An aerial, top-down view of a crosswalk on a paved road. Several pedestrians are captured in various stages of crossing the street. The crosswalk consists of white stripes on a dark asphalt surface. The image is partially obscured by a light blue and dark blue graphic overlay on the left side.

2023 Colorado Vulnerable Road User Safety Assessment

*Colorado Department of Transportation
November 15, 2023*



COLORADO
Department of Transportation

This report is prepared solely for the purpose of identifying, evaluating, and planning safety improvements on public roads. It is subject to the provisions of 23 U.S.C. 407, and therefore is not subject to discovery and is excluded from evidence. Applicable provisions of 23 U.S.C. 407 are cited below:

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Any intentional or inadvertent release of this report, or any data derived from its use shall not constitute a waiver of privilege pursuant to 23 U.S.C. 407.

Letter from Executive Director

Dear Fellow Coloradans and Visitors,

I am pleased to present the 2023 Colorado Vulnerable Road User Safety Assessment as an addendum to the 2020-2023 Colorado Strategic Transportation Safety Plan (STSP). Vulnerable road users are increasingly showing as a significant proportion of motor vehicle related fatalities in Colorado, consistently exceeding 15 percent of the state's traffic fatalities since 2016.

This assessment evaluates Colorado's safety performance with respect to non-motorists and their interaction with motor vehicles on all public roads. The application of data-driven analysis as well as collaboration with multidisciplinary partners and safety stakeholders across the state are critical components of this assessment. Specific locations, demographics, and crash characteristics are examined in this assessment along with the summary of consultations with various safety stakeholders at the state and local levels.

This assessment highlights FHWA's Safe Systems Approach, which promotes proactive approaches, equity considerations, and a commitment to advancing transportation safety for all road users. It is the hope that applying these principles will lead to identifying strategies and practices that will achieve a reduction in fatalities and serious injuries statewide.

Thank you to everyone across Colorado who participated in developing this safety assessment. Colorado needs everyone's commitment to work together, including you as a user of the transportation system. Please join CDOT and our safety partners to support this endeavor, and together, let's make our roadways safer for vulnerable road users and save lives.

Sincerely,



Shoshana Lew
Executive Director
Colorado Department of Transportation

Acknowledgements

This Vulnerable Road User Safety Plan is the result of the invaluable input and expertise of many individuals and organizations. It would not have been possible without their assistance, guidance, time and dedication.

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Table of Contents

Executive Summary	ES-1
Introduction.....	1
Section 1 Overview of Vulnerable Road User Safety Performance	2
1.1 Comparison of VRU Safety Performance to Overall Safety Performance	2
1.2 Historical Trends for VRU Fatalities and Serious Injuries	4
1.3 Crash Characteristics	5
1.3.1 Time-Related Crash Analysis	6
1.3.2 Roadway-Related Crash Analysis.....	7
1.4 Colorado vs. National Trends	10
1.5 Summary of Related Plans	12
1.5.1 Safe System Approach.....	12
1.5.2 Analysis of Proactive Methods	13
1.5.3 Equity.....	14
1.5.4 Definition of a Vulnerable Road User	14
1.5.5 Online dashboard	14
Section 2 Summary of Quantitative Analysis	16
2.1 Crash Analysis	16
2.2 Identification of High-Risk Areas.....	16
2.3 Demographic Analysis.....	22
Section 3 Summary of Consultation	25
3.1 Consultation Process.....	25
3.2 Summary of General Findings and Notable Practices from Consultation Process	25
3.2.1 General Findings.....	25
3.2.2 Notable Practices.....	26
3.3 Priority Location Findings	26
Section 4 Program of Projects and Strategies	28
4.1 Priority Location Program of Projects	28
4.2 Program of Recommended Strategies.....	32
4.2.1 VRU - Crash Types.....	32
4.2.2 VRU Exposure Data.....	32
4.2.3 VRU-Specific and/or Expanded Road Safety Audits (RSAs)	33
4.2.4 CDOT Regional Bicycle and Pedestrian Safety Studies.....	33

4.2.5	Repeat Demographic Data Analysis	33
4.2.6	Before and After Studies.....	34
4.2.7	Professional Education.....	35
4.2.8	Inventory of Vulnerable Road User Infrastructure	35
4.2.9	Expand Data Sources to Enable Proactive Approach	35
4.2.10	Address Priority Locations.....	36
Section 5	Overview of the Safe System Approach	37
5.1	Vulnerable Road User Safety Performance	37
5.2	Summary of Quantitative Analysis	37
5.3	Summary of Consultation	38
5.4	Program of Projects and Strategies	38
5.4.1	Program of Projects.....	38
5.4.2	Program of Strategies.....	38



List of Figures

Figure 1: VRU versus All Fatalities.....	2
Figure 2: VRU versus All Serious Injuries	3
Figure 3: VRU versus All Fatalities and Serious Injuries.....	3
Figure 4: VRU as a Percentage of All Fatalities and Serious Injuries	4
Figure 5: Pedestrians Involved in Serious Injury or Fatal Crashes	5
Figure 6: Bicyclists Involved in Serious Injury or Fatal Crashes	5
Figure 7: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Time of Day	6
Figure 8: Percent Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Day of Week	6
Figure 9: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Month of Year.....	7
Figure 10: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Location in Roadway	7
Figure 11: VRU Crashes by Functional Classification (Locally-Owned Roads)	8
Figure 12: VRU Crashes by Functional Classification (State-Owned Roads).....	8
Figure 13: VRU Crashes per Mile by Functional Classification (Locally-Owned Roads).....	9
Figure 14: VRU Crashes per Mile by Functional Classification (State-Owned Roads)	9
Figure 15: Percent of VRU Crashes by Number of Lanes.....	10
Figure 16: VRU Crashes by Lighting Condition	10
Figure 17: Colorado VRU Fatalities	11
Figure 18: National VRU Fatalities	11
Figure 19: Colorado versus National VRU Fatality Rates per 100,000 population.....	12
Figure 20: Pedestrian Sliding Windows Visualization on State-Owned Roads.....	18
Figure 21: Bicycle Sliding Windows Visualization on State-Owned Roads.....	19
Figure 22: Pedestrian Sliding Windows Visualization on Locally-Owned Roads	20
Figure 23: Bicycle Sliding Windows Visualization on Locally-Owned Roads.....	21
Figure 24: Map of Colorado Disproportionately Impacted Communities	23
Figure 25: Map of VRU Fatal and Serious Injury Priority Locations.....	31

List of Tables

Table 1: Comparison of VRU Definitions in Current State SHSPs.....	14
Table 2: Expected versus Actual Crash Rates per Census Block Group and per 1,000 population	24
Table 3: Expected versus Actual Crash Rates by Number of DIC Factors.....	24
Table 4: Thirty-Nine VRU Fatal and Serious Injury Priority Locations	28

Appendices

Appendix A: Related Plan Summaries.....	A-1
Appendix B: Consultation Meeting Notes	B-1
Appendix C: Priority Location Cut Sheets	C-1
Appendix D: TAC Meeting Notes and Presentations	D-1

List of Abbreviations

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ADOT	Arizona Department of Transportation
ADT	Average Daily Traffic
ANSI	American National Standards Institute
BIL	Bipartisan Infrastructure Law
CDOT	Colorado Department of Transportation
CEJST	Climate and Economic Justice Screening Tool
DIC	Disproportionately Impacted Community
DOT	Department of Transportation
DRCOG	Denver Regional Council of Governments
ES80	EnviroScreen Score > 80
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
GIS	Geographic Information System
HIN	High-Injury Network
HSIP	Highway Safety Improvement Program
OTIS	Online Transportation Information System
PBCAT	Pedestrian and Bicycle Crash Analysis Tool
ROW	Right of Way
RRFB	Rectangular Rapid-Flashing Beacon
RSA	Road Safety Audit
SHSP	Strategic Highway Safety Plan
SSA	Safe System Approach
SSPF	Safer Streets Priority Finder
STEP	Safe Transportation for Every Pedestrian
TAC	Technical Advisory Committee
USDOT	United States Department of Transportation
VRU	Vulnerable Road User

Executive Summary

Vulnerable Road User Safety Assessment and the Safe System Approach

The 2021 Bipartisan Infrastructure Law (BIL) requires each state to identify areas where people who ride bikes and walk are at higher risk of being involved in a crash that results in a death or serious injury, and work towards making those locations and populations safer. The Vulnerable Road User Safety Assessment is a high-level plan that considers both safety and equity across the roadway system and uses a Safe System Approach (SSA) as its guiding principle. The Safe System Approach aligns closely with Vision Zero efforts using the following principles:

» **Death and Serious Injuries are Unacceptable**

People should be able to use the roads without fear of being injured or killed.

» **Humans Make Mistakes**

People make mistakes that sometimes lead to crashes, but the roadway system and vehicles can be designed and operated so that crashes do not result in deaths or serious injuries.

» **Humans are Vulnerable**

Human bodies have limits to how much energy and force they can withstand before they are injured. The roadway system should be human-centric and accommodate these limits.

» **Responsibility is Shared**

Everyone involved in the transportation system has a part in making the system safe. The people who design, build, and maintain roads; everyone who travels on them; the people who design and build vehicles, bicycles and other devices that are used to navigate them; the people who make and enforce safety laws; and the people who respond to crashes when they occur; all have a role to play in the safety of the whole system.

» **Safety is Proactive**

We need to identify the conditions in which crashes are more likely to occur, and work towards preventing them before they happen.

» **Redundancy is Crucial**

A safe transportation system requires the use of multiple safety features so that if one safety feature fails, the other ones still protect people.



Source: FHWA.

For more information:

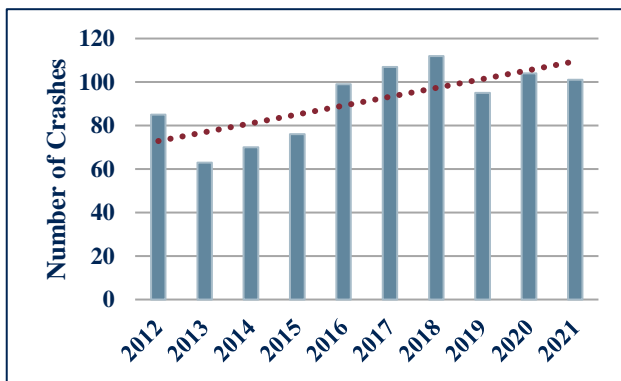
- » Vulnerable Road User Safety Assessment: <https://highways.dot.gov/safety/hsip/vru-safety-assessment-guidance>
- » Vision Zero and the Safe System Approach: <https://highways.dot.gov/safety/zero-deaths>

Colorado’s Vulnerable Road User Safety Assessment

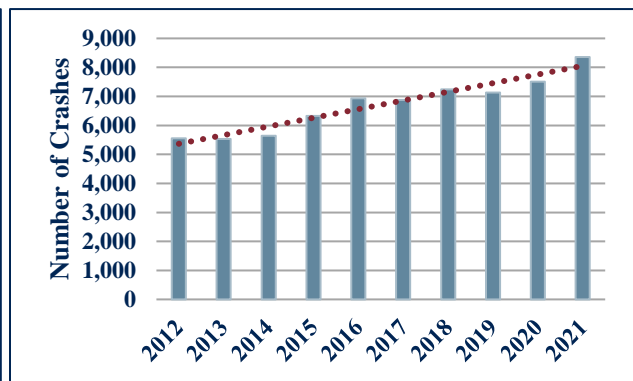
Colorado’s VRU Safety Assessment is a roadmap that describes safety issues facing people walking and bicycling in the state and how to best address them. It is a high-level planning document that begins the process of applying the Safe System Approach to roadway safety for VRUs. For this plan, a VRU is defined as people walking, riding bicycles and rideable toys (e.g. scooters or skateboards), people using personal mobility devices (e.g. walkers or wheelchairs), and people on foot working in work zones. People walking, riding rideable toys, using mobility devices, and working in work zones are all considered pedestrians, and are not distinguishable without reading crash reports which were not obtained for this plan.

Crash Characteristics

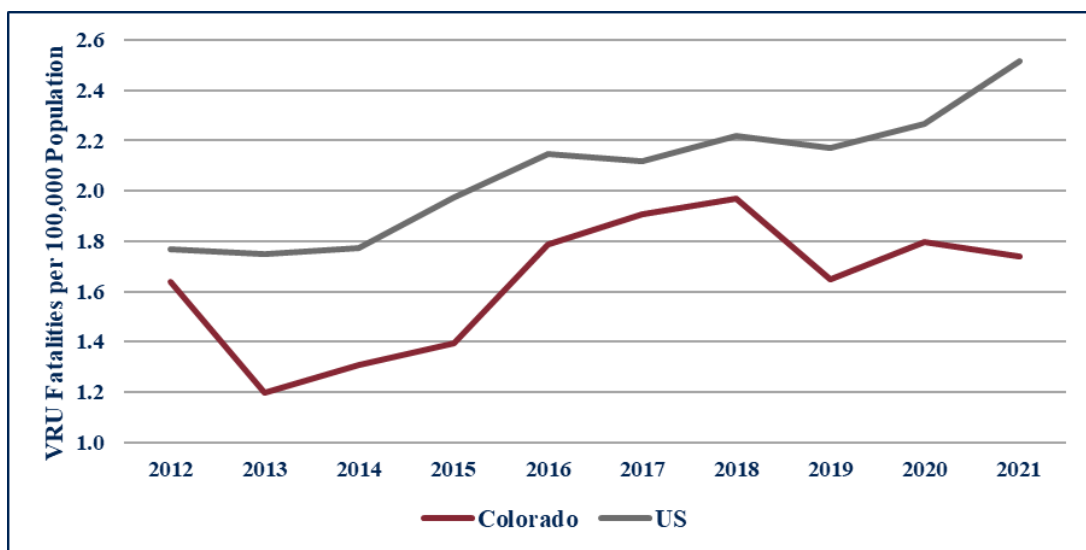
Using VRU fatal and serious injury crash data from 2012 through 2021, this planning effort first analyzed the overall VRU fatal and serious injury crash statistics and the roadway conditions where these crashes are most common. VRU fatal crashes have been increasing both nationally and in Colorado for at least 10 years however the rate of these crashes per 100,000 population remains lower in Colorado than in the United States as a whole. More recent data were not available at the time this assessment was started, however preliminary data from 2022 and 2023 show that the trend has not changed.



Colorado VRU Fatalities

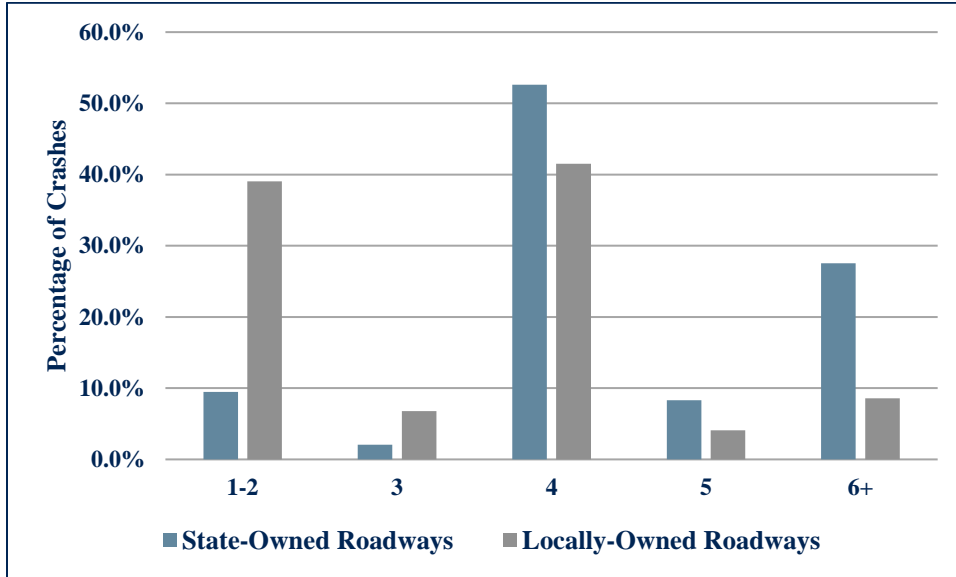


National VRU Fatalities

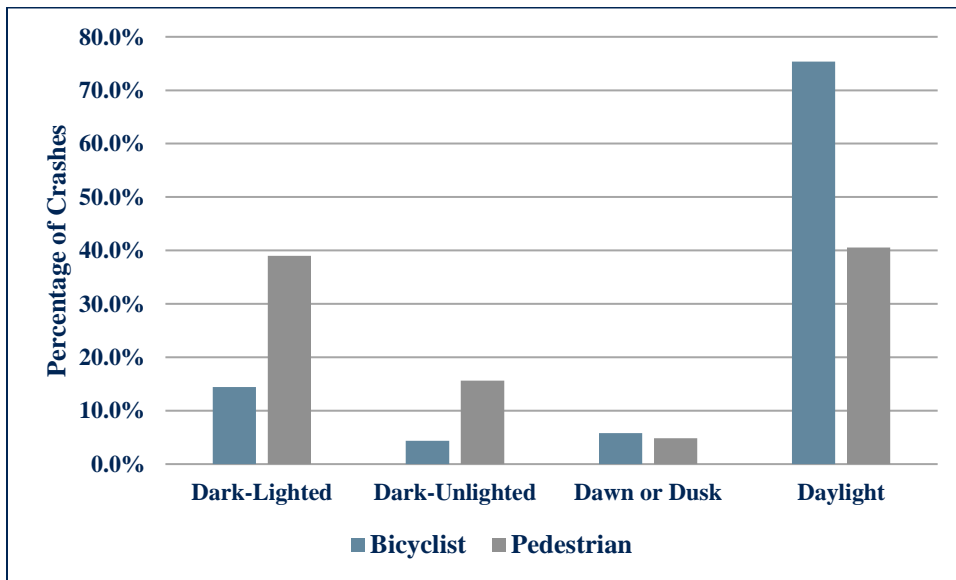


VRU Fatality Rate per 100,000 Population

For state-owned roadways, most VRU fatal and serious injury crashes occur on four- and six-lane roadways, while for locally-owned roadways, the majority of VRU crashes occur on one- or two-lane roadways and four-lane roadways. Most bicyclist fatal and serious injury crashes occur during daylight hours, while for pedestrians, more occur during nighttime conditions.



Percent of VRU Fatal and Serious Injury Crashes by Number of Lanes



Percent of VRU Fatal and Serious Injury Crashes by Lighting Condition

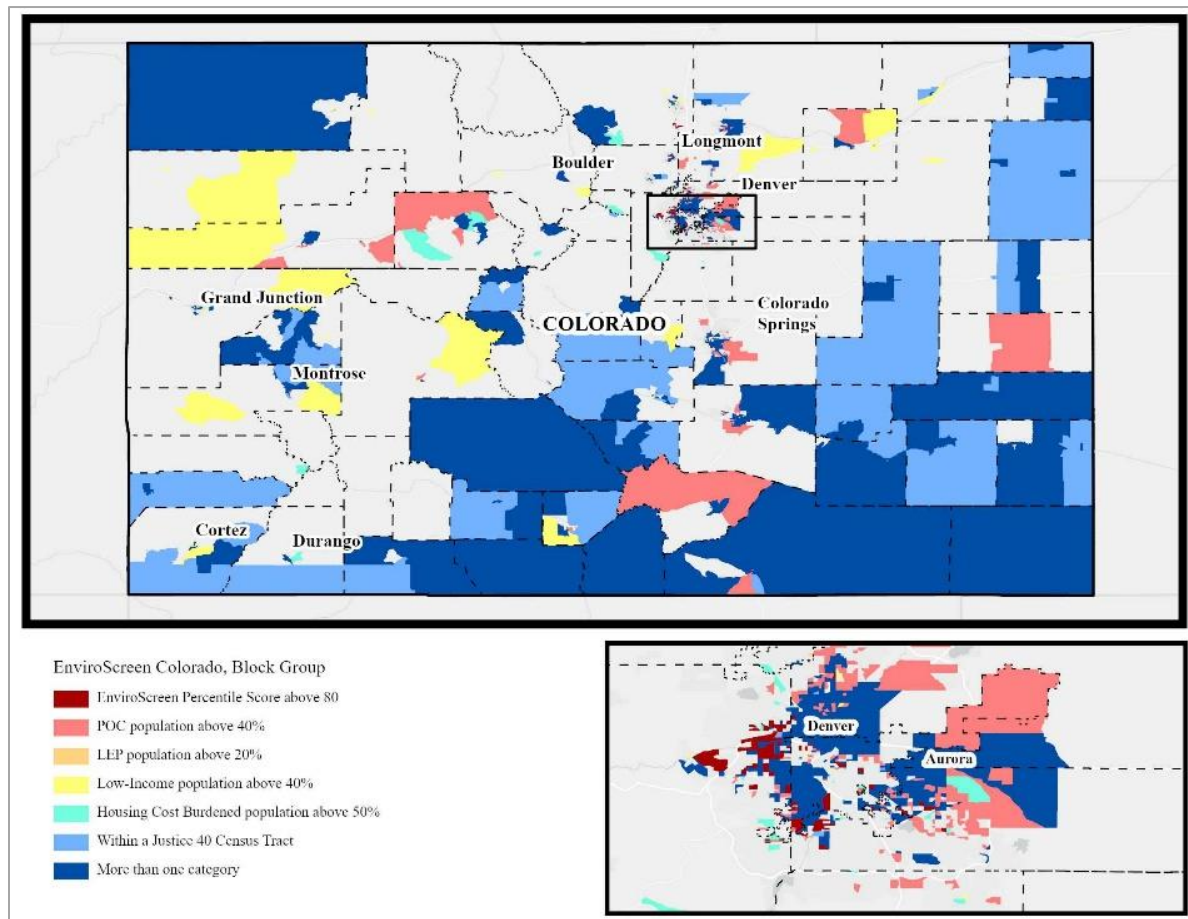
For a more detailed look at VRU fatal and serious injury crash characteristics, see Section 1 – Overview of Vulnerable Road User Safety Performance.

High-Injury Networks and Demographic Analysis

An equity analysis was performed using state-mandated data supplied by the Colorado Department of Health and Environment. This data is compiled into an on-line tool called EnviroScreen, (<https://cdphe.colorado.gov/enviroscreen>) which defines five categories of disadvantage:

- » Low-income population above 40%
- » People of color population above 40%
- » Housing cost burdened population above 50%
- » Linguistically isolated households above 20%
- » Federal Climate and Environmental Justice Screening Tool Communities (CEJST/Justice40)

EnviroScreen data is divided into census block groups, which are geographic areas created by the US Census Bureau that generally contain between 600 and 3,000 people. Census block groups that fall into at least one of these categories of disadvantage are designated Disproportionately Impacted Communities (DICs). Scores are also tallied and combined. The combined score is called the EnviroScreen score. Census block groups that fall into the top 80th percentile on the EnviroScreen score – designated as ES80 – are the most disadvantaged. The map below shows areas of the state that are considered either a DIC or ES80 community.



Map of Colorado Disproportionately Impacted Communities

By overlaying the equity map with VRU fatal and serious injury crash data, it was determined that if VRU fatal and serious injury crashes were equitably distributed across the state, each census block group would have a crash rate of 0.48 per 100,000 population. The actual crash rate for non-DIC block groups is significantly lower at 0.34 per 100,000 population, while in DIC communities it is significantly higher at 0.67. ES80 communities have the highest rate at 1.01 per 100,000 population. A more in-depth equity analysis can be found in Section 2.3 – Demographic Analysis.

Maps were created to show where high concentrations of VRU fatal and serious injury crashes are occurring, called High-Injury Networks (HINs). Four separate HINs were created depicting the following:

- » Pedestrian Crashes on State-Owned Roads
- » Bicyclist Crashes on State-Owned Roads
- » Pedestrian Crashes on Locally-Owned Roads
- » Pedestrian Crashes on Locally-Owned Roads

Maps of the HINs and an explanation of how they were created can be found in Section 2 – Summary of Quantitative Analysis. The majority of VRU fatal and serious injury crashes occur in the more populous areas of Colorado, including the Denver, Boulder, and Colorado Springs areas.

Consultation with Affected Communities

Agencies who own at least two of the top-ten locations in each of the HINs were consulted with in order to gain a better understanding of safety issues facing people who walk and ride bicycles in their communities. Discussion began around general safety complaints, and yielded the following insights:

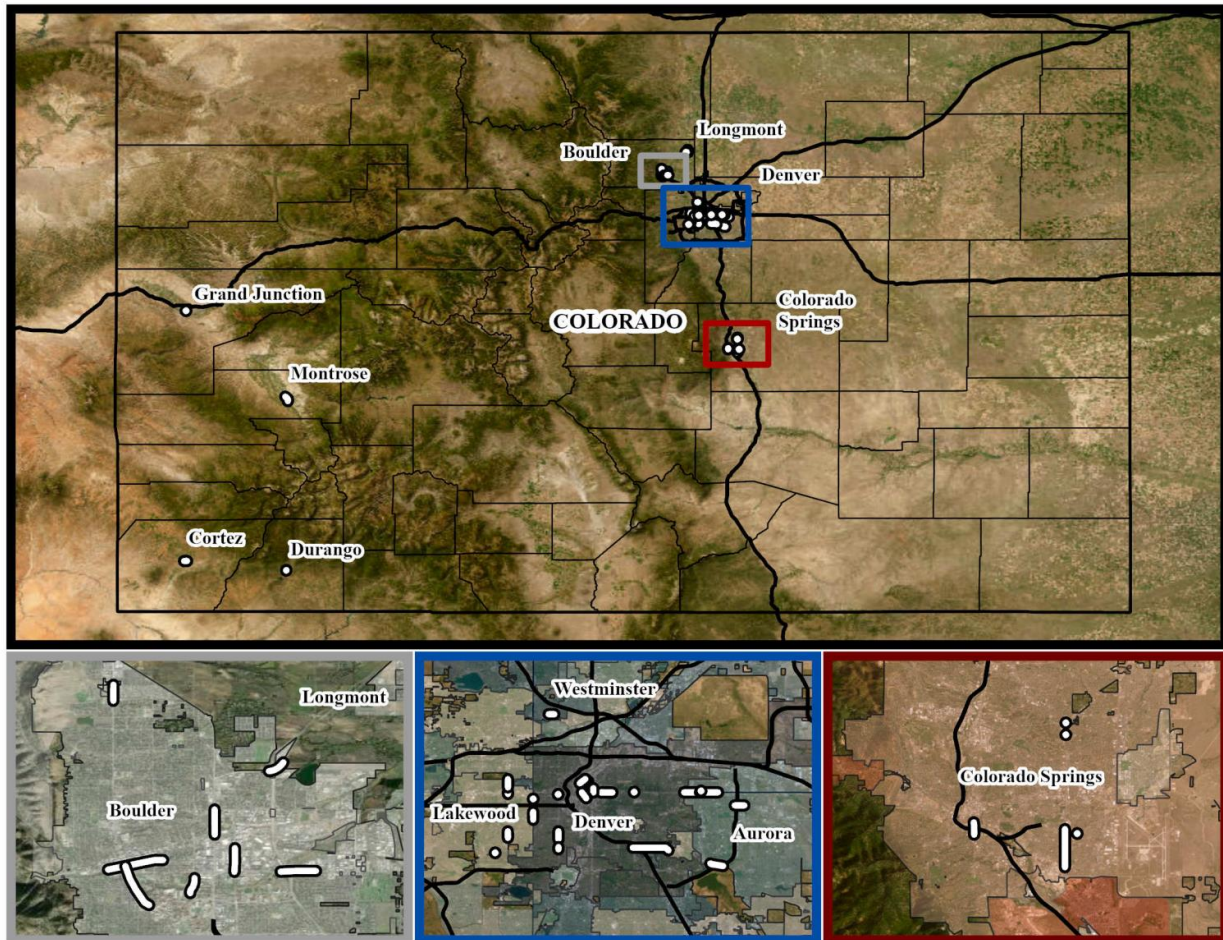
- » Pedestrians are concerned about drivers not stopping for people crossing the street, and often request new crosswalks at intersections, and in between when distances to the nearest intersection are too long. Speeding was also noted as a safety concern.
- » Bicycle riders are concerned about both a lack of bike lanes and – where bike lanes exist – a lack of adequate separation from cars. Like pedestrians, bicycle riders noted that drivers often do not yield to bicyclists trying to cross the roadway.
- » Many agencies report a general hostility towards bicycle riders, and complaints about bicyclists simply being on the road are not uncommon.
- » Nearly every agency mentioned a lack of funding for bicycle and pedestrian safety improvements, and several mentioned political and policy barriers to lowering speed limits.

The HIN locations were discussed with each agency. Agency employees generally seemed well-aware of most locations, and reported that many had safety improvements already made, or were planned for the near future. Agencies were also given an opportunity to suggest additional locations to be researched.

In addition to transportation agencies, meetings were held with a state-wide and a local bicycle advocacy organization, and with the Colorado Department of Public Health and Environment. A total of 15 consultation meetings were held. A summary of findings from these meetings can be found in Section 3 – Summary of Consultation, and notes from each meeting are detailed in **Appendix B**.

Recommendations

The HIN and consultation processes yielded a final list of 39 priority locations throughout Colorado. These locations are shown in the map below and listed in Section 4 Program of Projects and Strategies. A map of each location with information about crashes, roadway ownership and design features, recent or planned safety improvements, and recommendations can be found in **Appendix C**.



Map of Priority Locations for VRU Safety

A detailed list of recommended strategies to improve VRU safety can also be found in Section 4. These include strategies for:

- » Gaining a better understanding of the movements of bicycle riders, walkers and vehicle drivers that are resulting in crashes;
- » Gaining a better understanding of how many people are walking and riding bikes and where;
- » More in-depth examinations of roadway locations for safety issues important to people walking and riding bicycles;
- » Monitoring progress towards eliminating roadway safety inequity;
- » Gaining a better understanding of what types of safety projects work best in Colorado;

- » Providing safety education for people who are responsible for designing, operating and maintaining roadways, and enforcing safety laws;
- » Gaining a better understanding of where sidewalks and bike lanes exist and where there may be missing segments;
- » Using expanded data sources to be able to predict where crashes will happen regardless of whether crashes have occurred there; and
- » Ensuring that the 39 priority locations are addressed and monitored for improvements in VRU safety.

From an equity perspective, the identified priority locations and potential improvements will improve traffic safety inequity in Colorado, as 92% are in disadvantaged areas, with 72% in the highest level of disadvantage.

**92% of priority locations are in disadvantaged communities.
72% are in communities at the highest level of disadvantage.**

The Safe System Approach in this Assessment

Section 5 – Overview of the Safe System Approach provides a high-level overview of how the Safe System Approach was incorporated into this assessment, including:

- » A focus on fatal and serious injury crashes;
- » The formation of a committee of varied professional backgrounds to guide the process;
- » The use of multiple different data sets and sources to gain a better understanding of VRU safety issues;
- » Correlation of crashes with roadway features;
- » An equity analysis;
- » The development of a High-Injury Network;
- » Consultation with local roadway agencies as well as advocacy and public health organizations; and
- » The development of a program of projects and strategies to address VRU safety and to better align future updates to this assessment with the Safe System Approach.

Since this assessment used only fatal and serious injury crash data, there was not enough data to predict where crashes will occur regardless of crash history. Future Colorado strategic plans and assessments will explore opportunities to incorporate additional safety data, expand outreach efforts with the public and local agencies, and utilize more proactive risk assessment methods to address the limitations that were highlighted in this assessment.

Introduction

The Vulnerable Road User (VRU) Safety Assessment is a new requirement of the Bipartisan Infrastructure Law. Each state is required to use a data-driven process to analyze VRU fatal and serious injury crashes to identify areas of high-risk for VRUs. Vulnerable Road Users are defined as anyone who would be defined as a pedestrian or pedalcyclist in crash data, including bicyclists (and motorized bicycles), pedestrians, people using personal mobility devices, people using rideable toys (both motorized and non-motorized) and people working in roadway work zones. Also required is the consideration of demographic data of the locations of fatal and serious injury crashes, and consultation with local governments, metropolitan planning organizations and regional transportation planning organizations that represent a high-risk area. Finally, each state must develop a program of projects or strategies to reduce safety risks to VRUs in identified high risk areas. Guidance was issued by the Federal Highway Administration on October 21, 2022. ([VRU Safety Assessment Guidance \(dot.gov\)](https://www.fhwa.dot.gov/safety/vru/))

Each state is required to complete an initial assessment by November 15, 2023, and update the assessment on the same schedule as their Strategic Highway Safety Plan (SHSP).

As part of the USDOT's National Roadway Safety Strategy released in January 2022, the Safe System Approach (SSA) was adopted as a guiding principle to advance roadway safety. As described by the FHWA, the SSA involves a paradigm shift to "improve safety culture, increase collaboration across all safety stakeholders, and refocus transportation system design and operation on anticipating human mistakes and lessening impact forces to reduce crash severity and save lives." Understanding this paradigm shift is the key to incorporating the SSA into the VRU Safety Assessment.

Implementing this approach requires a deliberate change from the traditional ways we think about measuring and improving safety – moving from a reactive approach to a proactive one; focusing on countermeasures that reduce deaths and serious injuries; and using design interventions to reduce vehicle speeds rather than relying solely on education and enforcement to encourage people to deliberately slow

down. The paradigm shift illustration on this page shows the differences between the traditional and Safe System approaches. This assessment uses the Safe System Approach as detailed in Section 5 on page 33.



The 2023 Institute of Transportation Engineers' Technical Brief "Institutionalizing the Safe System Approach in Local Road Safety Plans" is a useful resource for identifying opportunities to align the safety planning process with the Safe System Approach.

Section 1 Overview of Vulnerable Road User Safety Performance

The Vulnerable Road User Safety Assessment Guidance document issued by the Federal Highway Administration on October 21, 2022, defines a vulnerable road user as “a nonmotorist with a fatality analysis reporting system (FARS) person attribute code for pedestrian, bicyclist, other cyclist, and person on personal conveyance or an injured person that is, or is equivalent to, a pedestrian or pedalcyclist as defined in the ANSI D16.1-2007”.

Pursuant to the definition of a VRU and instructions contained in the guidance document noted above to “...perform a quantitative analysis of vulnerable road user **fatalities and serious injuries**...”, fatal and serious injury crash data for bicyclists and pedestrians was obtained from CDOT in March 2023. A focus on deaths and serious injuries is consistent with the Safe System Approach. Data is inclusive of the most recent five years available at the start of the project, from 2017 through 2021. Crash data for 2022 was not yet available for analysis. A total of 2,686 bicyclist and pedestrian serious injury and fatal crashes occurred during the time frame of interest, including 87 bicyclist and 444 pedestrian fatalities, and 670 bicyclist and 1,485 pedestrian serious injuries.

1.1 Comparison of VRU Safety Performance to Overall Safety Performance

To more accurately depict longer-term trends, VRU fatal and serious injury crash data from 2012 through 2021 was analyzed for the comparison to overall safety performance trends in Colorado and the US. Between 2012 and 2021, both VRU and traffic-related fatalities show similar increases and decreases in most years, with notable exceptions from 2012 to 2013 and from 2020 to 2021 (**Figure 1**). Serious injury crashes involving VRUs decreased slightly from 2012 to 2013, and again from 2018 through 2019, but increases in other years leaves VRU fatalities at nearly the same level in 2021 as they were in 2012. 2022 crash data (released after the start of this study) and preliminary data for 2023 show that these trends have not changed.

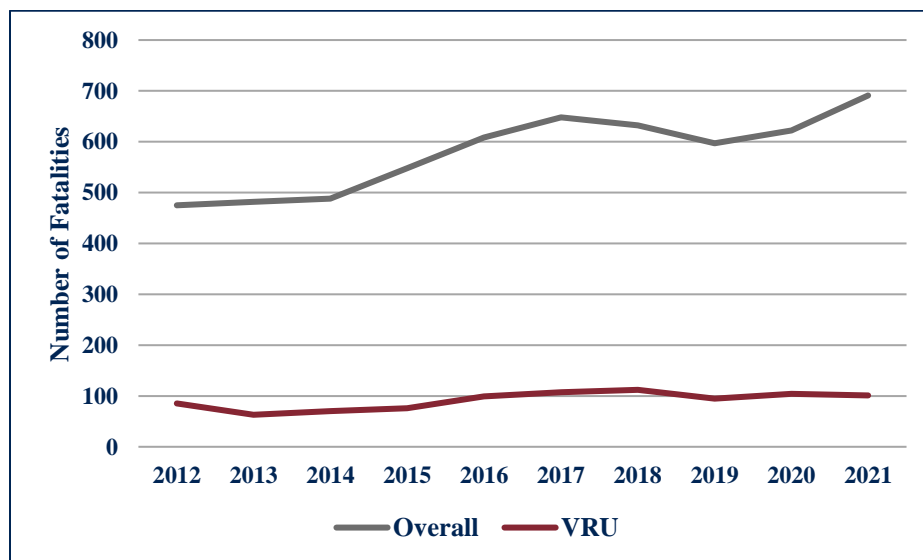


Figure 1: VRU versus All Fatalities

Traffic-related serious injuries overall declined between 2012 and 2017, then increased significantly between 2017 and 2018, and declined between 2018 and 2020. They increased to their highest level in 2021. VRU serious injures increased from 2012 to 2013 then remained relatively unchanged until 2020 when they decreased likely due to the pandemic. VRU serious injuries reverted to pre-pandemic numbers in 2021 (**Figure 2**). 2022 data shows a slight increase in both overall and VRU serious injuries as well. Combining fatal and serious injury crashes yields a very similar pattern (**Figure 3**).

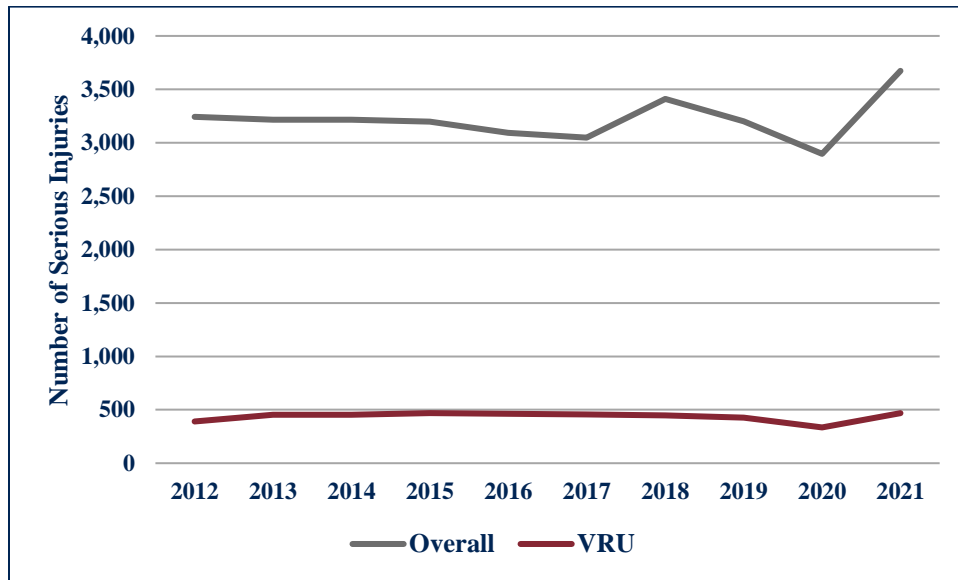


Figure 2: VRU versus All Serious Injuries

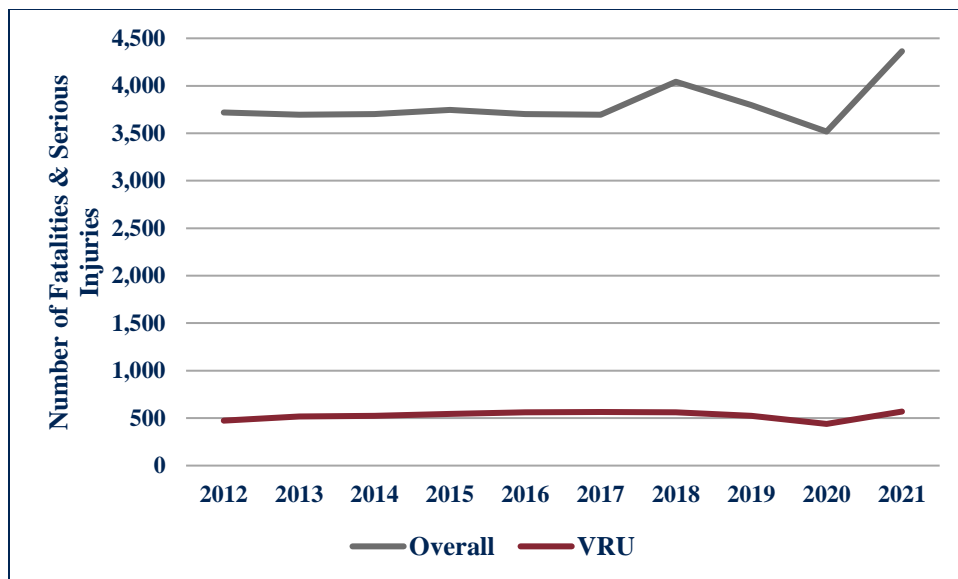


Figure 3: VRU versus All Fatalities and Serious Injuries

1.2 Historical Trends for VRU Fatalities and Serious Injuries

Between 2012 and 2021, VRU fatalities represented between 13.1% (2013) and 17.9% (2012) of all fatal crashes (**Figure 4**). VRU serious injuries ranged between 12.0% (2013) and 15.0% (2016 and 2017) of all serious injuries.

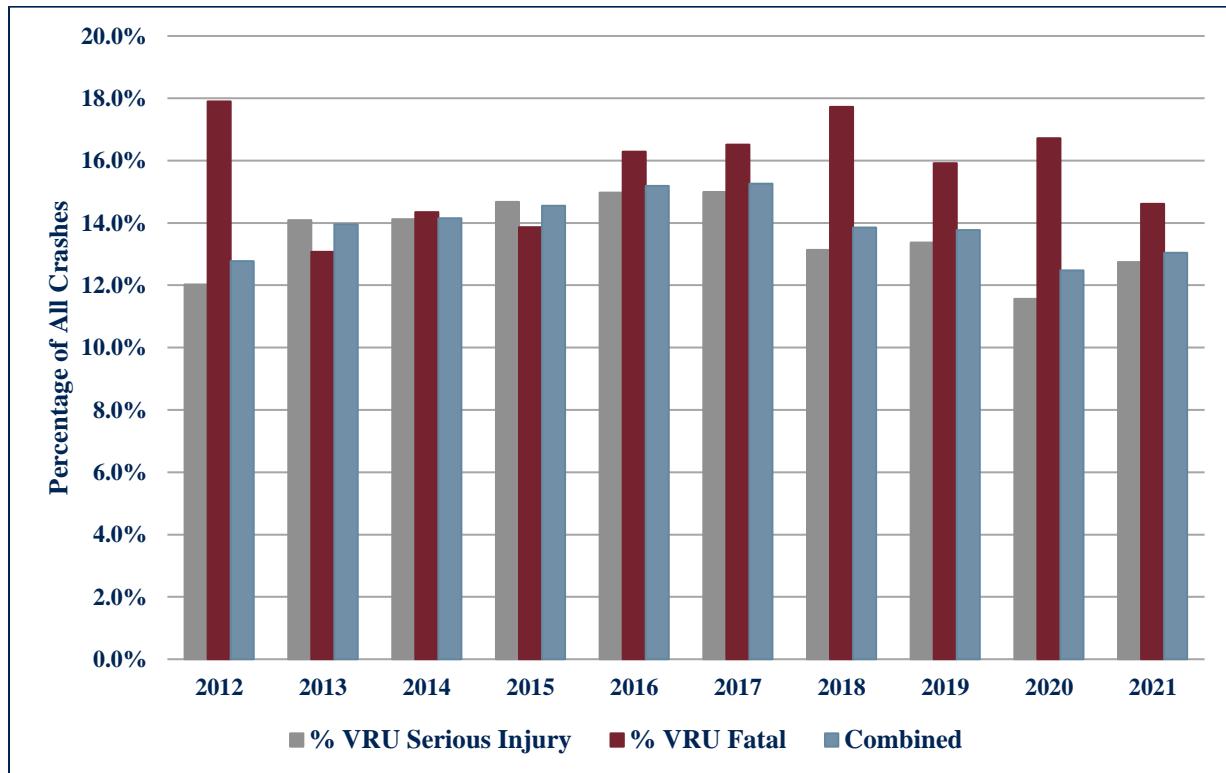


Figure 4: VRU as a Percentage of All Fatalities and Serious Injuries

Serious injuries and fatalities are shown for pedestrians and bicyclists respectively in **Figure 5** and **Figure 6**. Between 2012 and 2021, there were an average of 76 pedestrian fatalities and 15 bicyclist fatalities, with 90 pedestrian fatalities and 15 bicyclist fatalities occurring in 2021, showing an increase in pedestrian fatalities, but no real change in bicyclist fatalities over the 10-year period. Pedestrian serious injuries were lowest in 2013 and 2020 but range between 292 and 313 for all other years. Bicyclist serious injuries began a six-year period of decline in 2015 but show a sharp increase between 2020 and 2021.

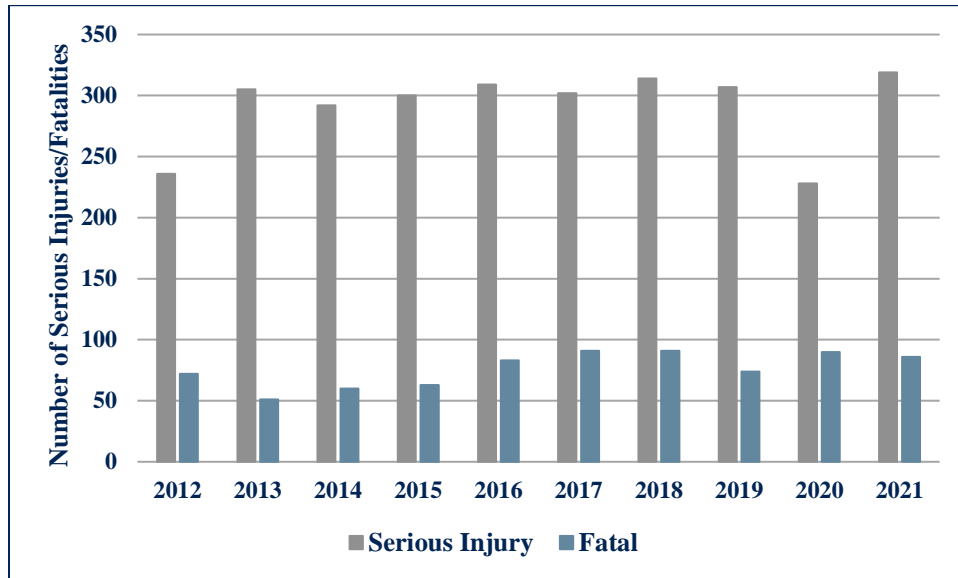


Figure 5: Pedestrians Involved in Serious Injury or Fatal Crashes

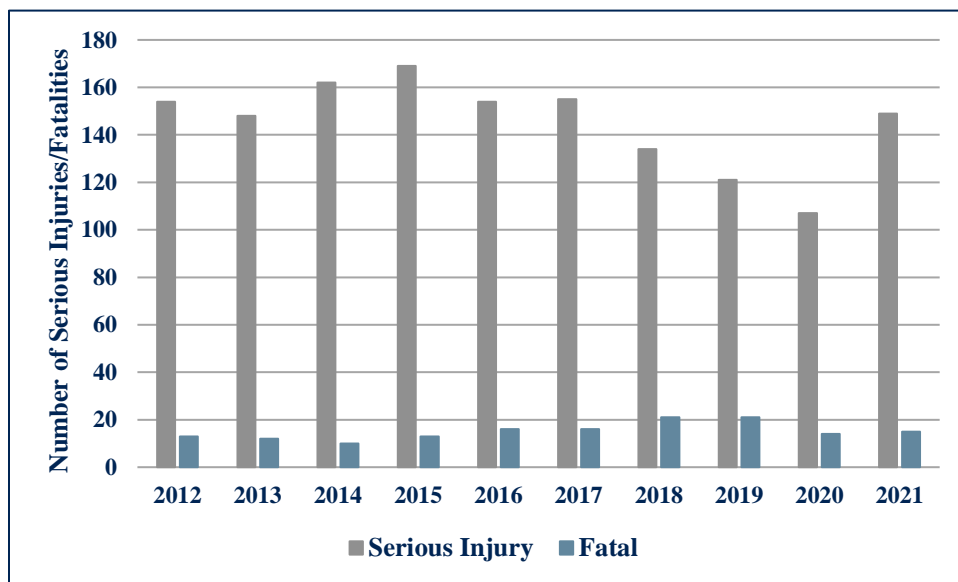


Figure 6: Bicyclists Involved in Serious Injury or Fatal Crashes

1.3 Crash Characteristics

Bicyclist and pedestrian (VRU) fatal and serious injury crashes were analyzed by time of day, day of week, month of year, roadway location and classification and lighting conditions. The SSA approach suggests a more in-depth pair-wise analysis between crash causes and roadway conditions, but this was of limited reliability for this study due to the relatively small number of fatal and serious injury VRU crashes. Using all-severity VRU crashes or obtaining and analyzing near-miss data would enable reliable correlations between crash causes and specific roadway characteristics such as VRU trip generators or roadway design/infrastructure elements, and should be considered for the next VRU Safety Assessment update.

1.3.1 Time-Related Crash Analysis

VRU fatal and serious injury crashes by time of day are shown in **Figure 7**. The number of crashes for bicyclists was highest between 6:00 PM and 10:00 PM, while pedestrian crashes peaked between 10:00 PM and 2:00 AM. VRU fatal and serious injury crashes by day of the week are shown in **Figure 8**. Both bicyclist and pedestrian crashes are lowest on the weekends. Bicyclist crashes are highest Monday through Thursday, while pedestrian crashes peak on Thursday and Friday. Bicyclist crashes peak during the summer, while pedestrian crashes are highest during fall and early winter months (**Figure 9**).

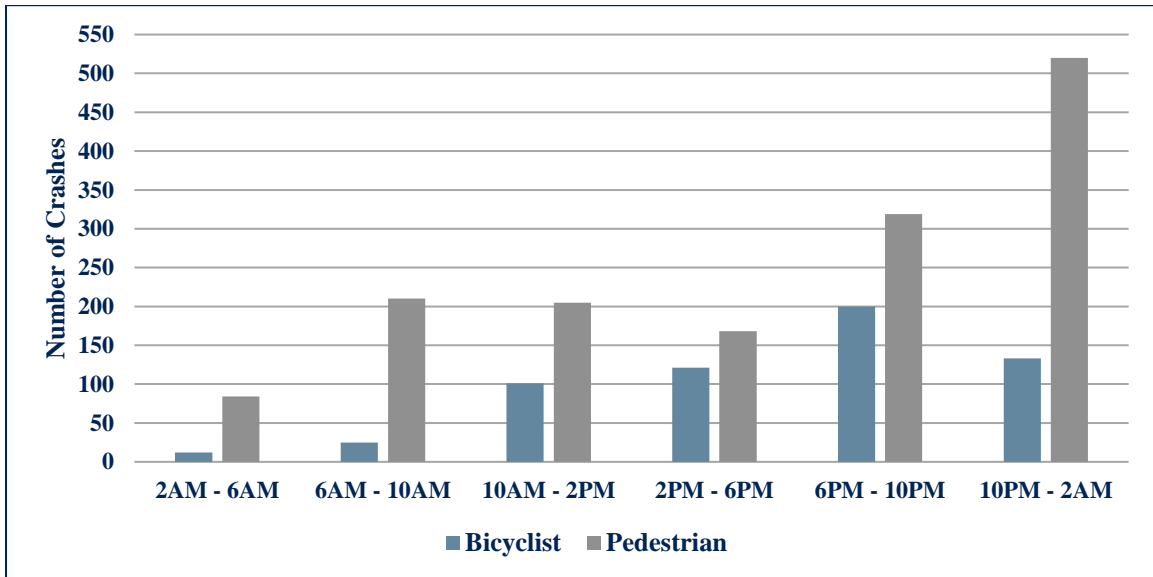


Figure 7: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Time of Day

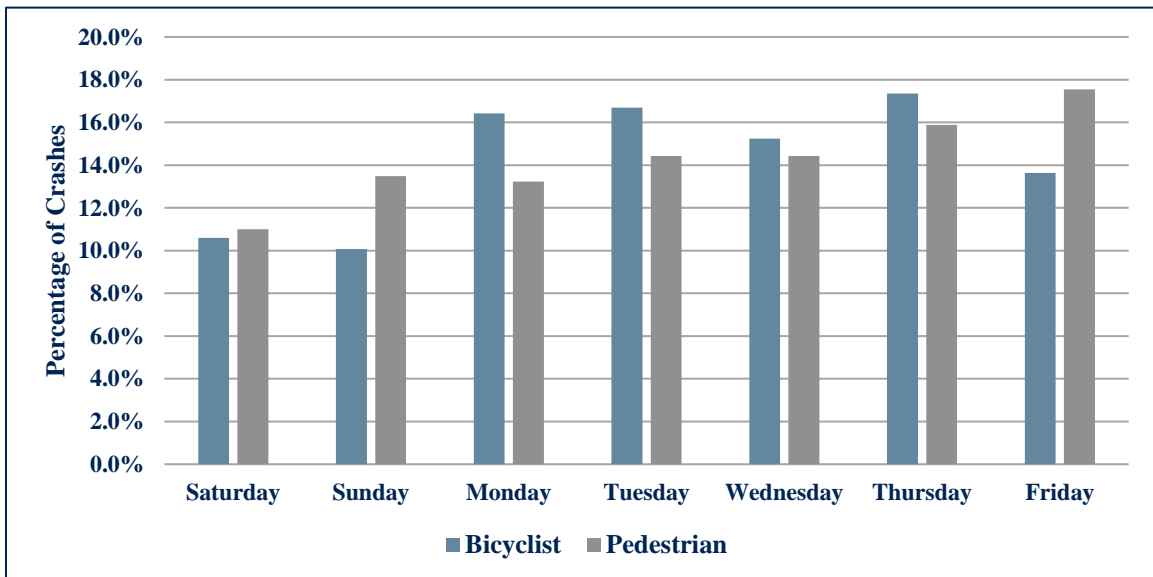


Figure 8: Percent Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Day of Week

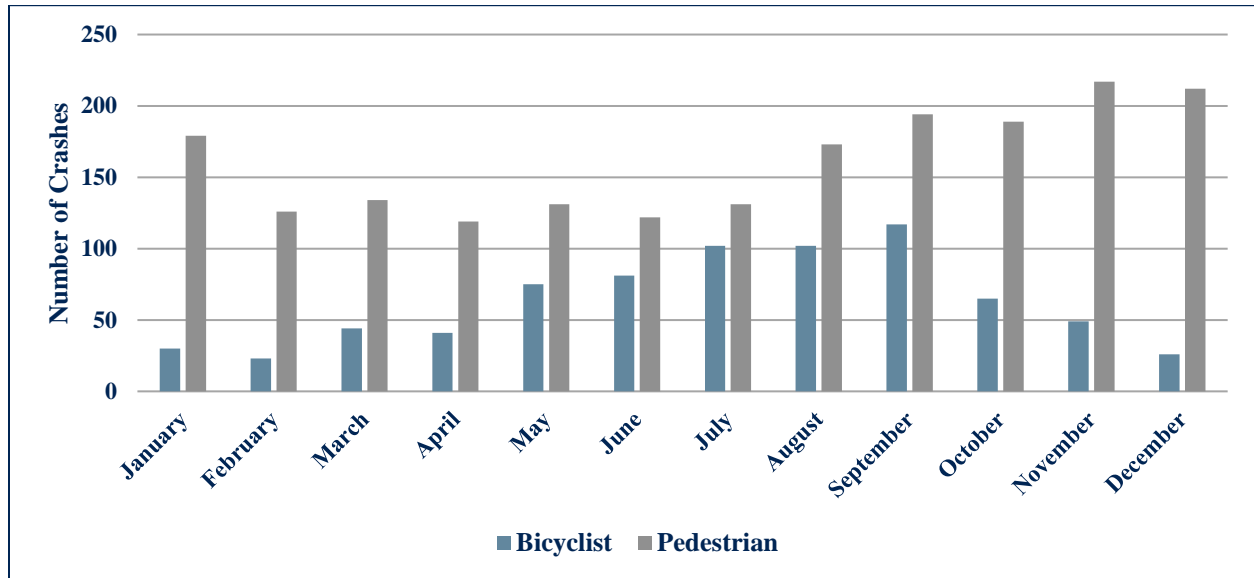


Figure 9: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Month of Year

1.3.2 Roadway-Related Crash Analysis

Bicyclist crashes are more common at intersections than non-intersection locations. Pedestrian crashes are nearly equal between intersection and non-intersection locations. (Figure 10).

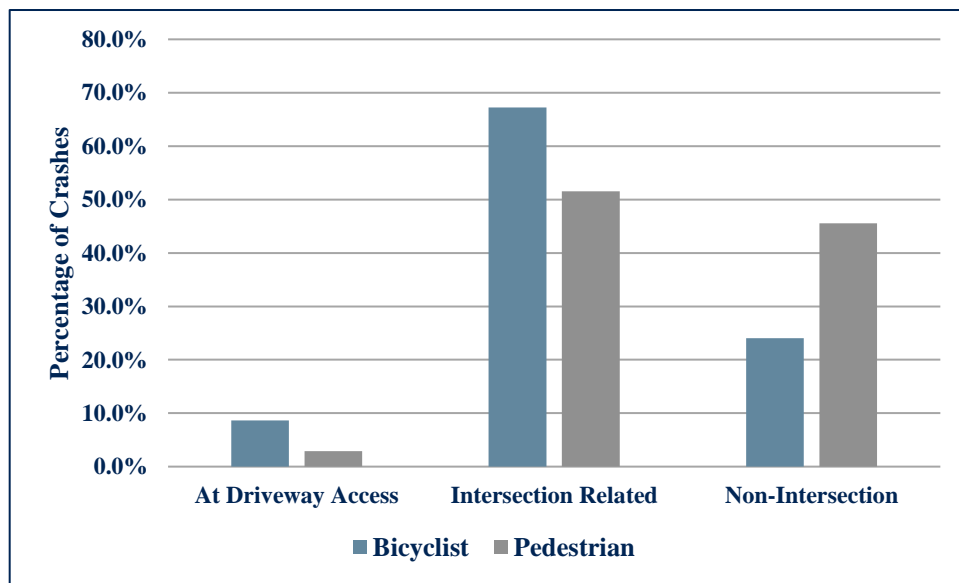


Figure 10: Bicyclist and Pedestrian Fatal and Serious Injury Crashes by Location in Roadway

Crashes by functional classification appear to differ between state-owned and locally-owned roadways. The majority of crashes on state-owned roadways occur on major arterials while on locally-owned roadways occur on minor arterials. (Figure 11 and Figure 12).

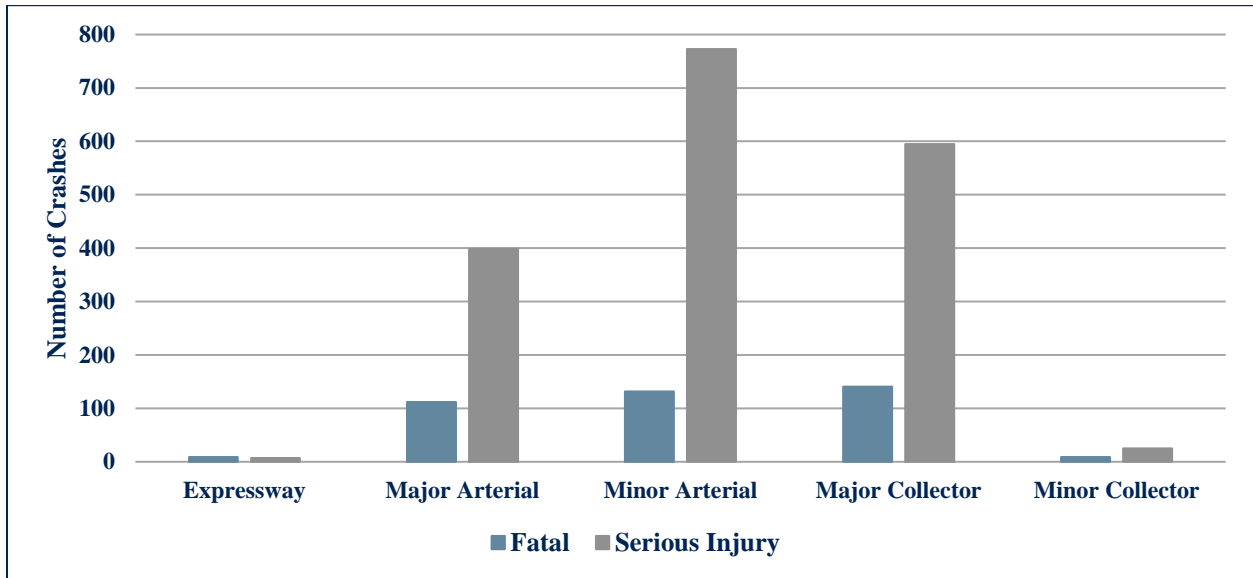


Figure 11: VRU Crashes by Functional Classification (Locally-Owned Roads)

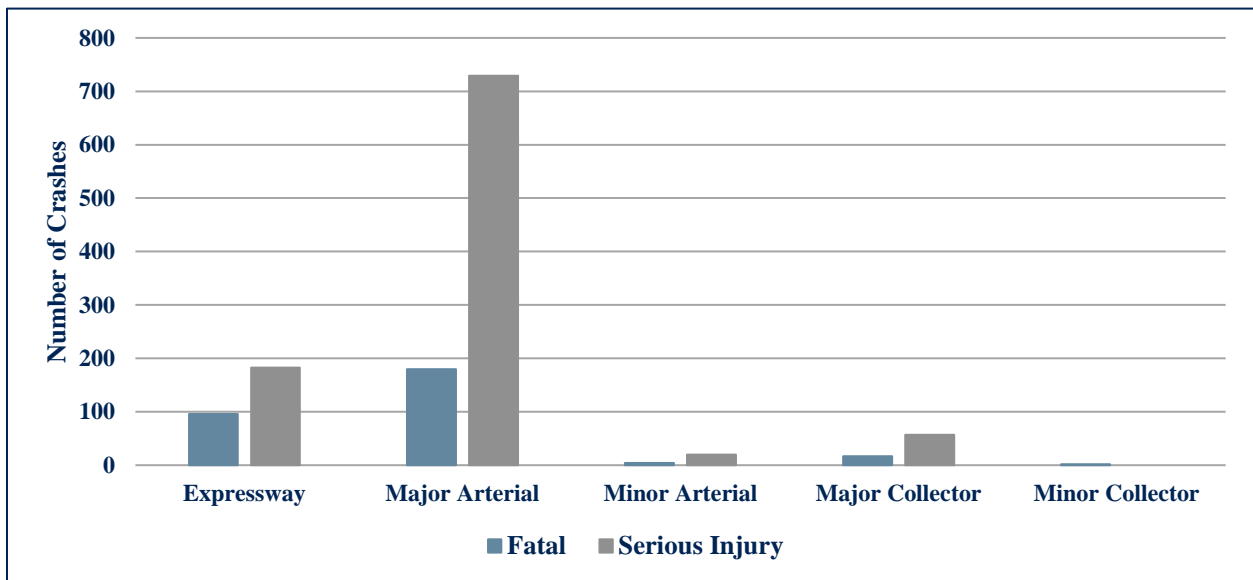


Figure 12: VRU Crashes by Functional Classification (State-Owned Roads)

Normalizing the data by crashes per mile, we see that major arterials have higher crash rates for both state- and locally-owned roadways, followed by expressways (Figure 13 and Figure 14). It is notable, however, that expressways make up 14% of the state-owned roadway system, but less than 1% of locally-owned roads. Given the low percentage of locally owned expressways and low number of VRU crashes, the most critical roadway types for the local system are major and minor arterials.

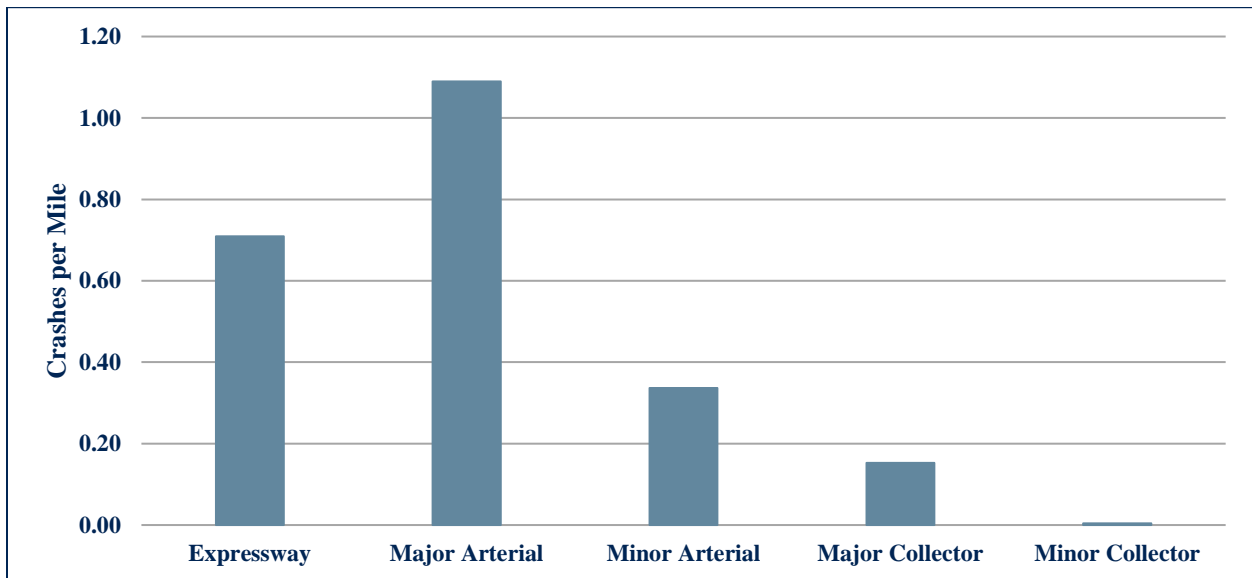


Figure 13: VRU Crashes per Mile by Functional Classification (Locally-Owned Roads)

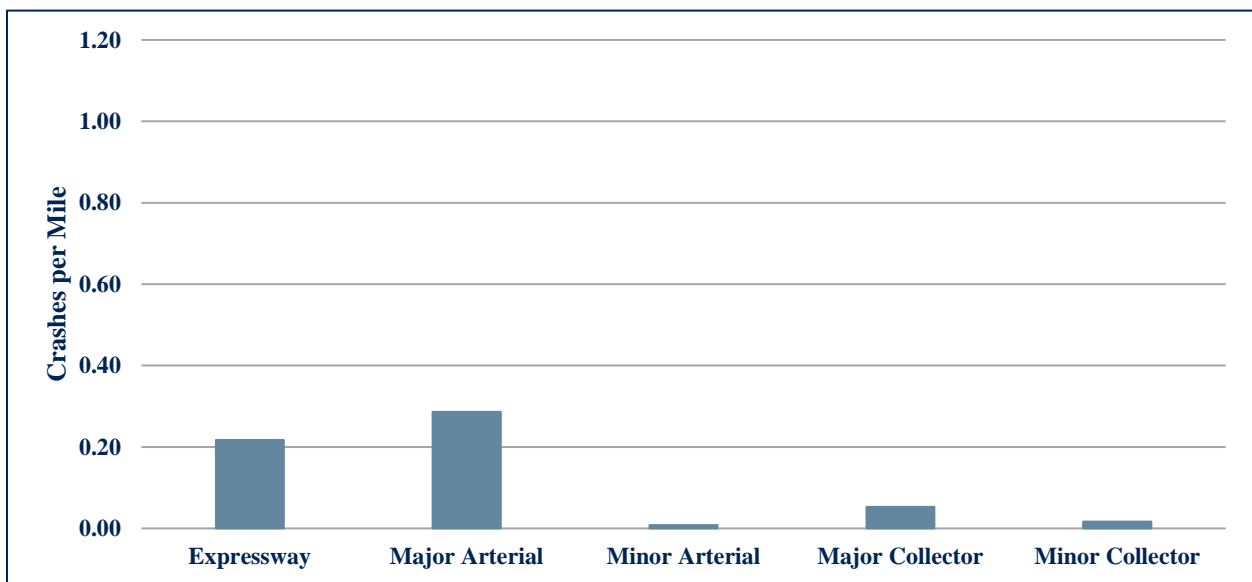


Figure 14: VRU Crashes per Mile by Functional Classification (State-Owned Roads)

The percentage of crashes by number of lanes also differs between state- and locally-owned roadway systems (**Figure 15**). These patterns are likely driven by VRU exposure and the percent of the roadway system that has a given number of lanes.

Low-light conditions can make bicyclists and pedestrians difficult for drivers to see, even on well-lit roadways. Bicyclist crashes overwhelmingly occur during daylight hours, which likely reflects the fact that most bicycle trips are taken during daylight hours. Compared to bicyclist trips, a greater share of pedestrian trips occur after dark, which contributes to the higher share of pedestrian crashes in dark conditions (**Figure 16**).

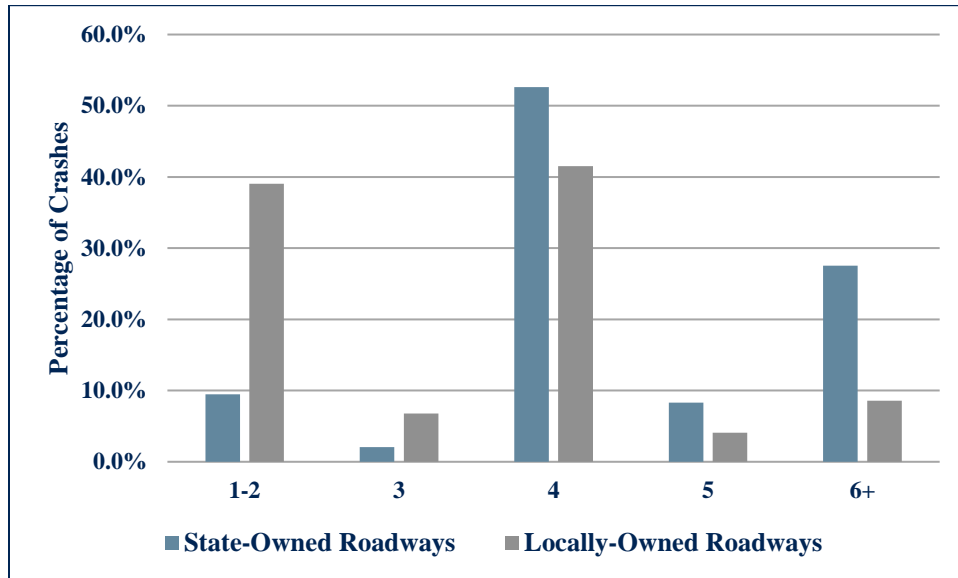


Figure 15: Percent of VRU Crashes by Number of Lanes

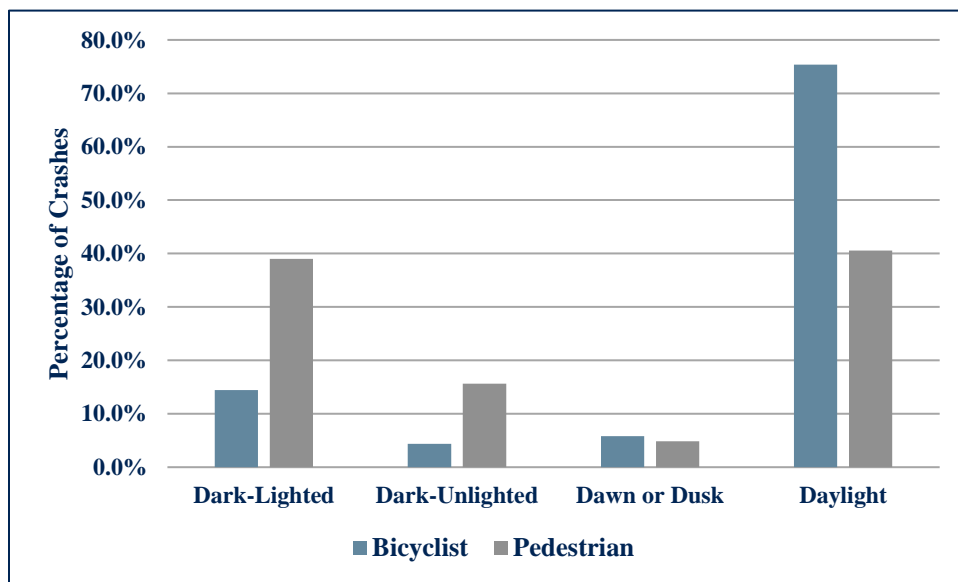


Figure 16: VRU Crashes by Lighting Condition

1.4 Colorado vs. National Trends

Between 2012 and 2021, data from the Fatality Analysis Reporting System (FARS) reveals that VRU fatalities in both Colorado and the US as a whole have been trending upward on approximately the same trajectory (**Figure 17** and **Figure 18**), however Colorado’s VRU fatality rate is consistently lower than the rate per 100,000 population for the nation as a whole (**Figure 19**). 2022 crash data (released after the start of this study) and preliminary data for 2023 show that these trends have not changed.

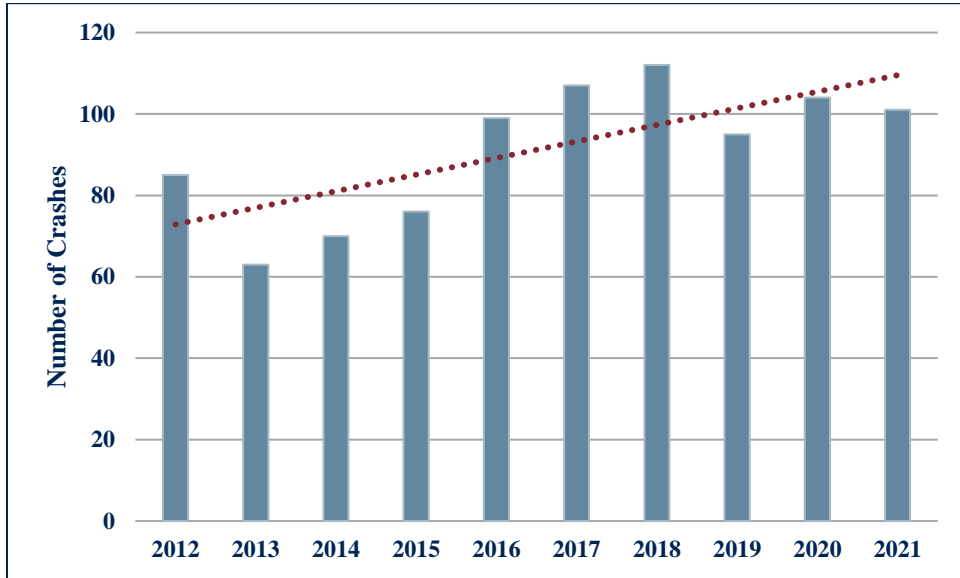


Figure 17: Colorado VRU Fatalities

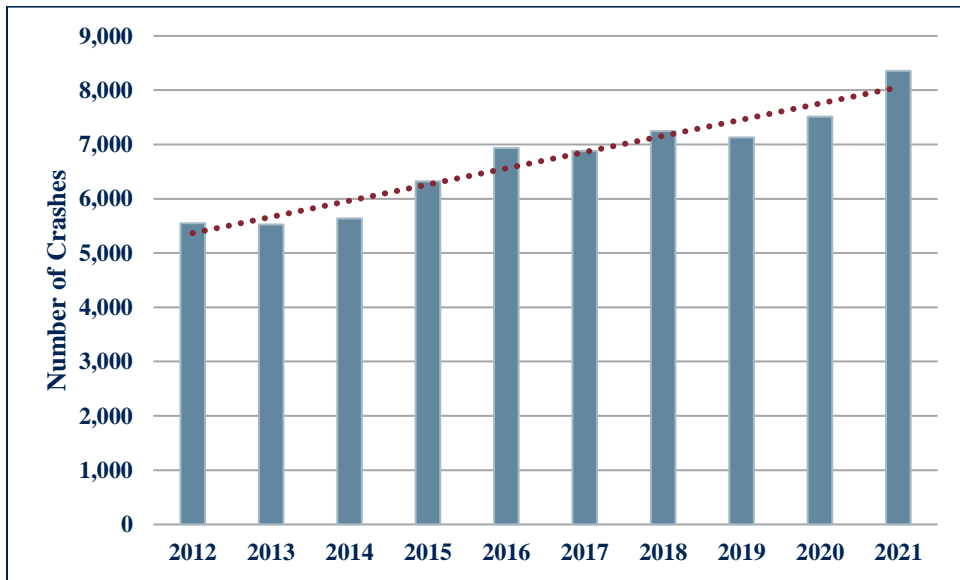


Figure 18: National VRU Fatalities

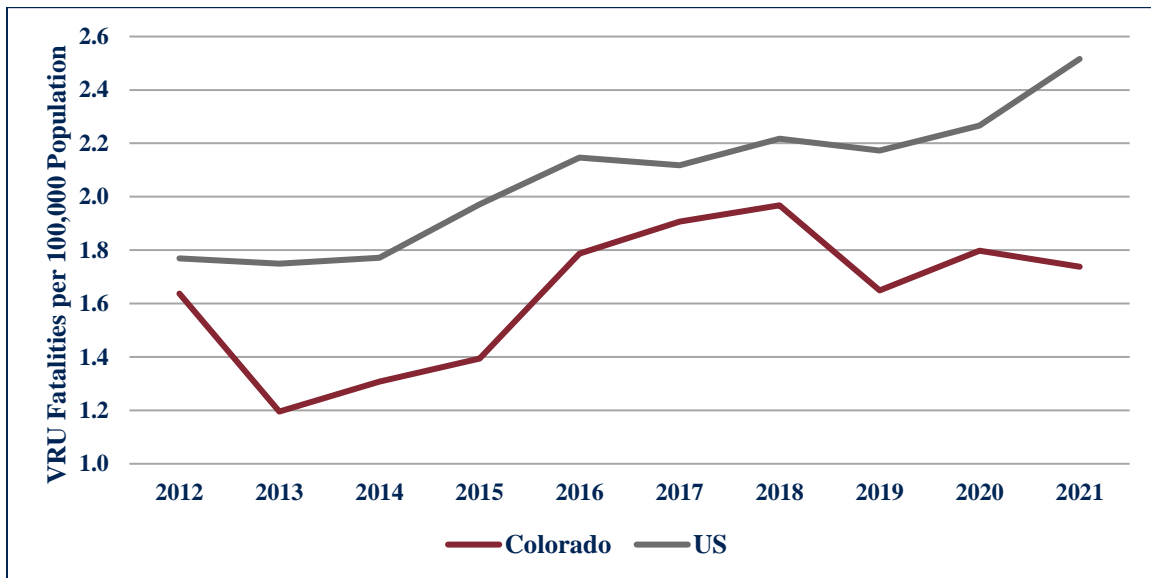


Figure 19: Colorado versus National VRU Fatality Rates per 100,000 population

1.5 Summary of Related Plans

Local VRU-related planning documents from within the State of Colorado were reviewed for reviewed for ways in which they incorporated a Safe System Approach including proactive approaches, equity considerations, and a commitment to a goal of zero fatalities and serious injuries. As Colorado continues to incorporate the Safe System Approach into their SHSP and VRU Safety Assessment, alignment with local jurisdiction plans in Colorado will continue to be important. State-level planning documents from Colorado’s transportation policy peer states as defined by Hendren and Niemeier in “Identifying peer states for transportation system evaluation and policy analyses” (2008) were also reviewed for their alignment with the SSA. State-level planning efforts in peer states can be used to understand what works in areas that exhibit similar geographic, economic, and population characteristics. Using 42 variables that impact transportation investment and policy, such as measures of infrastructure, roadway system usage, economic indicators, and geographic context, Hendren and Niemeier defined Colorado’s transportation peer state group to include Arizona, Idaho, Nevada, Oregon, and Utah. Notable practices from these plans are highlighted below, and full summaries of each plan can be found in **Appendix A**.

1.5.1 Safe System Approach

The Safe System Approach (SSA) is directly linked to the vision of eliminating all fatalities and serious injuries on the transportation system. This section highlights the agencies that have adopted Vision Zero or related commitments and integrated, to varying degrees, Safe System principles and objectives into their planning documents.

Oregon was found to be the most aligned with Vision Zero and SSA principles of the states considered in this review. The City of Portland and Oregon Metro indicated their commitment to Vision Zero in their safety planning documents. Further, the City of Portland fully integrated the SSA in their two-year update to their 2016 Vision Zero Action Plan. In Colorado, the Denver Regional Council of Governments (DRCOG) and Colorado Department of Transportation (CDOT) have also adopted Vision Zero or Toward

Zero Deaths initiative, and CDOT Regions 1 and 4 briefly mention the Safe System Approach in their Bicycle and Pedestrian Safety Studies.

Other states incorporate mission statements that highlight a goal of progressing toward zero deaths and serious injuries but have not adopted the Safe System framework. These states include Arizona, Idaho, Nevada, and Utah. Arizona will be fully integrating the SSA into their Strategic Highway Safety Plan (SHSP), and Active Transportation Safety Plan in 2024.

Reference Documents

- » 2019 Arizona Strategic Traffic Safety Plan
- » 2019 Denver Regional Active Transportation Plan
- » 2022 CDOT Region 4 Bicycle & Pedestrian Safety Study
- » 2023 CDOT Region 1 Bicycle & Pedestrian Safety Study
- » 2020 Colorado Strategic Transportation Safety Plan
- » 2021-2025 Idaho Strategic Highway Safety Plan
- » 2021-2025 Nevada Strategic Highway Safety Plan
- » 2021 Oregon Transportation Safety Action Plan
- » 2020 FHWA-SA-20-11
- » 2016 Portland Vision Zero Action Plan
- » 2019 Portland Vision Zero 2-Year Update
- » 2020 Utah Strategic Highway Safety Plan

1.5.2 Analysis of Proactive Methods

Traditionally, crash analysis seeks to make recommendations based on what has already occurred. This is a reactive approach to addressing traffic safety issues. Being proactive means analyzing data using predictive modeling to identify risk areas before crashes occur. Of Colorado's peer states, Arizona is the only state that presented predictive modeling as a component of their analysis on pedestrian and bicyclist safety. Recommendations in these studies not only addressed existing problem areas but also areas with high crash-potential based on common factors associated with pedestrian and bicyclist crashes. In Colorado, CDOT's Region 1 and Region 4 Bicycle and Pedestrian Safety Studies used FHWA's Systemic Safety Project Selection Tool and stakeholder near-miss input to proactively identify locations not captured in historical data.

Reference Documents

- » 2017 ADOT Pedestrian Safety Action Plan
- » 2018 ADOT Bicyclist Safety Action Plan
- » 2022 CDOT Region 4 Bicycle & Pedestrian Safety Study
- » 2023 CDOT Region 1 Bicycle & Pedestrian Safety Study

1.5.3 Equity

Equity has entered the transportation field as a key component of traffic safety. Often, data analysis shows that a disproportionate number of traffic-related fatalities and serious injuries occur in lower-income communities and amongst people of color. Oregon placed high importance on developing equitable traffic safety solutions. In particular, the City of Portland included equity goals in support of their Vision Zero efforts and Oregon State’s Transportation Safety Action Plan included a goal of equitable enforcement and emergency medical services. Nevada also included equity as a guiding principle of their Strategic Highway Safety Plan.

Reference Documents

- » 2021-2025 Nevada Strategic Highway Safety Plan
- » 2021-2025 Nevada SHSP Action Plan
- » 2021 Oregon Transportation Safety Action Plan
- » 2020 FHWA-SA-20-11
- » 2016 Portland Vision Zero Action Plan
- » 2019 Portland Vision Zero 2-Year Update

1.5.4 Definition of a Vulnerable Road User

Vulnerable Road Users (VRUs) most typically include pedestrians and bicyclists; however, some agencies include other roadway user groups both in and outside of vehicles. Below is a summary of the groups included within each state’s definition of VRU.

Table 1: Comparison of VRU Definitions in Current State SHSPs

<i>State</i>	VRU Definition
<i>Arizona</i>	Pedestrians, bicycles
<i>Colorado</i>	Pedestrians, bicycles (including e-bikes and e-scooters), motorcycles, older drivers, young drivers, work zones, first responders
<i>Idaho</i>	Pedestrians, bicycles, motorcycles, older drivers, young drivers, commercial motor vehicles
<i>Nevada</i>	Pedestrians, bicycles, motorcycles, micro-mobility
<i>Oregon</i>	Pedestrians, bicycles, motorcycles, older drivers
<i>Utah</i>	Pedestrians, bicycles, motorcycles

The USDOT issued guidance regarding the definition of VRU groups to be used in VRU Safety Assessments. This guidance indicates that VRUs include pedestrians, bicyclists, or other cyclists. The definition further clarifies that motorcyclists are not included as a VRU but that highway workers that are on foot in a work zone count as a pedestrian.

1.5.5 Online dashboard

While most agencies publish their safety plans as static documents, Utah formatted their Strategic Highway Safety Plan into a public-facing online dashboard. This interactive platform includes the traditional analysis

and recommendations with real-time updates on crash data, allowing stakeholders to shift priority or modify recommendations as necessary.

Reference Link

- » <https://www.udot.utah.gov/shsp/index.html>

Section 2 Summary of Quantitative Analysis

2.1 Crash Analysis

Geolocated fatal and serious injury crash data for bicyclists and pedestrians was obtained from CDOT for the most recent 5 years available at the start of this project. Data is inclusive of the years 2017 through 2021. A total of 2,686 bicyclist and pedestrian serious injury and fatal crashes occurred during the time frame of interest, including 87 bicyclist and 444 pedestrian fatalities, and 670 bicyclist and 1,485 pedestrian serious injuries. People walking, riding rideable toys, using mobility devices, and working in work zones are all considered pedestrians, and are not distinguishable without reading crash reports which were not obtained for this plan.

The data was provided in individual excel spreadsheets, each covering a single year. In 2021, Colorado began using an updated crash reporting form, and as such the 2021 spreadsheet was in a different format than the other four years of data. The data was cleaned and merged. Pivot tables within Excel were used to analyze the crashes as presented in Section 1 above.

2.2 Identification of High-Risk Areas

VRU Guidance from FHWA states that areas of high-risk to VRUs can be identified through several approaches, including the use of a High-Injury Network (HIN) analysis, a systemic safety analysis, and a predictive safety analysis. HINs have been used by Vision Zero cities to map corridors where high numbers of people have been killed or seriously injured in traffic crashes. Systemic analysis combines crash data and roadway features that correlate with crash types.

Predictive analysis methods estimate the expected safety performance on existing or proposed roadways using crash data, traffic volumes and roadway inventories. For this plan, the low number of VRU fatal and serious injury crashes combined with the lack of VRU traffic volumes (exposure data) made predictive analysis of marginal utility. Further, while some systemic analysis was presented in Section 1 such as crashes by number of through lanes and functional classification, the low number of fatal and serious injury crashes analyzed for this study, combined with a lack of exposure data makes acting on this information difficult. For example, while the data clearly shows that four-lane roadways have more VRU fatal and serious injury crashes than six-lane roadways, it is unclear whether that is because four-lane roadways are inherently unsafe, or if bicyclists and pedestrians mostly avoid six-lane roadways due to their perception that they are less safe than roads with fewer lanes. Furthermore, recommendations for specific system-wide countermeasures were not able to be identified due to the small number of fatal and serious injury crashes that correlated with specific roadway features. As noted in Section 1.3 Crash Characteristics, the use of all-severity VRU crashes or obtaining and analyzing near-miss data would enable reliable correlations between crash causes and specific roadway characteristics would strengthen the ability to recommend system-wide proven safety countermeasures and should be considered for the next VRU Safety Assessment update.

The geolocated crash data and detailed roadway characteristic data was uploaded to the Safer Streets Priority Finder (SSPF) tool and processed using a sliding windows analysis. A sliding window analysis uses overlapping “windows” along a roadway segment. For this analysis, crashes were tallied in half-mile sections (or “windows”) of a roadway, then the window is moved by a one-tenth mile offset and crashes tallied in the shifted window. The procedure is repeated along the entire roadway network of interest. The

highest scoring overlapping windows are then identified as high-crash locations. This analysis was performed separately for the state-owned and locally-owned roadway networks resulting in a bicyclist and a pedestrian HIN for each as shown in **Figure 20** through **Figure 23**.

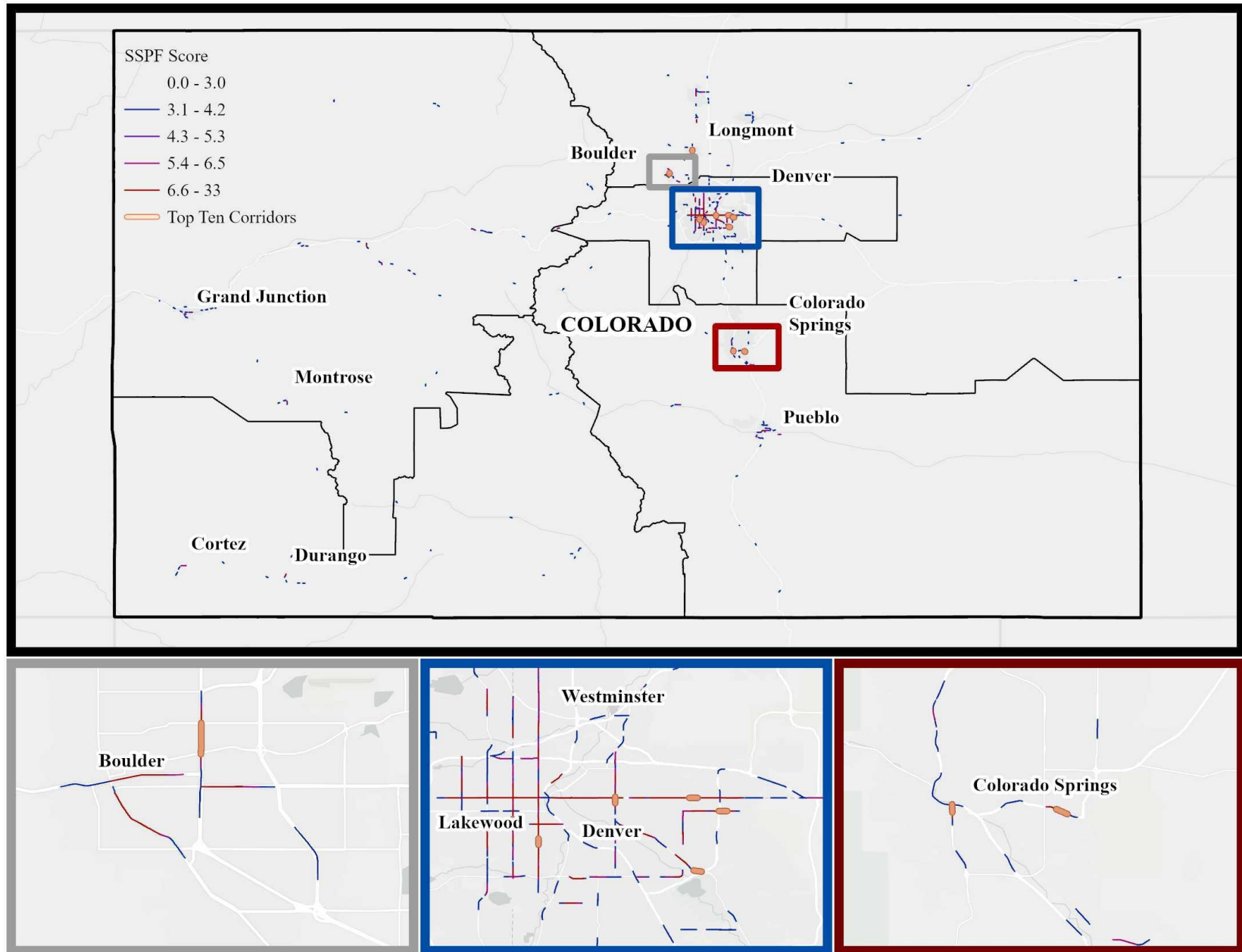


Figure 20: Pedestrian Sliding Windows Visualization on State-Owned Roads

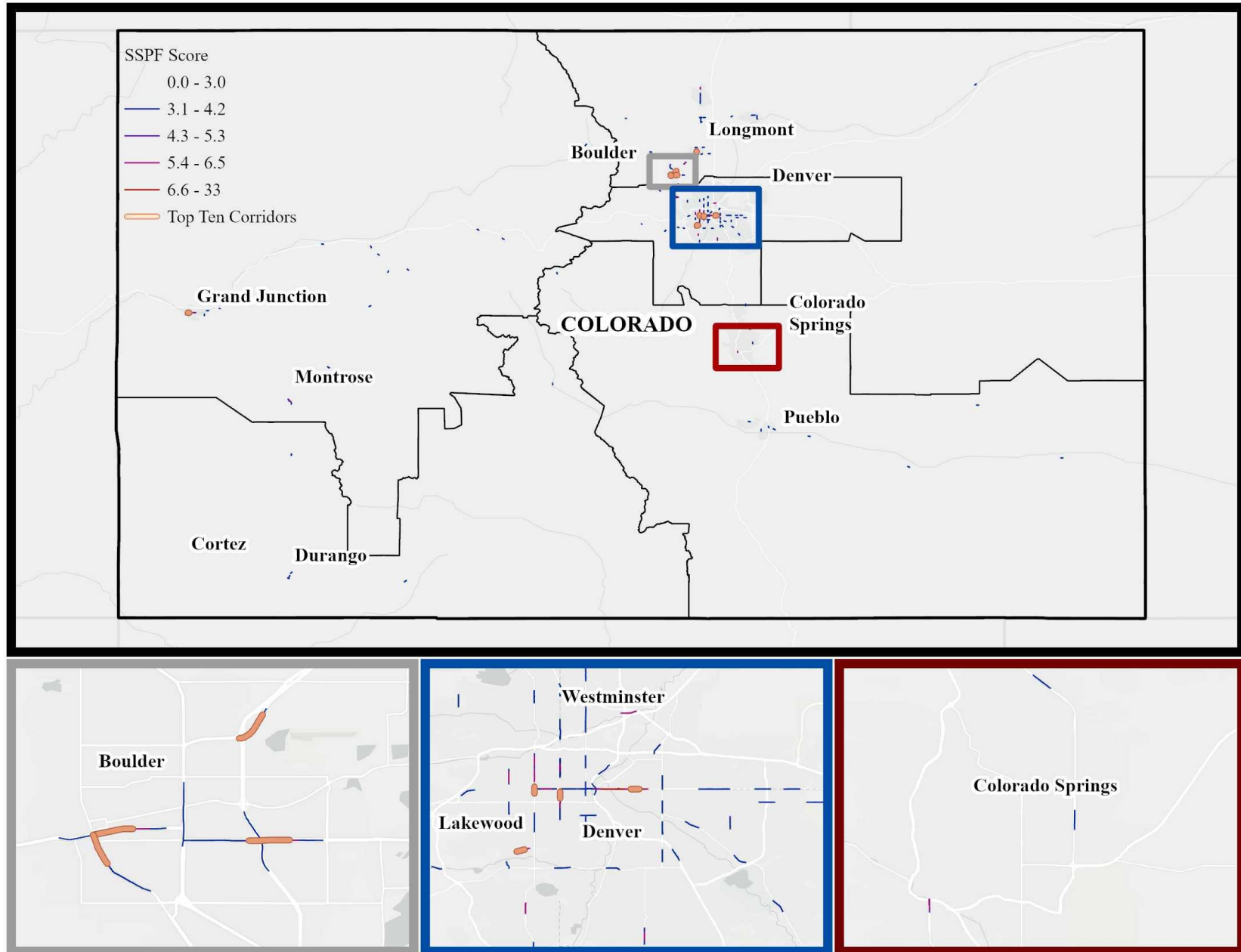


Figure 21: Bicycle Sliding Windows Visualization on State-Owned Roads

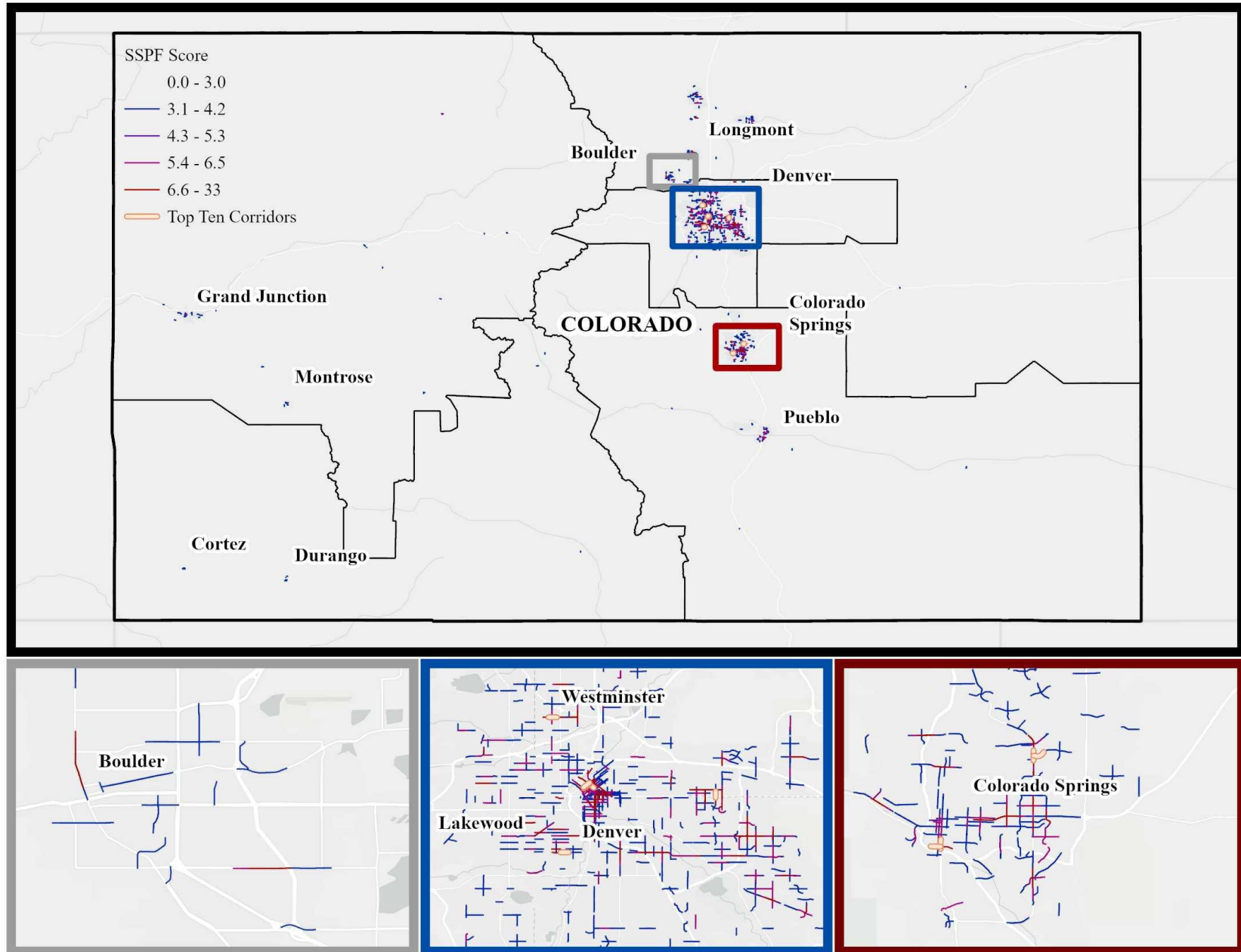


Figure 22: Pedestrian Sliding Windows Visualization on Locally-Owned Roads

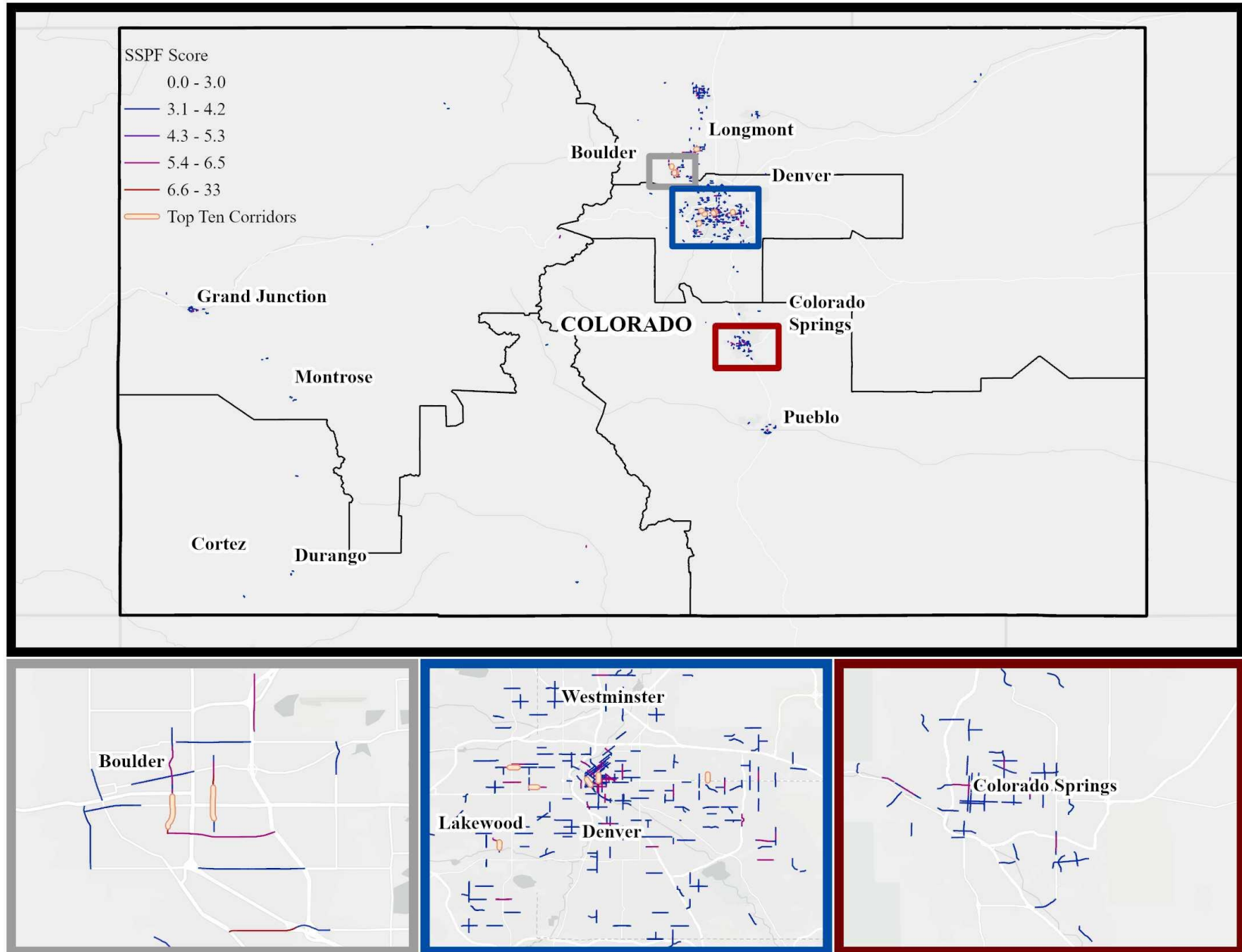


Figure 23: Bicycle Sliding Windows Visualization on Locally-Owned Roads

From the HINs, the top ten high-crash locations for each were identified, resulting in 40 high-risk areas, ten for bicyclists and ten for pedestrians on the state-owned roadway network, and ten each on the locally-owned roadway network.

The resulting HIN and high-risk areas were then imported into ArcGIS along with the original crash data and the additional data noted below:

- » City/Municipality Boundaries,
- » County Boundaries,
- » State Boundary,
- » CDOT Transportation Region Boundaries,
- » Census Tract and Block Group Boundaries,
- » DOT Disadvantaged Census Tract data,
- » Colorado EnviroScreen data,
- » Highway Segments (state owned roadways),
- » Major Road Segments (classified locally owned roadways),
- » Local Road Segments (non-classified locally owned roadways).

The above data was obtained from CDOT's Online Transportation Information System (OTIS) the US Census Bureau, the US Department of Transportation, and the Colorado Department of Public Health and Environment.

The 40 high-risk areas were visually screened to determine overlap between the serious injury and fatality locations for bicyclists and pedestrians, and beginning and endpoints were refined based on the actual location of the crashes within the identified half-mile window to create 29 priority corridors, 9 priority intersections, and one "activity center" which resulted from the combining of several high-injury locations in near proximity to one another. These locations were then presented to local jurisdictions during the consultation process to obtain local knowledge about each.

2.3 Demographic Analysis

Consistent with the SSA, an equity analysis was performed using Transportation Disadvantaged Census Tract data downloaded from the US DOT. On May 23, 2023, Colorado updated their definition of disproportionately impacted communities and passed a law requiring all state departments to use the new definitions for equity assessment. Similar to the DOT Transportation Disadvantaged Census Tract data, the updated definitions for Colorado include the following five categories of disadvantage:

- » Low-income population above 40%
- » People of color population above 40%
- » Housing cost burdened population above 50%
- » Linguistically isolated households above 20%
- » Federal Climate and Environmental Justice Screening Tool Communities (CEJST/Justice40)

All tribal lands and all mobile home parks are automatically defined as disadvantaged. The new definitions have been compiled into a data set available as the Colorado EnviroScreen Tool (Link: <https://cdphe.colorado.gov/enviroscreen>). Block groups that meet or exceed the thresholds above are considered Disproportionately Impacted Communities (DICs) and Block groups that score above the 80th percentile (i.e. with an EnviroScreen score greater than 80, designated as ES80 communities) are considered at the greatest disadvantage. It is important to note that all communities that are designated as ES80 are also DICs, but not all DIC communities are designated as ES80. Data was downloaded from the Colorado EnviroScreen mapping tool, and the equity analysis was performed again using the new data. Results were nearly identical between the two analyses. Results using Colorado EnviroScreen Scores are presented here.

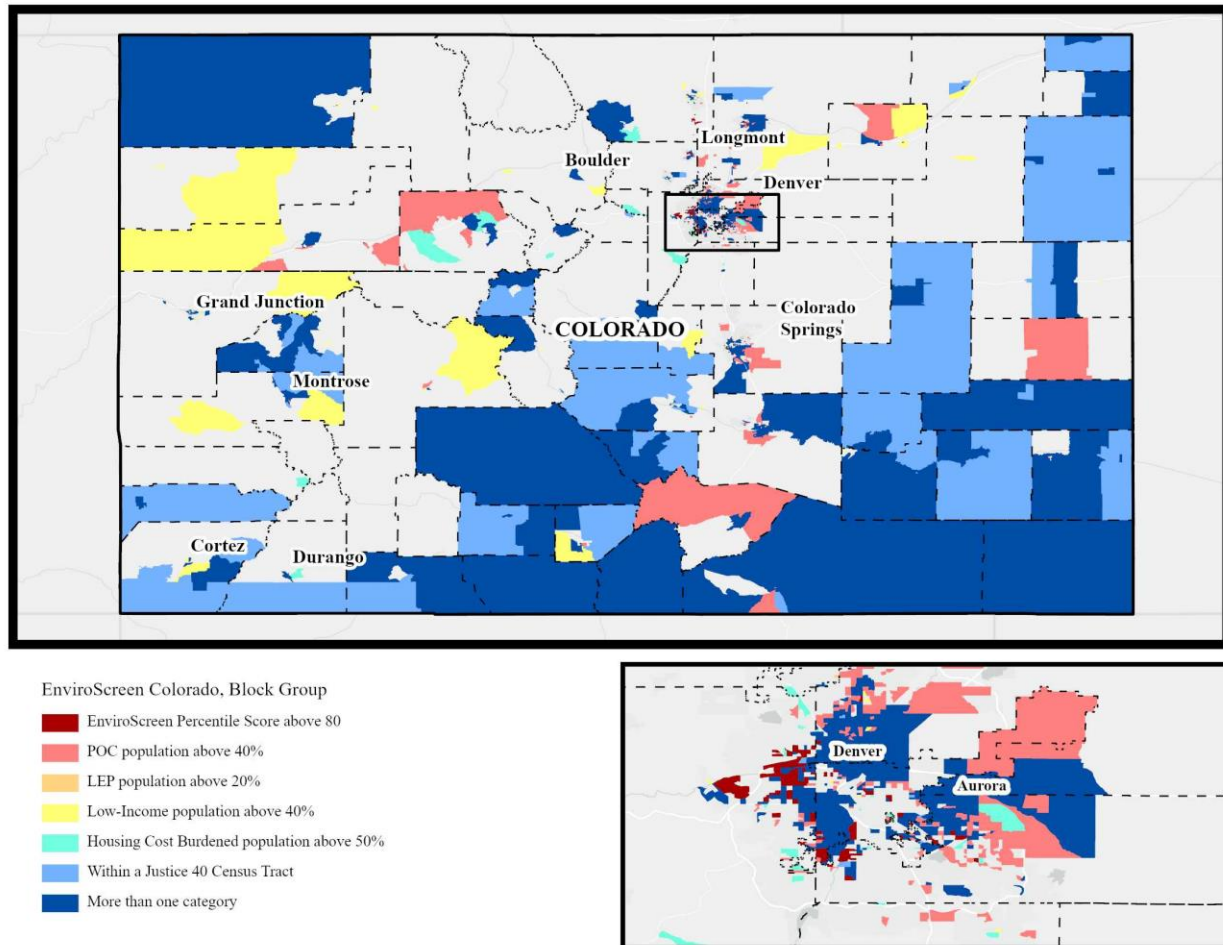


Figure 24: Map of Colorado Disproportionately Impacted Communities

First, expected numbers of crashes per census block group and per 1,000 population were calculated if crashes were equally distributed, giving us baseline averages of 0.76 crashes per block group and a crash rate of 0.48 per 1,000 population. Then actual crashes per block group were calculated within DIC and ES80 areas and compared to the expected crash rate. Results shown in Table 2 reveal that the actual crash rate for non-DIC communities is lower than the expected crash rate (0.34 vs 0.48 respectively), while the crash rate for DIC communities was higher than the expected crash rate at 0.67 per 1,000 population and even higher for communities that fall under the ES80 category (1.01 crashes per 1,000 population).

Table 2: Expected versus Actual Crash Rates per Census Block Group and per 1,000 Population

DIC/ES80	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
Non DIC	1,961	1,490	1,119	0.57	0.34
DIC	1,571	1,194	1,563	0.99	0.67
ES80	707	537	1,047	1.48	1.01

Next, crash rate was calculated for block groups by the number of factors by which they were considered disadvantaged. Results shown in Table 3 reveal that block groups with no disadvantage had an actual crash rate lower than the expected, block groups that met the definition of disadvantaged for only one factor had a crash rate equal to the expected rate, and rates increased as the number of factors increased with communities meeting the definition of disadvantaged with five factors having a crash rate of 1.52 – more than three times greater than expected, and more than 4 times greater than non-disadvantaged block groups.

Table 3: Expected versus Actual Crash Rates by Number of DIC Factors

# Factors	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
5	65	49	65	1.00	1.52
4	169	129	169	1.00	0.91
3	419	318	418	1.00	0.88
2	332	252	330	0.99	0.60
1	583	443	464	0.80	0.48
0	1,964	1,493	1,237	0.63	0.37

The purpose of an equity analysis is to ensure that historical disinvestment in disadvantaged communities is taken into account so that over time inequity is reduced. As such, there are three ways equity data can be utilized to achieve this outcome. The data can be used in the process by which locations are selected for improvements, in prioritizing selected locations, and then in making funding decisions. In determining whether building an equity component into the selection or prioritization process was warranted, we wanted to first determine whether the HIN development process yielded results that already prioritized disadvantaged communities. 42% of Colorado’s population lives in a DIC, with 18% qualifying for the higher-disadvantaged ES80 designation. Overlaying a map of priority locations with EnviroScreen data, we find that 92% of the priority locations developed through the HIN process are in DIC communities, and 71% are in ES80 communities making it unlikely that building an equity component into the selection and prioritization processes would yield very different results. Colorado DOT should, however, build an equity component into any funding decision-making process such as HSIP application scoring. Once a truly predictive method of crash analysis is developed for Colorado, it is expected that building an equity component into the selection and prioritization process will become more important.

92% of priority locations are in disadvantaged communities
72% are in communities with an EnviroScreen score greater than 80

Section 3 Summary of Consultation

3.1 Consultation Process

Consultation with stakeholders is an important element of the VRU Safety Assessment requirements as it allows for a better understanding of the safety issues facing bicyclists and pedestrians at the local level. Consultation meetings were held with every jurisdiction and council of government that contained two or more priority locations identified through the high-injury network. Additionally, consultation meetings were held with the state health department, one statewide advocacy group, and one local advocacy group. Working through established CDOT communication channels, several attempts were made during the project period to reach out to the Southern Ute and Ute Mountain Ute tribes for both crash data collection and consultation purposes. Unfortunately, neither tribe was able to participate during the short time frame of this project. Continuing efforts should be made to include both tribes in the 2025 update to this study.

A total of 15 consultation meetings were held. A mix of in-person and virtual formats were utilized based on jurisdictional preferences. Consultation meetings with jurisdictions utilized a guided discussion format, while consultations with advocates and other stakeholders consisted of an overview of the VRU Safety Assessment requirements and the equity analysis followed by general free-form discussion. The consultation meeting guided discussion format is summarized in **Appendix B**.

Draft meeting notes were sent to attendees after the consultation, with an opportunity to make any corrections or additions where necessary. Corrections were made and meeting notes were finalized for inclusion in **Appendix B**.

3.2 Summary of General Findings and Notable Practices from Consultation Process

3.2.1 General Findings

An analysis of the general findings from the consultation process yielded the following:

In general, pedestrians expressed concern regarding drivers failing to yield at intersections and midblock crossings – particularly at RRFBs. Jurisdictions receive many requests for marked crosswalks at intersections and new midblock crossings when distances between intersections are too long. Speeding was also an often-noted complaint.

Bicyclists' primary complaints were regarding lack of facilities and insufficient shoulders in general and lack of separation from traffic on existing facilities. Also noted were difficulties crossing roadways and drivers not yielding. Many jurisdictions noted that they have received positive feedback from bicyclists where R4-50 "Motorists Must Give Bicycles 3 FT Clearance" signs have been installed. Advocacy groups are the primary requesters of these signs.

Drivers complain more about bicyclists than pedestrians. Many jurisdictions reported a general hostility towards bicyclists from the driving community, and complaints about bicyclists simply being on a roadway are not uncommon.

In 2022, Colorado enacted a law allowing bicyclists ages 15 and over to perform a “Safety Stop” at intersections. People on bikes and other “low speed conveyances” may now proceed through a stop-controlled intersection without stopping provided they yield to pedestrians and other road users who have the right-of-way, and to proceed through a red light after coming to a complete stop if there is no oncoming traffic. Complaints about bicyclists not following roadway laws could be due to drivers not knowing what the laws regarding bicyclists are, particularly the new Safety Stop Law described above.

Many jurisdictions expressed initial concern over the safety implications of the Safety Stop Law, but all mentioned anecdotally that while they still get complaints from drivers about cyclists not stopping, there doesn’t seem to have been an increase in crashes since the law went into effect.

The most common implementation barriers experienced by jurisdictions include a general lack of funding for bicycle and pedestrian facilities and the reliance on benefit-cost ratios making it difficult to qualify for funding that is available. Difficulties with being able to lower speed limits was also mentioned by several jurisdictions.

3.2.2 Notable Practices

A notable practice at a local agency is found in the City of Lakewood. Lakewood transportation partners with the Lakewood Police, Jefferson County Coroner’s Office, and local public health experts on ageing to take a deeper look at the behavioral drivers of bicycle and pedestrian fatal crashes and devise more targeted approaches. They have noted that before they adopted this approach, countermeasures implemented on arterial streets would sometimes exacerbate the problem by pushing traffic onto parallel neighborhood streets where there are more VRUs. This more targeted approach has resulted in record lows in injury crashes since 2017.

The City and County of Denver, Denver Regional Council of Governments, and the City of Boulder have all committed to a goal of zero deaths and serious injuries on their roadway networks. Each has an active Vision Zero Plan with associated tool kits and design guidelines in place.

The Colorado Department of Public Health and Environment is currently focusing on finding innovative sources of data that can help give a fuller picture of traffic safety and help identify priority populations and geographies. Bicycle Colorado is also beginning work on strategic planning with regard to equity. Currently, they focus on statewide policy initiatives like the Safety Stop Law and use of R4-50 signs. They advocate for a proactive approach to safety. Bicycle Colorado Springs also advocates for a proactive approach to safety, particularly in ensuring new facilities and retrofits are built to contemporary standards of safety and ensuring staff are trained in and implementing newer designs.

3.3 Priority Location Findings

As noted in Section 2, jurisdictions were presented with each priority location within their roadway network and asked for local information to determine if there had been improvements to the area already made and if so, when, or if there were improvements planned. Notes and recommendations related to specific priority locations are reflected in the cut sheets in **Appendix C**.

Jurisdictions were also asked if there were locations they felt should be either removed from the list or added to the list. The crash history at each of these locations was then researched for potential inclusion or

removal. Twenty-two locations for further research were suggested during this process, resulting in three corridors being added to the list and two being removed for a final total of 39 Priority Locations . The final list of priority locations is shown in **Table 4** on page 28.

Section 4 Program of Projects and Strategies

4.1 Priority Location Program of Projects

As described in Section 3, thirty-nine final priority locations were identified through the development of the HIN in consultation with local jurisdictions. An alphabetized list of these locations appears below (**Table 4**), and in a map on Page 31 (**Figure 25**). Each priority location was then individually analyzed by a team of traffic engineers and planners using the local knowledge gathered during the consultation process; roadway factors such as speed limits, number of lanes, traffic volumes and roadway curvature; and land uses such as shopping centers, schools and transit stops. Fatal and serious injury VRU crashes in each location were analyzed for patterns in lighting conditions, time of day, and vehicle and VRU movements when available. The team developed recommended actions for each priority location. Cartographic sheets for each priority location were created and cut sheets with roadway data, crash data, and recommendations can be found in **Appendix C**.

Table 4: Thirty-Nine VRU Fatal and Serious Injury Priority Locations

Name	City	County	ROW Ownership	DIC/ ES-80	Ped Crashes	Bike Crashes	Priority Type	Page
28th Street (36B) - Spruce Street to Valmont Road	Boulder	Boulder	CDOT	No	4	0	Ped	C-25
30th Street - Arapahoe Avenue to Walnut Street	Boulder	Boulder	Boulder	DIC	1	3	Bike	C-28
E. 6th Avenue (30A) - N. Potomac Street to N. Sable Boulevard	Aurora	Arapahoe	CDOT	ES-80	6	1	Ped	C-14
72nd Avenue - Meade Street to N. Irving Street	Westminster	Adams	Westminster	ES-80	6	1	Ped	C-16
9th Avenue - Francis Street to Bross Street	Longmont	Boulder	Longmont	ES-80	0	3	Bike	C-34
Academy Boulevard and Austin Bluffs Parkway	Colorado Springs	El Paso	Colorado Springs	ES-80	5	0	Ped	C-23
Academy Boulevard - Hancock Expressway to E. Fountain Boulevard	Colorado Springs	El Paso	Colorado Springs	ES-80	6	2	Ped	C-10
Downtown Denver Activity Center	Denver	Denver	Denver	ES-80	20	2	Ped	C-03
Arapahoe Avenue (7C) - Foothills Parkway to 48th Street	Boulder	Boulder	CDOT	DIC	0	2	Bike	C-37
Broadway Street (93A) - 15th Street to Canyon Boulevard	Boulder	Boulder	CDOT	DIC	3	3	Bike	C-18
Broadway Street - Violet Avenue to Yarmouth Avenue	Boulder	Boulder	Boulder	DIC	0	3	Bike	C-33
Canyon Boulevard (7B) - 9th Street to 19th Street	Boulder	Boulder	CDOT	DIC	4	3	Bike	C-15
Carefree Circle and N. Academy Boulevard	Colorado Springs	El Paso	Colorado Springs	ES-80	5	0	Ped	C-24

*ES80 communities are a subset of DIC communities

Table 4: Thirty-Nine VRU Fatal and Serious Injury HIN Location List (continued)

Name	City	County	ROW Ownership	DIC/ ES-80	Ped Crashes	Bike Crashes	Priority Type	Page
E. Colfax Avenue (40C) – N. Clarkson Street to N. High Street	Denver	Denver	CDOT	ES-80	10	7	Bike	C-05
E. Colfax Avenue (40C) – N. Yosemite Street to N. Peoria Street	Aurora	Arapahoe	CDOT	ES-80	50	1	Ped	C-02
Colorado Boulevard (2A) and E. Colfax Avenue	Denver	Denver	CDOT	ES-80	4	0	Ped	C-30
Diagonal Highway (119B) – Foothills Parkway to Independence Road	Boulder	Boulder	CDOT	DIC	0	3	Bike	C-31
E. Evans Avenue – S. Jackson Street to S. Syracuse Way	Denver	Denver	Denver	ES-80	12	2	Ped	C-07
N. Federal Boulevard (88A) and W. Howard Place / W. 14th Avenue	Denver	Denver	CDOT	ES-80	8	0	Ped	C-12
S. Federal Boulevard (88A) – W. Iowa Avenue to W. Mississippi Avenue	Denver	Denver	CDOT	ES-80	13	1	Ped	C-08
S. Federal Boulevard (88A) – W. Warren Avenue to 200' North of W. Evans Avenue	Denver	Denver	CDOT	ES-80	6	0	Ped	C-20
Folsom Street – University Heights Avenue to Dorm Parking Lot Entrance	Boulder	Boulder	Boulder	DIC	1	3	Bike	C-29
E. Fountain Boulevard (24H) and S. Murray Boulevard	Colorado Springs	El Paso	CDOT	ES-80	3	0	Ped	C-35
Havana Street and E. 16th Avenue	Aurora	Adams	Aurora	ES-80	0	3	Bike	C-36
N. Lincoln Street – E. Colfax Avenue to E. 18th Avenue	Denver	Denver	Denver	ES-80	0	3	Bike	C-32
E. Main Street (160A) – N. Beech Street to S. Veach Street	Cortez	Montezuma	CDOT	DIC	5	0	Ped	C-22
Main Street (287C) – Longs Peak Avenue to 17th Avenue	Longmont	Boulder	CDOT	ES-80	12	4	Both	C-06
Main Avenue (550B) – E. Park Avenue to E. 21st Avenue	Durango	La Plata	CDOT	No	3	1	Ped	C-27
W. Morrison Road (8A) and S. Estes Street / S. Garrison Street	Lakewood	Jefferson	CDOT	No	0	2	Bike	C-39

*ES80 communities are a subset of DIC communities.

Table 4: Thirty-Nine VRU Fatal and Serious Injury HIN Location List (continued)

Name	City	County	ROW Ownership	DIC/ ES-80	Ped Crashes	Bike Crashes	Priority Type	Page
S. Nevada Avenue (115A) – E. Navajo Street to E. Mill Street	Colorado Springs	El Paso	CDOT & Colorado Springs	ES-80	16	4	Ped	C-04
North Avenue (6B) and N. 1st Avenue	Grand Junction	Mesa	CDOT	ES-80	0	2	Bike	C-38
S. Parker Road (83A) – E. Dartmouth Avenue to I-225	Aurora	Arapahoe	CDOT	ES-80	6	0	Ped	C-17
Sheridan Boulevard (95A) and W. 10th Avenue	Denver	Denver	CDOT	ES-80	0	2	Bike	C-40
Sheridan Boulevard (95A) – W. Dakota Avenue to W. 1st Avenue	Lakewood	Jefferson	CDOT	ES-80	6	1	Ped	C-13
N. Speer Boulevard – W. 11th Avenue to E. Colfax Avenue	Denver	Denver	Denver	ES-80	3	5	Bike	C-11
S. Townsend Avenue (550B) – Odelle Road to N. 7th Street	Montrose	Montrose	CDOT	DIC	4	4	Ped	C-09
Wadsworth Boulevard (121A) – W. 14th Avenue to E. Colfax Avenue	Lakewood	Jefferson	CDOT	ES-80	1	3	Bike	C-26
Wadsworth Boulevard (121A) – W. 19th Avenue to W. 26th Avenue	Lakewood	Jefferson	CDOT	ES-80	4	2	Bike	C-19
S. Wadsworth Boulevard – W. Florida Avenue to W. Mississippi Avenue	Lakewood	Jefferson	CDOT	DIC	6	0	Ped	C-21

*ES80 communities are a subset of DIC communities.

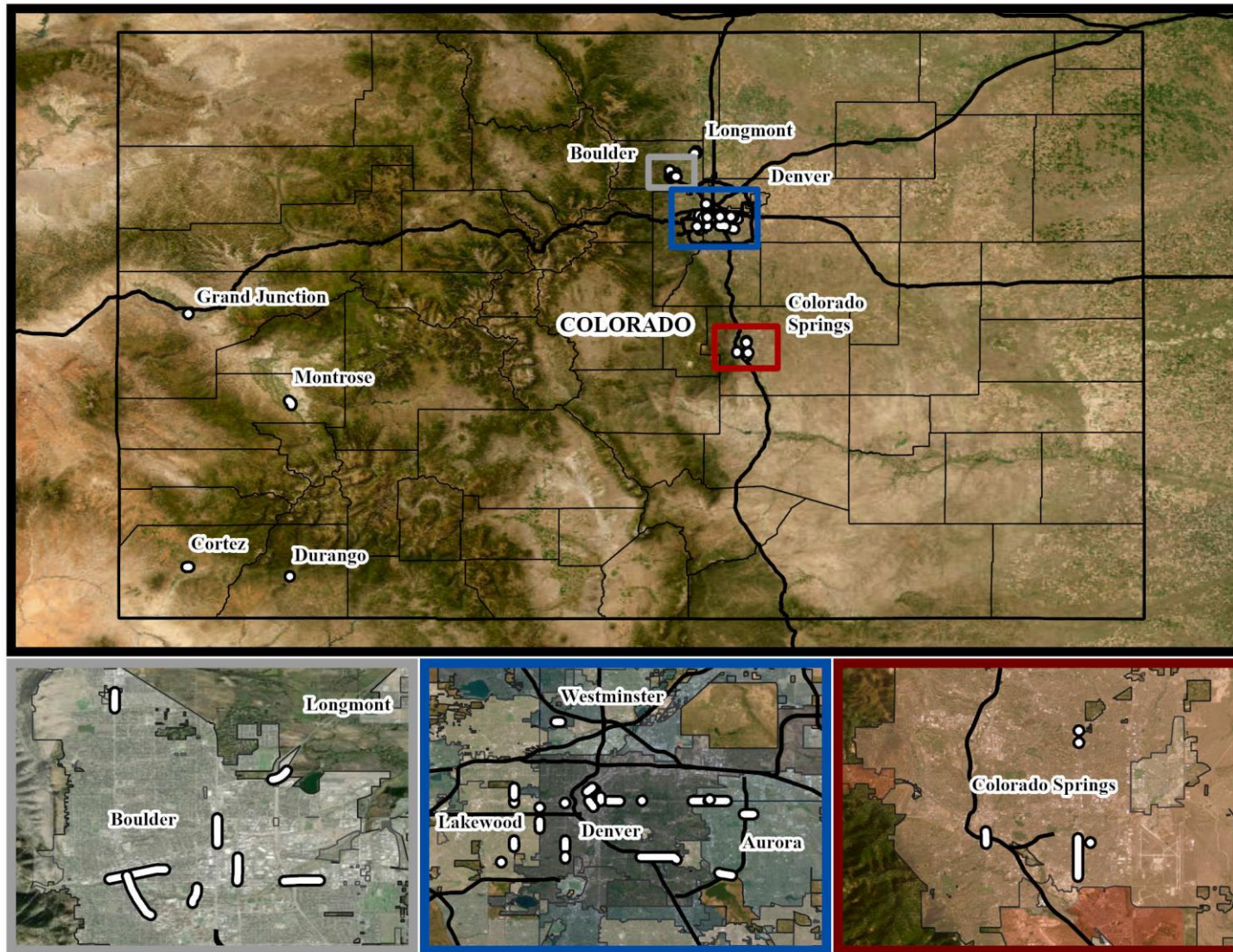


Figure 25: Map of VRU Fatal and Serious Injury Priority Locations

4.2 Program of Recommended Strategies

4.2.1 VRU - Crash Types

Crash data analysis is a foundational method for understanding road user safety and is used to select proven countermeasures appropriate to address safety risks. However, crash data for vulnerable road users are often not as complete or descriptive as for crashes that involve only motorists. Colorado updated their crash reporting form in 2019 which captures significantly more detail for crashes involving non-motorists, however there are no associated crash types which are often different from crash types involving only motor vehicles. It is noted that even with the 2021 crash data (the first year where the new form was fully captured), the “crash type” column in the database most often simply notes “pedestrian” or “bicycle” where it might note “head-on” or “sideswipe same direction” for a vehicle-to-vehicle crash. FHWA’s Pedestrian and Bicyclist Crash Analysis Tool (PBCAT) provides detailed crash types for motorist-VRU crashes which can aid in selecting the proven countermeasures most appropriate to address the safety risks encountered by VRUs.

Strategies:

- » Enter bicycle and pedestrian crashes into the Pedestrian and Bicyclist Crash Analysis Tool (PBCAT) to better understand contributing factors and movements for non-motorized crashes and more accurately match a countermeasure to the safety issue.
- » Examine existing crash reporting data elements to see if there is available information that aligns more with PBCAT entry fields; if not, consider adding data elements for crash reporting form update.

4.2.2 VRU Exposure Data

Without exposure data, high injury networks for VRUs reflect where more people are walking and riding, not necessarily where VRUs have a higher risk of crashes. To be able to calculate risk and the expected protective effect of different safety countermeasures, both exposure and crash data is needed. Lack of exposure data also makes site prioritization based on volume of users impossible. Using only crash frequency to determine high-risk roadway facilities for VRUs might lead one to believe that four-lane roadways are less safe than six-lane roadways when it is more likely that six-lane roadways have a higher crash risk, but fewer crashes because there are fewer people walking and riding on them.

A variety of automated bicyclist and pedestrian count systems are available, including permanent count stations as well as equipment that can be installed for short-term temporary counts. There are several “big data” sources of bicycle and pedestrian movements that can be purchased. Finally, in 2020 Strava Metro made access to their data free for government agencies. While Strava data largely captures recreational cycling data and tends to miss trips in low-income and underserved communities, recent advancements have been made in normalizing the data to predict all ridership.

Strategies:

- » Collect VRU counts in advance of Road Safety Audits and Corridor Studies to assess true level of risk for these roadways.

- » Implement a large-scale bicycle count program or purchase “big data” VRU exposure and origin-destination data.

4.2.3 VRU-Specific and/or Expanded Road Safety Audits (RSAs)

Road Safety Audits are formalized examinations of a roadway segment from a safety perspective and are performed by independent interdisciplinary teams, taking into account human factors and road user capabilities. They generally consider the safety of all roadway users but can be performed with a VRU safety focus if desired.

Strategies:

- » Establish an RSA process for the State of Colorado’s highway and roadway system.
 - Gather VRU exposure data for the RSA locations prior to performing the RSA, and require RSAs to include:
 - PBCAT or similar analysis of VRU crashes in addition to traditional crash analysis; and
 - analysis of human and behavioral factors in safety improvement recommendations.

4.2.4 CDOT Regional Bicycle and Pedestrian Safety Studies

Regional bicycle and pedestrian safety studies were completed for CDOT Regions 1 and 4 in 2023 and 2022 respectively. Each study identified 5 high crash locations, and 5 ‘systemic’ locations in the region, but included only CDOT-owned roadways. Systemic locations were derived from public comments. Locations were ranked by the number of public comments received, with locations already identified using crash data removed. The use of public comments as a ranking method may have negative impacts on equity, as residents of low-income and underserved communities tend to comment less often than residents of higher-income communities. However, if studies were completed for each region, expanded to include all roadways, and accounted for equity, taken together these documents could become a comprehensive and fair method for completing and maintaining the federal VRU Safety Assessment Requirement. Locations should be ranked based on a set of criteria used across all regions to avoid the possibility of missing priority locations in regions with very high VRU crashes, and result in a fair risk assessment across the state.

Strategies:

- » Build on CDOT Region 1 and 4 Bicycle and Pedestrian Safety Assessments as a systematic method of complying with the federal VRU Safety Assessment Requirement.

4.2.5 Repeat Demographic Data Analysis

The requirement to integrate a demographic analysis into the VRU Safety Assessment reflects the U.S. DOT’s focus on the disproportionate, adverse safety impacts that affect certain groups on our roadways (US DOT National Roadway Safety Strategy, 2022). As such, the demographic analysis should be both repeated on a regular basis to ensure that the disparity in roadway safety between demographic groups is being reduced, and also expanded to include all road users.

Strategies:

- » Continue demographic analysis and specific outreach for Colorado DIC and ES80 communities.
- » Include a screening process for DIC and ES80 communities in the project development process.
- » Consider DIC and ES80 communities during all project development stages.
- » Give funding priority to roadway safety projects located in DIC and ES80 communities.
- » Ensure meaningful community engagement.

4.2.6 Before and After Studies

Before and After Studies are an element of the HSIP Program. The most fundamental element of these studies is the comparison between crash rate and severity in the before and after conditions. The success of a project is defined by a drop in the Severity Index and Crash Type Score. It is recommended that following implementation, safety projects go through an evaluation phase where the benefits of safety measures are analyzed.

Before and after results are significantly impacted by other considerations, such as roadway geometrics (ADA improvements, lighting, auxiliary lane, alignment, etc.), operational (signal timing and phasing), and traffic data (volume, speed). Understanding the before conditions and after conditions is key to accurately assessing the performance of the crash mitigation that was implemented.

Several challenges can arise when completing before-and-after studies and several factors can influence the validity of the results. For example, results can be skewed due to fluctuations in crash rates from year to year and changes in conditions. Prior to implementing before and after analysis for determining if the implemented crash mitigations are effective, the type of before and after analysis and the required data needed to be collected will need to be determined. There are three types of evaluations used to measure safety improvement effectiveness and these evaluations use slightly different data:

1. Observational before/after studies:
 - a. Simple Observational before/after studies
 - b. Simple Observational before/after studies using the Empirical Bayes Method
2. Observational cross-sectional studies; and
3. Experimental before/after studies.

Strategies:

- » Continue to evaluate implemented safety projects using before-and-after studies
- » Offer support to local agencies to perform before-and-after studies
- » Compile state-wide database to build a Colorado-specific list of countermeasures that work throughout the state.

4.2.7 Professional Education

The state of the practice of VRU safety is quickly evolving and new tools, guidance, and design best practices are being developed and released often, making it difficult for even the most dedicated professional to keep up to date. Ensuring that traffic safety professionals in Colorado are educated in these new concepts and design strategies can have a positive effect on safety in every region.

Strategies:

- » Bring VRU safety educational opportunities - such as the FHWA trainings on bicycle and pedestrian design, Complete Streets, and the Safe System Approach - to Colorado.
- » Ensure that jurisdictional personnel are provided adequate time and support to attend.
- » Invite consultants to participate and give preference in procurement processes to consultants who attend these trainings.

4.2.8 Inventory of Vulnerable Road User Infrastructure

VRU infrastructure gap analysis allows for more strategic investments of Active Transportation resources. VRU crash and exposure data combined with network-wide facility information provides a proactive approach to target infrastructure improvements that have the greatest potential impact on VRU safety.

Strategies:

- » Update and maintain the existing inventory of active transportation facilities on the state highway system.
- » Survey local jurisdictions and document which ones maintain inventories of active transportation facilities on their local roadway system.
- » Assist local jurisdictions who do not already do so, create and update an inventory of active transportation facilities on their local roadway system.
- » Consolidate state system inventory with local jurisdiction inventories on a GIS-based website with either jurisdictional or public access.

4.2.9 Expand Data Sources to Enable Proactive Approach

The Vulnerable Road User Safety Assessment Guidance document released on October 21, 2022, instructs states to "...perform a quantitative analysis of vulnerable road user **fatalities and serious injuries**...". The document details many other types of data that can be used in the quantitative analysis, but does not indicate that non-injury, possible injury and minor injury crashes can be used. Using a strict interpretation of these directives, only fatal and serious injury crashes were used to develop the high-injury network. Due to the limited number of data points available (2,686 crashes), systemic analysis and predictive risk assessment methods are of limited value. Expanding the crash data to include all-severity VRU crashes would have garnered an additional 10,000+ data points, enabling a more robust systemic analysis or the creation of a proactive risk assessment tool. Information provided by FHWA that all-severity crash types could have been considered came too late in the process to incorporate the additional crashes into the analysis. The relatively small number of fatal and serious injury crashes also made system-wide analysis of correlations

between harmful events and land use or infrastructure indicators unreliable. Using all-severity crash types would enable this type of analysis in future updates to this report.

Strategies:

- » Pending clarification from FHWA, use all-severity crashes to establish a high-injury network
- » To the extent possible, incorporate exposure data into the analysis.
- » If all-severity crashes can be used, perform a pair-wise analysis to determine correlations between first harmful event and land use or infrastructure/roadway features.
- » Create a proactive risk-assessment tool to anticipate locations that have a high risk of crashes, regardless of crash history.

4.2.10 Address Priority Locations

As described in Section 4 and detailed in **Appendix C**, 39 priority locations were identified through the sliding windows analysis. Progress toward increasing safety should be made and monitored. Consultation with local jurisdictions revealed that in many of these locations, countermeasures had already been constructed, were currently under construction, or were planned. Individual recommendations for each location made in **Appendix C** take into account the status of planned and completed safety countermeasure implementation, but general strategies are listed below.

Strategies:

- » For locations where safety improvements have already been implemented, monitor safety impact of recent improvements on VRUs and conduct further analysis to identify proven safety countermeasures if VRU safety continues to be an issue.
- » For locations where safety improvements are in design and/or under construction, ensure traffic control plans accommodate safe access for VRUs through construction, and monitor safety impacts after construction is completed to assess whether VRU safety continues to be an issue.
- » For locations where safety improvements have not been planned, collect and use additional sources of data such as all-severity crashes, expanded crash typing using PBCAT, exposure data, land use and trip generators and near-miss data to determine and implement appropriate proven safety countermeasures to improve VRU safety at each location.
- » Safety countermeasures should align with the results of in-depth crash, design and land use analysis, and are backed up by research and studies that show their effectiveness in mitigating fatal and serious injury crashes. Resources for proven safety countermeasures that align with Safe System Approach principles such as separating users in space and time, increasing attentiveness, reducing cognitive load, and reducing the kinetic energy of crashes include:
 - FHWA's Safe Transportation for Every Pedestrian (STEP) guide (<https://highways.dot.gov/safety/pedestrian-bicyclist/step>), and
 - FHWA's Proven Safety Countermeasures website (<https://highways.dot.gov/safety/proven-safety-countermeasures>).

Section 5 Overview of the Safe System Approach

This section provides a high-level overview of ways in which the Safe System Approach was incorporated into this project. Details on how the SSA was considered and applied are reflected throughout the document.

Consistent with VRU Safety Assessment guidance and the Safe System Approach, a multi-disciplinary Technical Assistance Committee (TAC) guided this project from the beginning. TAC members included engineers, planners, and public health professionals, and met four times over the eight-month project. TAC meeting notes and presentations can be found in **Appendix D**. Additionally, this plan utilized SSA concepts in the following areas:

5.1 Vulnerable Road User Safety Performance

Due to a narrow interpretation of the guidance, only fatal and serious injury VRU crashes were considered during the creation of the high-injury network. While limiting in many ways, it had the effect of keeping the focus solely on fatalities and serious injuries throughout the process, which is the focus of the Safe System Approach. Additionally, crashes were analyzed by several systemic risk factors such as number of through-lanes, functional class and lighting conditions, however this analysis was of limited usefulness due to the low number of fatal and serious injury crashes analyzed for this project. Finally, local VRU-related plans within Colorado, and state-level plans in Colorado's transportation policy peer group were reviewed for alignment with the SSA, including the use of proactive approaches, including equity considerations, and whether there was a stated goal of zero deaths and serious injuries to help guide Colorado as they continue their journey of incorporating the SSA into their SHSP. A summary of notable practices appears on page 11 of this document and detailed summaries of each reviewed plan can be found in **Appendix A**.

5.2 Summary of Quantitative Analysis

Consistent with the SSA, the quantitative analysis used a variety of data sources in addition to VRU fatal and serious injury crash data, including census data, transportation disadvantage data, roadway system and road characteristics data, and Colorado EnviroScreen data, allowing for a better understanding of the crash data and VRU safety inequities across the state. A high-injury network was developed of VRU fatal and serious injury crashes. Some systemic analysis such as correlation between crashes and number of through lanes and roadway classification was presented with the crash data in section 1, however the combination of a low number of fatal and serious injury crashes combined with a lack of exposure data makes these correlations of limited usefulness. A number of recommendations for additional crash data collection and use to develop a more robust systemic or proactive risk assessment tool for Colorado were made for subsequent updates to the plan.

Equity analysis can generally be used in three ways –in selecting locations of interest, in prioritizing locations of interest, and in making funding decisions. Without specifically building equity into the selection or prioritization process, 92% of identified priority locations are in disproportionately impacted communities and 72% are in an areas with the highest level of disadvantage (indicated by EnviroScreen score greater than 80). With such a high percentage of locations occurring in disadvantaged neighborhoods, incorporating equity considerations into the selection process would be unlikely to change the results. Equity should, however, be a factor in prioritizing funding moving forward, and continual monitoring of transportation safety inequity across the state should be conducted to monitor progress.

5.3 Summary of Consultation

Public involvement was not a requirement of the VRU Safety Assessment; however 12 separate consultation meetings were held with local jurisdictions where priority locations had been identified. Additionally, consistent with the SSA, an additional 3 consultations were held – with a state-wide advocacy organization, a local advocacy organization, and the state public health department – making 15 total consultation meetings. Consultations used a guided discussion format enabling comparison of answers across jurisdictions. The consultations revealed details of recently installed safety countermeasures as well as ones planned for the near future in many of the identified priority locations. Safety complaints made from pedestrians and bicyclists, as well as from drivers about pedestrians were noted, and several innovative local practices that align with the SSA were highlighted during this process. Consultations with advocacy groups provided insight into the priorities of the bicycling and walking public, and the public health department enumerated several innovative efforts in utilizing data from untraditional sources in furthering VRU safety. Advocacy and public health involvement in VRU safety efforts should continue and be strengthened with subsequent updates to this report.

5.4 Program of Projects and Strategies

5.4.1 Program of Projects

The priority locations presented in Section 4.1 and detailed in **Appendix C** in many cases already had countermeasures applied or currently in construction as detailed in the consultation notes. Countermeasure recommendations for these locations were not made, however recommendations for VRU safety through the construction process and monitoring of VRU safety after implementation were made. For locations that had upcoming safety projects already planned, recommendations were made to assess effectiveness of the countermeasures on VRU safety, such as the use of before-and-after studies, with further analysis and remediation if VRU safety was not substantially improved. As discussed in the report, using only fatal and serious injury VRU crashes did not give the project team enough information to make proven safety countermeasure recommendations for the remaining projects, except where the team noted obvious sightline or traffic signalization improvements that could be made to increase the visibility of pedestrians and/or bicyclists or separate users in time. As noted for those locations in **Appendix C**, and listed as strategy 4.2.10, further analysis of crash causes and VRU/motorist conflicts using all-severity crash data and/or near miss analysis was recommended to better match countermeasures to the safety issue at each location.

5.4.2 Program of Strategies

The developed program of strategies in Section 4.2 makes numerous recommendations that will help align future updates to this plan with SSA principles, including recommendations for data collection and use, creating a proactive risk assessment network or tool, using FHWA's proven safety countermeasures, continued monitoring of implemented solutions and ongoing equity analysis.

Future Colorado strategic plans and assessments will explore opportunities to incorporate additional safety data, expand outreach efforts with the public and local agencies, and utilize more proactive risk assessment methods to address the limitations that were highlighted in this assessment.



Appendix A Peer State Related Plan Summaries

Arizona.....	A-1
Colorado.....	A-2
Idaho	A-5
Nevada	A-6
Oregon	A-6
Utah.....	A-8

Related Plan Details by State

Arizona

2019 Arizona Strategic Traffic Safety Plan

The AZ STSP focuses on statewide traffic safety strategies that can be used for planning and programming purposes. The plan's vision is to achieve zero fatalities through a reduction of crashes with a goal of reducing traffic fatalities. When expanded upon, the STSP's vision and goal also includes reducing traffic-related serious injuries. Overall trends for the state indicate an increase in fatalities and a decrease in serious injuries since 2014. In Arizona, 22 percent of all fatalities and 10 percent of all serious injuries are pedestrians. The AZ STSP also noted that pedestrian-related fatalities increased 100 percent between 2009 and 2018. In addition, most pedestrian fatalities occurred at midblock locations and nearly half involved alcohol or drug impairment of the pedestrian. Analysis presented in the study is limited to historical data, with presented strategies being more reactive than proactive. The AZ STSP categorized identified strategies into the traditional four E's of traffic safety: engineering, enforcement, education, and emergency medical services. The five emphasis areas identified in the AZ STSP are highway safety (behavior-related), intersections, lane departure, pedestrians, and safety-related data. VRU safety is primarily addressed in the pedestrian emphasis area with some mention of pedestrian and bicycle safety within the highway safety emphasis area. In general, the STSP only focuses on pedestrians rather than addressing the broader definition of VRUs. Countermeasures were provided for each of the STSP emphasis areas. These countermeasures were specifically infrastructure-related and included relevant FHWA Proven Safety Countermeasures. The pedestrian emphasis area countermeasures also mention RSA's and the AzSTEP Guide as additional resources. Strategies listed within each of the four E's categories provide general, non-infrastructure actions that can be taken to achieve the STSP's goal.

2018 ADOT Bicyclist Safety Action Plan

The ADOT BSAP is a statewide planning document focused on identifying strategies and countermeasures that can effectively reduce the number of bicycle-related crashes on the State Highway System (SHS). The overall goal of the BSAP is to measurably reduce the number of bicycle crashes, injuries, and fatalities on the Arizona SHS. The plan highlights a nationwide increase of 31.3 percent in bicyclist fatalities from 2010 to 2015 with Arizona ranked as the 9th highest state for bicyclist-vehicle fatal crashes. While total bicycle crashes in Arizona decreased from 2012 to 2016, the number of bicyclist fatalities increased during the same period. Analysis presented in the study is considers historical data and crash-potential. The methodology used to evaluate bicycle crash-potential identifies common factors associated with bicycle crashes and assigns them scores. Factors with higher assigned scores are correlated with a greater crash-potential. Roadway segments are then scored by the sum of their applicable crash-potential factors. This methodology allows the state to proactively identify roadway segments where bicycle improvements are needed before crashes occur. It is also important to note that the BSAP only considered bicycle crashes that occurred on state highway segments. Bicycle crashes on segments managed by local agencies were not considered. Rather than applying SSA elements, the AZ BSAP centers its analysis around the network planning analysis process presented in the FHWA Separated Bike Lane Planning and Design Guide. In terms of VRU, the BSAP focuses exclusively on bicycles. However, the plan does not address e-bikes, so it is unclear if they are included or not. Further,

the plan limits its analysis to crashes on the SHS. Countermeasures were provided for the 33 identified priority locations. These recommendations included engineering solutions (infrastructure and non-infrastructure related), education measures, and enforcement opportunities. The plan also provided figures of various interchange types to illustrate how some measures could be applied.

2017 ADOT Pedestrian Safety Action Plan

The ADOT PSAP is a statewide strategic action plan aimed at pedestrian-vehicle crashes on the SHS. Because the plan is focused on crashes occurring on the SHS, it is meant to supplement larger state plans such as the 2014 Strategic Highway Safety Plan. The PSAP identified two primary goals: reducing all pedestrian-involved crashes on the SHS to fewer than 125 crashes per year and reducing combined fatal and incapacitating injury crashes to fewer than 60 crashes per year. The plan highlighted that the annual average number of pedestrian-involved crashes from 2011 to 2015 was 165 crashes per year. During this same period, the annual average of combined fatal and incapacitating injuries for pedestrian-involved crashes was 81 crashes per year. In addition to an evaluation of historical data, the PSAP also conducted a crash risk assessment aimed at proactively identifying SHS locations with higher pedestrian crash probability. This risk assessment is a two-step process that includes GIS-based screening and visual review screening. Rather than applying SSA elements, the AZ PSAP centers its analysis around FHWA's Pedestrian-Bicycle Crash Analysis Tool (PBCAT) and Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). These tools were used to crash type the data to identify contributing factors and potential countermeasures. In terms of VRU, the PSAP focuses exclusively on pedestrians. Further the plan limits its analysis to crashes on the SHS. Countermeasures were provided for the high-crash and high-risk locations identified by the analysis. These recommendations included engineering solutions (infrastructure and non-infrastructure related), education measures, and enforcement opportunities.

Colorado

2019 Denver Regional Active Transportation Plan

Initiated by the Denver Regional Council of Governments (DRCOG), this action plan focuses on the transportation network within the Denver area. As a supplement to the DRCOG's Metro Vision, the plan's mission is to promote an active transportation network within the region. With safety being a component of active transportation, one of the ATP objectives is to reduce the number and severity of pedestrian and bicyclist related crashes and participate in Vision Zero initiatives. The regional study notes that while only four percent of commuters choose to walk or bike, 24 percent of all fatalities from crashes involve pedestrians and bicyclists. While some crash data is presented, the plan centers around existing initiatives, programs, and practices that support active transportation. A full presentation of historical analysis or predictive modeling was not included. Due to the intent of the ATP, the SSA is not mentioned. The plan defines pedestrian modes of travel to include walking, wheelchairs, bicycling, and other forms of self-propelled transportation. The plan further includes the use of e-bikes and e-scooters as alternative modes being addressed. Rather than providing countermeasures, the plan identifies opportunities for regional and local organizations can support VRU mobility and safety. Regional opportunities were grouped into three categories: collaboration; education and assistance; and investments. Similarly, local opportunities were grouped into three categories: collaboration; policies, plans, and regulations; and investments.

2022 CDOT Region 4 Bicycle & Pedestrian Safety Study

This study focuses on the transportation network within CDOT Region 4 as it relates to pedestrian and bicyclist safety. The stated goal of the study is to improve the safety of the bicycle and pedestrian network on CDOT roadways within Region 4. This goal is intended to contribute towards CDOT's Moving Toward Zero Deaths initiative through a more focused support of the Region's local agencies. Of the 836 pedestrian and bicyclist involved crashes in Region 4 from 2015 to 2019, nearly five percent were fatal, and 77 percent resulted in an injury. Safety analysis in the study was centered around historical crash data. High-risk locations were identified through crash identification and a systemic evaluation using FHWA's Systemic Safety Project Selection Tool. The study also incorporated stakeholder input to supplement the data collected. Although mentioned, FHWA's Safe System Approach is not a deeply integrated into the study as a template for developing strategies or countermeasures. Rather, the study only highlights the SSA emphasis on redundancy and goal of eliminating fatal and serious injury crashes. While the study is centered around pedestrians and bicycles, a deeper definition of these terms is not provided. Countermeasures were presented for the top ten locations identified through the analysis. All countermeasures identified were infrastructure-related improvements. The study also provided an extensive list of countermeasure resources and a table summarizing the general applicability and pros and cons of identified acceptable countermeasures.

2023 CDOT Region 1 Bicycle & Pedestrian Safety Study

This study focuses on the transportation network within CDOT Region 1 as it relates to pedestrian and bicyclist safety. The stated goal of the study is to improve the safety of bicycle and pedestrian network on CDOT roadways within Region 1. This goal is intended to contribute towards CDOT's Moving Toward Zero Deaths initiative through a more focused support of the Region's local agencies. Of the 2,222 pedestrian and bicyclist involved crashes in Region 1 from 2015 to 2020, over 6 percent were fatal, and 78 percent resulted in an injury. It was also highlighted that pedestrians accounted for 94 percent of the fatalities when compared to the 6 percent of bicyclists. Safety analysis in the study was centered around historical crash data. High-risk locations were identified through crash identification and a systemic evaluation using FHWA's Systemic Safety Project Selection Tool. The study also incorporated stakeholder input to supplement the data collected. Although mentioned, FHWA's Safe System Approach is not a deeply integrated into the study as a template for developing strategies or countermeasures. Rather, the study only highlights the SSA emphasis on redundancy. While the study is centered around pedestrians and bicycles, a deeper definition of these terms is not provided. Countermeasures were presented for the top 12 locations identified through the analysis. All countermeasures identified were infrastructure-related improvements. The study also provided an extensive list of countermeasure resources and a table summarizing the general applicability and pros and cons of identified acceptable countermeasures.

2020 Colorado Strategic Transportation Safety Plan

The CO STSP is a statewide planning document aimed at enhancing safety for all transportation modes within the state of Colorado. Colorado's STSP Vision is to achieve zero deaths and serious injuries for all transportation modes. This vision is supported by the plan's mission for Colorado agencies to collaboratively develop and implement strategies that eliminate fatal and serious injuries. To measure the plan's success, a performance target of a 15 percent reduction in fatal and serious injuries from 2020 to 2023 was established. Trends in pedestrian and bicyclist fatalities indicate an increase of 50 percent and 200 percent, respectively, from 2014 to 2018. During the same period, serious injuries among pedestrians and bicyclists have either decreased or remained relatively flat. Crash analysis in the plan

focused on historical data captured between 2014 and 2018. Although predictive modeling was not included in the analysis, identified strategies did consider the programmatic and systemic solutions to proactively address long-term needs. The CO STSP incorporates FHWA's four E's of highway safety rather than the Safe System Approach. This approach focuses on including engineering, education, enforcement, and emergency medical service elements into its recommended strategies. The CO STSP identifies vulnerable road users as one of the plan's emphasis areas. This emphasis area includes motorcyclists, bicyclists, pedestrians, older drivers, young drivers, work zones, and first responders. Identified high-level strategies are categorized into three tiers. Tier I Strategies are categorized high-priority, Tier II Strategies are categorized supporting strategies, and Tier III Strategies are categorized as low-priority. Each of the Tier I Strategies were then correlated with the plan identified emphasis areas. The STSP also provides a toolbox of ITS and technology-based countermeasures for each of the emphasis areas that are again correlated with strategies within each tier.

2022 Vision Zero Boulder Safe Streets Report

This report is aimed at moving the City of Boulder toward its Vision Zero goal for all modes of travel. The Vision Zero goal is supported by five objectives: eliminate serious injury and fatal crashes, reduce all crash types, improve travel comfort and security, enhance awareness and engagement with Vision Zero, and improve data and transparency. Highlighted trends for VRUs indicate that while pedestrians and bicyclists make up 2 percent and 6 percent, respectively, of total crashes between 2018 and 2020, they made up a disproportionately greater percentage of the severe crashes. Of the severe crashes between 2018 and 2020, pedestrians and bicyclists were involved in 18 percent and 36 percent, respectively. Analysis focused on historical crash data primarily between 2018 and 2022. While predictive modeling was not included, the report did highlight areas addressed based on previous versions of the report and the progress made. The report indicates that its Vision Zero approach includes the 4 E's: engineering, education, enforcement, and evaluation. The SSA is not mentioned in the report. Although the report addresses all roadway users, data specifically regarding pedestrians and bicyclists is also presented. Countermeasures are not included as part of this report. Instead, the Safe Streets Reports refers to the Boulder Vision Zero Action Plan for measures to address the crash data presented.

2020 DRCOG Taking Action on Regional Vision Zero

This regional action plan developed by DRCOG focuses on achieving Vision Zero for the Metro Denver area. Vision Zero initiatives strive to eliminate fatalities and serious injuries for all roadway users. Trends for the region show that pedestrians accounted for 19 percent of fatal crashes between 2013 and 2017 and bicyclists accounted for 4 percent of fatal crashed during the same period. These statistics are despite the two roadway users only accounting for a combined three percents of all crashes between 2013 and 2017. Analysis presented focuses on historical crash data from 2013 to 2017. Predictive modeling was not included in the report. Although not directly mentioned, the report does include elements of the SSA. These elements focus on preventing deaths and serious injuries, designing for human error, encouraging safer speeds. Although the report addressing all roadway users, data specifically regarding pedestrians and bicyclists is also presented. Countermeasures were organized by crash area type, including urban, suburban, rural, and limited-access highways. Measures specific to reducing pedestrian and bicyclist involved crashes were only included for urban and suburban areas. Additional strategies were provided to address human behavior and error, speed reduction, and equity.

2023 Boulder Vision Zero Action Plan

This Vision Zero action plan was developed to address the areas of concern identified by the City of Boulder Safe Streets Report. In line with the City's Safe Streets Report, Boulder's Vision Zero goal is to eliminate all traffic-related fatalities and serious injuries and reduce all crash types. The plan reiterates trends highlighted in the Safe Streets Report. The plan highlights historical crash data between 2016 and 2020 and applies a systemic safety analysis to determine patterns. This systemic analysis determined 6 risk factors that were then used to develop a High Risk Network (HRN). Despite only accounting for 7 percents of the City's streets, the HRN captures 56 percents of bike crashes and 57 percent of pedestrian crashes. Although not directly mentioned, the report does include elements of the SSA. Although the report addressing all roadway users, data specifically regarding pedestrians and bicyclists is also highlighted. Countermeasures presented first aimed at systemically addressing the most common crash types identified in the Safe Streets Report. The plan also presents an action plan with engineering solutions, education and enforcement initiatives, and improved Vision Zero practices, data, and transparency. Each action item is assigned a responsible party and time frame to further drive progress. Further, the plan highlights whether each action is a reactive or proactive approach to mitigating specific crash types.

Idaho

2021-2025 Idaho Strategic Highway Safety Plan

This planning document aims to coordinate the goals and highway safety programs across the state of Idaho in order to develop and implement strategies that reduce fatalities and serious injuries. Idaho's SHSP Vision is to continue to move toward zero deaths on all roadways within the state. This vision is supported by specific five-year average goals of reducing the number of fatalities to less than 230, the fatality rate to 1.26 per 100 million VMT, the number of serious injuries to less than 1,219, and the serious injury rate to 6.60 per 100 million VMT. However, the plan did not include any historical or predictive crash analysis to compare its stated goals go. The ID SHSP incorporates FHWA's four E's of highway safety rather than the Safe System Approach. This approach focuses on including engineering, education, enforcement, and emergency medical service elements into its recommended strategies. VRU's are included as one of the plan's five Focus Area Groups. This group includes motorcyclists, bicyclists, pedestrians, mature drivers, youthful drivers, and commercial motor vehicles. Specific goals were also provided for each of the VRU subgroups. It should be noted that the plan does not include e-bikes or e-scooters under the definition of bicycles. Strategies were included for each of the SHSP Focus Area Groups and their subgroups. Countermeasures were not included as part of this plan.

2014 Idaho Statewide Bicycle & Pedestrian Study

This study is a culmination of statewide goals and objectives related to economic development, public health, and transportation. The primary goals of this study are related to encouraging an active transportation system that supports healthy lifestyles and economic vitality. One of the five objectives developed to help achieve these goals is to improve bicyclist and pedestrian safety. The metric provided for this safety objective is to reduce bicycle and pedestrian crash rates by 50 percent by 2035. No added distinction is given to fatal or serious injury crashes. Regarding pedestrian and bicyclist safety, the study highlights an overall decrease in pedestrian and bicycle crashes, including fatal or serious injury crashes. Crash analysis in the study is limited to the trends highlighted earlier and does not include any predictive modeling. The study structures its recommended best practices around the "Five E's" rather than the Safe System Approach. This approach includes elements of engineering, encouragement, education,

enforcement, and evaluation. Although the study focuses entirely on bicyclists and pedestrians, safety is only addressed as an objective that is also lumped with efficiency when recommended initiatives are introduced. Recommended initiatives are provided under each of the “Five E” categories and then correlated to the study goals. These initiatives include both infrastructure and non-infrastructure related actions.

Nevada

2021-2025 Nevada Strategic Highway Safety Plan

This statewide safety plan focuses on identifying factors contributing to fatal and serious injury crashes and providing a framework to help eliminate them. Nevada’s overall goal is Zero Fatalities by 2050. To support this, the SHSP indicates five performance measures with specific 2025 targets necessary to achieve this goal. The performance measures include number of fatalities, number of serious injuries, fatality rate, serious injury rate, and non-motorized fatalities and serious injuries. Although the plan highlights an increase in non-motorized fatalities and serious injuries from 2014 to 2017, it also indicated a projected decrease based on data collected for 2018 and projected data for 2019 through 2021. Analysis presented in the SHSP focuses exclusively on historical crash data. Predictive modeling was not included in the plan. The study structures its recommended strategies around the “Six E’s” of traffic safety rather than the Safe System Approach. This approach includes elements of equity, engineering, education, enforcement, emergency medical services/emergency response/incident management, and everyone. Vulnerable Road Users are identified as a Key Area considered within the SHSP. This Key Area includes four emphasis areas: pedestrians, motorcyclists, bicyclists, and micro-mobility. The SHSP highlights pedestrians and motorcyclists as critical emphasis areas. For both critical emphasis areas, the plan discusses crash trends from 2014 to 2018, most common fatal and serious injury crash attributes, performance measures, and strategies. Actions related to bicycle and micro-mobility safety are not addressed. Countermeasures related to each of the emphasis area strategies are provided in the 2021-2025 SHSP Action Plan.

2021-2025 Nevada SHSP Action Plan

As an extension to the 2021-2025 Nevada SHSP, this action plan focuses on the statewide action steps for implementation and output measures. Further, the plan is designed to be modified as action items are completed or need to be adjusted during the 2021 to 2025 span. Strategies identified under the VRU Key Area Critical Emphasis Areas were broken down into action steps with specific output measures. These action steps are primarily high-level and non-infrastructure related. Specific countermeasures were not provided for VRU Critical Emphasis Areas.

Oregon

2021 Oregon Transportation Safety Action Plan

The OR TSAP is a statewide plan aimed at improving the safety of all road users. The plan includes data-driven long-term goals, policies, strategies, and near-term actions. Oregon’s vision is to achieve zero deaths and life-changing injuries by 2035. In support of this vision, the TSAP also identified six long-term goals. These goals include promoting a safety culture, improving infrastructure, designing active communities, implement transportation safety technologies, support a collaborative environment amongst stakeholders, and investing strategically. Highlighted trends include an increase in traffic fatalities from 2013 to 2018, with a 15-year high of 502 fatalities in 2018. Analysis presented in the TSAP focuses exclusively on historical crash data. Predictive modeling was not included in the plan. The TSAP

considers the four E's in its development of recommendations rather than the Safe System Approach. This approach includes engineering, emergency response, law enforcement, and education. Equity was also factored into the analysis and recommendations. The TSAP considers the four E's in its development of recommendations rather than the Safe System Approach. This approach includes engineering, emergency response, law enforcement, and education. Equity was also factored into the analysis and recommendations. Rather than countermeasures, policies and strategies are recommended for each of the TSAP goals. In addition, actions were developed for each of the emphasis subareas. These actions were non-infrastructure and infrastructure related.

2020 FHWA-SA-20-11

This FHWA report summarizes the efforts made by Oregon Metro to address equity in the Portland, Oregon metropolitan region. Summarized goals include eliminating traffic-related fatalities and serious injuries for all transportation modes by 2035, with a 16 percent reduction by 2020 and a 50 percent reduction by 2025. In addition, five equity goals were highlighted to address racial equity, community engagement, workforce diversity, safe communities, and resource allocation. The report highlights that the majority of fatalities and serious injuries, including those involving pedestrians and bicyclists, occurred in equity focus areas. The report focuses more on how Oregon Metro incorporated equity into their Vision Zero efforts than specifically addressing VRU's. However, the report that 67 percent of pedestrian fatalities and 83 percent of bicycle fatalities occurred in equity focus areas. These statistics emphasize the importance of considering equity when addressing VRU safety. Specific countermeasures and strategies were not included in the report.

2016 Portland Vision Zero Action Plan

This plan proposes equitable and data-driven actions aimed at achieving Vision Zero in the City of Portland by 2025. Vision Zero is a commitment to eliminate traffic-related deaths and serious injuries for all transportation modes. Although walking and biking only make up 14 percent of the City's primary travel mode, they make up 37 percent of all traffic related deaths. The action plan also highlights an increase in percentage of pedestrian deaths and a steady percentage of bicycle deaths over the last 20 years. Presented analysis is focused on historical data from 2004 to 2013. While the analysis does not include any predictive modeling, the plan does dive deeper into equity data to identify Communities of Concern and integrated equity metrics, demographic information, hospital trauma data, fire response data, and Oregon Liquor Control Commission data with traditional crash data. The action plan does not reference FHWA's Safe System Approach. Rather, recommended action items are mitigating the most common fatal and serious injury crash factors identified in the city. Rather than addressing VRU safety in a dedication section, the Portland Vision Zero Action Plan integrates VRU safety throughout the plan. Two-year and five-year actions are recommended for each of the identified crash factors. Actions include infrastructure improvements, education activities, policy changes or additions, and increased enforcement. In addition to crash factor actions, the plan also includes two-year and five-year actions related to community engagement and accountability.

2019 Portland Vision Zero 2-Year Update

This report is an update to Portland's 2016 Vision Zero Action Plan that highlights the successes and lessons learned in the two years following the plan's adoption. This update maintains the City's commitment to eliminate traffic-related deaths and serious injuries for all transportation modes. One highlighted trend was a 25 percent decrease in traffic deaths when compared to the previous year. The

report focuses on updates to historical crash data rather than including any predictive modeling. Recommended strategies and commitments were tied to the Safe System Approach. This systemic approach focuses on facilitating safe behavior, safe vehicles, safe roads, and safe speeds. Similar to the 2016 Action Plan, this update integrates VRU safety throughout its strategies and commitments. Each SSA oriented strategy has multiple objectives with actionable commitments. These actions are infrastructure and non-infrastructure related and are sometimes provided in yearly steps.

Utah

2016 Utah Pedestrian Safety Action Plan

This Pedestrian Action Plan is a statewide document aimed at providing actionable strategies to aid in promoting a safe transportation system for all travel modes. The action plan's mission is to improve the overall safety of pedestrians by reducing pedestrian-related crashes, injuries, and fatalities. Although the plan states that recommended actions were identified through analysis and research, no data was included as part of the report. In addition, the Safe System Approach is not included in Utah's action plan. The PSAP only focuses on pedestrians. Safety is structured and addressed under FHWA's target emphases for nationwide pedestrian safety: data, analysis, and evaluation; driver education and licensing; highway and traffic engineering; law enforcement and emergency services; communication program; pedestrian education and outreach program; and legislation, regulation, and policy. Each emphasis area is provided one or more goal with a broad scope aimed at improving pedestrian safety. Each goal then has specific tasks necessary to accomplish the respective goal. These tasks are infrastructure and non-infrastructure related with assigned lead agencies and anticipated timeframes for when the task should begin.

2020 Utah Strategic Highway Safety Plan

This interactive online plan is a statewide initiative to achieve Zero Fatalities on Utah's roads. The SHSP's original 2016 goal was to reduce traffic-related fatalities by 50 percent by 2030, or an annual decrease of 2.5 percent. In general, traffic fatalities have decreased from 2000 to 2020 despite a spike in 2020. Further, pedestrian fatalities have been increasing since 2014. Analysis presented in the SHSP focuses exclusively on historical crash data. Predictive modeling was not included in the plan. The study structures its recommended strategies around the five E's rather than the Safe System Approach. This approach includes elements of engineering, education, enforcement, emergency medical services, and everyone. The plan's identified safety areas are split into two categories, emphasis areas and continuing safety areas. Emphasis areas include programs that were identified as needing additional attention to reach Utah's Zero Fatalities goal. Continuing safety areas include existing programs that will continue to be supported and enhanced. Regarding VRU groups, pedestrian safety is categorized as an emphasis area and bicycle safety is categorized as a continuing safety area. Countermeasures are presented for each emphasis area and continuing safety area. These recommendations are organized under four of the aforementioned E's: engineering, education, enforcement, and emergency medical services.



Appendix B Consultation Meeting Notes

Consultation Meeting Guided Discussion Format	B-1
CDOT Region 4 Consultation Meeting Notes	B-2
City of Colorado Springs Consultation Meeting Notes	B-4
City of Boulder Consultation Meeting Notes	B-6
CDOT Region 1 Consultation Meeting Notes	B-9
Denver Regional Council of Governments (DRCOG) Consultation Meeting Notes	B-11
City of Aurora Consultation Meeting Notes	B-13
City and County of Denver (CCD) Consultation Meeting Notes	B-15
City of Lakewood Consultation Meeting Notes	B-18
CDOT Region 3 Consultation Meeting Notes	B-22
CDOT Region 2 Consultation Meeting Notes	B-24
Bicycle Colorado Consultation Meeting Notes.....	B-26
CDOT Region 5 Consultation Meeting Notes	B-28
City of Longmont Consultation Meeting Notes.....	B-30
Colorado Department of Public Health and Environment (CDPHE) Consultation Meeting Notes	B-32
Bicycle Colorado Springs Consultation Meeting Notes	B-34

Consultation Meeting Guided Discussion Format

- » Overview of VRU Safety Assessment Requirements
- » General discussion/questions:
 - What is the most common safety issue raised by pedestrians in your City/Region?
 - What is the most common safety issue raised by bicycle riders in your City/Region?
 - Are there any bicycle or pedestrian safety issues routinely raised by drivers in your City/Region?
 - Are there any laws or policies at either the state or local level that you feel are a barrier to improvements you would like to implement to increase the safety of VRUs in your City/Region?
 - Are you aware of any local bicycle or pedestrian planning efforts recently completed, now underway or coming soon?
 - Did you apply for an SS4A grant in the last cycle? (Asked if one was not awarded in FY22.)
 - Are you using Leading Pedestrian Intervals (LPIs)?
 - Are you installing the “Motorists must give bicycles 3 ft clearance” (R4-50) sign anywhere, and if so under what circumstances?
- » Presentation of aerial view of each priority location in their region of interest. For each location the following questions were asked:
 - Is this a location your city/region has concerns about?
 - Have any safety countermeasures been installed in this location in the past 5 years?
 - If so, how well are they working?
 - If not, are there plans to install safety countermeasures at this location?
 - If so, what countermeasures are being considered?
 - Are these bicycle- or pedestrian-specific improvements?
- » Final questions:
 - Are there any locations in your region that you are surprised were not identified?
 - Is there anything else you’d like to tell us about bicycle or pedestrian safety in your region?



FINAL MEETING NOTES

Date: August 16, 2023

Place: CDOT Region 4

Project/Purpose: CDOT VRU Assessment – Region 4 Consultation Meeting

Attendees: Katrina Klobberdanz – CDOT Region 4
 Bryce Reeves – CDOT Region 4
 Anthony Meneghetti – CDOT Region 4
 Daniel Marcucci – CDOT Region 4
 Donna Lewandowski – Stanley Consultants
 Marta Gerber – Stanley Consultants
 TJ Scarberry – Stanley Consultants
 Alicia Guccione – Stanley Consultants
 James McMackin – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Region 4 and their responses:
 - What are the most common complaints from pedestrians?
 - Crossing treatments on major roads
 - Advanced signing
 - What are the most common complaints from bicyclists?
 - Crossings and advance signing
 - Specifically on Hwy 14
 - Issues with construction and rumble strips in canyon areas
 - If rumble strips are installed only 3 foot shoulder is left, the guideline is 4' shoulder
 - What are the most common complaints from vehicles with regard to VRUs?
 - Complaints mostly related to drivers not knowing bike laws
 - 3' passing – using R4-50 sign
 - General complaints about bikes on the road
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Minimum B/C makes it challenging to get funding
 - Anything else we need to know about in the region?
 - Challenge getting shoulder widening with topographic constraints and historic roadside ditches
 - Bicycle crashes with right-turning vehicles at or near intersections (US 119 North 63rd)

- Discussion of HIN locations identified within the region
 - Main St (287) – Longs Peak to 17th Ave
 - Ped/bike safety study done that included 17th Ave intersection
 - Study included PDO crashes
 - Four intersections are under design for safety improvements
 - 287 & 23rd signal changes were implemented – protected left-turn phase
 - Boulder County BRT study looking to move bus stops off Main to adjacent street (1st to 9th area)
 - 28th – Spruce to Valmont
 - Boulder County putting BAT lanes along the segment with ADA and sidewalk improvements
 - Currently under construction
 - Canyon – 9th to 19th
 - 2017/2018 complete streets study done
 - City led walk audit
 - No improvements were done after the study
 - Busy, no bike facilities, larger unhoused population
 - Installed “LOOK” pavement markings for pedestrians
 - No comparative analysis done to test effectiveness
 - Diagonal Hwy – Foothills to Independence
 - Improvements done in 2016
 - City of Boulder may have exposure data
 - Arapahoe – Foothills to 48th
 - segment currently part of 2 design project (complete streets)
 - No funding at the moment
 - Broadway – 15th to Canyon
 - Nothing done or planned
 - Recommended for education
 - 30th – Arapahoe to Walnut
 - Arapahoe intersection is currently in design
 - Segment currently in planning stages for design and funding
 - City was just approved for TIP funding for multimodal improvements
 - Broadway – Violet to Yarmouth
 - Ped/bike improvements over COVID
 - Folsom – University Heights to dorm parking lot
 - Lots of crossing traffic
 - Refuge island installed recently (between 2019 and 2021)
 - City was just approved for TIP funding for multimodal improvements
 - 9th Ave – Francis to Bross
 - City may have plans for the area
 - Improvements are recent

Date: August 17, 2023

Place: City of Colorado Springs

Project/Purpose: CDOT VRU Assessment - Consultation Meeting

Attendees: Todd Frisbie – City of Colorado Springs
 Colleen Guillotte – City of Colorado Springs
 Donna Lewandowski – Stanley Consultants
 Rob Pratt – Stanley Consultants
 TJ Scarberry – Stanley Consultants
 Alicia Guccione – Stanley Consultants
 James McMackin – Stanley Consultants

NOTES:

- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for the City and their responses:
 - What are the most common complaints from pedestrians?
 - Crossing – concerned about near-misses within marked crossings; no crossing present; distance between crossings is too far; desire for auditory push buttons
 - Speeding vehicles and the concern of getting hit even when on the sidewalk
 - Missing sidewalks
 - What are the most common complaints from bicyclists?
 - City meets with a local bicycle group on a monthly basis
 - Group has one main vocal member that regularly pushes for more advanced bicycle infrastructure.
 - City will provide a contact for the bicycle group to Donna so she can reach out and schedule a consultation with them.
 - General requests include infrastructure where missing (including gaps) and crossings at trails
 - City has made some improvements already, including signaling crossings and placing RRFBs in some locations.
 - What are the most common complaints from vehicles with regard to VRUs?
 - Pedestrians and bicyclists do not follow the rules of the road.
 - Questioning the presence of bike lanes on certain roads
 - Concern that bike lanes or infrastructure creates more traffic congestion for vehicles.
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - City noted that challenges are more politically related than legislative.
 - Some conflicts between pedestrian infrastructure and bicycle infrastructure
 - Curb bump outs blocking bike lane continuity
 - Challenges designing for ADA compliance
 - Increased cost and right-of-way impacts
 - Difficult to accommodate due to existing grades, slopes, and infrastructure designed with historical standards (i.e. 8” curbs)
 - Maintenance concerns with separated facilities (i.e. plowing separated bike lanes)

- Anything else to note?
 - City noted the importance of understanding the context of various areas within the city in order to make appropriate infrastructure recommendations.
- Any pedestrian or bicyclist studies to be aware of?
 - Citywide intersection safety study was performed
 - Currently in the process of a similar study on segments
 - City will provide
- Discussion of HIN locations identified within the City of Colorado Springs
 - E. Fountain Blvd (24H) and S. Murray Blvd
 - Design for a road diet along Murray is currently in progress
 - No funding for construction at the moment
 - On-street bike lanes will be transitioned onto multiuse paths through the intersection on both sides of Fountain
 - Time of day crash analysis may be beneficial
 - Specifically for the north to east movement in the morning
 - S. Nevada Ave – E. Navajo St to I-25 and I-25 to E. Mill St
 - Large homeless community in this area
 - Project planned to remove the signal at Motor Way and replace with Right-In-Right-Outs (RIROs)
 - Planned improvements of the I-25 ramps
 - Recent signal improvements at Las Vegas St
 - Academy Blvd and Austin Bluffs Pkwy
 - Convergence of two of the largest corridors in the city
 - Academy historically was the main north-south commercial corridor for the city
 - High pedestrian activity
 - Numerous transit stops and transfers
 - City recently added leading pedestrian intervals to the signal
 - City is considering conditional no turn on red for right turns
 - Carefree Cir and N. Academy Blvd
 - City recently improved the signal
 - Leading pedestrian interval, EB conditional lefts
 - Any other areas the City feel strongly should be considered?
 - S. Academy Blvd, Chelton Rd to Hancock Expy
 - Garden of the Gods area
 - Nevada and Bejou – area near transit center
 - Near Palmer High School
- Additional questions for the City
 - Any other VRU projects to be aware of?
 - City wants to update their pedestrian and bicyclist master plan next year – updates needed to make the plan more prescriptive
 - Transportation master plan was recently updated
 - Has a section dedicated to active transportation
 - City recently applied for a SS4A grant
 - Already was awarded a SMART grant
 - Does the City have any exposure data?
 - No existing program for collecting exposure data
 - They have counts for some of the major bike corridors – will provide data
 - Other counts that are less relevant:
 - Trail counts
 - Multimodal cameras

Date: August 18, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – Boulder Consultation Meeting

Attendees: Manjari Bhat – CDOT
 David Swenka – CDOT
 Devin Joslin – City of Boulder
 Mark Shisler – City of Boulder
 Donna Lewandowski – Stanley Consultants
 Marta Gerber – Stanley Consultants
 Sarah Zarzecki – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for the City and their responses:
 - What are the most common complaints from pedestrians?
 - City has a means for pedestrians to report close calls
 - Online portal – initially used to map areas, now looking through at a high level, had for 8+ years
 - City has taken some action based on close call reports
 - City to provide link and Vision Zero safety plan
 - What are the most common complaints from bicyclists?
 - Yielding issues at crosswalks
 - Issues with RT slip lanes
 - Interaction between bikes and e-bikes with regard to speed differentials
 - Issues on path systems
 - City taking note of complaints and working to improve perception of safety (i.e. protected bike lanes)
 - Concern with bike lanes next to parking
 - Multiuse paths intersecting driveways due to bikes going both directions
 - City is looking into bending path to go behind the vehicle but requires more space
 - Specialty signs are being used to help people remember to look both directions
 - What are the most common complaints from vehicles with regard to VRUs?
 - Bikes going too fast through crossing (City has ordinance requiring bikes to slow through crossing)
 - Pedestrians darting across road
 - City does use LPI at intersections – has criteria for how and when to install
 - Also implemented left turn phasing and found it reduced crashes
 - Red light running cameras also found to be effective
 - City struggling with identifying areas where fatalities and serious injuries will occur due to low numbers
 - Does the City have or use exposure data?
 - City uses it to make decisions

- No turn on red criteria
- Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Recently overcame issues with speed enforcement – change in law allowed for automated speed enforcement
 - PROWAG requirement challenges – more how it affects projects and funding
 - Had concerns about Colorado safety stop law but haven't necessarily seen a difference in safety
- Any pedestrian or bicyclist studies to be aware of?
 - Low stress walk and bike network plan
 - Core arterial network – how to transform and enhance bike facilities (in progress)
- Anything else to note?
 - City has design and construction standards that were updated to increase standardization of bicycle and transit facilities
- Discussion of HIN locations identified within the City of Boulder
 - Questions from the City:
 - What is included in the data analysis?
 - 2017 to 2021, fatalities and serious injury only
 - ½ mile sliding window analysis
 - How does Boulder compare to other cities when taking exposure into account?
 - Hard to tell without further analysis and lack of exposure data.
 - Request for crash ID numbers for further investigation internally
 - City can work with CDOT to obtain
 - 30th St, Arapahoe Ave to Walnut St
 - Tracking project to improve 30th and Arapahoe intersection
 - Left turn phasing
 - Included in SS4A funding application
 - Many segments along 30th trying to get funding for
 - Identified segment for future project
 - Broadway, Violet Ave to Yarmouth Ave
 - Recently completed project in this corridor
 - Enhanced bike facilities (raised buffered bike lane), added multiuse path, signal at Yarmouth, better connectivity for bikes and pedestrians
 - Folsom St, Stadium Dr to Dorm parking lot entrance
 - Folsom is a higher volume N/S route
 - Added crossing treatment at Taft with refuge
 - Segment is part of planned study focused on safety
 - Included in SS4A funding application
 - 28th St (36B), Spruce St to Valmont Rd
 - Planned project along 28th
 - Add business access and transit lane, continuous 6-lane cross section
 - Access control plan
 - Signal reconstructions
 - Multiuse path both sides
 - Area where path has conflicts with driveways

- Canyon Blvd (7B), 9th St to 19th St
 - Not much planned
 - Looking into red light camera at 15th for WB direction
 - Transit upgrades on 14th south of Canyon
 - Some crossing east of 19th flagged for RRFBs potentially becoming pedestrian signals
 - 2017 corridor plan for Canyon – 9th to 17th
 - City to send
- Diagonal Hwy (119B), Foothills Pkwy to Independence Rd
 - More handled by a regional project
 - City looking to connect to planned regional bike
 - Red light camera at 48th St
 - Near side head for drivers to help with sight distance
- Arapahoe (7C), Foothills Pkwy to 48th St
 - Multiuse path in design for E Arapahoe
 - Added improvements at both signals
 - CDOT planning to resurface Arapahoe
 - Considering modifying striping to include bus rapid transit – bikes can ride in that lane but it is not encouraged
- Broadway St (93A), 15th St to Canyon Blvd
 - Design coming up at Broadway and University to signalize NB right turn
- Any other locations to include?
 - None

FINAL MEETING NOTES

Date: August 18, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – Region 1 Consultation Meeting

Attendees: David Swenka – CDOT
Alazar Tesfaye – Region 1 Traffic and Safety Program Engineer
Benjamin Kiene – Region 1 Traffic and Safety Engineer
Donna Lewandowski – Stanley Consultants
Marta Gerber – Stanley Consultants
Sarah Zarzecki – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Region1 and their responses:
 - What are the most common complaints from pedestrians?
 - Lack of marked X-walks, no safe crossings
 - Do not have too much ped activity in Region 1. A lot of CDOT Region1 facilities are in locations without a lot of ped activity.
 - Malfunctioning ped push buttons.
 - X-ing issues
 - Sidewalks are not a frequent item – no complaints.
 - What are the most common complaints from bicyclists?
 - Lack of shoulders on some highways.
 - Request for bicycle detection at signals.
 - Cameras to detect bicyclists, noninvasive, non loop detection.
 - We only have a few locations with push buttons.
 - What are the most common complaints from vehicles with regard to VRUs?
 - A few hot spots of intersection issues, the complaint is about the presence of cyclists.
 - Cold creek canyon – no shoulders, residents are angry that bikers can use that road.
 - Weekend riders in these areas, group rides that are holding up traffic on weekends.
 - Temp restrictions on bicycles during construction, when the restrictions are removed, that is when residents complain about bicyclists.
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Funding is always a barrier.
 - Anything in particular about the funding that you find difficult? – the cost of the projects is so much that is hard to get enough money – lack of funding for the project.
 - Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - Just completed the Regional Safety plan that identified 11 locations to move forward with.
 - Have you installed R4-50 “State Law – Motorists Must Give Bicycles 3 FT Clearance” signs - YES.... positive feedback from bicyclists

- Discussion of HIN locations identified within Region 1
 - E. Colfax Ave. (40C) – Hanover St. to N. Peoria St.
 - Multiple segments are in design in this corridor that were identified in the Safety study.
 - There is funding for this project.
 - S. Federal Blvd. (88A) – W. Iowa Ave. to W. Mississippi Ave.
 - Not in the study, there was a parallel effort with CCD in this corridor – it was included in the city’s plans. Anything that is in the city may not show up in the Region 1 study.
 - This is in the BRT corridor design, widening, maybe median changes, a lot of changes in this corridor, installed raised medians in 2019- it was the short-term plan, and the long-term plan is BRT-related improvements. BRT is from Dartmouth to 120th, it is in design now.
 - Stanley designed the Denver HSIP intersection project at Mississippi and Federal – it is going to construction. .
 - S. Federal Blvd. (88A) W. Warren Ave. to 200 feet north of W Evans Ave.
 - Median project here as well
 - BRT corridor as well.
 - Colorado Blvd. (2A) at E. Colfax Ave.
 - Identified BRT corridors (both roadways)
 - Interim improvements – operational challenges due to the new BRT line
 - Planned project along 28th
 - Sheridan Blvd. (95A) – W. Dakota Ave. to W. 1st Ave.
 - 1st Ave was recently reconstructed.
 - At the 1st Ave & Sheridan intersection- islands were installed, and curb ramps
 - Sheridan is a very narrow corridor, with multiple jurisdictions that has been a hindrance to improvements.
 - Stanley is working on a Denver HSIP project at the intersection Sheridan and Alameda
 - E. 6th Ave. (30A) at N. Potomac St. to N.Sable Blvd.
 - No projects in this area (ask Aurora)
 - S. Parker Rd. (83A) – E. Dartmouth Ave. to I-225
 - City of Aurora has a ped bridge project to the north side of the road
 - Parker Road corridor study – that covers this segment – Arapahoe County is leading the corridor study.
 - E. Colfax Ave. (40C) – N. Clarkson St. to N. High St.
 - BRT corridor
 - Denver has done low-cost improvements
 - Wadsworth Blvd. (121A) – W. 14th Ave. to E. Colfax Ave.
 - Nothing is going on
 - W. Morrison Rd. (8A) at S. Estes St. / S. Garrison St.
 - It was identified as a roundabout location, but nothing has been completed or implemented. Lakewood was unable to come up with a funding match.
 - It came out of intersection prioritization studies.
 - The most recent intersection prioritization study was completed 3 or 4 years ago.
 - Sheridan Blvd. (95A) at W. 10th
 - Nothing to report
 - Wadsworth Blvd. (121A) – W. 19th Ave. to W. 26th Ave.
 - Bike ped study included a segment that is moving into design, but that is north of this segment.
 - There is a SW gap that will be updated.
 - Any other locations to include?
 - One of the Strategic Plan Goals is to get rid of the remaining protected/permitted signal 5 section signal heads replacing them with flashing yellow arrows – a low-cost effort. The flashing yellow arrow omits that function when there is a conflicting pedestrian call for crossing and signal goes to a red arrow after it serves the turn phase to protect the conflict.

FINAL MEETING NOTES

Date: August 22, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment –
Denver Regional Council of Governments (DRCOG) Consultation Meeting

Attendees: Aaron Villere – DRCOG
Emily Kleinfelter – DRCOG
Donna Lewandowski – Stanley Consultants
Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
 - What is the feeling in the region about Vision Zero?
 - Depends on the area within the region. Tracking 8 agencies that have been awarded SS4A funding. Happy to see some of the smaller communities taking advantage and adopting the vision.
- Preliminary questions for DRCOG and their responses:
 - What are the most common complaints from pedestrians?
 - Complaints come from member governments or public meetings
 - Public outreach feedback from Vision Zero planning process – complaints included:
 - Distracted driving
 - Speeding
 - Red light/stop sign running
 - Different complaints depending on the area
 - Lack of infrastructure
 - Lack of yielding or speeding (more urban areas)
 - Increased interest in legislation regarding speed limit setting
 - Working on updating bike and ped crash report
 - Left turn crashes standing out (specifically at major-minor intersections)
 - Long distances between crossings along larger arterials
 - What are the most common complaints from bicyclists?
 - Lack of infrastructure or infrastructure being inadequate to feel safe
 - Concerns with taking ROW from other modes and funding
 - General ill-will towards bikes and motorcycles
 - Unwilling to share space
 - Lack of connectivity across intersections at arterials
 - Seeing positive results from swapping “share the road” signs with R4-50 “motorists must give bicycles 3 ft clearance”
 - Left turns an issue but right turns more so with bikes
 - Different issues depending on the type of bicyclist
 - Bigger conflicts happening in urban/suburban areas
 - Also seeing a big push and momentum for innovative solutions

- What are the most common complaints from vehicles with regard to VRUs?
 - Bikes not following rules vehicles have to follow
 - Challenge adjusting to new norms (vehicles understanding bikes)
 - Victim blaming
 - Trying to understand if complaints are from the majority or vocal few
 - Boulder poll done that found overall support in bike infrastructure
 - Denver voting to add tax for sidewalk infrastructure
 - Misconceptions
 - Bicyclists don't pay for the taxes that fund their infrastructure
 - Concern about how much taxes go to bike/ped facilities
 - Bike lanes increase traffic delay/congestion
- Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Challenges around local governments being able to set speed limits or modify state roads
 - New policies allow for speed cameras to be installed
 - Laws around DUIs and VRU crashes not as strict
 - Overbuilding streets as part of developments (meeting future needs too early)
 - Directing funding to areas the region wants to focus on
- Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - Updating crash report
 - Looking to update transportation plan
 - Working on update to implementation plan for Vision Zero plan
 - Planning to do a full update to Vision Zero report
 - Including HIN
 - Looking to expand beyond crash data to be less reactive and develop regional high risk network
 - Corridor planning program
 - Alameda Ave, Lakewood to Denver
 - Boulder Rd, Boulder to Lafayette
- Any applications for SS4A?
 - Not yet – wanted to but need to be better set up to meet the match
- Are you using LPIs or new signs?
 - Included in the countermeasure glossary – agencies required to use the glossary
- Anything else we need to know about in the region?
 - Complete streets toolkit [Complete Streets for the Denver region \(arcgis.com\)](http://arcgis.com)
 - Prioritization scoring for complete streets
 - Creating a Vision Zero story map
 - Hoping to finalize by October
- Discussion of HIN locations identified within DRCOG region
 - Activity center
 - Recent improvements on Market
 - Denver starting to look more systemically at this area rather than separate segments
 - Since DRCOG does not own/control any roadways, local information is best gathered from member agencies
 - Member agencies with identified priority locations will be consulted with.
 - Any other locations to include?
 - Federal and Howard intersection
 - Pedestrian hot spot
 - Clarified that identified corridors will also consider the intersections within it
 - Stanley to send DRCOG map of all the locations to make it easier to identify other potential gaps

Date: August 22, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – City of Aurora Consultation Meeting

Attendees: Carlie Campuzano – City of Aurora
 Carl Harline – City of Aurora
 David Swenka – CDOT
 Donna Lewandowski – Stanley Consultants
 TJ Scarberry – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Aurora and their responses:
 - What are the most common complaints from pedestrians?
 - Requests for new crossings
 - Associated with speeding complaints on collectors
 - Requests for signals and other crossing enhancements
 - More crossing time at signals, add flasher to signal, yielding issues
 - Speeding complaints
 - A lot associated with students/parents walking to/from school
 - Almost no complaints where crashes occur, instead at places people walk and live
 - Sidewalk requests (don't necessarily correspond with traffic)
 - What are the most common complaints from bicyclists?
 - Requests for better connectivity, especially to and from hubs
 - More vocal community than pedestrians
 - Request for more facilities
 - Complaints that detection or buttons are not working
 - What are the most common complaints from vehicles with regard to VRUs?
 - Complaints about prioritizing cyclists over motorists
 - Example - Adding a new bike lane
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Would love for more automated enforcement, but not popular
 - Concerned about new policy allow bikes to roll through red lights and stops
 - More challenges having funding to get things done immediately
 - Any pedestrian or bicyclist planning safety efforts you are aware of, recently, now or in the future?
 - Got TIP grant for multimodal planning study
 - Will include updates
 - Missing sidewalks map
 - ADA grants to help
 - TIP grant for safety action plan

- Any applications for SS4A?
 - No, but hoping to be eligible for implementation funds
- Are you using LPIs or new signs?
 - Added LPIs to some areas, not currently using the R4-50 signs
- Anything else we need to know about?
 - Did get internal city funding for signal improvements at 6 locations
 - Chip away at safety list (lengthen mast arms to get arrow head, update cabinet and controller for conditional protected phasing, etc)
 - Working on getting a traffic management center
 - Flashing yellows arrows installed by default
 - Received extra funding for traffic calming (roundabouts, speed cushions, RRFBs, etc)
- Discussion of HIN locations identified within Aurora
 - Havana & 16th
 - In design for curb extensions
 - Identified in planning corridor study
 - Has construction funding – design to be finished this year, construction to be completed next year
 - Colfax, Hanover to Peoria
 - Colfax and Peoria was rebuilt in 2021 with HSIP funding (updated to protected lefts)
 - Recent improvements at Havana intersection (controller, phasing, added bulb out – last Nov 2022)
 - Talking to Region 1 about getting FASTER funding
 - CDOT improvements planned at Moline
 - Big transfer point for transit
 - BRT project coming, will increase frequency
 - City does operate and maintain signal
 - 6th, Potomac to Sable
 - Lot of complaints about signal timing, not much from peds
 - Related to activated crossings
 - Parker, Dartmouth to I-225
 - Ped bridge planned here
 - Any other locations to include?
 - Colfax further west than our stretch (up to Yosemite)
 - All the signals too old to add improvements
 - Colfax in general
 - Colfax and Chambers
 - 6th and Del Mar



FINAL MEETING NOTES

Date: August 23, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment - City and County of Denver (CCD) Consultation Meeting

Attendees: David DiGiacomo – CCD
 Eric Stein – CCD
 John Eisinger – CCD
 David Swenka – CDOT
 Manjari Bhat– CDOT
 Marta Gerber – Stanley Consultants
 Michael Romero – Stanley Consultants

NOTES:

- Introductions
- Marta provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for CCD and their responses:
 - What are the most common complaints from pedestrians?
 - Pedestrian concerns with speeding and discomfort with proximity
 - Pedestrian concerns with vehicles yielding right-of-way
 - Difficult to cross at unsignalized locations
 - Long crossing lengths
 - Not enough marked crossings, lack of frequency
 - State law states motorists must YIELD to peds IN the crosswalk, not necessarily waiting at the corner to cross
 - Wanting ped only phasing at signalized intersections
 - What are the most common complaints from bicyclists?
 - Difficult to cross wider roads
 - Difficult to cross at unsignalized crossings
 - What are the most common complaints from vehicles with regard to VRUs?
 - Denver just implemented a lot of bicycle facilities, not overly received well by motorists
 - Drivers appear unfamiliar with bike facility rules
 - Right turn conflicts unclear on right-of-way
 - Denver did not provide much education on safety stop rule
 - Not many complaints regarding bicyclists themselves
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Denver passed photo enforcement to more roads (speed enforcement)
 - Lots of red light running, not a lot of red light crashes
 - Enforcement is reimagining their role

- Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - A lot of bicycle facilities have recently been implemented
 - Denver pledged 125 miles of bicycle before end of Hancock administration
 - S. Piper and B. Boncore more aware of future bike network projects
 - More are planned, but unknown with the group
 - Sidewalk tax beginning this fall (307)
 - Gaps will be filled first, then substandard
 - New Bike facility guidelines currently in draft form, soon to be released
- Have you applied for SS4A grant money?
 - CCD applied for implementation grant for SS4A
 - Morrison Road match (July)
- Are you using any LPIs within the City?
 - Yes, more than 200 but less than 1,000
 - No standardized implementation of No Right on Red at LPI locations
- Is the City using the R4-50 sign within the City?
 - Facilities that require this sign (higher speed) would have a separated bike facility
 - There is policy to grade separate or physically separate bike facilities on higher speed roadways
 - Bike Design Guidelines should be released this fall
- Discussion of HIN locations identified within CCD
 - 20th St. – Lawrence St. to Wazee St.
 - Striping modifications since 2021
 - Market St. – 15th St. to 20th St.
 - Striping modifications since 2021
 - Separated bike lanes added
 - Heavy bar network, assumed late night alcohol related
 - Paint and post ped improvements
 - Blake St. – 15th St. to 20th St.
 - Striping modifications since 2021
 - Separated bike lanes added
 - Fatality on Rockies Opening Day
 - Paint and post ped improvements
 - Wazee St. – 15th St. to 20th St.
 - Lincoln St. – Colfax Ave. to 18th Ave.
 - Northbound double left
 - Lots of pedestrians due to RTD lot
 - Colfax BRT project coming, but not pedestrian improvements
 - Vision Zero plan includes Colfax
 - Speer Blvd. – 11th Ave. to Colfax Ave.
 - Increased speed limit sign, size, and density
 - 13th and 14th rebuilt in last two years
 - Noted street racing along Speer
 - Race a cop program
 - Stanley is aware of a signal project at 12th Ave. soon to be designed
 - Evans Ave – S. Madison St. to S. Syracuse Way
 - Evans/Quebec currently under construction
 - Quebec fatality walking between cars
 - New roadway design guide being developed including roadway cross sections
 - Signals are further apart
 - Corridor study taking place
 - Detached sidewalk at new build developments

- S. Federal Blvd. (88A) – W. Iowa Ave. to W. Mississippi Ave.
 - Stanley redesigning Mississippi intersection
 - LPI added to this corridor
 - Signal retiming just implemented along this corridor
 - Access control median project implanted in this area
 - Ped recall all signals south of Alameda (to Dartmouth) since 2018
- S. Federal Blvd. (88A) – W. Warren Ave. to (200' n/o) W. Evans Ave.
 - Signal rebuild soon at Iliff (replace curb ramps, new mast arms, signals per lane)
- Colorado Blvd. (2A) at Colfax Ave.
 - Colfax BRT will be going through this intersection, resulting in a lane diet
 - Center running bus lane
- Colfax Ave. (40C) – Clarkson St. to High St.
 - Colfax BRT will be going through this intersection, resulting in a lane diet
 - Left turns only at signaled intersections, otherwise Right In/Right Out
 - LPI from Broadway to Yosemite (April 2020)
- Sheridan Blvd. (95A) at W. 10th Ave.
 - Road Safety Audit on Sheridan corridor (but not at 10th)
 - City border with Lakewood
 - Denver operates the traffic signal
- Any other locations to include?
 - CCD has identified Tier 1 and Tier 2 HINs
 - CCD has identified VRU priorities
- Misc.
 - RSAs include micro information including action plans given crash data
 - Vision Zero action plans
 - The unhoused population accounts for about 25% of crashes
 - Speed is the common denominator for fatalities
 - COC are under-represented in reaching out to government
 - Thought to be for various reasons (language, culture, distrust of government)
 - Data taken from emergency room visits



FINAL MEETING NOTES

Date: August 23, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – City of Lakewood Consultation Meeting

Attendees: Jenny Gritton – City of Lakewood
 Matt Duncan – City of Lakewood
 David Swenka – CDOT
 Manjari Bhat – CDOT
 Donna Lewandowski – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
 - Replaced all “share the lane” signs
 - Some with R4-50, some with “bikes may use full lane”
 - Well-received by bicycling public
 - Are crashes where bike/pedestrian at fault removed?
 - No – all included per SSA
- Preliminary questions for Lakewood and their responses:
 - Overview of City approach to VRU Safety
 - Very hands-on with safety in Lakewood. We partner with Lakewood Police, Jefferson County Coroner’s office, and public health experts on the ageing. We have determined that without an in-depth accounting of the details of crashes, proposed solutions often exacerbate the issue by pushing more traffic off of arterials and onto neighborhood streets where VRU’s are more common.
 - Approach has resulted in a consistent turn-around of crashes since 2017, especially along arterials. We have experienced record lows in injury crashes for multiple years, which began in 2017.
 - Annual bike crashes have been challenging to gauge- some years the “total” has slightly increased, but the challenge is that we have also added more in-road facilities and encouraged more biking. Without exposure data we are able to determine crashes/user, as we are with other modes. This has been a challenge with biking. One thing is very clear: with few exceptions, nearly all of our VRU deaths in recent years have been due to impairment of the pedestrian, with cyclist crashes resulting in death being equally complicated.
 - What are the most common complaints from pedestrians?
 - People thinking they don’t have to check surroundings before crossing in a crosswalk
 - Upset that cars don’t automatically yield to them or stop
 - City uses signs to remind pedestrians to check before crossing
 - Complaints about perceived speeding

- What are the most common complaints from bicyclists?
 - Speeding and distracted driving – top complaints
 - Most bike lanes are on collectors
 - Not getting full 3' of clearance
 - City sent out bicyclist surveys
- What are the most common complaints from vehicles with regard to VRUs?
 - Bikes running red lights and stop signs, and generally not obeying laws
 - Think new law is part of the problem
 - General disdain of cyclists by peds and vehicles
 - Pedestrians running out into roadway (homeless or drug use issue)
 - Specifically problem on 6-lane arterial – city working on safety improvements and have cameras monitoring area
 - Angled crosswalks to force peds to face traffic
 - Detection to activate blinking signs when peds unexpectedly enter roadway at night (nighttime crashes)
- Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Default speed limit for Lakewood (30mph)
 - Challenges getting some speed limits lowered
 - CDOT recently changed policy to be less rigid
 - New texting state law too difficult to enforce
 - Officer has to observe other violation in conjunction with using a phone
 - RSAs can be helpful but lack the attention to behavior-related details
 - Details can be obtained by working with local police and coroner's office
 - City is diligent about investigating crashes to understand full context, including behavioral details, that allow for intentional recommendations aimed at consistent reductions in injury crashes
- Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - Colfax project – ped safety study
 - Expecting approval of new budget line item for separated bike lanes throughout city in October
 - Awarded SS4A for Vision Zero plan – co-applicants with Jefferson County
 - Applying for FHWA connecting communities grant – bike/ped bridge feasibility study
 - No general bike/ped safety study – area included in Region 1 study
 - Annual safety study citywide
 - All modes included
 - Thorough review of all fatalities
 - Applying for funding for DRCOG's Sheridan Vision Zero study (Hampden to 52nd)
- Are you using LPIs?
 - Have a few locations
- Discussion of HIN locations identified within Lakewood
 - 10th Ave – Benton to Sheridan
 - One location E of Sheridan technically in Denver
 - All three crashes, cyclists at fault
 - Consider removing corridor location and just keep intersection at Sheridan
 - 26th – Wadsworth to Teller Ct
 - Right hook crash at Teller
 - Consider removing location as corridor
 - Flashing Left Yellow Arrow at signal currently
 - Sheridan – Dakota to 1st Ave (information received after meeting from Matt Duncan)
 - Sheridan is a very complicated roadway due to impairment and transient challenges, and generally narratives were similar in circumstance to other collisions in northwest Lakewood.

- Crash Details:
 - 1/19/18: Sheridan & Cedar - 0651 in morning, dark. DPD investigated. Report states that motorist entered intersection on yellow and cyclist was crossing perpendicular. This would mean cyclist is crossing against signal, but there is no mention of cyclist being charged. Motorist is charged with expired insurance, falsification of license plate, and careless driving causing injury. I could not understand if the last charge is related to the motorist technically not being permitted to drive and therefore being at fault, or if the motorist was doing something so careless that despite the signal being yellow they were ultimately charged with the collision. There seems to be more to the story- perhaps CCDenver can elaborate.
 - 10/28/19: Sheridan & Nevada Pl - NO RECORD FOUND in either LPD or DPD listing using crash number or date. This may be internal to DPD, as it was within their jurisdiction.
 - 3/1/20: Sheridan & Alameda - Again, very limited information (DPD). In my review, I understand the crash was not at the intersection, but near/ “within 200th block”. Additionally, the pedestrian is called out for being cited for “unlawful crossing”, not at intersection.
 - 2/27/20: Sheridan & Dakota - Somewhat limited DPD entries, but LPD did assist so I can put together witness interviews conducted by our agents on scene. The pedestrian was crossing at an unknown location in the dark wearing dark clothing “in the general area of the intersection”.
 - 11/23/20: Sheridan & Ellsworth - LPD investigated, several details provide context. Witnesses interviewed had stated the pedestrian frequently crossed in area and was slow moving. Family stated brother was “slow, possibly autistic but never diagnosed”. Pedestrian uses wheelchair as a “walker” due to recently broken foot. Known associate stated pedestrian “drinks heavily and has been hit two times prior in same area”. Another known person stated pedestrian “doesn’t like walking to the signal due to the distance”. Crash occurred in the dark. Mother and daughter in vehicle, travelling between 20 and 25 mph on the way to pick up pizza for dinner. Headlights reflected off of wheelchair wheel, but mother stated the moment she registered it was a wheelchair the collision had occurred. Other direction of Sheridan had come to a halt as he crossed other direction’s lanes. Toxicology report positive for meth.
 - 11/11/20 Sheridan & 1st Ave - Pedestrian near, but not at intersection, south of crosswalk. WB motorist turning left facing sun. He stated due to glare, his eyes had a hard time adjusting when he felt the impact. Low speed collision. Pedestrian charged for not being in crosswalk. Due to language barrier, interview not conducted at hospital.
 - 11/19/2021 (this one was lacking date on spreadsheet, LK21042814 occurred at Sheridan & Alameda) - Collision occurred in SB #2 lane south of intersection. Male passenger was sitting on RTD bus bench “with his belongings”. RTD bus pulled up to stop. 2 passengers exit the bus. Pedestrian continues to sit on bench gathering his belongings. Driver closes doors and pulls off. Pedestrian begins to run alongside bus banging on the side of the bus. Pedestrian loses balance and falls under the bus. Video evidence from RTD bus confirms driver nor passengers seem aware that pedestrian was running alongside bus. Pedestrian claims particular driver repeatedly tries to leave him, however pedestrian’s description of the driver does not match.

- Wadsworth – 14th to Colfax
 - Crash at Colfax – ice on roadway caused vehicle to slide when trying to yield in slip right lane
 - Midblock crash – cyclist traveling wrong direction hit by car making a right
 - Fatality on 14th – older driver crash with challenges seeing around sunset struck older cyclist
 - Dual left now protected only during daylight hours – change made citywide shortly after crash
- Morrison and Estes/Garrison
 - Cyclist coming down hill ran into stopped vehicle – not using bike lane
 - Vehicle took left too tight and hit waiting cyclist
- Wadsworth – 19th to 26th
 - Nearby liquor store contributing to issues
 - Bike injury at 26th – cyclist ran over after primary crash into vehicle
 - Pedestrian death at 26th – juvenile ped w/ special needs crossing street against red to try to make bus despite efforts made by brother and bus driver to stop him
 - Pedestrian death at 19th – elderly woman crossing in front of vehicle during dark conditions
 - Slow moving due to recent hip surgery – challenge crossing 6-lanes uncontrolled
 - Heading to Walmart – could have used well lit signal at 20th
 - Additional lighting needed in this area
 - Did roadside safety audit recently at 26th
 - Area needs greater focus on behavioral aspects of fatalities
- Highlighted challenges:
 - Shadows hindering visibility
 - Lots of issues with people under the influence
- Any other locations to include?
 - Colfax – Garrison to Carr St
 - Wadsworth – Florida to Mississippi
 - Kipling – 6th Ave to 8th Ave



FINAL MEETING NOTES

Date: August 24, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – Region 3 Consultation Meeting

Attendees: Zane Znamenacek – CDOT Region 3
 Andi Staley – CDOT Region 3
 David Swenka – CDOT HQ
 Donna Lewandowski – Stanley Consultants
 Marta Gerber – Stanley Consultants
 Rob Pratt – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Region 1 and their responses:
 - What are the most common complaints from pedestrians?
 - Crossings at signalized intersections – cars failing to yield
 - Primarily RTs but still get a lot of LTs
 - Any adjustments to signal timing?
 - Have implemented signage and LPIs
 - Any before/after studies?
 - No – not reported enough
 - Have looked at near miss data at one intersection
 - Requests for crossing locations from agencies
 - Some midblock, mostly intersections that don't have marked crossings
 - What are the most common complaints from bicyclists?
 - Lack of facilities and shoulders
 - There are a lot of winding, rural, mountainous roads
 - No road sweeping programs so even when there are shoulders, often bikes don't want to be in the shoulder
 - More requests for actual bike lanes
 - What are the most common complaints from vehicles with regard to VRUs?
 - Don't really get any complaints
 - Definitely a culture that doesn't like cyclists – takes to social media instead of calling in
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Some policies creating false sense of security
 - More funding barriers than anything else
 - Any pedestrian or bicyclist planning safety efforts you are aware of, recently, now or in the future?
 - Nothing specific to bike/ped
 - Some small projects for signage/operational improvements

- Are you using R4-50 signs?
 - Case by case basis, systematically replacing “share the road” signs
- Anything else we need to know about in the region?
 - Seeing a lot of requests for RRFB – typically leave to local agencies to implement and manage
 - Find them problematic to deal with
 - Pedestrian activated crossings leading to increases in ped crashes
 - What are you noticing? – peds crossing right away after activating instead of waiting for vehicles to stop
 - Systems need educational effort because they’re not intuitive
 - Grand Junction doing a great job of educating students and peds
 - Distracted peds and drivers becoming an increasing problem
 - Pushed back on installing PHBs because lack of driver understanding
 - Requires a lot of outreach and education that is challenging to implement
- Discussion of HIN locations identified within region
 - North Ave and 1st St
 - Sidewalk added to N side last summer – not specifically to address bike safety
 - Popped up during regional network screening last fall
 - Didn’t find anything specific that could be done
 - West of intersection is higher speed; east of intersection is lower speed
 - Going from 45 to 30
 - No curb/gutter or shoulder plus grade drop near injury crash
 - Townsend – Odelle to 7th St
 - Surprising location – no real complaints from peds or bikes
 - Challenging area for biking
 - Any transit?
 - Small local system with minimal stops
 - 20k population
 - Recently discovered fatal ped crash at Townsend Ave. and Woodgate Rd.
 - Any bars or activity centers?
 - Not really, just HS
 - Don’t see a lot of pedestrian/bike activity
 - Any other locations to include?
 - North Ave corridor – intersection probably covered this
 - Includes major crossings
 - Steamboat Springs area – high activity but no complaints so may not be concerning
 - Would like to better understand Montrose crashes



FINAL MEETING NOTES

Date: August 24, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – Region 2 Consultation Meeting

Attendees: Matthew Jagow – CDOT Region 2
 Pepper Whittlef – CDOT Region 2
 Jason Nelson – CDOT Region 2
 David Swenka – CDOT HQ
 Donna Lewandowski – Stanley Consultants
 TJ Scarberry – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Region 2 and their responses:
 - What are the most common complaints from pedestrians?
 - Turning traffic (lefts and free rights) not yielding to pedestrians at signals
 - Tried signage, conditional LT phasing (specific to Colorado Springs)
 - Talked about LPIs, but not implemented yet
 - What are the most common complaints from bicyclists?
 - Requests for R4-50
 - What are the most common complaints from vehicles with regard to VRUs?
 - Bicyclists not following laws
 - General dislike for cyclists
 - Staying bunched in groups and blocking entire lanes
 - Moving through stops – could be drivers unaware of safety stop law
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - Never seems to be funding for bike/pedestrian improvements
 - Any issues with crossing enhancement warrants?
 - No but have trouble with drivers understanding what to do with PHBs
 - Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - Not really – we incorporate a safety study into design projects
 - Local partners do majority of planning – region defaults to those in order to identify potential projects
 - Not really involved unless agency is crossing a state highway
 - Access control plan yearly that yields some pedestrian projects
 - Are you using R4-50 signs?
 - Put them on 2 roadway segments
 - PACE – bike advocacy group in Pueblo - CDOT participates in

- Anything else we need to know about in the region?
 - Award a lot of trail projects
 - Seeing issues where side streets are intersecting with trails
 - More midblock rather than walking up to the intersection
 - On-street bike lane inconsistencies create driver and cyclist confusion
 - Too many options for designs
- Discussion of HIN locations identified within region
 - Nevada – Navajo to I-25
 - Project in design – City is the lead
 - Establish bike and ped corridors, larger sidewalks – trying to entice bikes/peds to use adjacent corridors
 - Advertise next spring
 - Fountain and Murray
 - Rebuilt signal and ADA improvements
 - 3 intersections including Murray
 - Flashing beacons to reduce speeds during school arrival/dismissal times – recently turned on
 - Nevada – I-25 to Mill
 - Homeless problem at interchange
 - Academy and Austin Bluffs
 - No regional information
 - Carefree and Academy
 - No regional information
 - Any other locations to include?
 - Hwy 47 in Pueblo
 - Around Dylan
 - Hwy 50, Fortino to Elizabeth
 - Hwy 50 bypass at Hudson – might have already been improved
 - 4th St, Hudson to Erie – may be resolved by past projects
 - In general:
 - Hwy 50 – Fortino to Dylan
 - Hwy 47 – Fortino to Dylan
 - Near Walmart – Northern Ave and Pueblo Blvd



FINAL MEETING NOTES

Date: August 25, 2023

Place: Virtual – Google Meet

Project/Purpose: CDOT VRU Assessment – Bicycle Colorado Consultation Meeting

Attendees: Rachel Hultin – Bicycle Colorado
 Aishwarya Krishnamoorthy – Bicycle Colorado
 Jace Davis – Bicycle Colorado
 Jill Locantore – Denver Streets Partnership
 Pete Piccolo – Bicycle Colorado
 Brad Tucker – Bicycle Colorado
 Donna Lewandowski – Stanley Consultants
 Marta Gerber – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
 - Parameters for serious injury?
 - Follows what CDOT defines for officer coding at incident
 - Donna to send out public document with definition
 - Bike Colorado works closely with Bike Colorado Springs
 - Rachel able to help facilitate meeting
 - Jill mentioned it may be a helpful next step to look at the HIN in terms of facility type because a lot of issues are occurring on those arterials (streets that originated as highways that are now central to cities, so have more VRUs in general, more people trying to access transit, etc)
 - Time constraints with this first iteration make it challenging to make a proactive approach but that will be a strong recommendation in this assessment report for future iterations (highlights need for exposure data)
 - Challenge with exposure data because it doesn't capture locations where people would like to ride/roll/walk but are staying away because of stress level and safety issues. Latent demand does not get accounted for in planning efforts by agencies.
 - Good demand models are currently limited to vehicular data – traffic engineers need better VRU trip generation data to understand how facility/development types influence pedestrian and bicycle activity. With this, better forecasting models can (and are) being developed.
 - Rachel mentioned progress being made at CDOT for proactive and systemic change
 - Bicycle Colorado advocating for statewide adoption of countermeasures not necessarily included in the FHWA's "proven safety countermeasures" and recognizing them as impactful for safety
 - Example – utilizing R4-50 in all areas (specifically rural, less dense areas)
 - Challenges with insufficient data to make decisions – need to counteract the tendency for crashes - and therefore countermeasure implementation - to follow population density, which often leaves out rural areas.

- Donna presented an overview of the demographic impact analysis
 - Is it true to say that border streets are the bigger, faster streets where more severe crashes are occurring?
 - Yes – confirmed with data but hard to adequately explore without exposure data
 - Jill mentioned that Denver is using equity data for prioritization
 - Embedded in city’s Vision Zero plan through equity index
 - No formal process for how data is used for prioritization but still seeing progress
- Anything else?
 - Bicycle Colorado meeting soon to work on strategic planning with regard to equity

FINAL MEETING NOTES

Date: August 29, 2023

Place: CDOT Region 5

Project/Purpose: CDOT VRU Assessment – Region 5 Consultation Meeting

Attendees: Jennifer Allison – CDOT Region 5
Donna Lewandowski – Stanley Consultants
Marta Gerber – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Region 5 and their responses:
 - What are the most common safety complaints from pedestrians?
 - High priority safety crossing request on highways (not at intersections)
 - Crashes at RRFBs – cars don't stop when it is activated
 - Highways that go through towns, working with local agencies to make the corridors ped-friendly by adding safe crossings
 - What are the most common complaints from bicyclists?
 - Not many complaints from cyclists
 - There are a lot of biking events in the region
 - If bicyclists are not comfortable using on-street facilities like bike lanes and bike boxes, then calls come in
 - Bicyclists want to push the HAWK push buttons and go, not wait for the HAWK to activate
 - What are the most common complaints from vehicles with regard to VRUs?
 - No complaints regarding either pedestrians or bicyclists
 - Observation – flashing yellow for left-turn and ped phase conflict and driver inattention of peds still crossings
 - Are there any laws or policies that create barriers to making improvements that improve VRU safety?
 - There are no barriers to implementation to improve VRU safety
 - Law enacted for cyclists - do not have to stop in the intersection for vehicular traffic (Safety Stop Law) – very experienced cyclists are riding that way and there are no concerns. Initial safety fears have not materialized, but education is still needed for drivers.
 - Planning efforts?
 - Local agencies lead planning efforts, including for the highways that go through their town, planning efforts include complete streets to provide bike and ped facilities. Pagosa, Poncha, Buena Vista, Cortez, Alamosa, Durango, and Dove Creek all have complete street plans or starting complete streets related projects.
 - Are you using any LPIs within the Region?
 - Implementing them in the Region. Constantly reviewing them for potential conflicts, for example in Durango at Highway 550 and 17th
 - Is your Region using the R4-50 sign?
 - Implementing them in the Region. There are probably 20 signs installed so far.

- Durango area many of these signs have been installed on winding roadways to let drivers know when they can't see bikers due to curves ahead.
- Discussion of HIN locations identified within Region5:
 - E Main St (160A) –
 - Local agency has been awarded grant funding for safer streets, one of the populations they have a particular concern with is school-aged children
 - CDOT has upgraded signals, ADA facilities in the corridor
 - Local agencies utilize CDOT's Crossing guide for HAWK installation.
 - Main Ave (550B) – E Park Ave to E. 21st Ave
 - E Park Ave is on an angle and the intersection has 5 legs, it is near a school and it is a key intersection connection for access to the public library and river trails – leading ped phase was implemented. School-aged children in the area. One of the ped crossing legs, the longest one, could be eliminated to consolidate ped crossing to a shorter crossing with better visibility.
- Additional Corridors to review
 - Highway 491 through Cortez – include Canyon Drive (ped crash in 2022 or 2021 may not be in the VRU crash window. Review to include Highway 491 between San Juan and Canyon.

Date: August 29, 2023

Place: Virtual - Teams

Project/Purpose: CDOT VRU Assessment – City of Longmont Consultation Meeting

Attendees: Ben Ortiz – City of Longmont
 Tom Street – City of Longmont
 Caroline Michael – City of Longmont
 Kyle Haworth – City of Longmont
 Donna Lewandowski – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
- Preliminary questions for Longmont and their responses:
 - What are the most common complaints from pedestrians?
 - Crosswalk safety and access to crosswalks (too far between signals)
 - More driver compliance at signals
 - Requests for specific crossing locations
 - Speeding in general
 - Sidewalk connections requests happen but not as often
 - Buffers or detached sidewalks requested on larger roadways
 - What are the most common complaints from bicyclists?
 - Bigger bike lanes (requests)
 - Buffered bike lanes or separated paths (requests)
 - General lack of facilities
 - Debris in the road or poor roadway condition
 - Lower stress facilities (requests)
 - What are the most common complaints from vehicles with regard to VRUs?
 - Cyclists not following rules of the road
 - Challenges with should they be treated as a vehicle or as a pedestrian, especially with new law allowing cyclists to roll through stop sign/red light (Safety Stop Law)
 - Any pedestrian or bicyclist planning safety efforts aware of, recently, now or in the future?
 - City council recently committed Longmont to Vision Zero
 - Will be including more multimodal into CIP
 - Will be reaching out to consultants for RFP to do action plan
 - Any applications for SS4A?
 - Missed first round but anticipated will be able to apply for implementation after VZ action plan
 - Are you using LPIs or new signs?
 - Exploring using LPIs in more areas
 - Well received so far, some confusion at permissive signals
 - Haven't had discussion about R4-50 being used but trying to make sure the 3' is already built in (buffer or bike lane width)
 - Anything else we need to know about in the city?
 - Bicycling community does request R4-50

- Looking to hire VZ coordinator
- Discussion of HIN locations identified within Longmont
 - 9th – Francis to Bross
 - 2021 major striping redesign effort in this segment to add bike lanes
 - Main (287) – Longs Peak to 17th
 - Changing traffic signal network in this segment
 - Adding bike and ped detection – more adaptive to make changes on the fly
 - Can track direction and speed
 - Main St will be part of Vision Zero focus
 - Any other locations to include?
 - Nelson and Hwy 119 (Ken Pratt Blvd)
 - Hwy 119 and 287
 - Hwy 66 and 287
 - Airport Rd Clover Basin Dr. to Nelson Rd.

Date: August 30, 2023

Place: Virtual – Teams Meeting

Project/Purpose: CDOT VRU Assessment –
Colorado Department of Public Health and Environment (CDPHE) Consultation Meeting

Attendees: Ian Danielson – CDPHE
Steph Leonard – CDPHE
Amber Viitanen – CDPHE
David Swenka – CDOT
Donna Lewandowski – Stanley Consultants
Marta Gerber – Stanley Consultants
Alicia Guccione – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the VRU assessment requirements, goals of the consultation meetings, and equity analysis.
- Preliminary questions for CDPHE and their responses:
 - What are you doing in terms of safety?
 - Ian – We are also trying to focus on equity and determine if these data can be split out by race and ethnicity categories but we have challenges in the accuracy of that data.
 - Trauma/EMS data regarding race and ethnicity typically inaccurate – often not self report
 - <https://www.codot.gov/safety/safetydata/colorado-problem-identification-id-reports>
 - Report recently redone with considerable input from CDOT's highway safety office – new version out soon
 - Race and ethnicity not clearly addressed in national datasets – communities of color captured in CO dataset
 - Amber – there is some value in correlating level of care with the provider or EMT's assumption of race/ethnicity of the patient.
 - Trying to look more into the behavioral side of things rather than just engineering
 - Training coming out for multiple agencies to discuss equitable cities
 - Greater push for institutionalized equity
 - Ian – We also have some CDC funding for injury prevention that has three foci: motor vehicle, traumatic brain injury, and adverse childhood experiences. The motor vehicle side of this funding is focused on finding innovative data sources and identifying priority populations/geography
 - Less involved with preventative – more involved in the reactive component with EMS response
 - Availability of person-based data?
 - EMS collects data (nationwide standardization - NEMESIS) – shift in using these data more in safety applications
 - Captures patient demographics and scene information
 - Not GPS located, just general location
 - Ian – We do get that information from emergency department data, hospital discharge data, and death certificates. Motor vehicle injuries and deaths from these sources are all listed on our convenient injury dashboard

- Some efforts made in trying to link datasets (trauma with crash) – found that they aligned fairly well
- Differences in EMS response time for DIC/ES80 areas?
 - Task force dedicated to looking at equity – statewide
 - Have noticed reduced response time in these areas
- Anything else we should know?
 - Regional boots on the ground efforts (helmets, car seats, etc.)
 - Safe Kids group? – led by Children’s Hospital Colorado

Date: September 11, 2023

Place: Virtual – Teams Meeting

Project/Purpose: CDOT VRU Assessment – Bicycle Colorado Springs Consultation Meeting

Attendees: Joan Stang – Bicycle Colorado Springs & Pedestrian and Cycle Manitou Springs
 Gerald White – Bicycle Colorado Springs
 Donna Lewandowski – Stanley Consultants
 Alicia Guccione – Stanley Consultants

NOTES:

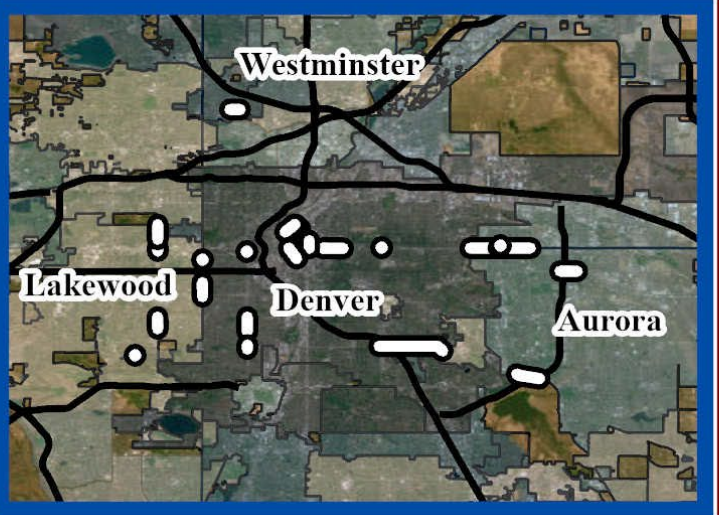
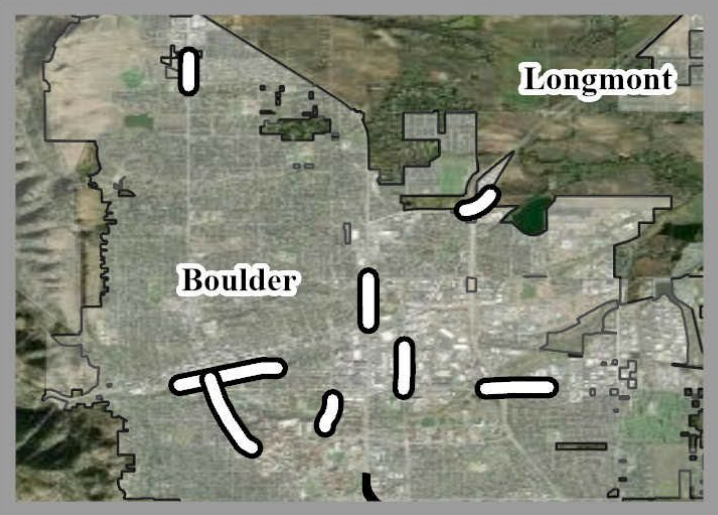
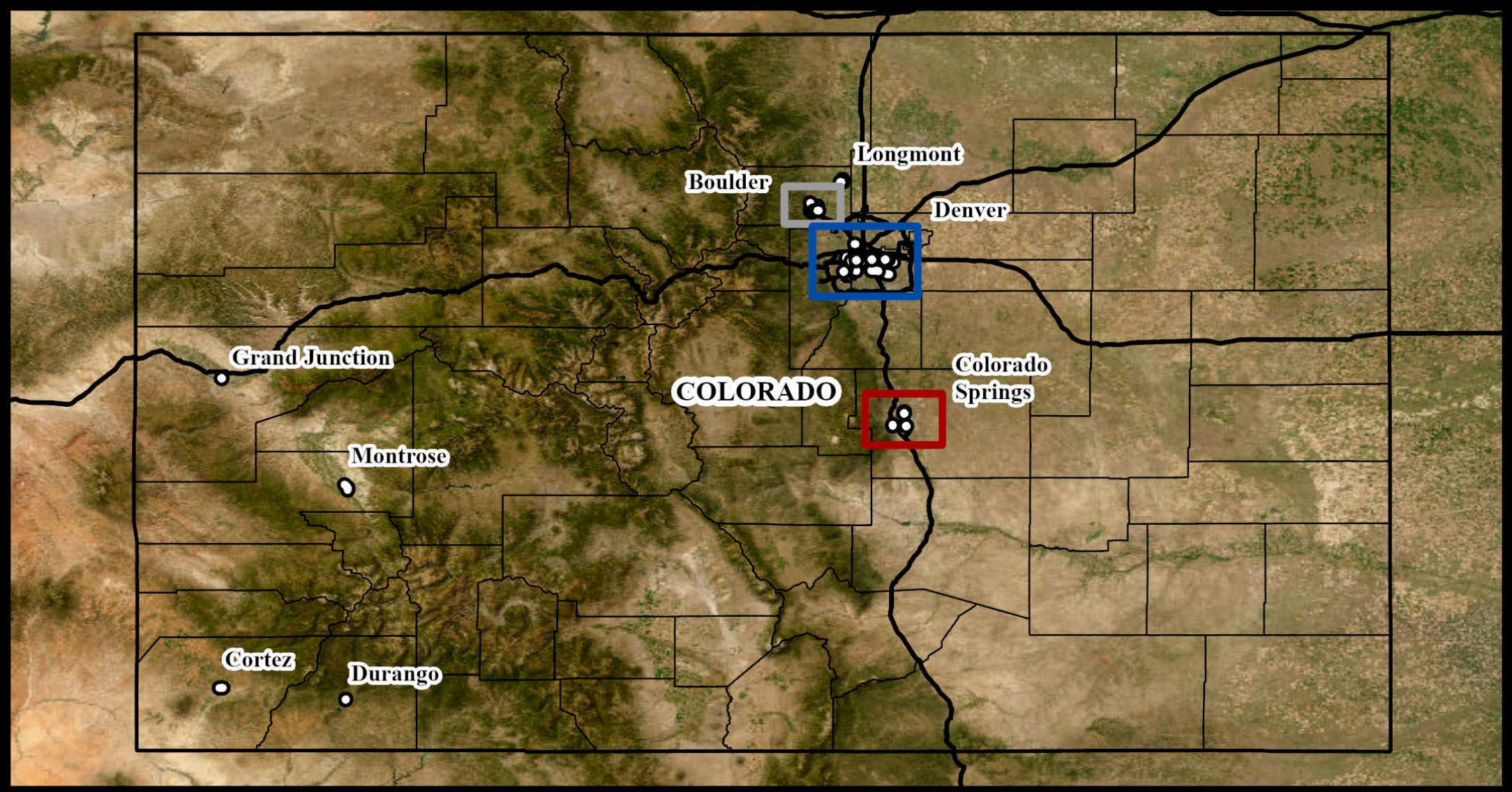
- Introductions
- Donna provided an overview of the VRU assessment requirements and goals of the consultation meetings.
 - Donna to provide pdf copy of the presentation to Bike COS
 - Questions from Bike COS:
 - How will this be enforced? Seen issues with local police not considering VRUs as part of traffic.
 - Donna - All agencies have to report crashes to the state and have been included in this assessment.
 - In discussions with PPACG they had not heard of Vision Zero or SSA.
 - Donna – we are finding that agencies push back on Vision Zero due to liability concerns. SSA is related but does not need to be directly tied to Vision Zero. May have better luck with local agencies by uncoupling the two concepts.
 - SSA appears to be limited by its assertion that we need to look at crash data to identify risk areas rather than using existing data from all over the world to proactively address safety.
 - Donna – it appears to be a parallel process by federal government to get agencies to adopt SSA locally, while at the same time compiling that data from other locations.
 - How to access crash data? It doesn't appear that police are actually reporting all events.
 - Donna provided a link to where CDOT publishes statewide crash data.
 - What's happening now? Who's deciding the important areas to focus.
 - For this project, CDOT has hired Stanley. We have developed a High-Injury Network based on the data analysis performed.
 - Responsibility is Shared – Doesn't seem like many agencies understand this or are reluctant to take part in messages regarding bike/ped safety. How do we reach these people?
 - Donna - Partially need a culture shift and having to see how different perspectives view this. The goal is to get everyone to think more wholistically rather than stopping at who was at fault. We're at the beginning of this journey with this assessment and it's going to be a long and challenging journey.
 - We also need greater education for District Attorneys on VRU laws

- Donna presented an overview of the demographic impact analysis
 - Jerry – I don't think the locations is as relevant to the conversation, it's more those locations attract low quality and unsafe designs.
 - Donna - By law, all infrastructure must be built to the most current standards. These areas tend to be less prioritized for updates to more current standards. The goal of a demographic analysis is to ensure that less equitable areas are being addressed for safety.
 - Donna - There are political barriers to ensuring safety on transportation systems as agencies and elected officials perceive that mitigating automobile congestion is of greater importance to the general public.
- Questions about Bike COS:
 - What are your organization's priorities?
 - Design should encompass the latest contemporary standards for safety of all roadway users. There are numerous examples of recent construction that are in direct violation of ADA and other safety-oriented standards. PE designation carries responsibilities and blindly following client directives to compromise safety is unethical.
 - Changes to the MUTCD to emphasize VRU safety.
 - Motor vehicle safety ratings only consider safety of occupants – want to see a change that includes the safety of people outside the vehicle
 - Donna noted that this is a big push in the SSA
 - Adding significant funding for training of existing staff on current design standards and best practices for VRU safety. This should also be mandated and employees provided time to participate in training.
 - Systemic education of enforcement groups, including their engagement in educating drivers and cyclists.
- Anything else?
 - Who can we reach out to in order to request R4-50 signs?
 - Donna – I would start with CDOT regional bike/pedestrian representative.
 - What is near-miss data and how is it being tracked?
 - Donna - Near-miss is typically defined by a “time to collision” metric which is a specific time within which a VRU and a vehicle will collide given that they do not change trajectory or speed. This data is not currently tracked and studies are limited to being conducted at locations of interest rather than nationally or regionally. They can also be collected via public input, but that method carries self-selection biases and is also dependent on the reporting person's own perception of what constitutes a near miss.
 - Joan shared handouts from Bicycle Colorado that encourage the use of the Colorado State Patrol's “Report an Aggressive Driver” program to report drivers that pass too closely to bicyclists.

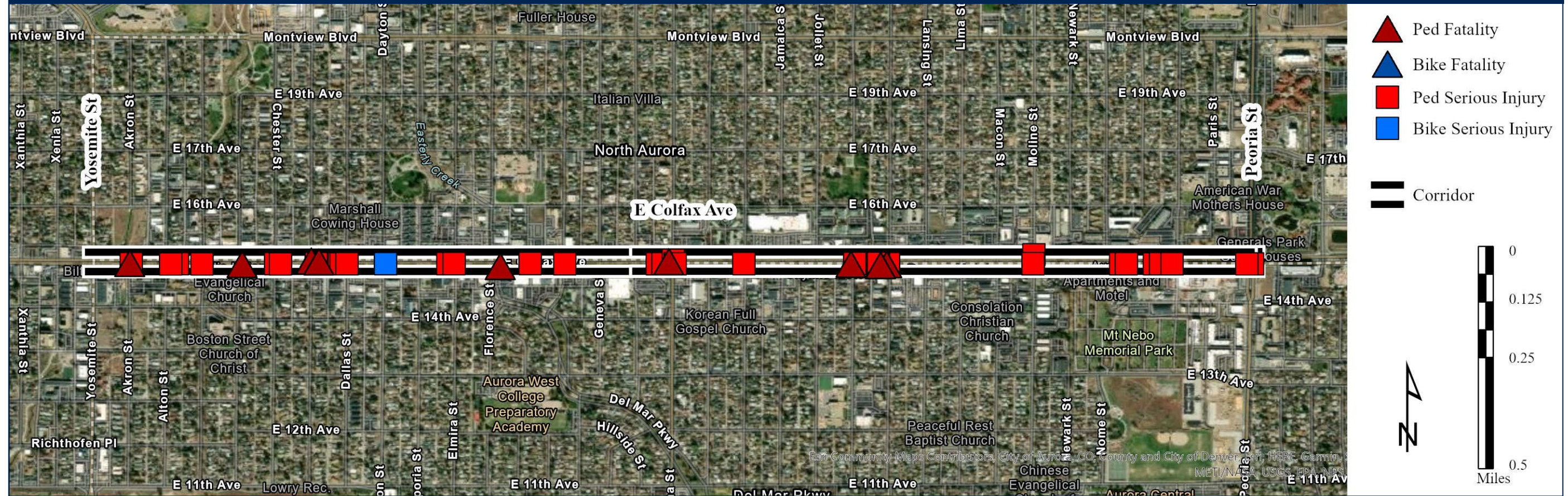
Appendix C Priority Location Cut Sheets

Map of VRU Fatal and Serious Injury Priority Locations	C-1
E. Colfax Avenue (40C) – N. Yosemite Street to N. Peoria Street.....	C-2
Downtown Denver Activity Center	C-3
S. Nevada Avenue (115A) – E. Navajo Street to E. Mill Street	C-4
E. Colfax Avenue (40C) – N. Clarkson Street to N. High Street.....	C-5
Main Street (287C) – Longs Peak Avenue to 17th Avenue.....	C-6
E. Evans Avenue – S. Jackson Street to S. Syracuse Way.....	C-7
S. Federal Boulevard (88A) – W. Iowa Avenue to W. Mississippi Avenue.....	C-8
S. Townsend Avenue (550B) – Odelle Road to N. 7th Street.....	C-9
Academy Boulevard – Hancock Expressway to E. Fountain Boulevard.....	C-10
N. Speer Boulevard – W. 11th Avenue to E. Colfax Avenue.....	C-11
N. Federal Boulevard (88A) and W. Howard Place / W. 14th Avenue	C-12
Sheridan Boulevard (95A) – W. Dakota Avenue to W. 1st Avenue.....	C-13
E. 6th Avenue (30A) – N. Potomac Street to N. Sable Boulevard	C-14
Canyon Boulevard (7B) – 9th Street to 19th Street	C-15
72nd Avenue – Meade Street to N. Irving Street	C-16
S. Parker Road (83A) – E. Dartmouth Avenue to I-225	C-17
Broadway Street (93A) – 15th Street to Canyon Boulevard.....	C-18
Wadsworth Boulevard (121A) – W. 19th Avenue to W. 26th Avenue	C-19
S. Federal Boulevard (88A) – W. Warren Avenue to 200' North of W. Evans Avenue	C-20
S. Wadsworth Boulevard – W. Florida Avenue to W. Mississippi Avenue	C-21
E. Main Street (160A) – N. Beech Street to S. Veach Street.....	C-22
Academy Boulevard and Austin Bluffs Parkway	C-23
Carefree Circle and N. Academy Boulevard.....	C-24
28th Street (36B) – Spruce Street to Valmont Road.....	C-25
Wadsworth Boulevard (121A) – W. 14th Avenue to E. Colfax Avenue.....	C-26
Main Avenue (550B) – E. Park Avenue to E. 21st Avenue.....	C-27
30th Street – Arapahoe Avenue to Walnut Street	C-28
Folsom Street – University Heights Avenue to Dorm Parking Lot Entrance	C-29
Colorado Boulevard (2A) and E. Colfax Avenue	C-30
Diagonal Highway (119B) – Foothills Parkway to Independence Road	C-31
N. Lincoln Street – E. Colfax Avenue to E. 18th Avenue	C-32
Broadway Street – Violet Avenue to Yarmouth Avenue.....	C-33
9th Avenue – Francis Street to Bross Street	C-34
E. Fountain Boulevard (24H) and S. Murray Boulevard	C-35
Havana Street and E. 16th Avenue	C-36
Arapahoe Avenue (7C) – Foothills Parkway to 48th Street.....	C-37
North Avenue (6B) and N. 1st Avenue.....	C-38
W. Morrison Road (8A) and S. Estes Street / S. Garrison Street.....	C-39
Sheridan Boulevard (95A) and W. 10th Avenue	C-40

Map of VRU Fatal and Serious Injury Priority Locations



E. Colfax Avenue (40C) – N. Yosemite Street to N. Peoria Street

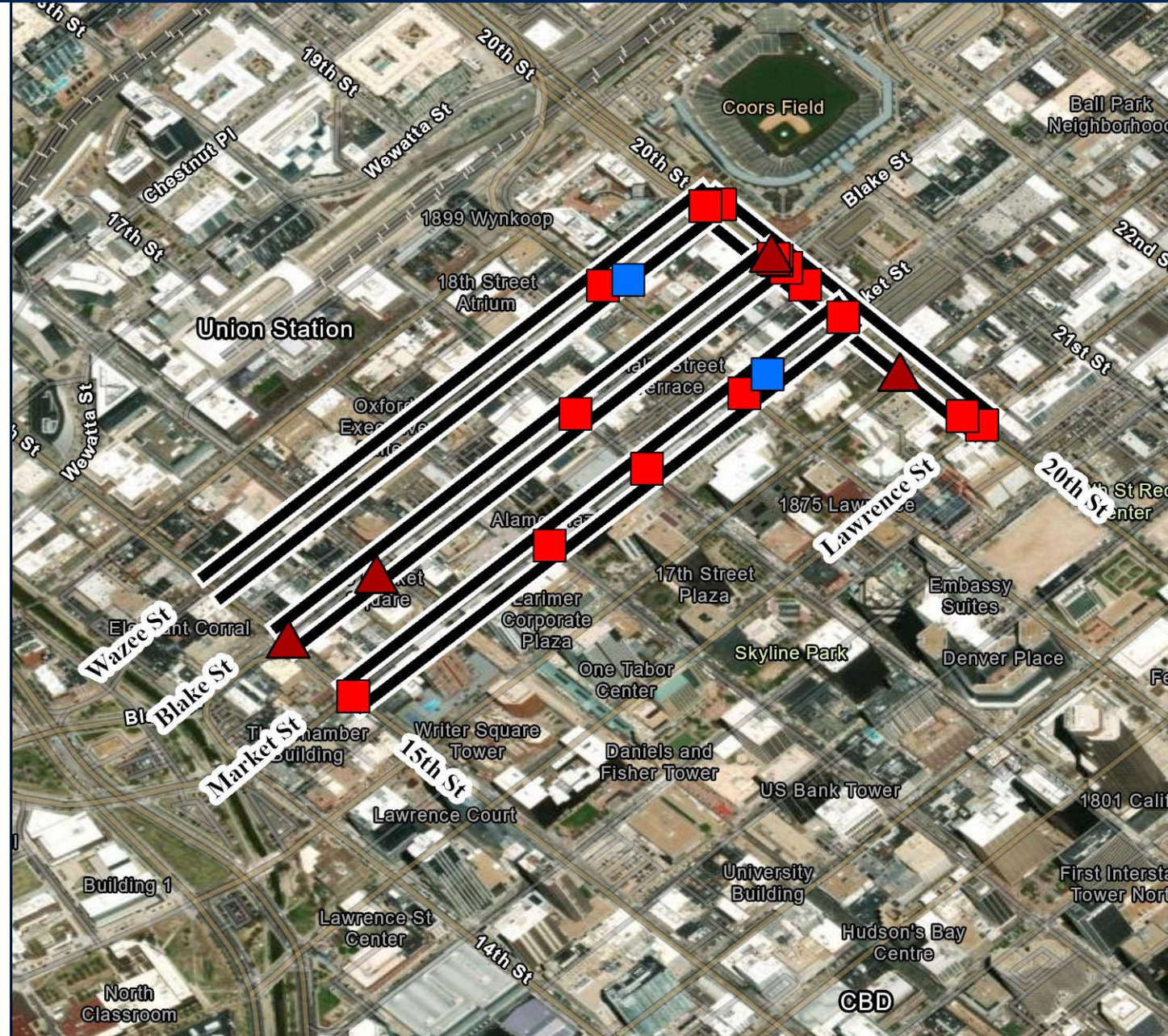


LOCATION SUMMARY
<ul style="list-style-type: none"> • Segment Limits: Yosemite St to Peoria St • Segment Length: 2 miles • CDOT District: Region 1 • City/Jurisdiction: Aurora, Arapahoe County • ROW Ownership: CDOT • DIC or ES-80: Both • Google Map: https://maps.app.goo.gl/UEgkLo2YKuxyrT476
LOCATION DESCRIPTION
<ul style="list-style-type: none"> • Classification: Principal Arterial • Cross Section: 4-Lane with Channelized Raised Median • AADT: 29,000 • Posted Speed Limit: 35 mph • Urban/Rural: Large Urbanized • Existing Facilities: Sidewalks on both sides • Transit: RTD Routes 15 and 15L – 24 stops

NARRATIVE
<p>This is a busy corridor with retail and restaurant establishments. There is sidewalk on both sides, but no bicycle facilities. There is a mixed-flow, side-running Bus Rapid Transit project in final design with construction planned for 2024 through 2026. (East Colfax Avenue Bus Rapid Transit - City and County of Denver (denvergov.org))</p>

CRASH HISTORY
<ul style="list-style-type: none"> • Pedestrian Crashes: 9 Fatalities / 41 Serious Injuries • Bicyclist Crashes: 0 Fatalities / 1 Serious Injury
CURRENT STATUS
<ul style="list-style-type: none"> • BRT project along Colfax Avenue is in design with construction planned for 2024. • Signal improvements were implemented throughout the corridor between 2020 and 2022. • Multiple segments under design following the recommendations presented in a regional safety study.
RECOMMENDED PROJECTS / STRATEGIES
<ul style="list-style-type: none"> • Implement designs and monitor impact • Ensure improvements are consistent throughout corridor • Ensure that BRT project includes adequate opportunities for midblock crossings and VRU safety in general • Education program for BRT bus drivers that includes VRU safety • Ensure traffic control plans accommodate safe access for VRUs during construction of all projects

Downtown Denver Activity Center



LOCATION SUMMARY

- **Boundaries:** Wazee St/Blake St/Market St – 15th St to 20th St; 20th St – Lawrence St to Wazee St
- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** Denver
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/5mNJv9nBvFm9SpfQA>

LOCATION DESCRIPTION

- **Classification:** Minor Arterial
- **Cross Section:** 2-Lane / 4-Lane (20th Street)
- **AADT:** 6,200-14,000
- **Posted Speed Limit:** 25 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks and separated bike lanes
- **Transit:** RTD Routes 0, 1, 6, 9, 10, 15, 15L, 19, 20, 28, 32, 38, 43, 44, 52, RX, 122X, FF, FMR, MALL – 20 stops

NARRATIVE

This area includes a number of restaurants and bars, along with several major pedestrian attractors (Union Station, Coors Field). Recent improvements throughout the area include enhanced, separated bike lanes. These may have a positive effect on pedestrian safety, however, wait times for pedestrian crossing lights are long, and the planning team observed many pedestrians crossing before the signal turned.

CRASH HISTORY

- **Pedestrian Crashes:** 4 Fatalities / 16 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 2 Serious Injuries

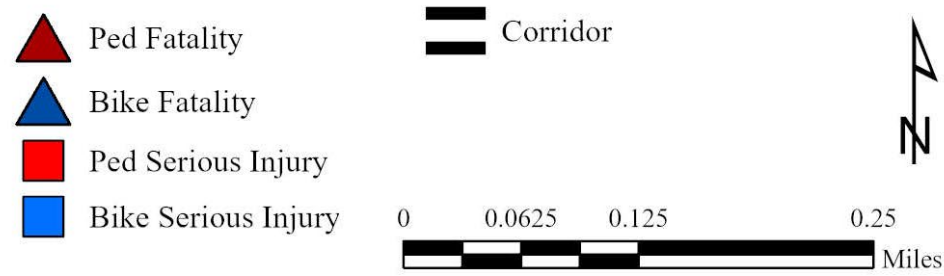
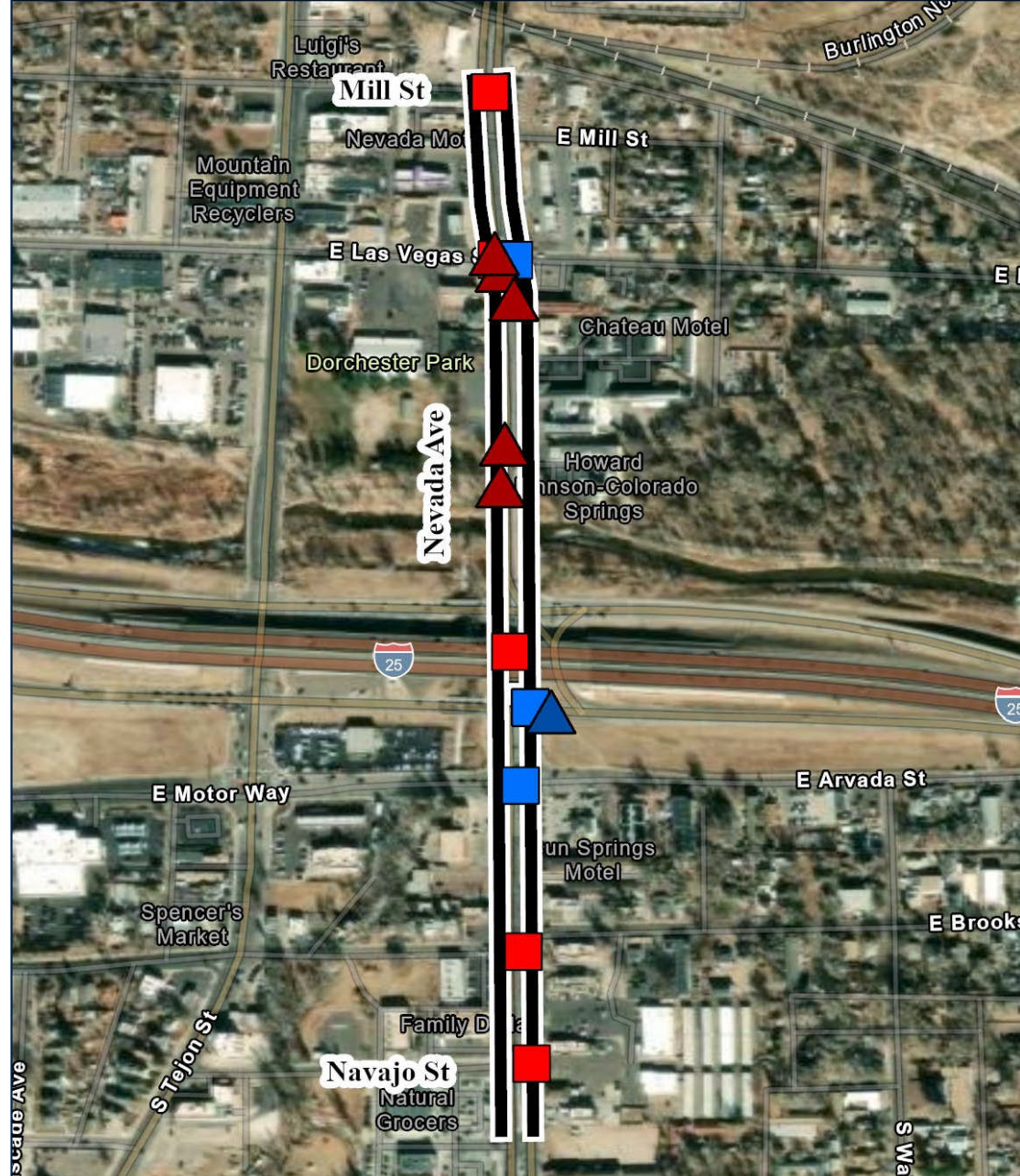
CURRENT STATUS

- Recent improvements throughout the area include striping modifications, separated bike lanes, and pedestrian improvements.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor impact of recent improvements.
- Consider a pedestrian and bicyclist focused RSA if pedestrian safety continues to be an issue.

S. Nevada Avenue (115A) – E. Navajo Street to E. Mill Street



LOCATION SUMMARY

- **Segment Limits:** Navajo St to Mill St
- **Segment Length:** 0.6 miles
- **CDOT District:** Region 2
- **City/Jurisdiction:** Colorado Springs, El Paso County
- **ROW Ownership:** CDOT (Navajo St to I-25) & Colorado Springs (I-25 to Mill St)
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/zzoVBYeoVZAZ18iT7>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 35,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** MMT Routes 10, 11, and 16 – 5 stops

NARRATIVE

This is a busy commercial corridor with sidewalks on both sides but no bike lanes. Visual clutter is observed throughout the corridor. There appears to be no formalized access to the multi-use pathway just north of I-25, though goat paths indicate a desire for one. There are a number of minor improvements recently completed or planned, however there is not a cohesive plan to improve safety along the corridor.

CRASH HISTORY

- **Pedestrian Crashes:** 5 Fatalities / 11 Serious Injuries
- **Bicyclist Crashes:** 1 Fatality / 3 Serious Injuries

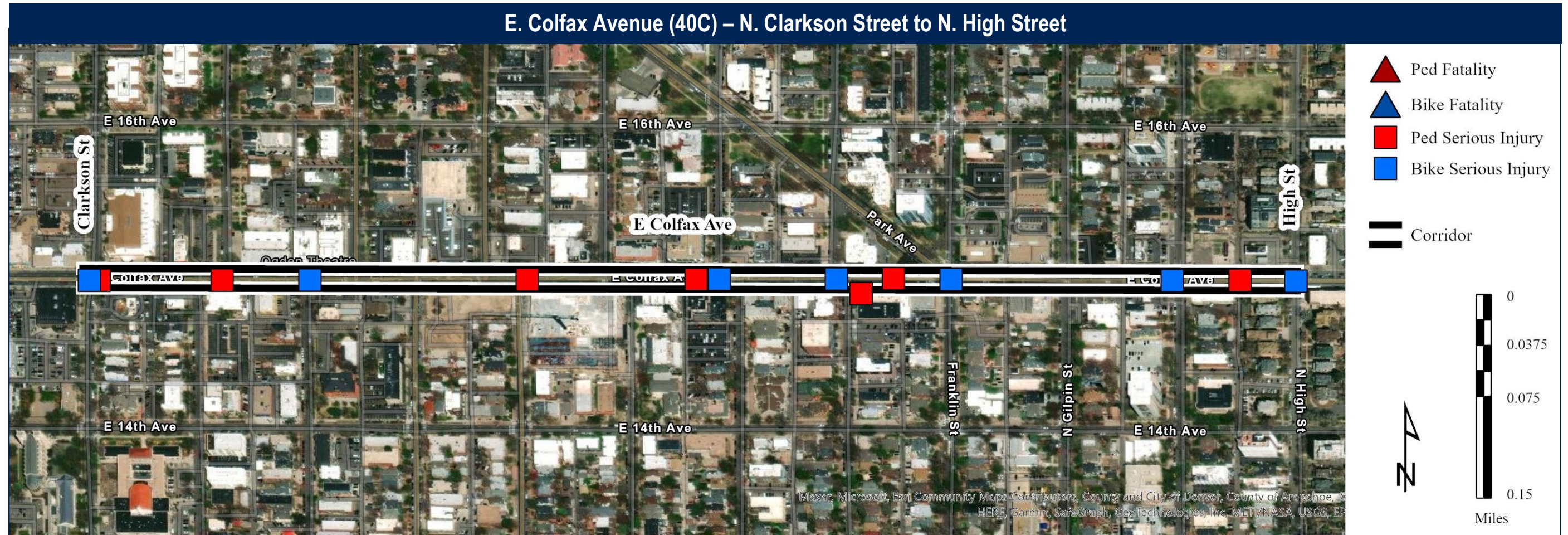
CURRENT STATUS

- There are planned improvements at the I-25 ramps.
- The signal at Motor Way is planned for removal with east and west access converted to right-in/right-outs.
- Designs for bicyclist and pedestrian facilities on an adjacent corridor are in progress.
- Improvements were recently installed at the Las Vegas Street signal.

RECOMMENDED PROJECTS / STRATEGIES

- Conduct a multijurisdictional RSA. Collect exposure data and use PBCAT to investigate all-severities of bike and pedestrian crashes to identify patterns.
- Investigate whether Pikes Peak Greenway Trail Access is contributing to midblock crossing issues.

2023 Colorado VRU Safety Assessment. Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

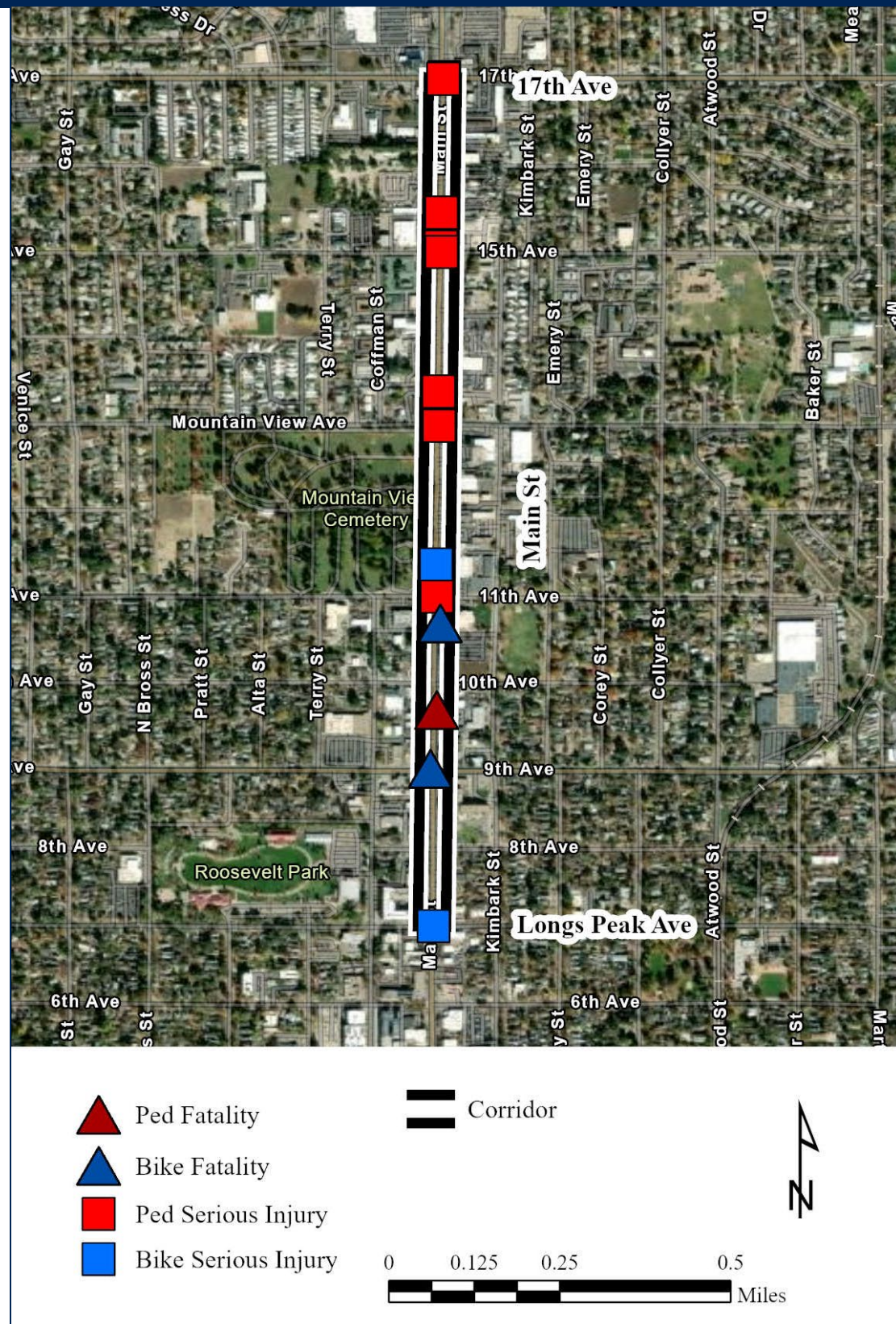


LOCATION SUMMARY
<ul style="list-style-type: none"> • Segment Limits: Clarkson St to High St • Segment Length: 0.7 miles • CDOT District: Region 1 • City/Jurisdiction: Denver, Denver County • ROW Ownership: CDOT • DIC or ES-80: DIC, ES-80 from Downing St to High St • Google Map: https://maps.app.goo.gl/UJCbUWdfBVmCrnbr9
LOCATION DESCRIPTION
<ul style="list-style-type: none"> • Classification: Principal Arterial • Cross Section: 4-Lane • AADT: 23,000 • Posted Speed Limit: 30 mph • Urban/Rural: Large Urbanized • Existing Facilities: Sidewalks on both sides • Transit: RTD Routes 12, 15, and 15L – 10 stops

NARRATIVE
<p>This is a visually busy corridor with both retail and restaurant establishments. There is sidewalk on both sides but no bicycle facilities. There is a center-running Bus Rapid Transit corridor project planned for construction in 2024, which may increase pedestrian crossing. (East Colfax Avenue Bus Rapid Transit - City and County of Denver (denvergov.org))</p>

CRASH HISTORY
<ul style="list-style-type: none"> • Pedestrian Crashes: 0 Fatalities / 10 Serious Injuries • Bicyclist Crashes: 0 Fatalities / 7 Serious Injuries
CURRENT STATUS
<ul style="list-style-type: none"> • BRT project along Colfax Avenue is in design with construction planned for 2024.
RECOMMENDED PROJECTS / STRATEGIES
<ul style="list-style-type: none"> • Implement designs and monitor impact. • Ensure improvements are consistent throughout corridor. • Ensure that BRT project includes adequate opportunities for midblock crossings and VRU safety in general. • Education program for BRT bus drivers that includes VRU safety. • Ensure traffic control plans accommodate safe access for VRUs during construction of all projects.

Main Street (287C) – Longs Peak Avenue to 17th Avenue



LOCATION SUMMARY

- **Segment Limits:** Longs Peak Ave to 17th Ave
- **Segment Length:** 1.2 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Longmont, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/wucAQ5jwFuZWLRfEA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Two-Way Left-Turn Lane
- **AADT:** 30,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 323, 324, 327, LX, J, BOLT, LD – 13 stops

NARRATIVE

Bicyclist and pedestrian detection are planned throughout the corridor and safety improvements at the intersection of Main St. and 17th Ave are in design. This is a busy commercial corridor that serves 7 bus routes with 13 stops and may be a driver of unsafe pedestrian movements. Bus stop locations and route-transfer timing should be analyzed for pedestrian safety.

CRASH HISTORY

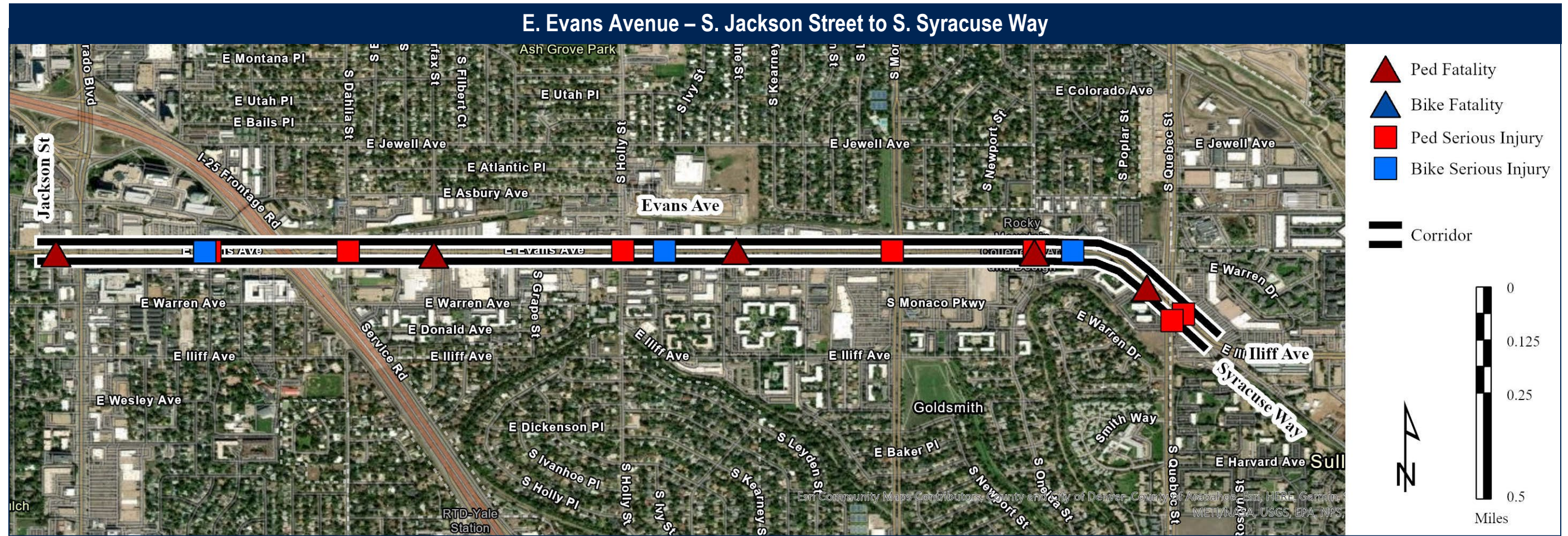
- **Pedestrian Crashes:** 1 Fatality / 11 Serious Injuries
- **Bicyclist Crashes:** 2 Fatalities / 2 Serious Injuries

CURRENT STATUS

- The corridor will be included as part of the City’s Vision Zero focus.
- Pedestrian and bicyclist detection is planned to be added throughout the corridor.
- The intersection at 17th Avenue is currently in design for safety improvements.
- The Boulder County BRT study is looking into relocating bus stops off of Main Street.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact.
- Ensure traffic control plans accommodate safe access for VRUs during construction of all projects.



LOCATION SUMMARY
<ul style="list-style-type: none"> • Segment Limits: Jackson St to Syracuse Way • Segment Length: 2.2 miles • CDOT District: Region 1 • City/Jurisdiction: Denver, Denver County • ROW Ownership: Denver • DIC or ES-80: Both • Google Map: https://maps.app.goo.gl/Fw8vvE7u7s6aCPod7
LOCATION DESCRIPTION
<ul style="list-style-type: none"> • Classification: Principal Arterial • Cross Section: 5-Lane / 4-Lane with Two-Way Left-Turn Lane • AADT: 44,000 • Posted Speed Limit: 35 mph • Urban/Rural: Large Urbanized • Existing Facilities: Sidewalks on both sides • Transit: RTD Routes 21, 40, 46, 65, 72 – 28 stops, PnR

NARRATIVE

This section of E. Evans Avenue has a mix of bicyclist and pedestrian crashes, including 5 pedestrian fatalities. It is a busy commercial corridor, with 28 transit stops serving 5 routes and a park-and-ride lot. Iliff Avenue to the east is currently undergoing construction which includes adding bike lanes, multi-use paths and sidewalk improvements, among other safety enhancements. An RSA along this corridor including the collection of exposure data and analysis of all crash severities is recommended, with a specific focus on the applicability of extending similar countermeasures the ones being built along Iliff Avenue.

CRASH HISTORY
<ul style="list-style-type: none"> • Pedestrian Crashes: 5 Fatalities / 7 Serious Injuries • Bicyclist Crashes: 0 Fatalities / 3 Serious Injuries
CURRENT STATUS
<ul style="list-style-type: none"> • There is an adjacent project along Iliff Avenue to the east aimed at improving the corridor. (Welcome to Arapahoe County, CO - Official Website)
RECOMMENDED PROJECTS / STRATEGIES
<ul style="list-style-type: none"> • Complete an RSA. Collect exposure data and use PBCAT with crash data for all VRU crash severities to identify patterns. • Investigate the applicability of continuing improvements from the adjacent Iliff Avenue project. • Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

S. Federal Boulevard (88A) – W. Iowa Avenue to W. Mississippi Avenue



LOCATION SUMMARY

- **Segment Limits:** Iowa Ave to Mississippi Ave
- **Segment Length:** 0.6 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/9DJbrwWh9oQDaq8QA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 5-Lane (2 northbound, 3 southbound) with Channelized Raised Median
- **AADT:** 37,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 14, 30 and 31 – 7 stops

NARRATIVE

A BRT project is planned to start construction in 2024 which will significantly change the safety profile of the corridor. Only 3 of the 14 crashes occurred after raised medians were installed in 2020. While this appears to have had a positive effect on pedestrian safety, ongoing monitoring if the BRT project is not implemented will be important to be sure the reduction in crashes was not an artifact of the pandemic.

CRASH HISTORY

- **Pedestrian Crashes:** 5 Fatalities / 8 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 1 Serious Injury
- Only 3 crashes occurred after the installation of medians along the corridor.

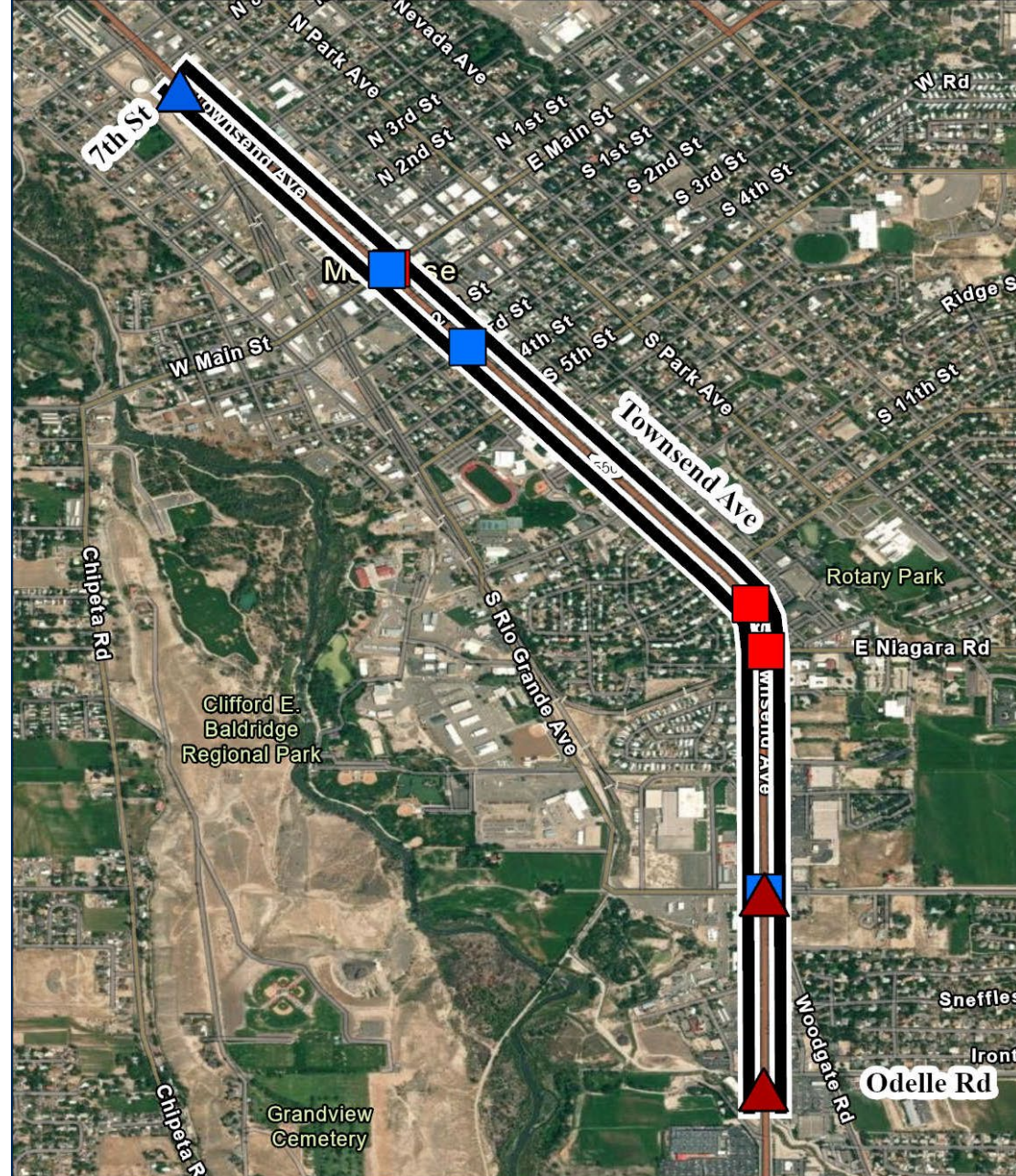
CURRENT STATUS

- BRT project along Federal Boulevard is in design with construction planned for 2024.
- Raised medians were installed and signal improvements implemented throughout the corridor in 2020.
- The intersection at Mississippi Avenue is currently being redesigned.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact
- Ensure that BRT project includes adequate opportunities for midblock crossings and VRU safety in general
- Education program for BRT bus drivers that includes VRU safety
- Ensure traffic control plans accommodate safe access for VRUs during construction of all projects

S. Townsend Avenue (550B) – Odelle Road to N. 7th Street



LOCATION SUMMARY

- **Segment Limits:** Odelle Rd to 7th St
- **Segment Length:** 2.5 miles
- **CDOT District:** Region 3
- **City/Jurisdiction:** Montrose, Montrose County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC (Oak Grove Rd to 7th St)
- **Google Map:** <https://maps.app.goo.gl/kexDZPsPRVirtuVA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 27,000
- **Posted Speed Limit:** 30 mph
- **Urban/Rural:** Small Urbanized
- **Existing Facilities:** Sidewalks on one side and gaps on the other side
- **Transit:** Townsend Express Route – 6 stops

NARRATIVE

No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education. Additionally, the presence of these crashes contradicts a belief that bicyclists and pedestrians do not use the corridor. Exposure data should be collected to help understand the use of the corridor and estimate any latent demand that exists.

CRASH HISTORY

- **Pedestrian Crashes:** 2 Fatalities / 3 Serious Injuries
- **Bicyclist Crashes:** 1 Fatality / 3 Serious Injuries

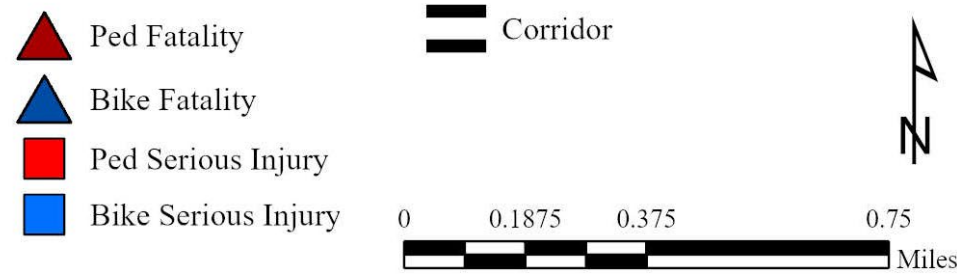
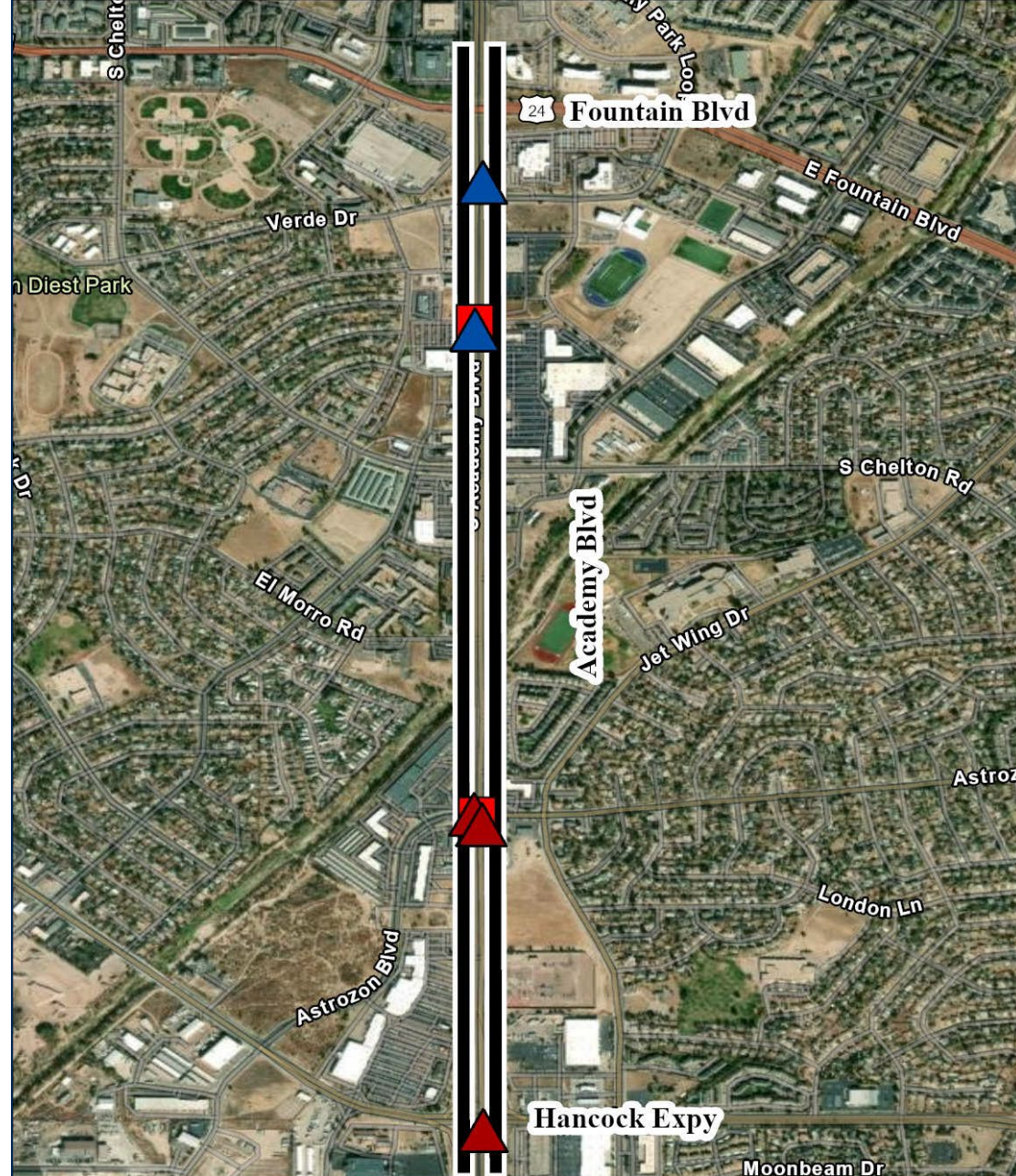
CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Complete an RSA. Collect exposure data and use PBCAT with crash data for all VRU crash severities.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

Academy Boulevard – Hancock Expressway to E. Fountain Boulevard



LOCATION SUMMARY

- **Segment Limits:** Hancock Expy to Fountain Blvd
- **Segment Length:** 1.9 miles
- **CDOT District:** Region 2
- **City/Jurisdiction:** Colorado Springs, El Paso County
- **ROW Ownership:** Colorado Springs
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/zxJQGPR2inzE6E94A>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial - Freeway
- **Cross Section:** 6-Lane
- **AADT:** 33,000
- **Posted Speed Limit:** 45 mph
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** Mountain Metro Transit: 1, 22, 27, 32, 37 – 10 stops (mostly 27)

NARRATIVE

This corridor has a mix of bicyclist and pedestrian crashes and severities. Most were intersection related, however no pattern to the crashes was apparent from the fatal and serious injury crashes. Further investigation through a pedestrian and bicyclist focused RSA using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 3 Fatalities / 2 Serious Injuries
- **Bicyclist Crashes:** 2 Fatalities / 0 Serious Injuries
- **Reasoning:** Primarily intersection related crashes

CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Complete a pedestrian/bicyclist focused RSA, including collecting VRU exposure data.
- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

N. Speer Boulevard – W. 11th Avenue to E. Colfax Avenue



- ▲ Ped Fatality
- ▲ Bike Fatality
- Ped Serious Injury
- Bike Serious Injury

▬ Corridor



LOCATION SUMMARY

- **Segment Limits:** 11th Ave to Colfax Ave
- **Segment Length:** 0.5 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** Denver
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/uQ8MVXK2ykQneYTVA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane Each Direction (Divided)
- **AADT:** 26,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides of NB Speer Blvd and one side of SB Speer Blvd, Connection to Cherry Creek Trail
- **Transit:** None

NARRATIVE

Several safety countermeasures have recently been implemented along this corridor, and an intersection signal project is planned at 12th Avenue. These all may have a positive effect on VRU safety.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 3 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 5 Serious Injuries

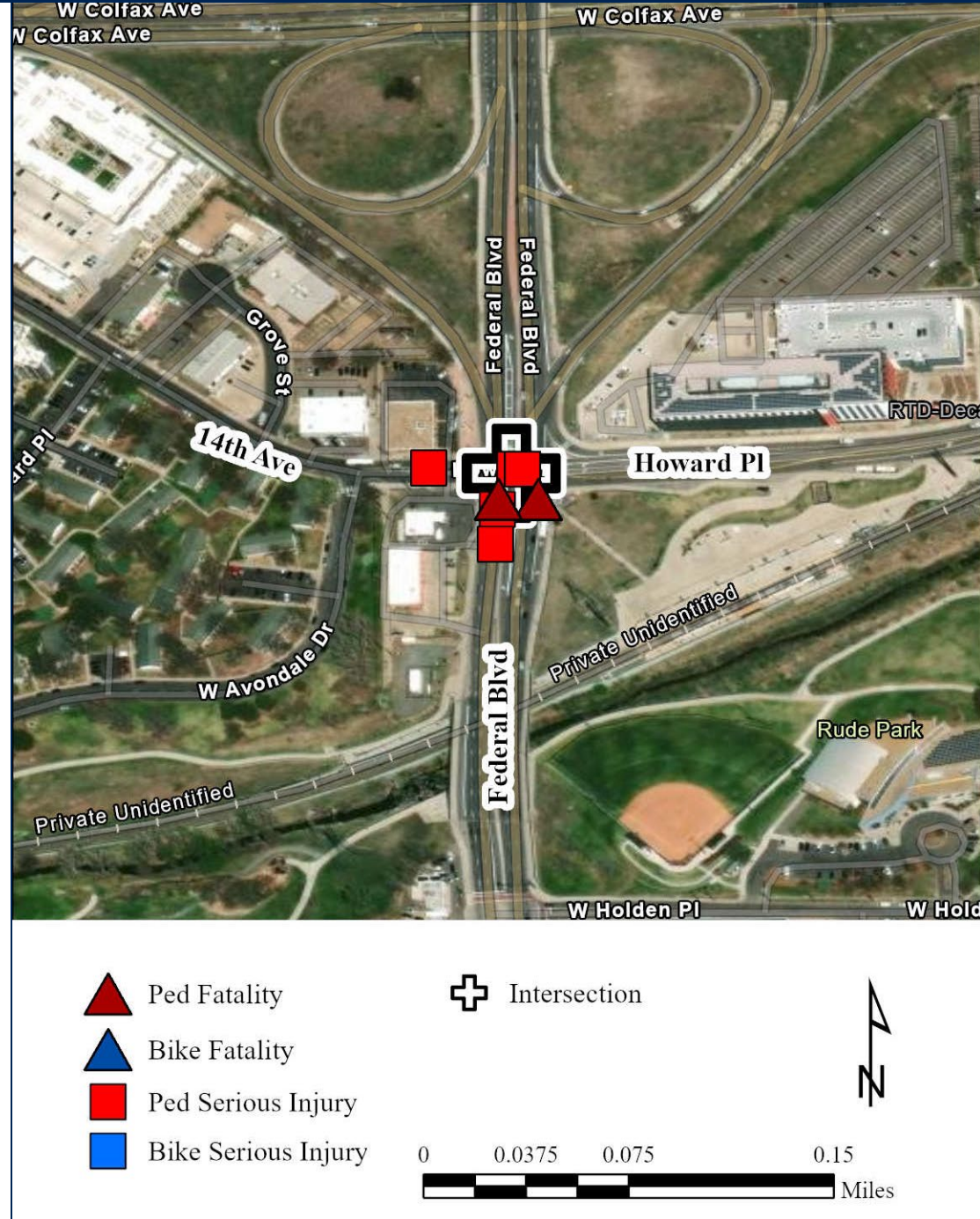
CURRENT STATUS

- Recent improvements to the corridor include increased size and frequency of speed limit signs, rebuilt 13th Avenue and 14th Avenue signals.
- There is a signal project planned at 12th Avenue.

RECOMMENDED PROJECTS / STRATEGIES

- Implement improvements and monitor impact.

N. Federal Boulevard (88A) and W. Howard Place / W. 14th Avenue



LOCATION SUMMARY

- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/WGczbg5ZeXEyZD8KA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial (Federal Blvd) / Major Collector (Howard Pl-14th Ave)
- **Cross Section:** 6-Lane with Channelized Raised Medians (Federal Blvd) / 2-Lane (14th Ave) / 3-Lane (Howard Pl)
- **AADT:** 34,000 (Federal Blvd) / 2,900 (14th Ave) / 5,600 (Howard Pl)
- **Posted Speed Limit:** 35 mph (Federal Blvd) / 25 mph (Howard Pl-14th Ave)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks in both directions with a physical fence in the center median south of the intersection
- **Transit:** RTD Routes 1, PLFX, 31, 16, 15L, 30 – 8 stops, PnR, Rail Station

NARRATIVE

Sidewalk and ramp improvements were made to this intersection in 2019 and has seen a 50% decrease in pedestrian injuries and a 100% decrease in pedestrian fatalities since that time. Permissive left turns are currently permitted at this location with some sight distance issues noted below. Implementing protected dual left turns may positively impact pedestrian safety at this location.

CRASH HISTORY

- **Pedestrian Crashes:** 2 Fatalities / 6 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries
- Both fatalities occurred before the 2019 improvements.

CURRENT STATUS

- Intersection had sidewalk and ramp improvements in 2019.
- Dual lefts are currently permissive and appear to experience sight distance issues, specifically the westbound lefts conflicting with the eastbound throughs.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor the impact of recent improvements.
- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Consider implementing protected dual left turns.

Sheridan Boulevard (95A) – W. Dakota Avenue to W. 1st Avenue



LOCATION SUMMARY

- **Segment Limits:** Dakota Ave to 1st Ave
- **Segment Length:** 0.6 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Lakewood, Jefferson County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/Ka3M4Cu9uubUpSU29>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** Varies (4-Lane, 5-Lane, and 6-Lane) with Two-Way Left-Turn Lane
- **AADT:** 37,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 1, 3, and 51 – 13 stops

NARRATIVE

This street borders both Denver and Lakewood while being owned and operated by CDOT. Any solution through the corridor will require input and buy-in from all three jurisdictions. No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 6 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 1 Serious Injury

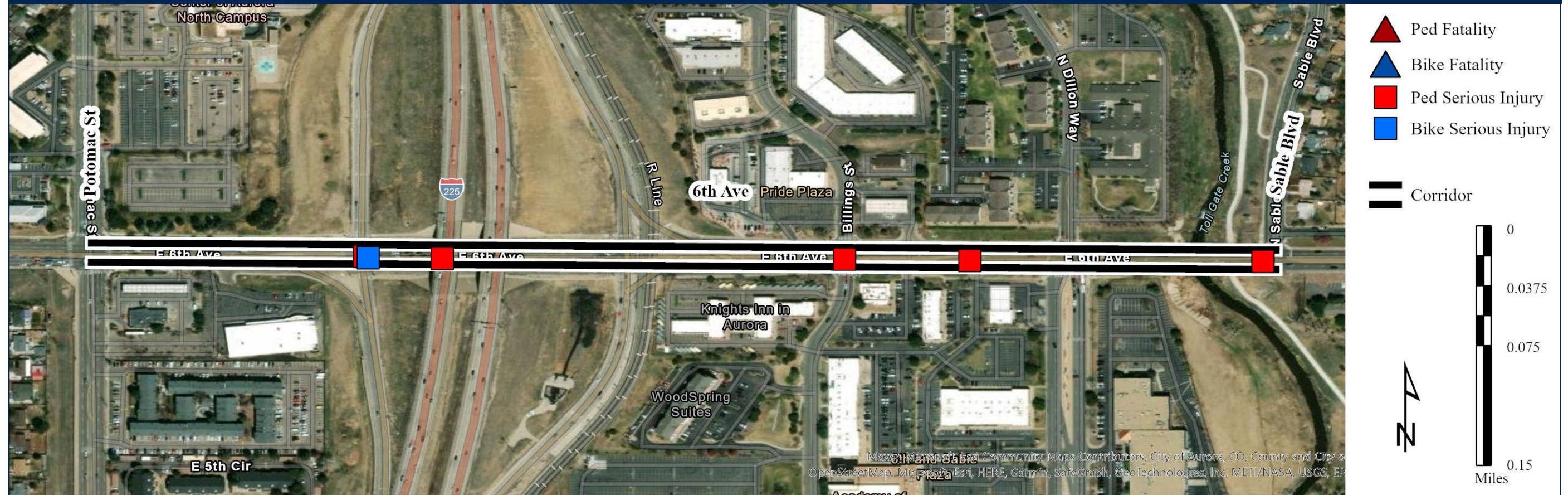
CURRENT STATUS

- Recent signal improvements completed at 1st Avenue.
- RSA was completed along the corridor south of Alameda Avenue.

RECOMMENDED PROJECTS / STRATEGIES

- Complete a multijurisdictional RSA north of Alameda Avenue. Collect exposure data and use PBCAT with crash data for all VRU crash severities.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.
- Implement designs and monitor impact of RSA recommendations south of Alameda Avenue.

E. 6th Avenue (30A) – N. Potomac Street to N. Sable Boulevard



LOCATION SUMMARY

- **Segment Limits:** Potomac St to Sable Blvd
- **Segment Length:** 0.6 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Aurora, Arapahoe County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/UHgtzSmbtLjm2bpSA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 38,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 6 and 15L – 6 stops

NARRATIVE

This corridor includes primarily pedestrian-related crashes. No patterns were apparent from fatal and serious injury crashes. Further investigation using all pedestrian and bicyclist crash severities may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 6 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 1 Serious Injury

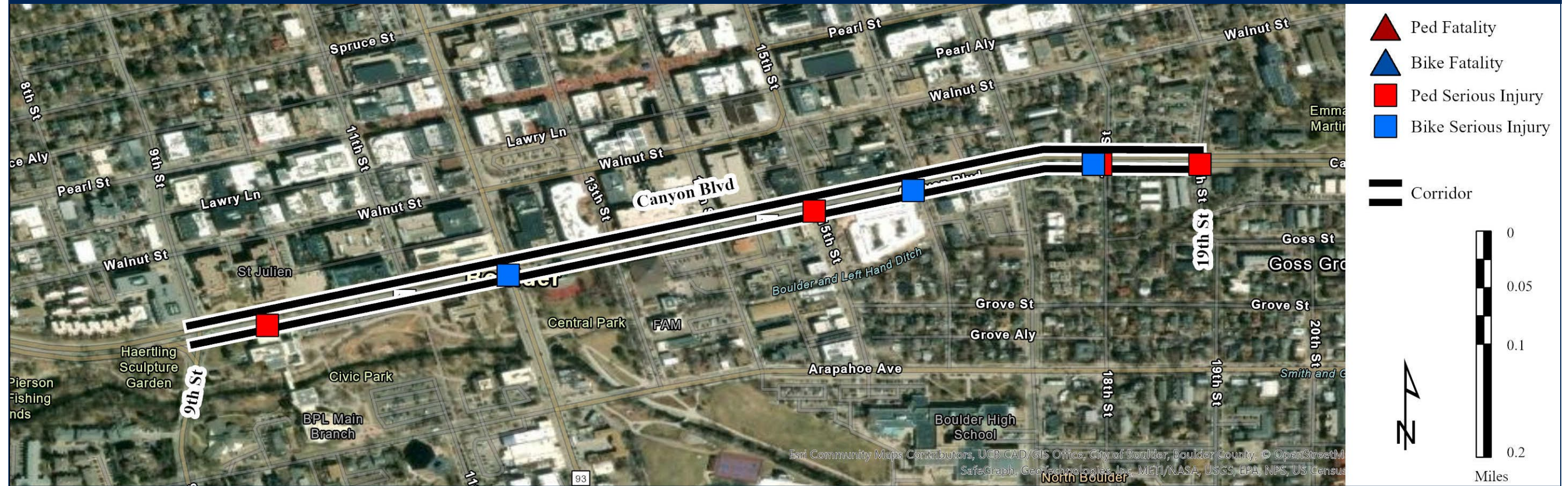
CURRENT STATUS

- Identified as a critical corridor in the DRCOG 2020 Taking Action on Regional Vision Zero Plan.
- No planned projects at this time.

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

Canyon Boulevard (7B) – 9th Street to 19th Street



LOCATION SUMMARY

- **Segment Limits:** 9th St to 19th St
- **Segment Length:** 0.7 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC from 17th St to 19th St
- **Google Map:** <https://maps.app.goo.gl/yMiSb7GcWCs4xMUv8>

LOCATION DESCRIPTION

- **Classification:** Minor Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 16,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides, Midblock crossings
- **Transit:** RTD Routes NB, 225, 204, 205, 208, BOLT, DASH, GS, SKIP, AB, JUMP, FF – 15 stops, Bus Station

NARRATIVE

Crashes through this corridor were a mixture of bicyclist and pedestrian injuries. There are sidewalks on both sides of the street, but no bike lanes. No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 4 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

CURRENT STATUS

- Corridor study was completed in 2017 but, in general, nothing is currently planned for this corridor.

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Collect pedestrian exposure data.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

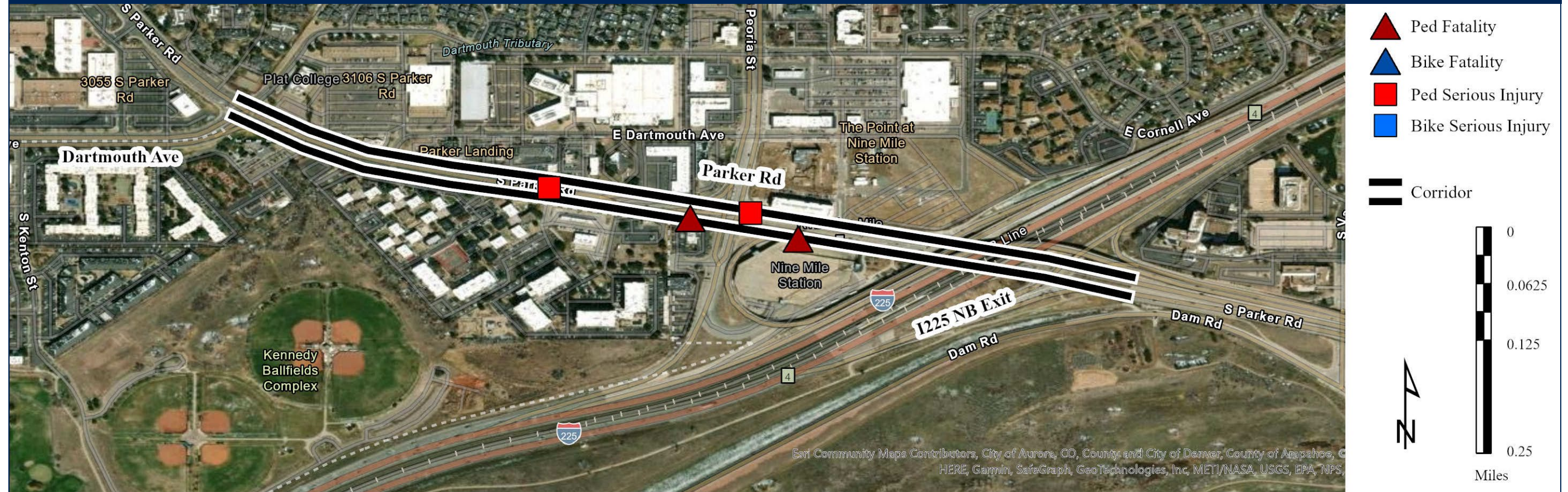


LOCATION SUMMARY
<ul style="list-style-type: none"> • Segment Limits: Meade St to Irving St • Segment Length: 0.3 miles • CDOT District: Region 1 • City/Jurisdiction: Westminster, Adams County • ROW Ownership: Westminster • DIC or ES-80: Both • Google Map: https://maps.app.goo.gl/RyfLDsneY76gfmyC8
LOCATION DESCRIPTION
<ul style="list-style-type: none"> • Classification: Minor Arterial • Cross Section: 4-Lane with Two-Way Left-Turn Lane • AADT: 21,000 • Posted Speed Limit: 30 mph • Urban/Rural: Large Urbanized • Existing Facilities: Sidewalks on both sides • Transit: RTD Route 72 – 4 stops

NARRATIVE
<p>This corridor includes primarily pedestrian-related crashes. No patterns were apparent from fatal and serious injury crashes. Further investigation using all pedestrian and bicyclist crash severities may yield a behavioral pattern that can be addressed through infrastructure changes and education.</p>

CRASH HISTORY
<ul style="list-style-type: none"> • Pedestrian Crashes: 1 Fatality / 5 Serious Injuries • Bicyclist Crashes: 0 Fatalities / 1 Serious Injury
CURRENT STATUS
<ul style="list-style-type: none"> • None.
RECOMMENDED PROJECTS / STRATEGIES
<ul style="list-style-type: none"> • Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns. • Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

S. Parker Road (83A) – E. Dartmouth Avenue to I-225



LOCATION SUMMARY

- **Segment Limits:** Dartmouth Ave to I-225
- **Segment Length:** 0.8 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Aurora, Arapahoe County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/TVTL7APVCzARzAsYA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 6-Lane with Two-Way Left-Turn Lane/Median
- **AADT:** 52,000
- **Posted Speed Limit:** 45 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 35, 83, 121, 130, 131 – 7 stops, PnR, Rail

NARRATIVE

Fatal crashes occurred during dark-lighted conditions while serious injuries occurred during daylight hours. No other pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education. An RSA focused on different times of the day and lighting conditions may yield more insight.

CRASH HISTORY

- **Pedestrian Crashes:** 2 Fatalities / 4 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries
- Fatalities occurred in the middle of the night. Serious injury crashes occurred during peak hours.
- Corridor has a long span between safe crossing locations.

CURRENT STATUS

- Pedestrian bridge crossing is planned near the Park-n-Ride but is not anticipated to help with crossings related to dining.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs in progress and monitor impact.
- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Complete an RSA that focuses on different times rather than just peak hours. Collect exposure data and use PBCAT with crash data for all VRU crash severities.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

Broadway Street (93A) – 15th Street to Canyon Boulevard



LOCATION SUMMARY

- **Segment Limits:** 15th St to Canyon Blvd
- **Segment Length:** 0.7 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC (15th St to Arapahoe Ave)
- **Google Map:** <https://maps.app.goo.gl/NmU6NoQ3QuE6PXuVA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 26,000
- **Posted Speed Limit:** 30 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 225, 204, DASH, FF, GS, SKIP, AB, HOP, NB – 13 stops

NARRATIVE

This area is close to the university, bars, sorority and fraternity houses, and 13 transit stops serving 9 routes. A corridor treatment to highlight the high pedestrian and bicycle activity through the corridor may increase driver awareness and could be time-bound if an investigation of all crash severities reveals a time of day or day of week correlation.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 3 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

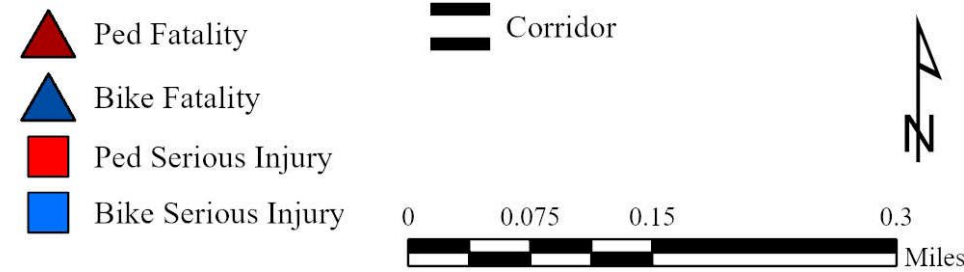
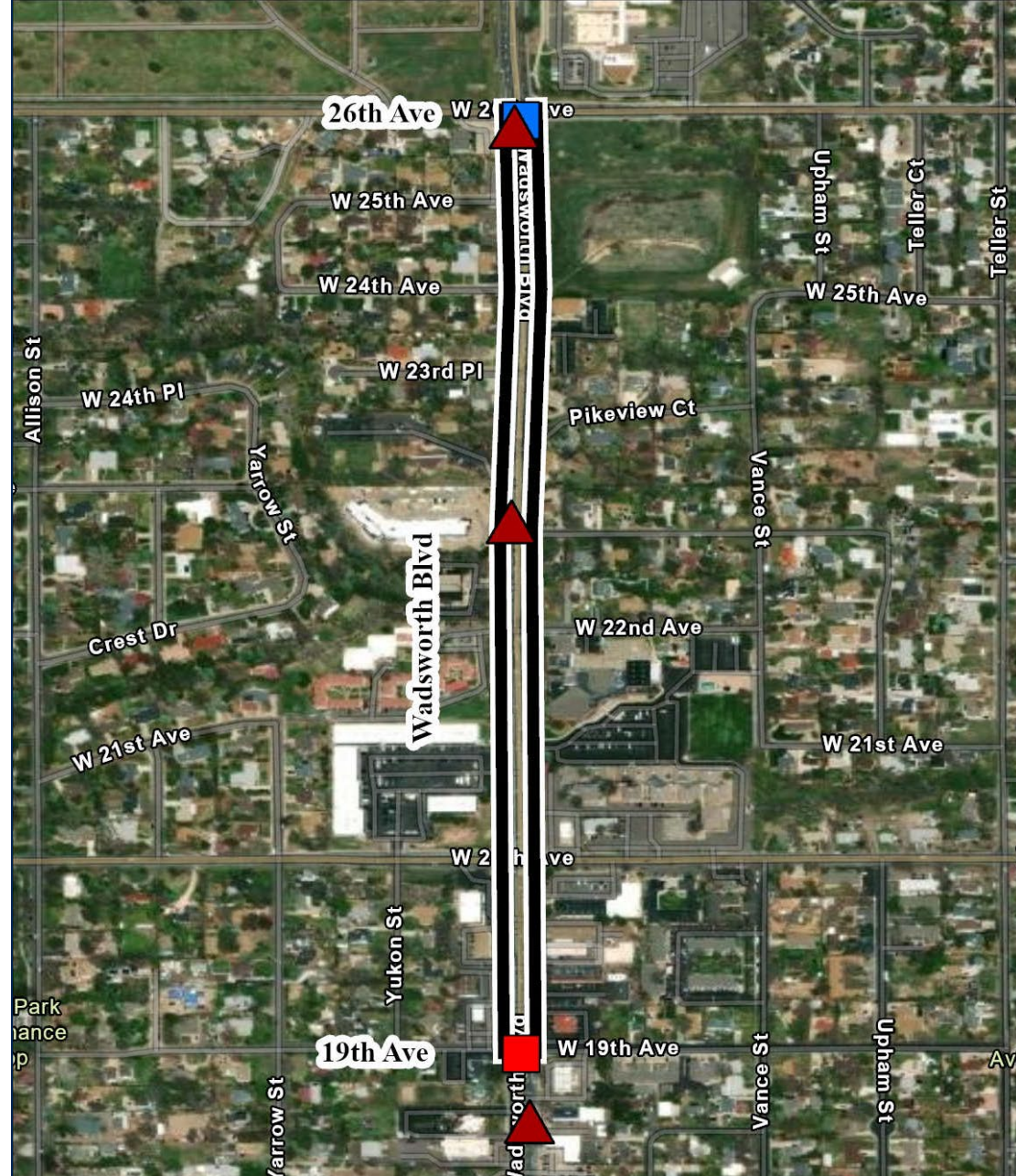
CURRENT STATUS

- This area is close to the university, bars, sororities/fraternities, and in general, a popular area for pedestrian activity.
- There is an odd intersection angle at College Avenue.
- There are planned improvements at the University intersection to signalize the northbound right turn.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact.
- Consider providing corridor treatments that highlight VRU activities.
- Investigate the time of day and week of all VRU crashes, including property damage only and minor injury crashes.

Wadsworth Boulevard (121A) – W. 19th Avenue to W. 26th Avenue



LOCATION SUMMARY

- **Segment Limits:** 19th Ave to 26th Ave
- **Segment Length:** 0.6 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Lakewood, Jefferson County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/ZUK1NUR9eM39wSpj6>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 40,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides through most of the corridor
- **Transit:** RTD Routes 20, 28, and 76 – 11 stops

NARRATIVE

No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education. The corridor may benefit from additional midblock crossing locations and/or pedestrian refuge medians.

CRASH HISTORY

- **Pedestrian Crashes:** 3 Fatalities / 1 Serious Injury
- **Bicyclist Crashes:** 0 Fatalities / 2 Serious Injuries

CURRENT STATUS

- There is a current plan to address the existing sidewalk gaps along the corridor.

RECOMMENDED PROJECTS / STRATEGIES

- Perform a near-miss analysis to investigate VRU behaviors. Depending on the results of the analysis, consider providing midblock crossings or refuge areas.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

S. Federal Boulevard (88A) – W. Warren Avenue to 200' North of W. Evans Avenue



LOCATION SUMMARY

- **Segment Limits:** Warren Ave to 200' North of Evans Ave
- **Segment Length:** 0.2 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/SJndLxnpPWylUdWx6>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 24,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 21, 29, 30, 31, 35, 36 – 5 stops, Transfer Station

NARRATIVE

A BRT project is planned to start construction in 2024 which will significantly change the safety profile of the corridor. Raised medians were installed in 2020. While this appears to have had a positive effect on pedestrian safety, ongoing monitoring if the BRT project is not implemented will be important to be sure the reduction in crashes was not an artifact of the pandemic.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 6 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

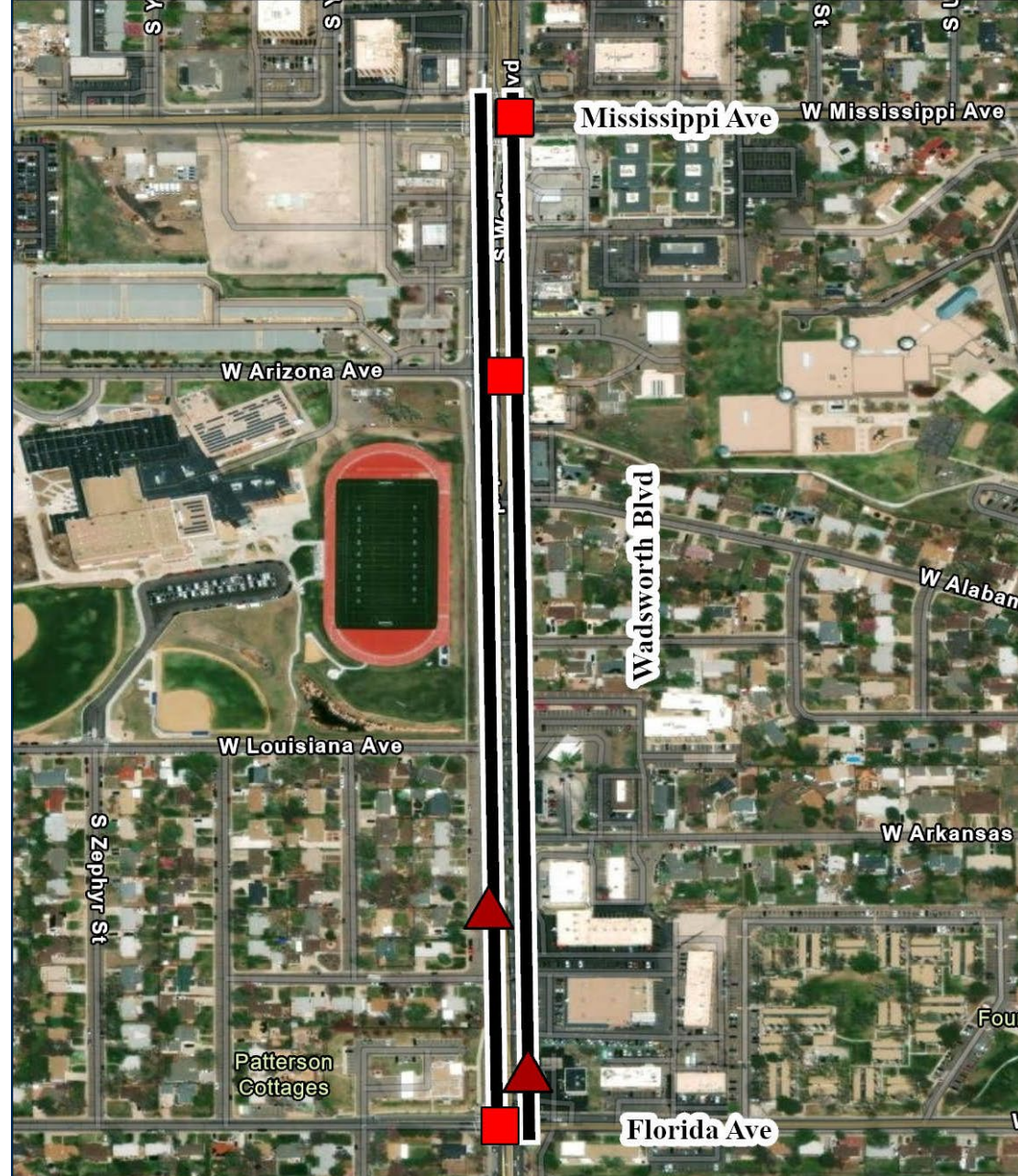
CURRENT STATUS

- BRT project along Federal Boulevard is in design with construction planned for 2024.
- Raised medians were installed throughout the corridor in 2020.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact.
- Ensure that BRT project includes adequate opportunities for midblock crossings and VRU safety in general.
- Education program for BRT bus drivers that includes VRU safety.
- Ensure traffic control plans accommodate safe access for VRUs during construction of all projects.

S. Wadsworth Boulevard – W. Florida Avenue to W. Mississippi Avenue



LOCATION SUMMARY

- **Segment Limits:** Florida Ave to Mississippi Ave
- **Segment Length:** 0.5 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Lakewood, Jefferson County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC
- **Google Map:** <https://maps.app.goo.gl/tK7dTovx5YJTtSRLA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Striped Median (Florida Ave to Alabama Dr) and Channelized Raised Median (Alabama Dr to Mississippi Ave)
- **AADT:** 43,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 11, 14, and 76 – 8 stops

NARRATIVE

No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education. The corridor may benefit from additional lighting and the installation of additional mid-block crossings and/or pedestrian refuge islands.

CRASH HISTORY

- **Pedestrian Crashes:** 2 Fatalities / 4 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

CURRENT STATUS

- There are a lot of students walking in this area.
- The corridor has inadequate lighting.

RECOMMENDED PROJECTS / STRATEGIES

- Perform a lighting analysis/study.
- Continue investigating the need for a school zone and/or reduced speed limits along the corridor.
- Conduct a near-miss analysis to determine unsafe road user movements.

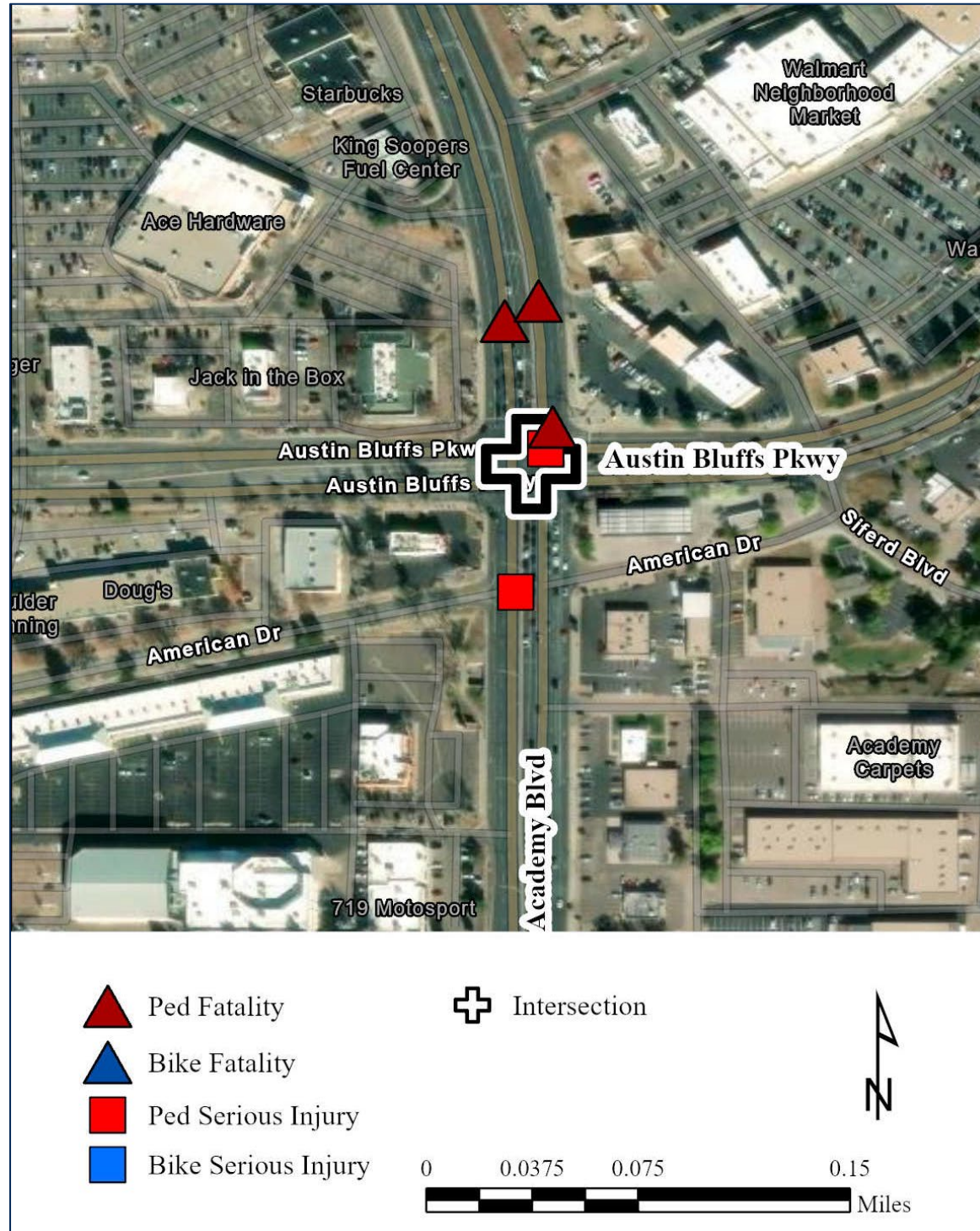


LOCATION SUMMARY
<ul style="list-style-type: none"> • Segment Limits: Beech St to Veach St • Segment Length: 1.2 miles • CDOT District: Region 5 • City/Jurisdiction: Cortez, Montezuma County • ROW Ownership: CDOT • DIC or ES-80: DIC • Google Map: https://maps.app.goo.gl/1Go2VZyKoT9sxBTU6
LOCATION DESCRIPTION
<ul style="list-style-type: none"> • Classification: Principal Arterial • Cross Section: 4-Lane with Two-Way Left-Turn Lane • AADT: 20,000 • Posted Speed Limit: 30 mph • Urban/Rural: Small Urbanized • Existing Facilities: Sidewalks on both sides • Transit: None

NARRATIVE
<p>No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.</p>

CRASH HISTORY
<ul style="list-style-type: none"> • Pedestrian Crashes: 1 Fatality / 4 Serious Injuries • Bicyclist Crashes: 0 Fatalities / 0 Serious Injuries
CURRENT STATUS
<ul style="list-style-type: none"> • None
RECOMMENDED PROJECTS / STRATEGIES
<ul style="list-style-type: none"> • Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns. • Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

Academy Boulevard and Austin Bluffs Parkway



LOCATION SUMMARY

- **CDOT District:** Region 2
- **City/Jurisdiction:** Colorado Springs, El Paso County
- **ROW Ownership:** Colorado Springs
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/WpKvW8Dt7GMAgv8U8>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial (Academy Blvd & Austin Bluffs Pkwy)
- **Cross Section:** 6-Lane with Channelized Raised Medians (Academy Blvd & Austin Bluffs Pkwy)
- **AADT:** 39,000 - 44,000 (Academy Blvd) / 33,000 – 43,000 (Austin Bluffs Pkwy)
- **Posted Speed Limit:** 40 mph (Austin Bluffs Pkwy) / 45 mph (Academy Blvd)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides
- **Transit:** MMT Route 23, 25, and 34 – 6 stops

NARRATIVE

Crashes at this intersection are all pedestrian-related, and an analysis of locations reveals that they are likely related to bus stop and transfer locations, particularly the two fatal crashes just north of the intersection. An enhanced pedestrian crossing between these two stops is not possible due to the long dual-left turn bays and proximity to the intersection. A change in bus transfer timing and/or bus stop locations will likely be needed to improve safety.

CRASH HISTORY

- **Pedestrian Crashes:** 3 Fatalities / 2 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

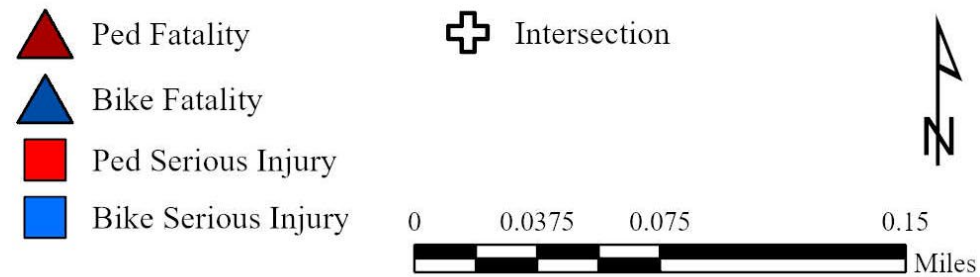
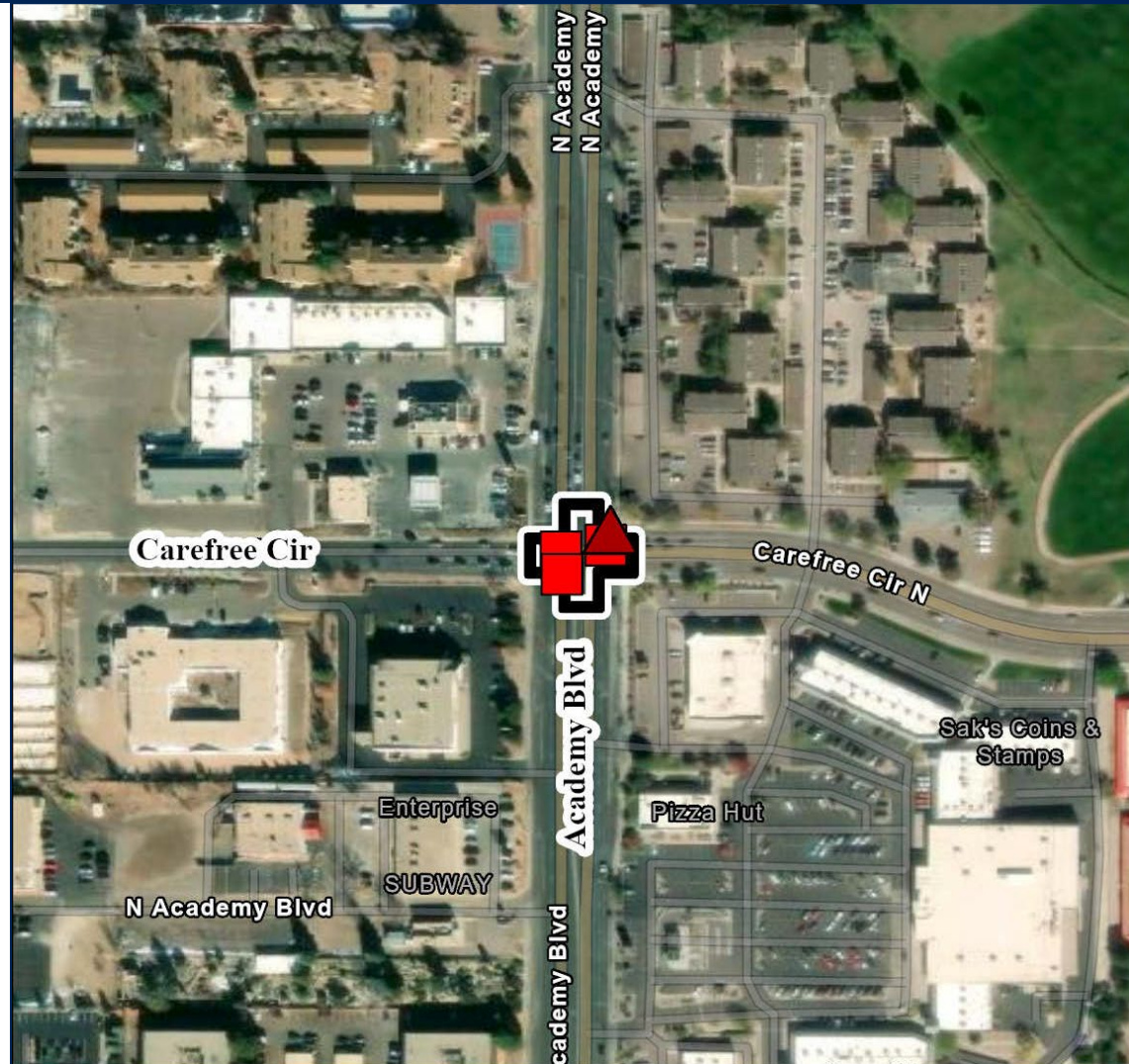
CURRENT STATUS

- Signal has Leading Pedestrian Intervals.
- A major transit transfer location is in this area.

RECOMMENDED PROJECTS / STRATEGIES

- Investigate the locations of bus stops and consider relocating to encourage safer crossings at designated locations.
- Investigate timing of bus transfers and consider schedule changes to allow more time for riders to cross at designated locations.

Carefree Circle and N. Academy Boulevard



LOCATION SUMMARY

- **CDOT District:** Region 2
- **City/Jurisdiction:** Colorado Springs, El Paso County
- **ROW Ownership:** Colorado Springs
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/oXQBxauRC5TWLm6c7>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial (Academy Blvd & Carefree Cir)
- **Cross Section:** 6-Lane with Channelized Raised Medians (Academy Blvd), 2-Lane/4-Lane with Two-Way Left-Turn Lane (Carefree Cir)
- **AADT:** 41,000 - 44,000 (Academy Blvd) / 14,000 (Carefree Cir)
- **Posted Speed Limit:** 35 mph (Carefree Cir) / 45 mph (Academy Blvd)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides
- **Transit:** MMT Route 25 – 2 stops

NARRATIVE

All crashes at this intersection were pedestrian related. There is an apartment building on one corner, with retail and restaurant establishments on the other three corners. Recent signal improvements installed Leading Pedestrian Intervals and conditional left turns for east-bound drivers on Carefree Circle. While this may improve pedestrian safety, it is worth noting that all crashes occurred in dark-lighted conditions. Crosswalk lighting may be inadequate.

CRASH HISTORY

- **Pedestrian Crashes:** 1 Fatality / 4 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

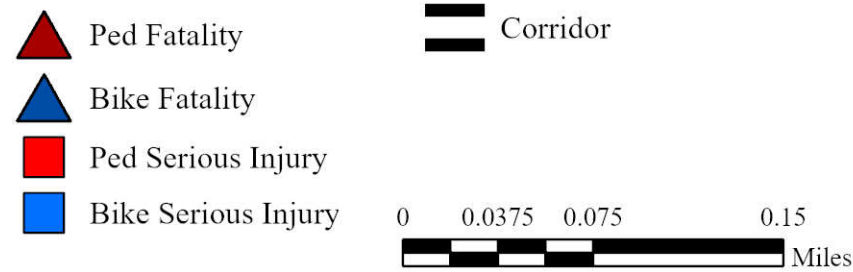
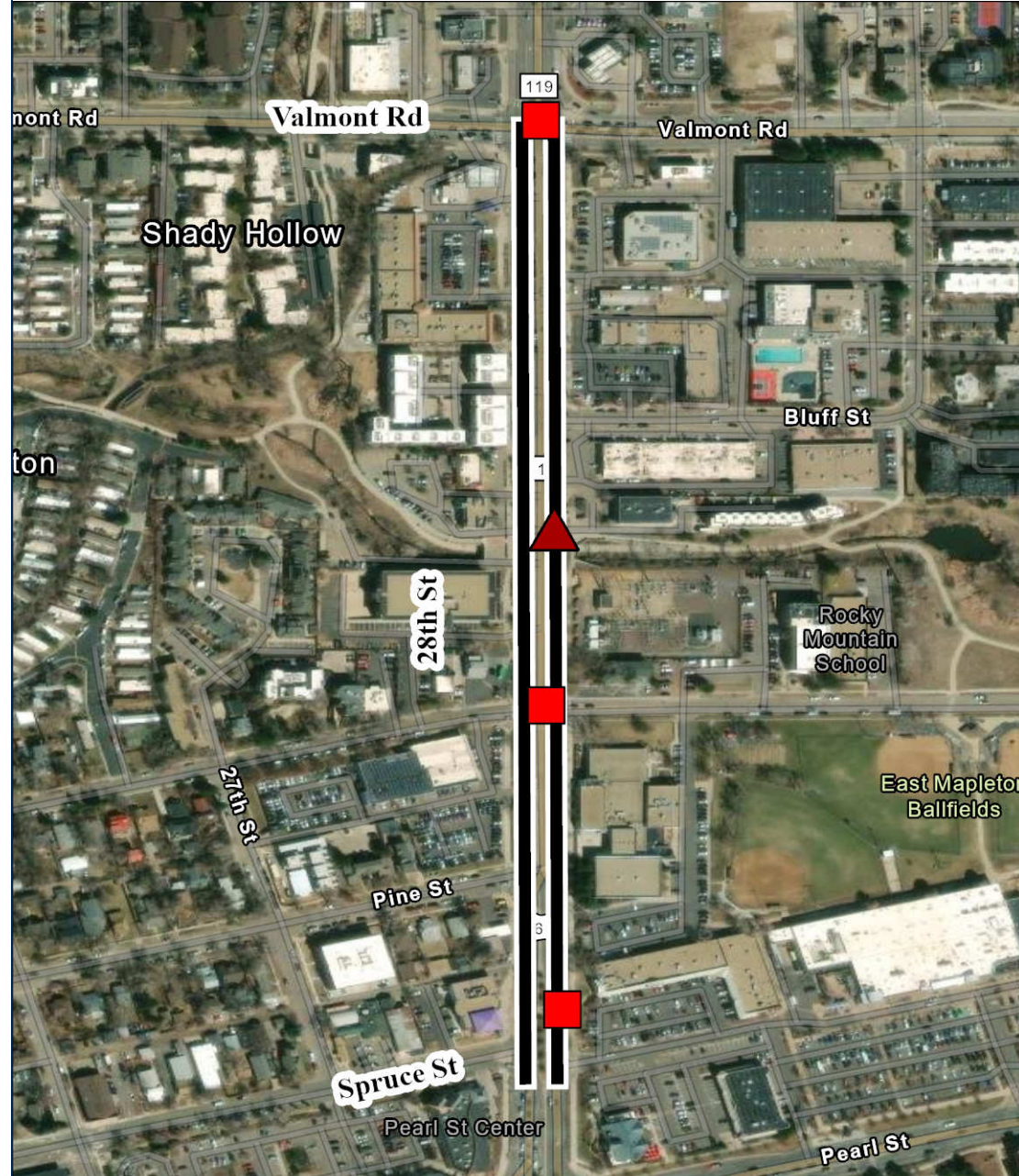
CURRENT STATUS

- Signal was recently improved to add Leading Pedestrian Intervals and conditional eastbound left-turns.
- All crashes occurred at night.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor the impact of recent improvements.
- Perform a lighting analysis/study.

28th Street (36B) – Spruce Street to Valmont Road



LOCATION SUMMARY

- **Segment Limits:** Spruce St to Valmont Rd
- **Segment Length:** 0.4 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** No
- **Google Map:** <https://maps.app.goo.gl/djhrfBJsMjtTENERA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Two-Lane Left-Turn Lane
- **AADT:** 25,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides, BAT lane from Spruce St to Pine St
- **Transit:** RTD Routes 205 and BOLT – 6 stops

NARRATIVE

The 28th Street Improvement Project currently underway will create a continuous multi-modal corridor from Iris Avenue to Canyon Boulevard, inclusive of this corridor. Planned improvements include a 10-foot multimodal pathway on both sides of the roadway, signal and intersection upgrades and the installation of a BAT lane. These improvements should enhance pedestrian safety throughout the corridor.

CRASH HISTORY

- **Pedestrian Crashes:** 1 Fatality / 3 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

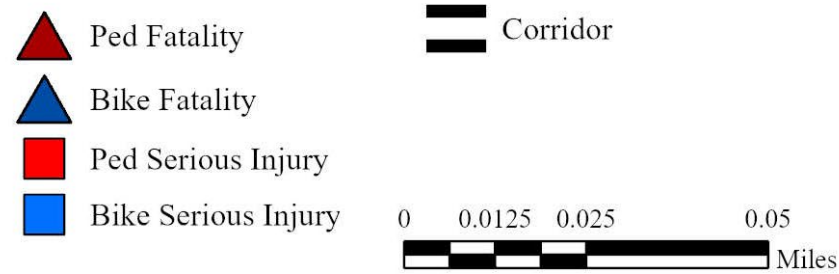
CURRENT STATUS

- The 28th Street Improvements Project is currently underway, with completion estimated for spring 2024. ([28th Street Improvements Project | City of Boulder \(bouldercolorado.gov\)](https://www.bouldercolorado.gov/28th-street-improvements-project)).
- Recent signal reconstructions and added multiuse path on both sides of the corridor.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact.
- If pedestrian crashes remain high, consider additional enhanced crossings through corridor.

Wadsworth Boulevard (121A) – W. 14th Avenue to E. Colfax Avenue



LOCATION SUMMARY

- **Segment Limits:** 14th Ave to Colfax Ave
- **Segment Length:** 0.2 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Lakewood, Jefferson County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/yiZkv1FhbEyTe83PA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 40,000
- **Posted Speed Limit:** 40 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes 16 and 76 – 4 stops

NARRATIVE

No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 1 Serious Injury
- **Bicyclist Crashes:** 1 Fatality / 2 Serious Injuries

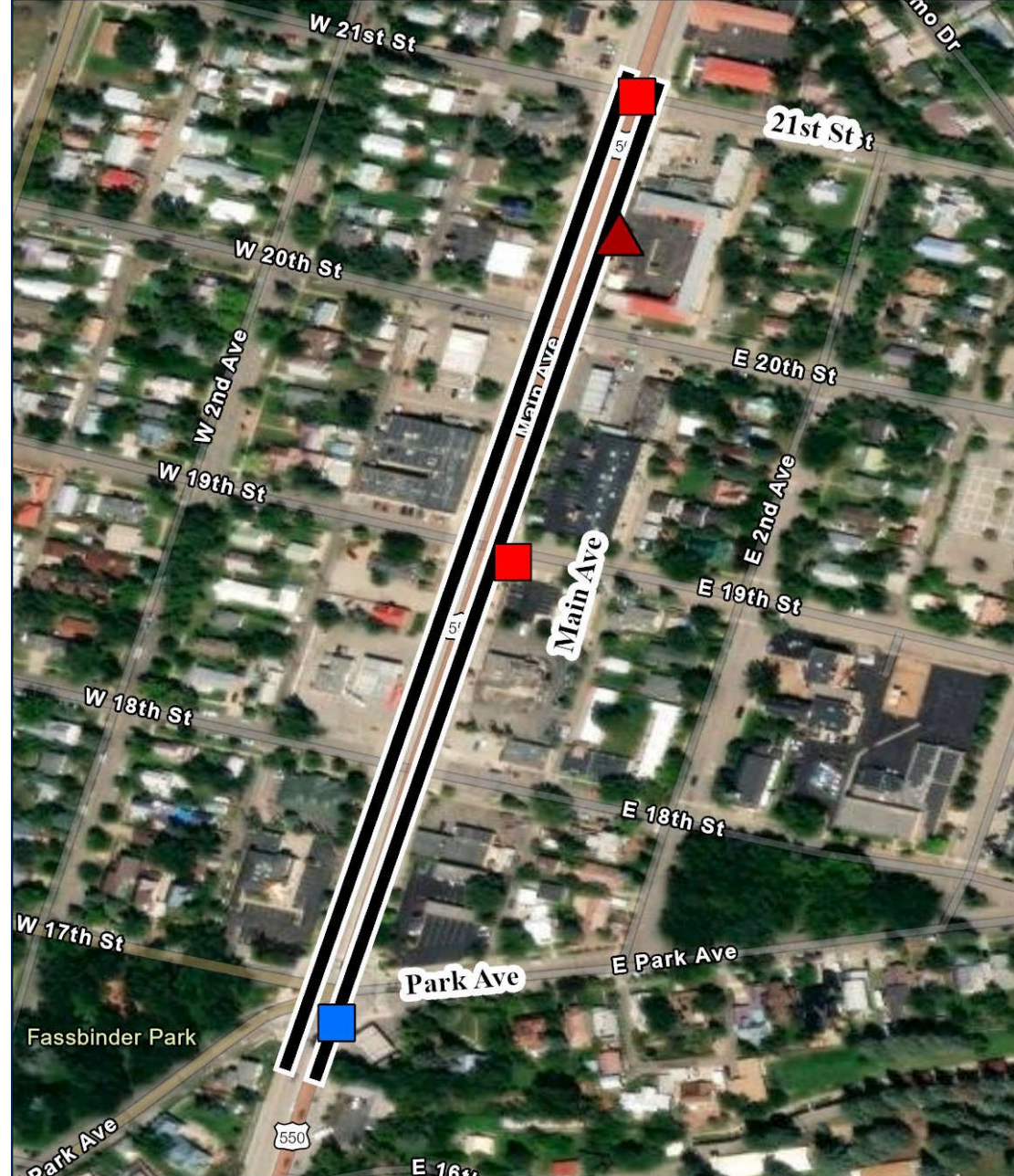
CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Conduct a near-miss analysis if crash patterns are still indistinguishable.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

Main Avenue (550B) – E. Park Avenue to E. 21st Avenue



LOCATION SUMMARY

- **Segment Limits:** Park Ave to 21st Ave
- **Segment Length:** 0.3 miles
- **CDOT District:** Region 5
- **City/Jurisdiction:** Durango, La Plata County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** No
- **Google Map:** <https://maps.app.goo.gl/mZ6XHPDZmG8UfhVw5>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane with Two-Way Left-Turn Lane/Median
- **AADT:** 31,000
- **Posted Speed Limit:** 35 mph
- **Urban/Rural:** Small Urbanized
- **Existing Facilities:** Sidewalks and bike lanes on both sides
- **Transit:** Durango Transit Route 1 – 4 stops

NARRATIVE

VRU attractors near this segment include a library and access to the river path system just to the east of the intersection of Main Ave. and Park Ave. The pedestrian crossing across the south leg of this intersection is long and has poor sight distances for drivers heading north on Main Ave. Pedestrian safety near the intersection of Main Ave. and Park Ave. may be improved by implementing a protected right turn or no right on red condition.

CRASH HISTORY

- **Pedestrian Crashes:** 1 Fatality / 2 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 1 Serious Injury

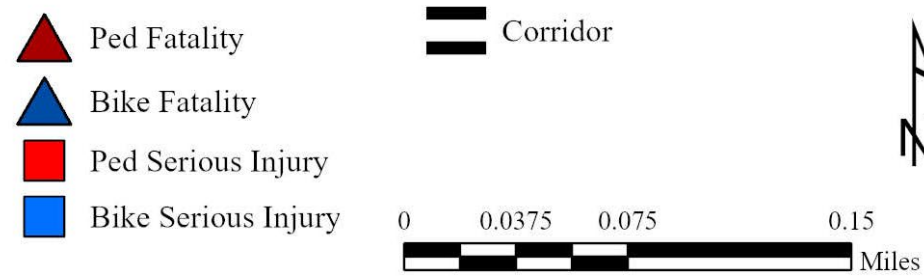
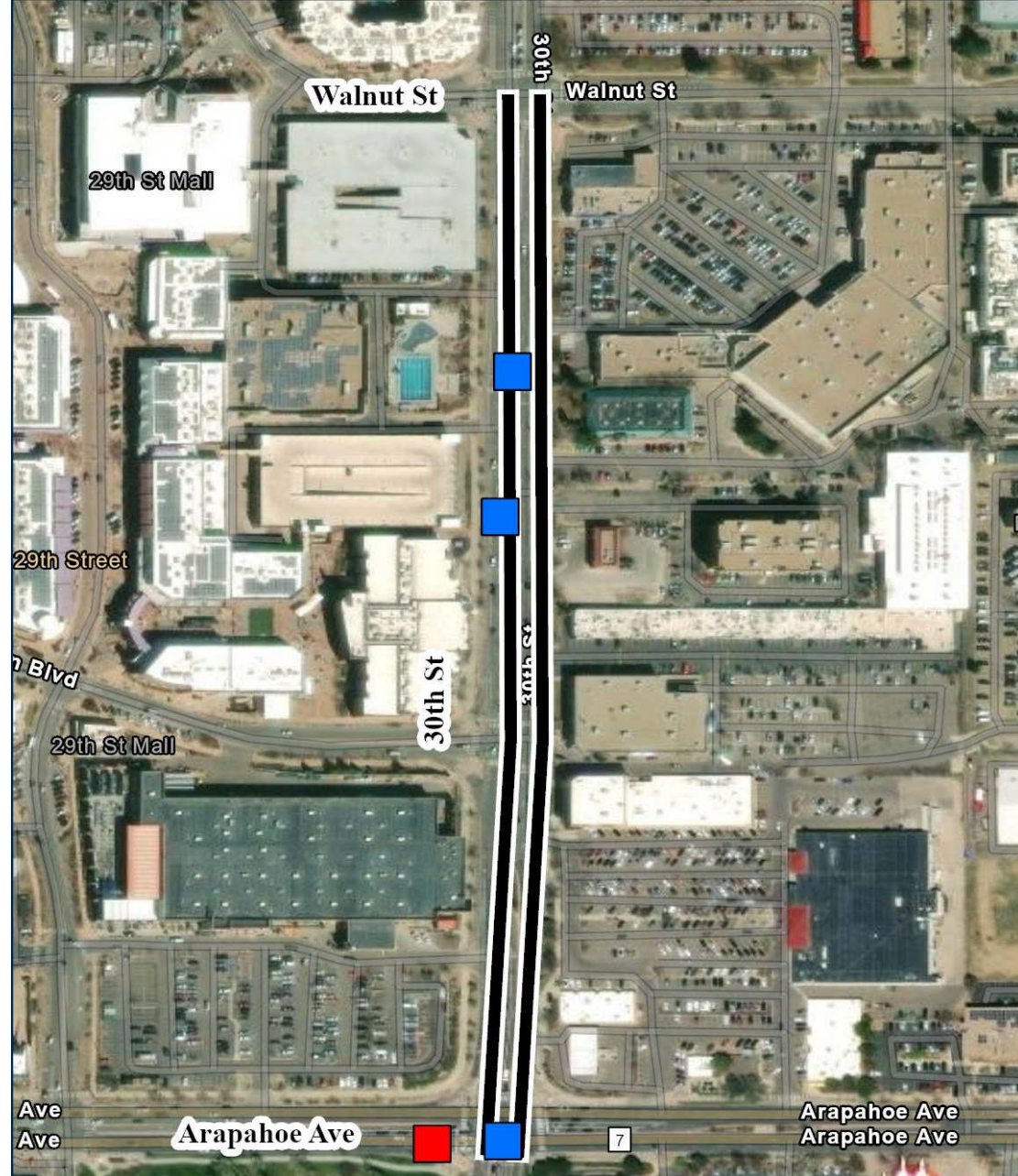
CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Implement a protected right-turn or “No Turn on Red” for the northeast movement at Park Avenue.
- Complete an RSA. Collect exposure data and use PBCAT with crash data for all VRU crash severities.
- Select appropriate countermeasures using FHWA Proven Safety Countermeasures and STEP guide.

30th Street – Arapahoe Avenue to Walnut Street



LOCATION SUMMARY

- **Segment Limits:** Arapahoe Ave to Walnut St
- **Segment Length:** 0.4 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** Boulder
- **DIC or ES-80:** DIC (Arapahoe Ave)
- **Google Map:** <https://maps.app.goo.gl/j1zzsCGsXZcnsC8b8>

LOCATION DESCRIPTION

- **Classification:** Minor Arterial
- **Cross Section:** 4-Lane with Channelized Raised Median
- **AADT:** 23,000
- **Posted Speed Limit:** 30 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks and bike lanes on both sides
- **Transit:** RTD Routes FF, J, JUMP, BOND, HOP – 11 stops

NARRATIVE

The crashes through this section are primarily bicycle-related. Between September 2019 and July 2021, the bicycle lanes throughout the corridor were enhanced with the addition of green ladder-style paint through the intersections and green bike lane symbols throughout. This should enhance bicyclist safety throughout the corridor. However, it was not possible to isolate patterns from fatal and serious injury crashes. If the corridor continues to see a high level of bicycle crashes, further investigation to isolate issues is warranted.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 1 Serious Injury
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries
- Trends indicate a potential distracted driving concern.

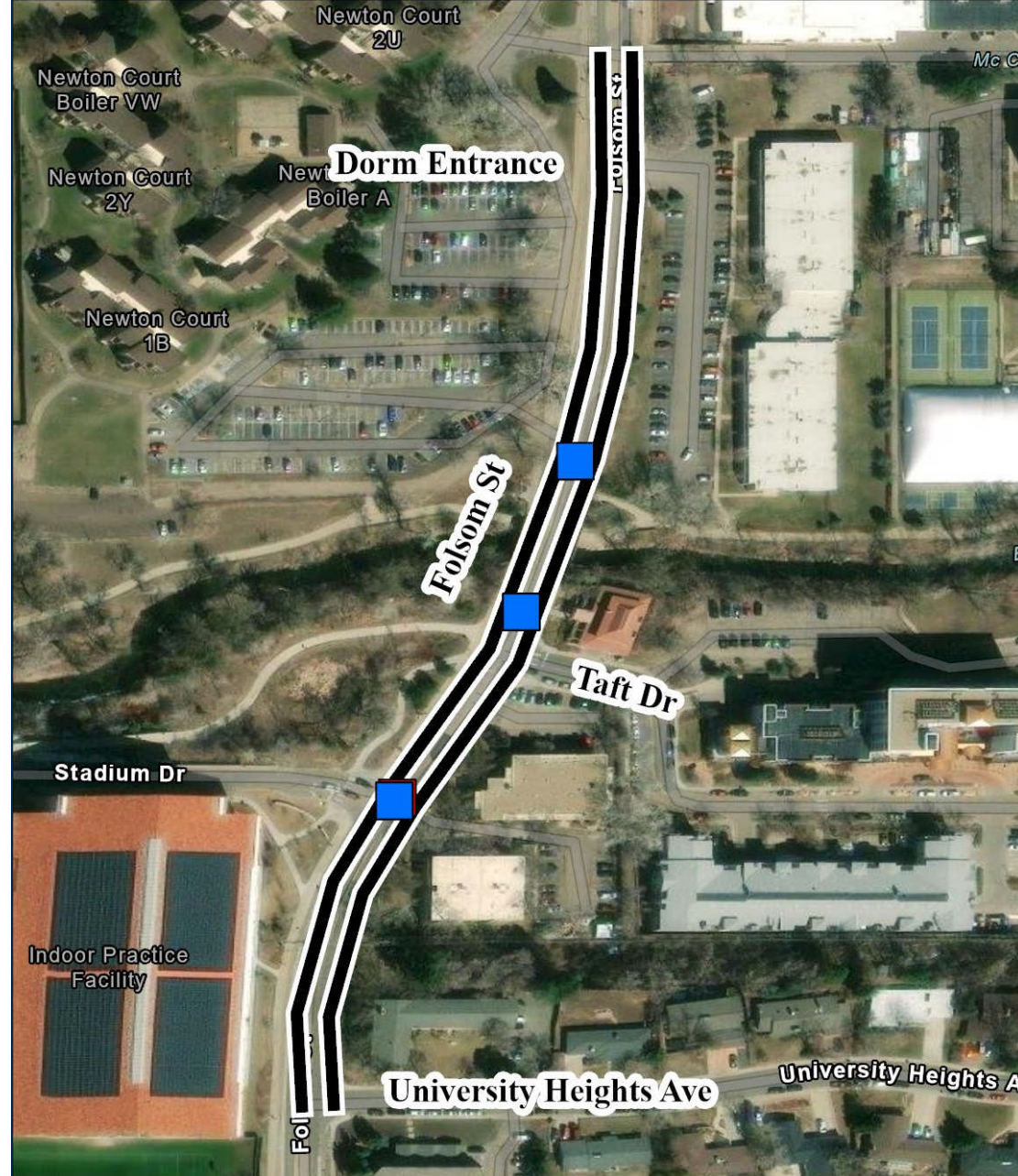
CURRENT STATUS

- The intersection at Arapahoe Avenue is in design for improvements, including the addition of left turn phasing.
- Corridor was included in the City’s SS4A funding application.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor effectiveness of green bike lane enhancement.
- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns. Use cameras to analyze bicyclist and driver behaviors.

Folsom Street – University Heights Avenue to Dorm Parking Lot Entrance



LOCATION SUMMARY

- **Segment Limits:** University Heights Ave to Dorm Parking Lot Entrance
- **Segment Length:** 0.3 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** Boulder
- **DIC or ES-80:** DIC
- **Google Map:** <https://maps.app.goo.gl/CCzyYQsHb4w1Ccyx5>

LOCATION DESCRIPTION

- **Classification:** Minor Arterial
- **Cross Section:** 2-Lane with Painted Median
- **AADT:** 7,800
- **Posted Speed Limit:** 30 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks and bike lanes on both sides, Midblock crossing at Taft Dr
- **Transit:** RTD Route HOP – 5 stops

NARRATIVE

Recent improvements were made to the intersection with Taft Drive, including the installation of a refuge island. This corridor is included in a planned safety study. An analysis of sight distance issues along the corridor may reveal additional low-cost treatments to improve the safety of bicyclists.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 1 Serious Injury
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

CURRENT STATUS

- This corridor is part of a planned safety study and has been included in an SS4A funding application.
- Treatment improvements to the midblock crossing at Taft Drive were made recently and included the addition of a refuge island.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor the impact of recent improvements.
- Analyze sight distance issues along the corridor. Additional warning signs or other low-cost treatments may improve bicyclist safety throughout the corridor.

Colorado Boulevard (2A) and E. Colfax Avenue



LOCATION SUMMARY

- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/eMAX4oHxA4ngzchHA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial (Colorado Blvd & Colfax Ave)
- **Cross Section:** 6-Lane (Colorado Blvd) / 4-Lane (Colfax Ave) with Channelized Raised Medians
- **AADT:** 45,000 - 46,000 (Colorado Blvd) / 24,000 - 30,000 (Colfax Ave)
- **Posted Speed Limit:** 30 mph (Colfax Ave) / 35 mph (Colorado Blvd)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides
- **Transit:** RTD Routes 15, 15L, 40, 41L - 5 stops

NARRATIVE

This is a large intersection with a hospital on one corner and a convenience store and a restaurant on two others. No apparent crash patterns were detectable from fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 4 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

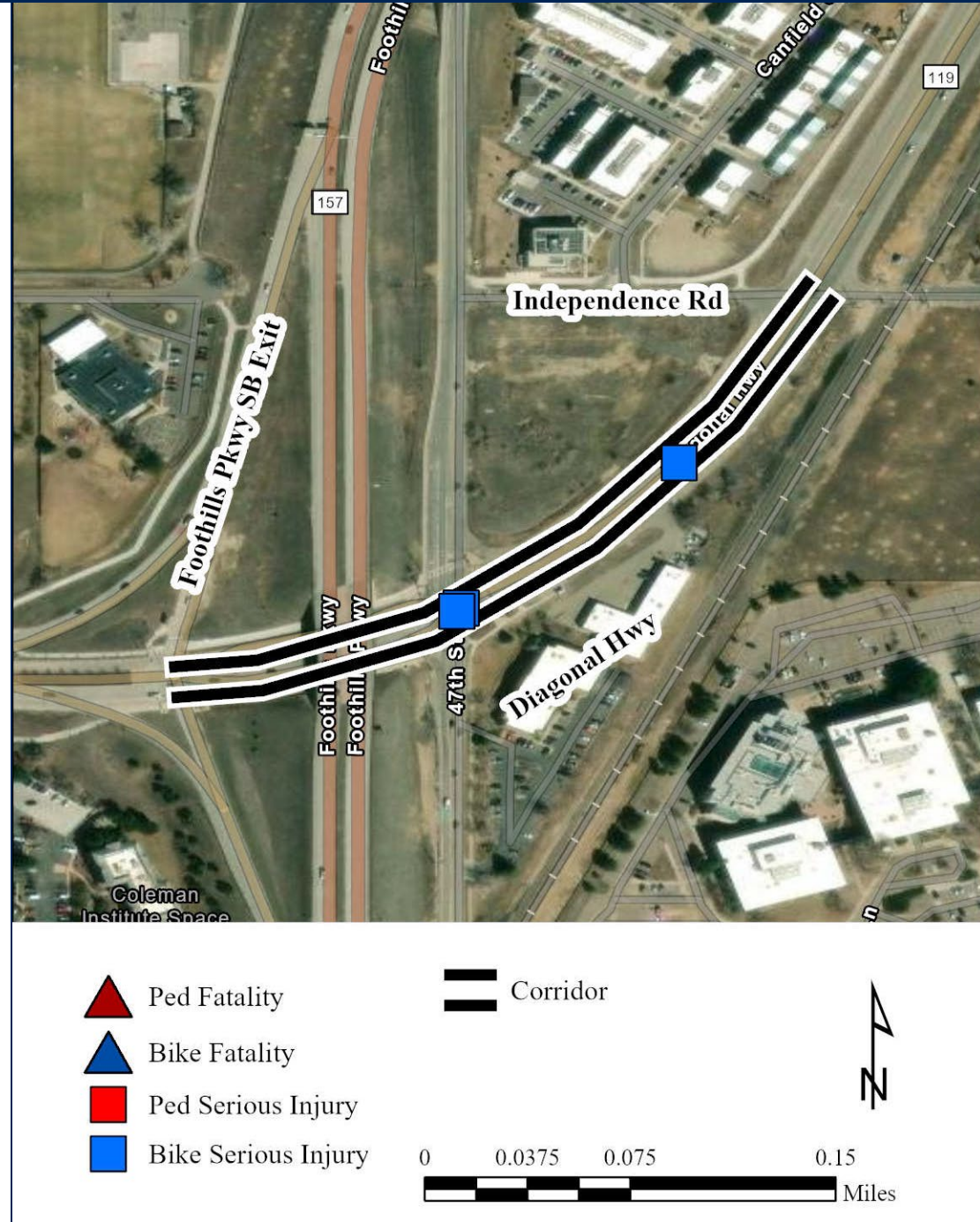
CURRENT STATUS

- BRT project along Colfax Avenue is in design with construction planned for 2024.

RECOMMENDED PROJECTS / STRATEGIES

- Complete an RSA. Collect exposure data and use PBCAT with crash data for all VRU crash severities
- Implement designs and monitor impact.
- Ensure that BRT project includes adequate opportunities for midblock crossings and VRU safety in general
- Education program for BRT bus drivers that includes VRU safety
- Ensure traffic control plans accommodate safe access for VRUs during construction of all projects

Diagonal Highway (119B) – Foothills Parkway to Independence Road



LOCATION SUMMARY

- **Segment Limits:** Foothills Pkwy to Independence Rd
- **Segment Length:** 0.2 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC
- **Google Map:** <https://maps.app.goo.gl/NDucXAH5N1tVBK1f9>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 3-Lane with Channelized Raised Median
- **AADT:** 31,000
- **Posted Speed Limit:** 45 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks and buffered bike lanes on both sides
- **Transit:** RTD Routes BOLT – 1 stop

NARRATIVE

Only bicycle crashes were observed in this corridor. Striping improvements were made throughout the corridor in 2016, however these three crashes occurred after the improvements were made. No crash patterns were apparent from fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education. Including data from the past 10 years will capture any increases in safety from the 2016 improvements.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

CURRENT STATUS

- Bicycle facility improvements were made in 2016.

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns. Include data from the last 10 years to capture crashes before and after improvements were implemented.

N. Lincoln Street – E. Colfax Avenue to E. 18th Avenue



LOCATION SUMMARY

- **Segment Limits:** Colfax Ave to 18th Ave
- **Segment Length:** 0.3 miles
- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** Denver
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/aDz9jSDbpbkQWyeRa8>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 4-Lane (One-way)
- **AADT:** 21,000
- **Posted Speed Limit:** 25 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides, Bus lane
- **Transit:** RTD Civic Center Station – no stops on Lincoln

NARRATIVE

No pattern to the bicycle crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

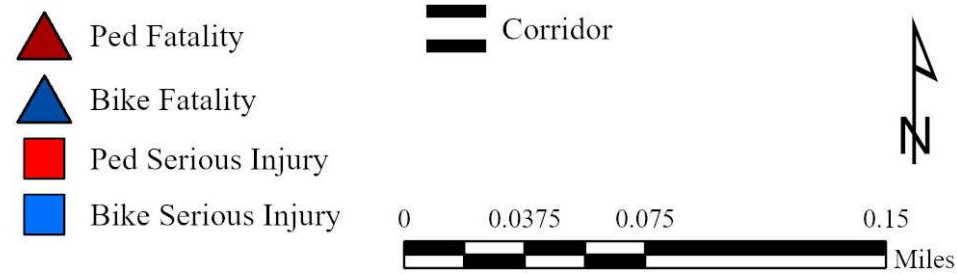
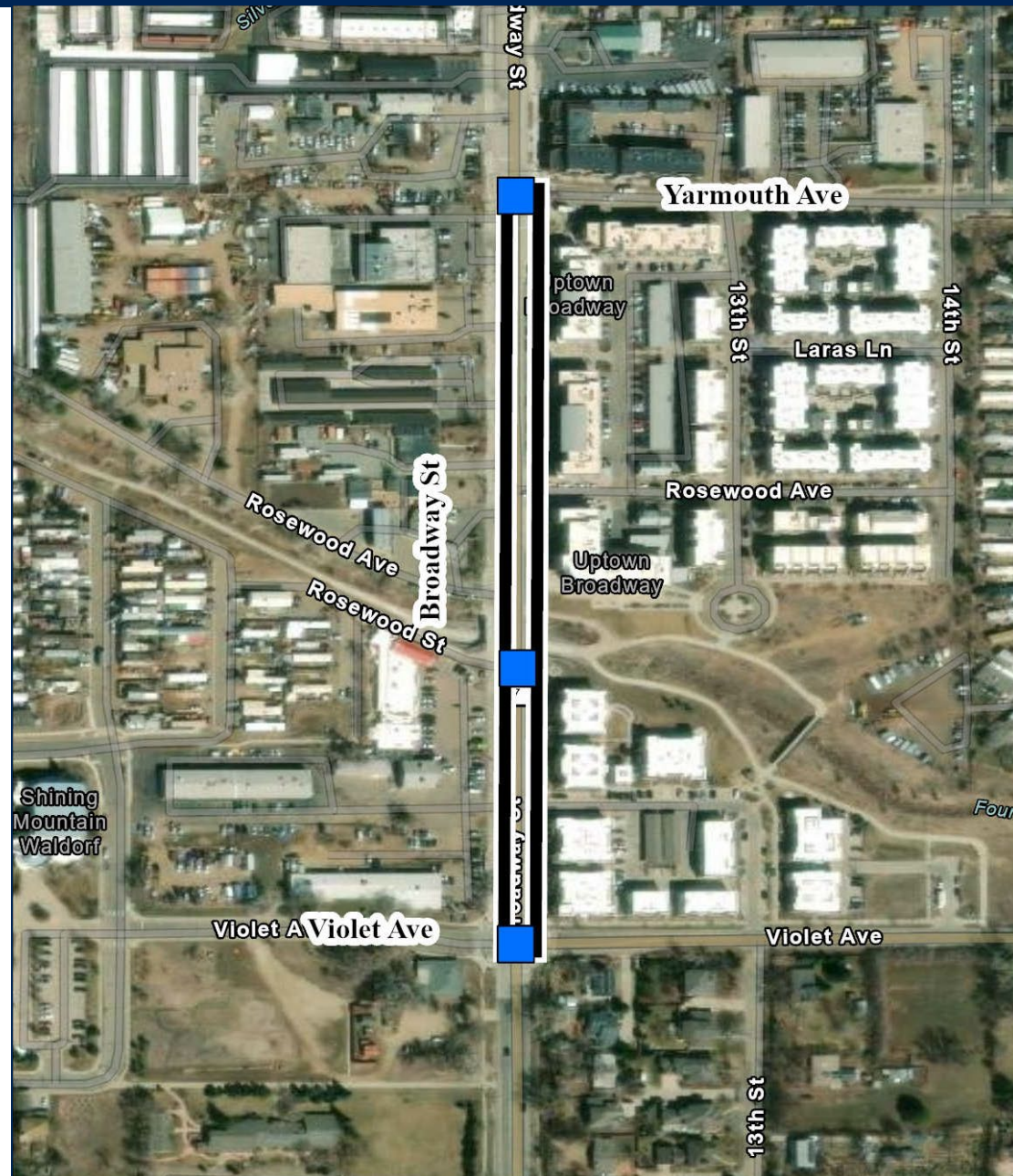
CURRENT STATUS

- Improvements made to the corridor occurred prior to the crash analysis period range.

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Conduct a near-miss analysis if crash patterns still are not apparent.

Broadway Street – Violet Avenue to Yarmouth Avenue



LOCATION SUMMARY

- **Segment Limits:** Violet Ave to Yarmouth Ave
- **Segment Length:** 0.3 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** Boulder
- **DIC or ES-80:** DIC
- **Google Map:** <https://maps.app.goo.gl/wZvPqHESHPnswYKB8>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 2-Lane with Two-Way Left-Turn Lane
- **AADT:** 12,000
- **Posted Speed Limit:** 30 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks and bike lanes on both sides
- **Transit:** RTD Routes 204, Y, SKIP – 4 stops

NARRATIVE

Crashes in the corridor were all bicyclist-related. There is a bicycle shop next to a coffee shop on the north end of this corridor that attracts large groups of bicyclists, in addition to numerous shops and eateries along the north half of the corridor. A recent project enhanced bike lanes along the roadway with green paint through intersections, green separation striping, and a small buffer between the vehicle travel lane and the bike lane. These improvements should result in increased bicycle safety and may increase ridership through the corridor.

CRASH HISTORY

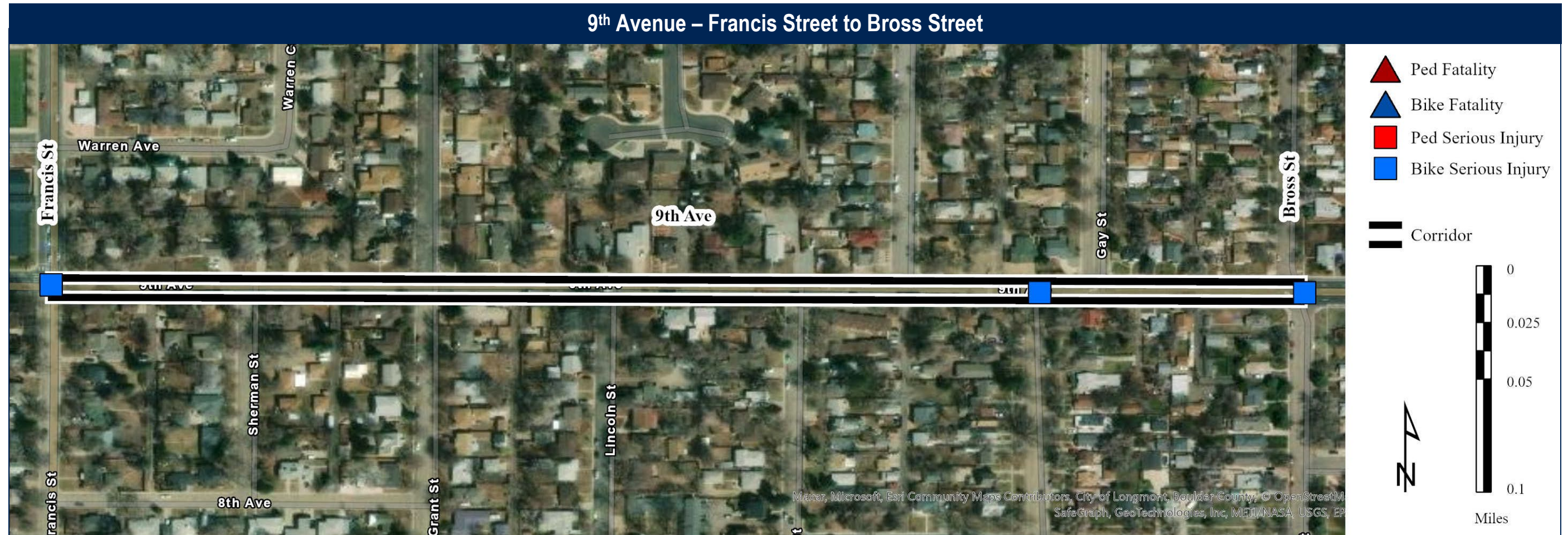
- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

CURRENT STATUS

- Recent projects included enhanced bike facilities, an added multiuse path, a signal at the Yarmouth Avenue intersection, and better VRU connectivity.
- The bike shop and coffee shop in this area appear to hold large biking events.

RECOMMENDED PROJECTS / STRATEGIES

- Monitor the impact of recent improvements.
- Complete a before and after study. Use exposure data to support the study and facilitate continued monitoring.



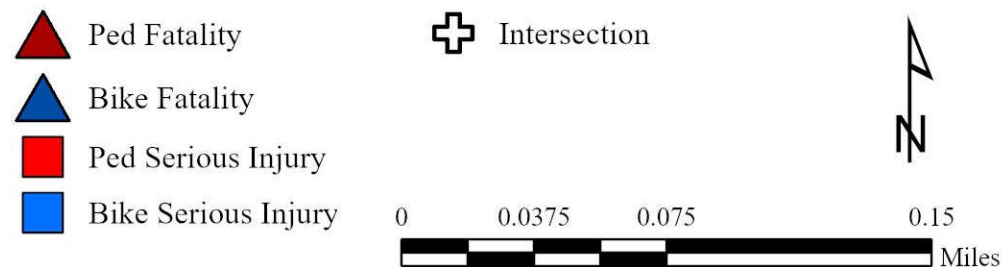
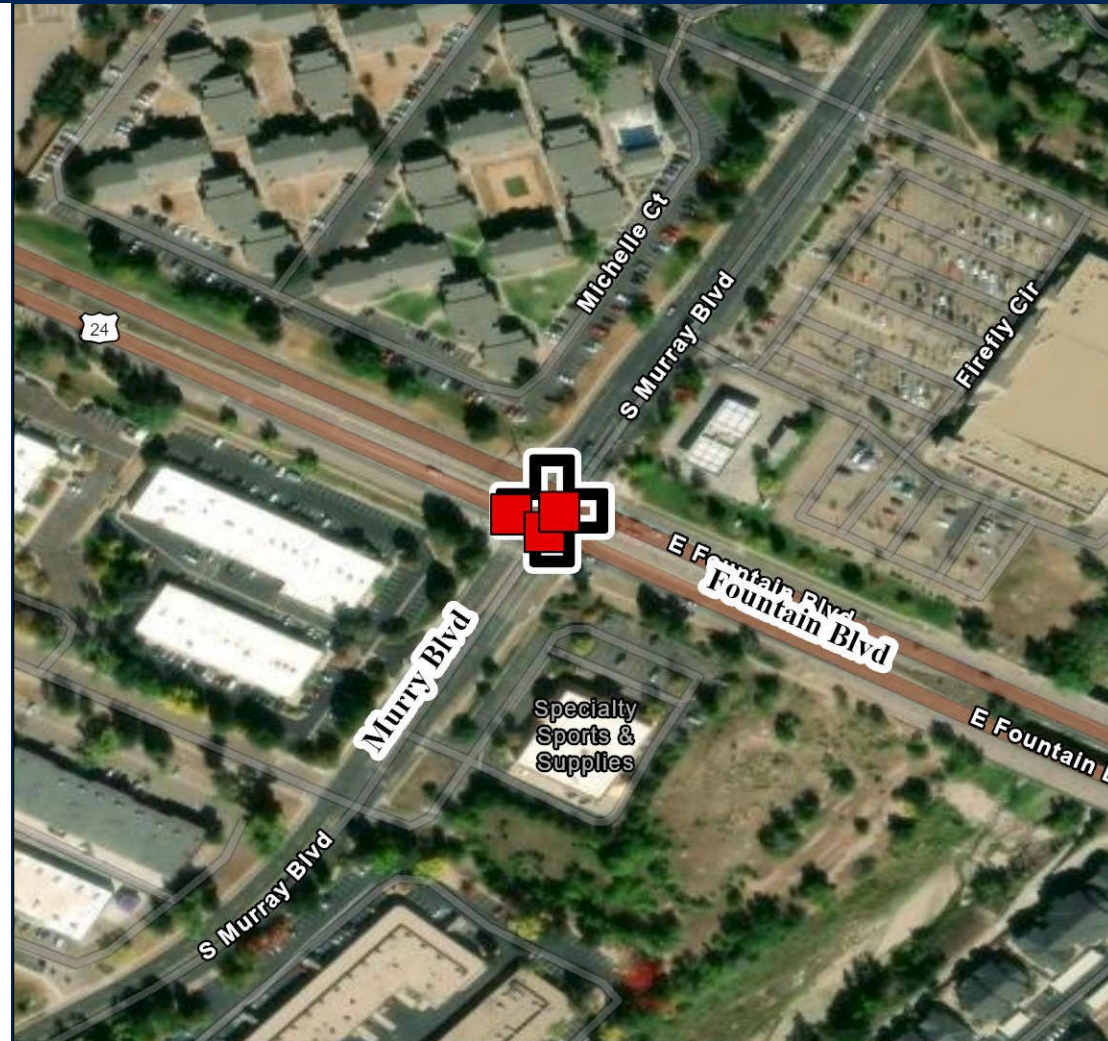
LOCATION SUMMARY	
• Segment Limits: Francis St to Bross St	
• Segment Length: 0.4 miles	
• CDOT District: Region 4	
• City/Jurisdiction: Longmont, Boulder County	
• ROW Ownership: Longmont	
• DIC or ES-80: Both (Gay St to Bross St)	
• Google Map: https://maps.app.goo.gl/7413CXVNR3Ms2d8m6	
LOCATION DESCRIPTION	
• Classification: Minor Arterial	
• Cross Section: 4-Lane	
• AADT: 11,000	
• Posted Speed Limit: 35 mph	
• Urban/Rural: Urbanized	
• Existing Facilities: Sidewalks on both sides, Pedestrian signal	
• Transit: RTD Route 326 – 3 stops	

NARRATIVE

This corridor includes only bicyclist crashes. The corridor was restriped in 2021 to include bike lanes, which may have a positive impact on safety, however no patterns to the crashes was apparent from fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY	
• Pedestrian Crashes: 0 Fatalities / 0 Serious Injuries	
• Bicyclist Crashes: 0 Fatalities / 3 Serious Injuries	
CURRENT STATUS	
• The corridor underwent a major striping redesign that included the addition of bike lanes in 2021.	
RECOMMENDED PROJECTS / STRATEGIES	
• Monitor impact of restriping project.	
• Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.	
• Conduct a near-miss analysis if crash patterns still are not apparent.	

E. Fountain Boulevard (24H) and S. Murray Boulevard



LOCATION SUMMARY

- **CDOT District:** Region 2
- **City/Jurisdiction:** Colorado Springs, El Paso County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/dJUntzezkTV7yhSM6>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial-Freeways-Expressways (Fountain Blvd) / Minor Arterial (Murray Blvd)
- **Cross Section:** 4-Lane with Channelized Raised Medians
- **AADT:** 28,000 - 36,000 (Fountain Blvd) / 5,600-10,000 (Murray Blvd)
- **Posted Speed Limit:** 35 mph (Murray Blvd) / 45 mph (Fountain Blvd)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides
- **Transit:** MMT Route 22 – 2 stops

NARRATIVE

A road diet along S. Murray Blvd is in design but is not yet funded. Flashing beacons were recently turned on to reduce speeds during school arrival and dismissal times. The permissive left turn phase for the north-to-east turning movement in the morning may be an issue. Performing a time-of-day analysis on crashes of all severities might reveal more insight into the safety of permissive lefts at this location.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 3 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 0 Serious Injuries

CURRENT STATUS

- A road diet along Murray Boulevard is in design but does not have construction funding at this time.
- Signal was recently rebuilt with added ADA improvements. Flashing beacons were also turned on to help reduce speeds during arrival and dismissal times for the adjacent school.

RECOMMENDED PROJECTS / STRATEGIES

- Implement designs and monitor impact
- Perform a time-of-day analysis and give special consideration to the N-to-E movement in the morning.

Havana Street and E. 16th Avenue



LOCATION SUMMARY

- **CDOT District:** Region 1
- **City/Jurisdiction:** Aurora, Adams County
- **ROW Ownership:** Aurora
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/9nLwQGwygC1XVBpT6>

LOCATION DESCRIPTION

- **Classification:** Major Collector (Havana St) / Local (16th Ave)
- **Cross Section:** 2-Lane (Havana St & 16th Ave)
- **AADT:** 11,000 (Havana St) / 16th Ave unknown
- **Posted Speed Limit:** 25 mph (Havana St & 16th Ave)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides
- **Transit:** RTD Route 105 – no adjacent stops to the intersection

NARRATIVE

A safety project including curb extensions at this intersection is currently in design, with construction scheduled to be completed in 2024. Curb extensions have a positive effect on pedestrian safety and may benefit bicyclists due to their speed-reduction potential, however inexperienced cyclists riding too close to the curb may swerve into traffic due to the narrowed roadway. Ensure that the design is safe for bicyclists and monitor the intersection for bicycle safety and comfort. Educational efforts may be necessary if bicycle movements become unsafe.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 3 Serious Injuries

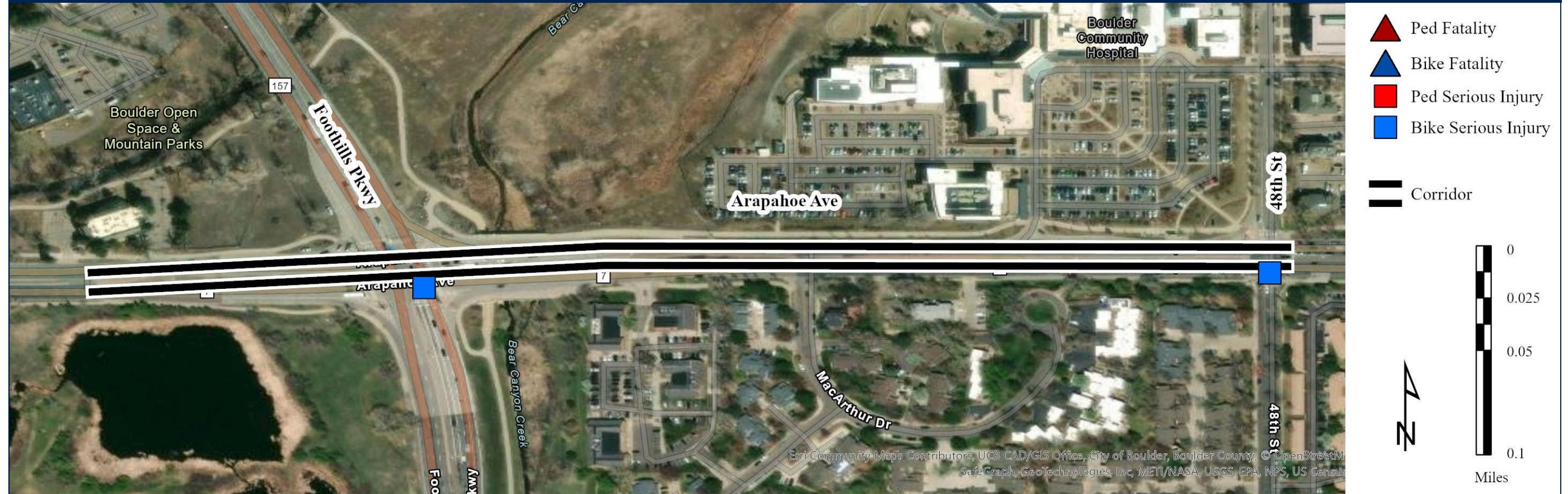
CURRENT STATUS

- Intersection is currently under design for added curb extensions which, while generally considered a pedestrian safety treatment, may have safety benefits for bicyclists as well. Construction is anticipated to be completed next year.

RECOMMENDED PROJECTS / STRATEGIES

- Implement and monitor impact of improvements.
- Ensure current design project includes crosswalks and stop bars for all four legs and does not negatively affect the safety of bicyclists.

Arapahoe Avenue (7C) – Foothills Parkway to 48th Street



LOCATION SUMMARY

- **Segment Limits:** Foothills Pkwy to 48th St
- **Segment Length:** 0.4 miles
- **CDOT District:** Region 4
- **City/Jurisdiction:** Boulder, Boulder County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** DIC at Foothills Pkwy
- **Google Map:** <https://maps.app.goo.gl/2DuJ3iRBWDOg1rov8>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 6-Lane with Channelized Raised Median
- **AADT:** 28,000
- **Posted Speed Limit:** 45 mph
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides
- **Transit:** RTD Routes FF, J, JUMP – 8 stops

NARRATIVE

This location included only bicyclist-related crashes. A multi-use path through the corridor is currently in design, which should increase safety, but may also increase ridership and the number of less-experienced bicyclists through the corridor. Since these crashes occurred at intersections, ensure that the pathway design at intersections supports the safety of less experienced and confident bicycle riders.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 2 Serious Injuries

CURRENT STATUS

- Signals were recently improved.
- A multiuse path along the corridor is currently in design.
- There is a plan to resurface the corridor that may include striping modifications to include BRT.

RECOMMENDED PROJECTS / STRATEGIES

- Ensure pathway design at intersections supports the safety of less experienced and confident bicycle riders.
- Implement designs and monitor impact.

North Avenue (6B) and N. 1st Street



LOCATION SUMMARY

- **CDOT District:** Region 3
- **City/Jurisdiction:** Grand Junction, Mesa County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/oPDRomBZUHDDhJKV9>

LOCATION DESCRIPTION

- **Classification:** Minor Arterial (North Ave & 1st St)
- **Cross Section:** 4-Lane with Channelized Raised Medians (only along North Ave)
- **AADT:** 18,000 – 19,000 (North Ave) / 9,100 - 11,000 (1st St)
- **Posted Speed Limit:** 30 mph (North Ave) / 35 mph (1st St)
- **Urban/Rural:** Urbanized
- **Existing Facilities:** Sidewalks on both sides of N and E legs
- **Transit:** GVT Route 5 – 1 stop (not directly adjacent to intersection)

NARRATIVE

No pattern to the crashes was apparent using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 1 Fatality / 1 Serious Injury

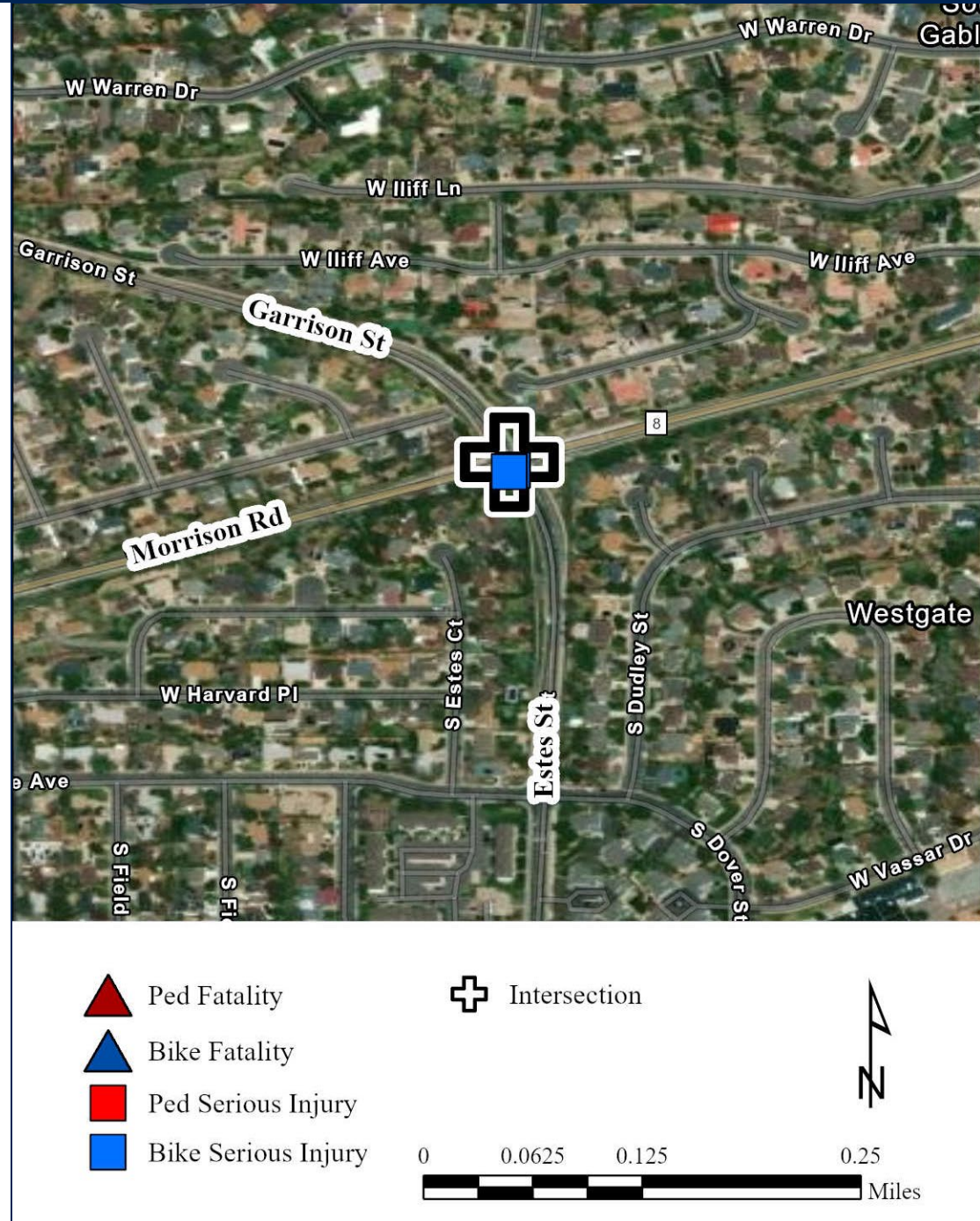
CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.

W. Morrison Road (8A) and S. Estes Street / S. Garrison Street



LOCATION SUMMARY

- **CDOT District:** Region 1
- **City/Jurisdiction:** Lakewood, Jefferson County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** No
- **Google Map:** <https://maps.app.goo.gl/cvEqkaYXQq7cAamN7>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial
- **Cross Section:** 2-Lane
- **AADT:** 7,600
- **Posted Speed Limit:** 45 mph
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on all sides, bike lane along S. Estes Street / S. Garrison Street
- **Transit:** MMT Route 22 – 2 stops

NARRATIVE

This intersection has both horizontal and vertical sight distance issues, and bicyclists in particular may have a higher than usual speed due to the downhill approach from the north. The southbound mixing zone north of the intersection is in a location where bicyclists cannot see vehicles approaching from behind due to the curvature of the roadway just prior to the zone.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 2 Serious Injuries

CURRENT STATUS

- The intersection was previously recommended for a roundabout that was not implemented due to funding.
- There are vertical and horizontal sight distance issues, specifically for the southbound movement.

RECOMMENDED PROJECTS / STRATEGIES

- Add signs to address southbound horizontal and vertical sight distance issues for bicycles and vehicles.
- Revisit striping for southbound bike lane mixing zone; consider allowing bicyclists to go straight from the right turn only lane instead of requiring them to merge to the left of this lane.
- Revisit need for a roundabout at the intersection.

Sheridan Boulevard (95A) and W. 10th Avenue



LOCATION SUMMARY

- **CDOT District:** Region 1
- **City/Jurisdiction:** Denver, Denver County
- **ROW Ownership:** CDOT
- **DIC or ES-80:** Both
- **Google Map:** <https://maps.app.goo.gl/3qh94Zh816PMK1uGA>

LOCATION DESCRIPTION

- **Classification:** Principal Arterial (Sheridan Blvd) / Major Collector (10th Ave)
- **Cross Section:** 4-Lane (Sheridan Blvd) / 2-Lane (10th Ave)
- **AADT:** 31,000 – 36,000 (Sheridan Blvd) / 4,200 – 4,600 (10th Ave)
- **Posted Speed Limit:** 30 mph (10th Ave) / 35 mph (Sheridan Blvd)
- **Urban/Rural:** Large Urbanized
- **Existing Facilities:** Sidewalks on both sides of N, E, and S legs, Sidewalks on one side of W leg
- **Transit:** RTD Routes 9 and 51 – 4 stops, PnR

NARRATIVE

No pattern to the crashes was appear using fatal and serious injury crashes. Further investigation using all crash severities and a near-miss analysis may yield a behavioral pattern that can be addressed through infrastructure changes and education.

CRASH HISTORY

- **Pedestrian Crashes:** 0 Fatalities / 0 Serious Injuries
- **Bicyclist Crashes:** 0 Fatalities / 2 Serious Injuries

CURRENT STATUS

- None

RECOMMENDED PROJECTS / STRATEGIES

- Use PBCAT to investigate all bike and pedestrian crashes, including property damage only and minor injury crashes, to identify patterns.
- Conduct a near-miss analysis if crash patterns are still not identifiable.

Appendix D TAC Meeting Notes and Presentations

TAC Kickoff Meeting Notes (TAC Meeting #1).....	D-1
TAC Kickoff Meeting Presentation	D-4
TAC Meeting #2 Notes	D-23
TAC Meeting #2 Presentation	D-29
TAC Meeting #3 Notes	D-41
TAC Meeting #3 Presentation	D-43
TAC Meeting #4 Notes	D-74
TAC Meeting #4 Presentation	D-75

TAC Kickoff Meeting Notes

Colorado Department of Transportation
SA 25514 – VRU Safety Assessment

DATE: Tuesday, May 16, 2023
TIME: 1:00 p.m. MDT
LOCATION: Microsoft Teams Meeting
ATTENDEES: David Swenka
 Manjari Bhat
 Dahir Egal
 Phil Vonhake (Attending for Annelies van Vonno)
 Steph Leonard
 Katrina Kloberdanz
 Donna Lewandowski
 Marta Gerber

UNABLE TO ATTEND: Annelies van Vonno
 Carol Gould

MEETING PURPOSE: Kickoff meeting for Technical Advisory Committee (TAC)

INTRODUCTIONS

- David welcomed the TAC committee and gave a short introduction to the VRU Assessment
- Team members introduced themselves

PROJECT SCHEDULE

- The team reviewed the revised project schedule, noting the four TAC meetings and review period. The project schedule is attached.

FEDERAL GUIDANCE:

- The TAC was presented with an overview of the federal guidance document, including the definition of a Vulnerable Road User (VRU), statutory requirements of the assessment for data, risk areas, consultation, strategies, and the report. We discussed the general approach to the project and a very brief overview of the Safe System Approach.
- VRU – CDOT SHSP defines it more broadly. For this safety assessment, VRU includes bicyclists and pedestrians only as defined by the statute.
- “Rideable toys” – means motorized and non-motorized scooters and skateboards, and segways. E-bikes are also included.
- The federal guidance document is attached.

- High-Risk area definition will drive public involvement:
 - Determine areas of interest from data analysis – for example, it could be 5 specific corridors, tribal lands, Traffic Interchanges, work zones, or geographic areas that are high risk. The identified High-Risk areas will drive where outreach and public involvement will be conducted.
- Statute requirement includes consultation for identified high-risk areas. We will talk to the local governments and MPOs and organizations that have local knowledge as well as local advocates. We will include people that utilize the facilities (this is not a requirement, but we will complete as much of this outreach as we can within the project timeframe).
- Another requirement is a program of strategies or projects, the program of strategies will be developed to match the current SHSP, as appropriate for the defined high risk areas. If corridors are identified as part of the high-risk areas, recommendations will still focus on strategies around the corridors, such as “complete RSAs in these corridors”.
- For the identified High-Risk Areas:
 - Crash data analysis,
 - Demographic analysis,
 - Consultation data analysis, and
 - The recommended program of strategies will reflect a safe system approach.

CRASH AND DEMOGRAPHIC DATA OVERVIEW

- The TAC was presented with descriptive statistics of the crash data. No unusual findings or anomalies were present in the descriptive statistics.
- The TAC was presented with an overview of Transportation Disadvantaged Census Tracts (also called Disadvantaged Communities, or DACs) using the US DOT’s interim definition for the Justice40 initiative.
 - There are 22 indicators that are grouped into six categories. A community is considered transportation disadvantaged if they are scored in the top 50th percentile of 4 or more categories except for resiliency (75th percentile):
 1. Transportation Access (example indicator: % total population with no vehicle)
 2. Health disadvantage (example indicator: % of population without health insurance)
 3. Environmental disadvantage (example indicator: level of diesel particulate matter in air)
 4. Economic disadvantage (example indicator: % of household income spent on housing)
 5. Resilience disadvantage (example indicator: expected loss of lives due to flooding)
 6. Equity disadvantage (example indicator: percent of households where no member over the age of 14 speaks English very well)
- The VRU Safety Analysis requires the consideration of demographic data. There are two options, location-based data or person/victim-based data for the crash analysis. This first time, most agencies will be using location-based data as person/victim-based data is not easily gathered and integrated into existing crash data. For this study, we are looking at the demographics of the area in which the crash occurred, using the DOT Transportation Disadvantaged Census Tract data as described above.
- An equity analysis overview revealed findings for Colorado that are consistent with

national findings. Crash rates for the 208 DACs in Colorado are double what they are for the 1,040 non-DACs. Expected crash rate per 1,000 population is 0.49. Actual crash rate in non-DACs is 0.42, while actual crash rates in DACs is 0.80.

- It is noted that these may change slightly once roadways that border DACs are taken into account. Tribal crash data is still being pursued, with the help of Julie Constan (Region 5 Transportation Director).
 - It is understood that it is not always easy or quick for tribes to respond to requests for data. If crash data is obtained from the tribes at any point during the project, the data will be incorporated into the final report in whatever capacity remains to do so at the time of receipt.
- Preliminary crash analysis results are in the attached PowerPoint presentation.

NEXT STEPS

- Network Analysis
 - The three basic types of network analysis were described to the TAC (High Injury Network Analysis, Predictive Safety Analysis, and Systemic Safety Analysis). Due to the short time frame for the project, the lack of existing exposure and crash type data limits the possible network analysis.
 - A high-injury network analysis will be performed. 15-20 high-injury corridors and 15-20 high-injury intersections will be identified. The network analysis will be completed for highways and major roads, while local road hot spots will be included in the final analysis
 - Some systemic analysis will be performed for the crashes along highways and major roads, using the following correlates:
 - Functional Classification
 - AADT
 - Rural/Small Urban/Urbanized/Large Urbanized
 - Number of through lanes
 - Divided vs undivided
 - Median type
 - Shoulder width
 - David provided a link to the CDOT MS2 data site.
 - If any high-injury locations are identified that are on local roads, we will reach out to local jurisdictions to see what data is available.
- Next TAC meeting
 - A TAC debriefing meeting to finalize the high-injury segments/corridors and intersections, and high-risk focus areas was set for June 12 2023, from 1:00 pm to 2:30 pm MDT. The meeting will be held virtually.
 - If released during the project period, crash data from 2022 will be reviewed and general trends will be included in the final report.

ATTACHMENTS

- PowerPoint presentation including project schedule, preliminary crash and demographic data analysis
- US DOT/FHWA Vulnerable Road User Safety Assessment Guidance memorandum



Vulnerable Road User Safety Assessment
TAC Kickoff Meeting


May 16, 2023

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1

Agenda

- TAC Members - Introductions
- Project Schedule
 - Safety Summit August 7/8/9 - Loveland
- Federal Guidance
- Crash Data Overview
- Next Steps
 - Network Analysis
 - TAC Debriefing Meeting
 - Consultation



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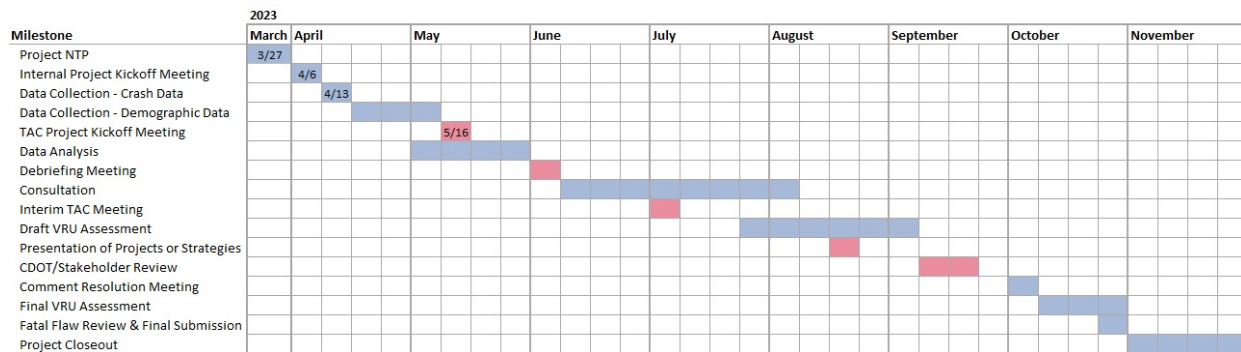
TAC Members - Introductions

- David Swenka
- Manjari Bhat
- Dahir Egal
- Annelies Van Vonno
- Carol Gould
- Steph Leonard
- Katrina Kloberdanz



3

Project Schedule



4

VRU Safety Assessment – Federal Guidance

- Initial Due Date: November 15, 2023
 - Updates on Strategic Highway Safety Plan (SHSP) schedule
- VRU Definition

Pedestrians	Bicyclists	Other
Walking	Bicycles	Golf Carts
Personal Conveyances	Unicycles	Go Carts
Work Zones	Tricycles	Minibikes
Rideable Toys (motorized and non-motorized)	Pedal Cars	Motorcycles
Personal Mobility Assistance Devices		Motor Scooters
		Mopeds

5

Statutory Requirements - Data

- Data-Driven Process
- Demographic Data
 - Location-based:
 - Race, ethnicity, income, age, etc. of the census tract where the crash occurred
 - Person-based:
 - Race, ethnicity, income, age, disability status of the person injured or killed

6

Statutory Requirements – Risk Areas

- Identification of High-Risk Areas
 - Geographic Region (e.g. a county, an MPO region)
 - Specific Facility Type (e.g. major arterials, 2-lane roadways)
 - Specific Location (e.g. corridor, intersection)
 - Priority Area (e.g. work zones, tribal lands)

Statutory Requirements – Consultation

- For identified High-Risk Areas
 - Required: Local Governments/MPOs/Regional Transportation Planning Organizations
 - Local knowledge and data
 - Encouraged: institutional, advocacy, community groups
 - Underrepresented populations based on location demographics

Statutory Requirements – Program of Projects or Strategies

- For identified High-Risk Areas
 - Crash data analysis
 - Consultation data analysis
- Safe System Approach
 - Death and Serious Injury are Unacceptable
 - Humans Make Mistakes
 - Humans are Vulnerable
 - Responsibility is Shared
 - Safety is Proactive
 - Redundancy is Crucial

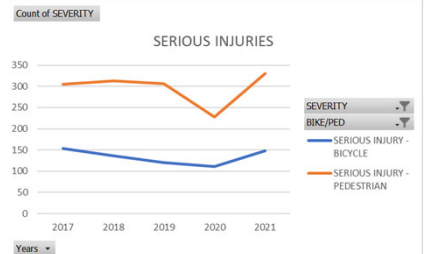
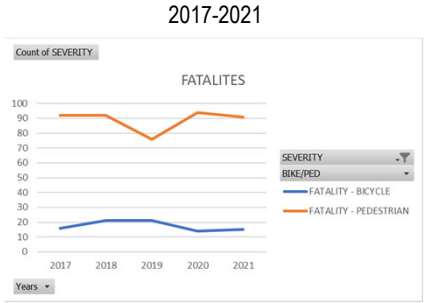
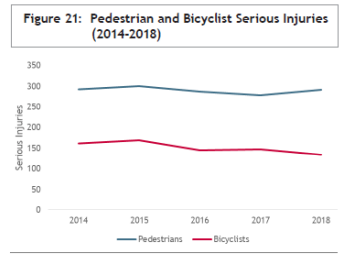
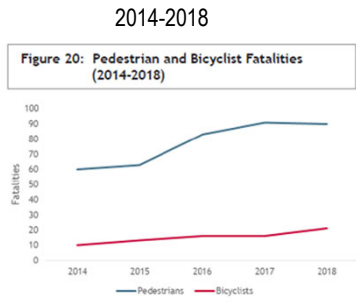
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Statutory Requirements – Report

- Template Provided by FHWA
 - Overview of VRU Safety Performance
 - Summary of Quantitative Analysis
 - Summary of Consultation
 - Program of Projects or Strategies
 - Safe System Approach

10

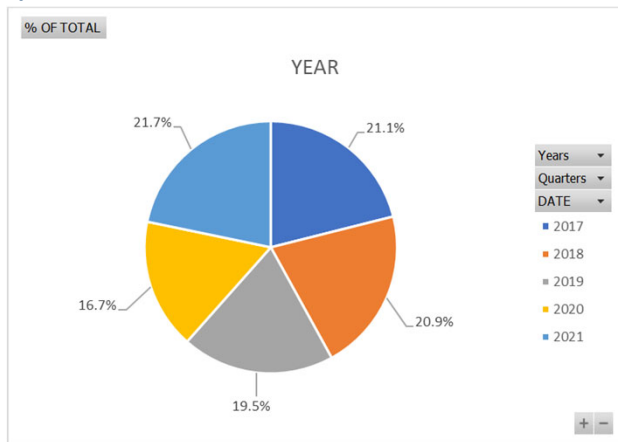
Crash Data Overview



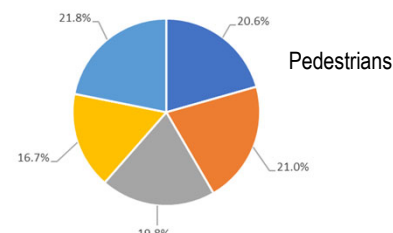
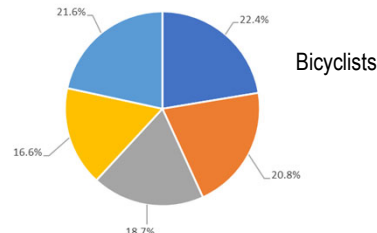
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11

By Year



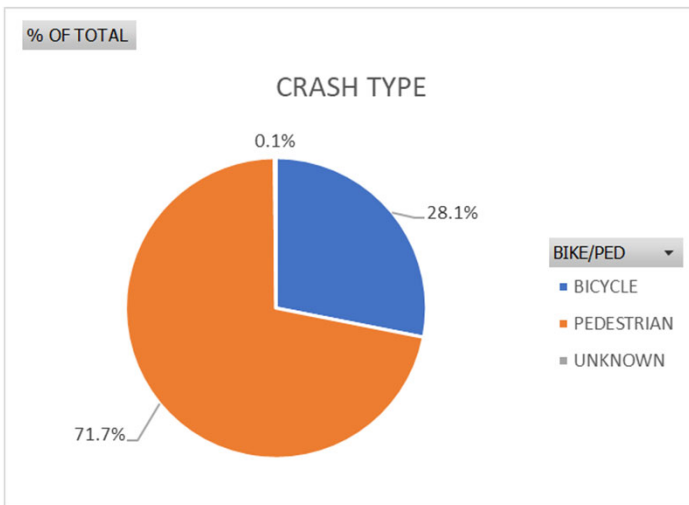
Combined Bicyclists & Pedestrians



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12

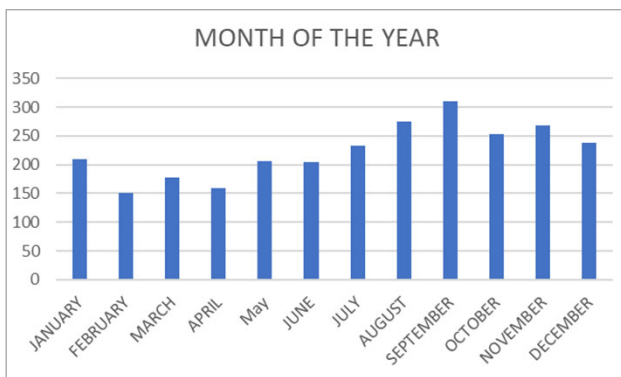
Bicyclist/Pedestrian



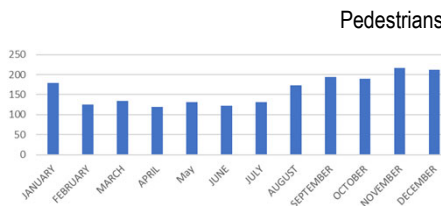
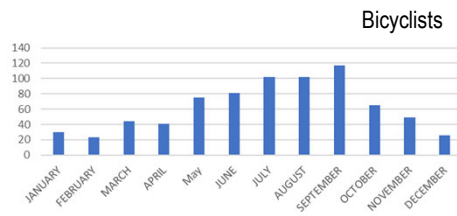
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13

Month of the Year



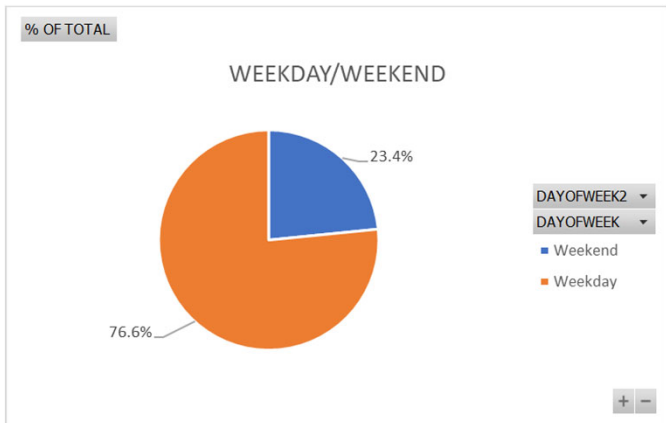
Combined Bicyclists & Pedestrians



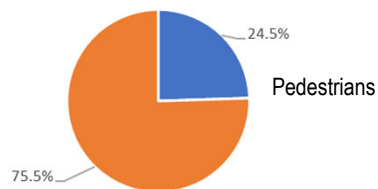
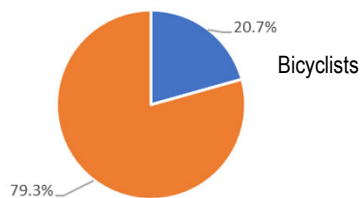
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14

Weekday vs. Weekend



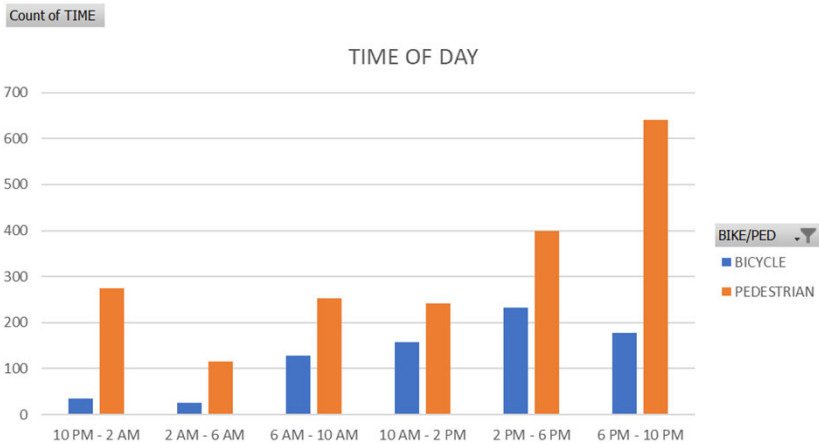
Combined Bicyclists & Pedestrians



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15

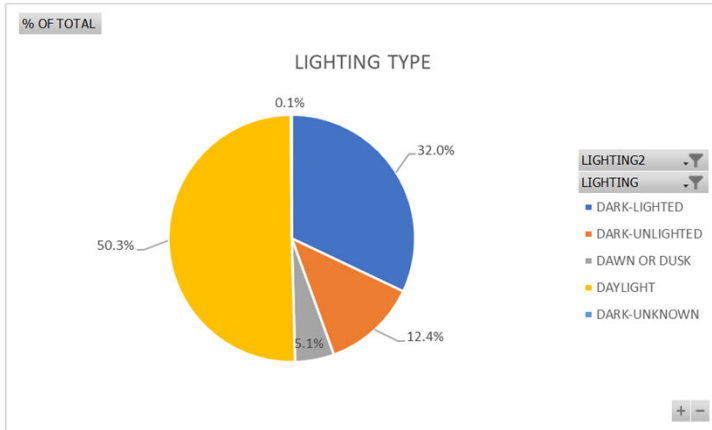
Time of Day



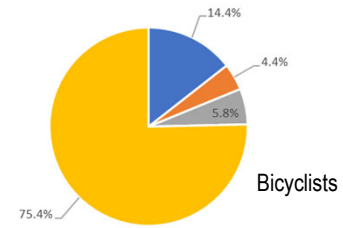
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16

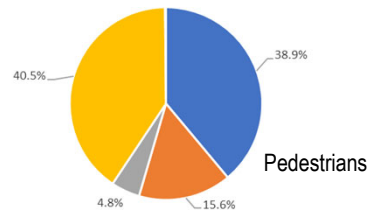
Lighting Condition



Combined Bicyclists & Pedestrians



Bicyclists

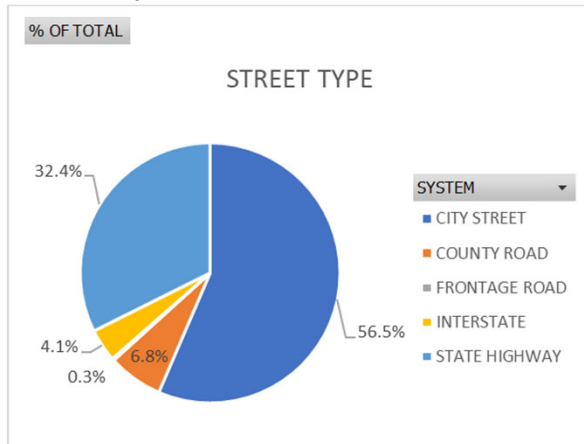


Pedestrians

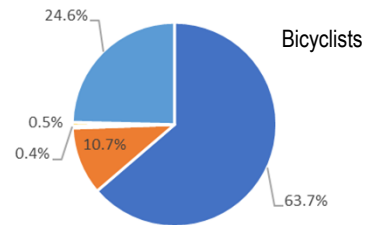


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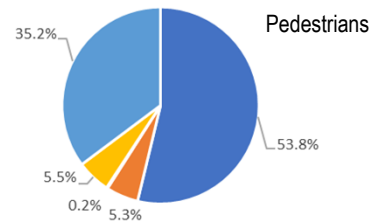
Roadway Owner



Combined Bicyclists & Pedestrians



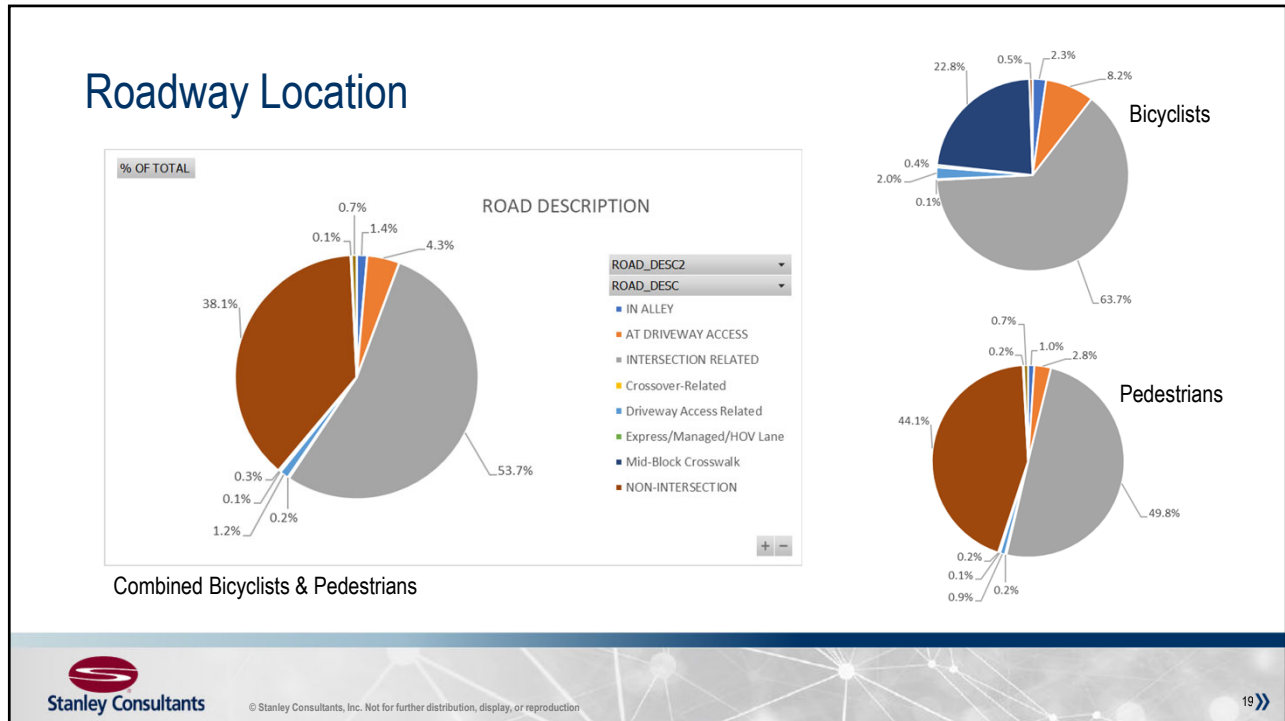
Bicyclists



Pedestrians



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19

Transportation Disadvantaged Census Tracts

- Historically Disadvantaged Communities - Interim Definition
 - 22 indicators collected at the census tract level
 - 6 categories of transportation disadvantage:
 - Transportation Access
 - Economic
 - Health
 - Resilience
 - Environmental
 - Equity
 - A Census Tract is considered “Transportation Disadvantaged” if it scores in the top 50th percentile (75th percentile for Resilience) on four or more categories.

20

Transportation Access Disadvantage

- **Indicators**

- **>30 min commute** - Percent of total population with a drive time to employment greater than or equal to 30 minutes
- **No Vehicle** - Percent of total population with no vehicle(s) available
- **Walkability** - A composite index of economic and built environment characteristics representing the extent to which the location is not supportive to walking
- **Transportation Burden** - Transportation Costs % Income for the Regional Typical Household



21

Health Disadvantage

- **Indicators**

- **Population 65 and older** - Percent of total population over age 64
- **Uninsured** - Percent of population without health insurance
- **Disability** - Percent of the non-institutionalized population with any disability

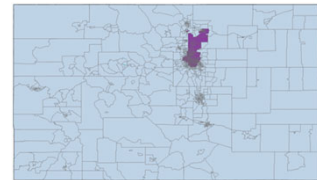


22

Environmental Disadvantage

• Indicators

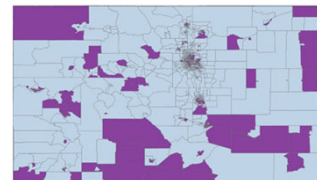
- **Homes Built Before 1960** - Percent of housing units built before 1960 (lead paint indicator)
- **Diesel** - EJ Index for Diesel particulate matter level in air
- **Cancer** - EJ Index for Air toxics cancer risk
- **Traffic Proximity** - EJ Index for Traffic proximity and volume
- **PM25** - EJ Index for PM2.5 level in air
- **Ozone** - Ozone level in air



Economic Disadvantage

• Indicators

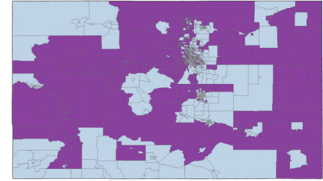
- **Less HS Education** - Percent of total population, age 25 and older, whose reported education is short of a high school diploma
- **Renters** - Proportion of occupied housing units not occupied by property owners
- **Unemployment** - Percent of civilian labor force reported as unemployed
- **GINI Index** - Endemic inequality
- **Low Income** - Percent of total population reported at or below area median income
- **Poverty** - Percent of population below Federal Poverty Level
- **Housing Costs** - % Income for the Regional Typical Household



Resilience Disadvantage

- **Indicators**

- **Climate Hazards** - Expected annual loss of life, building value and agricultural value from 18 climate hazards

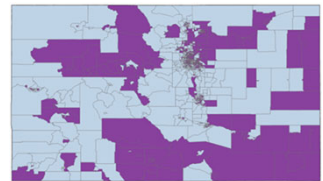


Equity Disadvantage

- **Indicators**

- **Linguistic Isolation** - Percent of households in linguistic isolation*

*when no member of a household over age 14 speaks English 'well' or 'very well'



Expected Numbers if Crashes were Equitably Distributed

- Number of Crashes: 2683
- Number of Census Tracts: 1249
- **Expected Crashes Per Tract: 2.15**
- Population (2010): 5,531,141
- **Expected Crash Rate Per 1,000 Population: 0.49**

Transportation Disadvantaged Tracts

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

TD?	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
Yes	208	447			
No	1040	2236			

Transportation Disadvantaged Tracts

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

TD?	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
Yes	208	447	741	3.56	0.80
No	1040	2236	1942	1.87	0.42

Disadvantaged by Number of Factors

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

# Factors	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
6	3	6.45			
5	42	90.29			
4	163	350.42			
3	258	554.66			
2	303	651.40			
1	328	705.15			
0	151	324.63			

29

Disadvantaged by Number of Factors

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

# Factors	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
6	3	6.44	16	5.33	1.22
5	42	90.22	199	4.74	1.04
4	163	350.14	526	3.23	0.73
3	258	554.21	687	2.66	0.61
2	303	650.88	614	2.03	0.43
1	328	704.58	468	1.43	0.34
0	152	326.51	173	1.14	0.25

30

What if we assign crashes on “border streets” to the tract that is disadvantaged?

31

Transportation Disadvantaged Tracts

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

TD?	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
Yes	208	447	741	3.56	0.80
No	1040	2236	1942	1.87	0.42

Original Data

TD?	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
Yes	208	447	986	4.74	1.07
No	1040	2236	1697	1.63	0.37

With border crashes assigned to disadvantaged tracts

32

Disadvantaged by Number of Factors

Equitable Distribution

- Expected Crashes Per Tract: 2.15
- Expected Crash Rate Per 1,000 Population: 0.49

# Factors	# Tracts	Expected Crashes	Actual Crashes	Actual Crashes Per Tract	Actual Crash Rate
6	3	6.44	16	5.33	1.22
5	42	90.22	199	4.74	1.04
4	163	350.14	526	3.23	0.73
3	258	554.21	687	2.66	0.61
2	303	650.88	614	2.03	0.43
1	328	704.58	468	1.43	0.34
0	152	326.51	173	1.14	0.25

Original Data

Difference between high and low crash rate will get wider, with spacing to remain similar to what is shown here

33

Next Step - Network Analysis

- **High Injury Network (HIN) Analysis:** maps corridors where high numbers of people have been killed and severely injured in traffic crashes.
- **Predictive Safety Analysis:** uses models to predict the number of crashes on a roadway segment or intersection, allowing for better project prioritization.
- **Systemic Safety Analysis (risk-based models):** identifies high-risk roadway features that correlate with particular crash types. Identifies locations that are at risk for severe crashes, even if there is not a high crash frequency at these locations.



34

Network Analysis

- High Injury Network:
 - Top 15-20 segments/corridors
 - Top 15-20 intersections
- Correlates for Systemic Analysis:
 - Highways and Major Roads
 - Functional Classification
 - AADT
 - Urbanized/Large Urbanized/Small Urbanized/Rural (Major Roads need numerical scheme)
 - # Through-lanes

35

Next Step – TAC Debriefing Meeting

- Review high-injury network screening results and suggested high-risk areas
 - Geographic Region (e.g. a county, an MPO region, disadvantaged census tracts)
 - Specific Facility Type (e.g. major arterials, 2-lane roadways)
 - Specific Location (e.g. corridor, intersection)
 - Priority Area (e.g. work zones, tribal lands)
- Date?

36

Next Step - Consultation

- Dependent upon High-Risk Areas chosen
- Time Frame – 2nd week of June to 2nd week of August
 - Suggestions?

TAC Kickoff Meeting Notes

Colorado Department of Transportation
SA 25514 – VRU Safety Assessment

DATE: Tuesday, June 13, 2023
TIME: 1:00 p.m. CDT
LOCATION: Microsoft Teams Meeting
ATTENDEES: David Swenka
 Manjari Bhat
 Dahir Egal
 Annelise van Vonno
 Steph Leonard
 Katrina Kloberdanz
 Medora Bornhoft
 Donna Lewandowski
 Marta Gerber
 James McMackin

UNABLE TO ATTEND: Carol Gould

MEETING PURPOSE: Meeting #2 for Technical Advisory Committee (TAC)

INTRODUCTIONS

- Team members introduced themselves

PROJECT SCHEDULE

- The team reviewed the schedule, and briefly discussed the next steps. The consultation will follow HIN determination. The project schedule is attached.

HIGH INJURY NETWORK – SLIDING WINDOWS ANALYSIS

- The TAC was presented with an overview of the High Injury Network Analysis (HIN). The analysis used a sliding window method to determine or group hotspots into the HIN segments. This analysis takes the crashes and road data within the study area and allocates the crashes to roads, measured on ½-mile sliding window segments stepped in 1/10-mile increments along the network. The sliding windows score weights the most severe crashes more heavily than lower severity crashes. The Sliding Windows Score is calculated by multiplying the number of Fatal (K) and Incapacitating Injury (A) crashes by 3 and multiplying the number of Non-Incapacitating Injury (B) crashes by 1. Non-Incapacitating Injury (B), Possible Injury (C) and Property Damage Only (O) Crashes were not reflected in this analysis. This aligns with the VRU requirements and the Safe System Approach where the focus is on reducing fatal and serious injury crashes. As noted above, K & A crashes were allocated the same number of points. Once the weights were established and applied to the crashes, the total number of crashes was aggregated along a corridor while incorporating the crash severity weighting, and the HIN was created.

- The HIN was created for two data sets:
 - Highways (CDOT-owned facilities)
 - Pedestrians

Number	Name	City	FunClass	Crash Score
040c	Colfax Ave	Aurora	Major Arterial	45
088a	Federal Blvd	Denver	Major Arterial	30
287c	Main St	Longmont	Major Arterial	24
002a	Colorado Blvd	Denver	Major Arterial	18
115a	Nevada Ave	Colorado Springs	Major Arterial	15
095a	Sheridan Blvd	Denver	Major Arterial	15
030a	Hampden Ave	Denver	Major Arterial	15
083a	Parker Rd	Aurora	Major Arterial	12
024h	Fountain Blvd	Colorado Springs	Expressway	12
036b	28th St	Boulder	Major Arterial	12

- Bicyclists

Number	Name	City	FunClass	Crash Score
040c	Colfax Ave	Denver	Major Arterial	15
007b	Canyon Blvd	Boulder	Major Arterial	9
119b	119	Niwot	Expressway	9
287c	Main St	Longmont	Major Arterial	9
121a	Wadsworth	Lakewood	Major Arterial	9
006b	North Ave	Grand Junction	Minor Arterial	6
007c	Arapahoe Rd	Boulder	Major Arterial	6
008a	Morrison Rd	Lakewood	Major Arterial	6
093a	Broadway	Boulder	Major Arterial	6
095a	Sheridan Blvd	Denver	Major Arterial	6

- The data above shows a lot of overlap for both pedestrians and bicyclists with the Region 4 and Region 1 Bicycle and Pedestrian Safety Studies completed in 2022 and 2023 respectively.
- There is also some cross-over between pedestrian and bicycle crash locations.
 - Major Roadways (local agency-owned facilities that are functionally classified)

- Pedestrians

Name	City	FunClass	Crash Score
Nevada Ave	Colorado Springs	Major Arterial	33
20th St	Denver	Minor Arterial	27
Las Vegas St	Colorado Springs	Major Collector	24
Academy Blvd	Colorado Springs	Major Arterial	21
Carefree Cir	Colorado Springs	Major Arterial	18
72nd Ave	Westminster	Minor Arterial	18
Market St	Denver	Minor Arterial	18
Blake St	Denver	Minor Arterial	18
Moline St	Aurora	Major Collector	18
Evans Ave	Denver	Major Arterial	18

- Bicyclists

Name	City	FunClass	Crash Score
Estes St	Arvada	Minor Arterial	9
Lincoln St	Denver	Major Arterial	9
30th St	Boulder	Minor Arterial	9
Broadway	Denver	Major Arterial	9
Folsom St	Boulder	Minor Arterial	9
Havana St	Aurora	Major Collector	9
10th Ave	Broomfield	Major Collector	9
26th Ave	Denver	Minor Arterial	9
9th Ave	Boulder	Minor Arterial	9
Speer Blvd	Denver	Major Arterial	9

- Local Roads (local agency-owned, non-classified roadways) were not included because there are relatively few crashes on these roadways, and they are widely disbursed.
- Principal arterials noted as either a freeway or expressway are included with the interstates.
- Correlates – Functional Classification Highway (CDOT-owned facilities)

Highways				
Functional Class	Includes	Total Miles	Percent	Crashes
Expressway	Interstate & Principal Arterial - Fwys and Expwys	1,284.49	14%	279
Major Arterial	Principal Arterial - Other	3,171.69	35%	909
Minor Arterial	Minor Arterial	3,097.72	34%	24
Major Collector	Major Collector	1,392.35	15%	74
Minor Collector	Minor Collector	117.24	1%	2
Local Road	Local	20.73	0%	0
Total		9,084.22		1288

- Major arterials have the highest number of fatal and serious injury crashes (909), and the highest crashes per mile (0.29).
- Major arterials are followed by expressways with 0.22 crashes per mile.
- Taken together, minor collectors and unclassified roads have the lowest crashes per mile (0.01).
- Correlates – Functional Classification - Major Roadways (Local Agency-owned facilities that are functionally classified)

Major Roads				
Functional Class	Includes	Total Miles	Percent	Crashes
Expressway	Principal Arterial - Fwys and Expwys	22.56	0%	16
Major Arterial	Principal Arterial - Other	469.09	3%	511
Minor Arterial	Minor Arterial	2,185.57	13%	736
Major Collector	Major Collector	5,933.46	34%	905
Minor Collector	Minor Collector	8,786.00	51%	34
Total		17,396.68		2202

- Major collectors have the highest total number of fatal and serious injury crashes (905), but the second-lowest crashes per mile (0.15).
- Major arterials have the highest number of crashes per mile (1.09), followed by expressways (0.71), minor arterials (0.34), and major collectors (0.15).
- Minor collectors have the lowest number of crashes per mile (0.004).

ANALYSIS RESULTS

- Highways (CDOT-owned facilities)
 - CDOT has a major arterial VRU crash problem, followed by an expressway problem. This is mostly due to the fact that CDOT owns and maintains a lot of miles of major arterials and expressways. CDOT owns and maintains slightly fewer minor arterial roadway miles, and those miles have a considerably lower number of crashes. (909 on major, but only 24 on minor)
 - The questions and issues to review/determine next are:
 - Could this trend be due to the roadway functional classification? Or a rural/urban split (i.e. most of the major arterials are in urban areas, whereas most of the minor arterials are rural?)
- Major Roadways (local agency-owned facilities that are functionally classified)
 - Local agency-owned major collectors have the highest number of crashes, followed by minor arterials and major arterials.
 - When comparing crashes per mile, the trend reverses, with major arterial roadways having the highest crash rate per mile on local agency roadways. This trend indicates that perhaps the focus should be on the 469 miles of major arterial roads instead of the other classifications that have many more roadway miles (2,185 for minor arterials and 5,933 for minor collectors)
- The data analysis does not show any anomalies which may be the result of Colorado's population distribution. The Denver metro area is 50% of the state's population. As a result, the crashes are more concentrated in the more densely populated areas. The rural areas are less densely populated as a result the crash rates are lower.
- Without exposure data, (pedestrian and bicyclist AADTs) rural areas/outside of the metro area hot spots are not rising to the top.
- Potential option for data analysis is to break out hot spots/HIN per CDOT Regions.

RECOMMENDATIONS

- We had discussed in the last meeting the different requirements for the documentation, one of them is the review of HIN screening results and suggested high-risk areas. Based on the results, our recommendation is to complete the analysis with the specific locations or top corridors, which would be a combination of pedestrian and bicyclist hot spots. The consultation will focus on these locations.
 - Specific Location (e.g. corridor, intersection) top corridors (after combining)
 - Priority Area (e.g. work zones, tribal lands) may be added based on consultation outcomes.
- We recommend performing the remaining correlate analysis on top corridors only.
- We will change the disadvantaged census tract (DCT) layer to the new definition of disproportionately impacted (DI) communities.
- DI data will be used to prioritize spending on corridors.
- Correlates – one aspect of the Safe System Approach is the focus on a predictive method to reduce fatal and serious injury crashes. For example, if there are four hotspots on a facility that has four through lanes and no median, it is reasonable to expect that other locations within the state that have similar physical attributes are at risk for crashes, regardless of their crash history. To prevent the same crash trends in similar locations, countermeasures should be applied system wide to all locations with similar attributes. This project will not go as far as a predictive model development for the state. However, we will begin to identify common physical attributes between high-crash locations, and recommend that in the next iteration of the VRU, CDOT should consider identifying corridors or intersections that have similar physical characteristic but have not experienced the same crash trends.
- Consultation – it will not be a full call to the public. We will avoid public involvement fatigue. Public meetings were conducted in 2021 Region 1 and in 2022 for Region 4. We will not target these communities. We will use the data that is available for these two regions.
- Dahir mentioned that Region 2, the Colorado Springs area has a lot of challenges. May want to consider doing PI there. Region 2 has a couple of hotspots, it is included in the plans for consultation.
- Regions 1, 2, and 4 are the focus areas that we will need to consult with. We will consult with each CDOT Region that has at least one hot-spot location.
- We recommend completing a public meeting in a region with a hot spot that is not Region 1 or 4. The Region 4 public involvement did not include the City of Boulder, as they were completing their own Public Outreach for their own bike/ped safety plan. Contact City of Boulder for their data.
- We will consider contacting major cities within each region to see if they have any bike and ped safety plans in the works. Region 1 study excluded Denver as they were in the process of completing their own Public Outreach for their own bike/ped safety plan. Contact the City and County of Denver for their data.
- We recommend consulting with each MPO/COGs region.
- Region 1 and Region 4 Bicycle and Pedestrian Safety Plans did not include information on Major Roads (local agency-owned roadways that are functionally classified). We can still use their Public Outreach data, as people most likely commented on all roads not only CDOT-owned facilities.


- Other groups to consult with such as Bicycle Colorado. Any groups that represent pedestrians:
 - Pedestrian Dignity – Denver and maybe active outside of Denver.
 - Denver Streets Partnership, they merged with Bicycle Colorado, they may still operate on their own.
 - Bike Fort Collins is a northern Colorado Group-Region 4.
 - Bike JeffCo is active in Region 1.
 - Statewide Transportation Advisory Committee (STAC). – Maybe
 - Ride for Racial Justice is a Denver based bicycle advocacy group focused on getting more BIPOC people riding <https://www.rideforracialjustice.org/>
 - NoCo Bike & Ped Collaborative is another group in Region 4.
- Recommendation for in-person meetings is the week of August 14th, 2023.
- Region 4 – North Front Range felt left out on a different plan which created a lot of concerns, make sure to avoid this situation. So even if a Region had public outreach for another project, see if all areas were included.
- Determine if each region has hot spot locations for now. If that is not the case, we would determine hot spot locations on lower fatal and serious injury crash criteria for future analysis.
- Safe People Emphasis Area Consultation was recommended to be included in the consultation – They meet the second Wednesday of every month.

NEXT STEPS

- CDOT Safe People EA meeting for VRU Assessment Outreach and Feedback is set for July 20, 2023, from 10:30 pm to 12:00 pm (Mountain Time). The meeting will be held virtually. Review of the VRU safety analysis findings and discuss how we can align the assessment with the ongoing EA and STSP/SHSP efforts.
- TAC meeting in August in person – Week of August 14th, 2023.

ATTACHMENTS

- Project Schedule



Vulnerable Road User Safety Assessment

TAC Meeting #2

June 12, 2023

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1

TAC Members – Roll Call

- David Swenka
- Manjari Bhat
- Dahir Egal
- Annelies Van Vonno
- Carol Gould
- Steph Leonard
- Katrina Kloberdanz

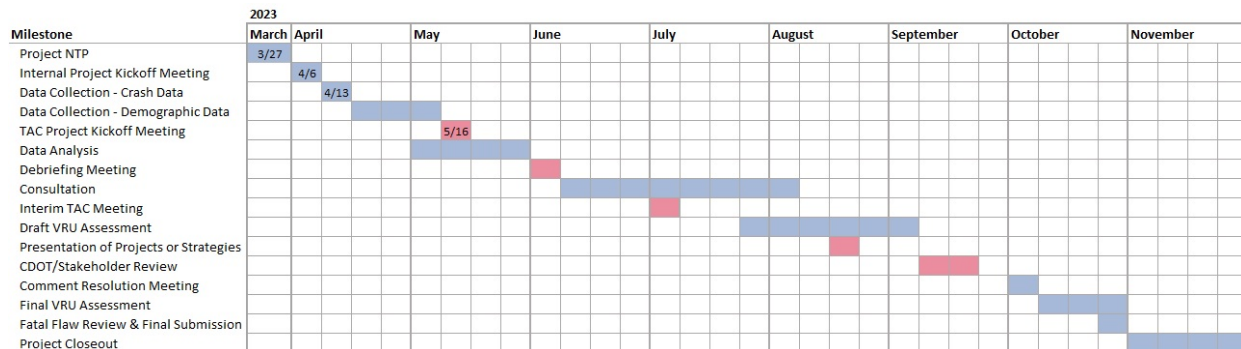


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2»

2

Project Schedule



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3

High Injury Network – Sliding Windows Analysis

- Half-mile roadway segments (Window)
- Moves along the roadway network in 1/10-mile increments (Slide)
- For each window, it asks “how many crashes (and of what type) are in this window” and gives it a weighted score (Crash Score)
 - K & A crashes = 3 points
 - B crashes = 1 point
- Aggregates total number of crashes along a corridor, incorporating the weighted crash score
- Creates the High Injury Network



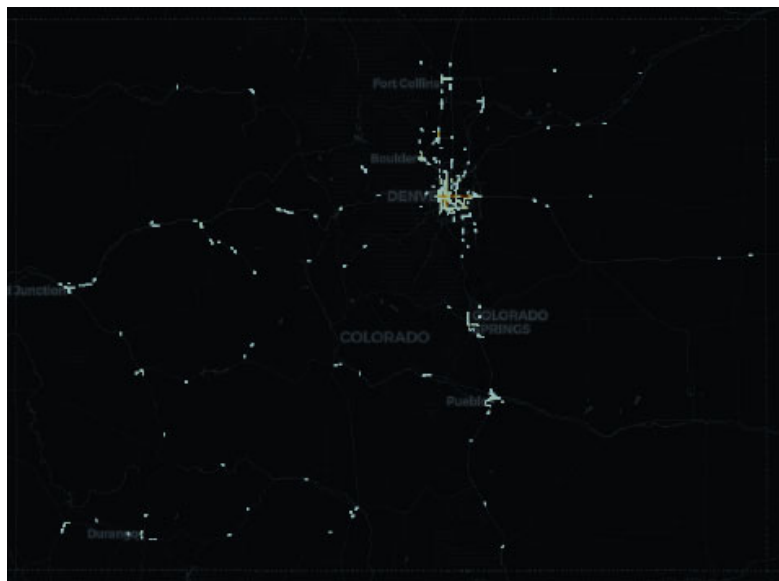
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4

High Injury Network – Highways

Pedestrian



Safer Streets Priority Finder Tool



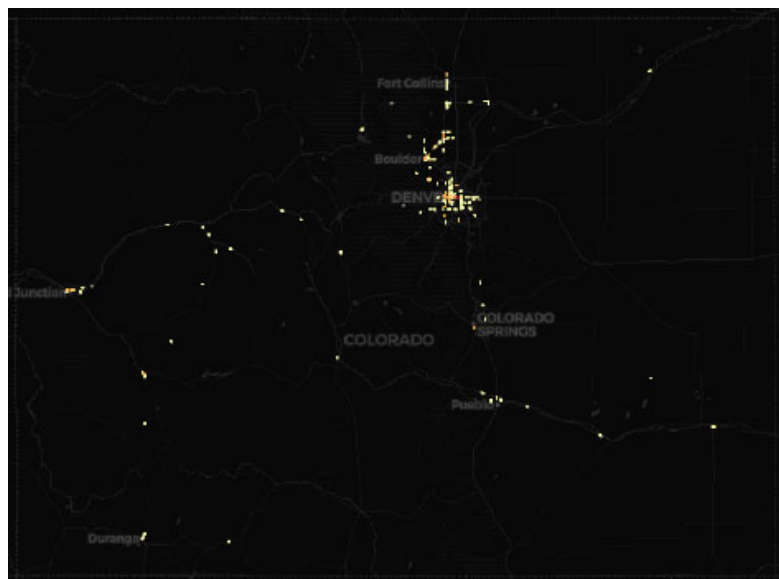
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5

High Injury Network – Highways

Bicycle



Safer Streets Priority Finder Tool



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6

High Injury Network – Highways

Pedestrian Top 10

Number	Name	City	FunClass	Crash Score
040c	Colfax Ave	Aurora	Major Arterial	45
088a	Federal Blvd	Denver	Major Arterial	30
287c	Main St	Longmont	Major Arterial	24
002a	Colorado Blvd	Denver	Major Arterial	18
115a	Nevada Ave	Colorado Springs	Major Arterial	15
095a	Sheridan Blvd	Denver	Major Arterial	15
030a	Hampden Ave	Denver	Major Arterial	15
083a	Parker Rd	Aurora	Major Arterial	12
024h	Fountain Blvd	Colorado Springs	Expressway	12
036b	28th St	Boulder	Major Arterial	12

Safer Streets Priority Finder Tool



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7

High Injury Network – Highways

Bicycle Top 10

Number	Name	City	FunClass	Crash Score
040c	Colfax Ave	Denver	Major Arterial	15
007b	Canyon Blvd	Boulder	Major Arterial	9
119b	119	Niwot	Expressway	9
287c	Main St	Longmont	Major Arterial	9
121a	Wadsworth	Lakewood	Major Arterial	9
006b	North Ave	Grand Junction	Minor Arterial	6
007c	Arapahoe Rd	Boulder	Major Arterial	6
008a	Morrison Rd	Lakewood	Major Arterial	6
093a	Broadway	Boulder	Major Arterial	6
095a	Sheridan Blvd	Denver	Major Arterial	6

Safer Streets Priority Finder Tool



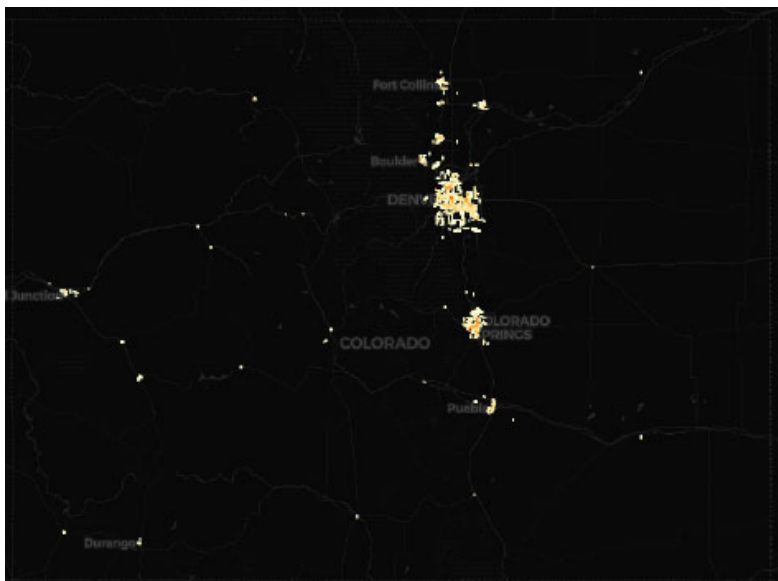
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8

High Injury Network – Major Roads

Pedestrian



Safer Streets Priority Finder Tool

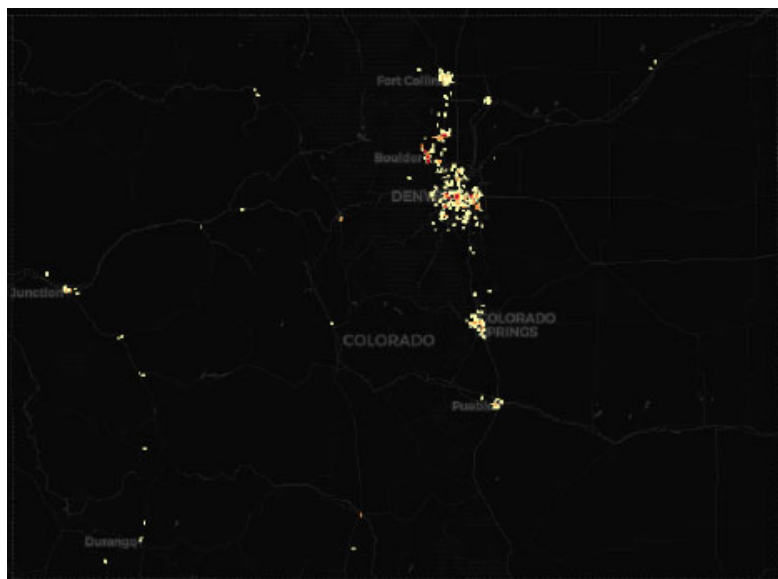


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High Injury Network – Major Roads

Bicycle



Safer Streets Priority Finder Tool



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High Injury Network – Major Roads

Pedestrian Top 10

Name	City	FunClass	Crash Score
Nevada Ave	Colorado Springs	Major Arterial	33
20th St	Denver	Minor Arterial	27
Las Vegas St	Colorado Springs	Major Collector	24
Academy Blvd	Colorado Springs	Major Arterial	21
Carefree Cir	Colorado Springs	Major Arterial	18
72nd Ave	Westminster	Minor Arterial	18
Market St	Denver	Minor Arterial	18
Blake St	Denver	Minor Arterial	18
Moline St	Aurora	Major Collector	18
Evans Ave	Denver	Major Arterial	18

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11»

11

High Injury Network – Major Roads

Bicycle Top 10

Name	City	FunClass	Crash Score
Estes St	Arvada	Minor Arterial	9
Lincoln St	Denver	Major Arterial	9
30th St	Boulder	Minor Arterial	9
Broadway	Denver	Major Arterial	9
Folsom St	Boulder	Minor Arterial	9
Havana St	Aurora	Major Collector	9
10th Ave	Broomfield	Major Collector	9
26th Ave	Denver	Minor Arterial	9
9th Ave	Boulder	Minor Arterial	9
Speer Blvd	Denver	Major Arterial	9

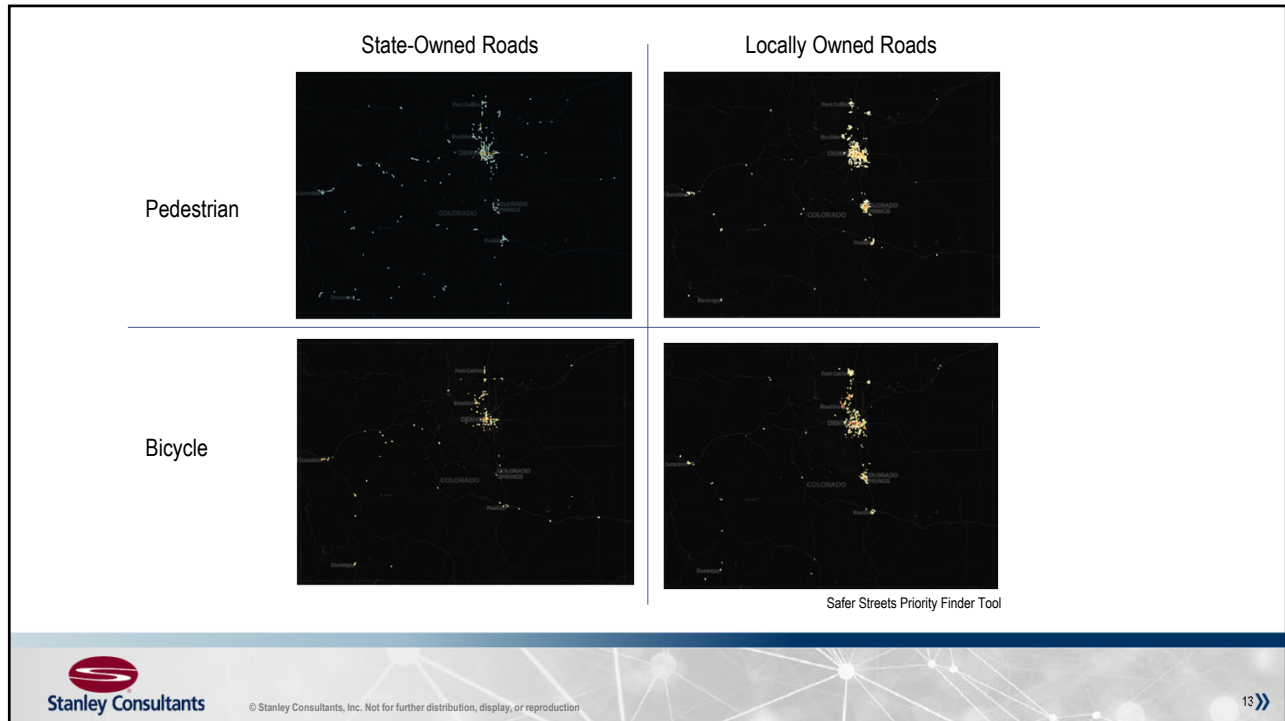
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12



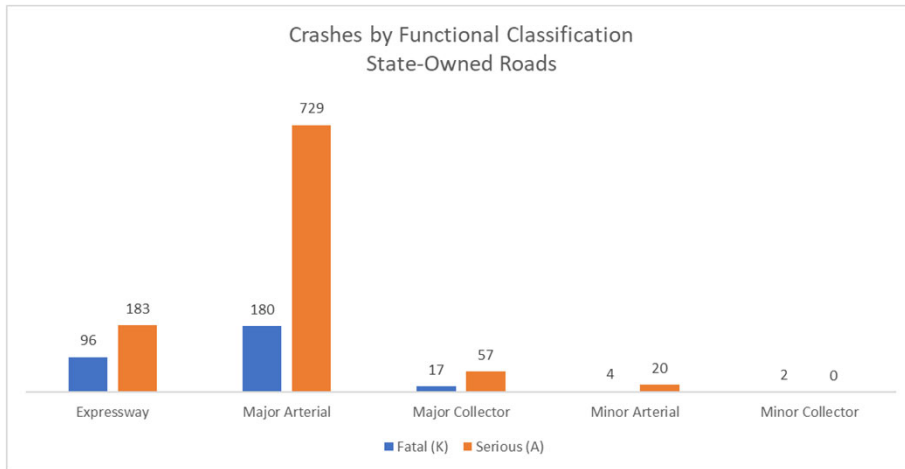
13

Correlates – Functional Classification (Highway)

Highways				
Functional Class	Includes	Total Miles	Percent	Crashes
Expressway	Interstate & Principal Arterial - Fws and Expwys	1,284.49	14%	279
Major Arterial	Principal Arterial - Other	3,171.69	35%	909
Major Collector	Major Collector	1,392.35	15%	74
Minor Arterial	Minor Arterial	3,097.72	34%	24
Minor Collector	Minor Collector	117.24	1%	2
Local Road	Local	20.73	0%	0
Total		9,084.22		1,288

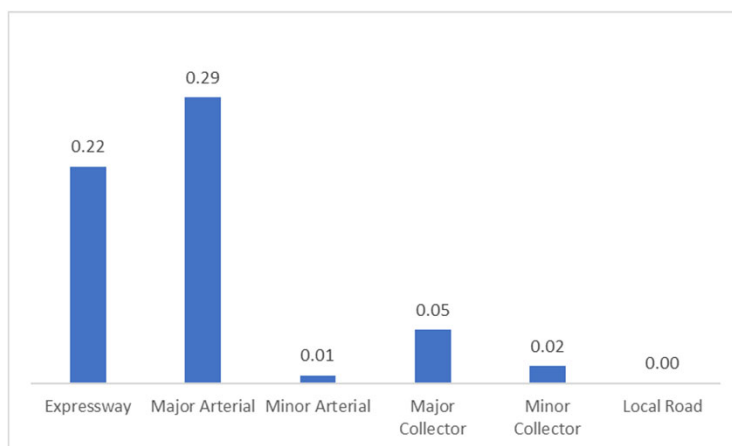
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Correlates – Functional Classification (Highway)



15

Correlates – Crashes per Mile by FunClass (Highway)



16

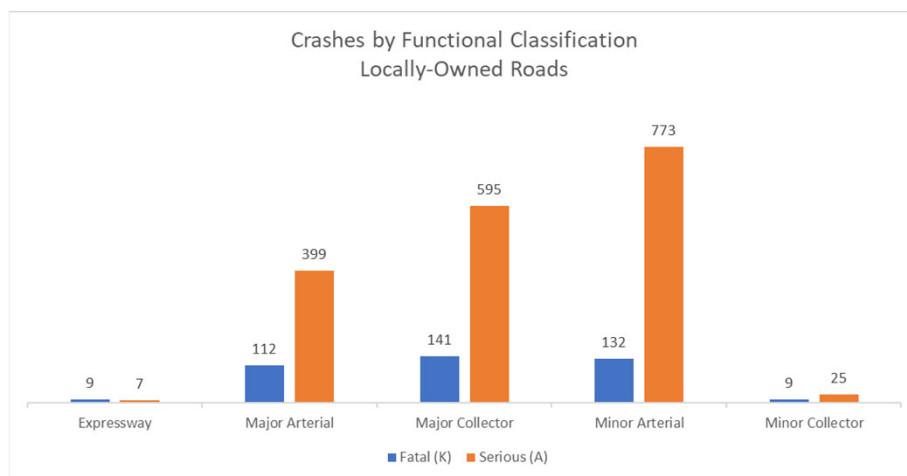
Correlates – Functional Classification (Major Roads)

Major Roads

Functional Class	Includes	Total Miles	Percent	Crashes
Expressway	Principal Arterial - Fws and Expwys	22.56	0%	16
Major Arterial	Principal Arterial - Other	469.09	3%	511
Major Collector	Major Collector	5,933.46	34%	736
Minor Arterial	Minor Arterial	2,185.57	13%	905
Minor Collector	Minor Collector	8,786.00	51%	34
Total				2,202

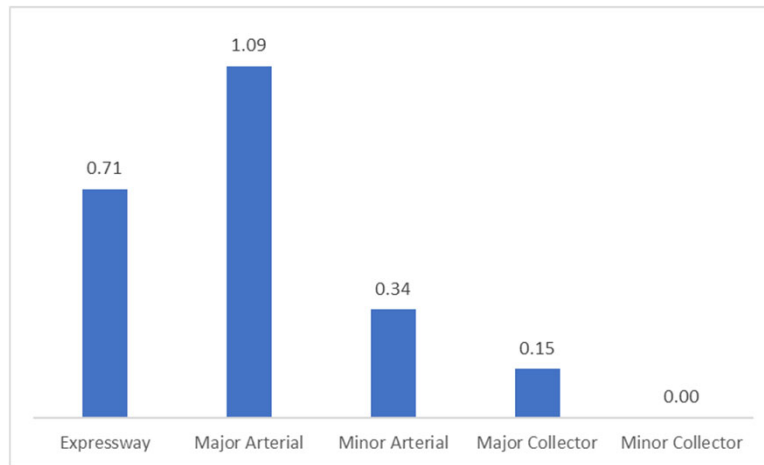
17

Correlates – Functional Classification (Major Roads)



18

Correlates – Crashes per Mile by FunClass (Major Roads)



19

So, what's going on here?

- CDOT has a major arterial problem, followed distantly by an expressway problem.
 - This largely reflects the fact that you have a lot of miles of major arterials and expressways.
 - Interesting anomaly – you have only slightly less minor arterial roadway miles but those miles have considerably lower number of crashes. (909 on major, but only 24 on minor)

20

So, what's going on here?

- Local agencies have a minor arterial problem, followed by a major collector, and then a major arterial problem.
- The fact that this reverses when looking at crashes per mile means that there may be more 'bang for the buck' to focus on the 469 miles of major arterial roads instead of the other classifications that have many more roadway miles (2,185 for minor arterials and 5,933 for minor collectors)

Colorado Crash Data is incredibly consistent with expectations.



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21

Density

- Colorado's metro areas are more dense than AZ:
 - Denver 4,674 / sq mi
 - Phoenix 2,797 / sq mi
 - Tucson 2,294 / sq mi
- AZ total population: 7.25M,
 - Phoenix Metro population 1.6M (22%)
 - Tucson Metro population: 1.0M (14%)
- CO total population: 5.8M,
 - Denver Metro population: 2.9M (50%)



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22

Recommendations

- Review high-injury network screening results and suggested high-risk areas
 - Geographic Region (e.g. a county, an MPO region, disadvantaged census tracts)
 - Specific Facility Type (e.g. major arterials, 2-lane roadways)
 - Specific Location (e.g. corridor, intersection) **top corridors (after combining)**
 - Priority Area (e.g. work zones, tribal lands) **may add after consultation**
- Perform remaining correlate analysis on top corridors only
- Change disadvantaged census tract (DCT) layer to new definition of disproportionately impacted (DI) communities?
- Use DI or DCT data to prioritize spending on corridors.

23

Next Step - Consultation

- Each CDOT region that has a location in it
- Each MPO/COG with a location in it
- ?

24



MEETING NOTES

Date: August 15, 2023

Place: CDOT HQ, Denver


Project/Purpose: CDOT VRU Assessment - TAC Meeting #3

Attendees: David Swenka – CDOT
 Annelies Van Vonno – CDOT
 Dahir Egal – FHWA CO Division
 Katrina Klobberdanz – CDOT Region 4
 Manjari Bhat – CDOT
 Medora Bornhoft – CDOT
 Steph Leonard – CDPHE
 Sweta Tripathi – CDOT
 Donna Lewandowski – Stanley Consultants
 Marta Gerber – Stanley Consultants
 Alicia Guccione – Stanley Consultants
 James McMackin – Stanley Consultants

NOTES:

- Introductions
- Donna provided an overview of the statutory requirements that included the equity assessment using Colorado Disproportionately Impacted Community data.
 - Basic analysis did not change from a previous assessment using Federal Transportation Disadvantaged Community data.
- Donna provided an overview of the VRU assessment consultation requirement
 - Will consult with each CDOT Region
 - Will consult with the following local jurisdictions/COGs:
 - City and County of Denver
 - City of Aurora
 - City of Lakewood
 - City of Boulder
 - City of Longmont
 - City of Colorado Springs/PPACG
 - DRCOG
 - Will consult with the following advocacy/community groups:
 - Bicycle Colorado
 - CDPHE
 - Other local groups if requested by local jurisdictions during the consultation process
- Discussion of HIN locations identified on CDOT network
 - Colfax, Hanover to Peoria
 - CDOT is aware of issues and needs for improvement
 - New Hospital in the vicinity
 - Parker, Dartmouth to I-225
 - CDOT is aware
 - There are apartments across from a transit center with no good crossing locations
 - S Federal, Warren to 200' north of Evans
 - Considered a state highway and needs to be moved to CDOT's list
 - Other areas to consider?

- E Iliff Ave, Parker to Chambers
 - Especially Peoria to Chambers
 - Concerned about numerous fatalities along the corridor
 - It is located in the City of Aurora
- Strategies CDOT would like the assessment to consider:
 - Emphasis of the separation of modes for some facilities during the consultation meetings and as part of high-level strategies or solutions
 - Speed limit policy is in flux
 - Historically, based on 85th percentile
 - Moving towards a more contextual approach
 - Pending upcoming MUTCD updates
 - RSAs are not common
 - CDOT incorporates a safety analysis in projects
 - May be more common among local agencies



Vulnerable Road User Safety Assessment

TAC Meeting #3


August 15, 2023

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Agenda

- Disadvantaged Census Tract to CO Disproportionately Impacted Community Data
- FHWA Technical Assistance (August 2)
- Top Locations from HIN
- Consultation schedule
- Discussion



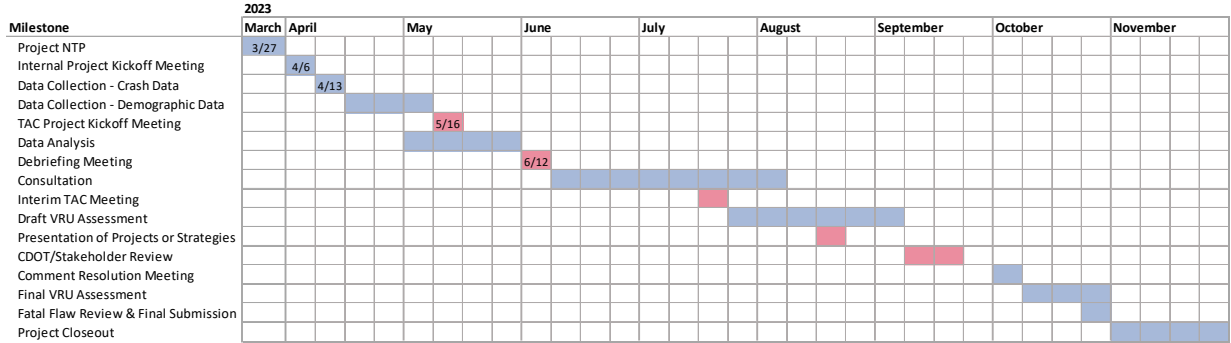
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2»

2

Project Schedule

Project Schedule
CO VRU Safety Assessment



3

Statutory Requirements – Consultation

- For identified High-Risk Areas
 - Required: Local Governments/MPOs/Regional Transportation Planning Organizations
 - Local knowledge and data
 - Encouraged: institutional, advocacy, community groups
 - Underrepresented populations based on location demographics

4

Overview of Demographic Data Analysis

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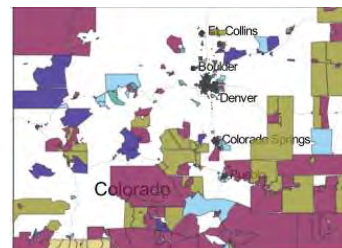

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5

Colorado Disproportionately Impacted Communities (DICs)

- New Definition
 - Signed into law on May 23, 2023
 - Applies to all State Agencies
 - 5 categories of impacts:
 - Low Income Communities
 - Communities of Color
 - Housing Cost-Burdened Communities
 - Linguistically Isolated Communities
 - Historically Marginalized Communities




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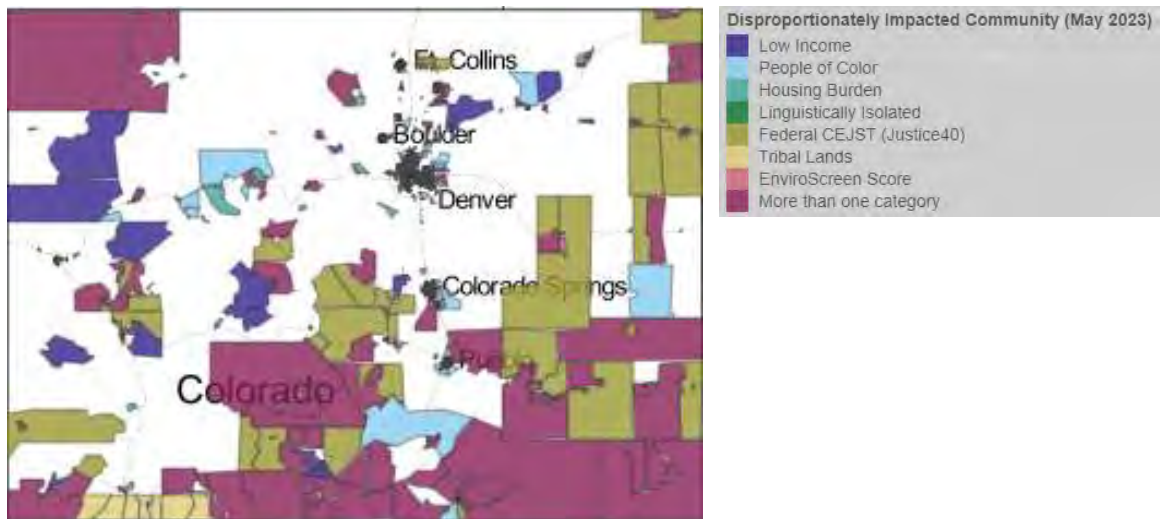


6

Colorado Disproportionately Impacted Communities (DICs)

- Also:
 - Cumulatively Impacted Communities
 - EnviroScreen Score > 80th percentile (ES80)
 - Federal EJ 40 Community
 - Tribal Lands
 - Mobile Home Communities

7



8

Expected Numbers if Crashes were Equitably Distributed

- Number of Crashes: 2,682
- Number of Census Block Groups: 3,532
- **Expected Crashes Per Block Group: 0.76**
- Population: 5,610,349
- **Expected Crash Rate Per 1,000 Population: 0.48**



9

DIC & ES80 Block Groups

- Equitable Distribution**
- **Expected Crashes Per Block Group: 0.76**
 - **Expected Crash Rate Per 1,000 Population: 0.48**

DIC/ES80	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
No	1,961	1,490			
DIC	1,571	1,194			
ES80	707	537			



10

DIC & ES80 Block Groups

Equitable Distribution

- Expected Crashes Per Block Group: 0.76
- Expected Crash Rate Per 1,000 Population: 0.48

DIC/ES80	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
No	1,961	1,490	1,119	0.57	0.34
DIC	1,571	1,194	1,563	0.99	0.67
ES80	707	537	1,047	1.48	1.01

11

Disadvantaged by Number of Factors

Equitable Distribution

- Expected Crashes Per Block Group: 0.76
- Expected Crash Rate Per 1,000 Population: 0.48

# Factors	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
5	65	49			
4	169	129			
3	419	318			
2	332	252			
1	583	443			
0	1,964	1,493			

12

Disadvantaged by Number of Factors

Equitable Distribution

- Expected Crashes Per Block Group: 0.76
- Expected Crash Rate Per 1,000 Population: 0.48

# Factors	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
5	65	49	65	1.00	1.52
4	169	129	169	1.00	0.91
3	419	318	418	1.00	0.88
2	332	252	330	0.99	0.60
1	583	443	464	0.80	0.48
0	1,964	1,493	1,237	0.63	0.37

13

What if we assign crashes on “border streets”
to the block group that is disadvantaged?

14

DIC & ES80 Block Groups

Equitable Distribution

- Expected Crashes Per Block Group: 0.76
- Expected Crash Rate Per 1,000 Population: 0.48

DIC/ES80	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
No	1,961	1,490	1,119	0.57	0.34
DIC	1,571	1,194	1,563	0.99	0.67
ES80	707	537	1,047	1.48	1.01

Original Data

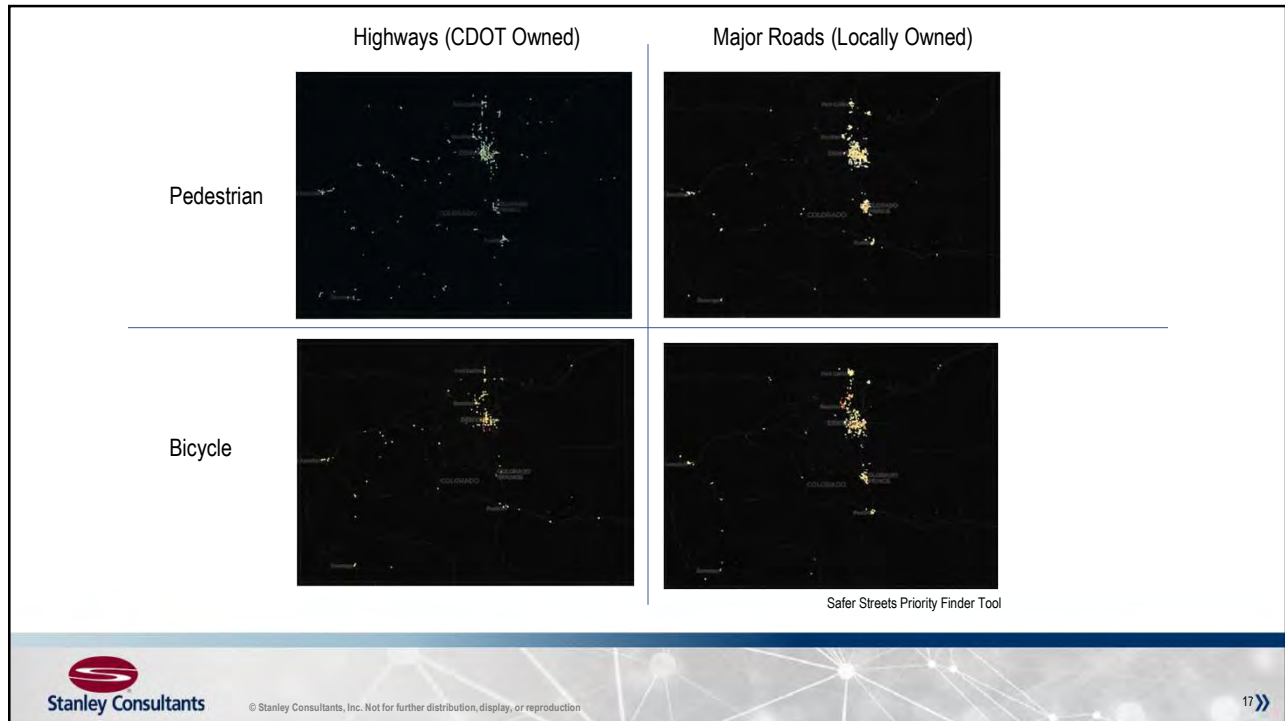
DIC/ES80	# Block Groups	Expected Crashes	Actual Crashes	Actual Crashes Per Block Group	Actual Crash Rate
No	1,961	1,490	806	0.41	0.26
DIC	1,571	1,194	1,876	1.19	0.80
ES80	707	537	1,313	1.86	1.27

With border crashes assigned to disadvantaged tracts

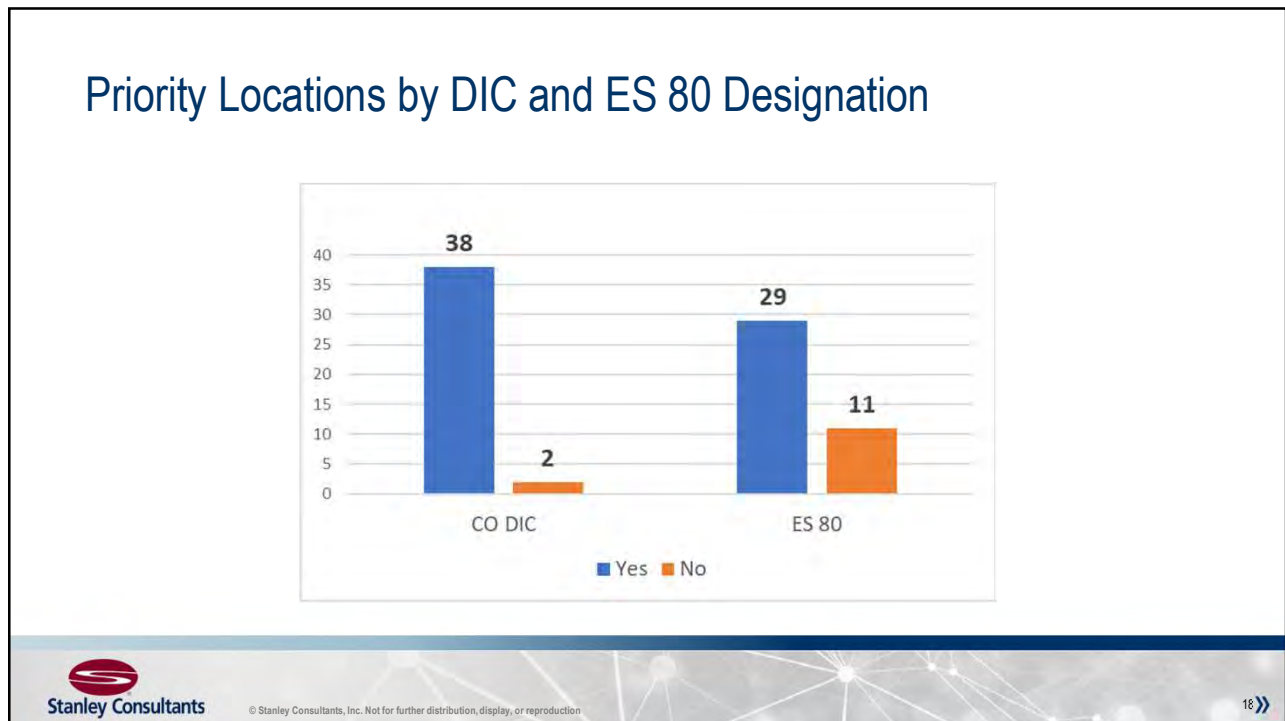
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High Injury Network (HIN) & Priority Locations

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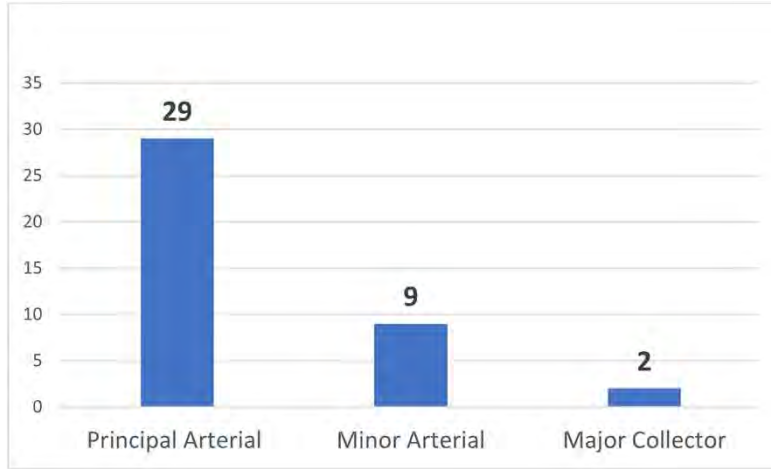


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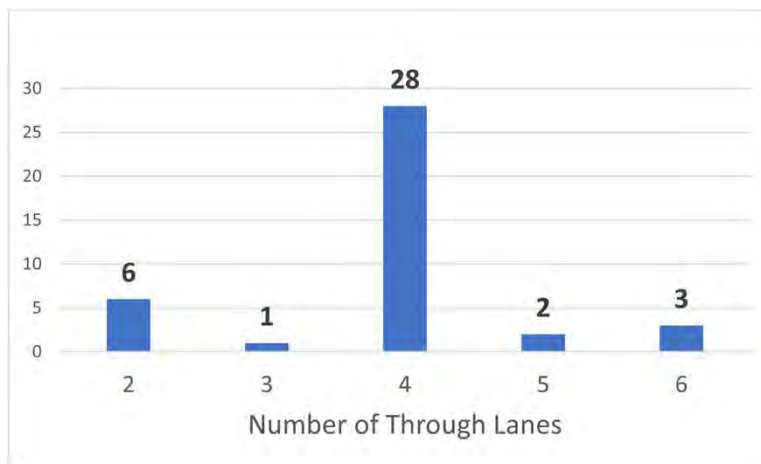


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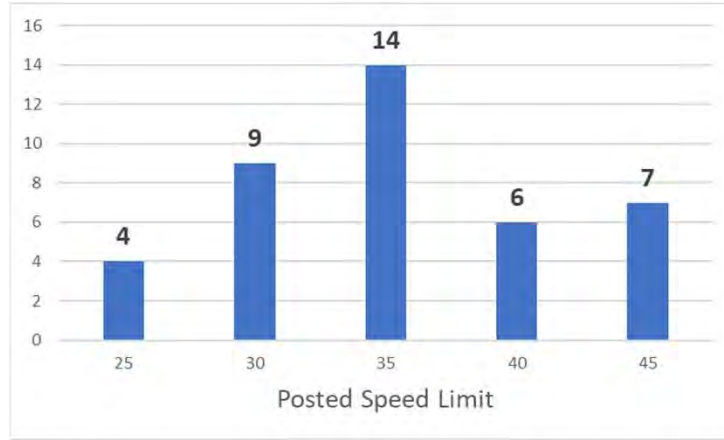
Priority Locations by Functional Classification



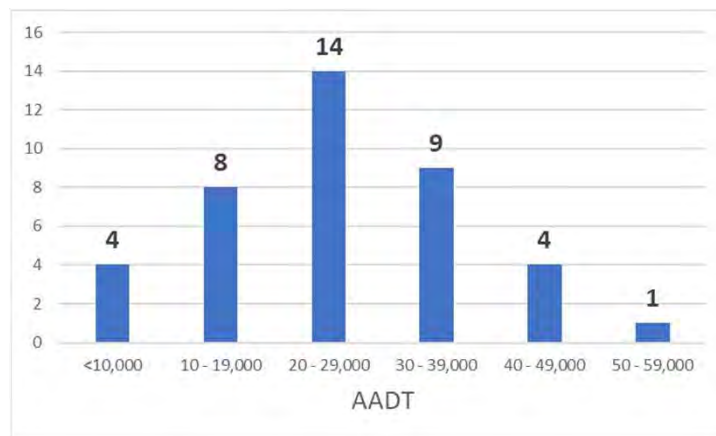
Priority Locations by Number of Through Lanes



Priority Locations by Posted Speed Limit



Priority Locations by AADT



E. Colfax Ave. (40C) – Hanover St. to N. Peoria St.

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28th St. (36B) – Spruce St. to Valmont Rd.

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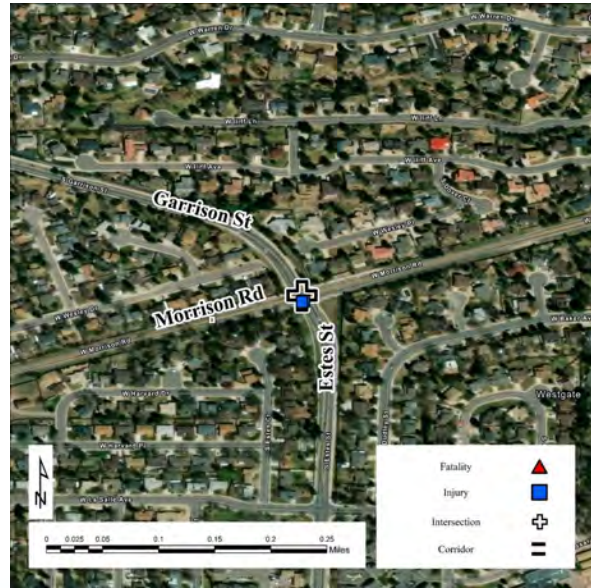


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E. Main St. (160A) – N. Beech St. to S. Veach St.

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Main Ave. (550B) – E. Park Ave. to E. 21st Ave.

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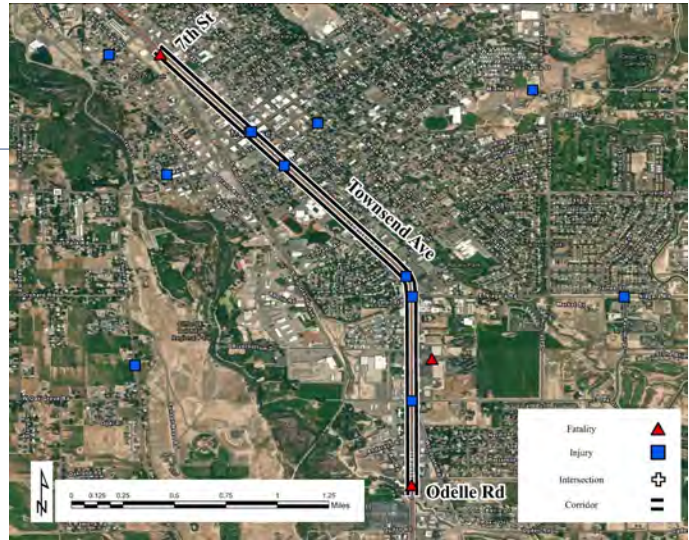
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S. Townsend Ave. (550B) – Odelle Rd. to N. 7th St.

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Major Roads (Local Agency-Owned)

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Activity Center –

- 20th St.
- Market St.
- Blake St.
- Wazee St.

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Carefree Cir. at N. Academy Blvd.

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72nd Ave. – Meade St. to N. Irving St.

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N. Lincoln St. – E. Colfax Ave. to E. 18th Ave.

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30th St. – Arapahoe Ave. to Walnut St.

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Broadway – Violet Ave. to Yarmouth Ave.

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Folsom St. – Stadium Dr. to Dorm Parking Lot Entrance

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Havana St. at 16th Ave.

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N. Speer Blvd. – W. 11th Ave. to E. Colfax Ave.

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MEETING NOTES

Date: September 13, 2023


Place: Microsoft Teams Meeting

Project/Purpose: CDOT VRU Assessment - TAC Meeting #4

Attendees: David Swenka – CDOT
Annelies Van Vonno – CDOT
Dahir Egal – FHWA CO Division
Katrina Kloberdanz – CDOT Region 4
Manjari Bhat – CDOT
Medora Bornhoft – CDOT
Steph Leonard – CDPHE
Donna Lewandowski – Stanley Consultants
Marta Gerber – Stanley Consultants
James McMackin – Stanley Consultants

NOTES:

- Introductions
- Donna presented maps and recommendations for each of the identified priority locations. Recommendations for each were discussed.
- Donna presented the proposed program of strategies.
- Medora expressed concern that jurisdictions that did not have any priority locations identified were not given a chance to suggest locations to have added, and requested that a note be made in the report as such.
- Final report schedule was discussed. A draft final report is due to CDOT on Monday, October 9th.



Vulnerable Road User Safety Assessment
TAC Meeting #4


September 13, 2023

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Agenda

- Overview of Location-Specific Recommendations
- Overview of General Recommendations
- Discussion



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High Injury Network (HIN) Priority Locations

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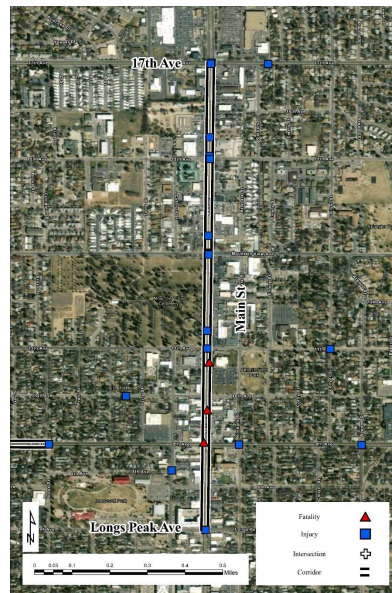
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Main St. (287C) – Longs Peak Ave. to 17th Ave.

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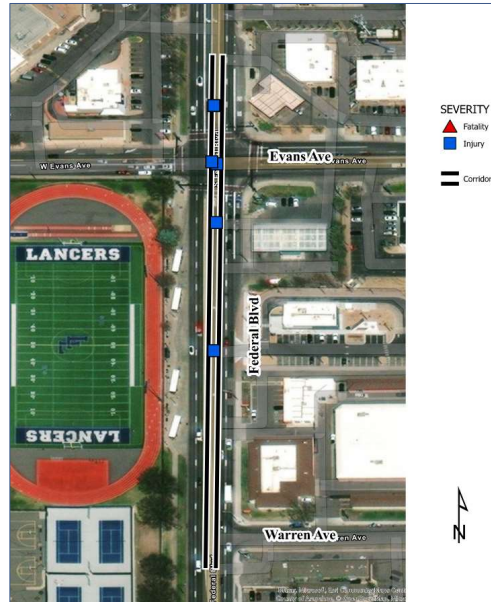
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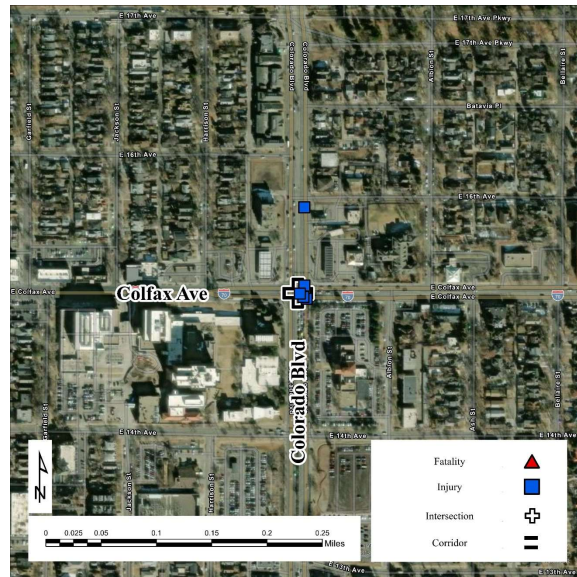
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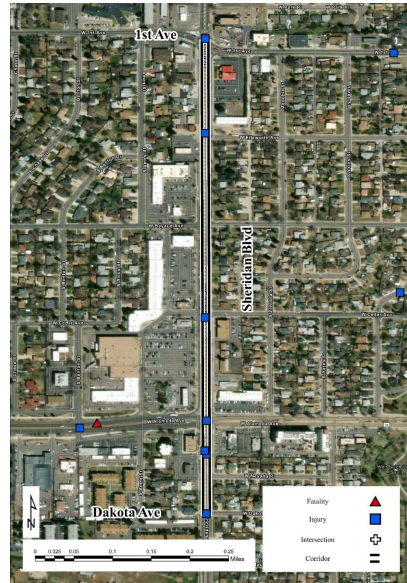
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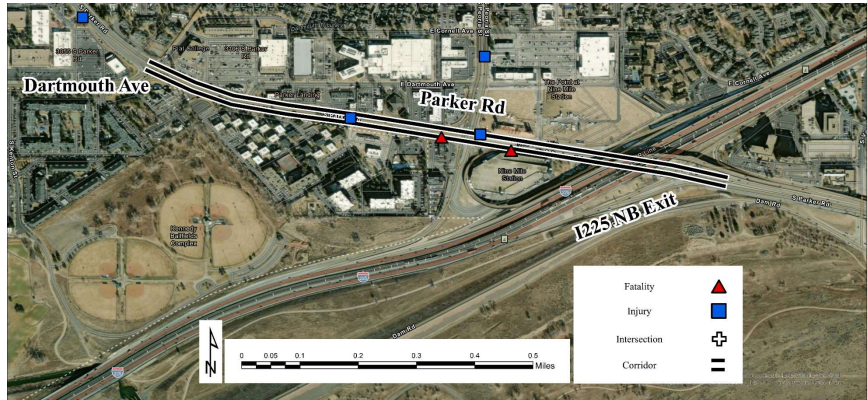


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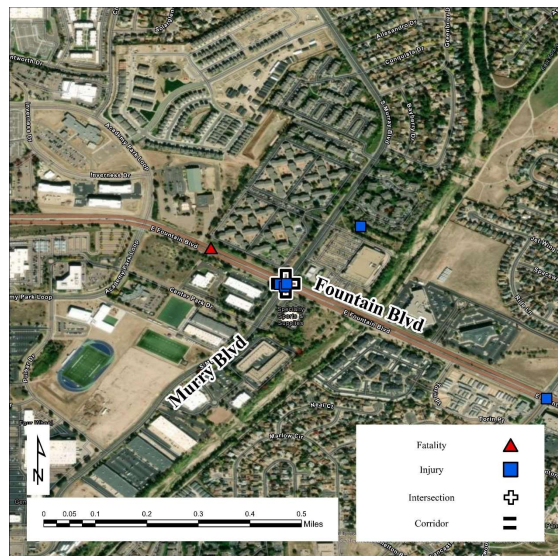
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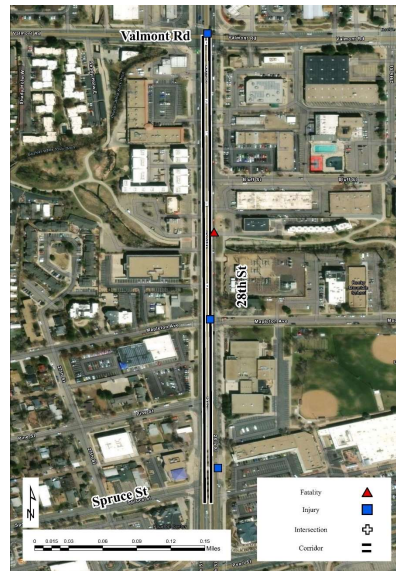
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28th St. (36B) – Spruce St. to Valmont Rd.

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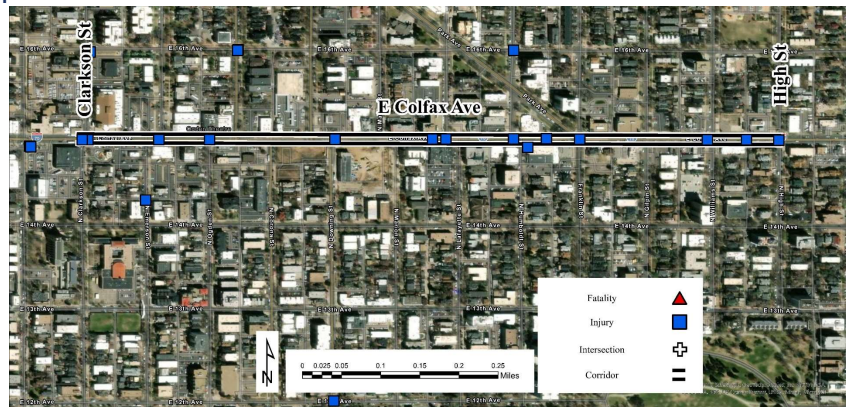


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E. Colfax Ave. (40C) – N. Clarkson St. to N. High St.

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Bicycle

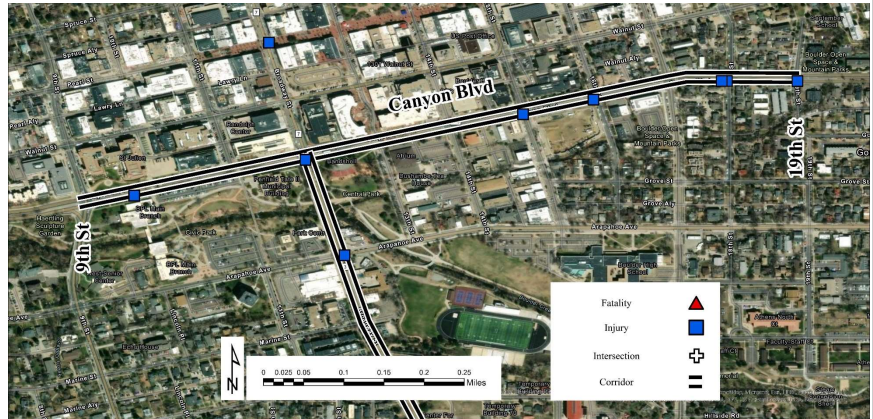


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Canyon Blvd. (7B) – 9th St. to 19th St.

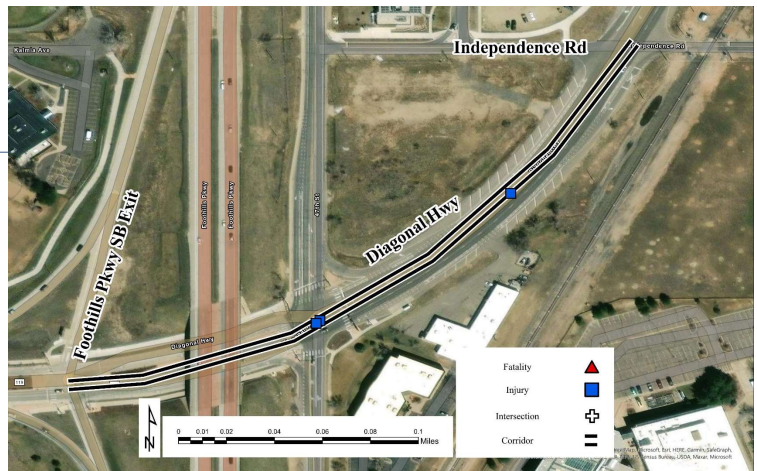
CDOT Region 4 – Boulder
Bicycle



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Diagonal Hwy. (119B) – Foothills Pkwy. to Independence Rd.

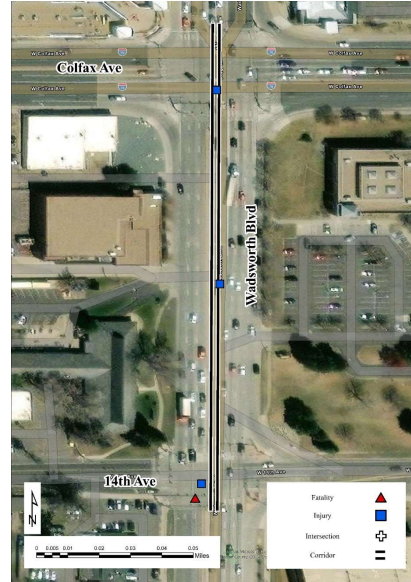
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Wadsworth Blvd. (121A) – W. 14th Ave. to E. Colfax Ave.

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North Ave. (6B) at N. 1st St.

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Bicycle



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Arapahoe (7C) – Foothills Pkwy. To 48th St.

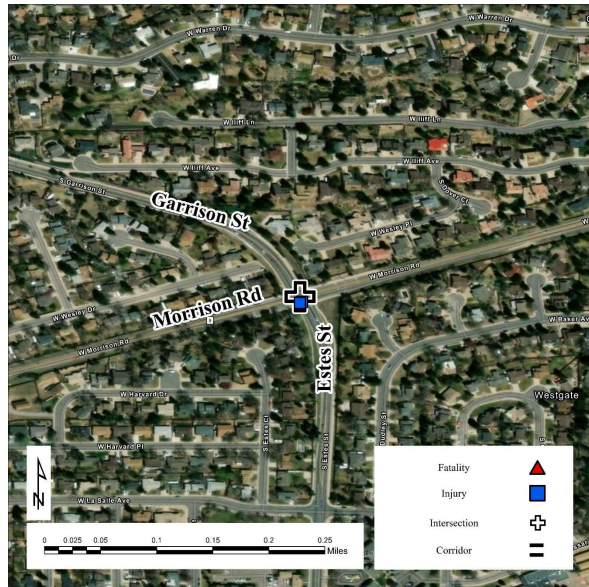
CDOT Region 4 – Boulder
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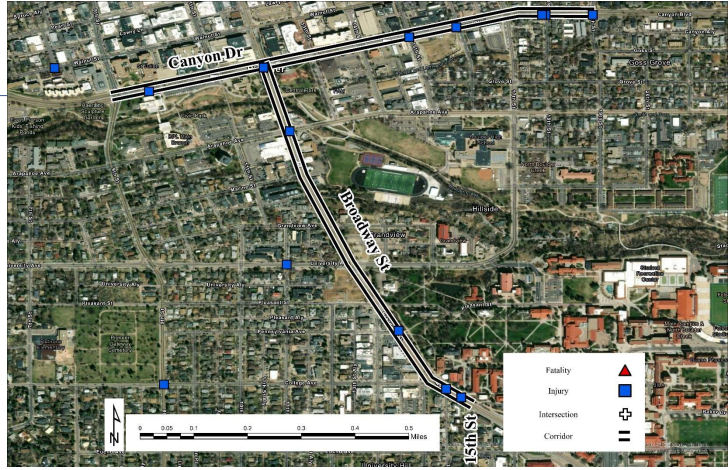
CDOT Region 1 – Lakewood
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Broadway St. (93A) – 15th St. to Canyon Blvd.

CDOT Region 4 – Boulder
Bicycle

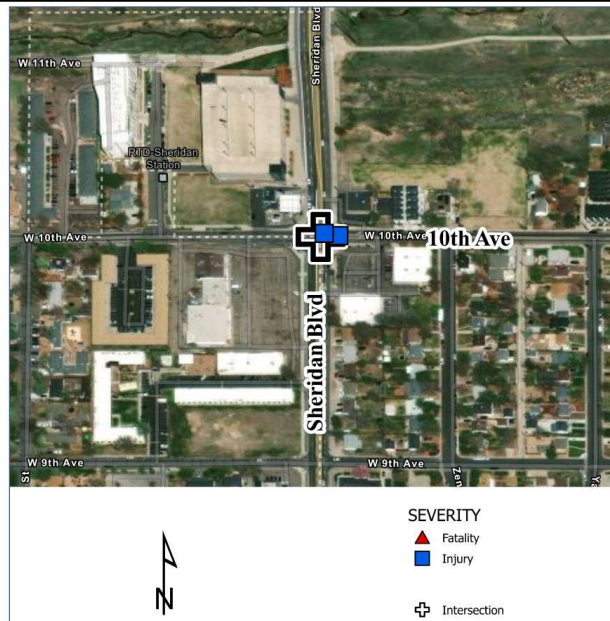


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Sheridan Blvd. (95A) at W. 10th

CDOT Region 1 – Denver
Bicycle

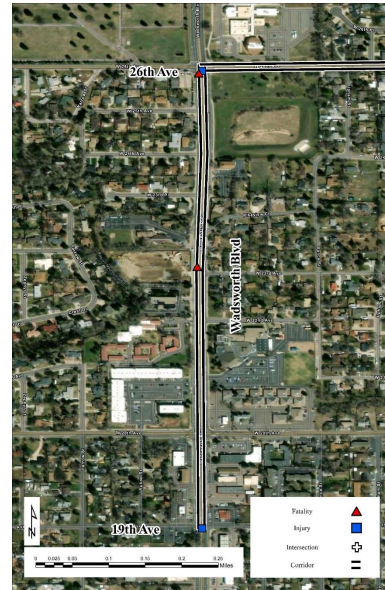


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22

Wadsworth Blvd. (121A) – W. 19th Ave. to W. 26th Ave.

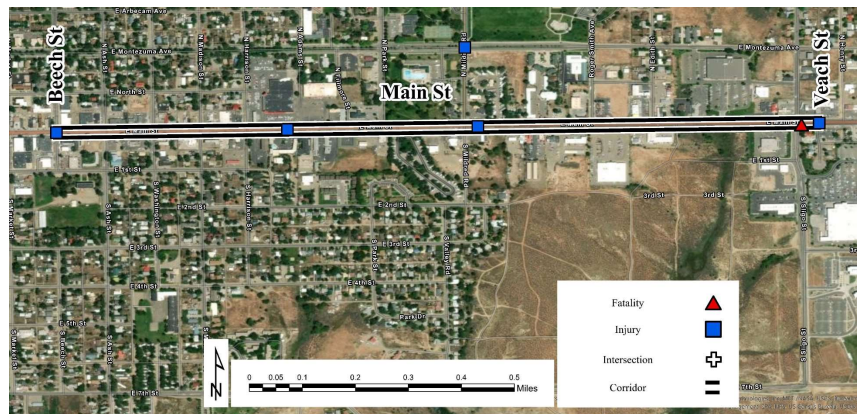
CDOT Region 1 – Lakewood
Bicycle



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E. Main St. (160A) – N. Beech St. to S. Veach St.

CDOT Region 5 – Cortez
Pedestrian



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Main Ave. (550B) – E. Park Ave. to E. 21st Ave.

CDOT Region 5 – Durango
Pedestrian and Bicycle

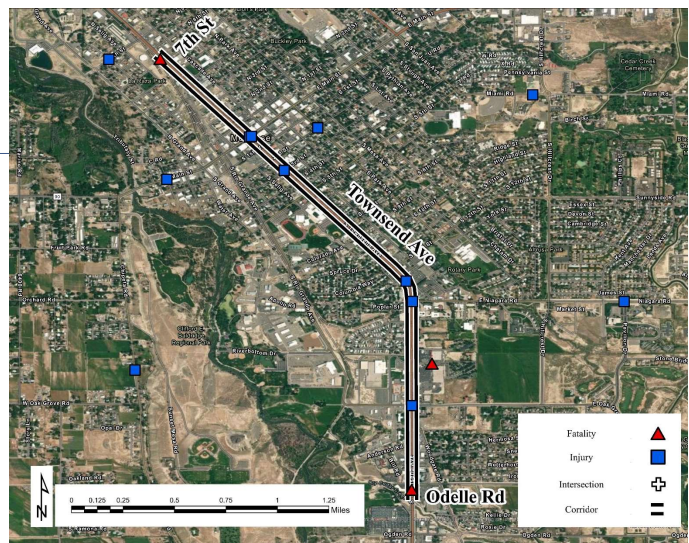


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S. Townsend Ave. (550B) – Odelle Rd. to N. 7th St.

CDOT Region 3 - Montrose



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Major Roads (Local Agency-Owned)

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S. Nevada Ave. (115A) – E. Navajo St. to I-25

CDOT Region 2 – Colorado Springs
Pedestrian

***To be addressed with
Major Road segment***



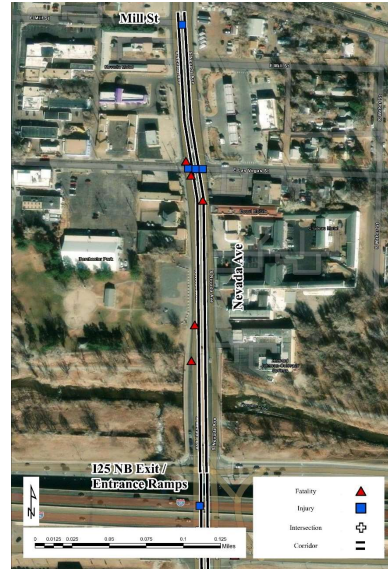
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S. Nevada Ave. – I-25 to E. Mill St.

CDOT Region 2 – Colorado Springs
Pedestrian

***To be addressed with
State-Owned segment***

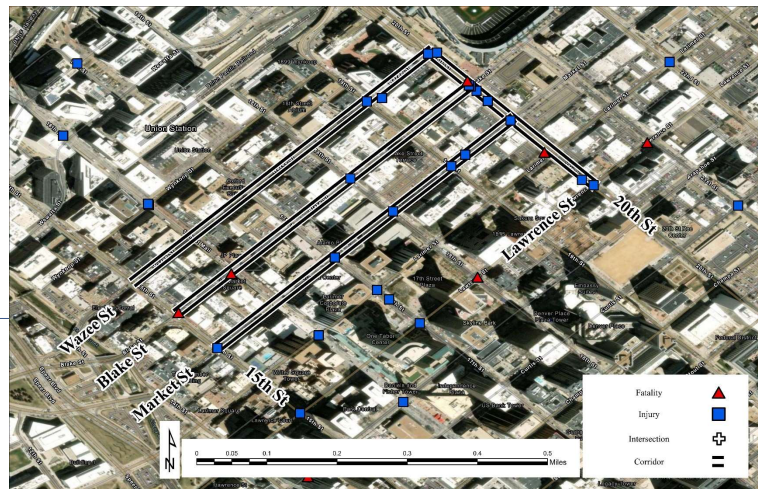


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Activity Center –

- 20th St.
- Market St.
- Blake St.
- Wazee St.

CDOT Region 1 – Denver
Pedestrian & Bicycle



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Academy Blvd. at Austin Bluffs Pkwy.

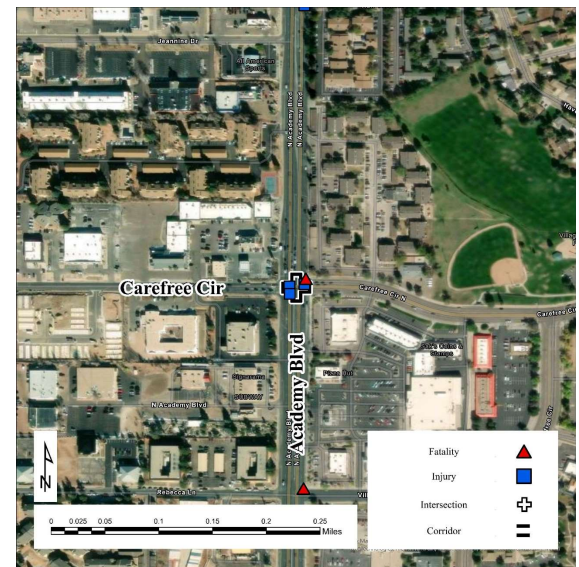
CDOT Region 2 – Colorado Springs
Pedestrian



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Carefree Cir. at N. Academy Blvd.

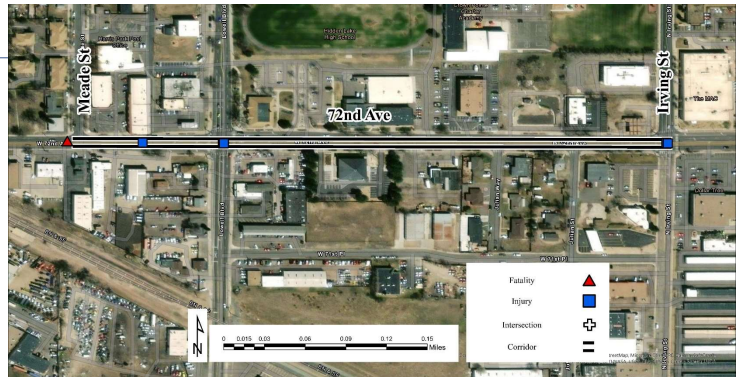
CDOT Region 2 – Colorado Springs
Pedestrian



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72nd Ave. – Meade St. to N. Irving St.

CDOT Region 1 – Westminster
Pedestrian

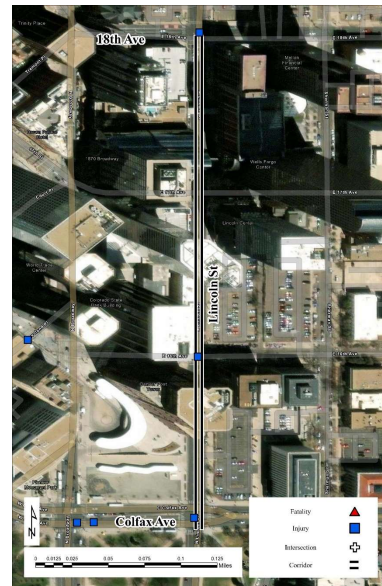


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N. Lincoln St. – E. Colfax Ave. to E. 18th Ave.

CDOT Region 1 – Denver
Bicycle

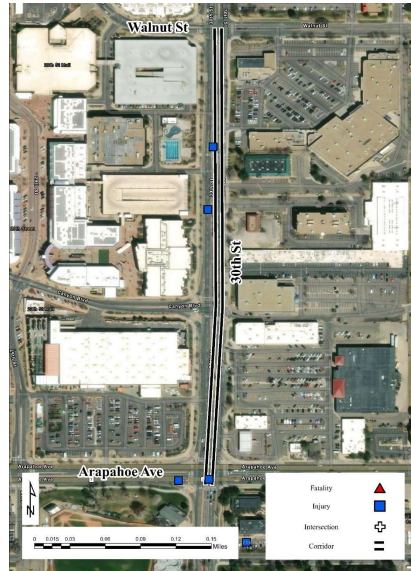


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30th St. – Arapahoe Ave. to Walnut St.

CDOT Region 4 – Boulder
Bicycle

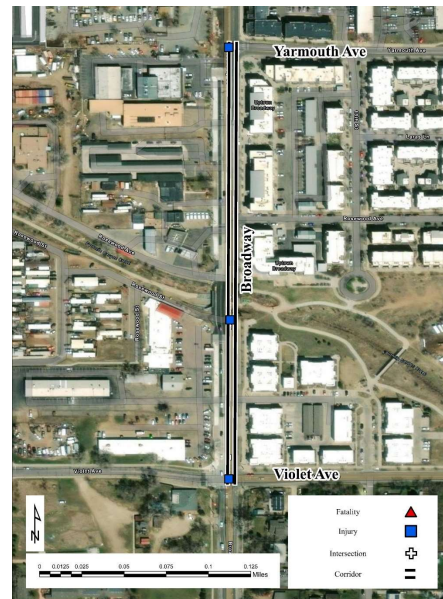


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Broadway – Violet Ave. to Yarmouth Ave.

CDOT Region 4 – Boulder
Bicycle

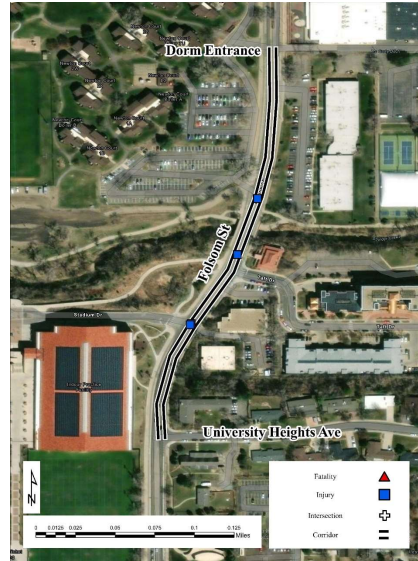


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Folsom St. – Stadium Dr. to Dorm Parking Lot Entrance

CDOT Region 4 – Boulder
Bicycle

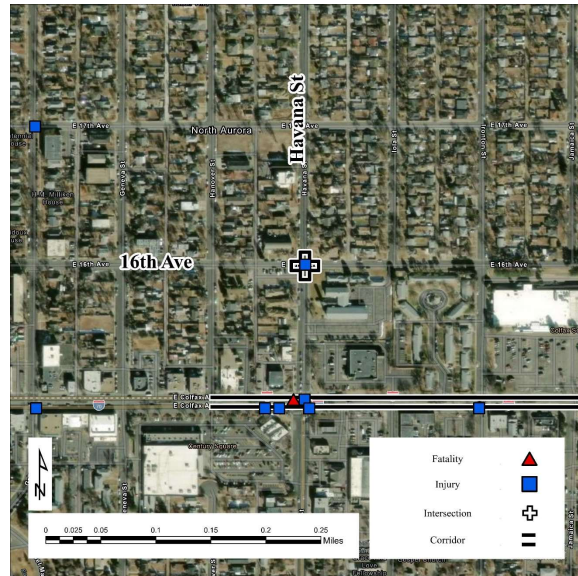


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Havana St. at 16th Ave.

CDOT Region 1 – Aurora
Bicycle



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9th Ave – Francis St. to Bross St.

CDOT Region 4 – Longmont
Bicycle



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N. Speer Blvd. – W. 11th Ave. to E. Colfax Ave.

CDOT Region 1 – Denver
Bicycle



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Added Locations

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41

S. Wadsworth Blvd. – W. Florida Ave. to W. Mississippi Ave.

CDOT Region 1 – Lakewood Bicycle



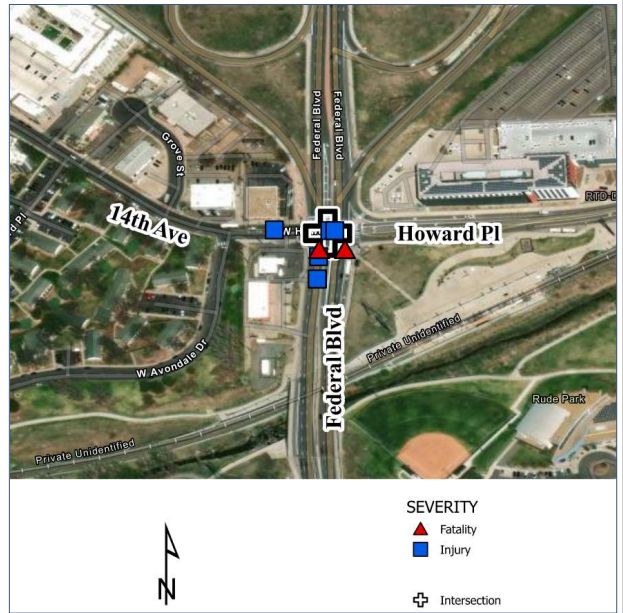
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42 >>

42

N. Federal Blvd. at W. Howard Pl. / W. 14th Ave.

CDOT Region 1 – Denver
Bicycle



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43 >>

43

E. Evans Ave. – S. Jackson St. to S. Syracuse Way

CDOT Region 1 – Denver
Bicycle



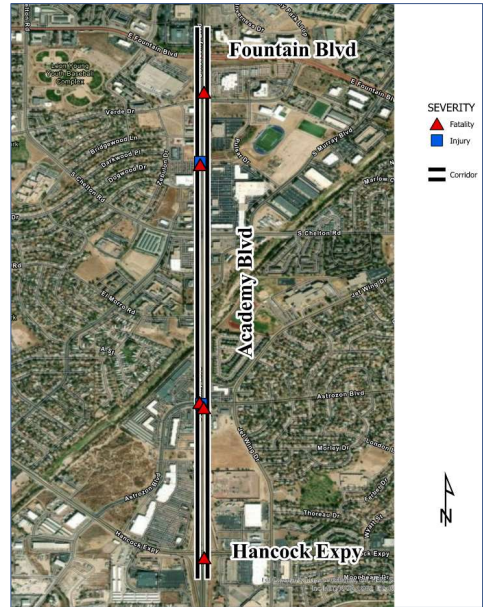
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44 >>

44

S. Academy Blvd. – Hancock Expressway to E. Fountain Blvd.

CDOT Region 1 – Colorado Springs
Bicycle



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Programmatic Recommendations

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Expand Crash Typing

- Use Pedestrian and Bicyclists Crash Analysis Tool (PBCAT) crash typing to better understand contributing factors and movements
 - Allows for more accurate matching of countermeasures to safety issue
- On next revision of crash reporting form, consider more closely aligning form inputs with information required for PBCAT entry

Gather VRU Exposure Data

- Collect VRU counts in advance of RSAs and Corridor Studies to assess true level of risk
- Consider implementing large-scale VRU count program or purchasing “big data” VRU AADT and origin-destination data

VRU-specific Road Safety Audits (RSAs)

- Establish a VRU-specific RSA program for state highway and roadway system
 - Require RSAs to include:
 - PBCAT crash type analysis
 - Exposure data
 - Human and behavioral factors

Expand CDOT Regional Bike/Ped Safety Studies

- Complete regional bike ped safety studies for each region
 - Update on a 5-year cycle (one each year)
 - Can be consolidated and used for the VRU Safety Assessment Requirement

Repeat Demographic Analysis

- Requirement reflects USDOT focus on disproportionate adverse safety impacts
 - Repeat yearly to ensure that countermeasures are being implemented in a way that reduces disparities
 - Screen for ES80 and DIC communities in project selection and development process
 - Give funding priority to projects in ES80 and DIC communities
 - Ensure meaningful engagement with community members

51

Before/After Studies

- Continue to evaluate implemented safety projects using before/after studies
- Consider offering support to local agencies to evaluate implemented safety projects.
 - Compile a state-specific list of countermeasures that work in Colorado

52

Professional Education

- Bring VRU safety-related educational opportunities to Colorado
 - Ensure jurisdictional personnel are encouraged and provided adequate time to attend
 - Invite consultants to participate
- Require or give preference to consultants who attend trainings



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53 >>