ADOPTED JUNE 16, 2020

TAKING ACTION ON

regional vision zero

SAFER STREETS FOR METRO DENVER

drcog
DENVER REGIONAL COUNCIL OF GOVERNMENTS

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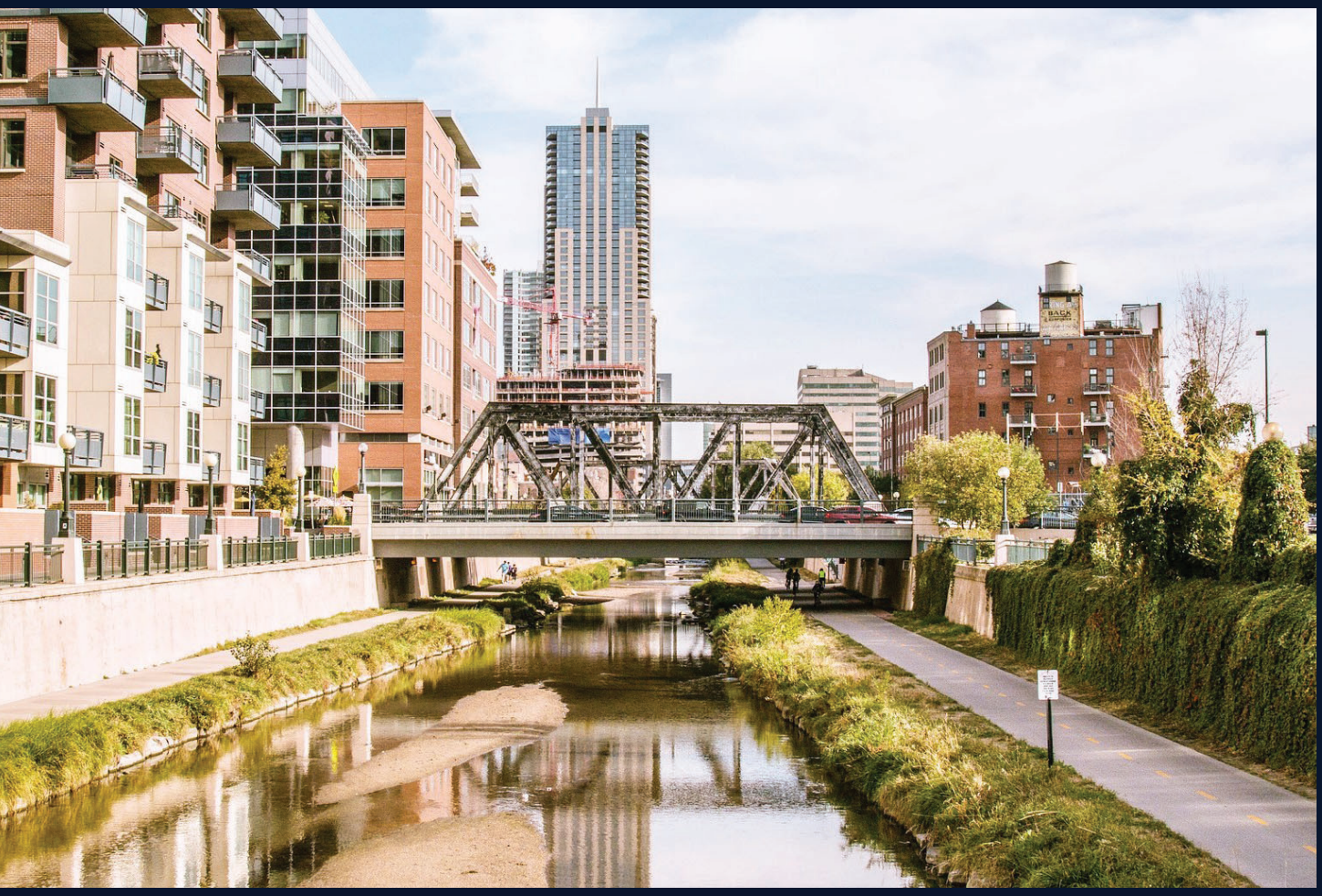


What is Vision Zero?

Vision Zero is a transportation safety philosophy based on the principle that loss of life is not an acceptable price to pay for mobility. Among those concerned with traffic safety Vision Zero has become a useful framework to eliminate traffic deaths and severe injuries in the transportation system with a proactive, preventive approach. Vision Zero recognizes that humans make mistakes and therefore the transportation system should be designed to minimize the consequences of human error. The Vision Zero approach is fundamentally different from the traditional traffic safety approach in American communities in six key ways. *Taking Action on Regional Vision Zero* establishes a target of zero fatalities and serious injuries on the Denver region's transportation system.

Source: Vision Zero Network

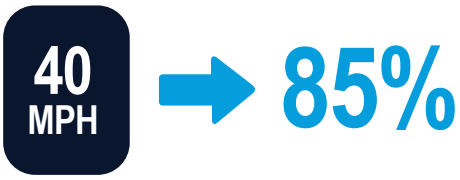
NATIONAL FATALITY STATISTICS

According to the National Highway Traffic Safety Administration, at least one driver was speeding in over **one in four fatal crashes** in the United States in 2017.

Source: Traffic Safety Facts 2017 Data, National Highway Traffic Safety Administration, May 2019

Helmets were estimated to be 37-percent effective in preventing fatal injuries to motorcycle riders and 41 percent for motorcycle passengers. In other words, for every 100 motorcycle riders killed in crashes while not wearing helmets, 37 of them could have been saved had all 100 worn helmets.

Source: Traffic Safety Facts 2017 Data, National Highway Traffic Safety Administration, May 2019



Even vehicle-vehicle crashes that happen at moderate speeds have a significant risk of fatality: **at 40 mph the risk of a fatality in a side-impact crash is up to 85 percent.**

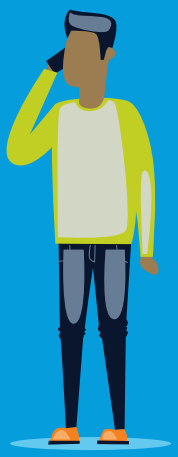
Source: Relationship between Speed and Risk of Fatal Injury: Pedestrians and Car Occupants, D.C. Richards, Transport Research Laboratory, Department for Transport: London, September 2010

According to the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, **more than half of teens (ages 13-19) and adults (ages 20-44)** who died in car crashes in the United States in 2016 were not wearing a seat belt at the time of the crash.

Source: Seat Belts: Get the Facts, Centers for Disease Control and Prevention, June 2018

Reframes traffic deaths as **PREVENTABLE.**

Integrates **HUMAN ERROR** into the approach.



Focuses on **PREVENTING FATAL AND SEVERE CRASHES** rather than eliminating all crashes.

Aims to **ESTABLISH SAFE SYSTEMS** prioritizing human life first and foremost when designing a road network.

Applies **DATA-DRIVEN** decision making.

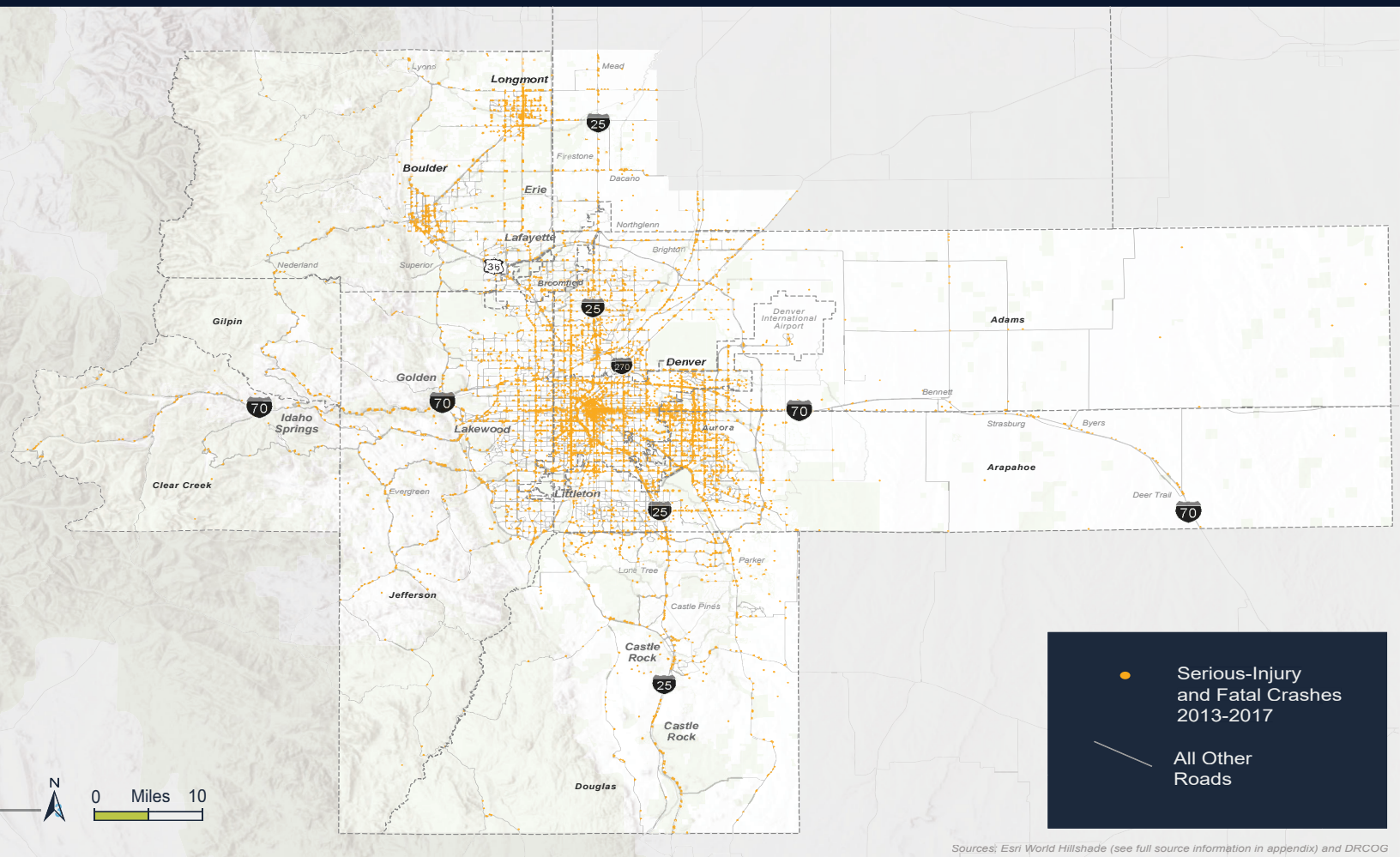
Establishes road safety as a **SOCIAL EQUITY ISSUE.**

Why the Denver Region Needs Vision Zero

The Denver Regional Council of Governments includes more than 50 local governments, each of which has an equal voice. The towns, cities and counties of the region work together to ensure the Denver region remains a great place to live, work and play.

Traffic-related deaths and severe injuries are a critical and preventable public health epidemic and social equity issue in the metropolitan Denver area. DRCOG, its member governments and its partner agencies are responsible for reducing crashes through safe systems.

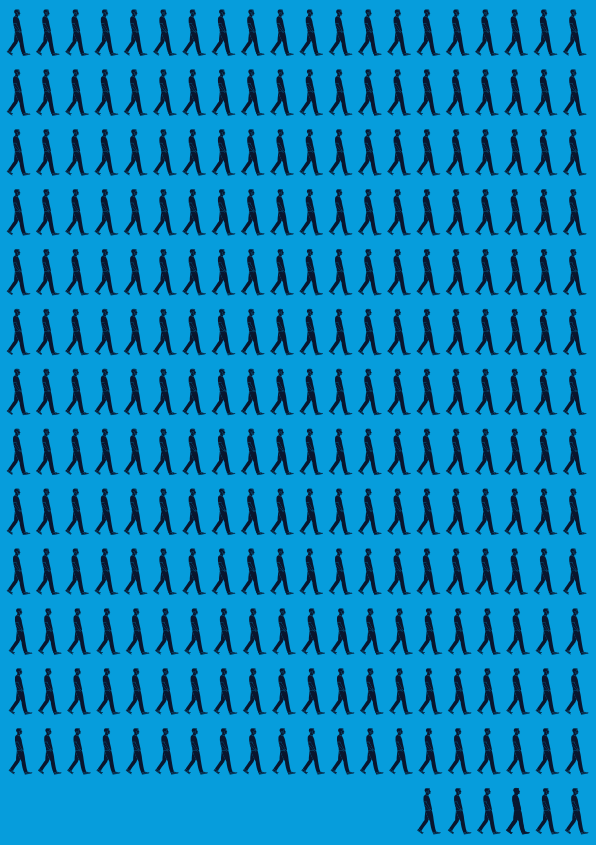
Regional Vision Zero is action-based, well aligned with other traffic safety efforts, and inclusive of and intentional with the people who use the transportation system in the Denver region.



Sources: Esri World Hillshade (see full source information in appendix) and DRCOG

CRASH HISTORY: A NEED FOR A CALL TO ACTION

DRCOG organizes crash data and provides geocoded crash information through its Regional Data Catalog. Crash data representing years 2013 through 2017 was used for the analysis in this plan.



IN 2017, 266 PEOPLE WERE KILLED IN CRASHES ON THE DENVER REGION'S STREETS AND HIGHWAYS.

In the Denver region there were nearly 8,700 crashes between 2013 and 2017 that resulted in a fatality or severe injury. The human toll of these crashes is significant:

1,149 PEOPLE DIED AND 8,827 PEOPLE WERE SERIOUSLY INJURED ON DENVER REGION ROADWAYS DURING THIS FIVE-YEAR PERIOD.

Engineering countermeasures could have prevented many of these crashes.

The following figures illustrate fatality trends, reinforcing the need for a coordinated regional effort to reduce fatal and severe injury crashes.

During this plan's development, complete crash data was available through the end of 2017. Early investigation of 2018 and 2019 data revealed similar trends.

DENVER REGION FATALITY TRENDS

Figure 1 shows the number of fatalities by travel mode between 2000 and 2017. Since bottoming out in 2008, the annual number of fatalities in the Denver region has been on the rise.

Figure 1. Fatalities by Travel Mode Between 2000 and 2017

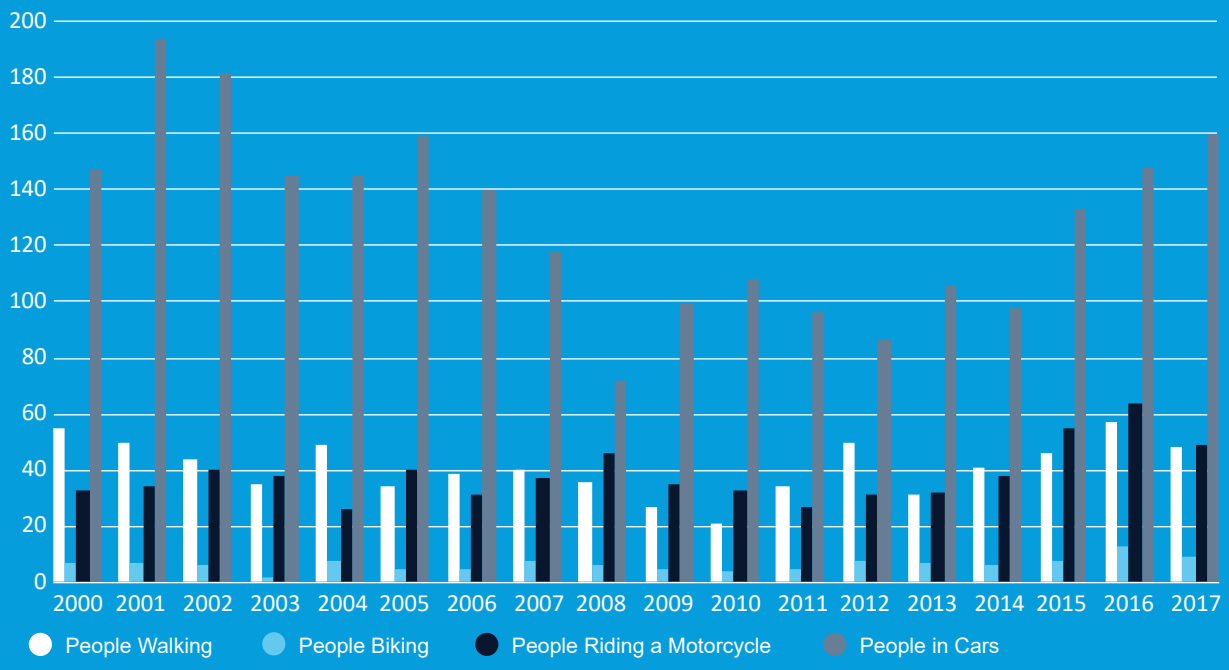


Figure 2 shows the number of fatalities by travel mode per 100,000 residents between 2000 and 2015. In recent years both the number of fatalities and the rate of fatalities for certain travel modes, such as people in cars, have been increasing.

Figure 2. Fatalities by Travel Mode per 100,000 Residents Between 2000 and 2015

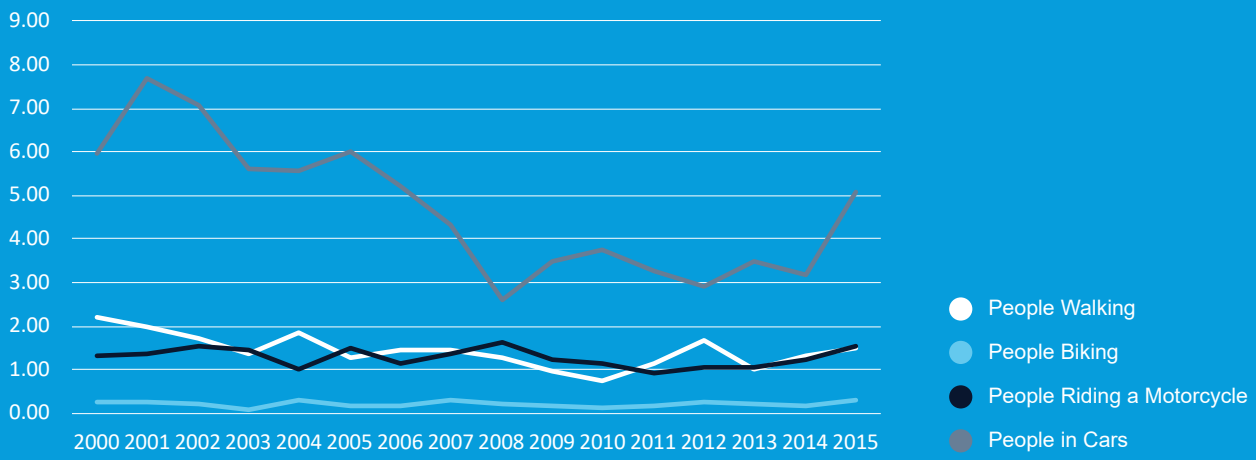


Figure 3 shows the percentage of all crashes, including noninjury and minor injury crashes, by travel mode based on 2013 through 2017 data. People in cars are involved in the vast majority, almost 95 percent, of all crashes.

Figure 3. Percent of All Crashes by Travel Mode Between 2013 and 2017

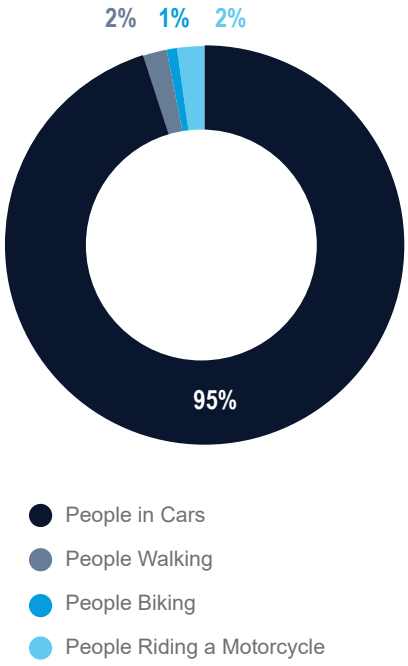
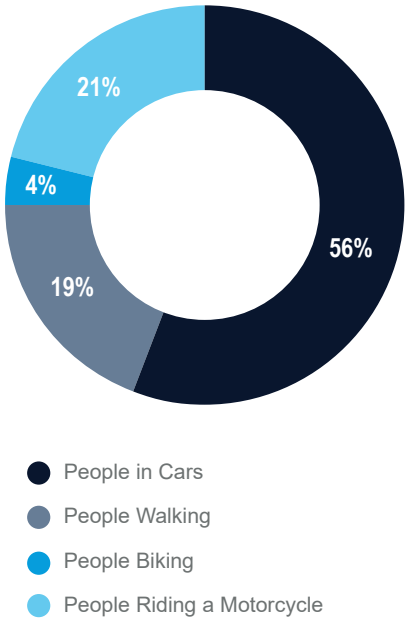


Figure 4 shows the percentage of fatal crashes by travel mode based on 2013 through 2017 data. In comparison to Figure 3, while the overall percentage of crashes involving people walking, biking or riding a motorcycle is small (approximately 5 percent total), the percentage of fatal crashes involving these travel methods is disproportionately high: 21 percent of fatal crashes involve a person riding a motorcycle, 19 percent involve a person walking and 4 percent involve a person biking.

Figure 4. Percent of Fatal Crashes by Travel Mode Between 2013 and 2017



Reducing crashes involving people walking, biking or riding a motorcycle is critical to reducing all fatal and serious-injury crashes and increasing the number of people who walk or bike as their travel mode. A survey conducted for DRCOG's Active Transportation Plan found that 59 percent of respondents are interested in biking but concerned about their safety.

Vision Zero Principles: Complete Streets, Safe Speeds and Equity

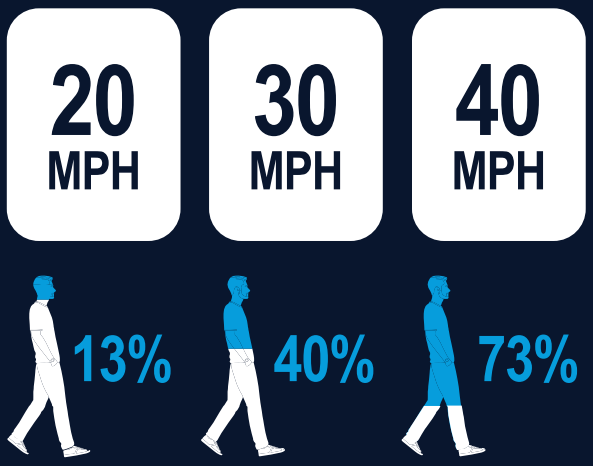
COMPLETE STREETS

The percentage of people who travel by walking or biking is relatively small, and most crashes involve people in cars; however, the percentage of fatal crashes involving people walking or biking is disproportionately high. ***While only 14 percent of trips in the Denver region are made by walking and biking, people walking and biking are involved in 24 percent of the region's fatal crashes.***

Source: DRCOG's Focus Travel Model, 2020

The Vision Zero approach is to design Complete Streets that accommodate people using all methods of transportation, prioritizing safe travel for all users over expeditious travel of motor vehicles.

PEDESTRIANS HIT BY A VEHICLE TRAVELING AT



LIKELIHOOD OF FATALITY OR SERIOUS INJURY

CONTEXT-APPROPRIATE SPEEDS

As crash speed increases, the likelihood of a severe injury or fatality also increases, especially for people walking and biking. For example, research completed by the AAA Foundation for Traffic Safety shows that the likelihood of a fatality or severe injury is 13 percent for a person walking struck by a vehicle traveling at 20 miles per hour, but this likelihood increases to 40 percent at 30 miles per hour and 73 percent at 40 miles per hour.

Source: Impact Speed and a Pedestrian's Risk of Severe Injury or Death, AAA Foundation for Traffic Safety, September 2011

The Vision Zero approach is to design and operate roads to achieve context-appropriate vehicle speeds that protect all roadway users.

EQUITY

Disadvantaged communities are disproportionately affected by traffic safety issues. Often, this results from a combination of streets not designed for all users or streets designed for high vehicle operating speeds traveling through areas otherwise affected by a combination of economic, health and environmental burdens where people are more likely to walk or bike. In the Denver region, 41 percent of the regional High-Injury Network occurs in areas with higher than average numbers of households in poverty and minority populations.

Source: DRCOG

The Vision Zero approach is to prioritize Complete Streets and roadway design and operation projects in disadvantaged communities, and to show empathy in enforcement of behaviors in disadvantaged communities.

Engaging the Community for a People-First Plan

Achieving the goal of Vision Zero involves everyone. Engaging local communities, stakeholders and the public across the Denver region was critical to the development of the plan and continued engagement is necessary for successful plan implementation.

Throughout plan development, DRCOG invited local communities to provide input through the regional Vision Zero Stakeholder Committee. The committee consisted of staff from local jurisdictions, two representatives for each county within DRCOG and partner agencies. The committee met multiple times throughout plan development and provided insight and feedback, assisted in developing outreach messaging and strategies, and helped develop goals and action initiatives to ensure future plan implementation.

To solicit input from the public to help identify primary traffic concerns in the region, DRCOG released an online survey, publicized in English and Spanish, from the beginning of August 2019 to the end of October 2019. To assist in reaching the large diverse area within DRCOG, paid social media advertising was used to promote the survey. The ads received nearly 475,000 impressions and more than 5,600 people clicked on the ads resulting in over 3,300 survey submissions.

DRCOG also released an online interactive map to accompany the survey, shown in **Map 1**. The map enabled the public to locate specific traffic safety concerns throughout the Denver metro area. Respondents could also express their agreement with others' posted concerns through the mapping application by liking the comment. In all, respondents identified more than1,000 locations were identified with concerns in the region, as well as 900 additional likes of 436 of the others' comments.

Simultaneous to the survey and map, DRCOG created and released a Regional Vision Zero video to bring awareness to traffic deaths in the Denver region. The video has been well received and has assisted in setting the tone and intent of Regional Vision Zero.

The Regional Vision Zero Stakeholder Committee reviews the draft regional High-Injury Network maps.

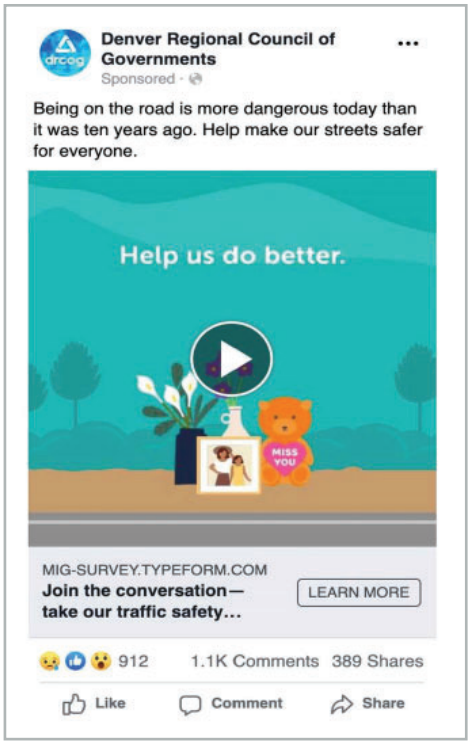
Residents identify the locations of safety issues at the Colorado Classic Open Streets Event.

DRCOG conducted local agency meetings throughout the region, including at the Jefferson County offices.

ADDITIONAL OUTREACH

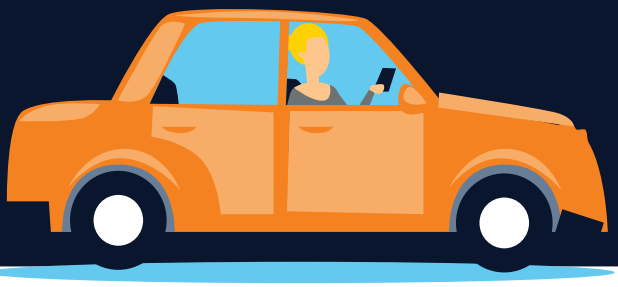
To supplement online outreach, staff attended the Colorado Classic Open Streets Event on Aug. 25. The booth included an oversized map of the region and, like the interactive online map, allowed attendees to identify traffic concerns in specific locations.

To reach more regional stakeholders, DRCOG staff and the consultant team held four local agency meetings in early November throughout the region to solicit input on the draft regional High-Injury Network, crash profiles, countermeasures, and action initiatives. DRCOG staff invited representatives from advocacy groups and local government staff, including planners, engineers, public works and public school employees and law enforcement personnel, to meetings in Denver, Bennett, Jefferson County and Longmont. The local representatives who attended provided direction to guide further work on the plan.



The roadside memorial video was the top performing social media ad for both English and Spanish language ads.

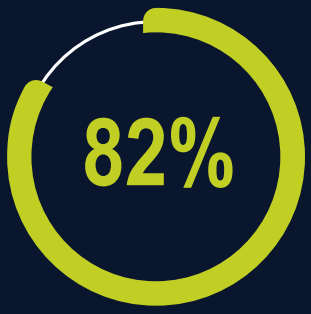
REGIONAL VISION ZERO ONLINE SURVEY RESULTS



DISTRACTED DRIVING WAS, BY FAR, THE TOP TRAFFIC SAFETY CONCERN IN THE DENVER REGION.

Speeding, red light and stop sign running, and unsafe turning or lane changing were the most significant concerns.

Prioritizing safe travel of people over expeditious travel of motor vehicles is a core Vision Zero strategy:

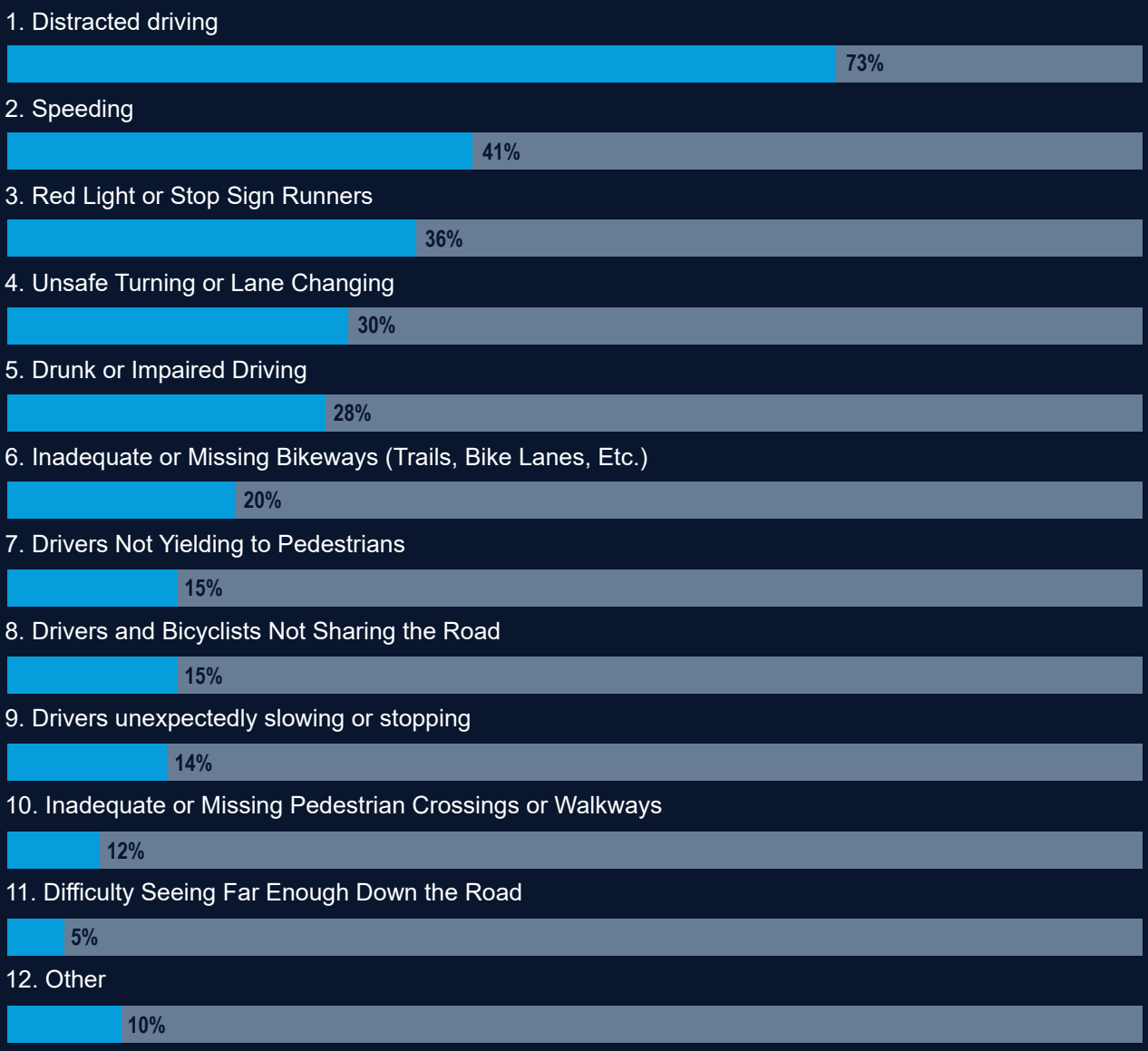


82% OF RESPONDENTS WERE WILLING TO ADD ONE OR MORE MINUTES TO THEIR COMMUTE TO IMPROVE SAFETY.

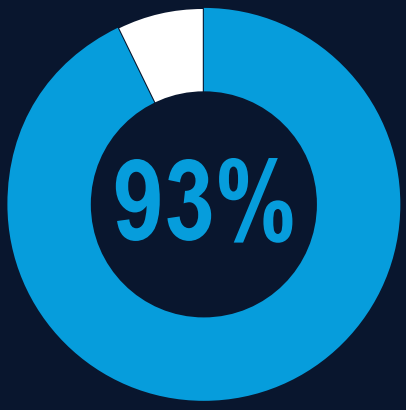
50 PERCENT WERE WILLING TO ADD FIVE TO 10 MINUTES TO THEIR COMMUTE TO IMPROVE SAFETY.

Figure 5.

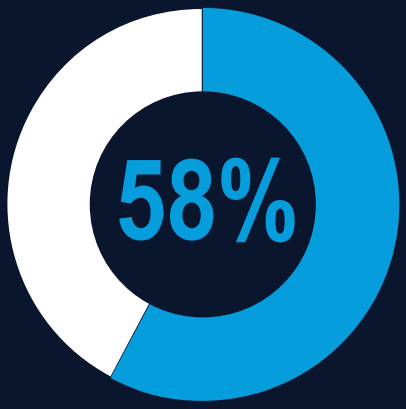
WHAT ARE YOUR TOP THREE TRAFFIC SAFETY CONCERNS IN THE DENVER REGION?



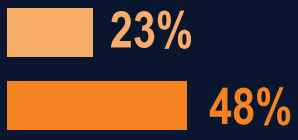
Source: Survey for DRCOG's Regional Vision Zero, administered in fall 2019



OF RESPONDENTS SAID TRAFFIC SAFETY IS EITHER THEIR TOP CONCERN OR IS IMPORTANT RELATIVE TO OTHER ISSUES IN THE DENVER REGION



INDICATED THAT THEY KNOW SOMEONE WHO HAS BEEN HOSPITALIZED OR KILLED AS A RESULT OF A TRAFFIC CRASH.



Only 48 percent of English-language survey respondents and only 23 percent of Spanish- language survey respondents

WOULD CONTACT THE POLICE WITH A TRAFFIC SAFETY CONCERN.

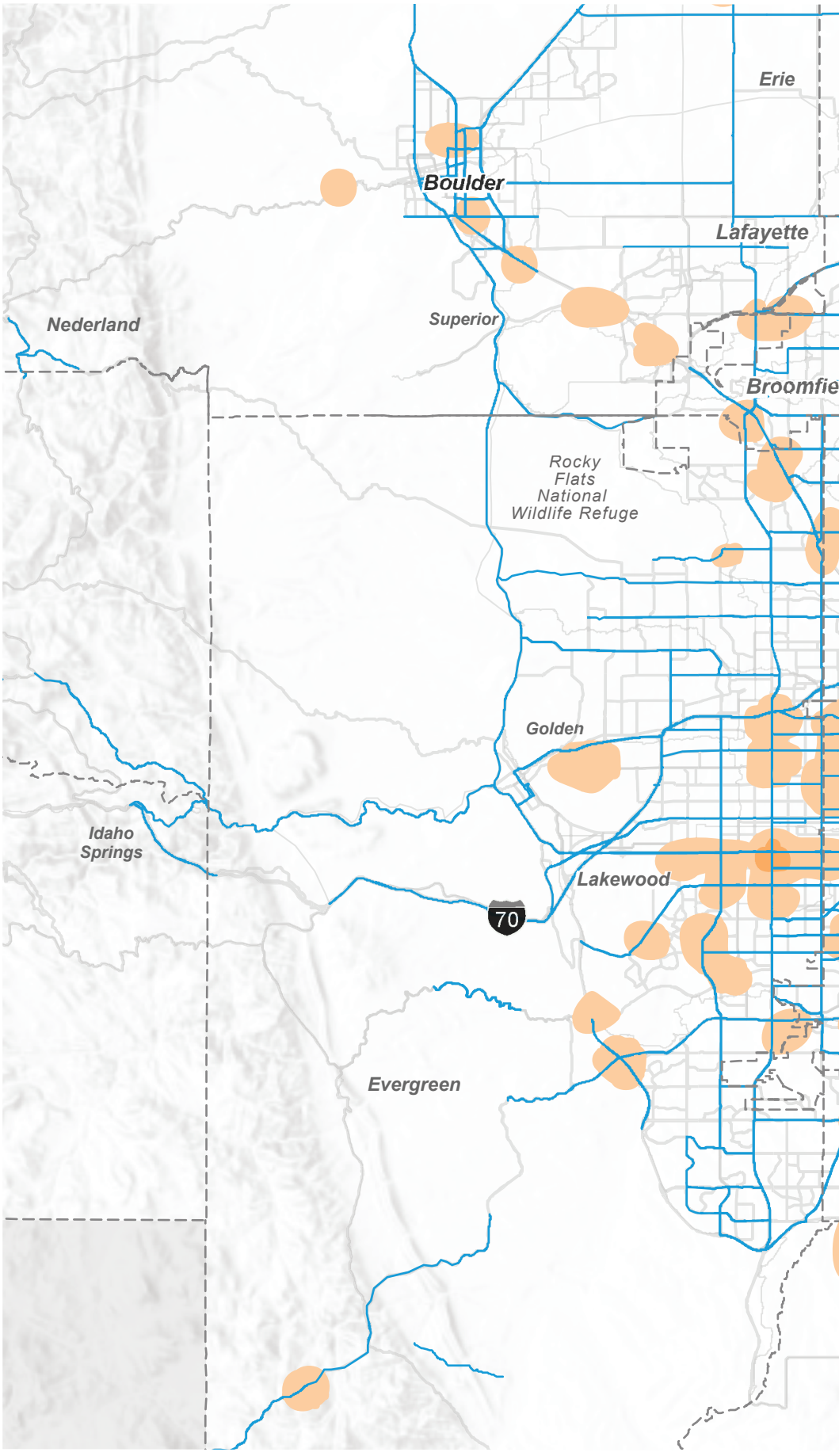
75 percent of English-language survey respondents and 87 percent of Spanish-language survey respondents

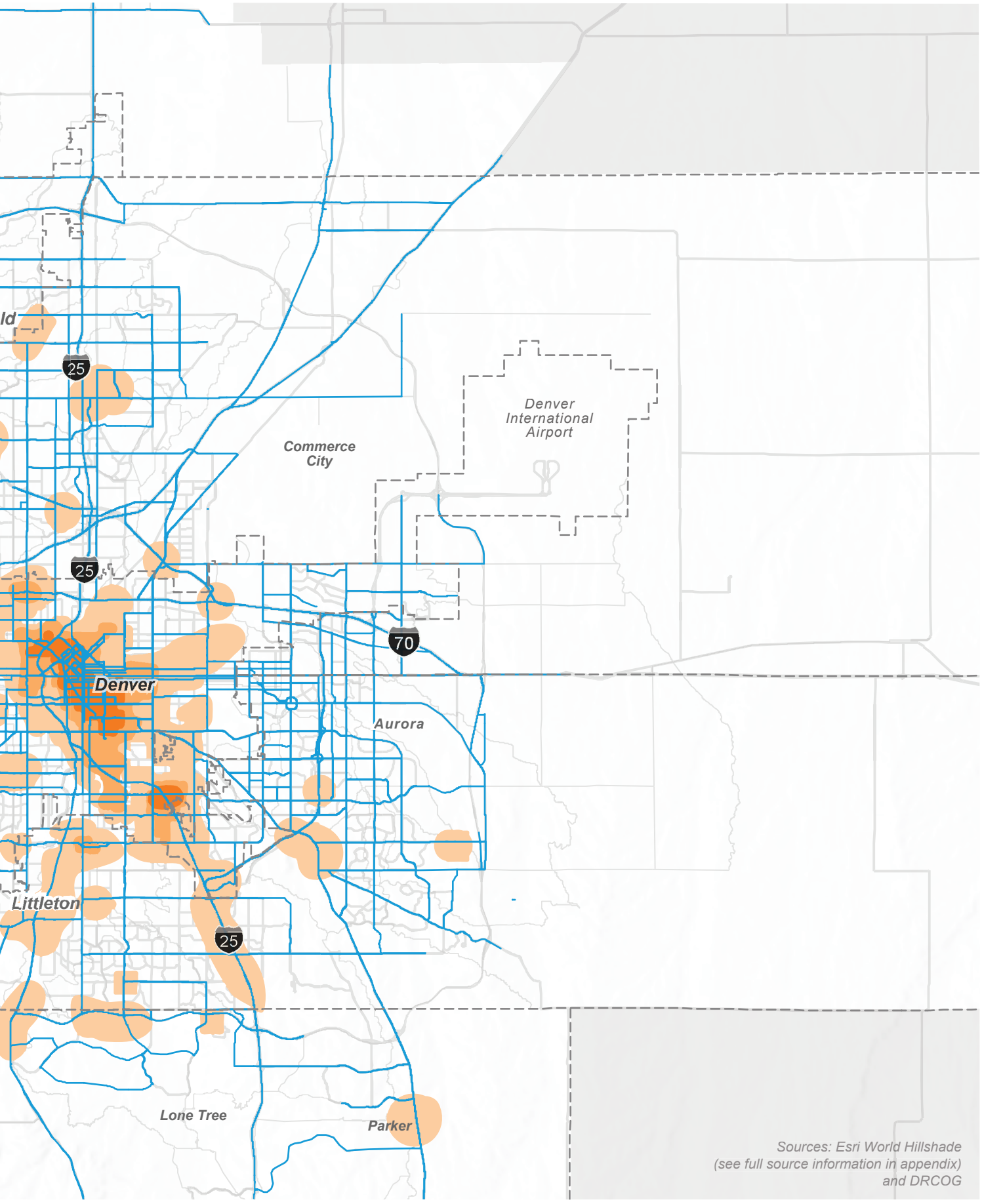
DO NOT KNOW WHO TO CONTACT, BESIDES THE POLICE, WITH A TRAFFIC SAFETY CONCERN.

Map 1. Summary of Regional Vision Zero Web Map Feedback

To gather feedback, an interactive web map was live from August to October 2019. The map gathered more than 1,100 comments, identifying locations where people had traffic safety concerns such as speeding issues, inadequate pedestrian or bicycle facilities and yielding or lane changing. **Map 1** shows how locations identified by the public overlap with the data driven draft regional High-Injury Network included in the regional Vision Zero toolkit.

Moving forward, local communities and the residents of the DRCOG region will continue to be critical to implement the plan, from community-based grants to project-level engagement and education campaigns.

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Lone Tree
Parker
Sources: Esri World Hillshade
(see full source information in appendix)
and DRCOG

Regional Vision Zero Toolkit: How to Use This Plan

DRCOG values local adoption and implementation of Vision Zero. This section describes how local governments can use this plan to join the effort of achieving zero serious injuries or deaths in the Denver region.

HOW TO USE THIS PLAN

Local governments may use this plan as a toolkit of resources that can be endorsed or customized to encourage Vision Zero adoption and local safety action plan development. Ideally, local governments will use this plan to work strategically to eliminate serious-injury and fatal crashes. The key information for each local government includes:

• **Regional High Injury Network –** Included in this plan is the Regional High-Injury Network the 9 percent of roads in the region where the majority of serious-injury and fatal crashes occur. The regional High-Injury Network also identifies critical corridors, which were selected by isolating the regional High- Injury Network by county and finding the highest-density corridors for serious-injury and fatal crashes along the regional High-Injury Network for each county. When locally owned and maintained, these roads may become priorities for safety improvements by local governments. Local governments can use the Regional High-Injury Network to identify places to support CDOT in traffic safety improvements through their jurisdictions. In developing a local Vision Zero plan, a local government can develop its own high-injury network through the use of more detailed local crash data, modify the regional High-Injury Network presented in this plan, or adopt the regional High-Injury Network within their communities.

• **Crash Profiles, Behavior Profiles and Countermeasures –** Crash profiles by area type provide information to local governments on crash types that are most frequently contributing to serious-injury and fatal crashes in their jurisdictions. The crash profiles and corresponding countermeasure glossary suggest potential countermeasures that local governments and their partners can use to reduce these types of crashes. To apply these crash profiles, a local government can identify the area types relevant in its jurisdiction and target reduction of key crash profiles by implementing recommended countermeasures in high-priority locations (such as on the regional High-Injury Network). Whereas the crash profiles vary by area type, the behavior profiles apply in all area types. Education and encouragement initiatives can promote behavior changes that reduce severe injury and fatal crashes across the region.

• **Local Adoption –** this plan suggests how local adoption of a Vision Zero goal, Vision Zero planning or other strategic safety efforts can contribute to the elimination of crashes in which people are killed or seriously injured across the region.

Regional High-Injury Network

The principles of regional Vision Zero prioritize data use in decision making. DRCOG, along with CDOT and local governments, tracks, analyzes and reports on traffic safety issues within the Denver region. DRCOG organizes crash data and provides geocoded crash information through its Regional Data Catalog. Crash data from 2013 through 2017 was used to analyze the locations of fatal and serious-injury crashes in the region to gain an understanding of the causes of these crashes and identify priority locations for safety improvements in the Denver region.

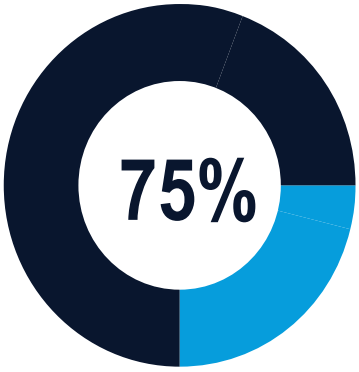
The Regional High-Injury Network identifies the roadways with the highest numbers of fatal and serious-injury crashes (also known as killed and severely injured crashes, or “KSI” crashes). There are more than 15,000 roadway miles in the Denver region, but KSI crashes disproportionately occur on just a small percentage of these roads. DRCOG, CDOT and local governments can use the Regional High-Injury Network to focus safety improvements, education and enforcement at locations where the most serious crashes happen with the greatest frequency.

The Regional High-Injury Network was developed by identifying the road segments with the highest KSI crash density, then the network was connected by adding links based on proximity to high crash density segments and road segment continuity. The High-Injury Network was further refined by filtering for isolated segments with lower KSI crash density. Lastly, the network was throughly reviewed by the Regional Vision Zero Stakeholder Committee and again at local agency meetings held throughout the Denver region. All relevant stakeholder comments were used to edit the regional High-Injury Network to reflect local context and subjective knowledge of areas of particular safety concern. The public comments collected from the interactive map were also taken into account, locations where multiple users had indicated safety concerns were further analyzed and added to the network as appropriate.

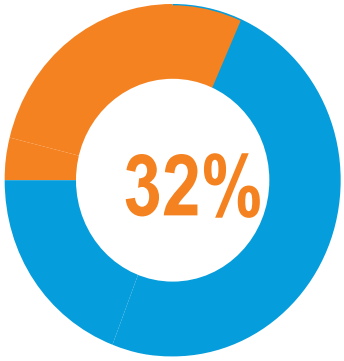
The critical corridors were developed from the regional High-Injury Network. Each of the 10 counties within the DRCOG boundary were analyzed separately to ensure the corridors were dispersed regionally. For each county the critical corridors identify the top 50 percent of KSI crash density corridors along the regional High-Injury Network.

Map 2 (on page 21) shows the draft Regional High-Injury Network developed for Taking Action on Regional Vision Zero.

Statistics

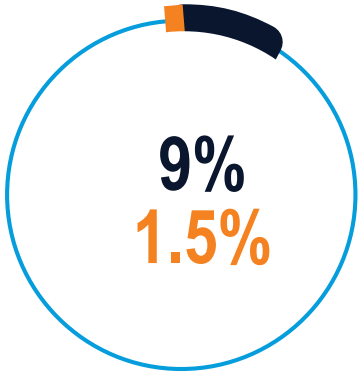


OF FATAL AND SERIOUS-INJURY CRASHES IN THE DENVER REGION ARE INCLUDED ON THE REGIONAL HIGH-INJURY NETWORK

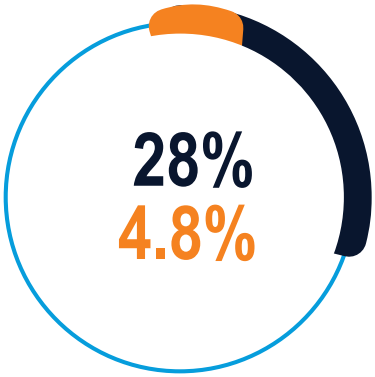


OF FATAL AND SERIOUS-INJURY CRASHES ARE INCLUDED ALONG CRITICAL CORRIDORS

The network includes:

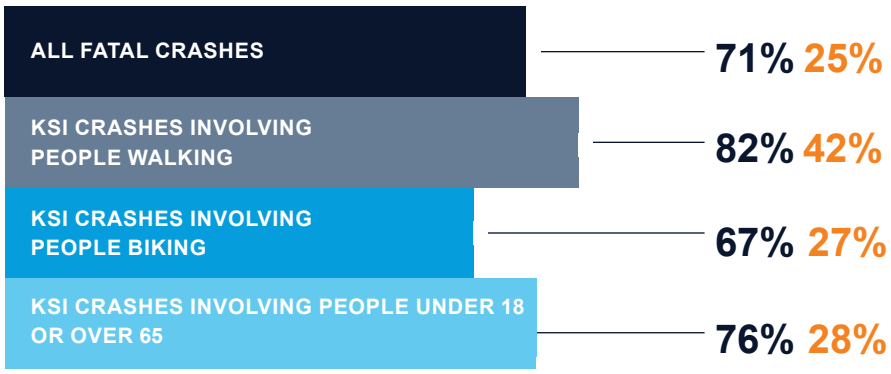


OF ALL ROADS IN THE DENVER REGION



OF HIGHWAYS AND MAJOR ROADS IN THE DENVER REGION

The Regional High-Injury Network and Critical Corridors capture:

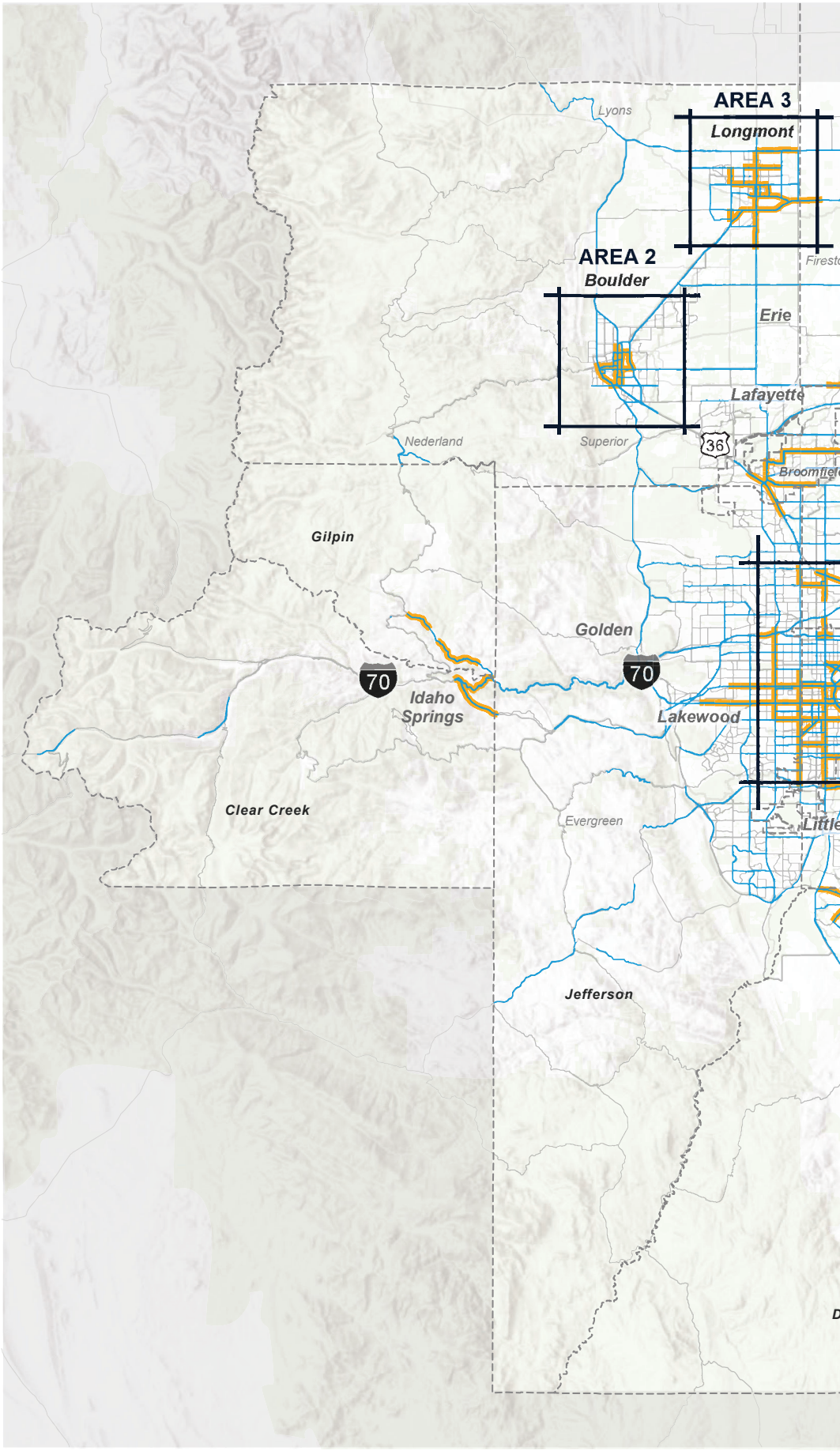


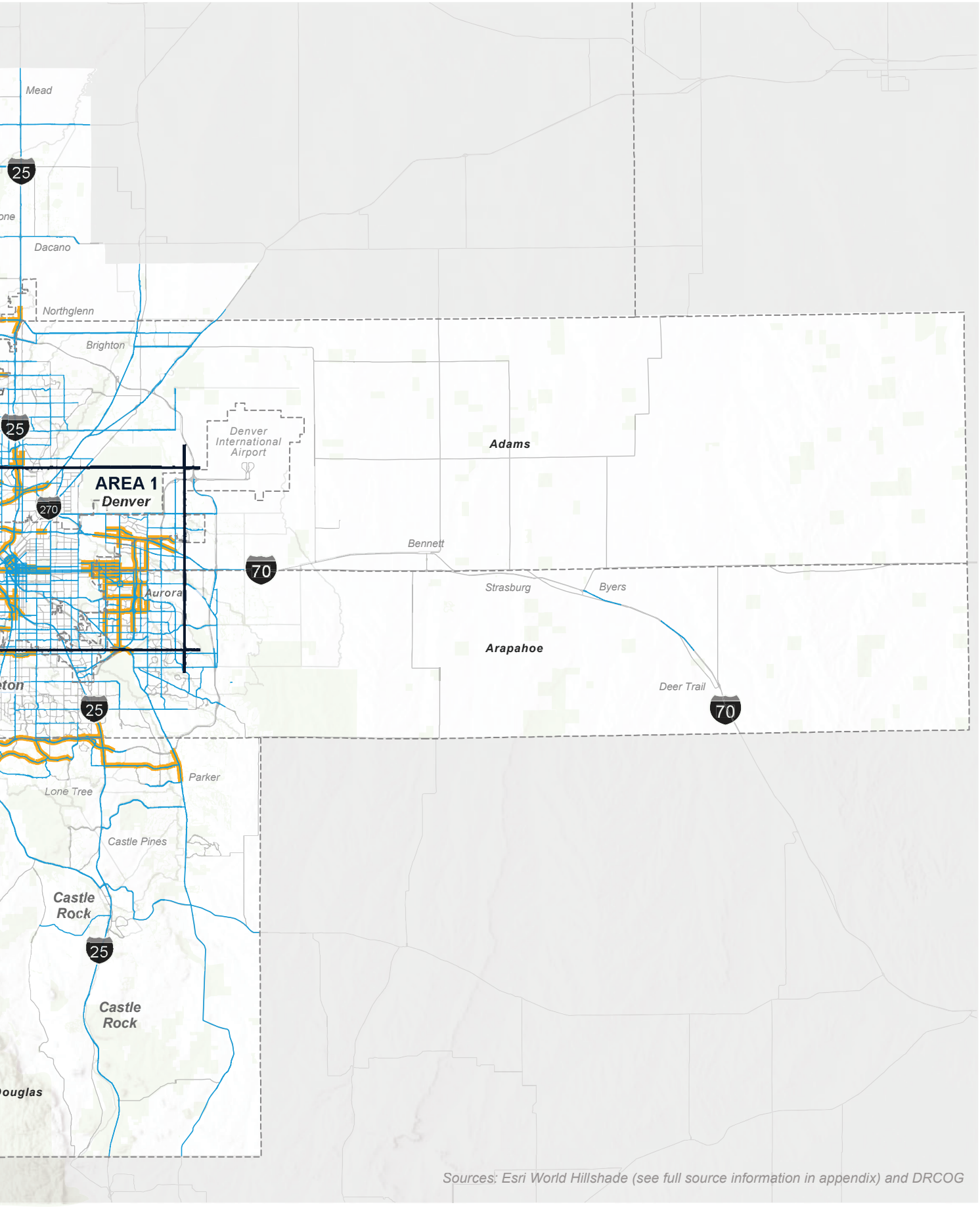
Map 2. Regional High-Injury Network

The Regional High-Injury Network was developed by identifying segments with the highest density of crashes in which people were killed or seriously injured in the DRCOG region.

To further hone in on some of the most dangerous areas on the Regional High-Injury Network, DRCOG staff conducted additional analysis for each county to identify critical corridors along the Regional High-Injury Network.

To make it easier for local jurisdictions to view the regional High Injury Network, DRCOG staffhas created an interactive map. Please use this tool to zoom into specific areas and get more detail such as local street names. The interactive map also includes additional layers that relate to the regional High Injury Network such as vulnerable populations. Please use this link to view the interactive map: Regional High-Injury Network.

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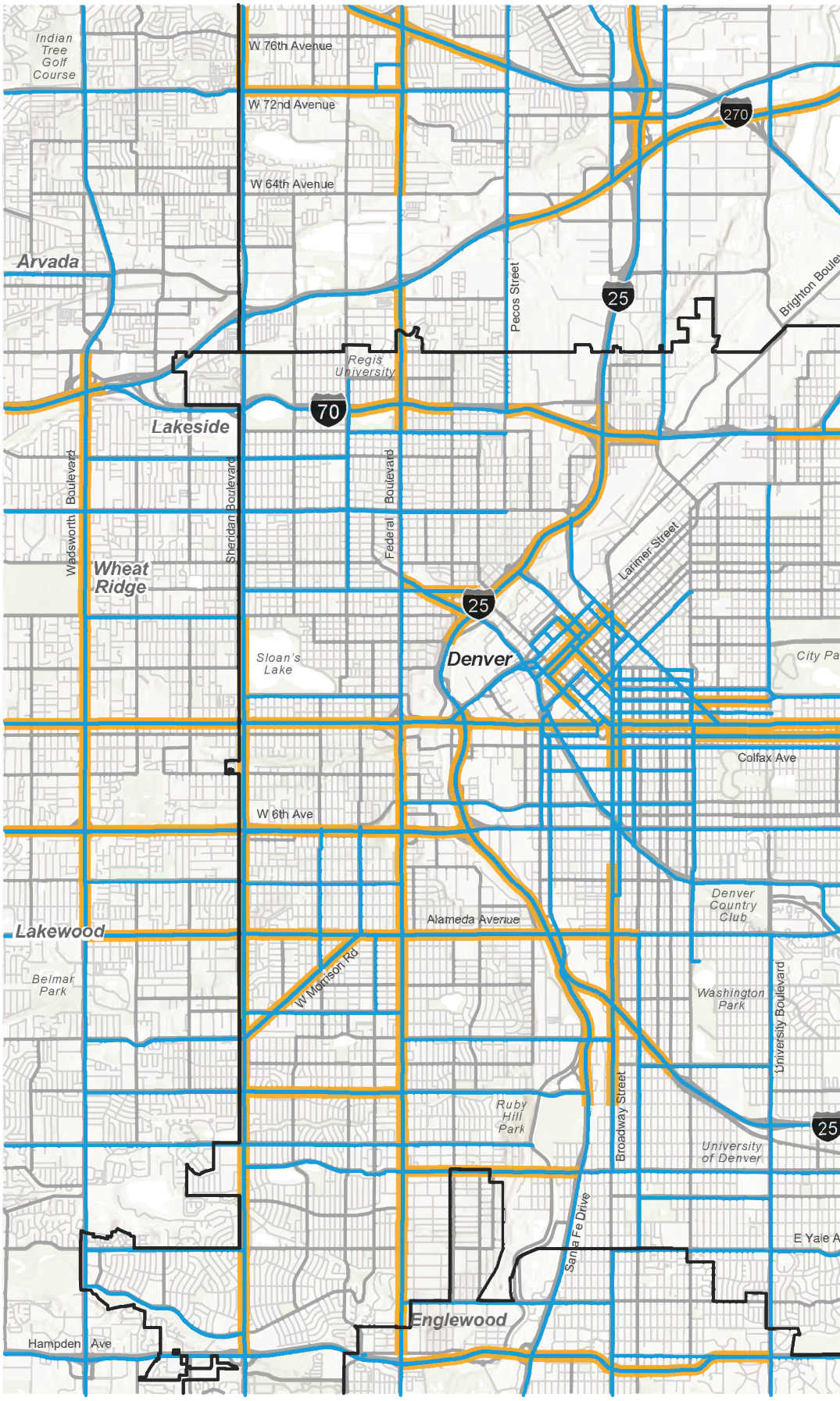
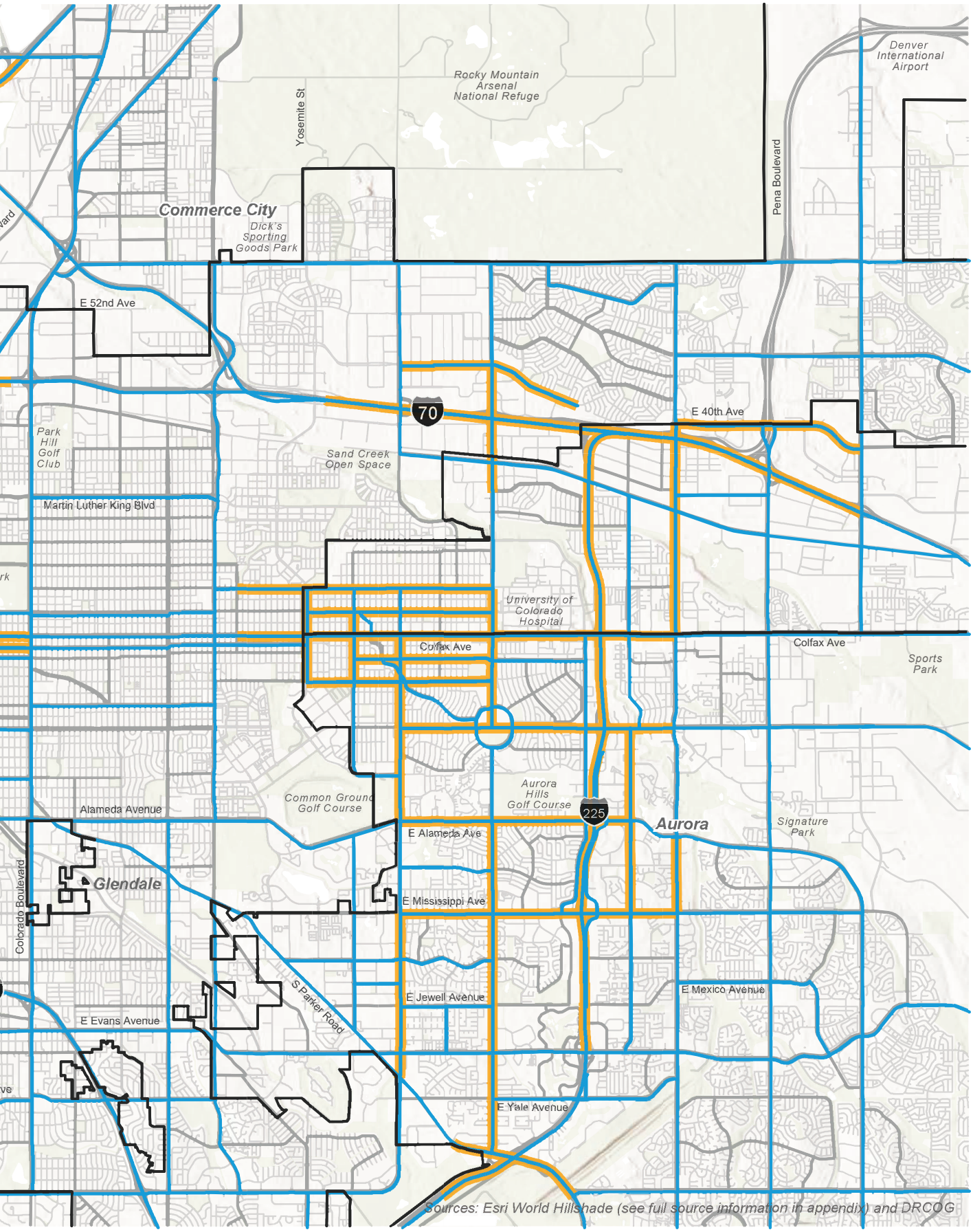
Castle Rock
Sources: Esri World Hillshade (see full source information in appendix) and DRCOG

Please use this link to view the interactive map:
Regional High-Injury Network

Map 3. Regional High-Injury Network Denver/Aurora

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Denver International Airport
Yosemite St
Pena Boulevard
Commerce City
Dick's Sporting Goods Park
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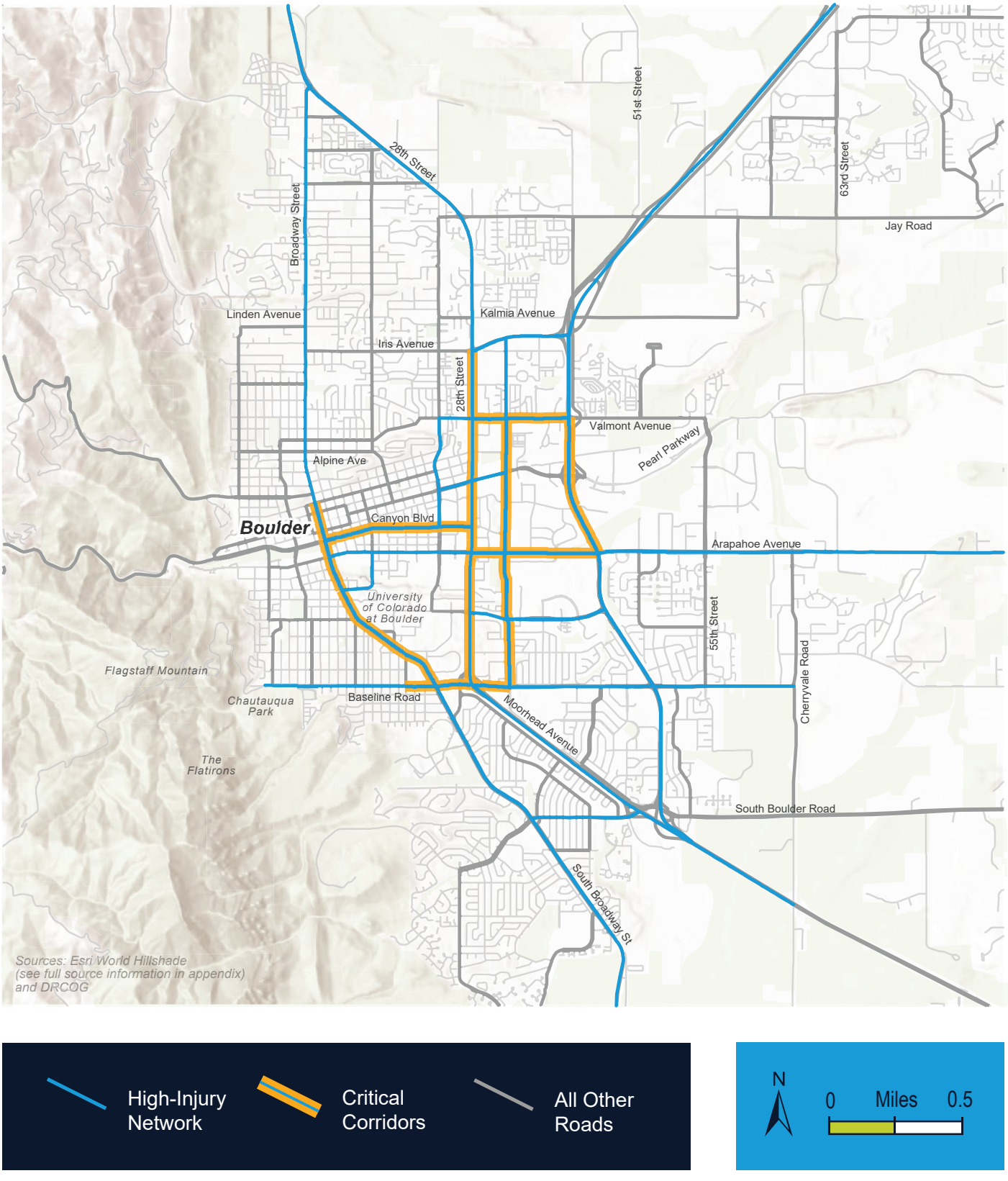
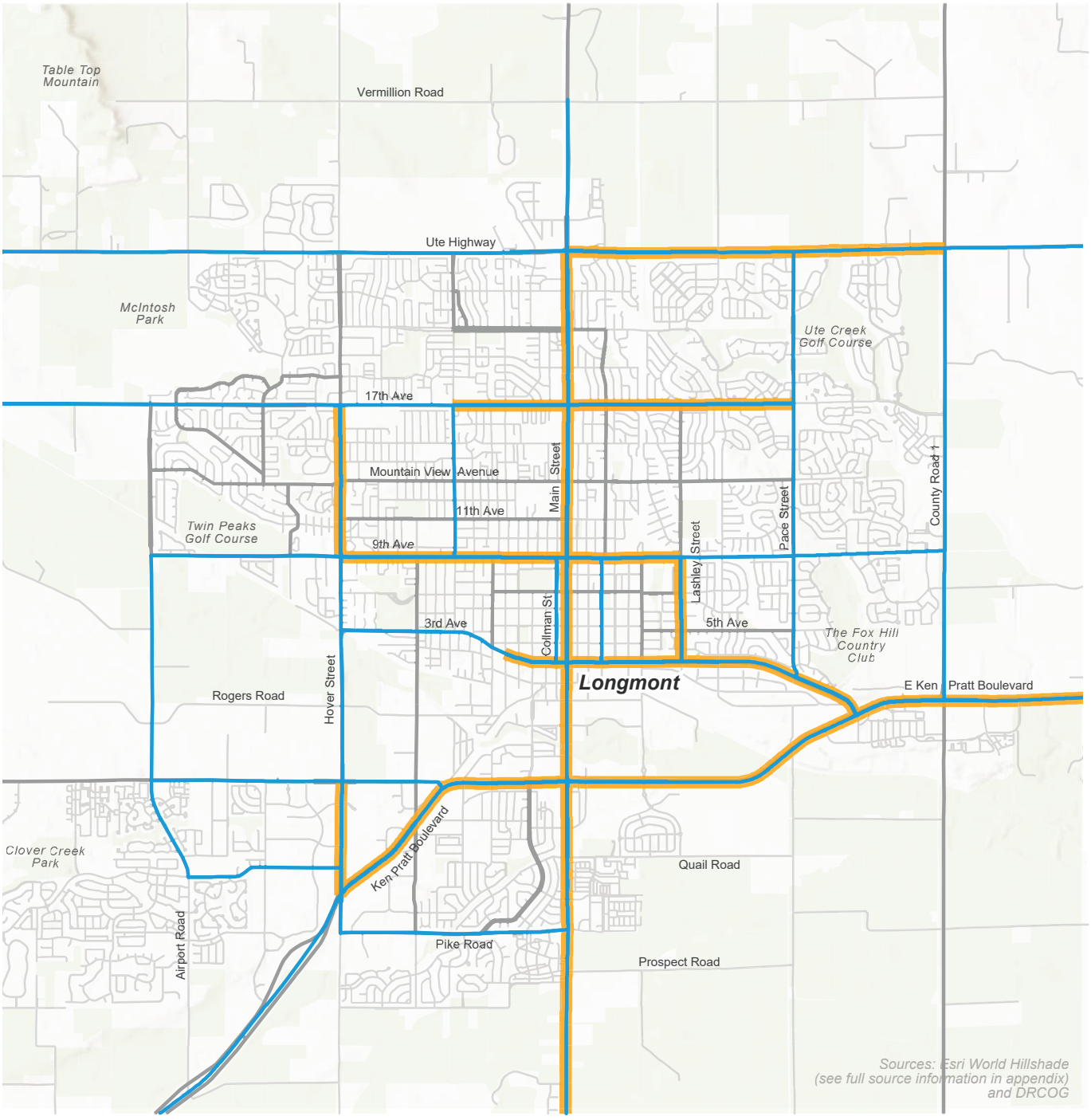
E 40th Ave
Park Hill Golf Club
Sand Creek Open Space
Martin Luther King Blvd
University of Colorado Hospital
Colfax Ave
Colfax Ave
Sports Park
Aurora Hills Golf Course
225
Aurora
Signature Park
Common Ground Golf Course
Alameda Avenue
E Alameda Ave
Glendale
Colorado Boulevard
E Mississippi Ave
S Parker Road
E Jewell Avenue
E Mexico Avenue
E Evans Avenue
E Yale Avenue
Sources: Esri World Hillshade (see full source information in appendix) and DRCOG

Map 4. Regional High-Injury Network Boulder



Please use this link to view the interactive map: Regional High-Injury Network

Map 5. Regional High-Injury Network Longmont



Please use this link to view the interactive map: Regional High-Injury Network

Crash Profiles, Behavior Profiles and Countermeasures

Crash profiles describe the most frequently occurring crash types that result in fatalities or severe injuries in the Denver region. By analyzing KSI crash data for the Denver region from 2013 to 2017, crash profiles were created according to area type. DRCOG and local governments have the greatest opportunity to reduce fatal and severe injury crashes across the region through application of countermeasures, actions and policies that address the crash profiles.

Crash profiles describe the specific events that occurred in a crash. Behavior profiles describe human behavior that may have led to a crash. Vision Zero seeks to integrate human failure into the approach to roadway design and operation. The infrastructure countermeasures provided for each crash profile can contribute to a safe system that integrates human failing. Though not reliant on communications and campaigns to change human behavior, Vision Zero communities still use these efforts. The behavior profiles are intended to inform communications and campaigns across the Denver region, not become a substitute to creating safe systems.

The potential countermeasures presented in this section are strategies with a documented crash reduction factor or otherwise recognized as a best practice for addressing certain crash types. Given the broad nature of the crash profiles and crash mechanisms/patterns, the lists of potential countermeasures are intentionally broad. Further engineering analysis should consider additional relevant design guidance in selecting the most appropriate countermeasures.

AREA TYPES

Given the diversity of roadways, land use contexts and roadway users, and the varying types of crashes that occur in the Denver region, the region was divided into four area types. The crash analysis was performed by area type to identify a distinct set of crash profiles and countermeasures for each of the four area types. **Map 6** shows the four area types.

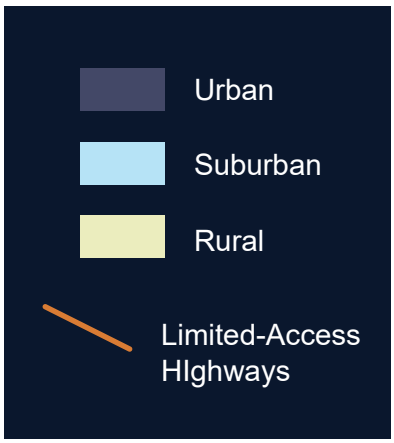
The distinction between area types was defined based on an area's population and employment density, an area's density of low-speed street intersections (less than or equal to 30 mph), and whether the location was within an existing DRCOG Urban Center. A separate area type was assigned to limited access highways which have distinct crash types and countermeasures compared with most other roads. **Table 1** shows the defining features of different area types.

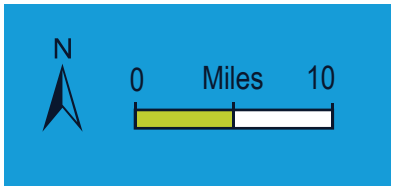
Table 1. Area Type Definitions

AREA TYPE	DEFINING FEATURES	EXAMPLE LOCATIONS
Urban	• High population or employment density • High density of low-speed (pedestrian-oriented) street intersections • Or, within an existing DRCOG urban center (as of 2019)	Core Denver neighborhoods, Aurora around Colfax Avenue, Englewood around Broadway, core Boulder neighborhoods, other downtown areas
Suburban/compact Communities	• Medium population or employment density	Denver Tech Center, Broomfield, southeast Aurora, Firestone, Idaho Springs
Rural	• Low population or employment density	Clear Creek County (excluding Idaho Springs), eastern Arapahoe County, parts of Boulder County
Limited-access highways	• Interstates or other limited access state highways or other roads	Interstate 25, Interstate 70, U.S. Route 36 (between Denver and Boulder), Peña Boulevard

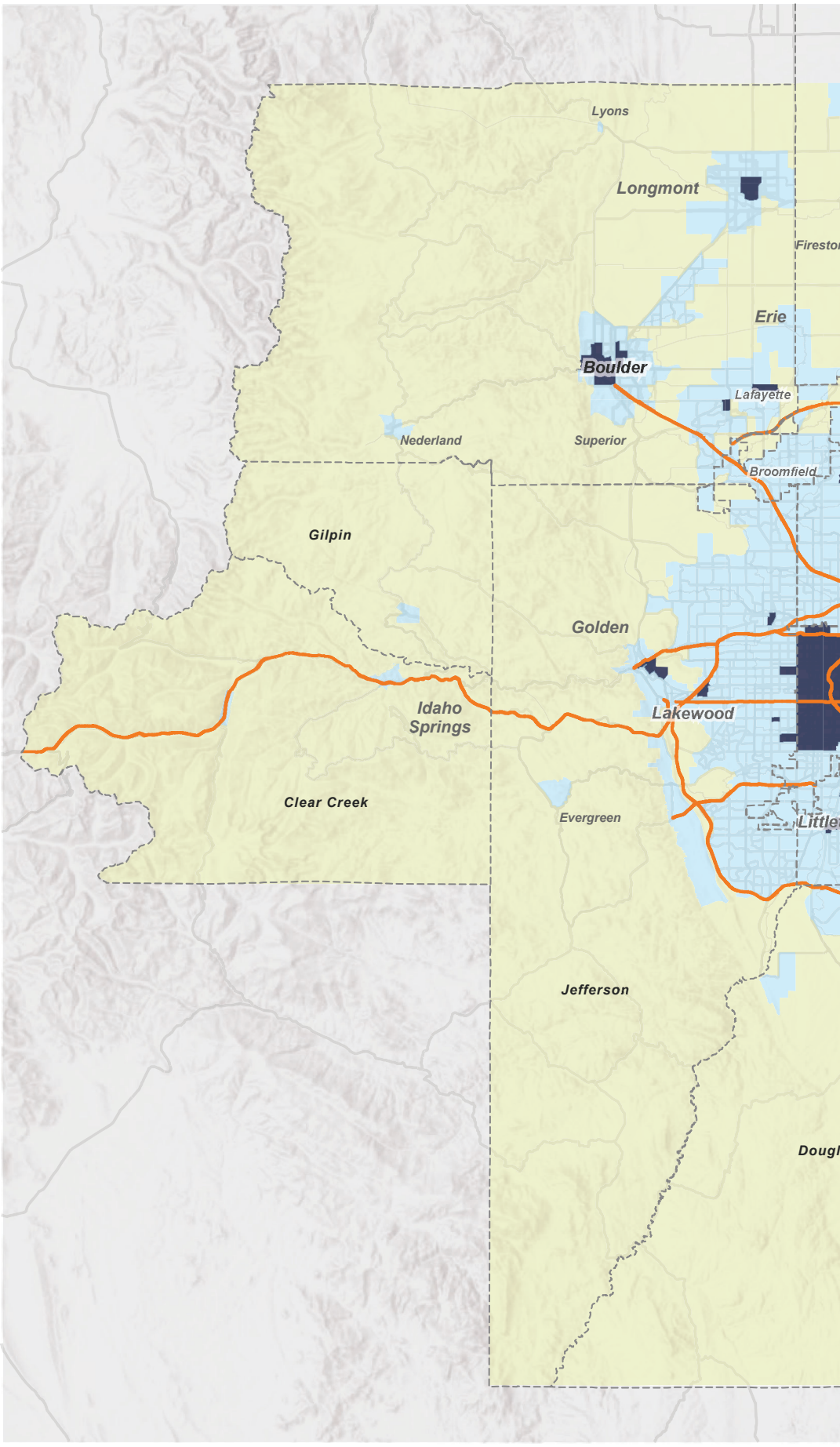
These area types are general for the purposes of regional crash analysis. Multiple area types can exist within a given community.

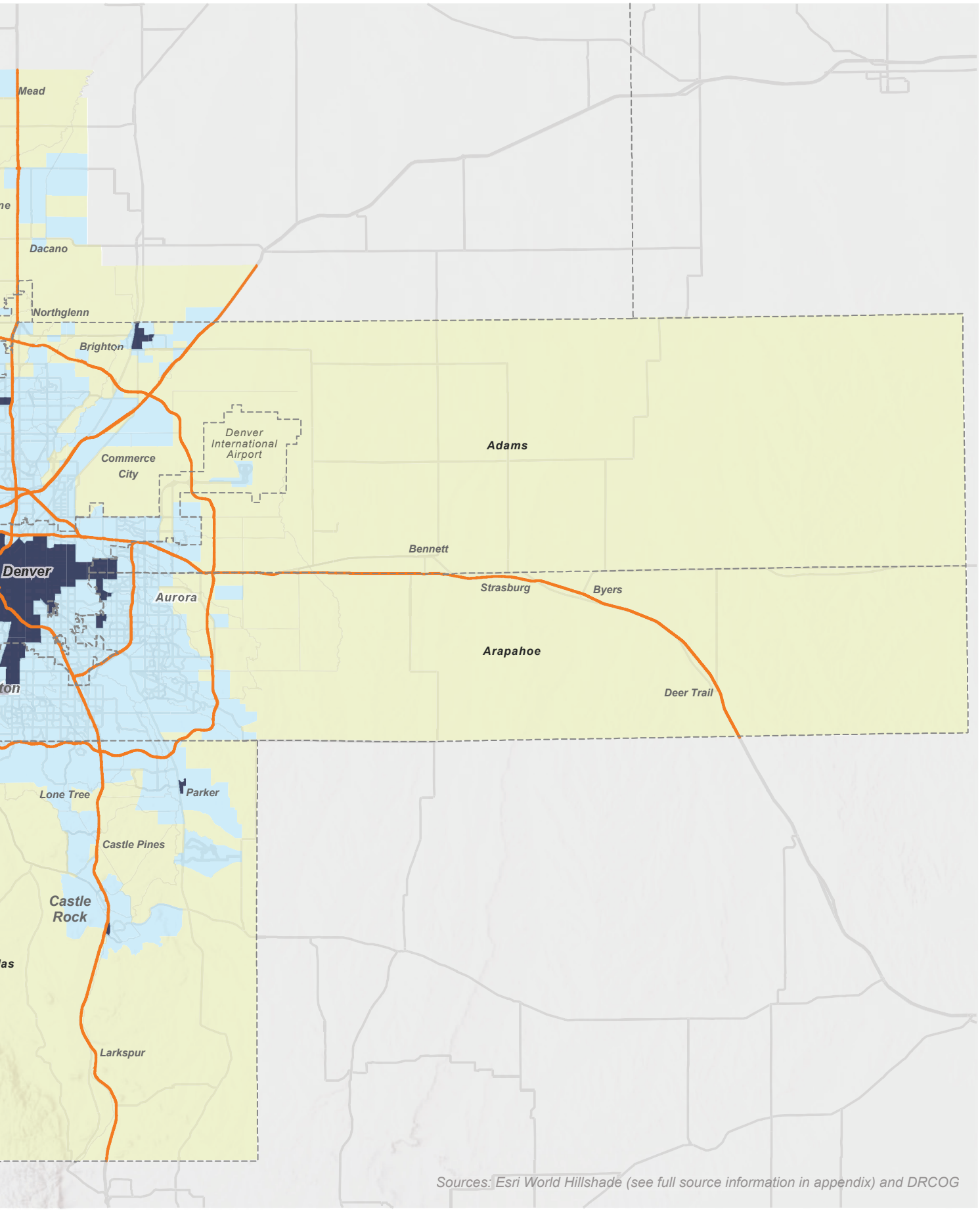
Map 6. Regional Area Types





These area types are general for the purposes of regional crash analysis. Multiple area types can exist within a given community.




Mead
Dacano
Northglenn
Brighton
Denver International Airport
Commerce City
Adams
Denver
Aurora
Bennett
Strasburg
Byers
Arapahoe
Deer Trail
Lone Tree
Parker
Castle Pines
Castle Rock
Larkspur
Sources: Esri World Hillshade (see full source information in appendix) and DRCOG


COORS
Coors
Coors BREAK
80 YEARS
Coors LIGHT

AREA TYPE CRASH DATA SUMMARY

Figure 6 shows annual fatal crashes by area type between 2013 and 2017. Between 2013 and 2017, fatal crashes increased by 50 percent in the Denver region, from 165 to 248. Fatal crashes have increased the most in the suburban/compact communities area type, by more than 90 percent from 2013 to 2017. Fatal crashes have also increased in the rural area type, while fatality levels have fluctuated in the urban and limited-access highway area types.

Figure 6. Annual Fatalities by Area Type Between 2013 and 2017

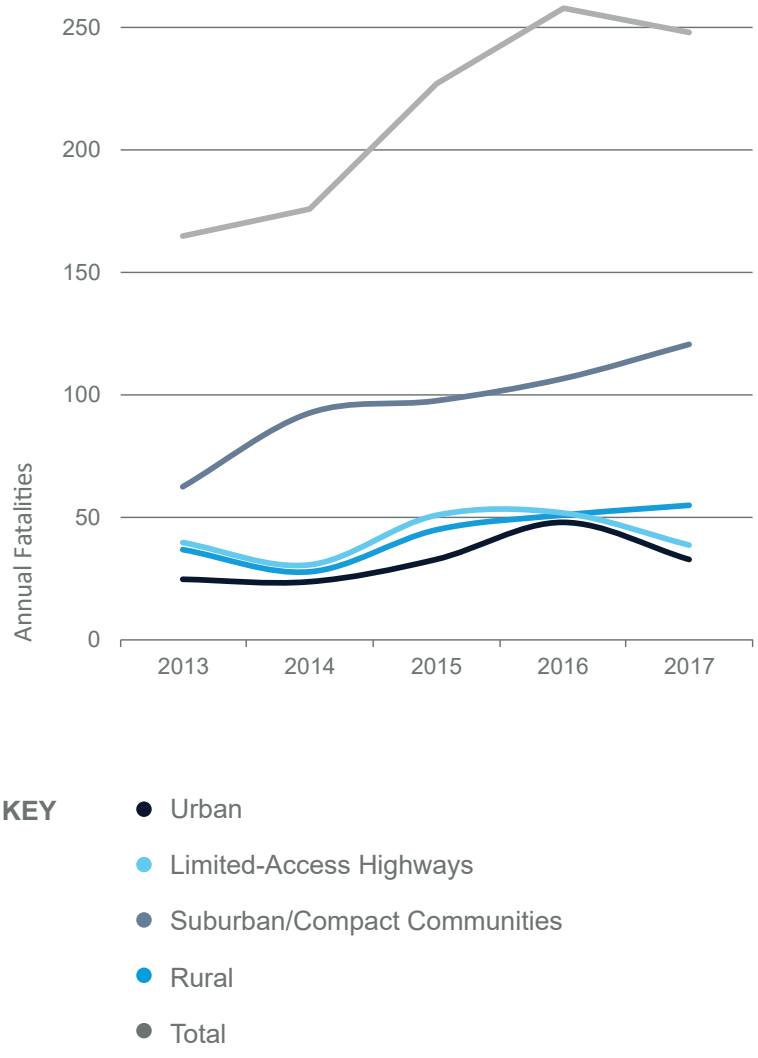


Figure 7 and **Figure 8** show that close to half of all KSI and fatal crashes in the Denver region occur in the suburban/compact communities area type. Additionally, while only 10 percent of KSI crashes occur in the rural area type, about 20 percent of fatal crashes occur in this area type. This indicates that the crashes that occur in the rural area type tend to be more severe.

Figure 7. Percent of KSI Crashes by Area Type Between 2013 and 2017

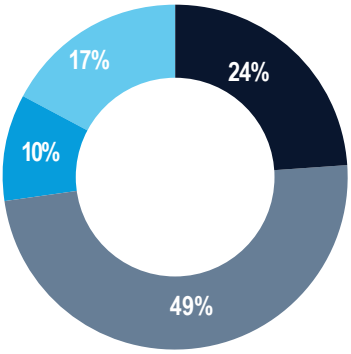
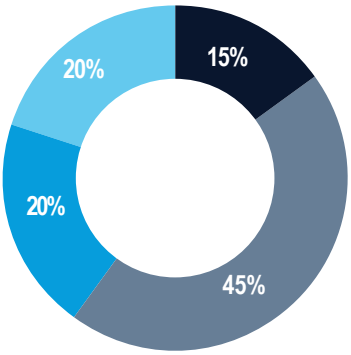


Figure 8. Percent of Fatal Crashes by Area Type Between 2013 and 2017



KEY

- Urban
- Suburban/ Compact Communities
- Rural
- Limited-Access Highway

Figure 9 and **Figure 10** show crashes that involved people walking between 2013 and 2017. Crashes that involved people walking represent a much higher percentage of KSI and fatal crashes in the urban and suburban/compact communities area types as compared with the rural and limited access highway area types. Nearly half (41 percent) of fatal crashes in the urban area type involve people walking.

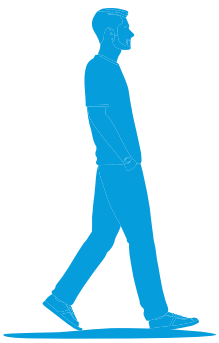


Figure 9. Percent of KSI Crashes that Involved People Walking Between 2013 and 2017

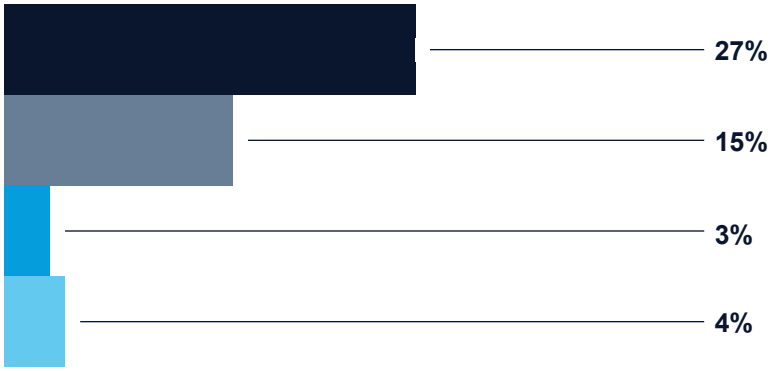


Figure 10. Percent of Fatal Crashes that Involved People Walking Between 2013 and 2017

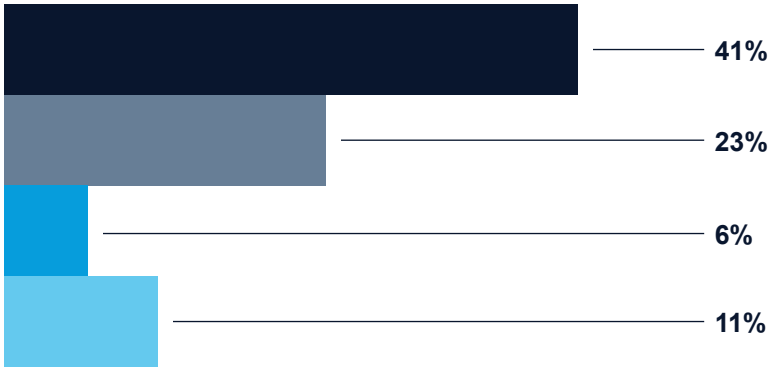
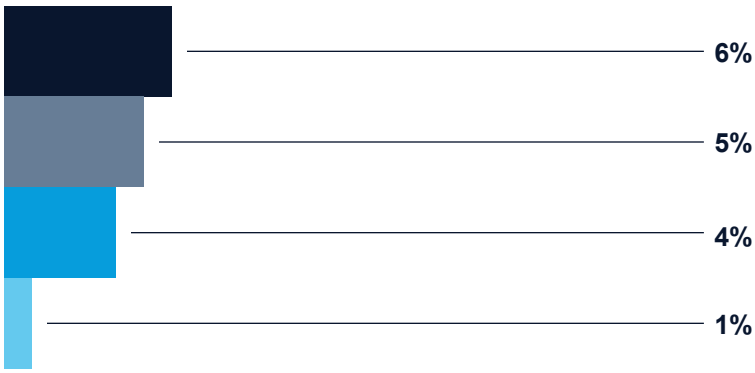


Figure 11 and **Figure 12** show crashes that involved people biking between 2013 and 2017. KSI crashes involving people biking were generally not as frequent as crashes involving people walking in the urban and suburban/compact communities area types. However, similar to crashes involving people walking, they represent a higher portion of KSI crashes in the urban and suburban/compact communities area types as compared with the other area types. Crashes that involved people biking represent nearly the same percentage of fatal crashes in the rural area type as they do in the urban and suburban/compact communities area types.

Figure 11. Percent of KSI Crashes that Involved People Biking Between 2013 and 2017

Figure 12. Percent of Fatal Crashes that Involved People Biking Between 2013 and 2017



KEY

- Urban
- Suburban/ Compact Communities
- Rural
- Limited-Access Highway

Speed Reduction Strategies

Speeding can be difficult to prove, especially in urban and suburban areas. As a result, crash data often underreports speed-related crashes and many of these crashes are attributed to careless or reckless driving. Additionally, even when speeding is not identified as a driver action because the person driving did not exceed the posted speed limit, posted or operating speeds above what is appropriate for the context increase crash severity.

Speed is identified as a crash profile for rural areas and limited-access highways where speeding is easier to prove. However, speed is a contributing factor to fatal and serious-injury crashes across all area types. Safe travel speed is a core Vision Zero principle given the documented relationship between speed and crash severity. A variety of proven techniques can be applied to reduce travel speed:

• **Traffic calming –** Vertical devices such as speed humps and speed tables and horizontal devices such as bulbouts, chicanes or mini traffic circles have documented speed-reduction effects. These treatments are typically limited to local and sometimes collector roads.

• **Realigning skewed intersections –** Broad, wide-radius turns can be made at high speeds. Tighter turns, closer to 90 degrees, with a small radius are made at lower speeds.

• **Reducing travel lane widths –** Narrower travel lanes encourage lower vehicle speeds. Recent updates to the American Association of State Highway Transportation Official's (American Association of State Highway Transportation Officials) *A Policy on Geometric Design of Highways and Streets* included allowances for narrow travel lanes in recognition of safety research that showed little or no difference in crash history in a variety of contexts.

• **Removing travel lanes –** Reducing the number of travel lanes on a street enables the slowest driver to set the operating speed on a street, rather than the fastest driver.

• **Roundabouts –** By introducing horizontal deflection onto otherwise straight roadways, roundabouts can reduce operating speeds. Additionally, roundabouts have proven safety benefits compared to standard intersections.

Equity Strategies

Equity is a foundational Vision Zero concept. Low-income communities and communities of color are disproportionately affected by fatal and serious-injury crashes. In the Denver region, 41 percent of the regional High-Injury Network is in areas with higher-than-average numbers of households in poverty and minority populations.

The Vision Zero Network published *Equity Strategies for Practitioners* to assist communities in implementing Vision Zero with a focus on equity. Key strategies from the guide are:

• **Commit to the work –** Ensure that Vision Zero or traffic safety leadership reflects the diversity of the community, agree that equity issues are a focus of Vision Zero and make a strong and firm commitment from the start.

• **Use data to focus efforts –** Incorporate demographic, social, public health and economic datasets, as well as qualitative data, into crash analysis and project prioritization.

• **Enforcement with empathy –** Enforcement must not have an outsized effect on low-income communities and communities of color, nor should they damage police-community relationships. Because safe infrastructure is lacking in many low-income communities and communities of color, these communities are already unfairly burdened by the transportation system. Strategies to integrate equity into enforcement include community policing, officer training, careful application of automated enforcement, transparency in traffic stop data, diversion programs that focus on education rather than punishment and graduated fines.

• **Community engagement –** Programs and associated staff should build sustaining relationships with the community and partners. Leaders must listen and demonstrate that they value the experiences of people affected by inequitable conditions. Hosting engagement meetings in locations people can attend conveniently and reducing barriers to participation are key elements of Vision Zero-focused community engagement.

URBAN AREAS CRASH PROFILES

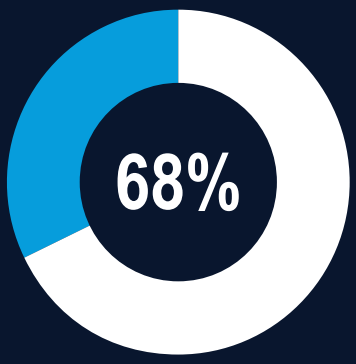
Table 2 shows the four crash profiles for the urban area type. Together these four crash profiles account for 68 percent of all KSI crashes and 66 percent of all fatal crashes in urban areas. Some crashes can be included in multiple crash profiles. For example, a crash could involve a left turn and a person walking.

Crashes involving people walking account for a significant portion of KSI crashes in urban areas, including 43 percent of fatal crashes. Taking measures to reduce the likelihood of crashes involving people walking in urban areas will have a significant effect on reducing overall fatal crashes.

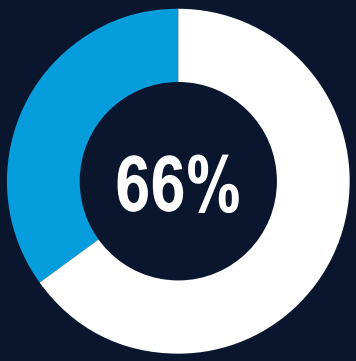
Table 2. Urban Area Crash Profiles

CRASH PROFILES	% KSI IN URBAN AREAS	% FATAL IN URBAN AREAS
Failed to Yield Right-of-Way and Left Turn	35%	20%
Pedestrian-Involved	27%	43%
Bicyclist-Involved	12%	6%
Red Light or Stop Sign Running	12%	8%

CRASH PROFILES INCLUDE



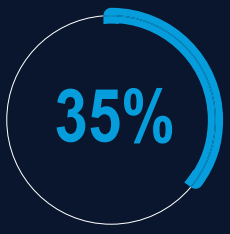
of all KSI crashes in urban areas



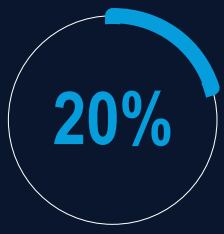
of all fatal crashes in urban areas

URBAN AREA 1

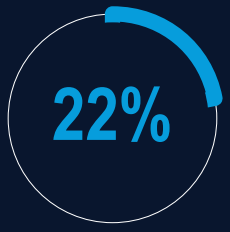
KEY CRASH PROFILE STATISTICS



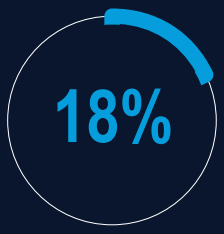
of all KSI crashes in urban areas



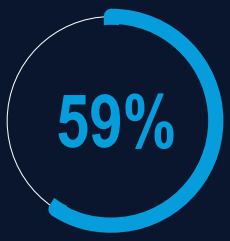
of all fatal crashes in urban areas



involve people walking



involve people biking



of failed to yield right-of-way involve left turns

FAILED TO YIELD RIGHT-OF-WAY AND LEFT TURN

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is “Failed to Yield Right-of-Way” or where the movement of a vehicle prior to the crash is “Left Turn.” Failed to yield includes instances of a person driving entering a street, attempting to cross a street or make a turn when another vehicle, person walking or person biking has the right-of-way.

The majority of KSI crashes in urban areas where a person driving failed to yield right-of-way, 59 percent, are left turns. Forty percent involve a person walking or a person biking, and another 28 percent result in vehicle-vehicle broadside crashes.

WHERE DO THESE CRASHES OCCUR?

Most left turn KSI crashes in urban areas occur on arterial streets (86 percent) and at or near signalized intersections (71 percent).

WHAT DO LOCAL COMMUNITIES SAY?

Fifteen percent of survey respondents in the Denver region ranked “drivers not yielding to pedestrians” and 30 percent ranked “unsafe turning/lane changes” in their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is “Failed to Yield Right-of-Way” or the prior movement of a vehicle prior to the crash is “Left Turn.”

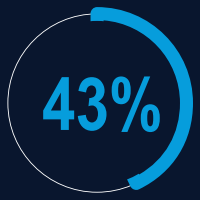
Table 3. Potential Countermeasures to Reduce Failed to Yield Right-of-Way and Left Turn Crashes in Urban Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Left turn at signalized intersection	• Appropriate green time for left turn • Appropriate yellow and all-red interval • Lagging turn phase • Leading pedestrian interval • Positive left turn offset for visibility • Protected turn phase
Left turn and broadside at unsignalized locations	• All-way stop • Consolidate driveways • Improve sight distance • Lighting • Partial closure • Positive left turn offset for visibility • Prohibit left turn • Raised median • Stop lines • Stop signs at near side and far side • Traffic calming • Traffic signal • Two-stage gap acceptance
Pedestrian-involved	• See Pedestrian-involved countermeasures
Bicyclist-involved	• See Bicyclist-involved countermeasures

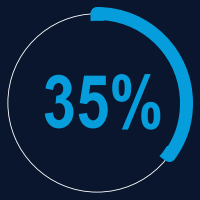
URBAN AREA 2

KEY CRASH PROFILE STATISTICS

of all KSI crashes in urban areas

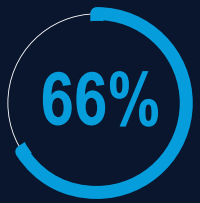


of all fatal crashes in urban areas

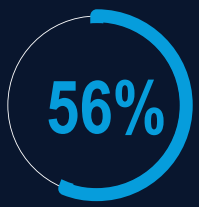


involve a victim of vulnerable age *(younger than 18, or older than 65)*

occur on arterial streets



occur at signalized intersections



occur at night or twilight

PEDESTRIAN-INVOLVED CRASHES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes that are classified as “pedestrian” or crashes where a person walking is involved in a harmful event that took place during the crash. While crashes involving people walking only account for 3 percent of total crashes in urban areas, they represent 43 percent of all fatal crashes.

As crash speed increases, the likelihood of a severe injury or fatality also increases, especially for people walking.

WHERE DO THESE CRASHES OCCUR?

The vast majority of KSI crashes in urban areas involving people walking occur on arterial streets (84 percent) and are at or near signalized intersections (66 percent).

WHAT DO LOCAL COMMUNITIES SAY?

Fifteen percent of survey respondents in the Denver region ranked “drivers not yielding to pedestrians” and 12 percent ranked “inadequate or missing pedestrian crossings or walkways” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

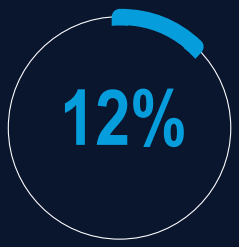
A harmful event is “school age to/from school,” “pedestrian on toy motorized vehicle,” or “all other pedestrians.”

Table 4. Potential Countermeasures to Reduce Pedestrian-Involved Crashes in Urban Areas

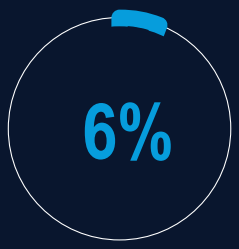
MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES	
Signalized intersection	• Advance stop bar • Bulbout • Countdown pedestrian signal heads • Dual curb ramps • Extend pedestrian crossing time • Far-side bus stops • High-visibility crosswalks • Intersection tightening • Leading pedestrian interval • Lighting • Parking prohibition	• Partial closure • Pedestrian recall signal timing • Pedestrian refuge median • Prohibit left turn • Prohibit right on red • Prohibit turn during pedestrian phase • Protected turn phase • Red-light camera • Roundabout • Shorten signal cycle length • Straighten crosswalks
Nonsignalized intersection	• All-way stop • Bulbout • Co-locate bus stops and pedestrian crossings • Dual curb ramps • Intersection tightening • Lighting • Marked crossing • Narrow travel lanes • Parking prohibition • Partial closure	• Pedestrian hybrid beacon • Pedestrian refuge median • Prohibit left turn • Raised median • Rectangular rapid flashing beacon • Road diet • Sidewalks • Signs • Traffic calming • Traffic signal

URBAN AREA 3

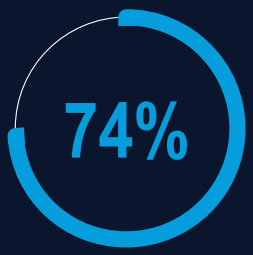
KEY CRASH PROFILE STATISTICS



of all KSI crashes in urban areas



of all fatal crashes in urban areas



occur at intersections

BICYCLIST-INVOLVED CRASHES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where a harmful event is classified as “bicycle.” While crashes involving people biking only account for 2 percent of total crashes in urban areas, they represent 12 percent of all KSI crashes. When a person biking is involved, the likelihood of the crash resulting in a severe injury or death is much higher than a motor vehicle-only crash.

WHERE DO THESE CRASHES OCCUR?

Nearly three quarters of bicyclist-involved KSI crashes occur at or near an intersection.

WHAT DO LOCAL COMMUNITIES SAY?

Twenty percent of survey respondents in the Denver region ranked “inadequate or missing bikeways” and 15 percent ranked “drivers and people biking not sharing the road” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

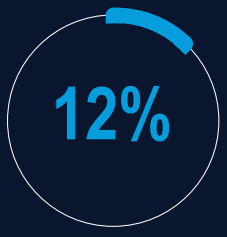
A harmful event is “bicycle.”

Table 5. Potential Countermeasures to Reduce Bicyclist-Involved Crashes in Urban Areas

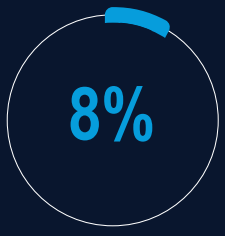
MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Intersection	• Automatic recall signal timing • Appropriate sight distance • Bike box • Bike conflict zone markings • Extend bike lane to and potentially through intersection • Extend signal clearance time • Green wave • Partial closure • Prohibit left turn • Prohibit right turn on red • Protected intersection • Protected turn phase • Shorten signal cycle length • Traffic signal • Traffic signal bike detection
Nonintersection	• All-way stop • Consolidate driveways • Improve sight distance • Partial closure • Prohibit left turn • Raised median • Traffic calming • Traffic signal • Two-stage gap acceptance

URBAN AREA 4

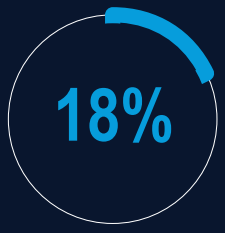
KEY CRASH PROFILE STATISTICS



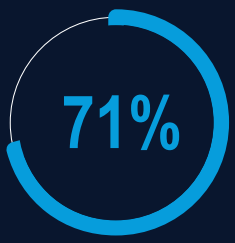
of all KSI crashes in urban areas



of all fatal crashes in urban areas



involve people biking



involve people driving and running a red light

RED-LIGHT OR STOP-SIGN RUNNING

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is "disregarded stop sign" or "failed to stop at signal." Red-light and stop-sign running can result in KSI crashes given at least one vehicle is traveling at relatively high speed and there is a greater likelihood of broadside crashes. The majority of KSI crashes that fall in this crash profile involve a person driving running a red light (71 percent) and result in a broadside crash (66 percent).

WHAT DO LOCAL COMMUNITIES SAY?

Thirty-six percent of survey respondents in the Denver region ranked "red-light or stop-sign runners" as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is "disregarded stop sign" or "failed to stop at signal."

Table 6. Potential Countermeasures to Reduce Red-Light and Stop-Sign Running Crashes in Urban Areas

MECHANISM /PATTERN	POTENTIAL COUNTERMEASURES
Red Light	• Advanced dilemma-zone detection • Appropriate cycle length • Appropriate yellow/all-red signal timing • Red-light camera • Signal coordination • Targeted enforcement • Traffic calming
Stop Sign	• Advance warning sign • All-way stop • Bulbout • Flashing stop sign • Improve sight distance • Lighting • Remove approach lanes • Stop lines • Stop signs at near and far side • Targeted enforcement

SUBURBAN/COMPACT COMMUNITIES AREAS CRASH PROFILES

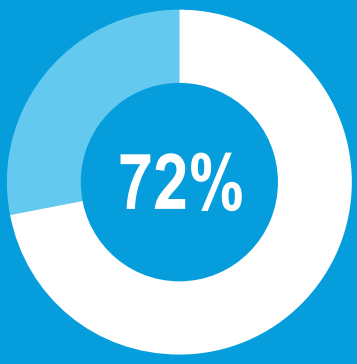
Table 7 shows the three crash profiles for the suburban/compact communities area type. Together these three crash profiles account for 72 percent of all KSI crashes and 61 percent of all fatal crashes in the suburban/compact communities area type. Some crashes can be included in multiple crash profiles.

Failed to yield right-of-way and turning conflicts result in about a third of all fatal crashes in the suburban/compact communities area type. This is followed closely by pedestrian-involved crashes, which represent about a quarter of all crashes in the suburban/compact communities area type.

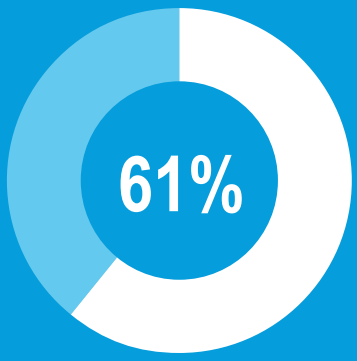
Table 7. Suburban/Compact Communities Crash Profiles

CRASH PROFILES	% KSI IN SUBURBAN/ COMPACT COMMUNITY AREAS	% FATAL IN SUBURBAN/ COMPACT COMMUNITY AREAS
Failed to Yield Right-of-Way and Turning Conflicts	47%	33%
Pedestrian-Involved	16%	25%
Rear End and Stopped or Slowing Vehicles	19%	9%

CRASH PROFILES INCLUDE



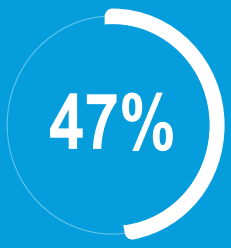
of all KSI crashes in suburban areas



of all fatal crashes in suburban areas

SUBURBAN COMMUNITIES 1

KEY CRASH PROFILE STATISTICS



of all KSI crashes in suburban/ compact community areas

of all fatal crashes in suburban/ compact community areas

occur at intersections

involve left turns

FAILED TO YIELD RIGHT-OF-WAY AND TURNING CONFLICTS

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver "failed to yield right-of-way," the crash form's accident type is "broadside" or a vehicle movement prior to the crash is a left turn or approach turn. This includes instances of a person driving entering a street, attempting to cross a street or make a turn when another vehicle, person walking or person biking has the right-of-way.

WHERE DO THESE CRASHES OCCUR?

The majority of these types of crashes, 85 percent, occur at intersections. Of these crashes, 72 percent involve a left turn.

WHAT DO LOCAL COMMUNITIES SAY?

Thirty percent of survey respondents in the Denver region ranked "unsafe turning or lane changing" as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action is "failed to yield right-of-way," the crash form's accident type is "broadside," or a vehicle movement prior to the crash is a left turn or approach turn.

Table 8. Potential Countermeasures to Reduce Failed to Yield Right-of-Way and Turning Conflict Crashes in Suburban Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Left turn at signalized intersection	• Appropriate green time for left turn • Appropriate yellow/all-red signal timing • Lagging turn phase • Leading pedestrian interval • Positive left-turn offset for visibility • Protected turn phase • Roundabout
Left turn at unsignalized locations	• All-way stop • Consolidate driveways • Improve sight distance • Partial closure • Positive left-turn offset for visibility • Prohibit left turn • Raised median • Roundabout • Stop lines • Stop signs at near side and far side • Traffic calming • Traffic signal • Two-stage gap acceptance
Broadside crashes	• Advance warning signs • All-way stop • Appropriate yellow/all-red signal timing (at signalized locations) • Lighting • Overhead flashing beacon (at unsignalized locations) • Prohibit left turn • Red-light camera • Roundabout • Signal coordination (at signalized locations) • Stop lines • Stop signs at near side and far side • Traffic signal

SUBURBAN COMMUNITIES 2

KEY CRASH PROFILE STATISTICS

of all KSI crashes in suburban/ compact community areas

of all fatal crashes in suburban/ compact community areas

occur at intersections

involve left turns

PEDESTRIAN-INVOLVED CRASHES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes that are classified as “pedestrian” or crashes where a pedestrian is involved in a harmful event that took place during the crash. Crashes involving pedestrians account for 25 percent of all fatal crashes in the suburban/compact communities area type.

As crash speed increases, the likelihood of a severe injury or fatality also increases, especially for people walking.

WHERE DO THESE CRASHES OCCUR?

The vast majority of pedestrian-involved KSI crashes in the suburban/ compact communities area type, 75 percent, occur on arterial streets.

WHAT DO LOCAL COMMUNITIES SAY?

Fifteen percent of survey respondents in the Denver region ranked “drivers not yielding to pedestrians” and 12 percent ranked “inadequate or missing pedestrian crossings or walkways” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

A harmful event is “school age to/from school,” “pedestrian on toy motorized vehicle,” or “all other pedestrians.”

Table 9. Potential Countermeasures to Reduce Pedestrian-involved Crashes in Suburban Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Signalized intersection	• Advance stop bar • Countdown pedestrian signal heads • Dual curb ramps • Extend pedestrian crossing time • High-visibility crosswalks • Intersection tightening • Lighting • Leading pedestrian interval • Partial closure • Pedestrian recall signal timing • Pedestrian refuge median • Prohibit left turn • Prohibit right turn on red-light • Prohibit turn during pedestrian phase • Protected turn phase • Red-light camera • Shorten crossing distance • Shorten signal cycle length
Nonsignalized intersection	• Co-locate bus stops and pedestrian crossings • Dual curb ramps • Lighting • Marked crossing • Narrow travel lanes • Partial closure • Pedestrian hybrid beacon • Pedestrian refuge median • Prohibit left turn • Raised median • Rectangular rapid flashing beacon • Road diet • Sidewalks • Signs • Traffic calming • Traffic signal

KEY CRASH PROFILE STATISTICS

of all KSI crashes in suburban/ compact community areas

of all fatal crashes in suburban/ compact community areas

involve people biking

involve people driving and running a red light

REAR-END CRASHES AND STOPPED OR SLOWING VEHICLES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where a harmful event is “rear end” or the movement of a vehicle prior to the crash is “slowing” or “stopped in traffic.”

Eighty-four percent of rear-end KSI crashes in the suburban/compact communities area type involve a stopped or slowing vehicle. In 23 percent of rear-end KSI crashes, distracted driving is a contributing factor, double the rate of all KSI crashes in the suburban/compact communities area type. Additionally, in another 54 percent of crashes careless or reckless driving is a contributing factor.

WHAT DO LOCAL COMMUNITIES SAY?

Fourteen percent of survey respondents in the Denver region ranked “other drivers unexpectedly slowing or stopping” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

A harmful event is “rear end” or the movement of a vehicle prior to the crash is “slowing” or “stopped in traffic.”

Table 10. Potential Countermeasures to Reduce Rear End Crashes in Suburban Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Arterial streets	• Advanced dilemma-zone detection • Appropriate yellow/all-red signal timing • Auxiliary lanes • Signal coordination • Traffic calming • Traffic incident management • Variable message sign
Distracted driving	• Targeted enforcement • See “Behavior profiles”

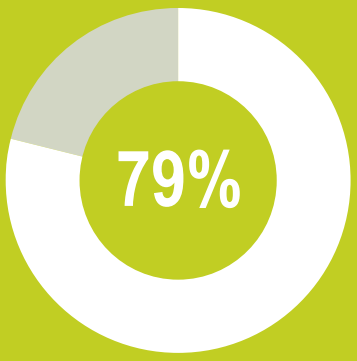
RURAL AREAS CRASH PROFILES

Table 11 shows the four crash profiles for the rural area type. Together, these four crash profiles account for 79 percent of all KSI crashes and 85 percent of all fatal crashes in rural areas. Some crashes can be included in multiple crash profiles. Departing from the travel lane, which involves head-on, sideswipe, or crashes with a fixed object, represents more than half of all fatal crashes in rural areas.

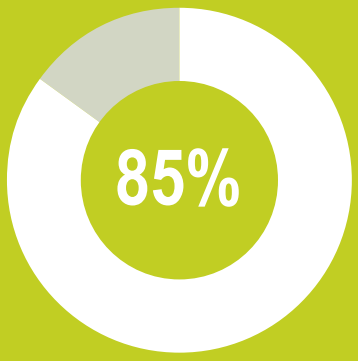
Table 11. Rural Area Crash Profiles

CRASH PROFILES	% KSI IN RURAL AREAS	% FATAL IN RURAL AREAS
Departing from the Travel Lane	40%	56%
Failed to Yield Right-of-Way and Turning Conflicts	25%	19%
Speeding	15%	20%
Rear-End and Stopped or Slowing Vehicles	12%	7%

CRASH PROFILES INCLUDE



of all KSI crashes in rural areas



of all fatal crashes in rural areas

RURAL AREAS 1

KEY CRASH PROFILE STATISTICS

of all KSI crashes in rural areas

of all fatal crashes in rural areas

result in a crash with a fixed object

result in a head-on crash

DEPARTING FROM THE TRAVEL LANE

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is “lane violation,” the crash form’s accident type is a “head-on” crash or a “sideswipe same side” crash, or a harmful event is a crash with a “fixed object,” such as a highway barrier, embankment, guardrail, tree, sign or any other fixed object. These include instances when a person driving unintentionally crosses their travel lane or when a person driving is intentionally passing in the opposing lane.

In rural areas, 59 percent of these crashes result in a crash with a fixed object and 23 percent of these crashes result in a head-on crash. A disproportionally high number of fixed-object crashes, 45 percent, occur at night or during twilight hours. Similarly, a disproportionally high number of fixed-object crashes, 33 percent, result from driving under the influence, driving while ability impaired or driving under the influence of drugs.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is a “lane violation,” the crash form’s accident type is a “head-on” crash or a “sideswipe same side” crash, or a harmful event is a “fixed object.”

Table 12. Potential Countermeasures to Reduce Departure from Travel Lane Crashes in Rural Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Departure to left	• Advance warning sign (with optional beacon) • High-friction pavement • Median barrier • No-passing zone • Pavement markings • Raised median • Rumble strips • See “Speeding countermeasures”
Departure to right	• Advance warning sign (with optional beacon) • Clear distance • High-friction pavement • Pavement markings • Roadside barriers • Rumble strips • See “Speeding countermeasures”
At night	• Lighting • Variable speed limit
Impaired driving	• Targeted enforcement • See “Behavior profiles”

RURAL AREAS 2

KEY CRASH PROFILE STATISTICS

of all KSI crashes in rural areas

of all fatal crashes in rural areas

occur at intersections

involve left turns

FAILED TO YIELD RIGHT-OF-WAY AND TURNING CONFLICTS

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver "failed to yield right-of-way," the crash form's accident type is "broadside" or a vehicle movement prior to the crash is a left turn or approach turn. This includes instances of a person driving entering a street, attempting to cross a street or make a turn when another vehicle, person walking or person biking has the right-of-way.

WHERE DO THESE CRASHES OCCUR?

The majority of these types of crashes, 83 percent, occur at intersections.

WHAT DO LOCAL COMMUNITIES SAY?

Thirty percent of survey respondents in the Denver region ranked "unsafe turning or lane changing" as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action is "failed to yield right-of-way," the crash form's accident type is "broadside" or a vehicle movement prior to the crash is "left turn" or "approach turn."

Table 13. Potential Countermeasures to Reduce Failed to Yield Right-of-Way and Turning Conflict Crashes in Rural Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Left turn at signalized intersection	• Protected turn phase • Roundabout
Left turn at unsignalized locations	• Advance warning sign • All-way stop • Consolidate driveways • Improve sight distance • Positive left-turn offset for visibility • Prohibit left turn • Raised median • Roundabout • Stop lines • Stop signs at near side and far side • Traffic calming • Traffic signal • Two-stage gap acceptance
Broadside crashes	• Advance warning signs • All-way stop • Appropriate yellow/all-red signal timing (at signalized locations) • Lighting • Overhead flashing beacon (at unsignalized locations) • Prohibit left turn • Red-light camera • Roundabout • Signal coordination (at signalized locations) • Stop lines • Stop signs at near side and far side • Traffic signal

KEY CRASH PROFILE STATISTICS

of all KSI crashes in rural areas

of all fatal crashes in rural areas

SPEEDING

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is "exceeded safe/posted speed." Speeding is one of the single greatest indicators of the severity of injury when a crash occurs. Nearly 35 percent of KSI speeding crashes in rural areas are also crashes with a fixed object.

WHAT DO LOCAL COMMUNITIES SAY?

Forty percent of survey respondents in the Denver region ranked "speeding" as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is "exceeded safe/posted speed."

Table 14. Potential Countermeasures to Reduce Speeding Crashes in Rural Areas

MECHANISM/ PATTERN	POTENTIAL COUNTERMEASURES
Speeding	• Oversized speed limit sign • Speed cameras • Speed feedback signs • Targeted enforcement • Traffic calming • Variable speed limit

KEY CRASH PROFILE STATISTICS

of all KSI crashes in rural areas

of all fatal crashes in rural areas

occur near or at intersections

involve distracted driving

REAR-END CRASHES AND STOPPED OR SLOWING VEHICLES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where a harmful event is “rear end” or the movement a vehicle prior to the crash is “slowing” or “stopped in traffic.”

Eighty-four percent of rear-end KSI crashes in rural areas involve a stopped or slowing vehicle. In 29 percent of rear-end KSI crashes in rural areas, distracted driving is a contributing factor, nearly triple the rate for all KSI crashes in rural areas. Additionally, in another 59 percent of crashes in rural areas, careless or reckless driving is a contributing factor.

WHERE DO THESE CRASHES OCCUR?

These crashes are evenly split between intersections and non-intersection locations.

WHAT DO LOCAL COMMUNITIES SAY?

Fourteen percent of survey respondents in the Denver region ranked “other drivers unexpectedly slowing or stopping” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action is “failed to yield right-of-way,” the crash form’s accident type is “broadside” or a vehicle movement prior to the crash is “left turn” or “approach turn.”

Table 15. Potential Countermeasures to Reduce Rear End Crashes in Rural Areas

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Rear-end crashes	• Advance warning sign • Auxiliary lanes • Incident management protocols • Traffic incident management • Variable message sign • Variable speed limit • See “Speeding countermeasures”
Careless or Reckless Driving (Tailgating)	• Targeted enforcement • See “Behavior profiles”

LIMITED-ACCESS HIGHWAYS CRASH PROFILES

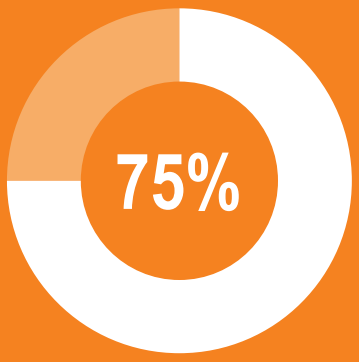
Table 16 shows the three crash profiles for the limited-access highways area type. Together these three crash profiles account for 75 percent of all KSI crashes and 71 percent of all fatal crashes on limited access highways. Some crashes can be included in multiple crash profiles.

Departing from the travel lane, which involves sideswipes or crashes with a fixed object, represents nearly half of all fatal crashes on limited-access highways.

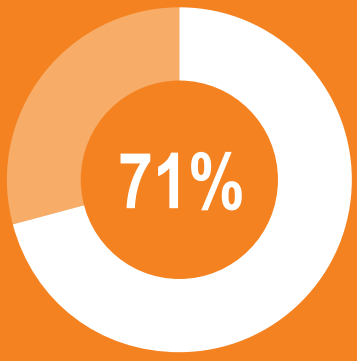
Table 16. Limited-Access Highway Crash Profiles

CRASH PROFILES	% KSI ON LIMITED-ACCESS HIGHWAYS	% FATAL ON LIMITED-ACCESS HIGHWAYS
Departing from the travel lane	43%	48%
Rear-end and stopped or slowing vehicles	32%	20%
Speeding	8%	10%

CRASH PROFILES INCLUDE



of all KSI crashes on limited-access highways



of all fatal crashes on limited-access highways

LIMITED-ACCESS HIGHWAYS 1

KEY CRASH PROFILE STATISTICS

of all KSI crashes on limited-access highways

of all fatal crashes on limited-access highways

occur at night or twilight

involve driving under the influence, driving while ability impaired, or driving under the influence of drugs

result in a crash with a fixed object

DEPARTURE FROM THE TRAVEL LANE

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is “lane violation,” the crash form’s accident type is “head-on” or “sideswipe same direction” or a harmful event is a crash with a fixed object.

Forty-two percent of lane-violation KSI crashes on limited-access highways result in sideswiping another vehicle traveling in the same direction and another 25 percent result in a crash with a fixed object.

Fixed-object crashes account for 26 percent of all KSI crashes and 28 percent of fatal crashes on limited-access highways. Crashes with concrete highway barriers and guardrails account for just over half of fixed-object KSI crashes on limited-access highways. The other common types of objects (accounting for another 20 percent of fixed-object KSI crashes on limited-access highways) include embankments, cable rails, traffic barrels and bridge structures. A disproportionately high number of fixed-object crashes, 59 percent, occur at night or during twilight hours. Similarly, a disproportionately high number, 35 percent, involve driving under the influence, driving while ability impaired or driving under the influence of drugs.

WHAT DO LOCAL COMMUNITIES SAY?

Thirty percent of survey respondents in the Denver region ranked “unsafe turning or lane changing” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is a “lane violation,” the crash form’s accident type is “head-on” or “sideswipe same direction,” or a harmful event is a “fixed object.”

Table 17. Potential Countermeasures to Reduce Departure From the Travel Lane Crashes on Limited-Access Highways

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Fixed object	• Advance warning sign • Median or roadside barrier • Pavement markings • Rumble strips • See “Speeding countermeasures”
Sideswipe	• Advance warning sign • Pavement markings • See “Speeding countermeasures”
At night	• Advance warning sign • Lighting • Pavement markings • Variable speed limit
Impaired driving	• Targeted enforcement • See “Behavior profiles”

LIMITED-ACCESS HIGHWAYS 2

KEY CRASH PROFILE STATISTICS

of all KSI crashes on limited access highways

of all fatal crashes on limited access highways

involve distracted driving

involve careless or reckless driving

REAR-END CRASHES AND STOPPED OR SLOWING VEHICLES

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where a harmful event is “rear end” or the movement of a vehicle prior to the crash is “slowing” or “stopped in traffic.”

Sixty-eight percent of rear-end KSI crashes on limited-access highways involve a stopped or slowing vehicle. In 24 percent of rear-end KSI crashes on limited-access highways, distracted driving is a contributing factor, more than double the rate for all KSI crashes on limited-access highways. In another 58 percent of crashes careless or reckless driving is a contributing factor.

WHAT DO LOCAL COMMUNITIES SAY?

Fourteen percent of survey respondents in the Denver region ranked “other drivers unexpectedly slowing or stopping” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

A harmful event is “rear end” or the movement of a vehicle prior to the crash is “slowing” or “stopped in traffic.”

Table 18. Potential Countermeasures to Reduce Rear-End Crashes on Limited-Access Highways

MECHANISM/ PATTERN	POTENTIAL COUNTERMEASURES
Rear end	• Auxiliary lanes • Traffic incident management • Variable message sign • Variable speed limit • See “Speeding countermeasures”
Careless or reckless driving (tailgating)	• Targeted enforcement • See “Behavior profiles”

KEY CRASH PROFILE STATISTICS

of all KSI crashes on limited-access highways

of all fatal crashes on limited-access highways

SPEEDING

WHAT TYPES OF CRASHES DOES THIS CRASH PROFILE INCLUDE?

This crash profile includes all crashes where the driver action of a vehicle is “exceeded safe/posted speed.”

Speeding is one of the single greatest indicators of the severity of injury when a crash occurs.

Nearly 39 percent of KSI speeding crashes on limited-access highways are crashes with a fixed object.

Crash report data likely underestimates the number of speeding-related KSI crashes as, in many instances when speeding is suspected but difficult to prove, the driver action is often characterized as careless driving.

WHAT DO LOCAL COMMUNITIES SAY?

Forty percent of survey respondents in the Denver region ranked “speeding” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The driver action of a vehicle is “exceeded safe/posted speed.”

Table 19. Potential Countermeasures to Reduce Speeding on Limited-Access Highways

MECHANISM/PATTERN	POTENTIAL COUNTERMEASURES
Speeding	• Speed cameras • Speed feedback signs • Targeted enforcement • Variable speed limit

Vision Zero seeks to integrate human failure into the approach to roadway design and operation. The infrastructure countermeasures provided for each crash profile can contribute to a safe system that integrates human failing. Though not reliant on communications and campaigns to change human behavior, the efforts Vision Zero communities still use. The behavior profiles are intended to inform communications and campaigns across the Denver region, not become a substitute to creating safe systems.

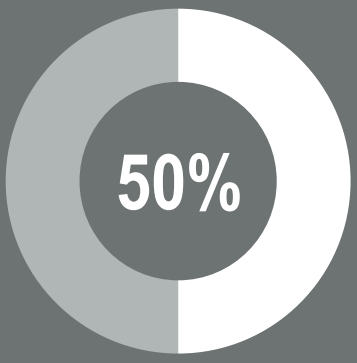
BEHAVIOR PROFILES

Whereas crash profiles describe the specific events that occurred in a crash, behavior profiles describe human behavior that led to a crash happening in the first place.

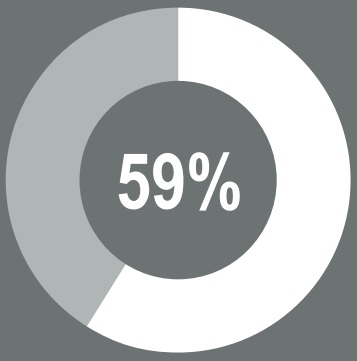
Table 20 shows the four behavior profiles that contribute fairly equally to KSI crashes across all area types regionwide.

Together, these four behavior profiles represent 50 percent of all KSI crashes and 59 percent of all fatal crashes in the Denver region. Frequently, careless or reckless driving occurs alongside other behaviors that contribute to crashes.

BEHAVIOR PROFILES INCLUDE



of all KSI crashes



of all fatal crashes

Table 20. Behavior Profiles

CRASH PROFILES	REGIONWIDE		PERCENT FATAL BY AREA TYPE			
	% KSI	% FATAL	URBAN	SUBURBAN/ COMPACT COMMUNITIES	RURAL	LIMITED-ACCESS HIGHWAY
Careless or reckless driving	42%	34%	37%	35%	22%	43%
Alcohol and drugs	19%	30%	27%	34%	26%	29%
Aggressive driving	9%	15%	17%	15%	12%	14%
Distracted driving	11%	7%	4%	6%	7%	11%

KEY BEHAVIOR PROFILE STATISTICS

of all KSI crashes

of all fatal crashes

also involve driving under the influence, driving while ability impaired or driving under the influence of drugs

CARELESS OR RECKLESS DRIVING

WHAT TYPES OF CRASHES DOES THIS BEHAVIOR PROFILE INCLUDE?

This behavior profile includes crashes where the driver action of a vehicle is “careless driving” or “reckless driving.”

The majority of these crashes are careless-driving incidents. Part of the reason such a high percentage of KSI crashes regionwide, 42 percent, are associated with careless driving is because it is a catch-all term used when an investigative officer suspects a person driving was acting illegally but cannot prove a specific action. One of the most common difficult-to-prove actions is speeding and many of the careless-driving citations likely involve speeding.

About 28 percent of careless- or reckless-driving crashes also involve driving under the influence, driving while ability impaired or driving under the influence of drugs.

WHAT DO LOCAL COMMUNITIES SAY?

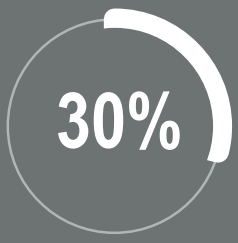
Forty percent of survey respondents in the Denver region ranked “speeding” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

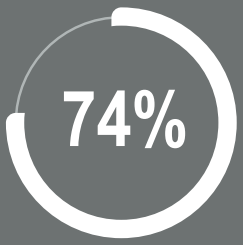
The driver action of a vehicle is “careless driving” or “reckless driving.”

KEY BEHAVIOR PROFILE STATISTICS

of all KSI crashes



of all fatal crashes



occur at night or twilight

ALCOHOL AND DRUGS

WHAT TYPES OF CRASHES DOES THIS BEHAVIOR PROFILE INCLUDE?

This behavior profile includes crashes where the human contributing factor of a vehicle is “driving under the influence, driving while ability impaired and driving under the influence of drugs,” otherwise known as impaired driving.

These crashes disproportionally occur at night, with about three quarters of impaired driving KSI crashes occurring at night or during twilight. Twenty-nine percent of impaired-driving KSI crashes result in a crash with a fixed object.

WHAT DO LOCAL COMMUNITIES SAY?

Twenty-eight percent of survey respondents in the Denver region ranked “alcohol or impaired driving” as one of their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASH IN CRASH REPORTS OR CRASH DATA

The human contributing factor of a vehicle is “DUI, DWAI and DUID.”

KEY BEHAVIOR PROFILE STATISTICS

of all KSI crashes

of all fatal crashes

result in a approach turn crash

AGGRESSIVE DRIVING

WHAT TYPES OF CRASHES DOES THIS BEHAVIOR PROFILE INCLUDE?

This behavior profile includes crashes where the human contributing factor of a vehicle is “aggressive driving.” These include instances when a person driving intentionally engages in risky behavior and takes chances. Significantly exceeding prevailing travel speeds, tailgating, weaving, rapid lane changes and red-light running are all examples of aggressive driving.

This behavior profile is pervasive across area types and contributes fairly equally to all crash types, with a slight overrepresentation in approach-turn crashes.

WHAT DO LOCAL COMMUNITIES SAY?

Survey respondents in the Denver region were not specifically asked about aggressive driving; however, many commented in open-ended responses that aggressive driving and road rage are among their top three traffic safety concerns.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The human contributing factor of a vehicle is “aggressive driving.”

KEY BEHAVIOR PROFILE STATISTICS

of all KSI crashes

of all fatal crashes

result in a rear end crash

DISTRACTED DRIVING

WHAT TYPES OF CRASHES DOES THIS BEHAVIOR PROFILE INCLUDE?

This behavior profile includes crashes where the human contributing factor of a vehicle is “distracted.” Distractions can include passengers, mobile phones, the radio and other distractions. In about three quarters of distracted KSI crashes “other” is listed as the distraction as it is often difficult to prove what causes a distraction.

The instances of distraction are likely underrepresented as they are only indicated on the police report when there is evidence of distraction. Thirty-two percent of distracted KSI crashes are also rear-end crashes.

WHAT DO LOCAL COMMUNITIES SAY?

Seventy-one percent of survey respondents in the Denver region ranked “distracted driving” as one of their top three traffic safety concerns, the highest by far of any concern listed.

HOW TO IDENTIFY THESE CRASHES IN CRASH REPORTS OR CRASH DATA

The human contributing factor of a vehicle is “distracted.”

BEHAVIOR COUNTERMEASURES

Countermeasures for human behaviors are intended to inform communications and campaigns across the Denver region, not become a substitute to creating safe systems. Countermeasures take the form of enforcement, legislation and culture change campaigns that inform and educate the public.

ENFORCEMENT

Successful Vision Zero enforcement strategies focus on enforcing the most dangerous behaviors in the most important places, including along the regional High-Injury Network. Using traffic safety cameras to automate enforcement is a strategy available in Colorado and used successfully in Vision Zero communities around the world. Equity and empathy are critical considerations in a Vision Zero-aligned enforcement campaign to ensure that people already burdened by unsafe transportation infrastructure, including low-income populations and people of color, are not further burdened by unreasonable enforcement.

LEGISLATION

Legislation at multiple levels, including at a town or city, countywide or statewide scale can help address human behaviors that result in crashes that cause death or serious injury. Speed limit setting is one example of legislation being used to reduce behaviors that result in speeding; several United States cities have recently adopted 20 mph residential speed limits through “Twenty is Plenty” campaigns. Legislation can also be used to affect the penalties associated with unsafe behaviors to further discourage them.

CAMPAIGNS

Campaigns can be implemented from the local level through the national level. Effective Vision Zero campaigns use a sophisticated, data-driven approach, ensuring that the right messages reach the right audiences at the right time. Successful campaigns have focused on the people affected by traffic crashes and individual choices that cause crashes while avoiding victim blaming.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COUNTERMEASURE GLOSSARY

This section presents definitions for each of the countermeasures referenced in the crash profiles.

COUNTERMEASURE	DESCRIPTION
Advance stop bar	A stop bar placed ahead of the crosswalk at stop signs and signals reduces instances of vehicles encroaching on the crosswalk.
Advance warning sign	A sign placed to warn a person driving of an upcoming curve, stop sign, traffic signal, roundabout, pedestrian crossing, or other potential point of conflict where a person driving may need to slow down or use caution. Signs can include flashing beacons to enhance awareness.
Advanced dilemma-zone detection	Advanced dilemma-zone detection enhances safety at signalized intersections by adjusting traffic signal timing on the fly to reduce the number of people driving that may have difficulty deciding whether to stop or proceed during a yellow phase. This may reduce rear-end crashes associated with unsafe stopping and angle crashes due to red-light running.
All-way stop	Converting two-way stops to all-way stops prevents people driving, walking and biking from having to cross free-flowing travel lanes at a side-street stop-controlled intersection and reduces the risk of a crash.
Appropriate yellow/all-red signal timing	Retime the yellow and all-red signal phases to the appropriate time to allow vehicles to fully clear the intersection in consideration of the speed of the street and size of the intersection.
Automatic recall signal timing	Signals can be put in “recall” all the time or for key time periods of the day. The “walk” and/or corresponding green signal would be displayed every signal cycle without prompting by a person walking or from vehicle detection. This can ensure bicyclists get a green signal every cycle and discourages red-light running by people biking.
Auxiliary lanes	Auxiliary lanes provide an acceleration or deceleration lane for left-turning, right-turning or merging vehicles onto or off of a higher-speed highway. Auxiliary lanes are most appropriate on limited-access highways and highways in rural settings and can help prevent rear-end crashes.
Barrier	Barriers placed on the right side or median of a highway reduce the likelihood of more severe head-on crashes and fixed-object crashes (such as with a pole, tree or structure). They can be a concrete barrier, cable barrier or guardrail.
Bike box	A designated painted area at the head of a traffic lane at a signalized intersection that provides people biking with a safe and visible way to get ahead of queuing traffic during the red signal phase.
Bike conflict zone markings	Green painted pavement within a bicycle lane that increases the visibility of people biking and reinforces bicycle priority. Green pavement can be used in spot treatment and conflict areas such as driveways. It can also be used across intersections to define the bikeway.
Bulbout	Raised devices, usually constructed from concrete, landscaping, or paint and plastic materials, that narrow the roadway to reduce speeds of turning vehicles, improve sight lines and shorten crossing distances for people walking.
Clear zone (clear distance)	An unobstructed, traversable roadside area that allows a driver who has left the highway to stop safely. Clear zones are most appropriate on higher-speed highways in rural areas and can mitigate crashes with a fixed object. Clear zones are generally not recommended on lower-speed urban and suburban streets as they can encourage higher travel speeds in those settings and be dangerous for people walking.

COUNTERMEASURE	DESCRIPTION
Co-locate bus stops and pedestrian crossings	Place bus stops and pedestrian crossings in close proximity to allow people riding transit to cross the street safely.
Consolidate driveways	Reducing the number of driveway entrances and exits through consolidation limits the exposure of people biking, people walking and people driving to vehicles entering or exiting driveways, reducing conflicts.
Countdown pedestrian signal heads	Displays “countdown” of seconds remaining on the pedestrian signal. Countdown indications improve safety for all road users, and are required for newly installed traffic signals where pedestrian signals are installed.
Dual curb ramps	Dual curb ramps improve Americans with Disabilities Act accessibility at all intersection approaches so people walking with mobility challenges, or those pushing carts or strollers, can safely enter and exit all crosswalks at the appropriate angle.
Extend bike lane to and potentially through intersection	In locations where a bike lane is dropped due to the addition of a turn pocket, a parking lane or turn lane along the intersection approach may be repurposed a to provide a dedicated bike lane through the intersection. At intersections use skipped striping or green paint to highlight conflict zones between bicyclists and motor vehicles.
Extend pedestrian crossing time	Increases time for pedestrian walk phases, can better accommodate vulnerable age groups (younger than 18 or older than 65).
Extend signal clearance time	Extending yellow and all-red time allows people driving and people biking to safely cross through a signalized intersection before conflicting traffic movements are permitted to enter the intersection.
Far-side bus stops	Far-side bus stops are located after an intersection, allowing the vehicle to pass through the intersection before stopping for the passenger loading and unloading a bus.
Flashing stop sign	A flashing beacon or flashing LED lights can be embedded in stop signs to enhance awareness of people driving and increase compliance rates.
Green wave	A series of coordinated traffic signals that allow for slower vehicle travel speeds through several intersections along a corridor. Coordinating signals for slower travel speeds gives people biking more time to cross safely and encourages people driving to travel at slower speeds.
High-visibility crosswalks	High-visibility crosswalks are more visible to people driving. They are striped with continental, ladder or other markings using high-visibility material such as thermoplastic tape instead of paint.
Improve sight distance	Remove objects that may prevent people driving and people walking from having a clear sightline. Methods for improving sight distance may include trimming or removing landscaping or removing or relocating large signs.
Incident management protocols	Use protocols to quickly move queue causing vehicles including those that are disabled or were involved in a minor crash.
Intersection tightening	Visually and physically narrowing the street at intersections, can create a shorter crossing for people walking and slows vehicles approaching the intersection and turning. Intersection tightening can be permanent or temporary, using materials like paint, plastic bollards and reflective markers.
Leading pedestrian interval	Traffic signals timed to allow people walking a short head start in crossing an intersection minimize conflicts with turning vehicles and improve pedestrian safety. Audible beacons can be paired with leading pedestrian intervals to ensure that people who are blind or visually impaired know when to begin their crossing.

COUNTERMEASURE	DESCRIPTION
Lighting	Overhead lights illuminate the roadway and enhance visibility at night.
Marked crossing	Legal crosswalks with traffic control markings in the pavement that increase driver awareness of people walking and yield compliance by people driving. Marked crosswalks are not always appropriate at uncontrolled crossings and an engineering study should be performed before a marked crosswalk is installed away from a traffic signal or an approach controlled by a stop or yield sign.
Narrow travel lanes	A reduction in lane width on low speed streets, to 11 feet or 10 feet, can produce a traffic calming effect by encouraging people driving to travel at slower speeds, lowering the risk of severe crashes with people biking, people walking and other people driving.
No passing zone	Converting a passing zone (where a vehicle uses the opposing lane of traffic to pass another vehicle) to a no-passing zone may reduce head-on or run-off-the-road crashes.
Parking prohibition	By restricting parking at curbs in front of intersection crosswalks, sight lines are cleared between pedestrian crossings and oncoming people driving, reducing the risk of a crash (also called “daylighting”). Parking can also be restricted in locations with on-street bicycle facilities to minimize dooring.
Partial closure	A partial closure is a roadway treatment that restricts certain crash-prone turning movements using regulatory signage or channelizing barriers.
Pavement markings	Pavement markings are used to delineate the travel lane, indicate which part of the roadway to use, provide information about conditions ahead, and indicate turning lanes and where passing is allowed. Well-maintained and highly visible pavement markings may prevent lane departure. Consider reflective striping to further enhance visibility, particularly at night or during inclement weather.
Pedestrian Hybrid Beacon	Pedestrian hybrid beacons are used at side-street stop intersections and at mid-block locations to require people driving to stop for people walking with a series of yellow and red lights.
Pedestrian recall signal timing	Signals can be put in “recall” all the time or for key time periods of the day such as peak business hours or school drop-off/pick-up times. The “walk” signal would be displayed every signal cycle without prompting by a pedestrian push button.
Pedestrian refuge median	Pedestrian refuge medians provide a protected area for people walking at the center of the roadway. They reduce the exposure time for people walking and simplify crossings by allowing people walking to focus on one traffic direction at a time.
Prohibit left turn	Consider banning left turns at locations where a turning vehicle may conflict with people walking in the crosswalk, where opposing traffic volume is high, or from a side street onto a busy two-way arterial street. Prohibiting people driving from turning left reduces pedestrian interaction with vehicles when crossing.
Prohibit right turn on red	Prohibiting right turns on red can help prevent crashes between vehicles turning right on red from one street and through vehicles on the cross street, and crashes involving people walking. Consider prohibiting right turns on red at skewed intersections, or in combination with exclusive pedestrian “walk” phases, leading pedestrian intervals, sight distance issues or high pedestrian volumes.
Prohibit turn during pedestrian phase	Restricting left or right turns during the pedestrian crossing phase at locations where a turning vehicle may reduce conflicts with people walking in the crosswalk.
Protected turn phase	Protected turns provide an exclusive phase for left- or right-turning vehicles to enter an intersection separate from conflicting vehicle or pedestrian movements.

COUNTERMEASURE	DESCRIPTION
Protected/separated bikeway	Designated bicycle lanes separated from vehicle traffic by a physical barrier (such as bollards, landscaping or parked cars) can increase safety for everyone by decreasing opportunities for encroachment on the bike lane by people driving. Protected and separated bikeways also reduce the risk of dooring.
Raised median	Curbed sections in the center of the roadway that are physically separated from vehicular traffic can reduce travel speeds and also help control access to and from side streets and driveways, reducing conflict points.
Rectangular rapid flashing beacon	Pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert people driving to a pedestrian crossing.
Red light camera	Red light cameras can be used for automated enforcement to issue citations to people driving running red lights at signalized intersections, which may discourage red-light running.
Road diet	Road diets generally reassign space in the roadway from vehicle travel lanes to create room for bicycle facilities, wider sidewalks or center turn lanes. Road diets optimize street space to benefit all users by improving the safety and comfort of people walking and people biking and reduce travel speeds and the potential for rear-end crashes.
Roundabout	Roundabouts are large circular islands, placed in the middle of an intersection, which direct flow in a continuous circular direction around the intersection. Roundabouts reduce the number of conflict points and decrease vehicle speeds due to intersection geometry.
Rumble strips	Shoulder or centerline rumble strips are an effective countermeasure to reduce roadway departure crashes. Rumble strips result in noise and vibration to alert people driving when they leave the travelway.
Shorten crossing distance	Shortening the crossing distance by adding a bulbout, removing a turn lane, tightening the turn radius or other means reduces the length of time required for people walking to cross an intersection. Shorten crossing distances can also visually narrow the roadway, which encourages people driving to slow down.
Shorten signal cycle length	Reducing the cycle length at intersections may reduce the delay experienced by vehicles, people biking and people walking. When delay is significant, road users are more likely to ignore signal indications.
Sidewalks	Sidewalks and walkways are pedestrian lanes that provide people with space to travel within the public right-of-way that is separated from motor vehicles. They are associated with reduced crashes where people walking were previously walking along the roadway. In most cases sidewalks should be provided on both sides of the street and designed in accordance with local street standards.
Signal coordination	A series of coordinated traffic signals allows vehicles to travel a corridor at relatively uniform speed with minimal stopping and can reduce rear-end crashes.
Speed camera	Speed cameras are a type of automated enforcement that use cameras as well as radar or in-ground sensors to detect speed and identify the associated vehicle. Speed cameras can substantially reduce speed-related crashes.
Speed feedback sign	A roadway treatment that uses radar to alert people driving to their actual speed relative to the posted speed limit, encouraging people driving who exceed to the speed limit to slow down.
Straighten crosswalks	Straightening crosswalks improves sight lines, making people walking more visible to oncoming people driving, and may shorten the crossing distance, reducing the length of time required for people walking to cross an intersection.

COUNTERMEASURE	DESCRIPTION
Targeted enforcement	Targeted enforcement is used to reduce the most dangerous behaviors (such as speeding, distracted driving, aggressive driving, impaired driving, and red-light and stop sign running), particularly at locations with a history of such behaviors. People driving are less likely to participate in dangerous behaviors when they know there is a higher likelihood they will be caught.
Traffic incident management	Traffic incident management is a planned and coordinated multidisciplinary process to detect, respond to and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible.
Traffic calming	Traffic calming refers to a full range of horizontal and vertical design elements intended to slow the movement of cars through a corridor. Examples include horizontal curvature, chicanes, narrow travel lanes, traffic circles, fewer lanes, bulbouts, medians, signals coordinated for slower speeds, and speed humps.
Traffic signal	Traffic signals help to organize travel of all modes at an intersection, limiting interactions between vehicles, people walking and people biking with conflicting movements. New traffic signals can have a traffic calming effect on long, high-speed straightaways.
Traffic signal bike detection	Bike detection is used at signalized intersections, either through use of buttons, in-pavement loops, or by video or infrared cameras, to call a green light for people biking and reduce delay for bicycle travel. Traffic signal bike detection discourages red-light running by people biking and increase convenience of bicycling.
Two-stage gap acceptance	Two-stage gap acceptance provides a refuge in the median for vehicles making a left turn onto a busy street in two stages. This design allows people driving to focus on finding a gap in traffic in one direction of travel instead of both.
Variable message sign	Variable message signs are electronic signs that allow for varying messages. Variable message signs can be used to warn people driving of slowdowns ahead, decreasing rear-end crashes.
Variable speed limit	Speed limit signs that can be adjusted at various times of the day. Reducing the speed limit when conditions are less optimal such as at night, during inclement weather, poor road conditions or when there is heavy traffic can reduce the likelihood of severe crashes.

Sources for countermeasure descriptions:
- *American Association of State Highway and Transportation Officials Highway Safety Manual*
- *Caltrans Local Roadway Safety Manual*
- *Federal Highway Administration Office of Safety*
- *Federal Highway Administration Crash Modification Factors Clearinghouse*
- *Federal Highway Administration Bicycle Safety Guide and Countermeasure Selection System*
- *Federal Highway Administration Pedestrian Safety Guide and Countermeasure Selection System*
- *National Association of City Transportation Officials Urban Bikeway Design Guide*
- *Fehr & Peers*

MEASURING EFFECTIVENESS OF COUNTERMEASURES

A crash reduction factor describes the percentage crash reduction that could be expected from implementing a given countermeasure. Crash reduction factors are represented as percentages between zero percent and 100 percent. A higher crash reduction factor, closer to 100 percent, indicates that the countermeasure is more effective at reducing crashes. Crash modification factors are similar crash reduction factors but are expressed as a decimal and represent the expected number of crashes after implementing a countermeasure. A lower crash modification factor, closer to zero, indicates that the countermeasure is more effective at reducing crashes. Not all countermeasures have been studied to identify crash reduction factor or crash modification factor for all crash types; however, research in this area is expanding. The Crash Modification Factor Clearinghouse, cmfclearinghouse.org, can be used to search for available crash modification factors.

Why Local Adoption?

Achieving Vision Zero in the Denver region will take local action and collaboration. Crashes in which people are killed or seriously injured and dangerous behaviors occur throughout the region's urban, suburban and rural areas.

Local adoption of Vision Zero, the creation and implementation of local Vision Zero plans or other strategic safety efforts, demonstrate communities' public commitments to eliminating serious-injury and fatal crashes. These actions help local governments make the right strategic decisions to get to zero deaths and serious-injury crashes.


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TAKING ACTION ON

Metro Vision establishes shared desired future outcomes among DRCOG's partners. One theme among these outcomes is a connected multimodal region, which includes a supporting objective to improve transportation safety and security. Traffic-related deaths and serious injuries are a critical and preventable public health epidemic and social equity issue in the metropolitan Denver area. DRCOG, its member governments and its partner agencies are responsible for implementing projects and initiatives that will reduce serious-injuries and fatalities.

Regional Vision Zero further explains how DRCOG and local governments can improve transportation safety and security by establishing a series of Regional Vision Zero objectives and action initiatives.

DRCOG'S METRO VISION

Metro Vision, the region's plan for continued success, establishes shared desired future outcomes among DRCOG's many partners across the Denver region. Metro Vision defines the region's communities' shared aspirational regional vision in five themes, each including outcomes and objectives that are being implemented through collaboration on strategic initiatives. DRCOG works with partners throughout the region to implement Metro Vision. DRCOG's five overarching themes provide a destination point for regional outcomes:

- **An Efficient and Predictable Development Pattern**
- **A Connected Multimodal Region**
- **A Safe and Resilient Natural and Built Environment**
- **Healthy, Inclusive and Livable Communities**
- **A Vibrant Regional Economy**

For transportation and mobility, the Denver region aspires to have a connected multimodal region that provides everyone with viable travel choices. The overall vision for the region's transportation system is organized around two regional outcomes:

- **The regional transportation system is well connected and serves all modes of travel**
- **The transportation system is safe, reliable and well maintained**

To work toward a future where **"**the transportation system is safe, reliable and well maintained" will require education, enforcement and engineering approaches to enhance safety to reduce crashes, focusing on serious injuries and fatalities. The main objective is to "operate, manage and maintain a safe and reliable transportation system." The following **supporting** objectives are defined in Metro Vision:

- **Maintain existing and future transportation facilities in good condition**
- **Improve transportation system performance and reliability**
- **Improve transportation safety and security**

SUPPORTING METRO VISION

Taking Action on Regional Vision Zero builds on these supporting objectives with six additional Regional Vision Zero supporting objectives:

- **Improve collaboration between allied agencies**
- **Increase awareness and adoption of Vision Zero**
- **Design and retrofit roadways to prioritize safety**
- **Improve data collection and reporting**
- **Increase funding and resources**
- **Increase legislation support that results in safety improvements**

A CALL TO ACTION

Taking Action on Regional Vision Zero includes a detailed description of the Regional Vision Zero supporting objectives. It defines what action initiatives will be required to accomplish the objectives and outcomes. Many action initiatives include subactions, to better define components of the initiative. Subactions are not meant to limit each action initiative and may be modified or added to. Action initiatives that do not have subactions will be defined as each are further developed by the Regional Vision Zero working group as part of the implementation process. Each action initiative includes regional partners that must be involved and take responsibility to accomplish each supporting objective according to implementation timelines. All action initiatives consist of ongoing efforts to eliminate crashes causing death or serious injury in the DRCOG region.

Monitoring progress at a regional level is a critical part of taking action and providing transparency on what partners are providing support to achieve Vision Zero. DRCOG will track progress on each implemented action initiative at the beginning of each year.

Regional Vision Zero Objectives

1 IMPROVE COLLABORATION BETWEEN ALLIED AGENCIES

The region will pursue collaboration among local governments and allied agencies through convening working groups, sharing traffic safety data and strategies and providing training and support systems. Allied agencies may include state and regional transportation agencies, police departments and state patrol, advocacy organizations, and organizations from public health, social services, economic development, education, homelessness, religious and spiritual communities and other community-based groups. Collaboration will allow for more unified Vision Zero messaging and strategies, implementation participation and involvement across the region.

2 INCREASE AWARENESS AND ADOPTION OF VISION ZERO

The region will increase awareness of Vision Zero among local communities, local governments and related transportation agencies and support adoption of Vision Zero or similar local safety plans or strategies by local governments. This will include educational campaigns targeted at driver behavior, promoting Vision Zero principles, data sharing and street design tactics.

REGIONAL VISION ZERO OBJECTIVES

3 DESIGN AND RETROFIT ROADWAYS TO PRIORITIZE PEOPLE'S SAFETY

The region will design and build roadways that prioritize safety for all roadway users. This includes making updates to local and state highway and street design guidelines and codes to prioritize safety, developing toolkits that incorporate street safety techniques, applying traffic safety countermeasures to corridors and intersections as part of street reconstruction projects, and strategically prioritizing quick-build safety projects. Projects should be prioritized along the regional (or local) High-Injury Networks or at locations that will reduce the risk of fatal and serious-injury crashes. Redesigning and rebuilding streets and roadways to prioritize safety can significantly reduce the number of fatal and severe injury crashes across the region.

4 IMPROVE DATA COLLECTION AND REPORTING

The region will improve collection, analysis and reporting of crash data to local communities, local governments and relevant agencies. This will include frequent updates to the regional crash database and improved data collection techniques. More robust, accurate and transparent data will provide the region with the tools to identify strategies, programs and projects and prioritize investments that most efficiently and effectively reduce the number of fatal and serious-injury crashes.

5 INCREASE FUNDING AND RESOURCES

The region will take measures to increase funding and allocation of resources for programs and projects that improve traffic safety. Strategies may include prioritizing safety projects in the Transportation Improvement Program (particularly those along the regional High-Injury Network or address a crash profile), dedicating Capital Improvement Project funds to traffic safety projects or providing grant-writing support. Increased funding will be critical to the region's ability to implement many of the key traffic safety improvement projects in a timely manner.

6 INCREASE LEGISLATIVE SUPPORT

The region will pursue and support legislation that results in traffic safety improvements. Legislation may address speed limit setting, helmets for motorcycle drivers and passengers, seatbelt laws, safety cameras and other methods of reducing crashes as safety research evolves. DRCOG, its local governments and allied agencies can help elected officials better understand the scope of crashes causing death and serious injuries in the region, and pursue and support legislation to reduce them. Changes to legislation will provide governments with a greater set of tools and resources and reduce barriers to making improvements that reduce fatal and serious-injury crashes.

OBJECTIVE 1

IMPROVE COLLABORATION BETWEEN ALLIED AGENCIES

TRACKING PROGRESS:

1. number of local governments and allied agencies participating in the Regional Vision Zero working group
2. number of police department working sessions
3. number of support events for victims of traffic violence

ACTION INITIATIVES	SUB-ACTIONS	RESPONSIBILITY	ACTION YEAR
1. Convene Vision Zero working groups that will share updates on crash data, resources, current activities, policy evolution, funding opportunities, equity data, traffic safety performance, enforcement, emerging issues, vehicle fleet safety and other relevant safety information. Invite allied organizations to participate in the Vision Zero working groups, including organizations from: public health, social services, economic development, homelessness, religious and spiritual communities, and other community-based organizations.	1.1 Organize a regional Vision Zero working group to convene regular meetings of safety stakeholders. Use the working group as a place to share and expand on Vision Zero updates in regard to data, resources, policy evolution and emerging issues. This group will also further develop details of future action initiatives.	DRCOG CDOT Colorado State Patrol Local Governments Advocacy Organizations	2020
	1.2 Facilitate working sessions among police departments to focus on the regional High-Injury Network, crash profiles, contributing violations and behaviors, and equity and empathy. Use these sessions to help promote prioritizing enforcement with empathy on the regional High-Injury Network.	DRCOG CDOT Colorado State Patrol Local Governments Local Police	2021
	1.3 Distribute Vision Zero marketing and outreach materials through the working groups.	DRCOG	2020
	1.4 Share and discuss funding opportunities within the working groups.	DRCOG CDOT	2020
	1.5 Collaborate with the Advanced Mobility Partnership to support transportation technology efforts that support Regional Vision Zero through data collection, planning, programming and decision-making.	DRCOG Advanced Mobility Partnership partners	2020
2. Working with allied organizations, create support systems for victims of traffic violence such as counseling, memorializing and storytelling.		DRCOG Local Governments	2021

OBJECTIVE 2

INCREASE AWARENESS AND ADOPTION OF VISION ZERO

ACTION INITIATIVES	SUB-ACTIONS	RESPONSIBILITY	ACTION YEAR
3. Plan for and identify relevant strategies and appropriate counter-measures to reduce fatal and serious-injury crashes at the local government level.	3.1 Formally adopt support for DRCOG's *Taking Action on Vision Zero*, develop a local government Vision Zero Action Plan or develop a similar safety action plan.	Local Governments	2020
4. Develop and implement an ongoing Regional Vision Zero partnership program modeled on the Way To Go program to promote and prioritize safety in the DRCOG region.	4.1 Provide information, resources, trainings, and educational opportunities to local communities, local governments, and media outlets. Promote consistent messaging and crash reporting language.	DRCOG CDOT Federal Highway Administration National Highway Traffic Safety Administration	2021
	4.2 Provide information and resources regarding the perspectives of particularly vulnerable travel methods (people walking, people biking) and particularly harmful travel methods (for example, large trucks).	DRCOG	2022
	4.3 Identify and promote training opportunities to local governments, including resources from the national Vision Zero Network, Federal Highway Administration and others.	DRCOG CDOT Federal Highway Administration National Highway Traffic Safety Administration Advocacy Organizations	2020
5. Work with school districts and provide them with tools to host educational seminars or workshops on Vision Zero principles and targeted engagement for K-12 students about traffic safety. Seminars should emphasize empowering youth leadership to promote safe transportation in school communities, prioritizing communities of concern.		DRCOG CDOT Local Governments	2021

TRACKING PROGRESS:

4. number of local governments that develop safety plans for reducing fatal and serious-injury crashes
5. volume, reach and exposure of Regional Vision Zero partnership program
6. number of school seminars or workshops

OBJECTIVE 3

DESIGN AND RETROFIT ROADWAYS TO PRIORITIZE PEOPLE'S SAFETY

ACTION INITIATIVES	RESPONSIBILITY	ACTION YEAR
6. Develop a Complete Street Toolkit for the DRCOG region addressing safety-related aspects of street design, incorporating Vision Zero principles, crash profiles and countermeasures, and including further guidance for establishing safe design components.	DRCOG	2021
7. Work with CDOT to update its Roadway Design Guide and the State Highway Access Code to support context-sensitive safety design solutions.	DRCOG CDOT	2023
8. Provide guidance on the implementation of quick-build projects. Implement quick-build projects at high-priority locations when long-term solutions may lack sufficient immediate funding or have a long construction timeline.	DRCOG Local Governments	2022
9. Update local government street design guidelines, standards and municipal codes in accordance with Vision Zero design principles and safe design controls.	Local Governments	2020
10. Prioritize design, construction and maintenance projects on roadways on the regional High-Injury Network.	DRCOG CDOT Local Governments	2020
11. Maintain existing facilities components such as pavement markings, signage, painted surfaces, reflective surfaces and vegetation.	CDOT Local Governments	2020

TRACKING PROGRESS:

7. number of traffic safety improvement projects implemented along the regional High-Injury Network
8. publication of the Complete Streets Toolkit
9. update to CDOT's Roadway Design Guide and State Highway Access Code
10. monitor asset management in annual budgets

OBJECTIVE 4

IMPROVE DATA COLLECTION AND REPORTING

ACTION INITIATIVES	SUB-ACTIONS	RESPONSIBILITY	ACTION YEAR
12. Conduct and prepare crash analyses, including updating crash profiles and the regional High-Injury Network.	12.1 Analyze crashes to understand high-risk actions, pre-crash activities and demographics to further build out crash profiles.	DRCOG	2021
	12.2 Create a story data platform on the Regional Data Catalog to enhance the Regional Vision Zero toolkit and provide local governments with easy access to quick analysis of area type crash profiles.	DRCOG	2021
	12.3 Facilitate training sessions for local jurisdictions on how to download and use the regional crash data for detailed analysis of crash locations in local jurisdictions.	DRCOG CDOT Local Governments	2021
13. Update the publicly available crash database and improve the timeliness of fatal and serious-injury crash data processing and reporting.	13.1 Work with the Colorado Department of Revenue to periodically update the crash form and to improve the quality of crash form completeness, improve value of data analysis, emphasizing data collection on speed, impairment, distractions and use of emerging mobility options like e-scooters and ride-hailing services at locations where crashes caused death or serious injury.	CDOT Colorado Department of Revenue DRCOG	2020
14. Establish and deploy a regional or local response team to investigate fatal crashes and evaluate crash locations for safety enhancements.	14.1 Create data to track crash investigation findings.	DRCOG CDOT Local Governments Local Police Advocacy Organizations	2021
15. Annually perform posted speed data collection on the regional High-Injury Network to identify places where speed-related engineering measures or enforcement is necessary.	15.1 Develop and maintain a database of collected posted speed data.	DRCOG CDOT	2022

TRACKING PROGRESS:

11. frequency of crash profiles and regional High-Injury Network updates
12. timing of fatal and serious-injury crash data availability
13. number of site visits by response teams
14. mileage of roadways with available posted speed data

OBJECTIVE 5

INCREASE FUNDING AND RESOURCES

ACTION INITIATIVES	RESPONSIBILITY	ACTION YEAR
16. Modify Transportation Improvement Program criteria to prioritize safety projects on the regional High-Injury Network that address key crash profiles, or otherwise reduce killed and serious-injury crashes.	DRCOG	2021
17. Dedicate a Capital Improvement Project funding source for safety improvements, targeting the regional (or local) High-Injury Network or specific crash profiles depending on area type, land use context and street function, with a focus on communities of concern.	Local Governments	2021
18. Dedicate funding and resources to maintenance of facilities that enhance safety.	CDOT Local Governments	2021
19. Research and identify grants as potential funding resources for local governments and provide data and analysis for applications and letters of support.	DRCOG	2020

TRACKING PROGRESS:

15. annual regional and local funding dedicated to traffic safety projects

OBJECTIVE 6

INCREASE LEGISLATIVE SUPPORT

ACTION INITIATIVES	RESPONSIBILITY	ACTION YEAR
20. Pursue legislation to increase funding and evaluate reallocation of existing funding to safety projects to create a reliable, dedicated funding stream.	DRCOG	2020
21. Pursue legislation that enables approaches to setting speed limits that reduce vehicle operating speed and crash severity, such as the injury minimization/safe system approach.	DRCOG	2022
22. Support legislation that requires motorcycle drivers and passengers to wear helmets.	DRCOG	2021
23. Support legislation that establishes a primary seatbelt law.	DRCOG	2023
24. Support legislation to maintain ability to use safety cameras as an enforcement technique, including red-light running and speeding.	DRCOG	2021
25. Re-evaluate legislative priorities as new safety research arises.	DRCOG	2020

TRACKING PROGRESS:

16. number of transportation safety-related bills supported, pursued, and passed annually

Additional Active Efforts

Local governments can look to their peers across the nation and partner agencies in the region for inspiration or guidance in implementing Vision Zero

LOCAL GOVERNMENTS

More than 20 cities in the United States have made Vision Zero commitments. Several DRCOG local governments have taken steps toward Vision Zero. The City of Boulder adopted Vision Zero in 2014 as part of the City's Transportation Master Plan and the County of Boulder adopted a target of zero serious-injury or fatal crashes in unincorporated Boulder by 2035. The City and County of Denver adopted the Denver Vision Zero Action Plan in 2017, a five-year plan to achieve zero traffic deaths and serious injuries by 2030. The City of Brighton launched the Vision Zero and School Zone Safety Action Plan currently pending formal adoption, the city has been actively working on eliminating traffic deaths by following the actions outlined in the plan.

COLORADO DEPARTMENT OF TRANSPORTATION

The Colorado Department of Transportation is committed to a vision for Colorado where all people using any transportation mode arrive at their destination safely. CDOT is currently developing the 2020-2023 Strategic Transportation Safety Plan that identifies strategies for CDOT as well as every agency and jurisdiction in the state to cooperatively eliminate transportation system fatalities and serious injury crashes. DRCOG has developed Regional Vision Zero to complement and support CDOT's commitment to achieving zero fatal and severe injury crashes on roadways throughout Colorado.

LOCAL ADVOCACY

Advocacy organizations in the Denver region are actively involved in Vision Zero. The Denver Streets Partnership, which operates within the City and County of Denver, has established its Vision Zero core principles and has identified priority implementation actions related to street design, street operations, enforcement and funding. Elsewhere, although not specifically called out within advocacy agendas, organizations such as Bicycle Colorado and Community Cycles in Boulder are actively engaged in local governments' safety efforts including planning, design, implementation and culture change.

How Local Governments Can Stay Engaged

DRCOG has made a Vision Zero commitment and is dedicated to the action initiatives detailed in this plan. Local governments can use DRCOG as a resource and participate in the future of Vision Zero in the region by:

• **Participate in the Regional Vision Zero Working Group –** Local governments can have key representatives join the working group.

• **Participate in Training Opportunities –** Local governments can facilitate their staff and residents to participate in training opportunities communicated by DRCOG.

• **Collect data –** The continuous improvement and availability of crash data and traffic safety information is a priority for DRCOG. Local governments should consult with DRCOG for data questions and assistance understanding and applying the data within the regional High-Injury Network.

• **Apply for Grants –** Local governments can track updates on available funding and grants for safety projects and apply for funding for safety projects or programs.

• **Join the Vision Zero Network –** Local governments can join the Vision Zero Network, become a Vision Zero community and stay involved with evolving research and training on Vision Zero through this national group.


Welton
FOURTEENTH ST
NO DOUBLE TURN
ONE WAY
ONLY
ONE WAY
HUMMER
Jeep
THE DENVER ATHL
WELCOMES

DATA USED FOR ANALYSIS

The data source for this plan is the Denver Regional Council of Governments-Colorado Department of Transportation traffic crash database. This database is a collaborative effort among multiple local government and law enforcement agencies. When crashes involving vehicles occur, officers fill out a crash form and send it the Department of Revenue, which processes the records and enters them into the state's DRIVES database. CDOT receives crash data from DRIVES and processes the data. CDOT staff add an additional crash type field, correct common errors, update location information and normalize the data. CDOT sends the Denver regional crash data to DRCOG to geocode. Once geocoded, CDOT verifies the final product. The database does not include records for crashes not reported to, or by, law enforcement agencies.

This plan focuses on killing and serious-injury (KSI) crashes. To identify this level of crash, crashes that were identified as injury level of "persons with evident, incapacitating injury" and "persons killed" were compiled for years 2013 through 2017.

Given data limitations, it is not possible to determine which individual or person type (for example, the driver, passenger, pedestrian or bicyclist) was injured in a specific crash. For data tabulations, it was assumed that the most vulnerable person was the most likely to suffer the most severe injury. Detailed injury data was not available for this plan. There are also gaps in the data, as most of the crashes do not have all detailed fields available. For example, the age of the person associated with a crash may be available for one crash but not for another. All numbers in this report were derived from available data. Readers are encouraged to consider data constraints while reading T*aking Action on Regional Vision Zero.*

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Esri. "World Hillshade" [basemap]. Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community. Scale Varies. February, 2020. https://esri.maps.arcgis.com/home/item.html?id=f47a5a35be8c41f7890c1763f65a6d9f.

regional vision zero
SAFER STREETS FOR METRO DENVER

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