

Regional Bicycle Safety Analysis based on Crash Report Review

2019 Arizona ITE Breakfast Series

August 28, 2019

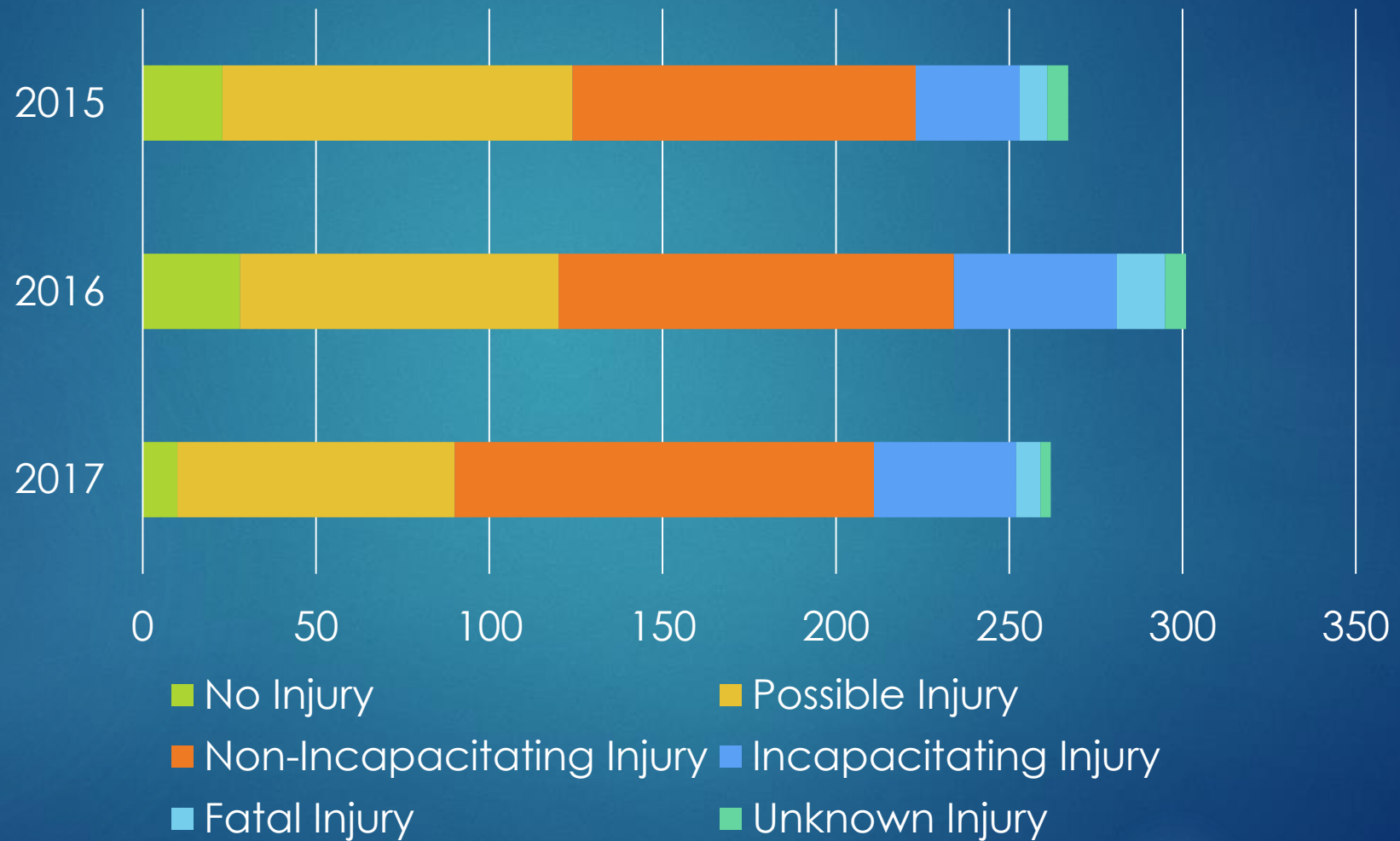
Scope of the Study

- ▶ Literature Review
- ▶ Bicycle Crash Reports Review
- ▶ Historical Review of Bicycle Infrastructure
- ▶ Bicycle Safety Infrastructure Guidance Document

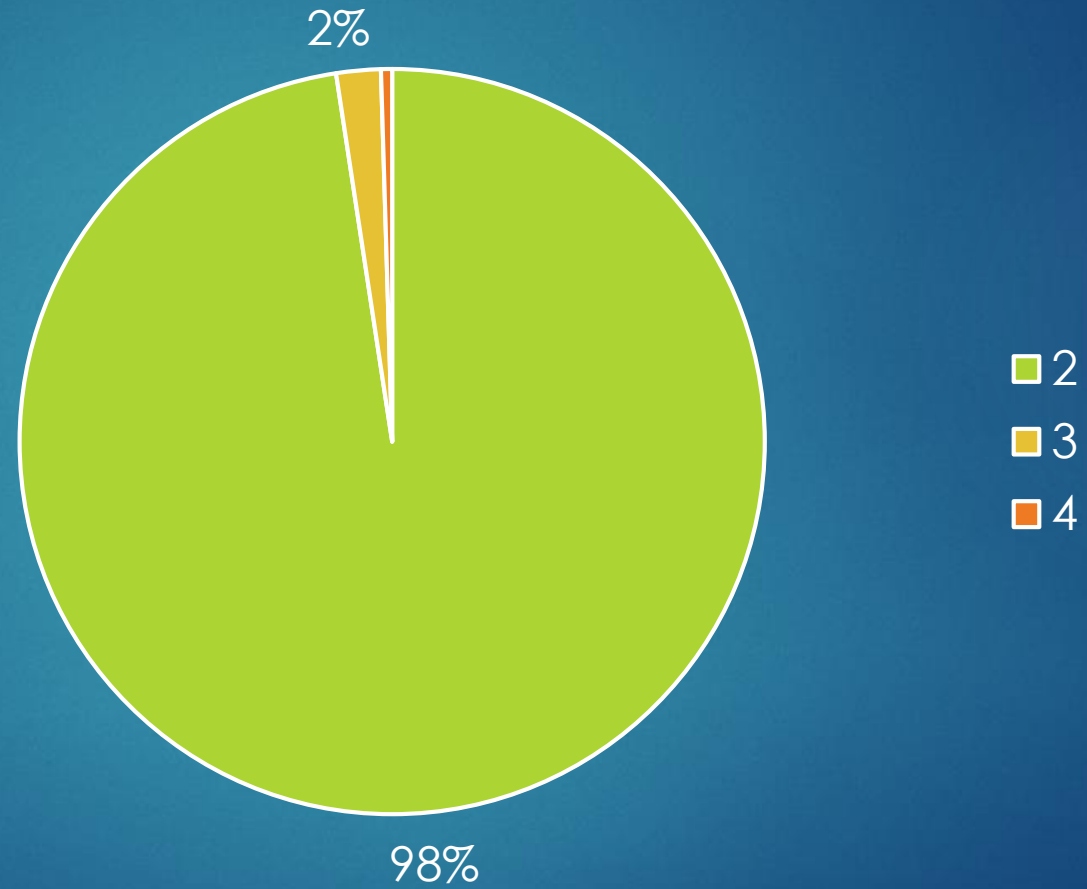
Crash Reports Review

- ▶ MAG Region bicycle crashes, 2015 – 2017
- ▶ Excludes crashes at intersections of two arterials
- ▶ 874 crash reports provided by MAG, 44 omitted:
 - ▶ 35 occurred at intersections of two arterials
 - ▶ 3 did not involve a crash
 - ▶ 2 did not involve a bicycle
 - ▶ 2 occurred on private property
 - ▶ 1 involved a wheelchair improperly coded as a bicyclist
 - ▶ 1 involved a bicycle struck while parked with no rider
- ▶ 830 crashes meeting the intent of the study

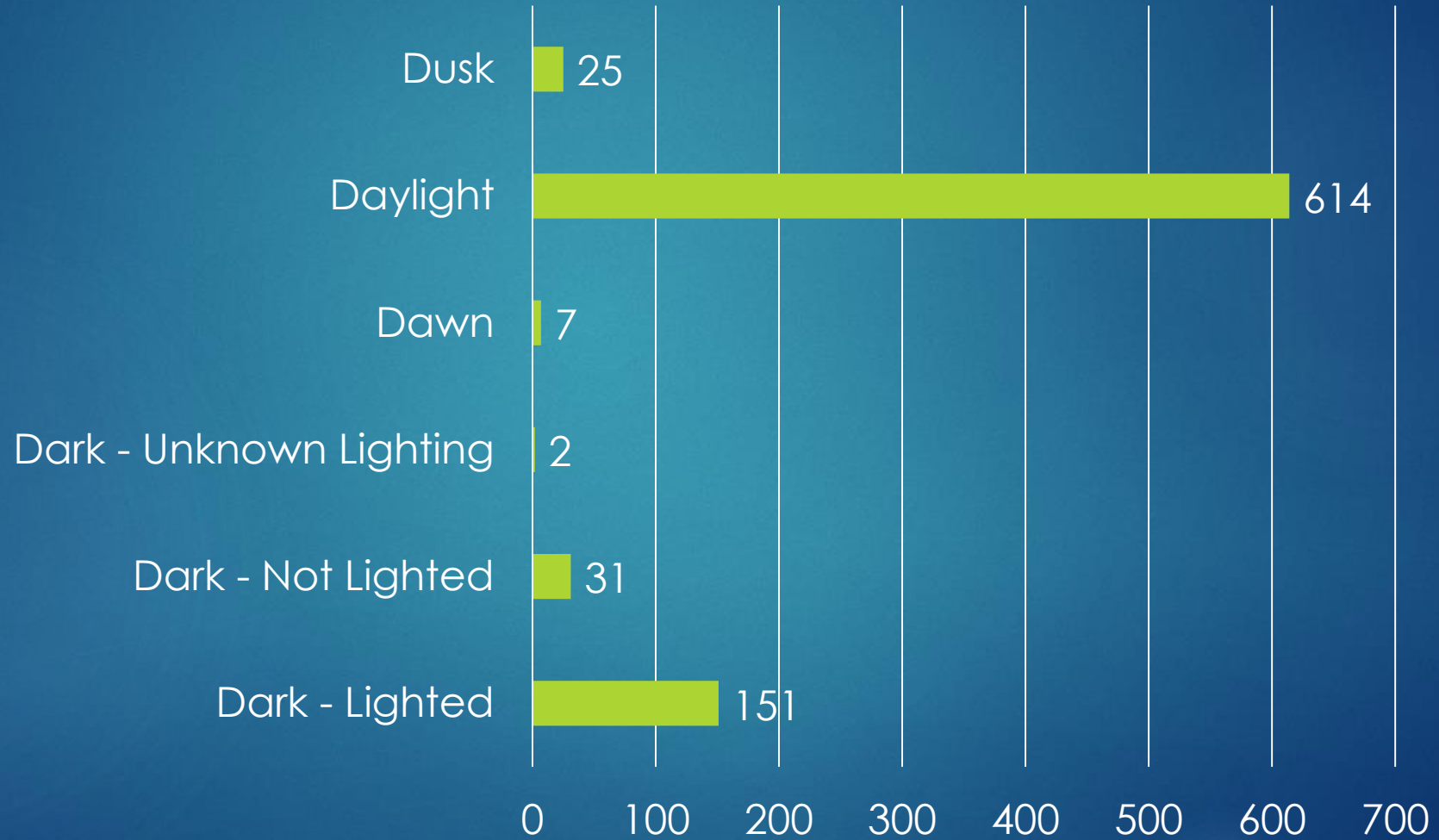
Crashes by Year and Injury Severity



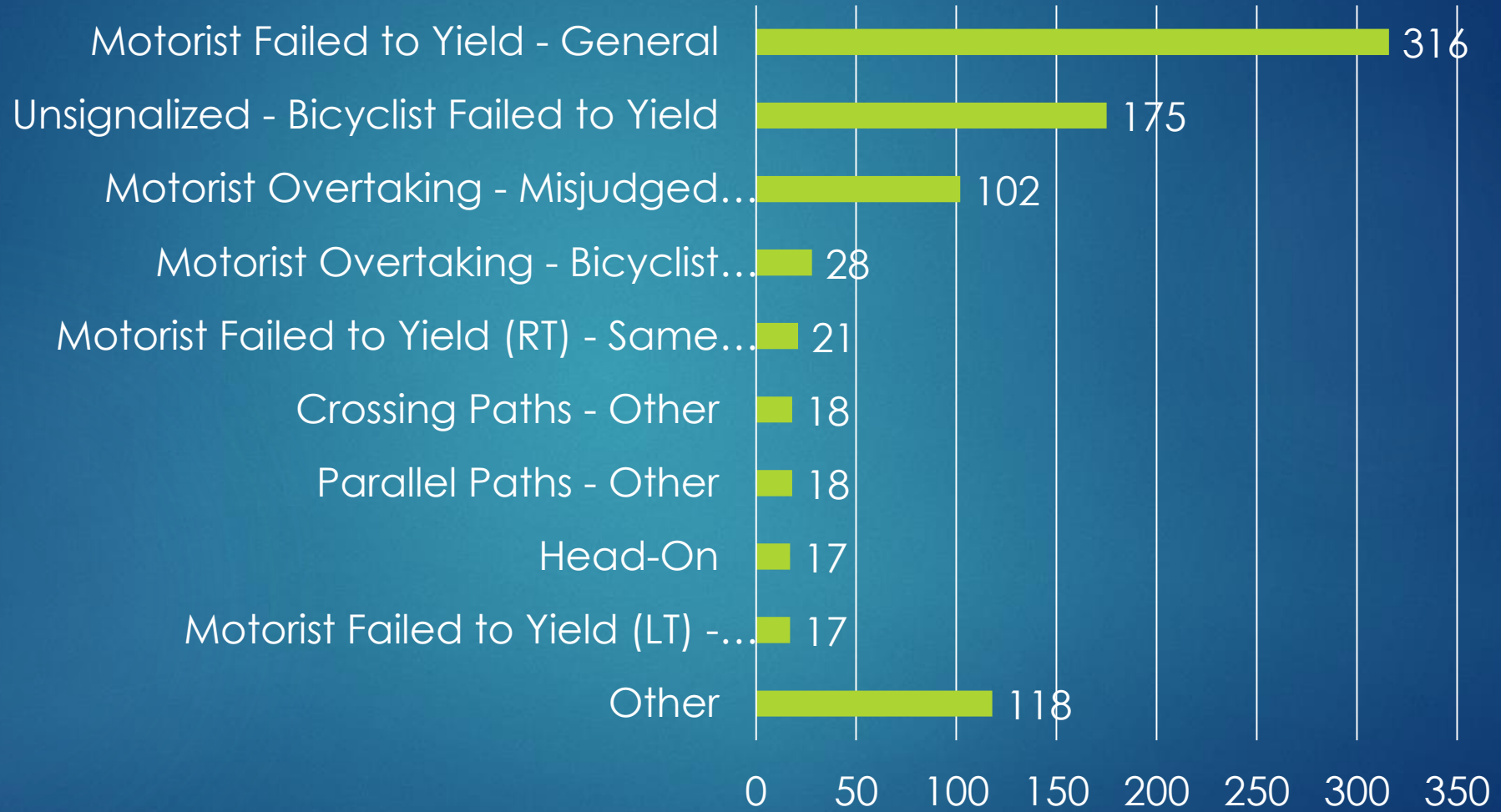
Number of Units Involved in Crashes



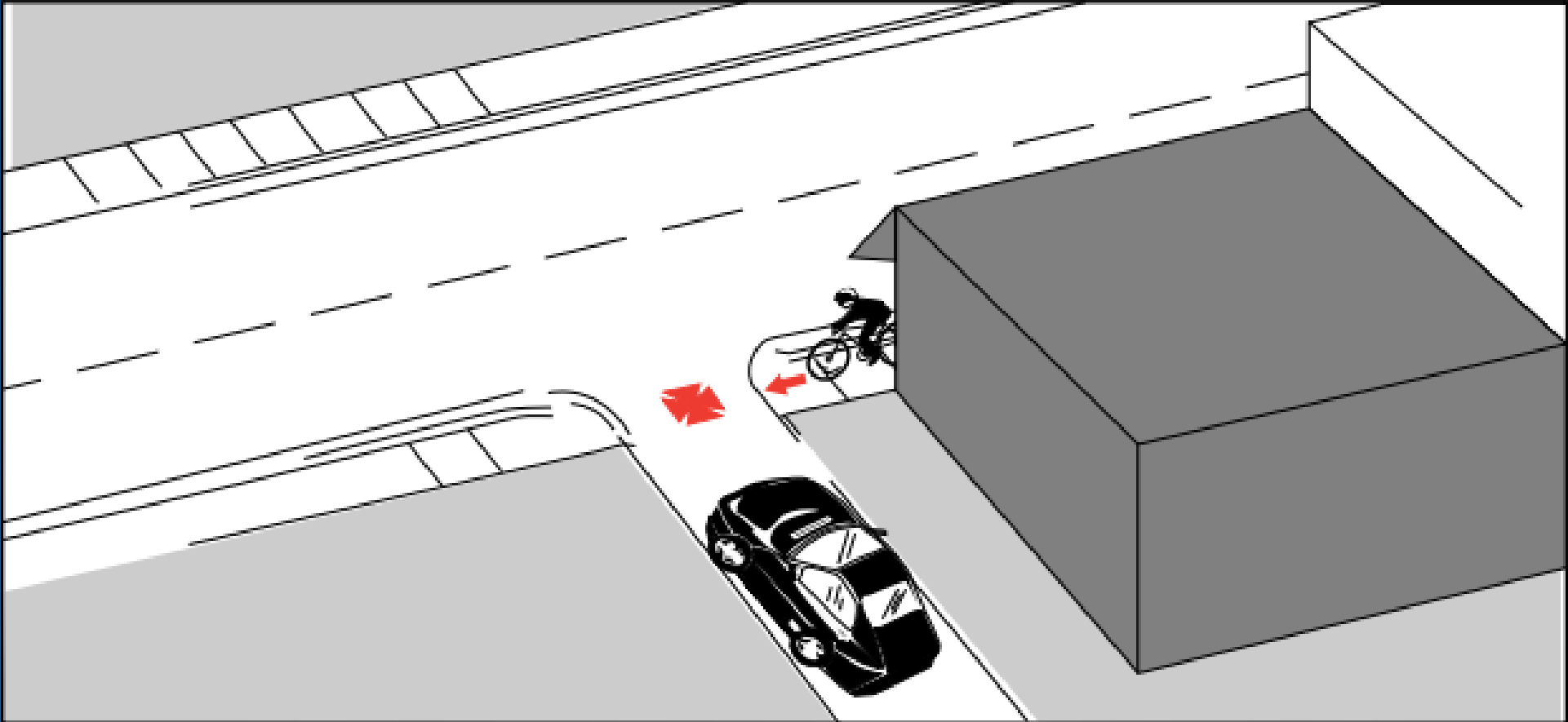
Lighting Conditions



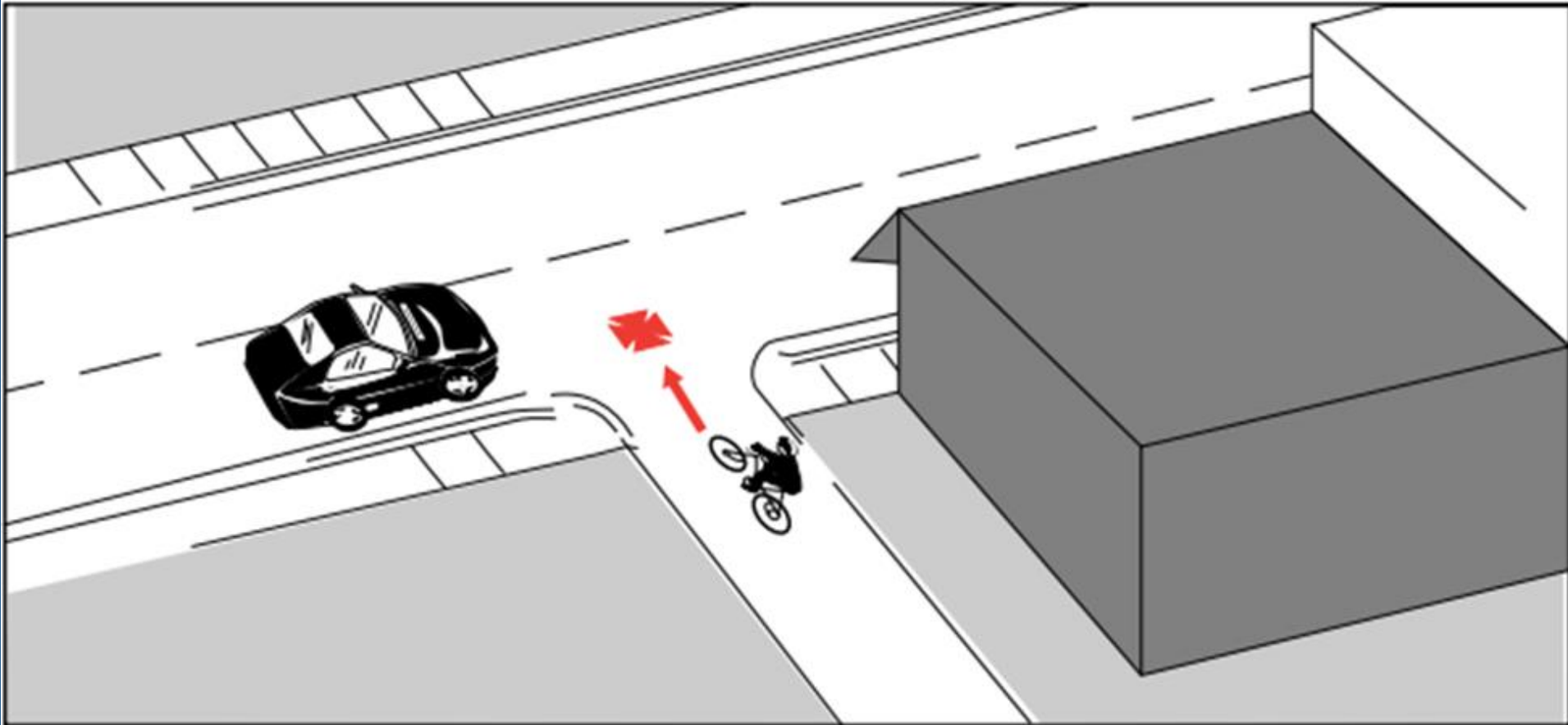
Crash Type



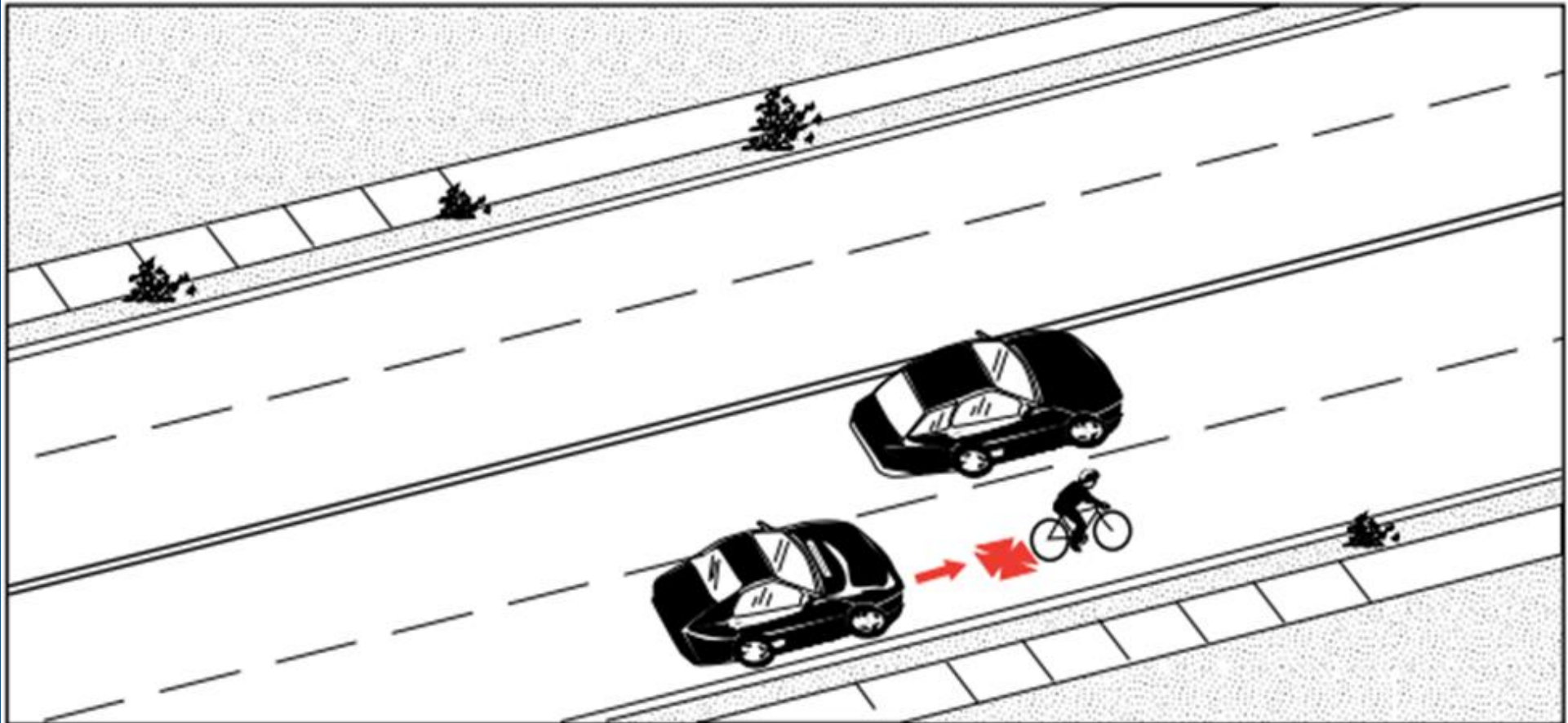
Motorist Failed to Yield - General



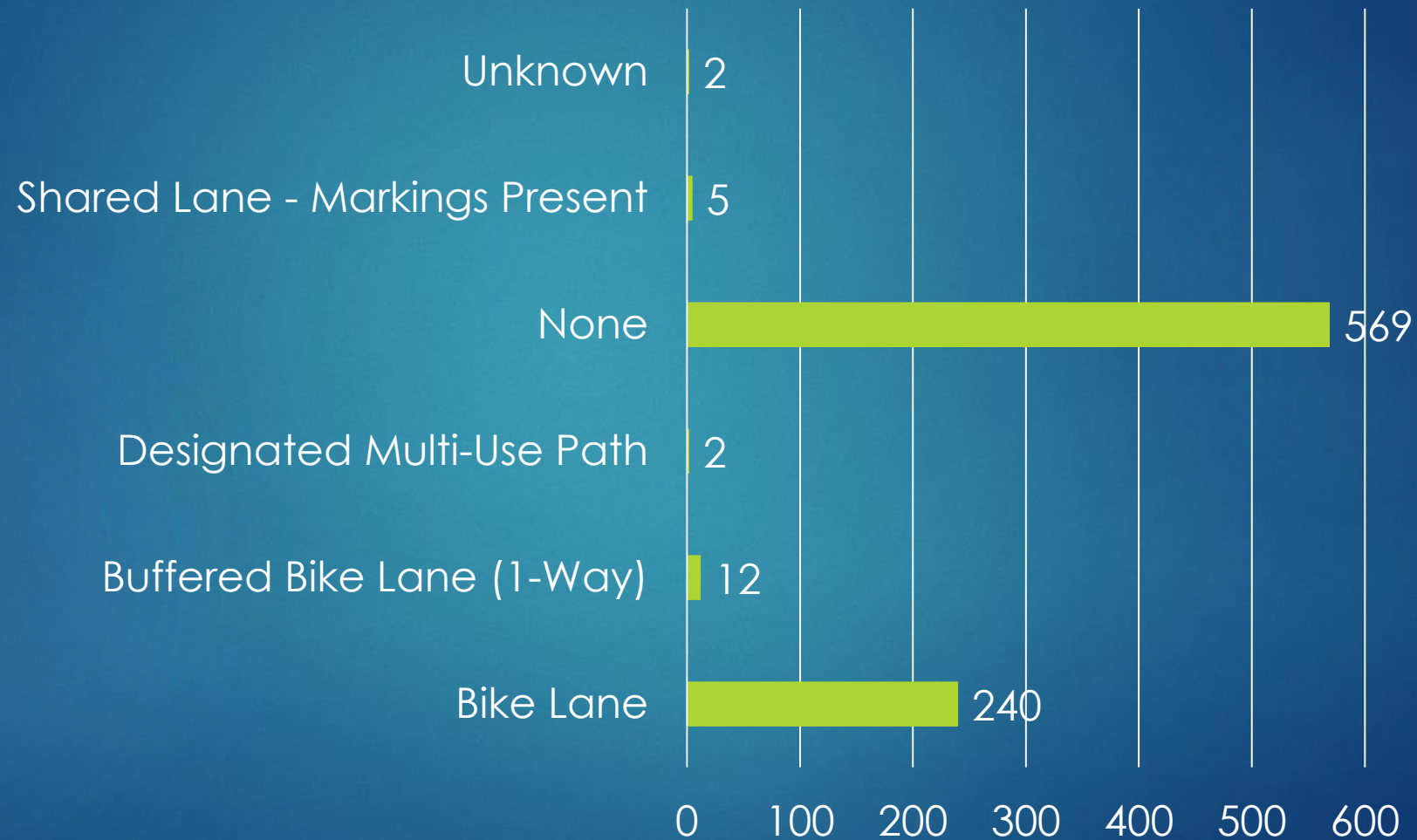
Unsignalized – Bicyclist Failed to Yield



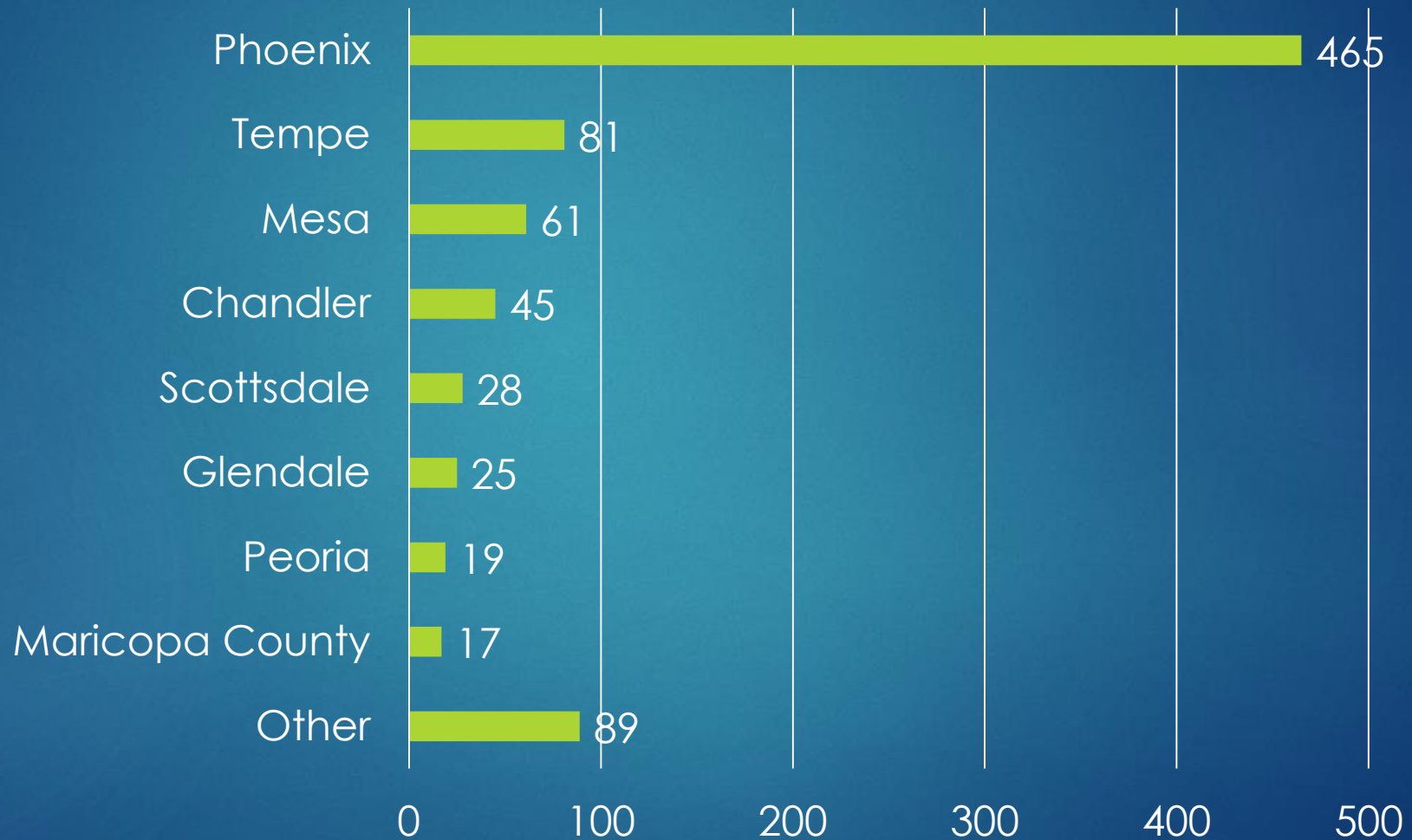
Motorist Overtaking – Misjudged Cyclist



Bicycle Facility Along Path of Cyclist in Crashes

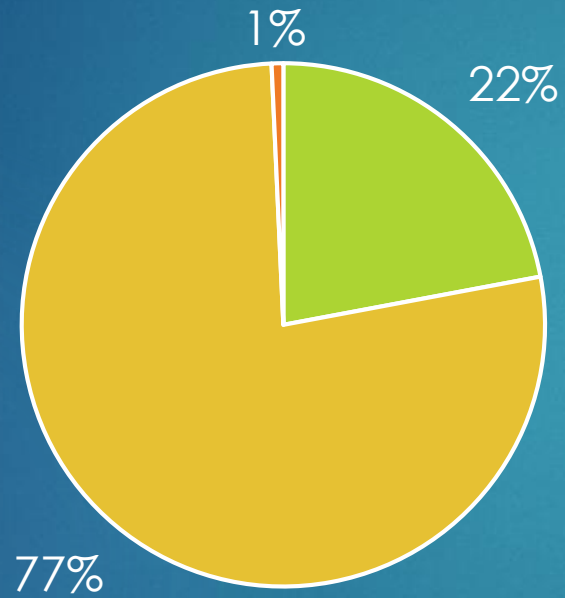


Crashes by Jurisdiction



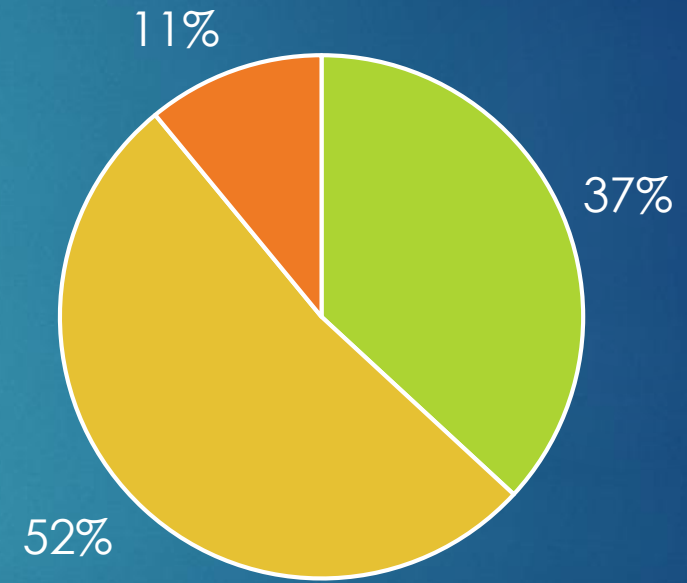
Gender

Bicyclist



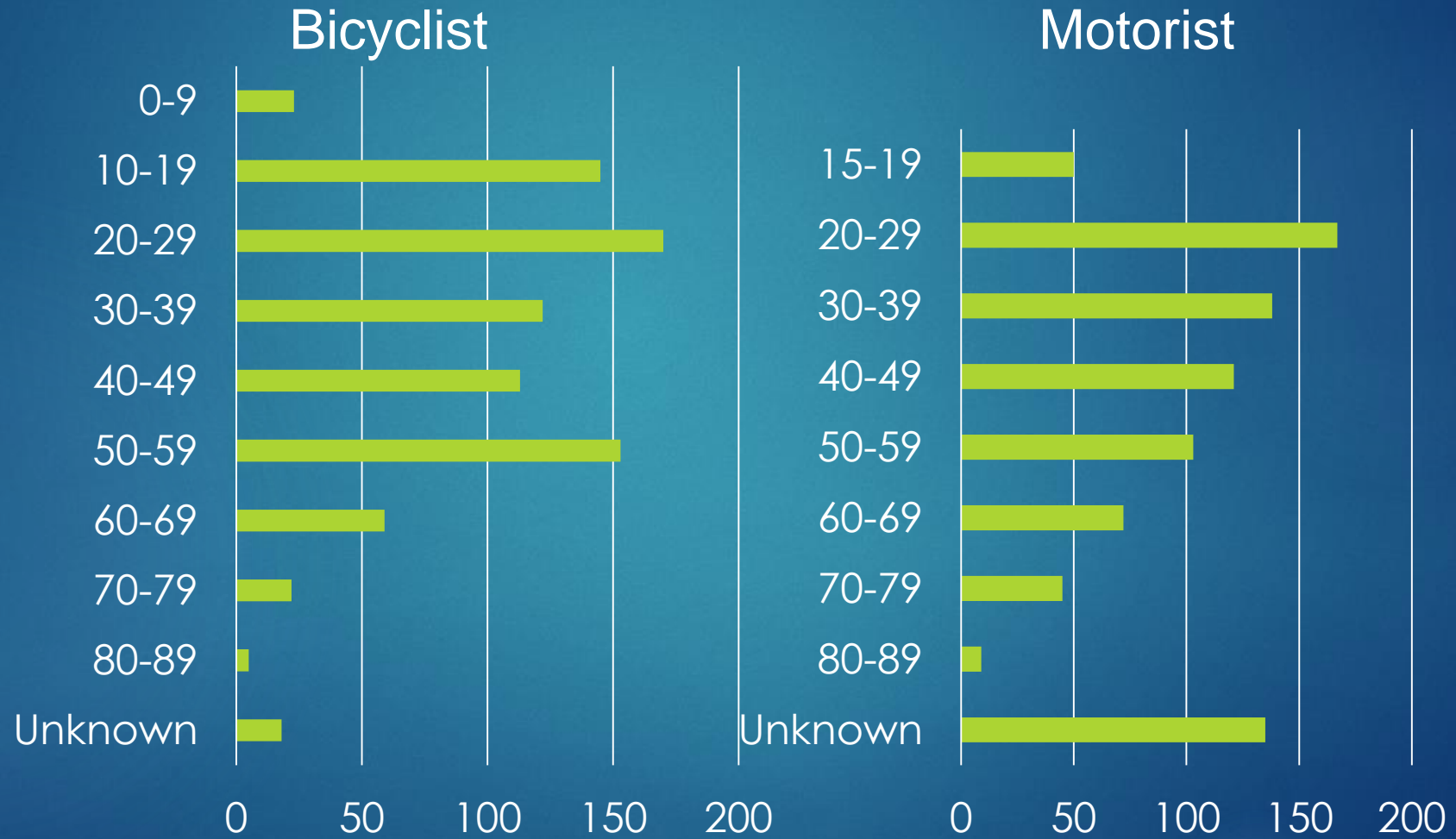
■ F ■ M ■ U

Motorist



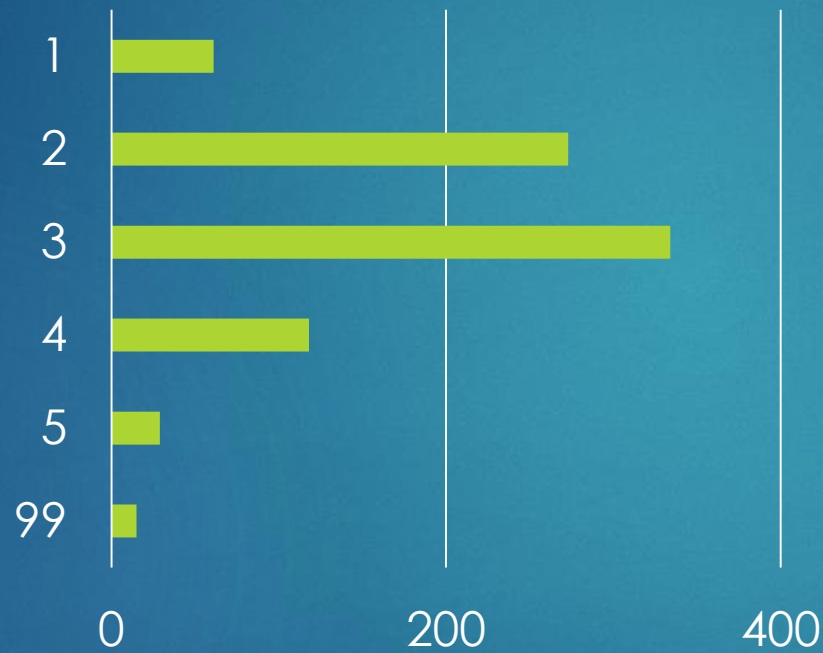
■ F ■ M ■ U

Age

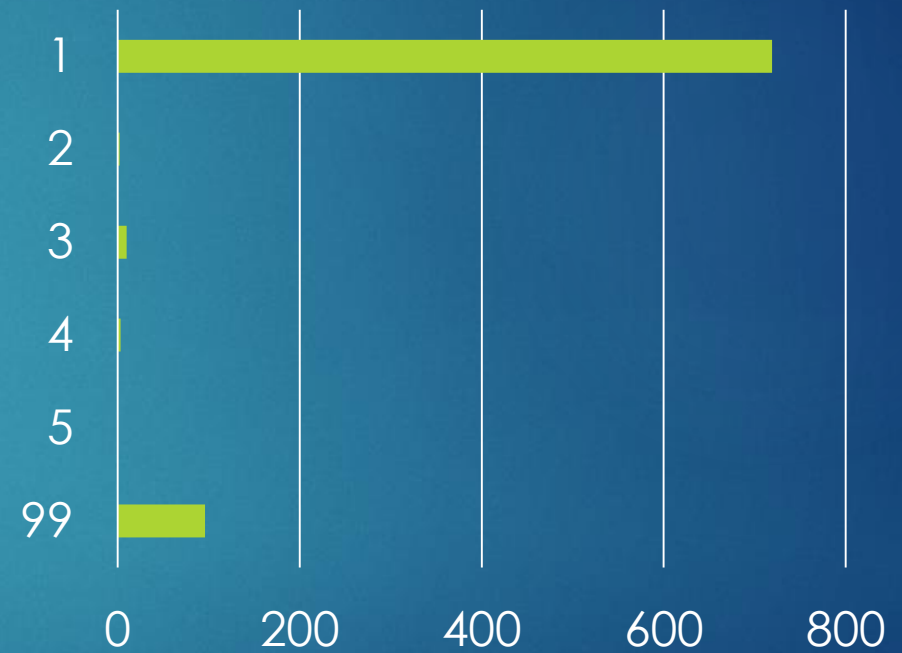


Injury Severity

Bicyclist



Motorist

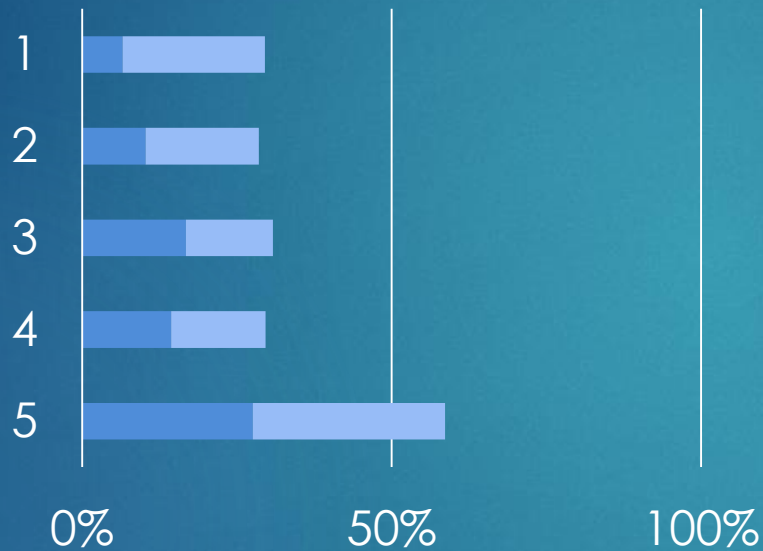


1 – No Injury
 2 – Possible Injury
 3 – Non-incapacitating Injury

4 – Incapacitating Injury
 5 – Fatal Injury
 99 – Unknown injury

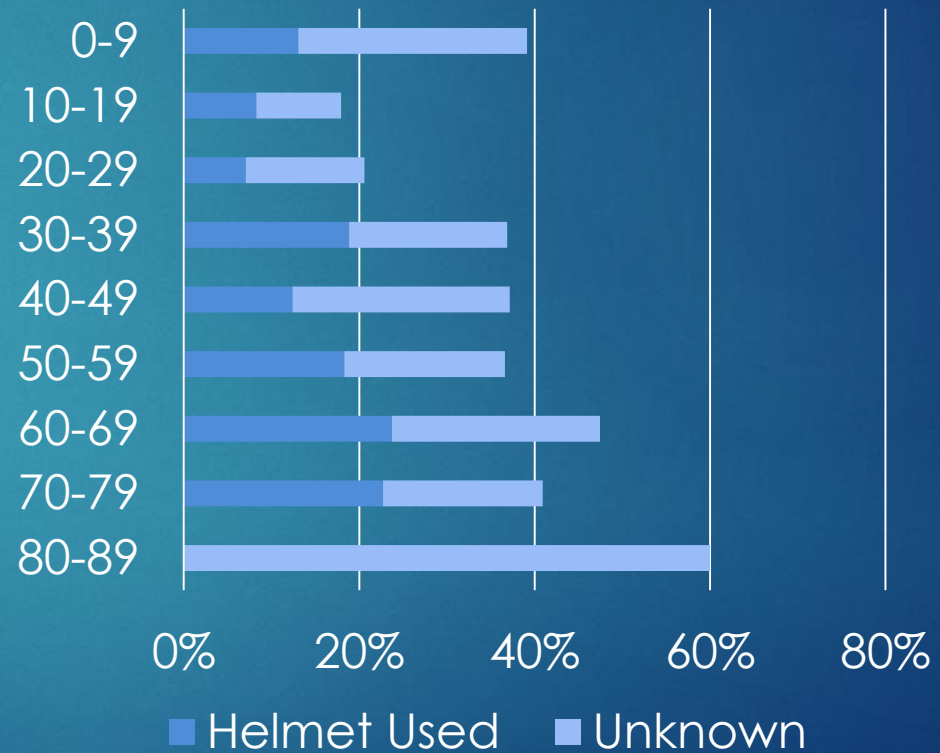
Percent of Cyclists in Crashes Wearing Helmets

By Severity



- 1 – No Injury
- 2 – Possible Injury
- 3 – Non-incapacitating Injury
- 4 – Incapacitating Injury
- 5 – Fatal Injury

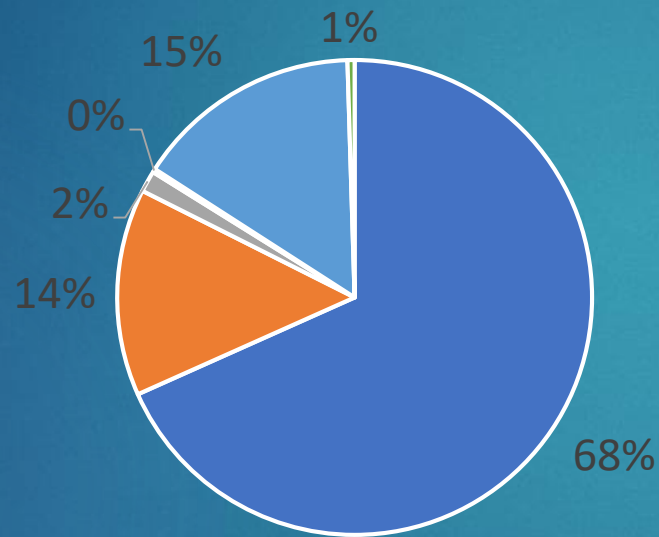
By Age



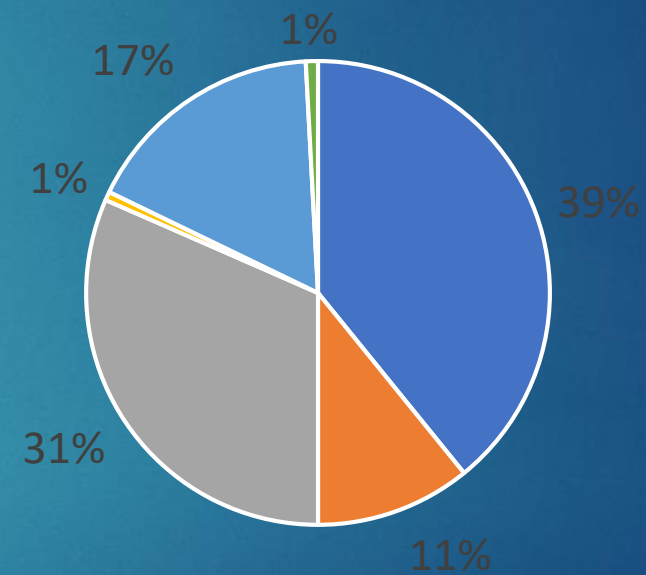
■ Helmet Used ■ Unknown

Types of Roadways Where Crashes Occur

Bicyclist Roadway

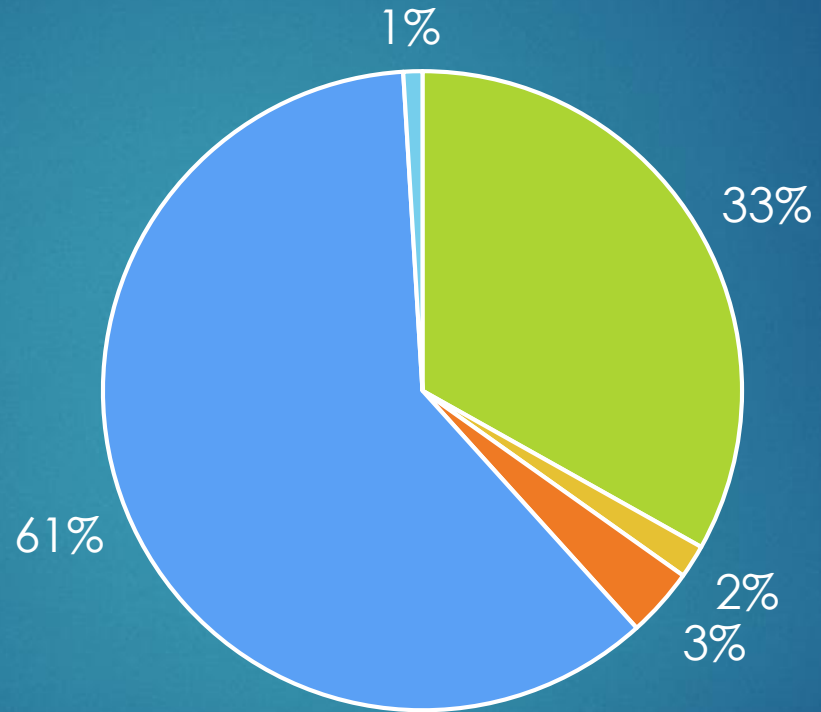


Motorist Roadway



- Arterial
- Local
- Collector
- Freeway/Ramp
- Driveway
- Unknown

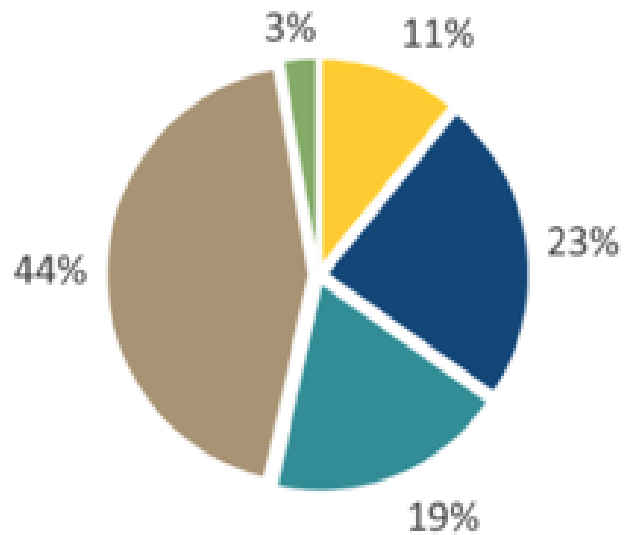
Fault



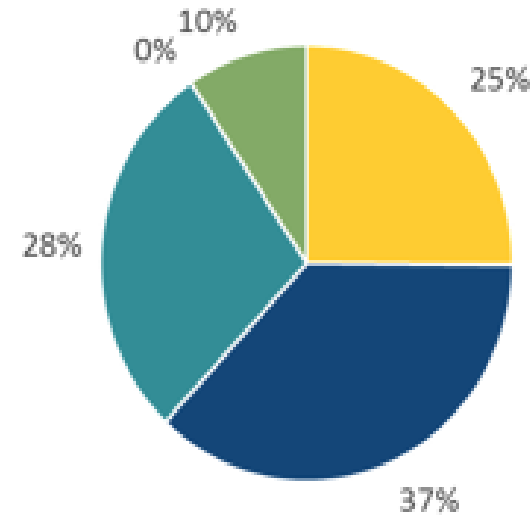
- Bicyclist at Fault
- Both at Fault
- Can't Determine Fault
- Motorist at Fault
- Neither at Fault

Location of Bicyclists Involved in Crashes

Streets with Bike Lanes (254 crashes)



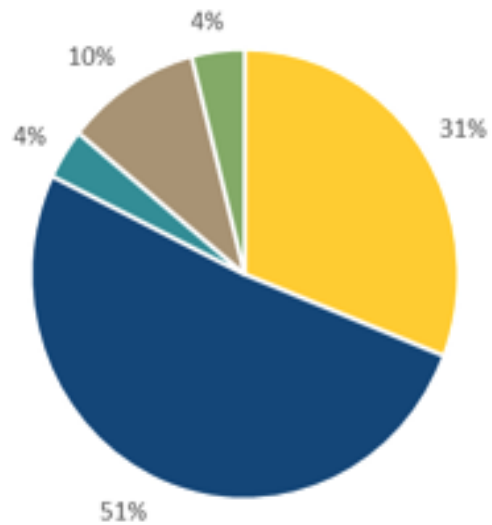
Streets without Bike Lanes (569 crashes)



- Travel Lane
- Sidewalk
- Crossing Road
- Bike Lane
- Other

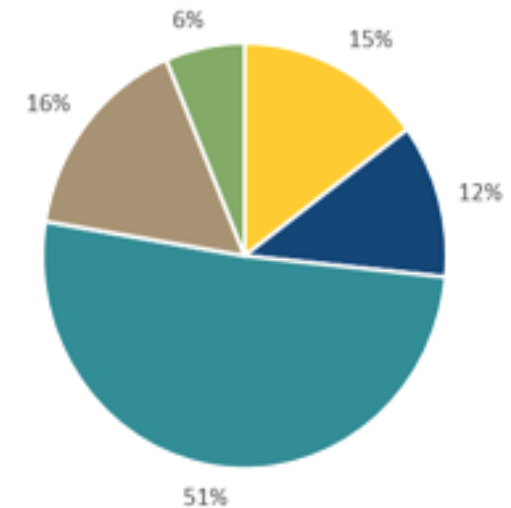
Location of Bicyclists Involved in Crashes

Bicyclist is at Fault (275 crashes)



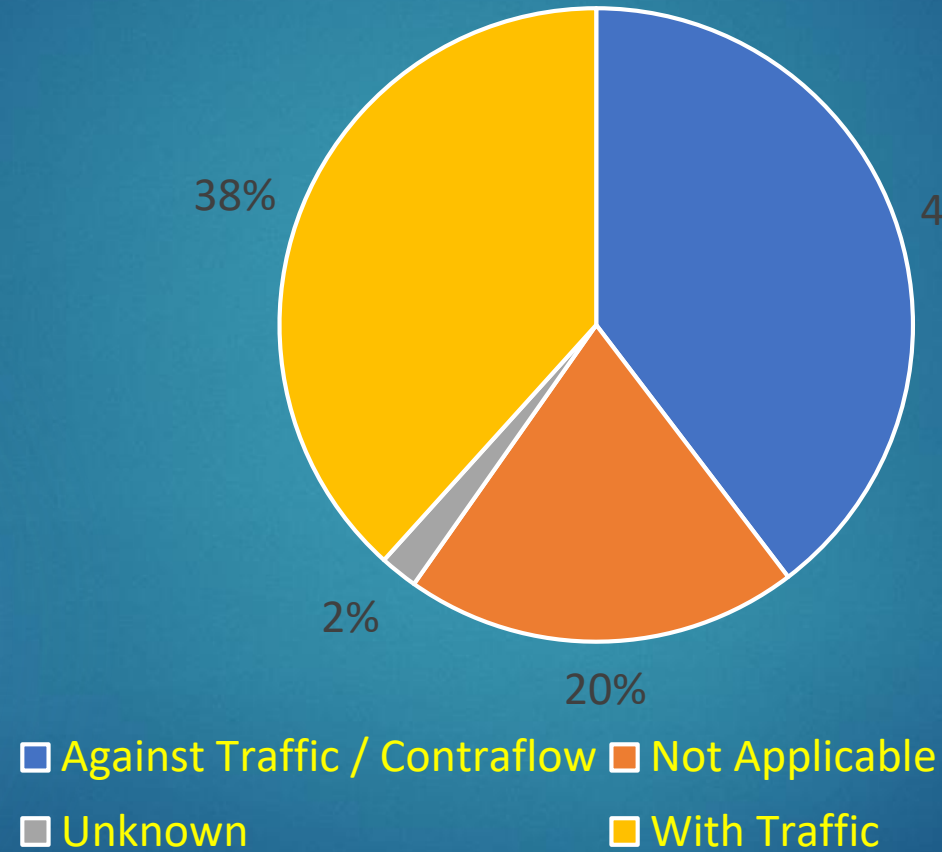
■ Travel Lane
 ■ Crossing road
 ■ Sidewalk
 ■ Bike Lane
 ■ Other

Motorist is at Fault (504 crashes)



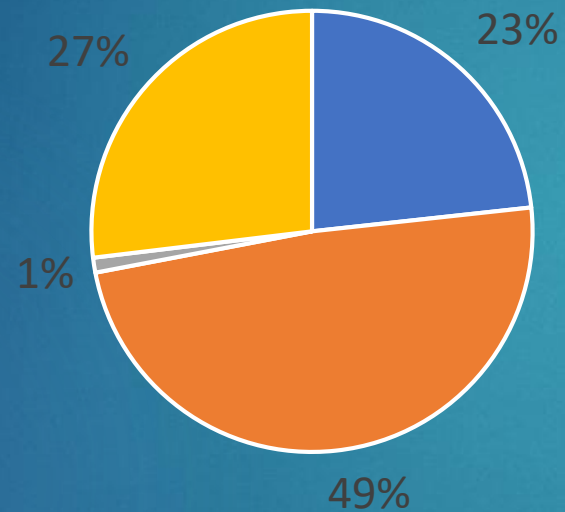
■ Travel Lane
 ■ Crossing road
 ■ Sidewalk
 ■ Bike Lane
 ■ Other

Bicyclist Travel Direction at Time of Crash

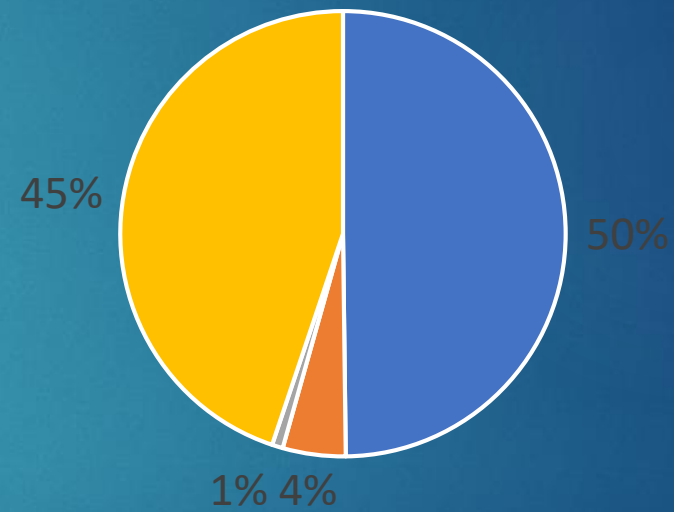


Bicyclist Travel Direction at Time of Crash with Fault Status

When Bicyclist at Fault



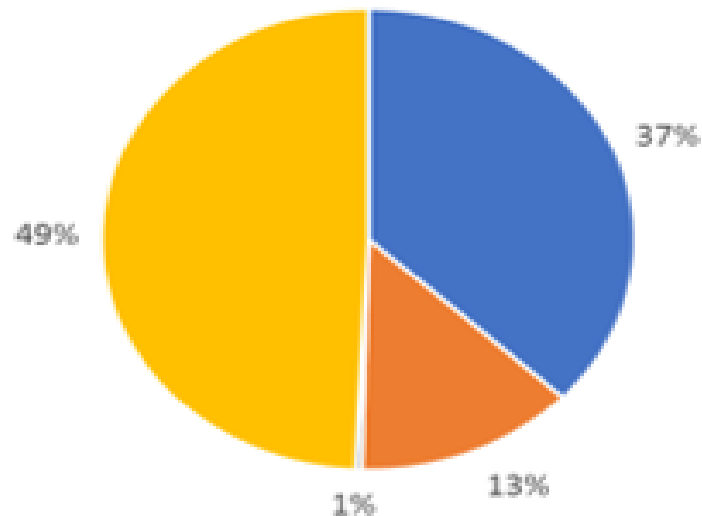
When Motorist at Fault



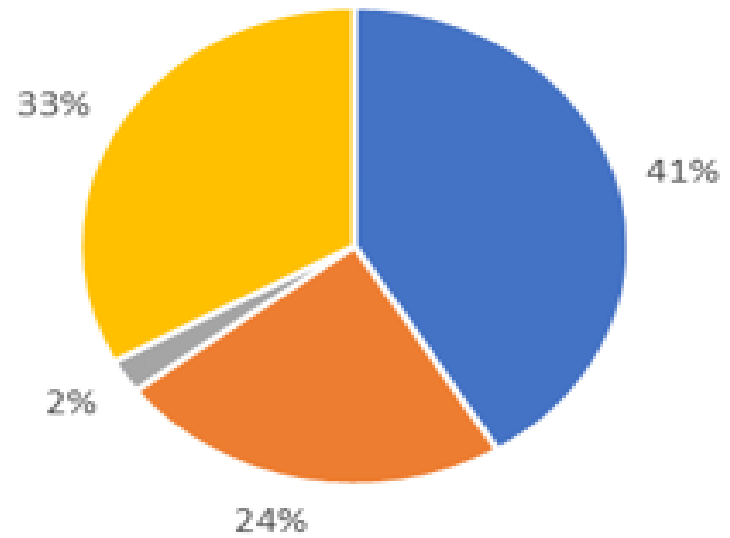
- Against Traffic / Contraflow
- Not Applicable
- Unknown
- With Traffic

Bicyclist Travel Direction with or without Bike Lane

Streets with Bike Lanes (254 crashes)



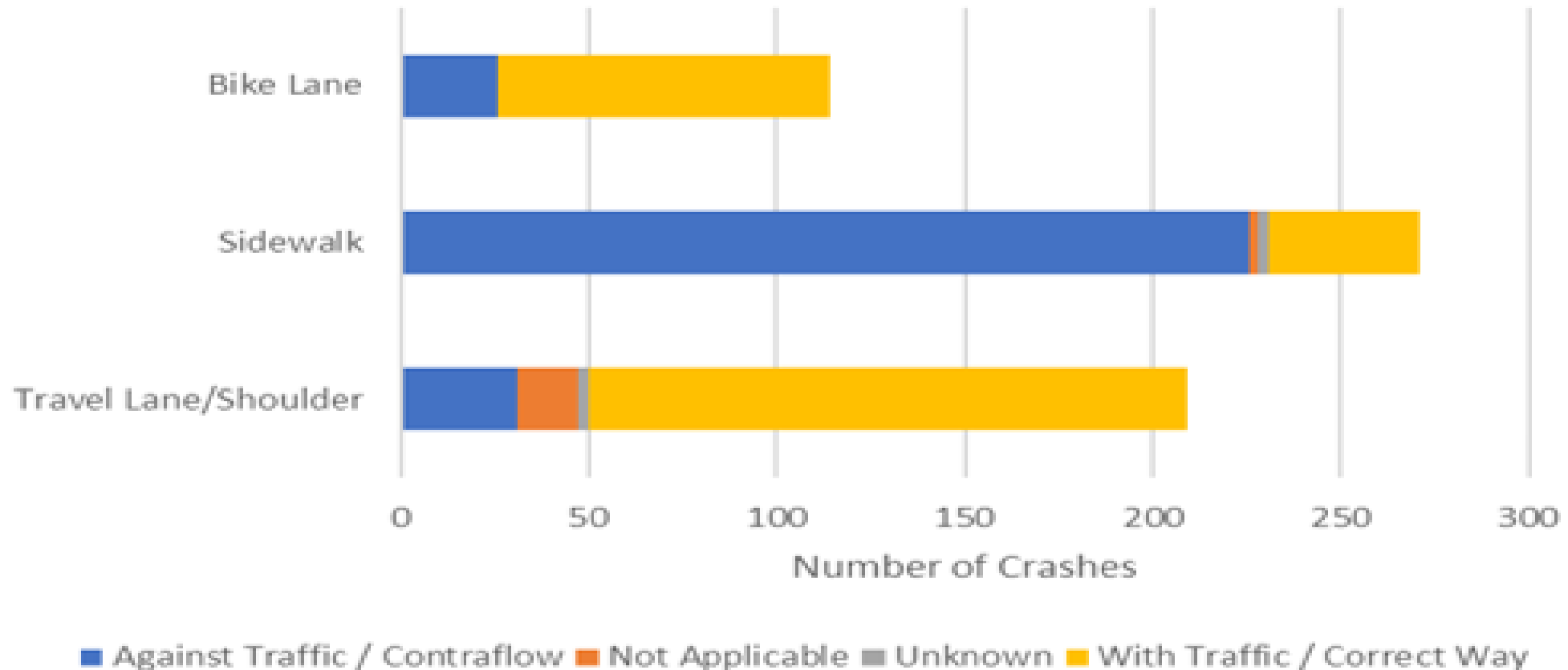
Streets without Bike Lanes (569 crashes)



■ Against Traffic / Contraflow
 ■ Crossing / Other
 ■ Unknown
 ■ With Traffic / Correct Way

Bicyclist Travel Direction & Riding Location

Figure 40: Relationship Between Cyclist Travel Direction and Cyclist Riding Location



Primary Conclusions

- ▶ The most common crash type (23% of all crashes) involves a motorist entering a street from a driveway and a bicyclist on the sidewalk approaching from the right
- ▶ Cyclists may feel safe on sidewalks, but sidewalk riding against traffic is a key contributor to crashes
- ▶ Over two-thirds of crashes occurred on streets with no bicycle accommodations, but streets with bike lanes were the site of about 29 percent of crashes.
- ▶ Among cyclists in crashes while traveling along a street with a bike lane, only 44 percent of cyclists in crashes were using the bike lane
- ▶ Helmet use ranges from 10% to 30% among cyclists in crashes
- ▶ Bicycle crashes are generally not concentrated at hotspots
- ▶ Location-specific crash patterns are rare, but similar types of crashes are observed regionwide
- ▶ Bicyclists in crashes are riding along or crossing arterials in 68% of crashes

Preliminary Recommendations

- ▶ Cyclists need frequent opportunities to cross streets to reduce contraflow riding
- ▶ Access management techniques can help minimize driveway crossing conflict points
- ▶ Bicycle (and pedestrian) infrastructure needs to be continuous
- ▶ Bicycle infrastructure is needed on arterials
- ▶ Bicycle boulevards are an effective, low-cost way to provide continuous cycling accommodations and arterial crossings
- ▶ Officers may need additional resources to more accurately complete bicycle crash reports
- ▶ Drivers and cyclists may benefit from education about frequent crash types

Questions??

Mohammad Shaheed
MAG Transportation Safety Program
mshaheed@azmag.gov
602-254-6300