



APPENDIX C:
**BICYCLE CRASH
ANALYSIS**

BICYCLE CRASH PATTERNS

Roadway crashes can result from any combination of human behavior, weather conditions, lighting, infrastructure design, or other outside factors. To determine how Lakewood roadways should be designed in order to mitigate these many potential contributing factors, it is important to evaluate each crash thoroughly through a combination of understanding high-level patterns and situational context. This appendix analyzes various citywide patterns from the most recent ten years of crash data available, totaling 479 crashes involving a bicycle from 2014-2023. In addition to the broader patterns identified and examined here, such as the recent decrease in bicycle crashes for the past several years shown in Figure C-1, City staff will continue to perform in-depth analysis on individual crashes beyond the adoption of this Plan.

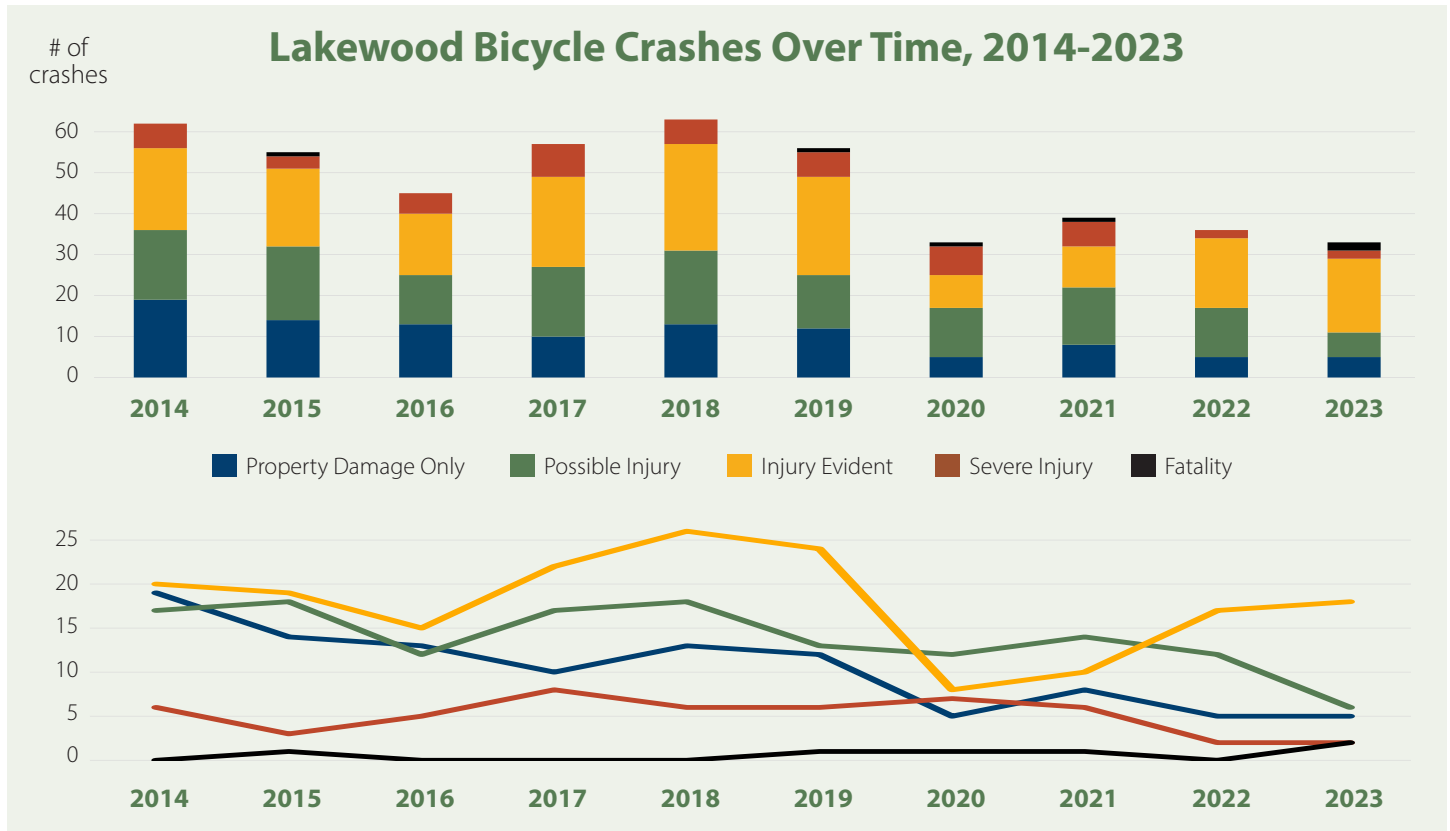


Figure C-1: Lakewood bicycle crashes over time from 2014-2023, categorized by level of severity.

Location Factors

The location of a crash can provide information on the roadway characteristics, intersection configuration, bicycle facility design, motor vehicle speeds and volumes, and other potential factors that could have contributed to the crash. Considering crash locations at a higher level, citywide patterns can help staff identify where to focus in order to prevent further crashes. Nearly 75% of Lakewood bicycle crashes take place at intersections (Figure C-2) and the majority of all

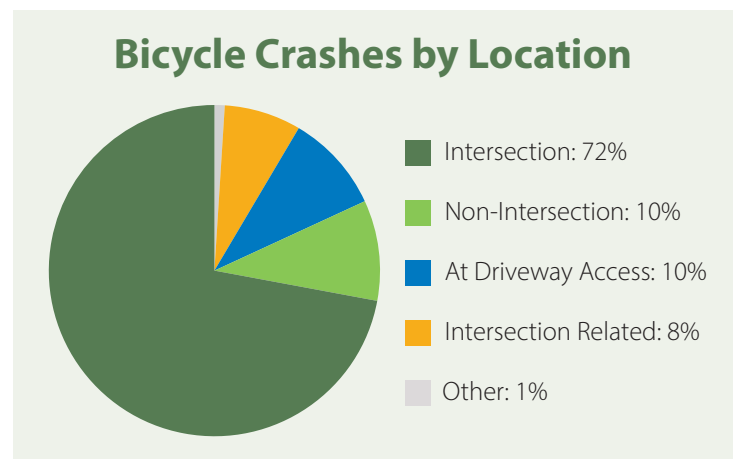


Figure C-2: Lakewood bicycle crashes 2014-2023 by roadway location.

crashes are on high-speed and high-volume arterial roadways (Figure C-3). Table C-1 identifies the top ten Lakewood intersections with the most bicycle crashes from 2014-2023, and Figure C-5 on the following page shows the locations of all 479 crashes. Knowing the specific roads on which bicycle crashes are happening allows City staff to explore traits of each of those roadways for potential correctable patterns such as bicycle facility type, intersection designs, and more. For instance, the map provides a visual that Wadsworth Blvd and Colfax Ave—both arterial roads, in line with Figure C-3—are common crash locations, which can then be confirmed with individual crash details to determine that 34% of Lakewood bicycle crashes are happening on one of these roads.

Environmental Factors

While most environmental factors that contribute to crashes cannot necessarily be changed or controlled, proactive roadway design can ensure safe travel for all users by considering potential crash factors and applying appropriate mitigation. Lighting is a factor in nearly 25% of crashes (see Figure C-4) and City staff has been working in recent years to address this with upgraded street lighting and/or flashing warning signs in areas with a large number of nighttime crashes. Another environmental condition taken into account with engineering design is slippery pavement caused by snow, ice, or rain, so best practices avoid installing uncontrolled crossings in sloped areas or at the bottoms of hills in order to prevent potential crashes when skidding vehicles are unable to stop in these conditions. When other challenging environmental factors such as sun glare and excessive shadows are identified in crash reports, City staff analyzes these details for potential design, technological, or education solutions that could be implemented in the future.

Bicycle Crashes by Roadway Type

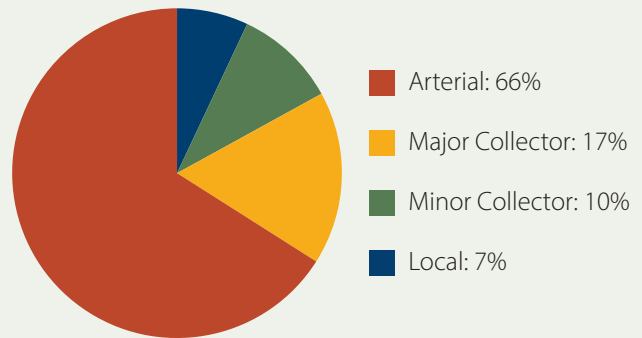


Figure C-3: Lakewood bicycle crashes 2014-2023 by roadway classification.

Intersection	# of crashes
14th Ave / Wadsworth Blvd	8
Colfax Ave / Wadsworth Blvd	7
Alameda Ave / Pierce St	6
10th Ave / Wadsworth Blvd	5
1st Ave / Wadsworth Blvd	5
Colfax Ave / Teller St	5
5th Ave / Wadsworth Blvd	5
6th Ave* / Garrison St	5
20th Ave / Carr St	4
Colfax Ave / Kipling St	4

Table C-1: Top 10 intersections in Lakewood with the most bicycle crashes from 2014-2023. * = includes intersections with frontage roads and ramps.

Bicycle Crashes by Lighting

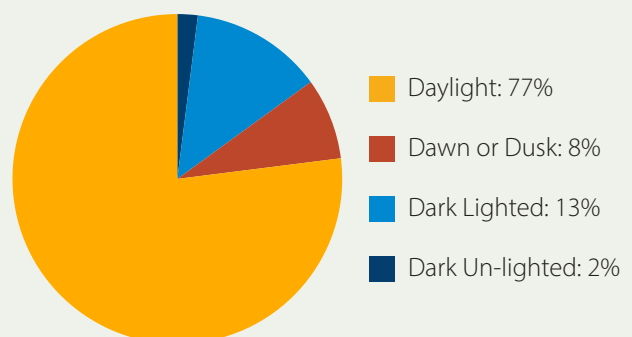


Figure C-4: Lakewood bicycle crashes 2014-2023 by lighting condition.

BICYCLE CRASHES 2014-2023

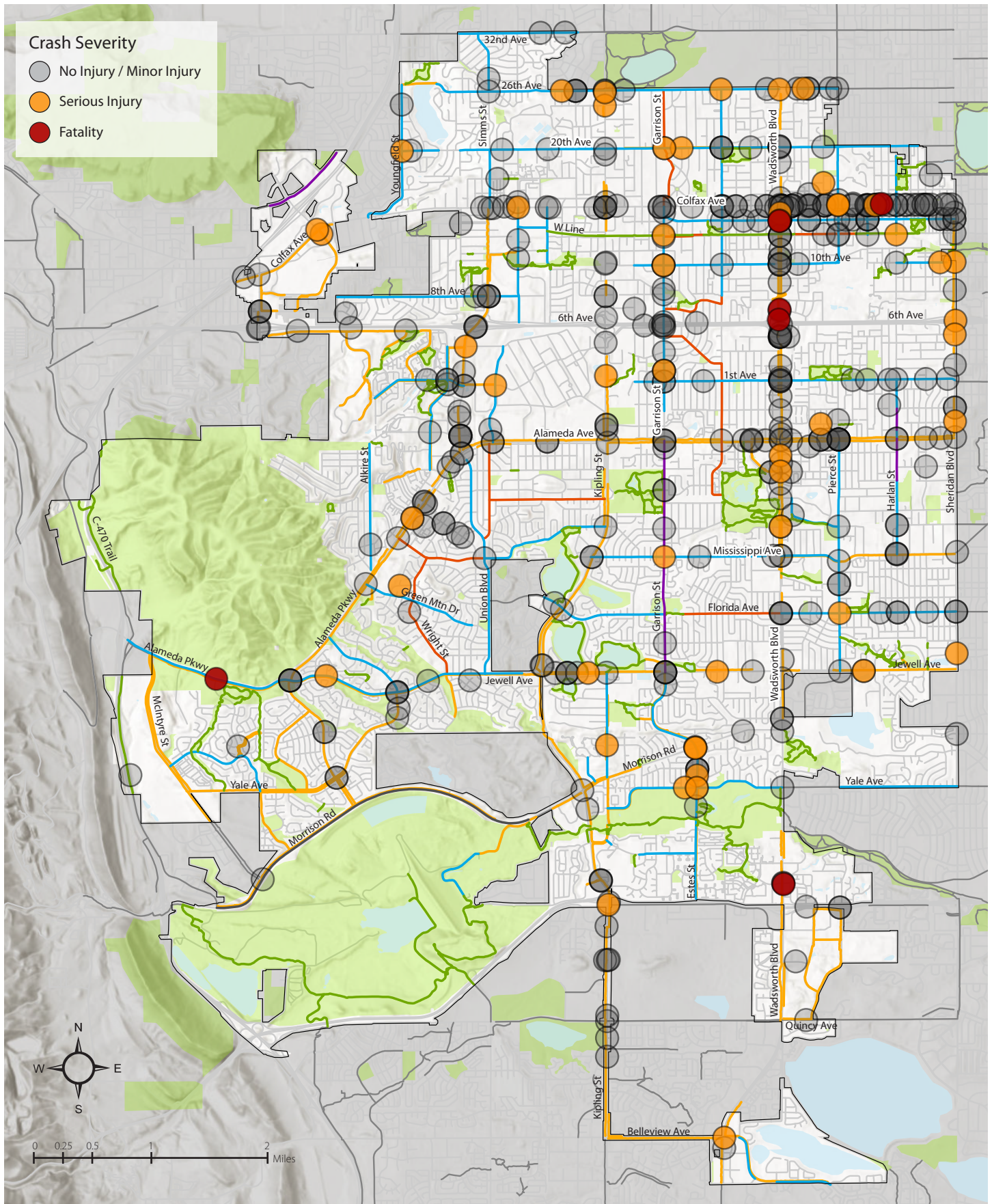


Figure C-5: Map of all 479 reported bicycle crashes in Lakewood from 2014-2023, categorized by level of severity.

Behavioral Factors

While location and environmental factors provide valuable information to understand the context of a crash, human behavior can also be one of the most important contributors to crashes. City staff recognizes the importance of understanding human behaviors that can result in crashes so that future roadway design features can mitigate those behaviors as much as possible. As seen in Figure C-6, one third of Lakewood bicycle crash reports cited the bicyclist as the at-fault vehicle, suggesting that analyzing existing infrastructure to ensure it is intuitive and convenient for bicyclists could prevent unsafe behaviors. For example, 16% of bicycle crashes in Lakewood involve a bicyclist disregarding a signal or stop sign (Figure C-7), which could prompt an examination of those devices to determine whether they are clearly visible, intuitive, and placed at appropriate intervals for multimodal travel. Similarly, crashes caused by a motorist’s failure to yield to an oncoming bicyclist when turning (a factor in 30% of bicycle crashes, see Figure C-7) could potentially be mitigated by signage, markings, or roadway designs that increase the visibility and predictability of bicycle travel on Lakewood roads. Even lawful behaviors can still result in a crash: 27% of bicycle crashes in Lakewood involve a bicyclist riding on a side path or sidewalk in the opposite direction as adjacent traffic (Figure C-7). All sidewalks in Lakewood permit two-way bicycle travel, but motorists focused on finding a gap in oncoming traffic typically do not expect bicyclists to approach from the opposite direction, so they are less likely to look for them before entering the intersection. This pattern contributed to an emphasis on providing on-street routes in the proposed network as alternatives to existing side paths (see Chapter 4 and Appendix A). These types of patterns could also guide other changes to Lakewood’s bicycle network in the future to increase visibility and predictability.

Bicycle Crashes by V1 Type

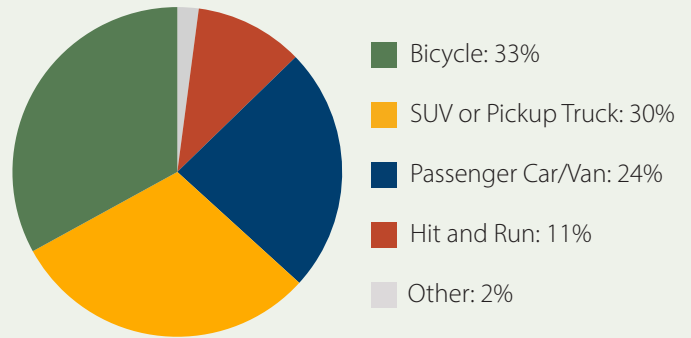


Figure C-6: Lakewood bicycle crashes 2014-2023 by reported V1 (the vehicle determined by the police to be at fault for the crash).

Actions Contributing to Bicycle Crashes

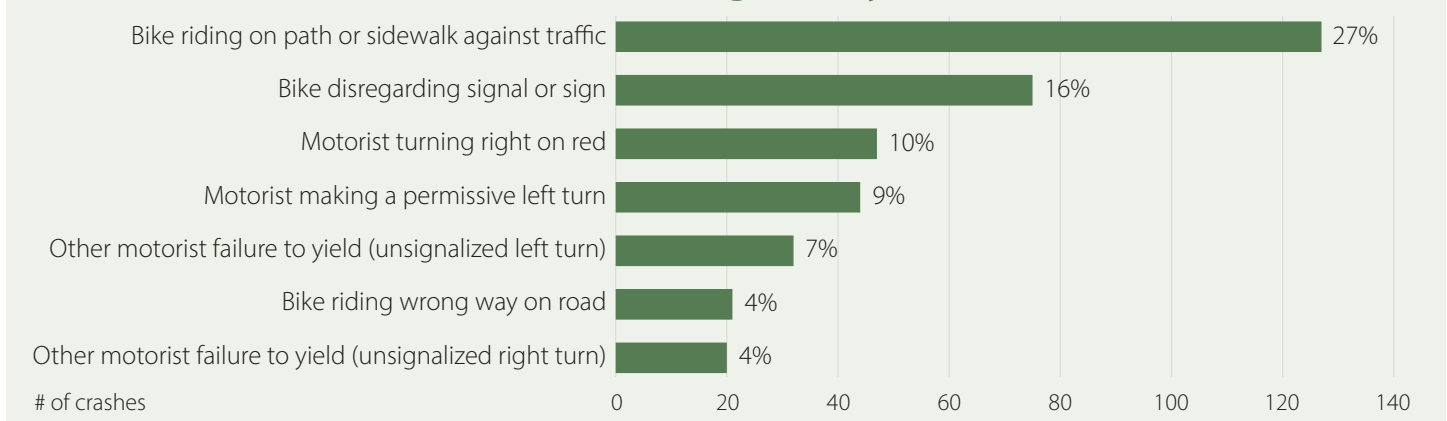


Figure C-7: Most common specific actions at the time of the crash for all Lakewood bicycle crashes 2014-2023 (regardless of vehicle reported to be at fault) as determined by an analysis of the written narratives associated with each reported crash.

When unsafe behavior cannot be attributed to roadway design, then educational campaigns, changes in legislation, and/or increased enforcement should be pursued to help prevent future crashes. Alcohol and drug impairment have increasingly contributed to crashes in Lakewood over the past 10 years, including bicycle crashes. This public health component is challenging to address and will require combined efforts from transportation professionals, public safety officers, health professionals, and local leaders.