38	32	10	0	\$858,990
Mower	19	0	39	13	38	\$1,249,274
Rice	23	0	79	11	41	\$1,525,510
Wabasha	22	0	79	9	4	\$1,165,110
Winona	25	20	14	0	7	\$1,167,537
	169	87	491	59	146	\$9,829,893



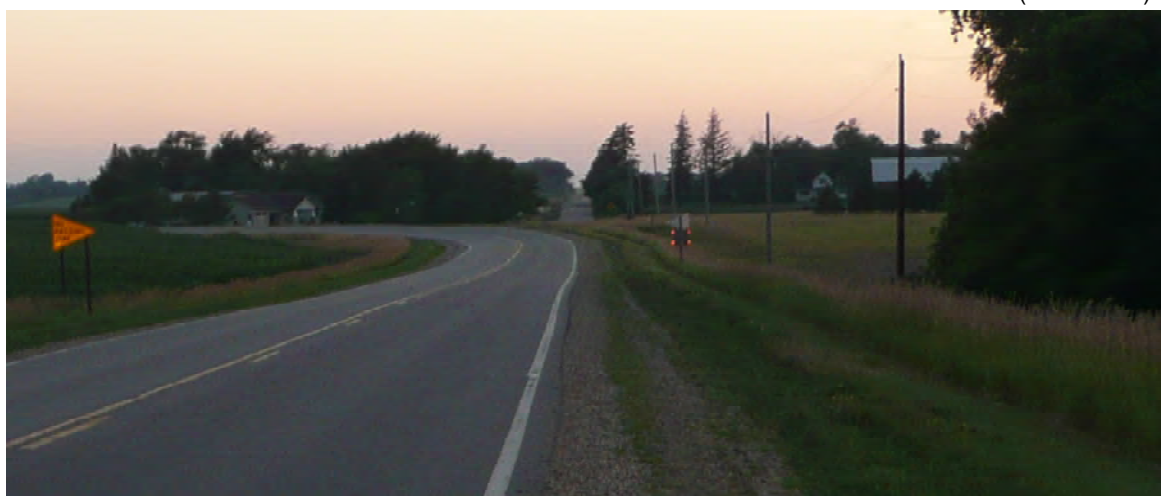
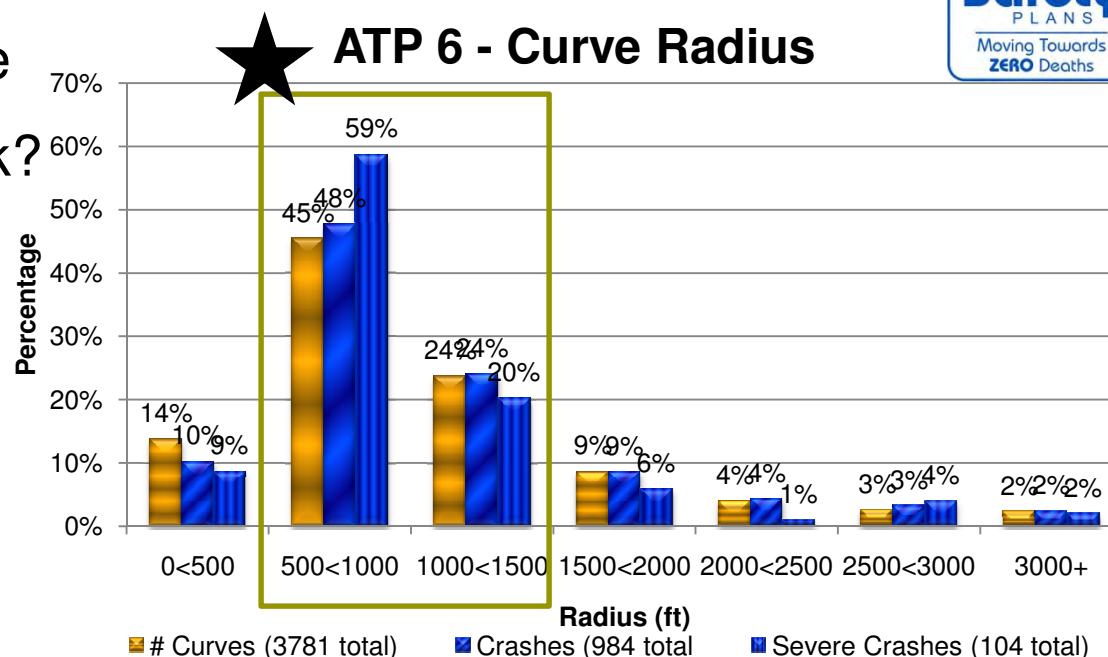
ATP 6 - Curves

- 3,782 total curves
 - 2,611 (70%) curves with no crashes
 - Crashes
 - 984 total, 104 severe crashes
 - 1 curve with multiple fatal crashes (2 fatal crashes in 5 years)
 - 5 curves with multiple severe crashes
 - 0.05 crashes/curve/year
 - 0.006 severe crashes/curve/year

County	Curve Count	Severe Crashes	Total Crashes	Chevrons Installed
Dodge	90	3	39	26
Fillmore	782	18	186	12
Freeborn	202	10	44	114
Goodhue	968	20	203	68
Houston	504	10	106	14
Mower	106	4	28	51
Rice	206	20	159	99
Wabasha	421	7	84	24
Winona	503	12	135	47
Total	3782	104	984	455

Curve-Related Roadway Departure

- In ATP 6, 61% of roadway departure crashes are curve related
- Are all curves equally at-risk?
 - No
- Curve Ranking Factors
 - ADT Range
 - Radius Range
 - Severe crash on curve
 - Intersection on curve
 - Visual Trip on curve



- The majority of severe crashes occurred on curves with 500'-1,500' radii.

Houston County Curve Prioritization



Curve Count	ID	Crashes										Severe RoR		ADT	Intersection on Curve	Chevrans	Visual Trap	Rank	Proximity	Chevron Candidate
		Corridor	Segment	Total	Severe	K	A	B	C	PDO	K	A	Radius (ft)							
1	001A	1.01	CSAH 1	1	-	-	-	-	-	1	-	92	125	50	-	-	-			
2	001B	1.01	CSAH 1	-	-	-	-	-	-	-	-	557	422	50	-	-	-	★		
3	001C	1.01	CSAH 1	-	-	-	-	-	-	-	-	823	493	50	-	-	-	★		
4	001D	1.01	CSAH 1	-	-	-	-	-	-	-	-	379	359	50	-	-	-			
5	001E	1.01	CSAH 1	-	-	-	-	-	-	-	-	669	456	50	-	-	-	★		
6	001F	1.01	CSAH 1	-	-	-	-	-	-	-	-	270	431	50	-	-	-			
7	001G	1.01	CSAH 1	-	-	-	-	-	-	-	-	314	324	50	-	-	-			
8	001H	1.01	CSAH 1	-	-	-	-	-	-	-	-	545	239	50	-	-	-	★		
9	001I	1.01	CSAH 1	-	-	-	-	-	-	-	-	459	225	50	-	-	-			
10	001J	1.01	CSAH 1	-	-	-	-	-	-	-	-	368	274	50	-	-	-			
11	001K	1.01	CSAH 1	1	-	-	-	-	-	1	-	318	390	50	-	-	-			
12	001L	1.01	CSAH 1	-	-	-	-	-	-	-	-	267	399	50	-	Yes	-			Installed
13	001M	1.01	CSAH 1	-	-	-	-	-	-	-	-	1,475	345	50	-	-	-	★		
14	001N	1.01	CSAH 1	-	-	-	-	-	-	-	-	763	578	130	Yes	-	-	★★		
15	001O	1.01	CSAH 1	-	-	-	-	-	-	-	-	859	353	210	Yes	-	-	★★		
16	002A	2.02	CSAH 2	1	-	-	-	1	-	-	-	583	752	930	-	-	-	★★	Yes	Yes
17	002B	2.02	CSAH 2	-	-	-	-	-	-	-	-	584	635	930	Yes	-	-	★★★	-	Yes
18	002C	2.02	CSAH 2	-	-	-	-	-	-	-	-	799	665	930	Yes	-	-	★★★	-	Yes
19	002D	2.02	CSAH 2	-	-	-	-	-	-	-	-	963	626	930	-	-	-	★★	Yes	Yes
20	002E	2.02	CSAH 2	-	-	-	-	-	-	-	-	1,234	584	930	-	-	-	★★	Yes	Yes
21	002F	2.02	CSAH 2	-	-	-	-	-	-	-	-	1,188	719	930	-	-	-	★★	Yes	Yes
22	002G	2.02	CSAH 2	1	1	-	1	-	-	-	-	938	556	930	-	-	-	★★★	-	Yes
23	002H	2.02	CSAH 2	-	-	-	-	-	-	-	-	1,199	402	930	-	-	-	★★	Yes	Yes
...
...
...
502	249ZH	249.01	CR 249	-	-	-	-	-	-	-	-	432	301	275	Yes	-	-		Yes	Yes
503	249ZI	249.01	CR 249	-	-	-	-	-	-	-	-	814	344	275	-	-	-		Yes	Yes
504	249ZJ	249.01	CR 249	-	-	-	-	-	-	-	-	800	685	275	-	-	-	★	Yes	Yes

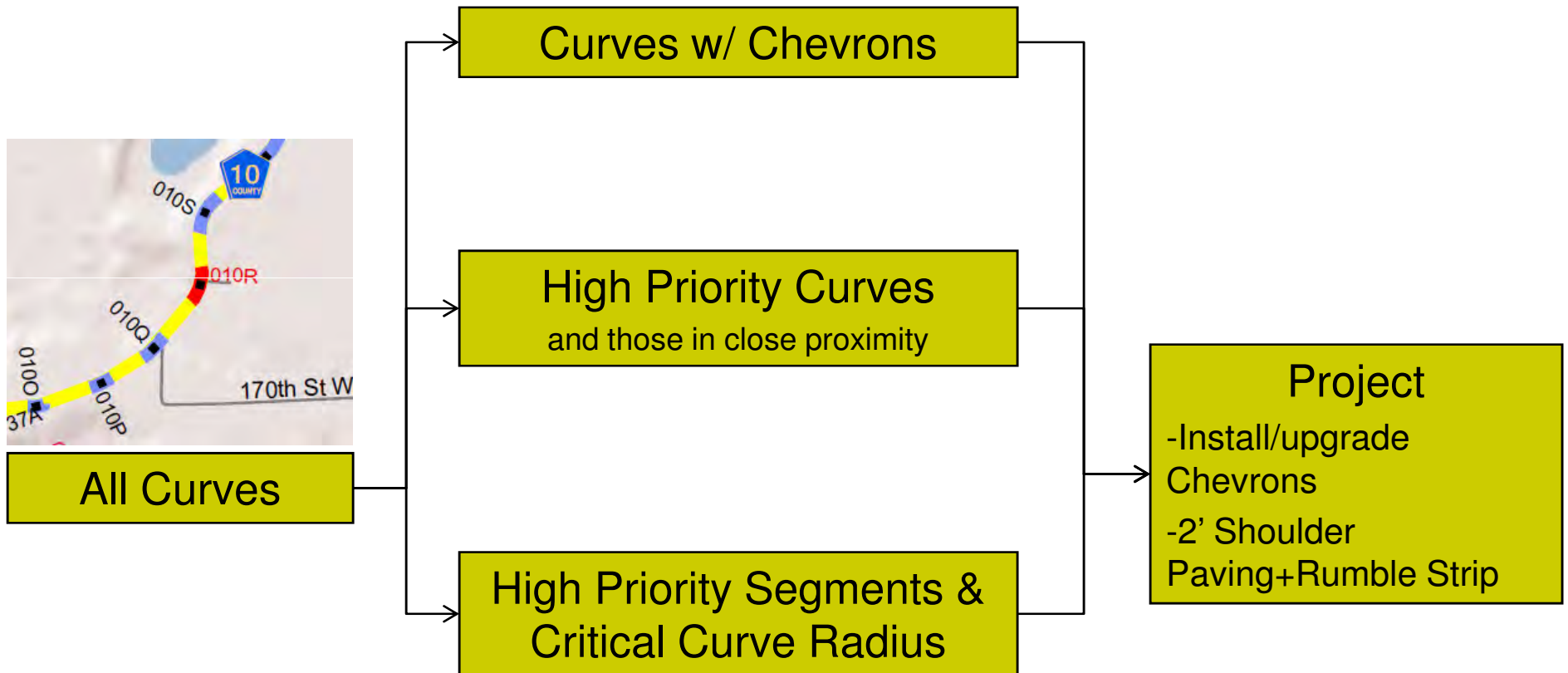
- Complete census of 504 curves
- 32 High Priority Curves (6%)
 - 138 Curves in Proximity

Stars	#	%	Chevrans in Place	
			#	%
★★★★★	0	0%	0	0%
★★★★	7	1%	2	0%
★★★	25	5%	4	1%
★★	108	21%	1	0%
★	250	50%	2	0%
-	114	23%	5	1%
	504	100%	14	3%

Project Development – High Priority Curves



- Three ways for a Curve to receive a project





ATP 6 – Curve Project Summary

ATP 6	Currently Installed Chevrons	★ Ranking	Proximity	HP Seg + Crit Rad	Total Project Value
Dodge	26	35	14	24	\$647,868
Fillmore	6	42	91	97	\$2,104,625
Freeborn	119	11	39	12	\$1,522,274
Goodhue	32	64	119	64	\$2,399,979
Houston	14	26	138	161	\$2,744,071
Mower	51	15	9	7	\$785,698
Rice	99	14	56	11	\$1,556,763
Wabasha	24	53	114	81	\$3,306,345
Winona	27	49	164	31	\$2,481,812
	398	309	744	488	\$17,549,436





ATP 6 - Intersections

- 1,310 total intersections
 - 22 signalized
 - 7 All Way Stop
 - 1281 Thru Stop/Yield
- 2,379 total crashes
- 119 Severe Crashes
 - 43 severe right angle
- Intersections with Multiple Severe Crashes: 40
 - Intersections with Multiple Fatal Crashes: 9
- 0.36 crashes/intersection/year
- 0.02 severe crashes/intersection/year

County	Intersections
Dodge	135
Fillmore	168
Freeborn	254
Goodhue	145
Houston	67
Mower	160
Rice	175
Wabasha	94
Winona	112
Total	1310

Rural Thru STOP Intersection Ranking Factors



- Geometry
 - Skewed minor leg approach
 - Intersection on/near horizontal curve
- Volume
 - Minor ADT/Major ADT ratio
- Proximity
 - Previous STOP sign
 - Railroad crossing
- Intersection Related Crashes
- Commercial Development in quadrants



Winona County Rural Intersection Prioritization



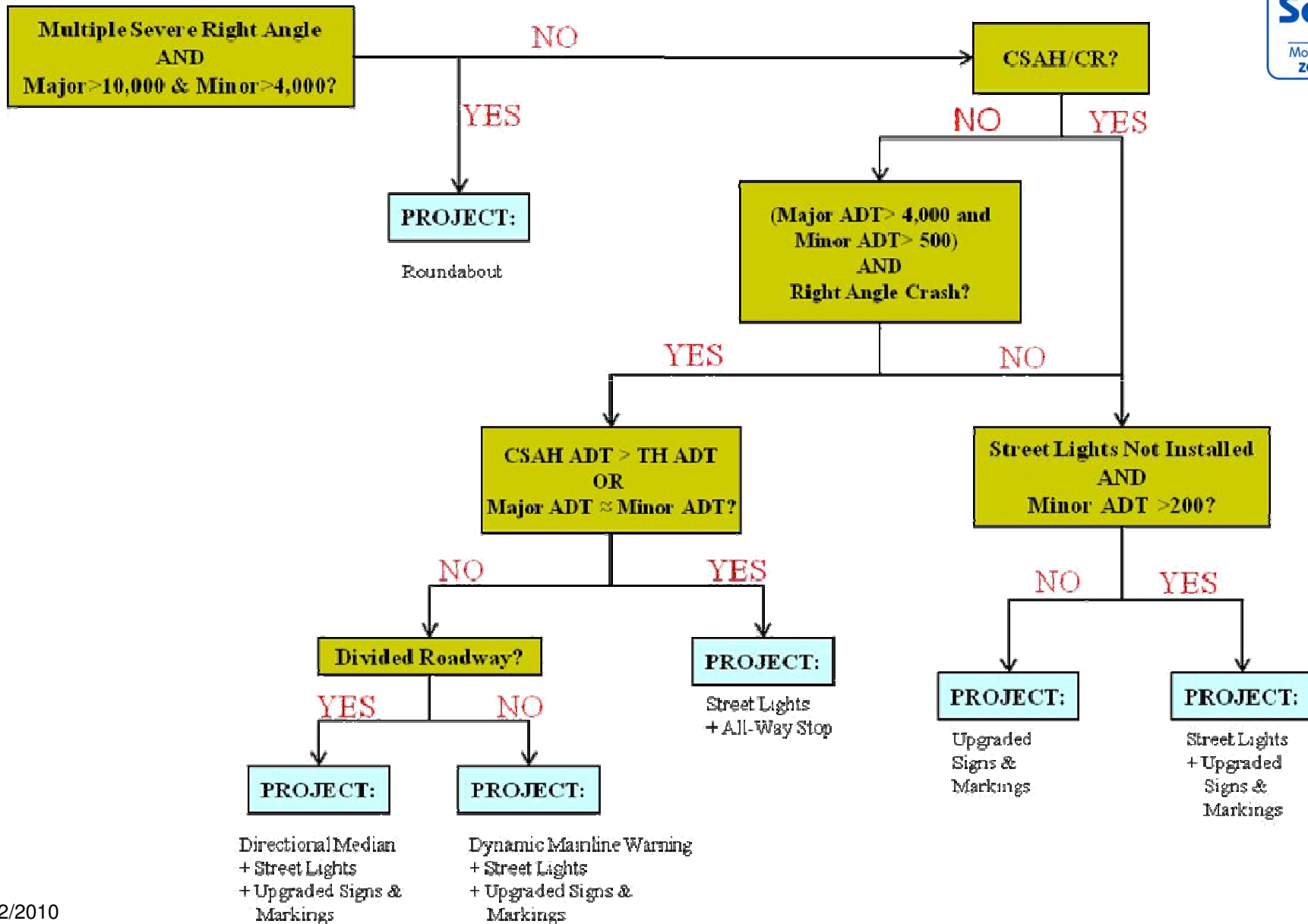
Rank	Int #	Sys	#	Intersection Description	Skew	On/Near Curve	Development	RR Xing	Previous STOP (>5mi)	Total Crashes	Ratio (Min/Maj)	Priority	Crash Cost
1	21.02	CSAH	21	CSAH-44 RT		★			★	★	★	★★★★	\$ 399,000
2	6.01	CSAH	6	MNTH-74 X-ING	★				★	★	★	★★★★	\$ 196,000
3	29.01	CSAH	29	CR-109 RT, CSAH-29 TURNS LT	★	★			★	★		★★★★	\$ 182,000
4	21.01	CSAH	21	MNTH-43 X-ING, T-130 BHD	★	★			★	★		★★★★	\$ 175,000
5	12.06	CSAH	12	MNTH-76 RT	★	★			★	★		★★★★	\$ 91,000
6	25.03	CSAH	25	CR-106 AHD, CSAH-25 CURVES	★	★				★	★	★★★★	\$ 12,000
7	12.07	CSAH	12	CR-104 RT	★	★	★		★			★★★★	\$ -
8	1.01	CSAH	1	CSAH-12 X-ING	★	★			★		★	★★★★	\$ -
9	25.05	CSAH	25	USTH-14 X-ING					★	★	★	★★★	\$ 813,000
10	6.02	CSAH	6	CSAH-43 RT					★	★	★	★★★	\$ 685,000
11	6.04	CSAH	6	CSAH-33 X-ING ENTER FREMON	★					★	★	★★★	\$ 503,000
12	44.02	CSAH	44	CSAH 44 Lake St		★			★	★		★★★	\$ 411,000
13	12.03	CSAH	12	MNTH-43 X-ING		★			★	★		★★★	\$ 342,000
14	39.03	CSAH	39	MNTH-74 X-ING (NORTH)	★				★	★		★★★	\$ 318,000
15	20.01	CSAH	20	CSAH-27 LT & BHD T-560 RT		★			★	★		★★★	\$ 239,000
16	23.04	CSAH	23	USTH-61 SBL X-ING	★	★				★		★★★	\$ 163,000
17	5.01	CSAH	5	CSAH-8 LT	★	★				★		★★★	\$ 136,000
18	120.02	CNTY	120	USTH-14 X-ING, T-322 AHD east	★	★				★		★★★	\$ 103,000
19	6.03	CSAH	6	CSAH-35 LT CR-113 RT	★					★	★	★★★	\$ 91,000
20	8.01	CSAH	8	CSAH-11 X-ING	★					★	★	★★★	\$ 91,000
21	11.03	CSAH	11	CSAH-12 X-ING	★				★	★		★★★	\$ 12,000
22	20.03	CSAH	20	CSAH-25 LT & BHD east		★				★	★	★★★	\$ 12,000

- Is Winona County's entire system at-risk?
 - No – about 1/3 of their system

	#	%
★★★★★★	0	0%
★★★★★★	0	0%
★★★★★	0	0%
★★★★	8	11%
★★★	21	30%
★★	33	46%
★	9	13%
-	0	0%
	71	100%

Considered for projects

Project Development – High Priority Rural Intersections



Winona County Intersections


- CSAH 30 and TH 74 Project Form
 - Intersection Data –ADT, TCD, Street Lights, etc
 - Crash Data
 - Deficiencies – Star Ranking
 - Strategies
 - Selected Strategy



CSAH 30 and MNTH-74 X-ING
Agency: Winona County

Intersection Data

Configuration: X
 Configuration (2): Undivided
 True Mile: 4.04
 Urban/Rural: Rural
 County: Winona
 ATP: 6
 Entering ADT: 550
 Traffic Control Device: Thnu/STOP
 Street Lights: No
 Flashers: No
 Major ADT: 260
 Minor ADT: 290



Crash Data

2003-2007 MnCMAT Crash Data 5 years

	Total	Angle	K+A
Crashes	0		
Rate (per MVM)	0.0	0.0	0.0

Ranking Factors

	Value	Critical	Star Ranking
Skew	Yes	Yes	★
On/Near Curve	Yes	Yes	★
Development	No	Yes	
Near RR Crossing	No	Yes	
Distance from previous STOP	Yes	Yes	★
Volume Ratio	1.12	0.4 - 0.8	
Total Crashes	0	>0	★★★

Short List of Strategies

Description	Type	Cost per Intersection	Selected	Notes - -
Roundabout	Proactive	\$1,000,000	-	
Directional Median	Proactive	\$150,000	-	
Mainline Dynamic Warning Sign	Proactive	\$30,000	-	
Installing Street Lights	Proactive	\$8,000	x	
Upgraded Signs & Markings	Proactive	\$13,200	x	

Selected Strategy

Installing Street Lights	Federal Funds	\$19,080
Upgraded Signs & Markings	Local Match (10% of Total project cost)	\$2,120
	Total Project Cost	\$21,200

Page: 25
 Intersection ID: 30.01
 8/6/2010

ATP 6 - Intersection Project Summary



ATP 6	Directional Median	Dynamic Warning Sign	Street Lights	Signs & Markings	Total Project Value
Dodge	2	3	21	30	\$921,000
Fillmore	0	1	28	30	\$587,300
Freeborn	0	0	22	23	\$446,600
Goodhue	3	5	29	41	\$1,349,600
Houston	0	0	7	8	\$145,100
Mower	0	2	22	33	\$798,700
Rice	0	5	15	29	\$619,800
Wabasha	0	0	30	39	\$665,700
Winona	1	1	17	22	\$570,100
Total	6	17	191	255	\$6,103,900





ATP 6 – Project Summary

ATP 6	Intersections	Segments	Curves	Total
Dodge	\$921,000	\$1,073,012	\$647,868	\$2,641,880
Fillmore	\$587,300	\$425,388	\$2,104,625	\$3,117,313
Freeborn	\$446,600	\$1,412,603	\$1,522,274	\$3,381,477
Goodhue	\$1,349,600	\$952,470	\$2,399,979	\$4,702,048
Houston	\$145,100	\$858,990	\$2,744,071	\$3,748,161
Mower	\$798,700	\$1,249,274	\$785,698	\$2,833,672
Rice	\$619,800	\$1,525,510	\$1,556,763	\$3,702,073
Wabasha	\$665,700	\$1,165,110	\$3,306,345	\$5,137,155
Winona	\$570,100	\$1,167,537	\$2,481,812	\$4,219,449
	\$6,103,900	\$9,829,893	\$17,549,436	\$33,483,229

Average Per County	Intersections	Segments	Curves	Total
ATP 6	\$678,211	\$1,092,210	\$1,949,937	\$3,720,359

What's Next



- Counties
 - Review, edit/concur with segment and intersection descriptions.
 - Begin assembling information about previous deployment of safety strategies; shoulder rumblestrips, 6" edgelines, street lights, chevrons, etc.
- Next meetings
 - Safety Emphasis Areas Review Meeting
 - October
 - Detroit Lakes and Willmar
- Ann Johnson (P.E. Services) will be in contact to assist with data gathering.
- Start thinking about Workshop in November/December 2010



More Information

- Mn/DOT State Aid website
 - www.dot.state.mn.us/stateaid
- Olmsted County Safety Plan
 - <http://www.co.olmsted.mn.us/departments/pw/highways.asp>
- Contact Information
 - Howard Preston, CH2M HILL, 651.365.8514, howard.preston@ch2m.com
 - Michael Barry, CH2M HILL, 651.365.8520, michael.barry@ch2m.com
 - Mike Marti, SRF Consulting Group, 763.249.6779, mmarti@srfconsulting.com
 - Carla Stueve, SRF Consulting Group, 765.249.6797, cstueve@srfconsulting.com
 - Ann Johnson, P.E. Services, 612.275.8190, johns421@umn.edu

Questions?