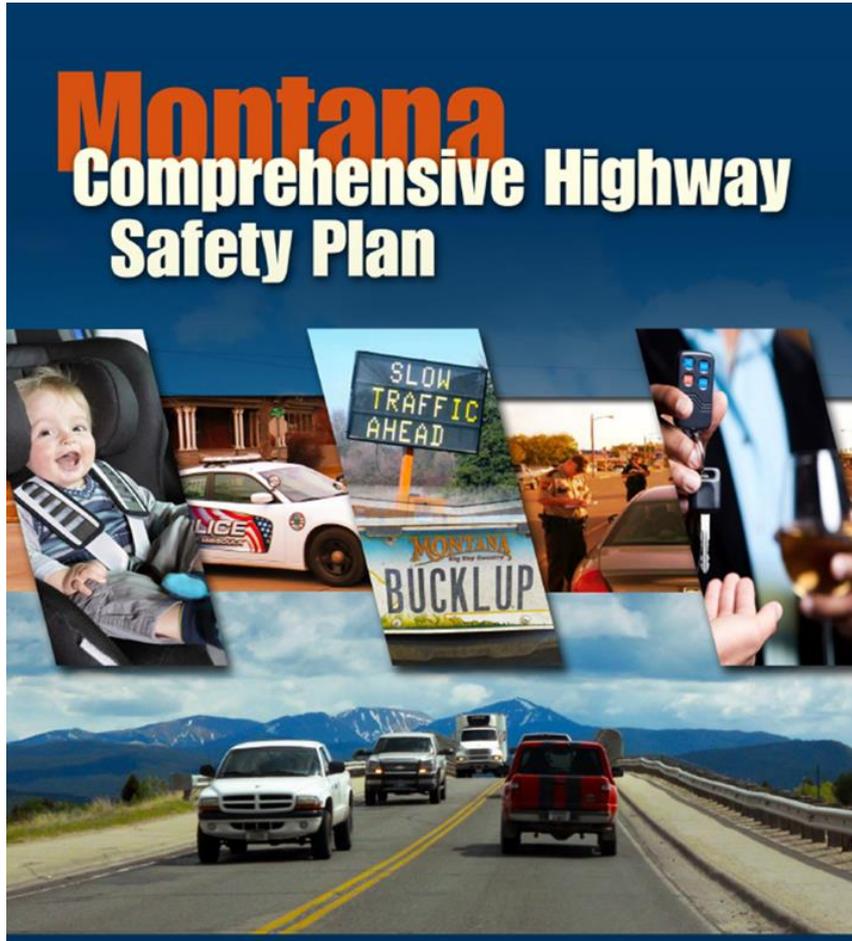


Roadway Departure & Intersection Crashes Emphasis Area



Roadway Departure & Intersection
Crashes Emphasis Area
Radisson Colonial Hotel
Helena, MT
October 13, 2016

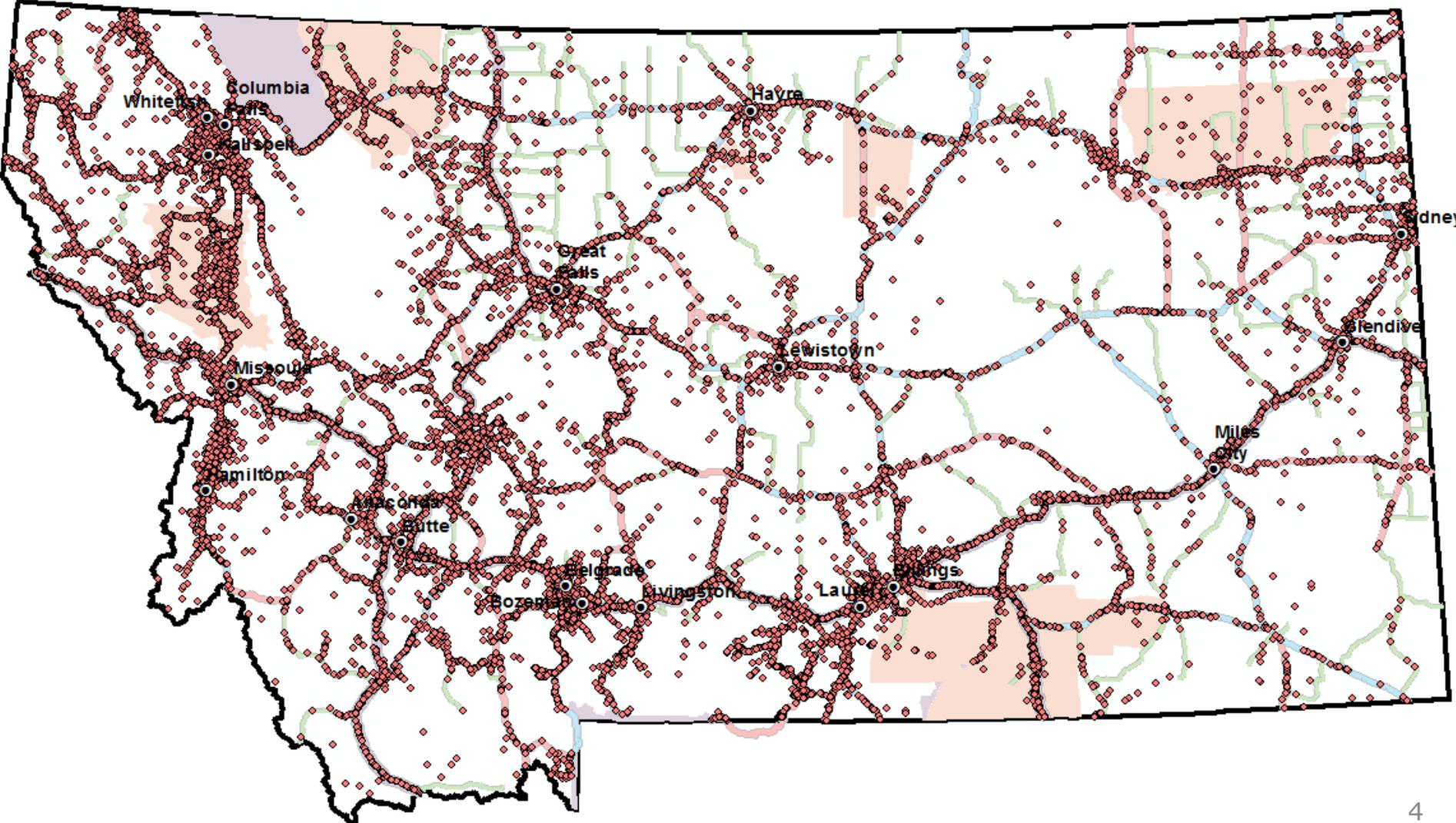
Kraig McLeod, Bureau Chief,
Multimodal Planning Bureau
Montana Department of
Transportation

- **Safety Issues**
- **Fatalities & Serious Injuries**
- **Strategies**
- **Implementation Update**
- **Moving Forward**

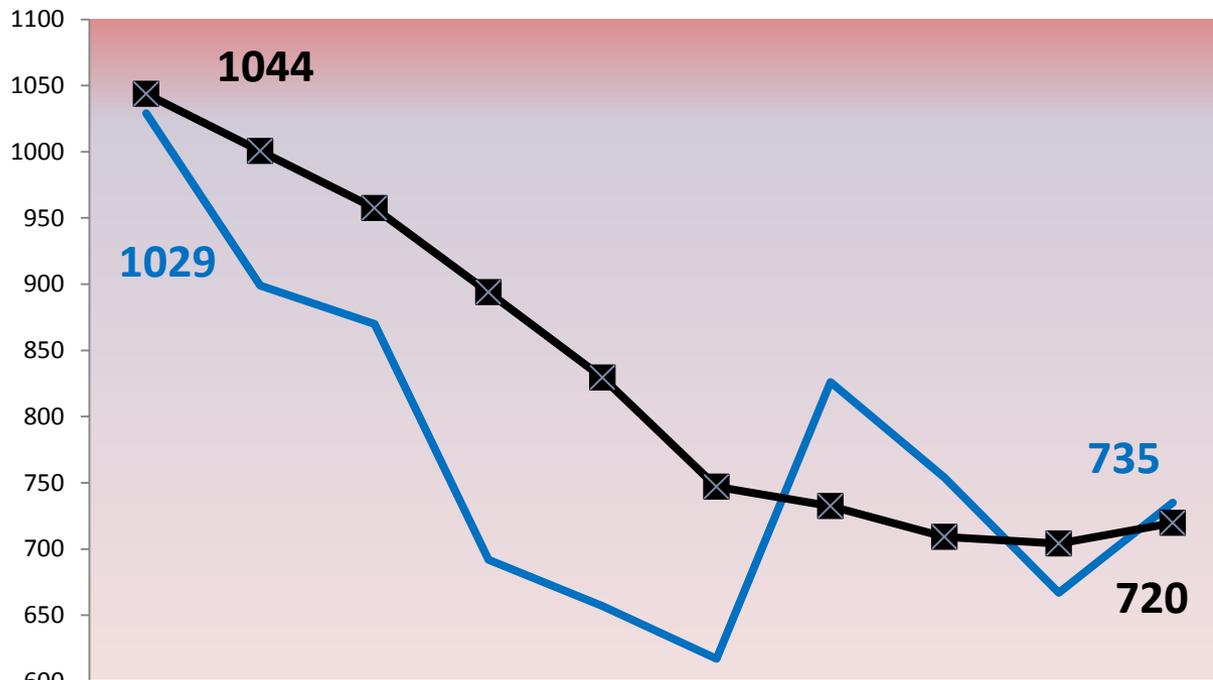
Safety Issues

In 2015, roadway departure crashes accounted for 69% of all Montana's roadway fatalities.

2005-2014 Rural RD Fatal & Injury Crashes



Roadway Departure Fatalities & Serious Injuries



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
— Roadway Departure Crash - Fatalities and Serious Injuries	1029	899	870	692	657	617	826	754	667	735
—x— 5 Year Average (F + SI)	1044	1001	957	894	829	747	732	709	704	720
Fatalities	167	194	143	146	121	142	158	151	126	155
Serious Injuries	862	705	727	546	536	475	668	603	541	580

Date as of 9/13/2016

Montana Comprehensive Highway Safety Plan
2015-2020

#VisionZeroMT
zero deaths | zero serious injuries

3-year Roadway Departure Severe Injury Trend – by Crash Factor

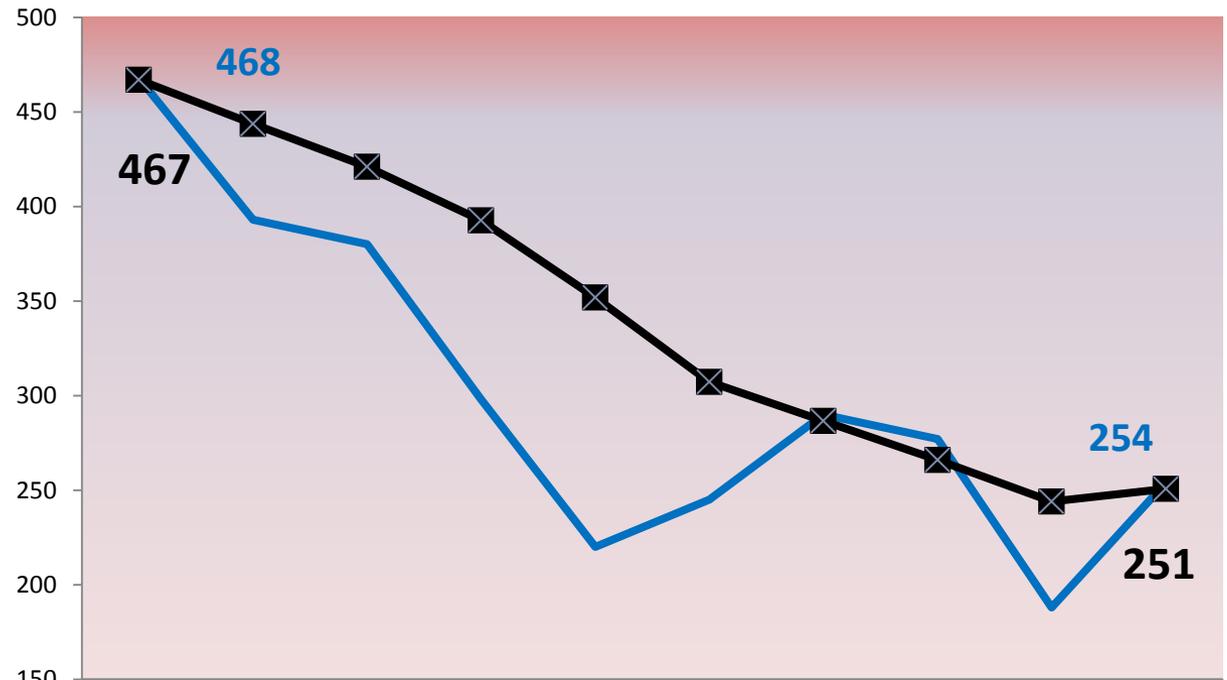
	2013	2014	2015
Fatalities	151	126	155
Serious Injuries	603	541	580
Severe Injuries	754	667	735
Impaired Driver Involved (~47%)	325	293	347
Unrestrained Occupant (~45%)	316	270	331
Young Driver Involved	119	113	132
Older Driver Involved	93	87	91
Male Driver Involved (~73%)	551	474	534
Female Driver Involved	246	232	226
Motorcyclist	98	77	80
Large Vehicle	32	35	50

3-year Roadway Departure Severe Injury Trend – by Crash Factor

(continued)

	2013	2014	2015
Fatalities	151	126	155
Serious Injuries	603	541	580
Severe Injuries	754	667	735
Rural Crash (~92%)	720	612	678
Urban Crash	34	55	57
June, July, and August (~38%)	293	233	280
Friday, Saturday, and Sunday(~52%)	399	354	385
Nighttime (~33%)	279	221	240
Shoulder Width less than 4 feet (~45%)	317	314	334
More than 2 lane roadway	216	99	114
Speed as a Factor	174	172	202

Intersection Related Fatalities & Serious Injuries



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intersection Crash - Fatalities and Serious Injuries	468	393	380	298	220	245	290	277	188	254
5 Year Average (F + SI)	467	444	421	393	352	307	287	266	244	251
Fatalities	40	37	37	32	30	30	17	27	20	30
Serious Injuries	428	356	343	266	190	215	273	250	168	224

Date as of 9/13/2016

Montana Comprehensive Highway Safety Plan
2015-2020

#VisionZeroMT
zero deaths | zero serious injuries

3-year Intersection

Severe Injury Trend – by Crash Factor

	2013	2014	2015
Fatalities	27	20	30
Serious Injuries	250	168	224
Severe Injuries	277	188	254
Impaired Driver Involved (~26%)	61	32	65
Unrestrained Occupant (~18%)	74	43	46
Young Driver Involved (~22%)	72	35	55
Older Driver Involved (~27%)	64	37	68
Male Driver Involved (~82%)	239	146	209
Female Driver Involved	151	103	144
Non-motorized Involved (~11%)	30	27	28
Motorcyclist (~13%)	41	30	32
Large Vehicle	15	8	10

3-year Intersection

Severe Injury Trend – by Crash Factor

(continued)

	2013	2014	2015
Fatalities	27	20	30
Serious Injuries	250	168	224
Severe Injuries	277	188	254
Rural Crash (~50%)	154	103	126
Urban Crash (~50%)	123	85	128
June, July, and August (~36%)	105	57	91
Friday, Saturday, and Sunday (~37%)	122	74	94
Nighttime	62	41	60
Shoulder Width less than 4 feet	109	62	80
More than 2 lane roadway	81	47	64
Speed as a Factor	37	23	27

1

Reduce and mitigate roadway departure crashes through data-driven problem identification and the use of best practices.

- **Implement MDT's Roadway Departure Plan including systemic and hot spot treatments on rural state routes.**
- **Construct infrastructure improvements to mitigate road departure crashes, both on and off the state system.**
- **Evaluate new roadway departure prevention technologies on an ongoing basis for applicability to Montana's roadways.**
- **Conduct Roadway Safety Audits on corridors or locations identified as having safety Issues**

Implementation Update

- Implement MDT's Roadway Departure Plan including systemic and hot spot treatments on rural state routes.
- Construct infrastructure improvements to mitigate road departure crashes, both on and off the state system.
 - Utilize SIMS/Roadway Departure Study to program HSIP projects
 - HSIP –Includes Section 164 Funds (FFY 2015); \$22.4 million (CN/CE)
 - By Sept. 2016; HSIP & Section 164 - obligated \$27.2M (CN/CE)

Implementation Update

- Implement MDT's Roadway Departure Plan including systemic and hot spot treatments on rural state routes
- Construct infrastructure improvements to mitigate road departure crashes, both on and off the state system
 - Fall of 2015 – began installing centerline rumblestrips on a systemic basis
 - Continuing effort to complete horizontal curve signing projects by 2019

Implementation Update

- Evaluate new roadway departure prevention technologies on an ongoing basis for applicability to Montana's roadways.
 - **Conducted feasibility study for developing a VSL system for implementation on I-90 at Lookout Pass.**
 - The feasibility study developed a concept framework
 - Study developed a cost estimate
 - Total cost for field infrastructure such as speed sensors, electronic signs, communication, cameras, etc. would be ~\$13 million.
 - About \$2.6 million on a yearly basis to maintain and operate this system.

2

Reduce and mitigate speed-related roadway departure/ intersection crashes

- **Complete the “Safety Impact of Differential Speed Limits on Rural Two-Lane Highways in Montana” research study**
- **Support targeted enforcement based on demonstrated crash patterns and high-risk drivers.**

Implementation Update

- Safety Impact of Differential Speed Limits on Rural Two-Lane Highways in Montana research study was completed in August 2016
 - **Criteria for moving towards uniform speed limits**
 - ADT of 3000 or higher, and
 - Percent trucks of 10% or higher

http://www.mdt.mt.gov/research/projects/traffic/differential_speed.shtml

Implementation Update

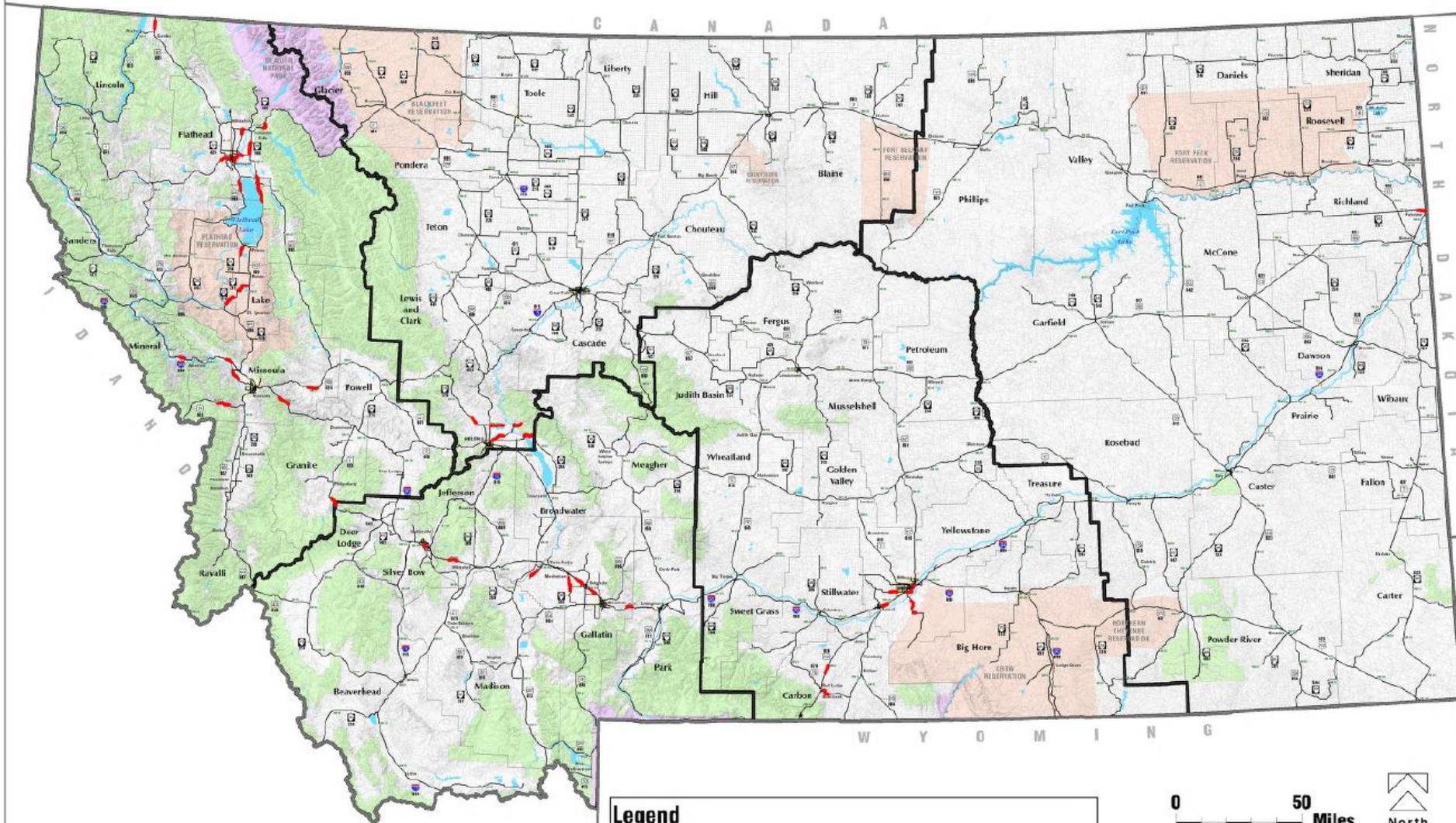
- Support targeted enforcement based on demonstrated crash patterns and high-risk drivers.

MDT Motor Carrier Services completed Operation Safe Driver events at 2 locations.

- **Gallatin Canyon – Four Corners to West Yellowstone**
- **Bakken Area**
- **Issued 113 Warnings & 29 Citations to Non-CMV Drivers**
- **Upcoming: US 93 – Missoula to Kalispell**

Roadway Departure Safety Implementation Plan

ALCOHOL CRASH PATTERNS



Map prepared May, 2014 by Felsburg Holt & Ulløvig in coordination with DiExSys. Alcohol involved crash patterns were determined through modeling produced/revised in May, 2014 by DiExSys™. Map produced in ESRI ArcMap 10.2. Land jurisdiction and highway information provided by MDT Hillshade provided by USGS. Mapped using lookup table (provided by MDT) for conversion between reference marker (RM) and true distance (DCMI) linear referencing systems. Map reduced from 34" x 44".

Legend

- Alcohol Involved Crash Patterns
- County Boundaries
- Reservations
- Forest Service Lands
- National Parks
- MDT Districts

0 50 Miles



3

Reduce roadway departure and intersection crashes through education

- **Enhance awareness of and encourage increased participation of evidence-based roadway user skills training.**
- Research underlying beliefs and behaviors of high-risk groups to better understand, develop focused strategies, and by using proven and innovative communication channels.
- **Conduct public awareness/education about roadway conditions, yellow flashing signals, roundabouts, bicycle lanes, pedestrian signals, operations around EMS responders, and right-of-way rules at stop-controlled and uncontrolled intersections, etc.**
- **Promote/support evidence-based teen peer-to-peer education re: risky driving behavior, consequences of distracted driving, impaired driving, and not using seat belts, among others.**

Implementation Update

Organization	Website	Trainings	Programs	Materials	Contact Person
AAA	https://www.mountainwest.aaa.com/news/traffic-safety#trafic_saftey-tab-five			Variety of web info/brochures related to teens; seniors; bike/ped...	Anna O'Donnell
AARP	aarpdriversafety.org	Smart Driver Course in 9 regions; 4-hours long; classes can be identified through			Carl Peil
Bike Walk Montana	http://www.bikewalkmontana.org/resources/montana-bicycle-laws/	Bicycle/pedestrian safety classes		safety brochures	Melinda Barnes
City of Billings	http://ci.billings.mt.us/index.aspx?NID=2097			Variety of info on navigating intersections, etc.	
City of Missoula	http://www.ci.missoula.mt.us/911/Rou			Roundabout Information	
City of Missoula	http://www.ci.missoula.mt.us/mediacenter.aspx?CID=6#player			Bicycle/Pedestrian Safety Videos	
Journeys from Home	http://www.journeysfromhomemontana.org/	Child bicycle/pedestrian curriculum; adult bicycle education classes		Curriculum videos/handouts	Roger DiBrito
MDT	http://www.mdt.mt.gov/visionzero/docs/flashing-yellow.pdf			Flashing Yellow Left-turn Arrows brochure	Roy Peterson
MDT	http://plan2live.mt.gov/		plan2live		Janet Kenny
MDT	http://www.mdt.mt.gov/visionzero/people/skill.shtml		Peer-to-Peer Traffic Safety Campaign Program (young		Sheila Cozzie

Implementation Update

- Enhance awareness of and encourage increased participation of evidence-based roadway user skills training.
 - Montana Motorcycle Rider Safety Program
 - AARP – Training/Carfit
 - Teens and Trucks
 - AAA
 - Operation Lifesaver
 - Teen Peer to Peer Program
 - Others



Implementation Update

- Conduct public awareness/education about roadway conditions, yellow flashing signals, roundabouts, bicycle lanes, pedestrian signals, operations around EMS responders, and right-of-way rules at stop-controlled and uncontrolled intersections, etc.
 - Flashing Yellow Arrows brochures available
 - Updated roundabout brochures available
 - Pedestrian Hybrid Beacon information on VisionZero webpage

<http://www.mdt.mt.gov/visionzero/roads/>

Implementation Updates

Driving with

Flashing Yellow Left-Turn Arrows



Indication Meanings



A **Steady Red Arrow** means drivers must stop and may not enter the intersection.



A **Steady Green Arrow** means drivers have a "protected" turning movement. If there is no green arrow, left and right turning traffic is "unprotected" and must yield right of way to oncoming traffic and pedestrians.

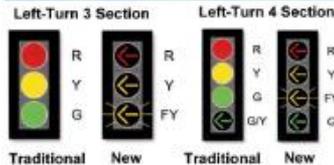


A **Steady Yellow Arrow** means drivers are warned the signal is turning red. Do not enter the intersection if you can stop safely. Vehicles in the intersection should safely complete their turn.



A **Flashing Yellow Arrow** means drivers are allowed to turn after yielding to oncoming traffic and pedestrians. Oncoming traffic has a green light. Drivers must determine if there is an adequate gap for safety before turning.

Signal Display Changes



National Safety Benefit

A national study conducted by the National Cooperative Highway Research Program (NCHRP) has demonstrated that drivers find flashing yellow left-turn arrows more understandable than traditional yield-on-green indications. For safety, the Federal Highway Administration (FHWA) adopted the flashing yellow arrow as the national standard for left-turn operations where the driver must yield to oncoming traffic.

Learn more at
www.mdt.mt.gov

2701 Prospect Ave
PO Box 201001
Helena, MT 59620-1001
406-444-6200

Montana Department of Transportation

Moving towards zero deaths and zero serious injuries on Montana roads.

Alternative accessible formats of this document will be provided on request. Persons who need an alternative format should contact the Civil Rights Bureau, Department of Transportation, 2701 Prospect Avenue, PO Box 201001, Helena, MT 59620. Telephone (406) 444-9229. Those using a TTY may call 1 (800) 335-7592 or through the Montana Relay Service at 711.

This document is printed at state expense. Information on the cost of producing this publication may be obtained by contacting the Department of Administration.

Driving with

Roundabouts

Single Lane Roundabouts



- 1. SLOW DOWN** when approaching a roundabout, and be prepared to stop.
- 2. LOOK TO THE LEFT** as traffic flows in a counter-clockwise direction. Yield to **ALL** vehicles already in the roundabout. They have the right of way **no matter which lane they are traveling in**.
- 3. STAY IN YOUR LANE** when entering a roundabout. Merge into the traffic flow when it is safe.
- 4. TRAVEL AROUND THE CIRCLE** in a counterclockwise direction until you reach your desired street. Use your right-turn signal to exit the roundabout.

Other Vehicles

Large Vehicles need more space when navigating roundabouts, and smaller vehicles should drop back to allow the larger vehicle to complete travel through the roundabout.

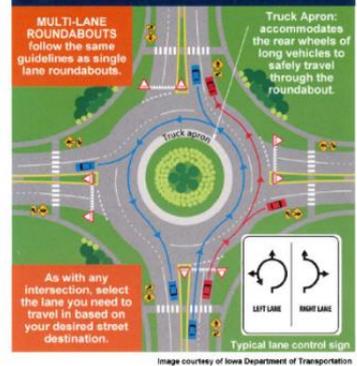
If an **Emergency Vehicle** approaches, exit the roundabout immediately and then pull over. **Do not stop in the roundabout.**

Bicycles and Pedestrians

Pedestrians must cross at designated crosswalks.

Bicyclists are encouraged to walk their bikes and use pedestrian crosswalks for safety. If you are comfortable riding in traffic, ride on the roadway while obeying the same traffic rules as motorized vehicles. Clearly signal your turning intentions.

Multi-Lane Roundabouts



Learn more at
www.mdt.mt.gov

2701 Prospect Ave
PO Box 201001
Helena, MT 59620-1001
406-444-6200

Montana Department of Transportation

Moving towards zero deaths and zero serious injuries on Montana roads.

Alternative accessible formats of this document will be provided on request. Persons who need an alternative format should contact the Civil Rights Bureau, Department of Transportation, 2701 Prospect Avenue, PO Box 201001, Helena, MT 59620. Telephone (406) 444-9229. Those using a TTY may call 1 (800) 335-7592 or through the Montana Relay Service at 711.

This document is printed at state expense. Information on the cost of producing this publication may be obtained by contacting the Department of Administration.

Implementation Update

- Pedestrian Hybrid Beacon informational webpage:



AS A PEDESTRIAN..

See This?	Do This!
	Push the Button to Cross
	Wait
	Continue to Wait
	Start Crossing
	Continue Crossing
	Push the Button to Cross

AS A DRIVER..

See This?	Do This!
	Proceed with Caution
 (flashing)	Slow Down (Pedestrians have activated the push button)
	Prepare to Stop
	STOP! (Pedestrians in Crosswalk)
 (alternately flashing)	STOP! (Proceed with Caution if Clear)
	Proceed with Caution

<http://www.mdt.mt.gov/visionzero/roads/pedestrian-hybrid-beacons.shtml>

Implementation Update

- Promote/support evidence-based teen peer-to-peer education regarding risky driving behavior, consequences of distracted driving, impaired driving, and not using seat belts, among others.
 - Road Departure Media Campaign

Road Departure Media Campaign – Social Media

PartnersCreative

Sponsored · 🌐



Don't get bucked off the road. Drive safely, buckle up and arrive alive.



Stay between the lines

7 Montana Road Trip Reminders

www.mdt.mt.gov

[Learn More](#)



Like



Comment



Share

PartnersCreative

Sponsored · 🌐



Keep that festival vibe going. Drive safely and be sure you and your friends arrive alive.



Focus on the road

7 Montana Road Trip Reminders

www.mdt.mt.gov

[Learn More](#)



Like



Comment



Share

PartnersCreative

Sponsored · 🌐



Keep the tradition alive. Drive safely, buckle up and arrive alive.



Stay in control

7 Montana Road Trip Reminders

plan2live.mt.gov

[Learn More](#)



Like



Comment



Share

<http://www.plan2live.mt.gov/road-trip.shtml>

Road Departure Media Campaign – Social Media

plan2live

a safety movement from the Montana Department of Transportation

7 MONTANA ROAD TRIP REMINDERS

Shockingly, summer is the deadliest time on Montana roads, despite dry roadways and bluebird skies. Here are seven reasons why.



1

"I have to get around this guy!"

Unsafe passing, swerving and speeding increase when roads are good and all of us — drivers and motorcyclists alike — are eager to get out and enjoy Montana. In fact, many of Montana's deadliest crashes are speed related. So slow down, enjoy the scenery and arrive alive.



3

"Ugh, I got ketchup on my shirt!"

Ketchup down the front of your new Patagonia shirt could be the least of your worries. Eating and drinking while driving can lead to losing control and crashing. So enjoy those summer eats sans the wheel.



5

"Better text Emma."

We all know that using our cellphones while driving is dangerous. So don't do it. Pull over to text or talk. It only takes a minute and it could save your life.



6



and arrive alive.



2

"Sit, Brutus, sit!"

Sure, it's fun to pile the whole family in and go for a drive, but distractions like ol' Brutus can cause you to reach, making you 8 times more likely to crash. So keep the dog in the back and your rig on the road.



4

"Dude, keep it between the lines."

Overcorrection is a leading cause of rollover crashes. People drive too fast, let their attention lapse and have to make sudden maneuvers. So as the song goes, "Keep your eyes on the road, your hands upon the wheel."



6

"I'm okay to drive ... really."

Whether you've been drinking beer on the river or you're tired from a long hike, hand over the keys. Hundreds of deadly and serious crashes are caused each year in Montana by drunk or tired drivers.



7

"I'm just going to the store."

Think you don't need your seat belt for short trips? So did dozens of other Montanans killed or injured in crashes last year. No matter where you're going or how long the trip is, always buckle up.

#VisionZeroMT
zero deaths | zero serious injuries

Road Departure Media Campaign - Billboards



Road Departure Media Campaign

– Myth Crashes & Radio

- Myth Crashers Video:
 - <https://youtu.be/4oBHf5DOoXk>

- Radio:



4

Reduce and mitigate intersection crashes through data-driven problem identification and the use of best practices

- **Develop and implement an intersection safety plan.**
- **Construct infrastructure improvements to mitigate intersection-related crashes.**
 - **Some examples include: roundabouts; turn lanes; signal phasing/timing/coordination; flashing yellow arrows; retroreflective back plates on signals; pedestrian crossing improvements; bicycle improvements; enhanced/improved lighting or signing.**

5

Support and increase enforcement of proper road use behaviors by all users in high-crash corridors and high-crash locations

- **Implement technologies and equipment to aid law enforcement in conducting enforcement**
- **Implement and support targeted enforcement efforts to reduce intersection and roadway departure crashes.**

Implementation Update

- Implement technologies and equipment to aid law enforcement in conducting enforcement.
- Selective Traffic Enforcement Program (STEP) Equipment Grants:
 - Missoula County Sheriff's Office
 - Gallatin County Sheriff's Office
 - Fort Peck Tribal Enforcement
 - Fort Belknap Tribal Enforcement
 - Whitefish Police Department
 - Lewis and Clark County Sheriff's Office
 - Valley County Sheriff's Office
 - Helena Police Department
 - Jefferson County Sheriff's Office
 - Havre Police Department
 - Belgrade Police Department

- **Body Cameras**
- **In Car Video Systems**
- **Speed Trailers/ Message Boards**

Implementation Update

- Implement and support targeted enforcement efforts to reduce intersection and roadway departure crashes.
 - Complete speed investigations studies on the seven interstata segments that were not raised to 80 mph.
 - Currently anticipated the studies will be presented to Transportation Commission in early 2017.

6

Explore and implement best practices for reducing road departure, such as distracted driving and fatigued driving, in addition to other behavioral factors

- **Implementation steps to be determined as best practices are identified.**
 - **Centerline Rumble Strip Projects**
 - **Butte District; Let in September 2015**
 - **Billings District: Let in May 2016**
 - **Great Falls District: Let in September 2016**
 - **Glendive and Missoula; TBD – most likely 2017 and 2018**

Moving Forward

- Complete ongoing center line rumble strip installation
- Continue to use Roadway Departure Study for basis of HSIP projects
- Complete Intersection Study and begin implementation within the HSIP process

Moving Forward

- Complete interstate speed limit studies for commission approval
- Review corridors that qualify for a uniform speed limit and get commission approval
- Continue with Roadway Departure Media Campaign through 2017.

Engineering a Safer Drive

MDT's *Traffic and Safety Bureau* provides management, design, and technical support for traffic and safety engineering; and is responsible for traffic signal operations. This team of professionals looks carefully at road designs to ensure the safest possible drive.

TRAFFIC AND SAFETY BUREAU »



Roy Peterson, Chief
Traffic & Safety Bureau, Engineering
Montana Department of Transportation
406-444-9252, roypeterson@mt.gov

Comprehensive Highway Safety Plan <http://www.mdt.mt.gov/visionzero/plans/chsp.shtml>
Pam Langve-Davis, CHSP Coordinator, 406-444-7646, plangvedavis@mt.gov