



# 2017 TRAFFIC SAFETY REPORT



# Table of Contents

Introduction	3
2017 Crash Trends	4
Overall Crashes	5
Crash Rates	7
Distracted and Impaired Crashes	8
Fatal Crash Review	9
Roadway Departure Crashes	11
Motorcycle Crashes	12
Bicycle and Pedestrian Crashes	13
Animal Related Crashes	14
Traffic Safety Mitigation	15
2017 Low Cost Safety Improvements	16
Traffic Safety Mitigation 2018	17
Safety Improvement Monitoring and Evaluation	18
Appendix A — 2017 Fatal Crash Descriptions/Locations	19
Appendix B — Monitoring of Low Cost Safety Improvements at Six Run Off the Road Crash Locations	21

# Introduction

This report covers the unincorporated roadways in Larimer County that the County has responsibility to maintain. Unincorporated Larimer County has nearly 893 miles of roadways - 105 miles in subdivisions, 84 in urban areas surrounding communities, and 704 in rural portions of the county.

Larimer County strives to make roadways as safe as possible. The Traffic Safety Program Goal is to **reduce the number and severity of crashes on our roadways.**



## **2017 Colorado Deaths**

### **Caused by...**

**Cardiovascular Disease<sup>1</sup>**  
7,243

**Influenza & Pneumonia<sup>1</sup>**  
532

**Motor Vehicle Crash<sup>1</sup>**  
627

**Avalanche<sup>2</sup>**  
1

**Unincorporated Larimer County  
Roadway Fatalities**  
11

**Lightning Strike<sup>3</sup>**  
2

*Sources:*

<sup>1</sup>[www.colorado.gov/pacific/coepbt/death-data-statistics](http://www.colorado.gov/pacific/coepbt/death-data-statistics);

<sup>2</sup>[www.avalanche.org/accidents.php?date=2016-2017](http://www.avalanche.org/accidents.php?date=2016-2017);

<sup>3</sup>[www.lightningsafety.noaa.gov/fatalities17.shtml](http://www.lightningsafety.noaa.gov/fatalities17.shtml)

Crashes are categorized into three classes by severity: Property Damage Only (PDO), Injury, and Fatal. A property damage only crash indicates that no one was injured or killed in the crash. In an injury crash at least one person was injured in the crash but no one was killed. In a fatal crash at least one person lost their life although there may also have been injuries sustained by other persons.

Property damage only and injury crashes were down slightly in 2017 compared to 2016. However, fatal crashes continue to rise at a rate that exceeds both state and national trends. Larimer County saw 10 fatal crashes resulting in 11 fatalities in 2017, the highest number of fatal crashes since 2004.

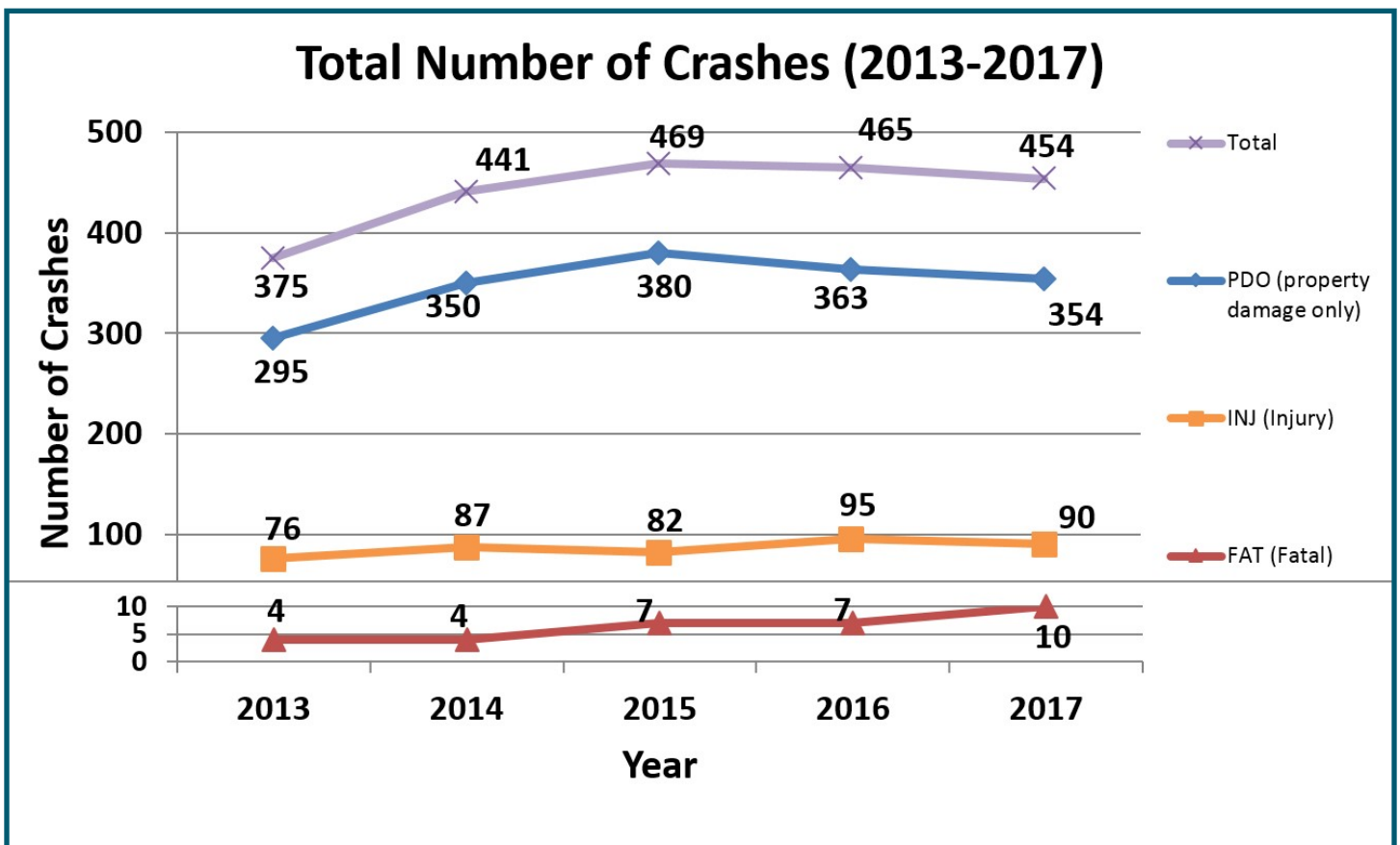
Crashes and crash severity may often be influenced by the choices people make. Examples of these choices include speeding, distracted driving, driving under the influence of alcohol or drugs, and seat belt or helmet use.

This report summarizes crashes in unincorporated Larimer County by a variety of factors that are focused on areas of interest and identification of trends to be addressed through safety improvements and education.

## 2017 CRASH TRENDS

There were an average of 441 crashes on unincorporated roads in Larimer County between 2013 and 2017. In 2017, **total crashes increased** by about **3%** compared to the **5 year average**. In 2017, the total number of **crashes decreased slightly** by about 2% compared to 2016.

There is generally a correlation between an increase in Vehicle Miles Traveled (VMT) and the number of crashes. Approximately 333 million miles were traveled on Larimer County roads in 2017 compared to 2016, a 3.6% increase. The 3.6% increase in miles traveled exceeded the 1.9% growth in population, estimated by the Colorado Department of Local Affairs.



Fatal crashes: 10 crashes (11 fatalities) **increased 43%** from 2016

Injury crashes: **Decreased by 5%**

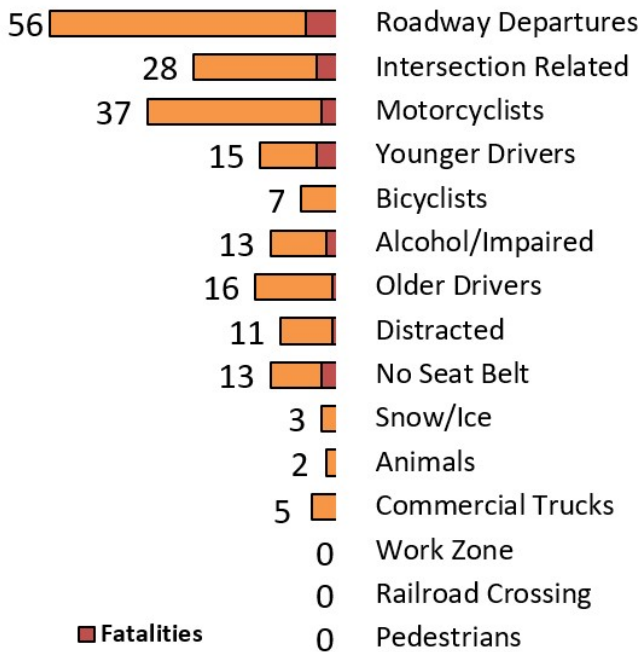
Property Damage Only: **Decreased by 2.5%**

# Overall Crashes

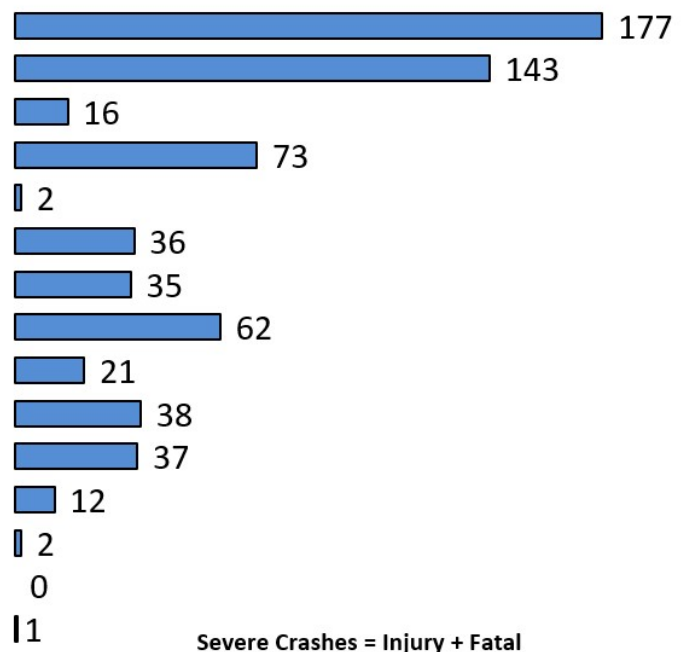
This Traffic Safety Annual Report summarizes the general trends in roadway safety, analyzes specific areas of interest, and monitors ongoing traffic safety efforts in the County. Crash data are obtained directly from Colorado State Patrol crash reports.

## Unincorporated Larimer County Crashes - 2017

### Severe Crashes



### Property Damage Only



Severe Crashes = Injury + Fatal

### Compared to 2016:

**Roadway Departure** crashes continue to be the most common in Larimer County, even while decreasing 8%

**Driving Under the Influence (DUI)** are up 17%

**Distracted** driving is down 8%

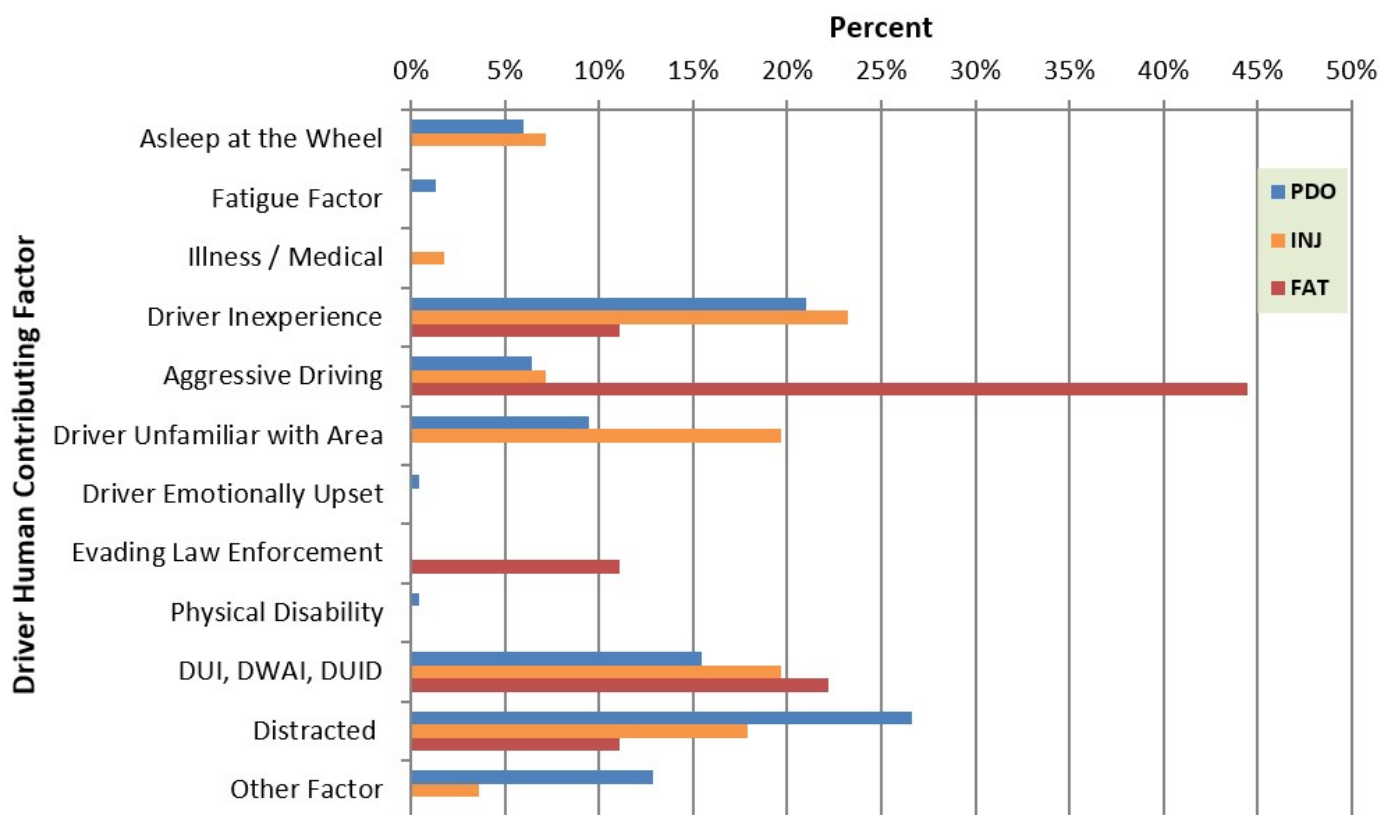
Crashes involving **motorcycles** increased 20%

Crashes that have an **animal** involved increased 23%

Crash Characteristics	% Change between 2016 and 2017	2017 Total Crashes
Roadway Departures	-8%	233
Intersection Related	-13%	171
Motorcyclists	20%	53
Younger Drivers	29%	88
Bicyclists	29%	9
Alcohol/Impaired	17%	49
Older Drivers	-23%	51
Distracted	-8%	73
No Seat Belt	-6%	34
Snow/Ice	-32%	41
Animals	11%	39
Commercial Trucks	55%	17
Work Zone	-33%	2
Railroad Crossing	0%	0
Pedestrians	0%	1

## Overall Crashes (continued)

### 2017 Crashes with a Human Contributing Factor (By Crash Severity)



Out of 298 crashes with Human Contributing Factors, 9 were fatal and 56 had injuries. The five leading causes of injury or death are:

- Drivers Inexperience (14)
- Driving Under the Influence (13)
- Distracted (11)
- Driver unfamiliar with area (11)
- Aggressive driving (8)

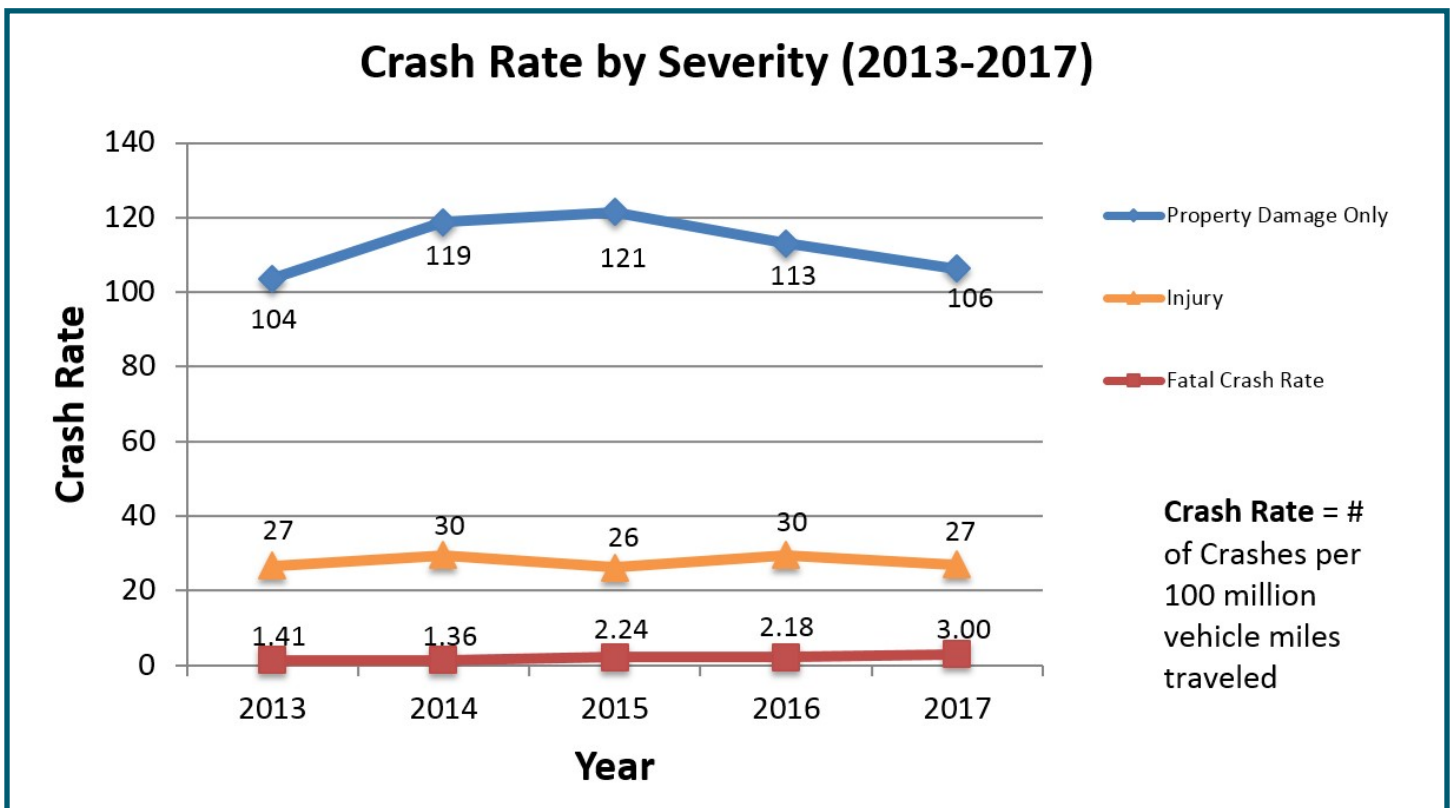
Driving is about human interaction with the vehicle, the natural elements and with other drivers on the roads.

Nearly **two thirds** of all crashes in unincorporated Larimer County had a human contributing factor.

# Crash Rates

To account for varying amounts of traffic, a measure of crash *RATE* is used in addition to crash *NUMBERS*. A crash rate is expressed in the number of crashes per 100 million vehicles miles traveled.

This graphic shows the crash rate by severity, and indicates that the property damage only crash rate **decreased 6%** and the injury crash rate **decreased 10%** respectively in the past year. The fatal crash rate **increased nearly 38%** over the previous year. This increase in fatal crash rate continues a negative trend and is increasing faster than the state and national rates.



The Colorado Problem Identification Report, Colorado Department of Transportation, Fiscal Year 2016, shows the average 5 year (2011-2015) statewide injury crash rate per 100 million VMT is 20.82 while Larimer County (2013-2017) is 28.0.

Crash rates on the unincorporated County road system are higher than the Colorado rates. Several factors contribute to these elevated rates including higher speeds, sharp curves, narrow shoulders, or no medians.

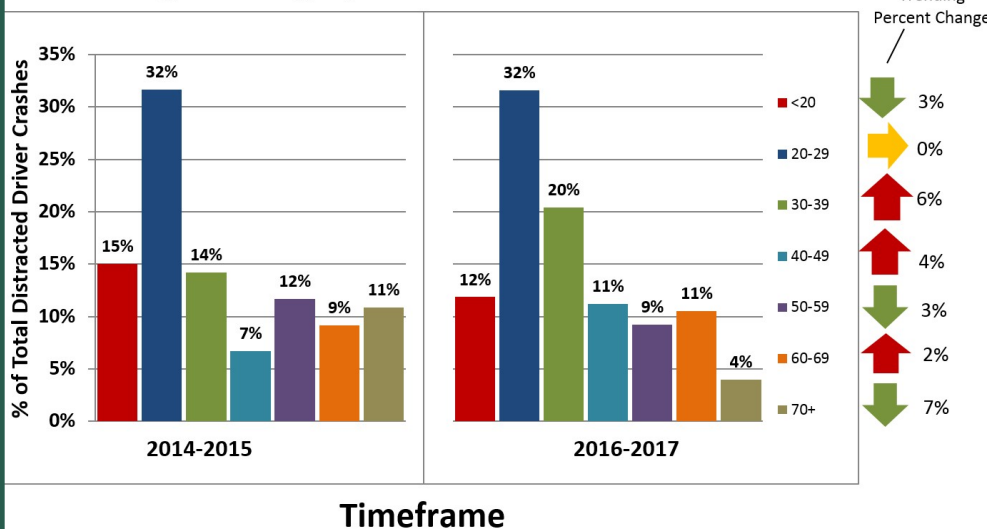
# Distracted and Impaired Crashes

Distracted driving is not just about cell phones or texting. Travelers Insurance reports the likelihood of a car accident increases while performing common activities:

- Texting—23 times
- Reaching—9 times
- Reading—4 times
- Grooming—3 times
- Eating—2 times

In 2017, **122** crashes were the result of distracted or impaired drivers, nearly identical to the previous year. These crashes resulted in **24** injuries and **3** fatalities.

## Age Demographics of Distracted Drivers



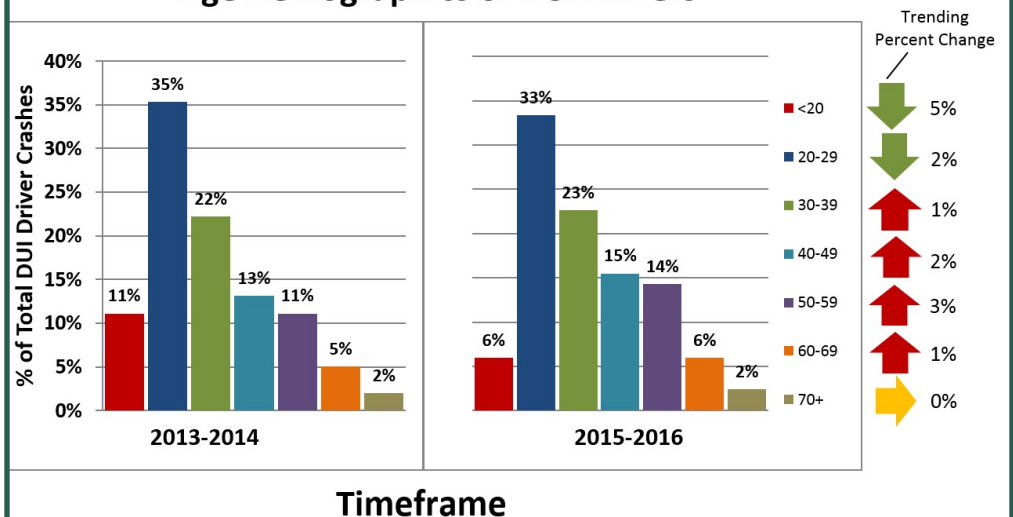
According to CDOT, Distracted driving fatalities are increasing in Colorado.

In 2015, 69 of the 547 Colorado traffic fatalities were caused by distracted driving. This is an increase of 17% over 2014.

Of the 547 traffic fatalities in Colorado in 2015, 187 involved drivers tested positive for alcohol, 99 tested positive for marijuana, and 35 of those tested positive for both alcohol and marijuana.

Source: National Highway Traffic Safety Administration

## Age Demographics of DUI Drivers





# Serious Crash Review

A serious crash is defined as a crash resulting in injury or death. There were **106 serious crashes** on the unincorporated County road system in 2017 resulting in **one hundred and nineteen injuries**, down from one hundred and twenty-seven in 2016 and **eleven fatalities**, up from seven in 2016. Using these data, the following generalities or trends have been noted.

Details of the fatal crashes occurring in 2017 are presented in Appendix A.



**Overturn**

45%



**Inattentive to Driving**

22%



**DUI**

12%

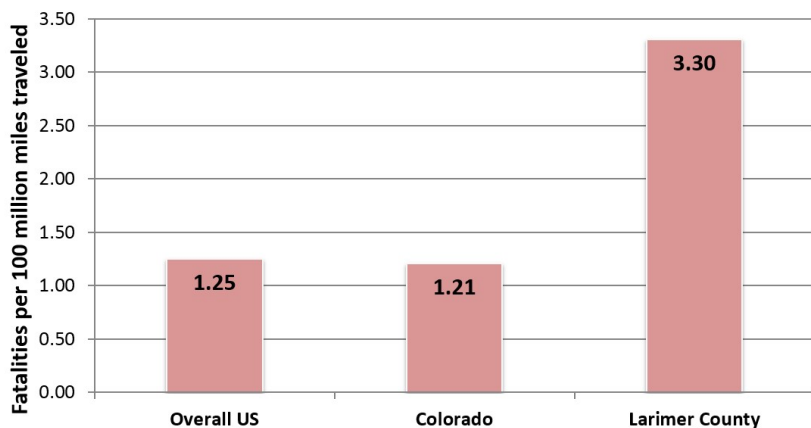


**Motorcycles**

34%

**Overtuning** was the most harmful event in 45% of serious crashes while 57% of serious crashes involved **roadway departure**.

**Comparison of Overall Fatality Rates**

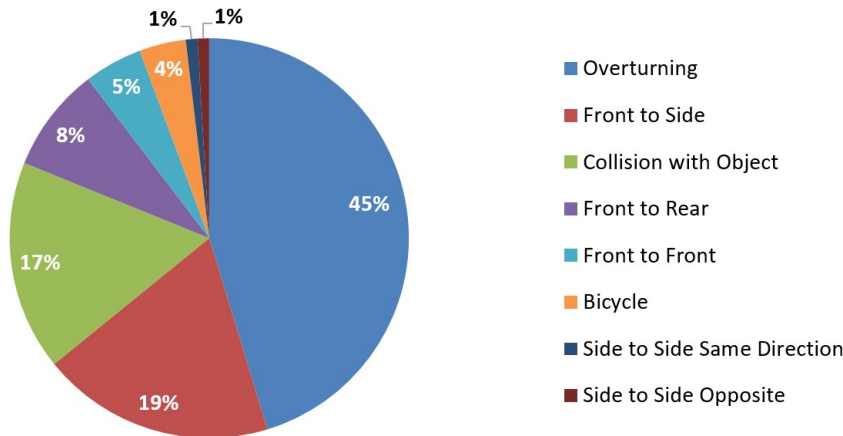


In 2017 serious crashes made up 23% of all reported crashes in unincorporated Larimer County.

Sources: US - National Highway Traffic Safety Administration (2016); Fatalities National Safety Council (2017)  
 Colorado - Federal Highway Administration, Office of Highway Policy Information, Traffic Volume Trends (Jan 2017 - Dec 2018); CDOT 2017 Fatalities by Region (2017)  
 Larimer County - County records (2017)

# Serious Crash Review (continued)

### Most Harmful Event 2017



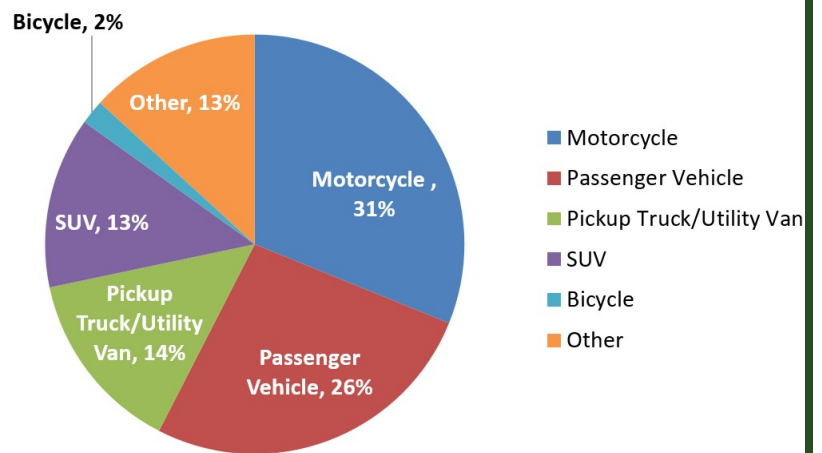
In 2015 the national use rate of seat belts is 90%. Nationally 48% of passenger vehicle occupants killed in 2015 were unrestrained. Unrestrained occupants are nearly **seven times more likely to die in a traffic crash** than if they wear seat belts.

Source: [www.nhtsa.gov/risky-driving/seat-belts](http://www.nhtsa.gov/risky-driving/seat-belts)

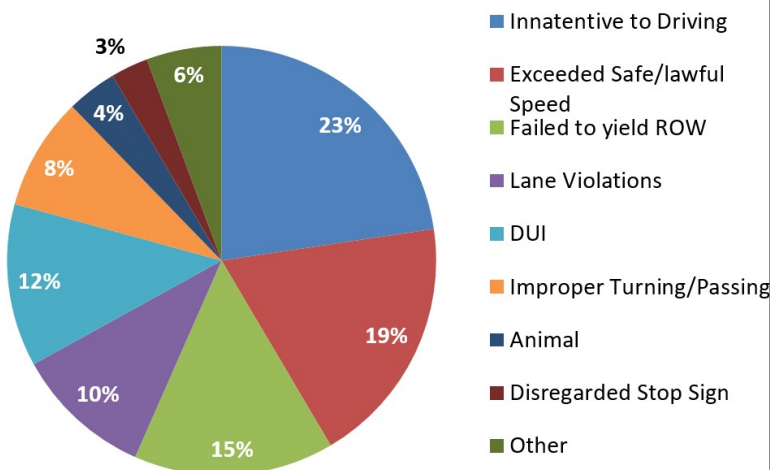
Seven of the ten fatal crashes in 2017 involved vehicles traveling at speeds **20 mph or more above the speed limit or posted curve advisory**. Four of these were traveling at speeds of at least 80 mph.

**67%** of persons killed in Larimer County fatal crashes in the last five years chose not to wear a seat belt

### Vehicle Type 2017



### Crash Cause 2017



For US fatal crashes in 2015, about 80 percent of passenger vehicle occupants who were totally ejected from the vehicle were killed.

Source: [www.nhtsa.gov/risky-driving/seat-belts](http://www.nhtsa.gov/risky-driving/seat-belts)

# Roadway Departure Crashes

Two-lane rural roads are the most dangerous part of the road system. In 2017, **51%** of all crashes involved a vehicle leaving the roadway (roadway departure crash). Here's what we know about those crashes:

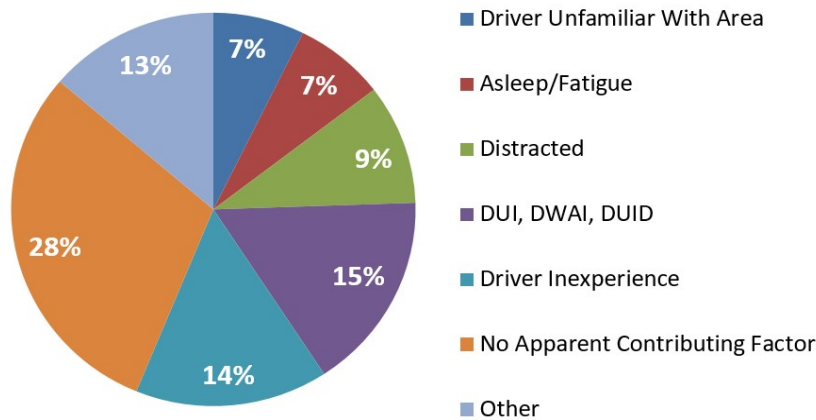
**Road Condition:** 78% of the crashes occurred on dry roads

**Light Condition:** 54% occurred during daylight hours

**Fatal Crashes:** 60% are Roadway Departure Crashes



## 2017 Causes of Roadway Departure



**49%** of all roadway departure crashes occur on straight roadways .

In Larimer County, there is no singular cause of roadway departure crashes. 43% of the causes of these crashes have either no apparent human contributing factor or other.

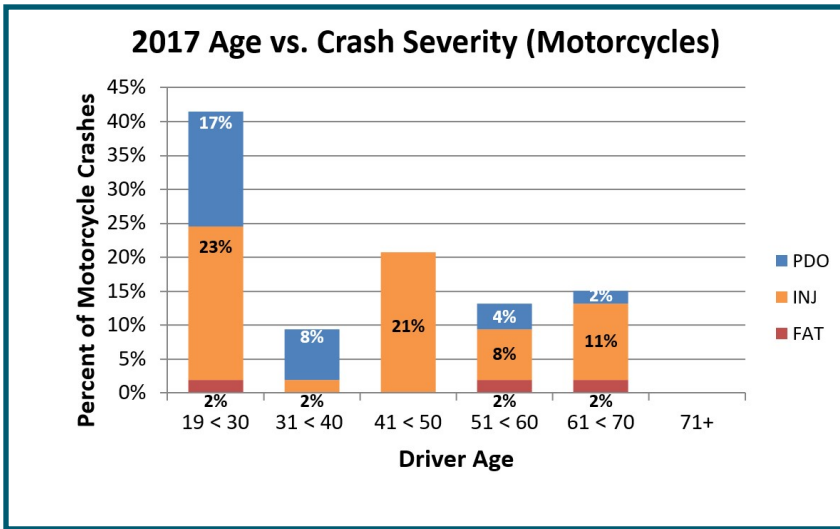
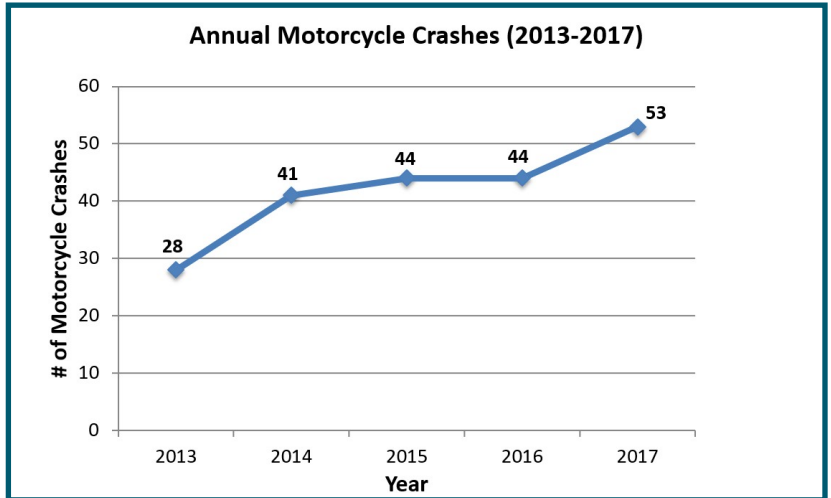
Many roadway departure crashes appear to be randomly scattered along Larimer County roadways making it difficult to target improvements that will make a difference. One treatment which may be effective is called **Safety Edge**. Safety Edge replaces the nearly vertical asphalt edge at the pavement's edge with a beveled or chamfered edge. The sloped edge makes it easier for a vehicle which has dropped a wheel off the edge of the road to get back onto the roadway without losing control. Larimer County is installing Safety Edge as part of road reconstruction or overlay where room exists on the roadway platform.

## 2017 Roadway Departure Top 5 Worst Locations

- **CR 8E** [4 Crashes Total] - from CR 31 to 0.50 mi east of CR 31
- **CR 38E** [5 Crashes Total] - within 0.7 mi of CR 23
- **CR 67** [4 Crashes Total] - within 0.3 miles of Hallet Heights Dr.
- **CR 9** [4 Crashes Total] - from Douglas Rd to 0.5 miles north of CR 56
- **CR 29** [4 Crashes Total] - within 0.7 miles of the Heart J Trail intersection

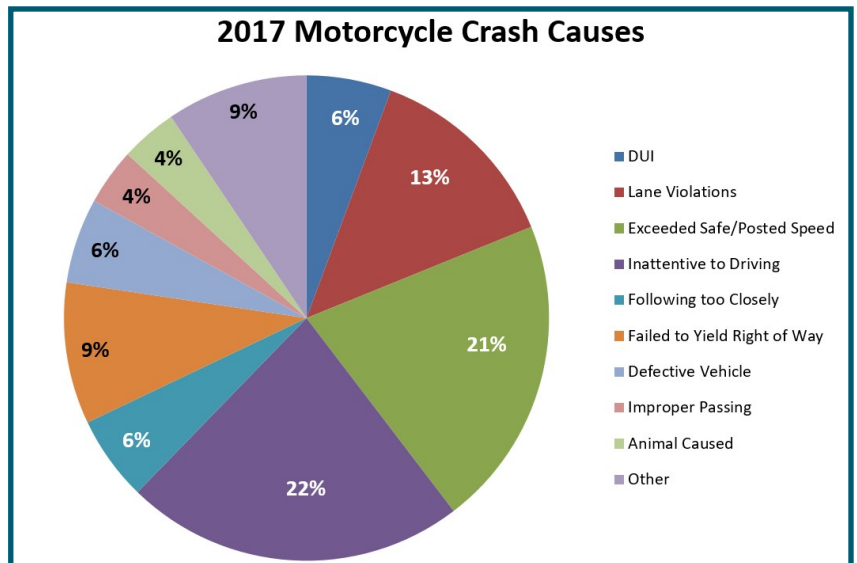
# Motorcycles Crashes

Motorcycles were involved in nearly 12% of all crashes in 2017. However, the chance of injury or death is disproportionately higher. In 2017, **70% of motorcycle crashes resulted in injury or death compared to 15% in other vehicles.**



**75%** of motorcycle crashes did not involve another vehicle in 2017

*The majority of motorcycle crashes are caused by Inattentive Driving, Speed, or Lane Violations, accounting for 56% between these three causes.*



# Bicycle and Pedestrian Crashes

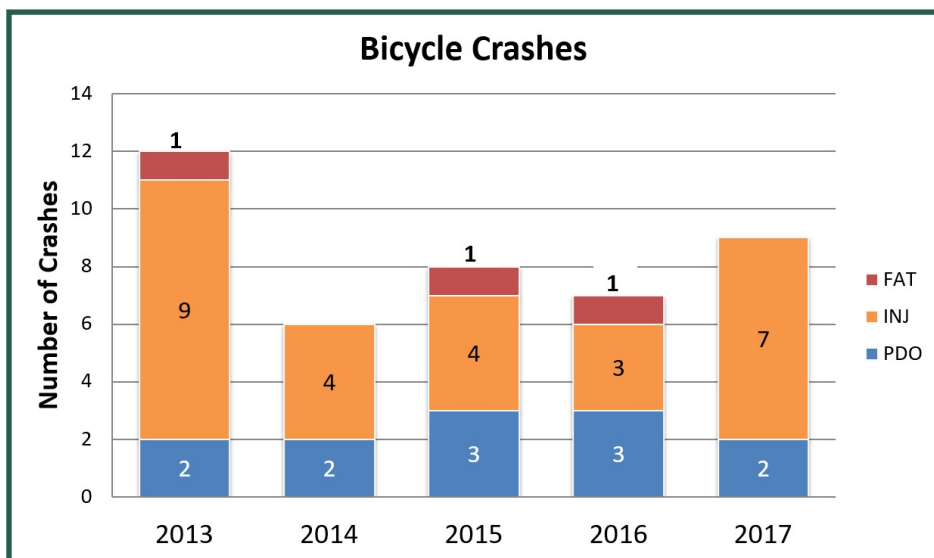
## Bicycle Crashes

Bicycling is a popular activity in Larimer County whether riding for commuting or pleasure. Many of the cities and towns actively promote bicycling and many events are requested and held on county roads in the summertime.

The number of bicycle crashes has remained fairly steady over the past four years. However, similar to motorcycles, the severity of the crashes is much higher than for a motor vehicle.

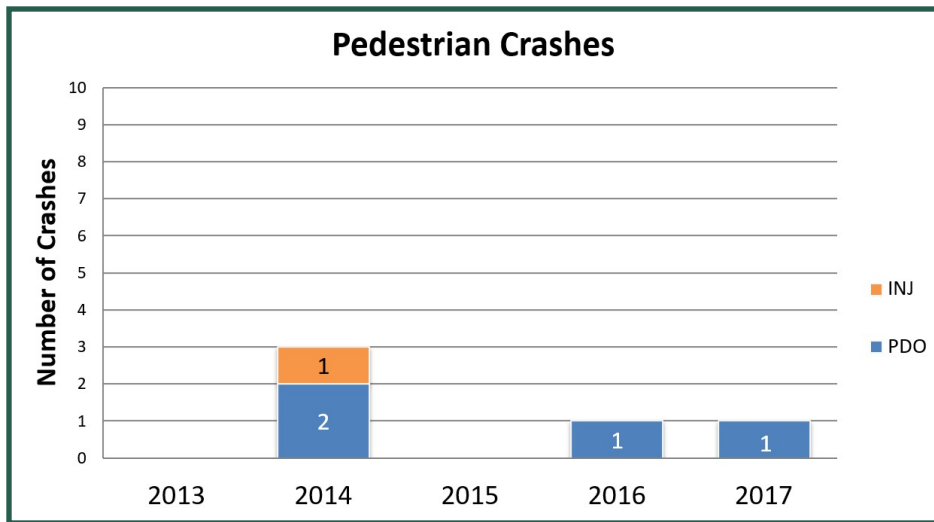


*Since 2013 an average 71% of reported bicycle involved crashes resulted in injury or death.*



## Pedestrian Crashes

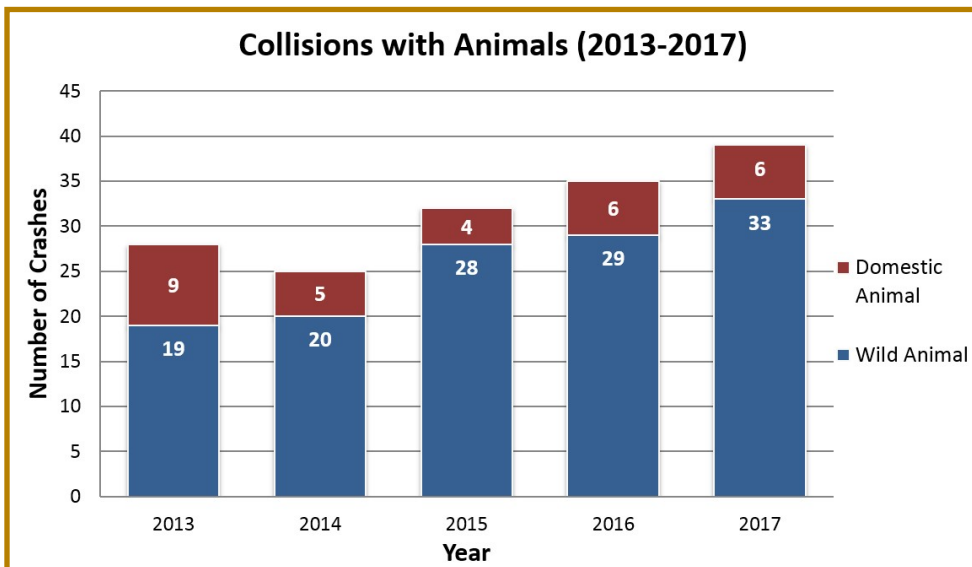
The number of crashes involving pedestrians is low in Larimer County with five during the last five years. This reflects the general rural character of Larimer County roads. Locations with significant pedestrian traffic include parks, open spaces, trails, or near city development.



**87%** of all reported pedestrian crashes involve some level of injury or fatality

# Animal Related Crashes

The total number of reported animal collisions in 2017 was 39, up from 2016. This is an increase in animal related crashes from the previous year of 11%. All but one crash involved large animals, both wild and domestic, that can cause more damage and injury. These numbers do not include crashes where an animal was not hit but may have caused the crash.

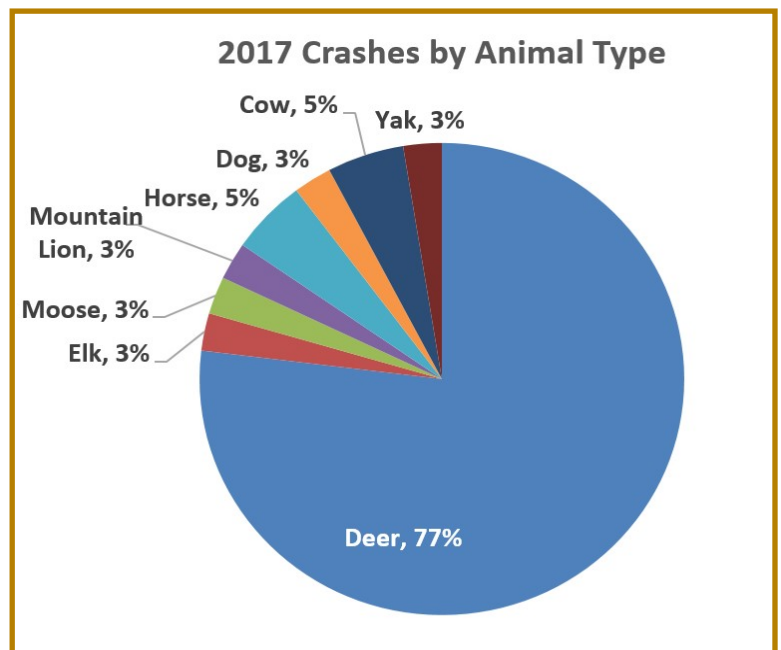


Nearly half of collisions with animals in 2017 were during the months of October through December.

For crashes with animals 85% involved wild animals

The most common animal crash was with deer, 77% of all animal crashes

Nearly 7 in 10 crashes with animals are at night



# Traffic Safety Mitigation

## Safety improvements completed on the County Road system during 2017

**CR 30 - Pedestrian Hybrid Beacon:** As part of the construction of the Bicycle / Pedestrian trail connecting east side Fort Collins and Loveland trail systems, a pedestrian hybrid beacon was installed on County Rd 30 at the trail crossing approximately 0.25 miles west of County Rd 11C. When activated by a bicyclist or pedestrian, the new beacons require a stop by vehicles on County Rd 30. Pedestrian countdown displays are included and should help with pedestrian / bicycle safety at the crossing. The signal is dark when not in use and allows for normal traffic flow on County Rd 30 when there is no activation by pedestrians or bicyclists.



**Radar Speed Display Signs—Test Project.** Radar speed display signs were installed at 6 locations on the Larimer County Road system during 2017. Larimer County is doing a study to determine the long term effectiveness of radar speed display signs. The signs were placed on roadways where there have been numerous speeding complaints. The locations are northbound CR 23 north of Bingham Hill Rd. Eastbound CR 52E (Rist Canyon Rd) west of CR 23. Northbound Gregory Rd north of CR 50E (Country Club Rd), eastbound Gregory Rd near E. Ridgecrest Rd. CR 50E (Country Club Rd) east and west bound near Warren Dr. Speed data were collected before the radar sign installations at each of the locations and will be monitored for 1 year after the installations. Based on the study results, the county will decide if the radar display signs will be eligible for more widespread use on the county road system.



**CR 11C - Road Reconstruction:** CR 11C was reconstructed from the CR 24E / Boise Ave intersection to the Horseshoe Lake Outlet. The road was widened to include 6 foot paved bike shoulders on each side of the road. A south bound left turn lane was added at the new main entrance to Boyd Lake State Park. This is a big safety improvement for a heavily traveled commuter roadway that is also popular with bicyclists and handles a lot recreational vehicle traffic.

## 2017 Low Cost Safety Improvements

- New signing was installed on a curve located on County Rd 30 at Donath Lake. The curve is located on the east side of Donath Lake. There have been several run off the road crashes throughout the curve over the past several years. The signing was upgraded from standard sheeting to a “Day Glo” Hi Intensity sheeting for the advance warning signs and the chevron signs located in the curve. The new signs are more visible during the day time hours and also provide excellent night time retro reflectivity. The number of chevron panels was increased with reduced spacing between signs. There are now 9 pairs of Chevron signs with back to back panels located through the curve. It is anticipated the new signing will provide better guidance to drivers and reduce the number of run off the road crashes through the curve.



- In conjunction with City of Fort Collins Traffic Operations, low cost safety improvements were made to the intersection of CR 52 (Richards Lake Rd) and CR 9 (Giddings Rd). There has been an increase in right angle crashes at the intersection in recent years including a Fatal Crash (2 fatalities) involving a vehicle moving at a high rate of speed running the stop sign on eastbound Richard Lakes Rd. The intersection is located on the city/county line. The city and county did a joint safety audit of the intersection. Several low cost improvements were recommended and implemented at the intersection. Larger (48”) Stop signs were installed east and west bound on CR 52 (Richard Lakes Rd). The supports for the stop signs were wrapped in red reflective sheeting for increased visibility of the stop signs at night. Cross Traffic Does Not Stop signs were added below the stop panels in each direction. Thermoplastic stop bars were added on CR 52. The stop ahead symbol signs and the cross road warning signs on CR 9 were relocated so they were at equal distances from the intersection and the westbound stop ahead symbol sign was increased in size from 30” to 36”.



# Traffic Safety Mitigation 2018

The following section highlights some safety projects the Engineering Department will be focusing on in 2018.

## Low Cost Safety:

- County wide evaluation of all crash data and select locations for individual safety audits. This includes the top 5 worst roadway departure crashes to determine potential mitigation measures and estimated cost.
- The radar speed display signs installed during 2017 will continue to be evaluated for long term effectiveness. Near the end of 2018 the evaluations should be complete and decisions should be made regarding future use of these devices on the county road system.
- Installation of continuous red solar flashing lights on the stop signs on County Rd 21 at the intersection of County Rd 8.
- Installation of advance warning flashers at the Berthoud Fire Station No. 2 located on West County Rd 8 near the intersection of County Rd 8 and County Rd 23. The driveway to the fire station is located on a curve between CR 8 and CR 23. The advance flashers will give notice to drivers on both county roads that fire equipment is entering the roadway from the fire station access. Fire department staff will be able to remotely turn on the flashing lights on as they approach the roadway from the fire station.

## 2018 Safety Projects:

- **Advisory Speed Studies for Horizontal Curves:** The Engineering Department will continue to re-evaluate the safe advisory speed on all significant horizontal curves and turns on the Larimer County maintained road system. The Engineering Department utilizes an on board electronic ball-bank indicator and drives each curve to determine the safe advisory speed. Federal guidelines recently changed regarding the use of ball-bank indicators to determine advisory speeds. The curves and turns on the county road system are all being re-evaluated using the new guidelines.
- Major road construction projects will take place on County Rd 70 (Owl Canyon Rd) between County Rd 19 and County Rd 15 in northern Larimer County and on County Rd 17 between County Rd 14 and County Rd 16 in southern Larimer County. The County Rd 70 project will completely re-construct the roadway with a new asphalt surface that will include 6 foot paved shoulders. The additional shoulder width should be safer for vehicles on the roadway and give bicyclists additional room to safely ride next to high speed traffic. The County Rd 17 project will completely reconstruct the road into a three lane section with a continuous center turn lane to separate left turning vehicles from the through traffic at intersections and driveway locations. The project will also place 6 foot paved shoulders along the roadway for increased safety for motorists and bicyclists.

# Safety Improvement Monitoring and Evaluation

Six locations where there was a problem with run off the road crashes and have had low cost safety improvements implemented were reviewed to see how the improvements are performing.

- ◆ CR 16 — curves located at and west of CR 19
- ◆ CR 50E— Bingham Hill Rd—turns located at the top of Bingham Hill east of CR 23
- ◆ CR 29 — curve located 0.5 mi south of CR 18E (Pole Hill Rd)
- ◆ CR 13 — northwest of CR 30—Sharp turn near irrigation ditch north side of Donath Lake.
- ◆ CR 38E — curve located near the intersection of Rim Rock Valley Ln.
- ◆ CR 19 — reverse curve located north of CR 60E.

The locations compare average crashes per year before and after the low cost safety improvements. Overall there have been significant reductions in the number of overall and serious crashes at these locations.

**Average for all Six Locations:**

**56 % Reduction in All Crashes**

**73 % Reduction in Severe Crashes**

The before and after crash statistics for each location are listed in Appendix B — Table 1



## Appendix A

### 2017 Fatal Crash Descriptions/Locations

**County Rd 52E:** 328 Feet east of Nomad Dr. 5/7/2017. EB motorcycle on CR 52E initiated a lane change to pass multiple passenger busses. Motorcycle entered curve to the right and accelerated, ran off the left side of the road into ditch, continued EB and lost control in the ditch, hit uneven ground and became airborne. Motorcycle collided with uneven ground and ejected the motorcycle driver. Motorcycle driver was killed. Daylight, road surface was dry, Vehicle speed prior to crash estimated at 60 Miles Per Hour.

**County Rd 13 at SH 60:** State Highway 60 at County Rd 13 Southbound. 5/9/2017. split jurisdiction crash (CDOT). Vehicle 1 WB on SH 60 behind Vehicle 2 stopped WB with turn signal activated at SB CR 13, Vehicle 3 EB on SH 60 approaching CR 13. Vehicle 1 failed to observe stopped Vehicle 2 and swerved left to avoid a rear end collision. Vehicle 1 collided with left rear of Vehicle 2 and then collided head on with EB Vehicle 3. Vehicle 1 and Vehicle 3 rotated off the SE side of intersection. Driver of Vehicle 1 was killed. Light was Dawn, road surface dry,

**County Rd 16E at CR 11:** 72 Feet west of CR 11 on CR 16E. 5/13/2017. Vehicle 1 NB on CR 11 entered a left hand turn to CR 16E and began to rotate counter clockwise. Vehicle 1 travelled off the right (north) side of CR 16E and struck a mailbox. Vehicle 1 rolled 1/2 time and ended up on it's top. Fatality was a rear passenger not wearing a seatbelt. The passenger survived for several weeks at the hospital before passing away. (crash changed from injury to fatal on amended report.)

**County Rd 23:** 0.15 miles north of CR 42C. 6/17/2017. Motorcycle NB on CR 23, Vehicle 2 SB on CR 23. Motorcycle was approaching 90 degree turn to the right, skidded and then rolled over 1/4 time to left side, Vehicle 1 slid into SB lane and collided with driver side of Vehicle 2. Vehicle 1 then redirected east and stopped in road on left side Motorcycle driver was ejected and killed. Daylight, road surface was dry, estimated vehicle speed prior to crash was 40 Miles Per Hour.

**County Rd 46E:** CR 46E (Laporte Ave) at CR 19F (Sunset St) (just west of Ft Collins City Limit) 6/23/2017. Vehicle 1 WB on CR 46E, Vehicle 2-Motorcycle EB on CR 46E at Sunset St. Vehicle 1 turned left (south) in front of Vehicle 2. Vehicle 2 made an effort to avoid crash, but ultimately crashed into the right side of Vehicle 1. Vehicle 2 came to rest on it's side facing south in the middle of Laporte Ave. Motorcycle driver was killed. Dark, unlighted, road surface dry.

**County Rd 19:** CR 19 181 Feet north of CR 64. 6/24/2017. Vehicle 1 NB on CR 19. Vehicle 1 was travelling at a very high rate of speed, lost control on hill crest, Vehicle 1 skidded, turned to the right and then overcorrected back to the left. Vehicle skidded 219 feet across both lanes. Vehicle 1 ran off the left side of the road, down and embankment and struck a fence. Vehicle 1 rotated and rolled 2 and 1/2 times. Rear passenger not wearing a seatbelt was ejected and killed.

**County Rd 63E:** CR 63E (Pingree Park Rd )196 Feet south of Milepost 3. 9/27/2017. Vehicle 1 SB on CR 63E in curve to the right, failed to negotiate curve and entered NB portion of the road. Vehicle 1 ran off the right side of the left side of the road before overcorrecting right. Vehicle 1 spun 180 degrees back into SB lane, ran off the right side of the road, began to roll, hit embankment, rolled onto it's top and then rolled back onto it's wheels in SB lane. Driver of Vehicle 1 who was not wearing a seatbelt was partially ejected and killed. Daylight, non-paved road surface was wet due to rain, estimated vehicle speed prior to crash was 40 Miles Per Hour.

## Appendix A (continued)

### 2017 Fatal Crash Descriptions/Locations

**County Rd 52 at County Rd 9:** CR 52 (Richards Lake Rd ) at CR 9 (Giddings Rd). Crash occurred on the city / county line. Jurisdictional split with Fort Collins. 11/9/2017. Vehicle 1 EB on CR 52 at high rate of speed. Vehicle 2 SB on CR 9. Vehicle 1 failed to stop for stop sign and collided with Vehicle 2. Front of Vehicle 1 hit passenger side of Vehicle 2. Both vehicles ended up SE of the intersection. Passenger in Vehicle 2, not wearing a seatbelt was ejected. The driver and the passenger in Vehicle 2 were both killed. Dark, unlighted. Road surface dry. Estimated speed for Vehicle 1 prior to crash was 84 Miles Per Hour.

**County Rd 15:** CR 15 1,015 Feet south of CR 82. 11/13/2017. Vehicle 1 NB on CR 15 at high rate of speed. Vehicle 1 ran off the right side of the road and lost control. Vehicle 1 re-entered CR 15 crossing both lanes, driver attempted to correct Vehicle which started rotating clockwise. Vehicle 1 ran off the left side of the road and hit a fence. Vehicle 1 continued rotating and then rolled 2 and 1/2 times ejecting the driver who was killed. Driver was not wearing a seatbelt. Dark, unlighted, Road surface dry, estimated vehicle speed prior to crash was 89 Miles Per Hour.

**County Rd 17:** CR 17 south of River Glen Way and at the intersection with CR 2E. 11/16/2017. Vehicle 1 SB on CR 17 at extremely high rate of speed evading law enforcement. Vehicle 1 began skidding and traveled off the left shoulder. Driver attempted to counter steer and started to rotate clockwise. Vehicle 1 travelled down an embankment and started to roll. Vehicle 1 rolled across CR 2E and ended up resting on a concrete retaining wall near SE corner of the intersection. Driver of Vehicle 1 who was not wearing a seatbelt was ejected and killed. Dark, unlighted, road surface was dry, estimated vehicle speed prior to crash was 120 Miles Per Hour.

# Appendix B

## Monitoring of Low Cost Safety Improvements at Six Run Off the Road Crash Locations

Segment	Time Frame	Number Crashes Per Year						Date Improved	Notes
		PDO	INJ	FAT	Total Avg	Minor	Severe		
CR 16 Turns at and west of CR 19	Type of Improvement	New warning signs and chevrons at curves						6/1/2010	Average of 4 years before improvements and 7 years after
	Before Improvements	2.75	0.75	0.25	3.75	2.75	1.0		
	After Improvements	0.29	0.14	0.00	0.43	0.29	0.14		
	Change	-89%	-81%	-100%	-89%	-89%	-86%		
50E—Turns at top of Bingham Hill Rd	Type of Improvement	New warning signs and chevrons at turns.						12/15/2009	Average of 6 years before improvements and 8 years after
	Before Improvements	0.33	0.17	0.00	0.50	0.33	0.17		
	After Improvements	0.00	0.00	0.00	0.00	0.00	0.00		
	Change	-100%	-100%	0%	-100%	-100%	-100%		
CR 29 curve approx. 0.5 mi south of CR 18E	Type of Improvement	Chevron signs placed at curve						9/3/2013	Average of 4 years before improvements and 4 years after
	Before Improvements	0.25	0.75	0.50	1.50	0.25	1.25		
	After Improvements	0.25	0.00	0.00	0.25	0.25	0.25		
	Change	0%	-100%	0%	-83%	0%	-80%		
CR 13 Northwest of CR 30 - Sharp Turn near irrigation ditch	Type of Improvement	Signing adjustments and installation of SB rumble bars						5/20/15	Average of 7 year before improvements and 2 years after
	Before Improvements	1.57	0.29	0.00	1.86	1.57	0.29		
	After Improvements	0.00	0.00	0.00	0.00	0.00	0.00		
	Change	-100%	-100%	-100%	-100%	-100%	-100%		
CR 38E at turn near the intersection of Rim Rock Valley Ln	Type of Improvement	Upgraded advance warning signs and installed Chevrons through the curve						11/1/2010	Average of 5 years before improvements and 7 years after
	Before Improvements	1.20	0.40	0.00	1.60	1.20	0.40		
	After Improvements	0.67	0.50	0.00	1.17	0.67	0.50		
	Change	-44%	20%	0%	-16%	-44%	20%		
CR 19—Reverse Curve north of CR 60E	Type of Improvement	Upgrade sign materials, added pavement markings						5/17/2008	Average of 4 years before improvements and 9 years after
	Before Improvements	0.33	0.67	0.33	1.33	0.33	1.00		
	After Improvements	0.33	0.11	0.00	0.44	0.33	0.11		
	Change	0%	-84%	-100%	-67%	0%	-89%		

## Contact Information

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