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**MONTANA DEPARTMENT
OF TRANSPORTATION**

Roadway Departure & Intersection Crashes

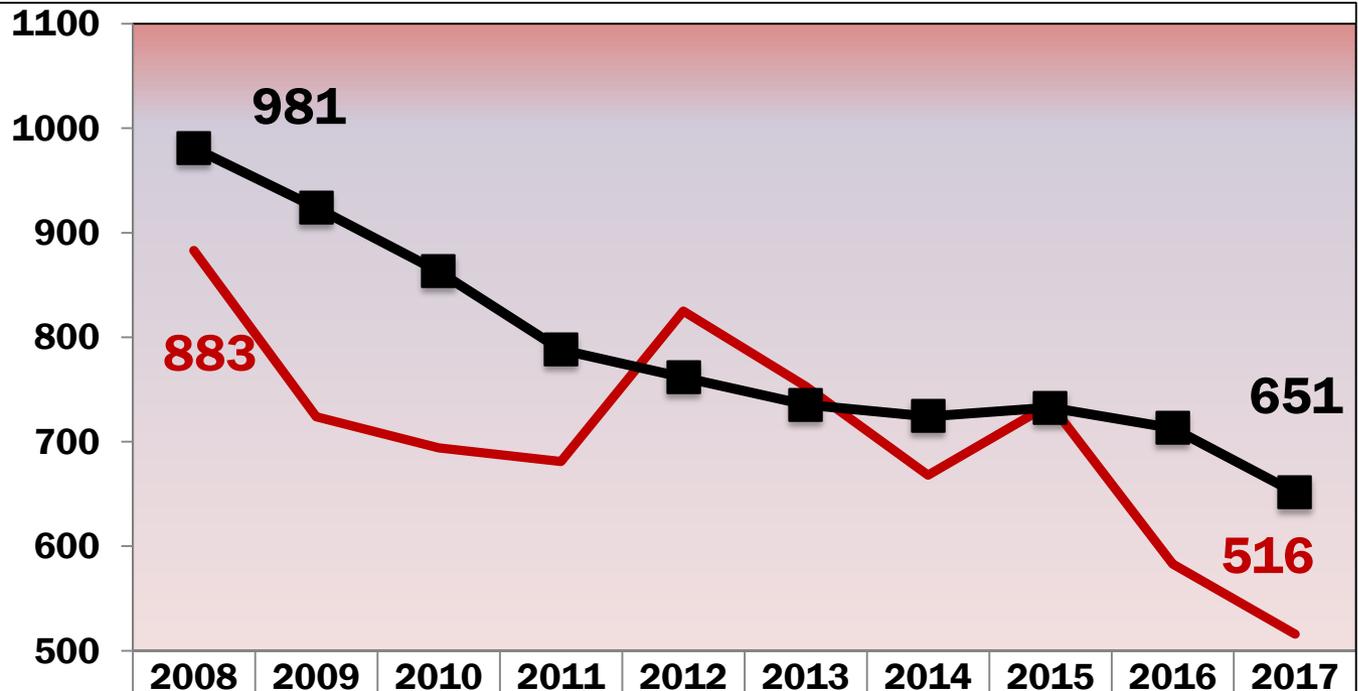
Great Northern Hotel
Helena, MT

Roy Peterson
Bureau Chief
Traffic & Safety Bureau- Engineering,
Montana Department of Transportation

October 10, 2018

- Emphasis Area Overview
- Progress Data
- Alignment with CHSP
- Next Steps

Roadway Departure Fatalities & Serious Injuries



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
— Roadway Departure Crash - Fatalities and Serious Injuries	883	724	694	681	825	753	668	736	583	516
■ 5 Year Average	981	924	863	788	761	735	724	733	713	651
Fatalities	142	146	121	142	158	151	127	155	130	124
Serious Injuries	741	578	573	539	667	602	541	581	453	392

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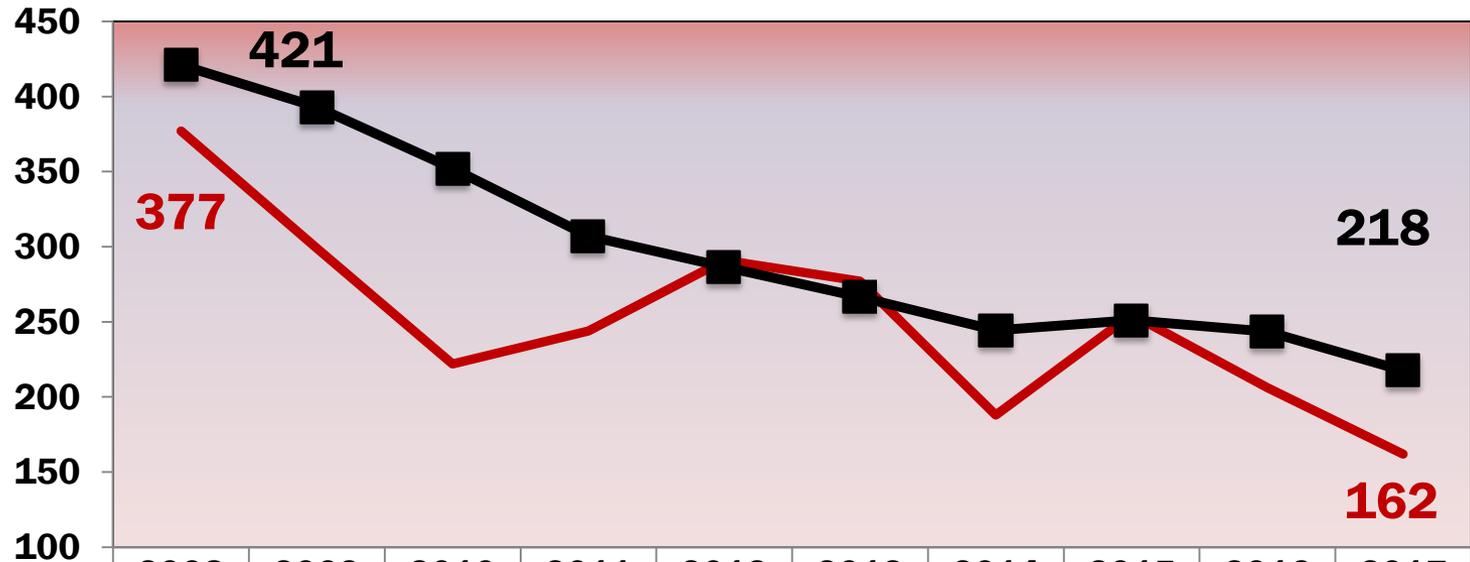
3-Year Roadway Departure Severe Injury Trend -by Crash Factor

	2015	2016	2017
Fatalities	155	130	124
Serious Injuries	581	453	392
Severe Injuries	736	583	516
Impaired Driver Involved (50%)	348	293	273
Unrestrained Occupant (46%)	332	276	229
Older Driver Involved (14%)	91	89	82
Young Driver Involved (16%)	132	86	71
Male Driver Involved (71%)	535	402	370
Female Driver Involved (34%)	227	217	189
Motorcycle Involved (11%)	80	62	66

3-Year Roadway Departure Severe Injury Trend -by Crash Factor (cont.)

	2015	2016	2017
Fatalities	155	130	124
Serious Injuries	581	453	392
Severe Injuries	736	583	516
Rural Crash (91%)	679	541	458
June, July, August, and September (47%)	347	276	236
Friday, Saturday, Sunday (52%)	386	306	270
Nighttime (33%)	240	208	165
Dry Roadway (79%)	581	479	389
Shoulder Width <4 Feet (43%)	336	251	199
More Than 2 Travel Lanes (22%)	170	146	90
Speed Limit >35 MPH (78%)	577	469	390
Large Vehicle (6%)	51	29	22

Intersection Related Fatalities & Serious Injuries



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
— Intersection Crash - Fatalities and Serious Injuries	377	299	222	244	291	277	188	255	206	162
■ 5 Year Average	421	393	352	307	287	267	244	251	243	218
Fatalities	37	32	30	29	18	27	20	30	15	17
Serious Injuries	340	267	192	215	273	250	168	225	191	145

3-Year Intersection Severe Injury Trend – by Crash Factor

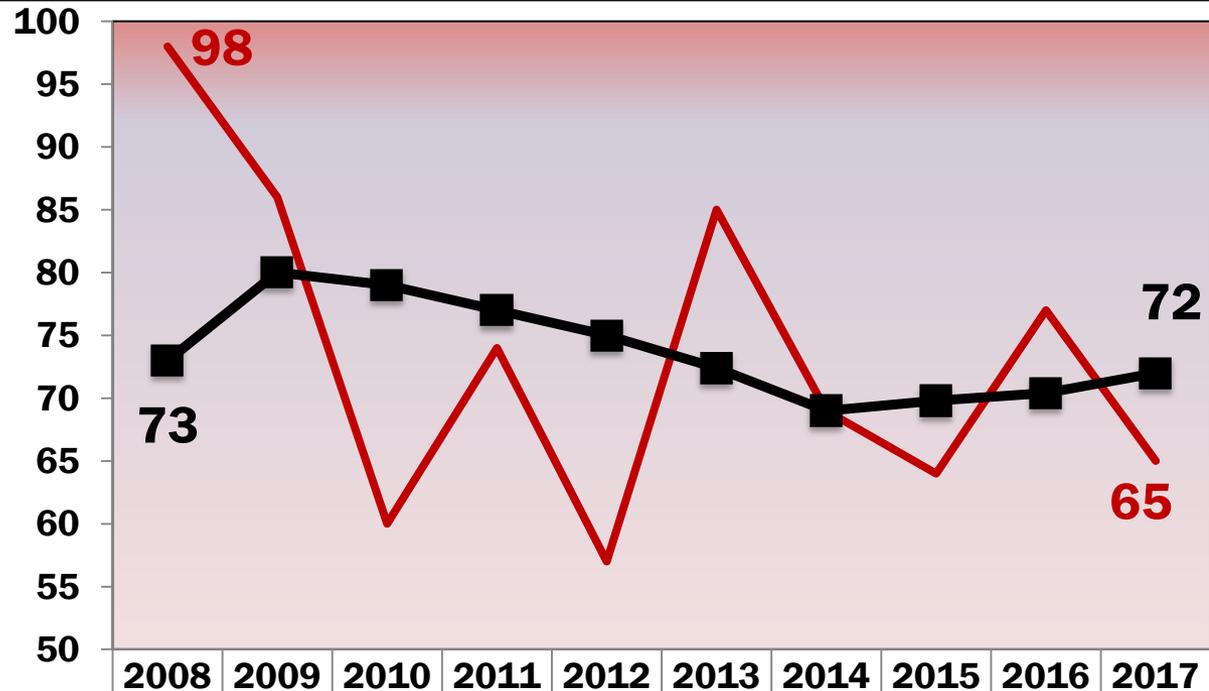
	2015	2016	2017
Fatalities	30	15	17
Serious Injuries	225	191	145
Severe Injuries	255	206	162
Impaired Driver Involved (27%)	65	66	35
Unrestrained Occupant (20%)	46	44	33
Older Driver Involved (25%)	68	49	36
Young Driver Involved (23%)	55	51	35
Male Driver Involved (80%)	209	163	126
Female Driver Involved (56%)	144	105	98
Non-motorized Involved (13%)	28	32	24
Motorcyclist (13%)	32	25	22
Speed Limit >35 MPH (44%)	106	98	73

3-Year Intersection Severe Injury Trend – by Crash Factor (cont.)

	2015	2016	2017
Fatalities	30	15	17
Serious Injuries	225	191	145
Severe Injuries	255	206	162
Rural Crash (48%)	126	104	71
June, July, August, and September (40%)	109	73	69
Friday, Saturday, Sunday (38%)	93	85	58
Nighttime (24%)	60	58	33
Shoulder Width <4 Feet (33%)	79	72	54
More Than 2 Travel Lanes (32%)	62	81	55
Speed as a Factor (12%)	27	31	18
Large Vehicle (5%)	10	12	12
Low Volume Roadway (AADT < 750) (38%)	91	80	64

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Non-Motorized Fatalities & Serious Injuries (Pedestrians & Bicyclists)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
— Non-Motorist Fatalities and Serious Injuries	98	86	60	74	57	85	69	64	77	65
■ 5 Year Average	73	80	79	77	75	72	69	70	70	72
Fatalities	14	16	10	16	9	24	12	15	14	15
Serious Injuries	84	70	50	58	48	61	57	49	63	50

Non-Motorized Severe Injury Trend (Pedestrians & Bicyclists)

	2015	2016	2017
Fatalities	15	14	15
Serious Injuries	49	63	50
Severe Injuries	64	77	65
Intersection Crash (41%)	28	32	24
Impaired Driver Involved (16%)	9	11	12
Urban Crash (67%)	43	49	45
June, July, August, September (44%)	28	33	29
Friday, Saturday, Sunday (44%)	28	36	27
Nighttime (43%)	25	30	33
Speed Limit >35 MPH (25%)	15	23	14

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Non-Motorized Severe Injury Trend

(Pedestrians & Bicyclists) – by Crash Factor (cont.)

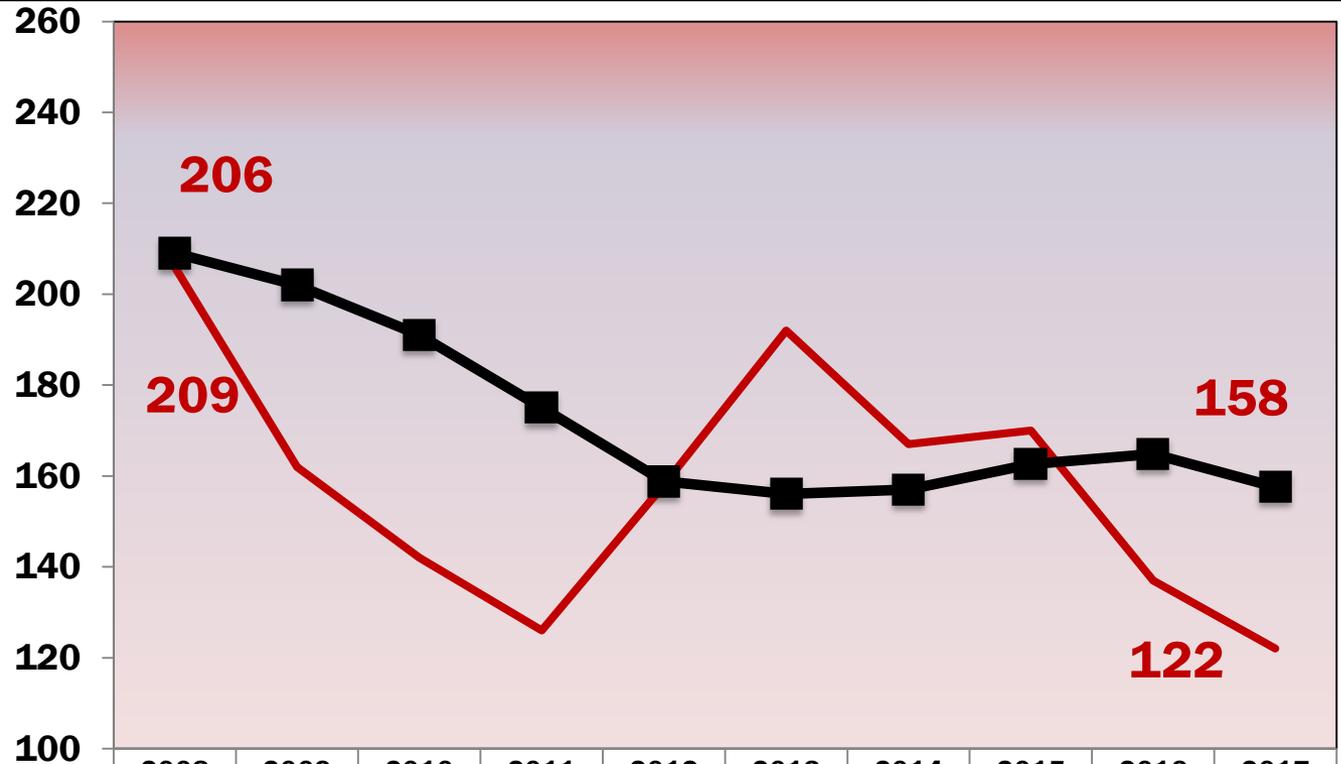
	2015	2016	2017
Fatalities	15	14	15
Serious Injuries	49	63	50
Severe Injuries	64	77	65
Pedestrians (66%)	42	46	47
Bicyclists (34%)	22	31	18
Low Volume Roadway (AADT < 750) (36%)	20	30	25
Shoulder Width <4 Feet (29%)	14	26	20
More Than 2 Travel Lanes (27%)	19	22	15

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Motorcyclist Fatalities & Serious Injuries



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Motorcyclist - Fatalities and Serious Injuries	206	162	142	126	158	192	167	170	137	122
5 Year Average	209	202	191	175	159	156	157	163	165	158
Fatalities	36	26	25	20	30	34	23	25	17	22
Serious Injuries	170	136	117	106	128	158	144	145	120	100

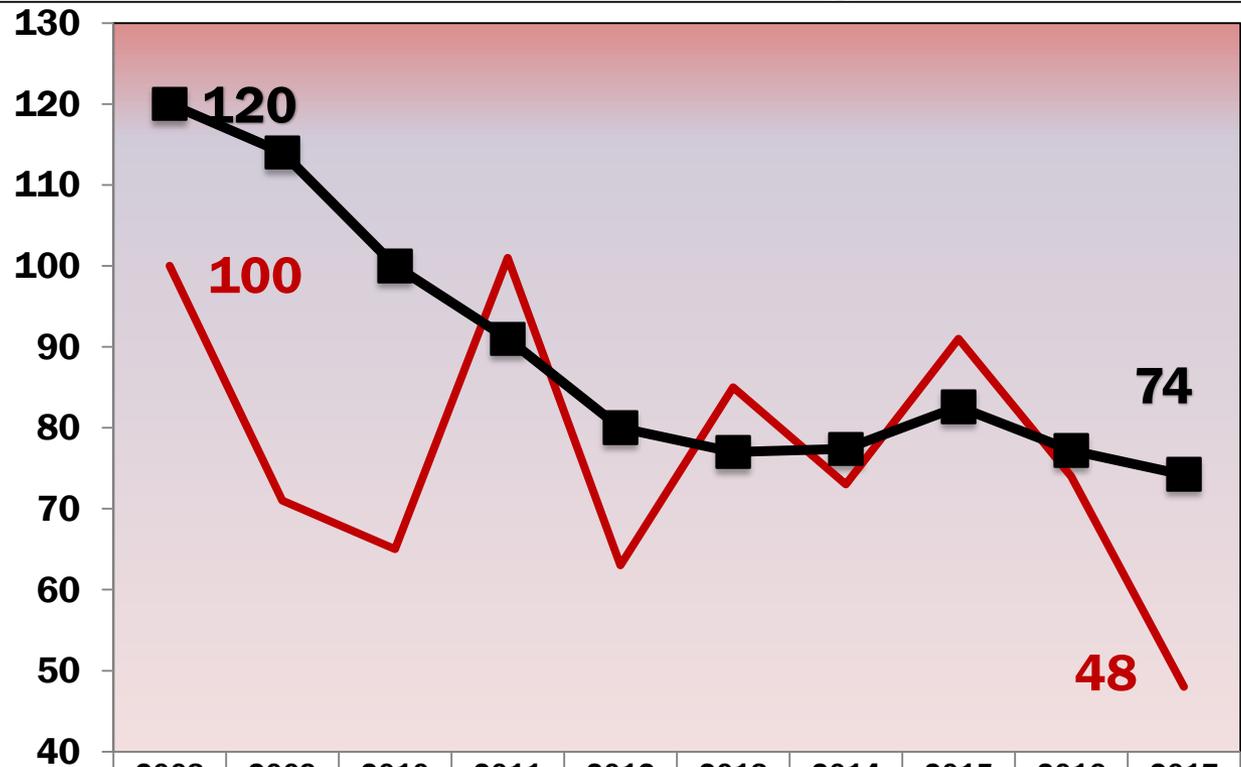
3-Year Motorcyclist Severe Injury Trends - by Crash Factor

	2015	2016	2017
Fatalities	25	17	22
Serious Injuries	145	120	100
Severe Injuries	170	137	122
Roadway Departure Crash (48%)	80	62	66
Intersection Crash (18%)	32	25	22
Impaired Motorcycle Operator Involved (26%)	46	36	31
Motorcyclist - No Helmet (42%)	79	55	47
Motorcycle Driver Age 51-65 Involved (38%)	65	61	35
Motorcycle Driver Age 31-50 Involved (29%)	52	36	36
Motorcycle Driver Age 21-30 Involved (17%)	31	17	24

3-Year Motorcyclist Severe Injury Trends - by Crash Factor (cont.)

	2015	2016	2017
Fatalities	25	17	22
Serious Injuries	145	120	100
Severe Injuries	170	137	122
Rural Crash (76%)	129	110	88
Urban Crash (24%)	41	27	34
June, July, August, and September (71%)	119	98	89
Nighttime (17%)	32	25	18
Dry Roadway (96%)	164	131	117
Speed Limit >35 MPH (65%)	106	98	73
Low Volume Roadway (AADT < 750) (40%)	64	49	60
Shoulder Width <4 Feet (50%)	81	71	61
More Than 2 Travel Lanes (19%)	34	25	22

Large Vehicle Involved Fatalities & Serious Injuries



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Large Vehicle - Fatalities and Serious Injuries	100	71	65	101	63	85	73	91	74	48
5 Year Average	120	114	100	91	80	77	77	83	77	74
Fatalities	25	27	18	32	11	21	14	22	22	20
Serious Injuries	75	44	47	69	52	64	59	69	52	28

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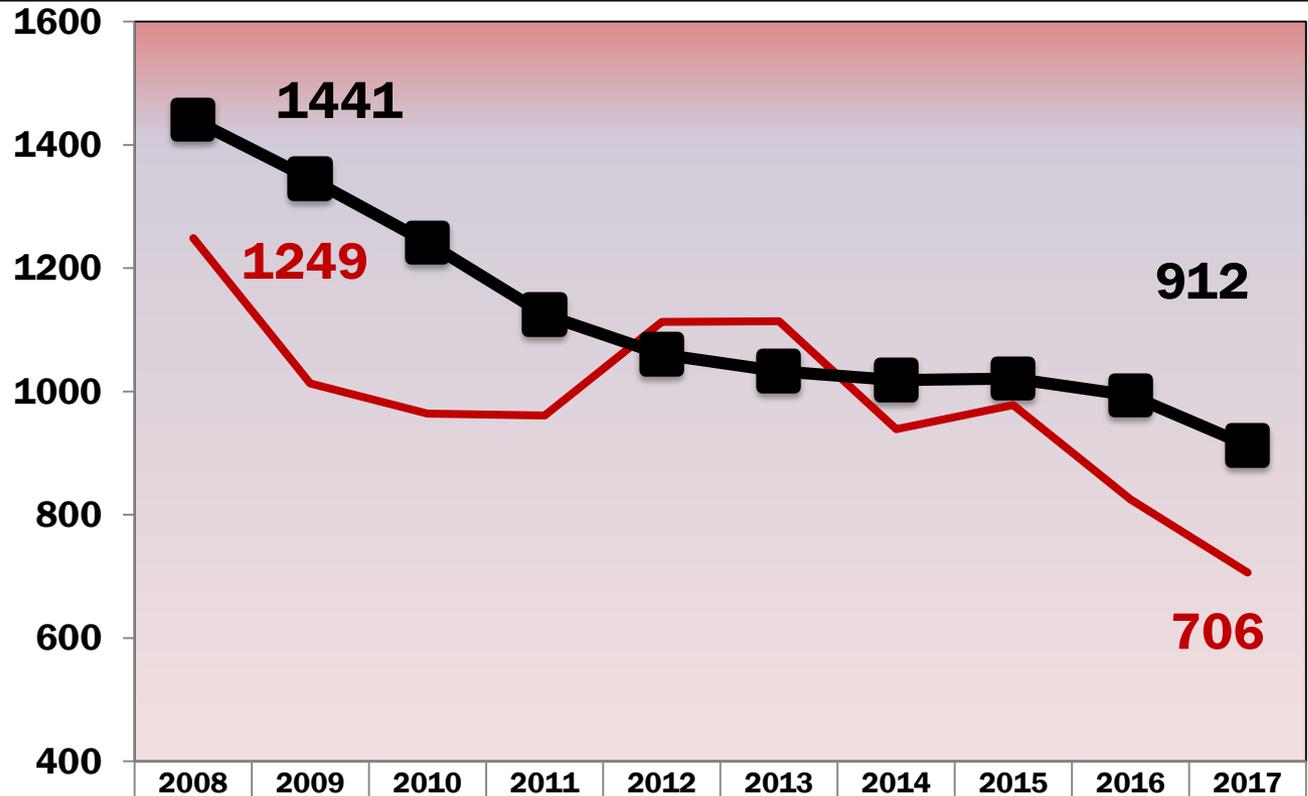
3-Year Large Vehicle Severe Injury Trends - by Crash Factor

	2015	2016	2017
Fatalities	22	22	20
Serious Injuries	69	52	28
Severe Injuries	91	74	48
Roadway Departure Crash (48%)	51	29	22
Intersection Crash (16%)	10	12	12
Impaired Driver Involved (22%)	13	20	14
Unrestrained Occupant (32%)	27	27	15
Rural Crash (92%)	81	70	45
June, July, August (28%)	33	14	13
Friday, Saturday, Sunday (37%)	29	32	17

3-Year Large Vehicle Severe Injury Trends - by Crash Factor (cont.)

	2015	2016	2017
Fatalities	22	22	20
Serious Injuries	69	52	28
Severe Injuries	91	74	48
Nighttime (22%)	16	18	12
Dry Roadway (64%)	68	47	22
Speed Limit >35 MPH (88%)	80	65	43
Low Volume Roadway (AADT < 750) (25%)	22	14	17
Shoulder Width <4 Feet (32%)	31	21	16
More Than 2 Travel Lanes (35%)	34	32	9

Rural Roadway Crashes Fatalities & Serious Injuries



— Rural Roadway Crash - Fatalities and Serious Injuries	1249	1013	964	961	1113	1114	939	978	825	706
■ 5 Year Average	1441	1345	1241	1124	1060	1033	1018	1021	994	912
Fatalities	202	196	174	176	189	209	174	198	176	163
Serious Injuries	1047	817	790	785	924	905	765	780	649	543

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3-Year Rural Roadway Crash Severe Injury Trends - by Crash Factor

	2015	2016	2017
Fatalities	198	176	163
Serious Injuries	780	649	543
Severe Injuries	978	825	706
Roadway Departure Crash (67%)	679	541	458
Intersection Crash (12%)	126	104	71
Impaired Driver Involved (44%)	404	377	333
Unrestrained Vehicle Occupant (39%)	374	344	269
June, July, August, and September (46%)	449	376	318
Friday, Saturday, Sunday (52%)	502	435	363
Speed Limit >35 MPH (82%)	788	681	578

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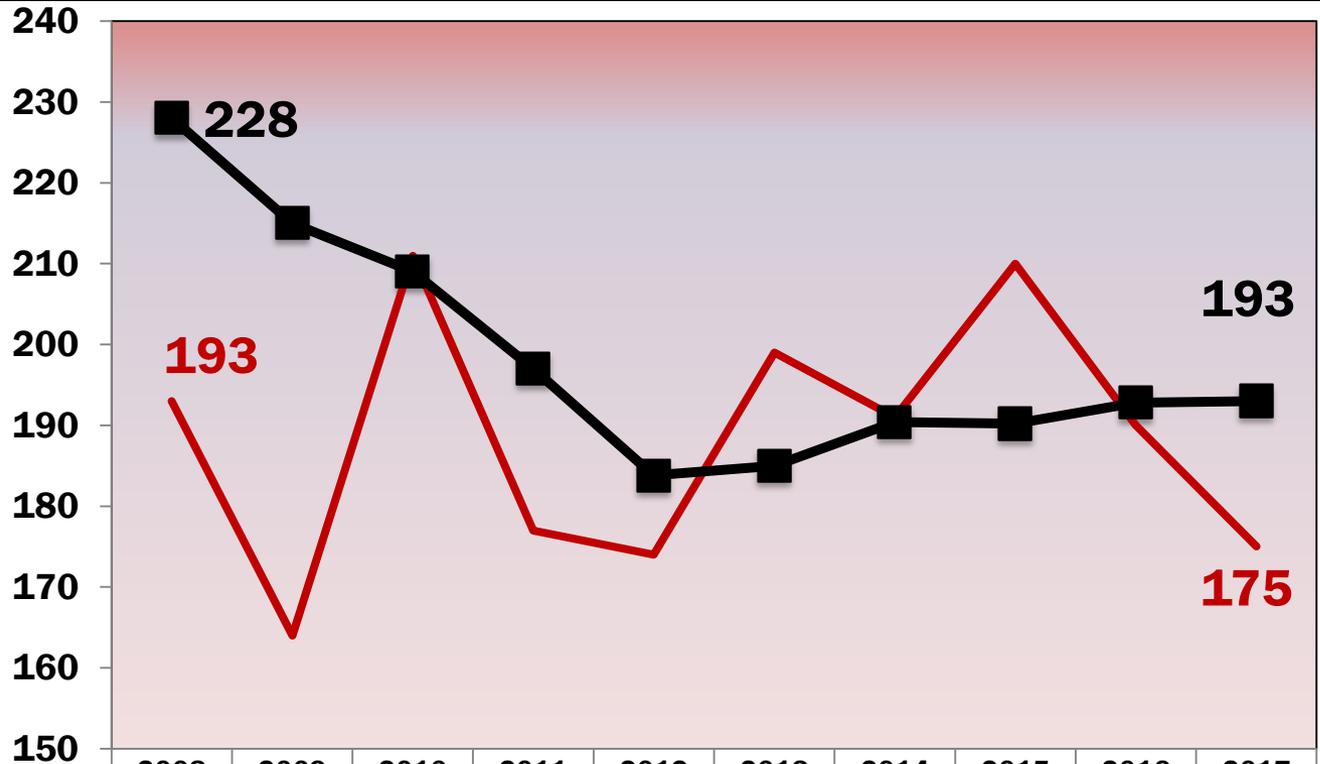
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3-Year Rural Roadway Crash Severe Injury Trends - by Crash Factor (cont.)

	2015	2016	2017
Fatalities	198	176	163
Serious Injuries	780	649	543
Severe Injuries	978	825	706
Dry Roadway (78%)	765	675	518
Single Vehicle (68%)	670	583	454
Nighttime (32%)	288	275	228
Older Driver Involved (35%)	320	292	256
Young Driver Involved (17%)	176	132	116

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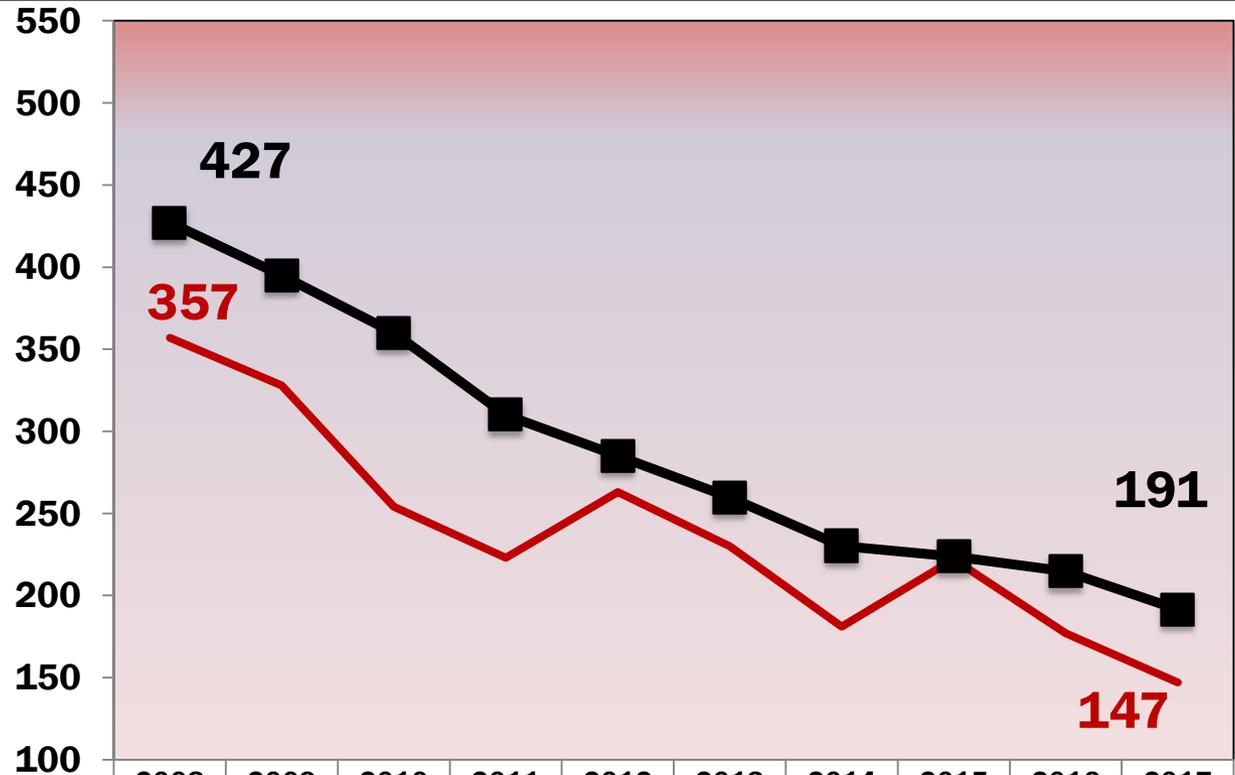
Older Driver Involved Fatalities & Serious Injuries



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Driver Age 65 and Older Involved - Fatalities and Serious Injuries	193	164	211	177	174	199	191	210	190	175
5 Year Average	228	215	209	197	184	185	190	190	193	193
Fatalities	31	40	42	39	26	51	32	46	34	37
Serious Injuries	162	124	169	138	148	148	159	164	156	138

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Young Driver Involved Fatalities & Serious Injuries



Driver Age 14-20 Involved - Fatalities and Serious Injuries	357	328	254	223	263	230	181	222	177	147
5 Year Average	427	395	360	310	285	260	230	224	215	191
Fatalities	35	41	40	27	26	26	24	36	18	25
Serious Injuries	322	287	214	196	237	204	157	186	159	122

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Strategies

S1: Reduce and mitigate roadway departure crashes through data-driven problem identification and use of best practices

S2: Reduce and mitigate speed-related roadway departure/ intersection crashes.

S3: Reduce roadway departure and intersection crashes

S4: Reduce and mitigate intersection crashes through data-driven problem identification and use of best practices

S5: Support and increase enforcement of proper road use behaviors by all users in high-crash corridors and high-crash locations

Engineering

Reduce and mitigate roadway departure & intersection related crashes through data-driven problem identification ...

- Construct infrastructure improvements both on and off state systems;
 - Center and shoulder rumble strips, wider shoulders, roundabouts, pedestrian hybrid beacons, high-friction surfacing, cable median barriers, guardrail improvements



Engineering

Implement best practices for reducing road departure, such as distracted driving and fatigued driving.

Benefits of rumble strips

- Provide immediate feedback to distracted or drowsy drivers of unintentionally crossing the centerline of two-lane highways.
- Act as a guideline to vehicles and snowplows in winter whiteout conditions and other low-visibility conditions.



Education

Reduce roadway departure and intersection crashes through education.

- Enhance awareness & increased participation in roadway skills training.
 - AARP, MMRS, Operation Lifesaver, Operation Safe Driver, MT D.R.I.V.E.
- Conduct public awareness about roadway operations and management strategies;
 - Public service campaigns



Safety Partners

- AARP
- Bike Walk Montana
- Federal Motor Carriers Safety Administration (FMCSA)
- Montana D.R.I.V.E.
- Montana Highway Patrol (MHP)
- Montana Motorcycle Rider Safety (MMRS)
- Motor Carrier Services - MDT
- Operation LifeSaver
- Operation Safe Driver- Motor Carriers of Montana
- Records & Driver Control- DOJ
- State Highway Traffic Safety Section-MDT
- Traffic & Safety-MDT

Program Highlights

- **Strategy Efforts Completed**
 - Roadway Departure Study
 - Intersection Safety Study
 - Centerline rumble strips in 4 of 5 MDT districts
 - All curve warning/chevron signage in 3 of 5 districts
 - Retroreflective traffic signals backplates is the standard for on-system roads
 - Research - Safety Impact of Differential Speed Limits on Rural Two-Lane Highways in Montana

Next Steps

- Update HSIP manual – previous version was 1989 (Dec 2018)
- Complete freeway median barrier warrant study (Dec 2018)
- Finish up the horizontal curve signage (curve and chevrons) in District 4 & 5 (summer 2019)
- Install CLRS in the Missoula District
- Begin implementation of Intersection Safety Study
- Low volume/Local Roads research – goal is to provide more safety improvements on the local and low volume roads
- Highway Safety Public Education research – videos installed at motor vehicle divisions and vehicle registration stations.
- Upcoming research – before/after study for CLRS effectiveness
- Update the Safety Performance Functions



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Safer Roads

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 »



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