City of Castle Pines Safety Action Plan

May 2024

CITY OF CASTLE PINES

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Introduction

The City of Castle Pines (City) continues to make meaningful progress in creating a safe, connected, and reliable transportation system. The City's recent planning efforts, existing policy framework, and infrastructure investments make clear that **it is committed to a multimodal system that safely accommodates travel for all modes, ages, and abilities**. Castle Pines recognizes that all traffic-related injuries are preventable and is committed to providing a safer environment for all users. It also recognizes that the transportation system is central to the community's high quality of life, economic vibrancy, and significant population growth that will occur in the next 5-10 years.

WHAT IS A SAFETY ACTION PLAN?

A Safety Action Plan is a strategic document that evaluates historic - crash data and system challenges and identifies strategies and actions to reduce the potential for significant injuries and fatalities in the future.

This Safety Action Plan (SAP) builds on the City's momentum in creating a safe, reliable, and connected system. This SAP provides a 'playbook' of prioritized and community-informed projects and recommended policy/process changes aim to reduce significant injuries over time.

The SAP goals are:

- Analyze and map crash data from the last five years to identify trends and hot spots for crashes.
- Using a systemic analysis method, identify areas where likelihood of future crashes is greater.
- Engage community members to better understand needs, concerns, and priorities related to transportation safety.
- Select data-driven countermeasures (improvements) to address crash hot spots and locations where future crashes are more likely.

The primary content of this SAP includes:

- An analysis of historic crash data from the last five years, identification of crash hot spots, and explanation of primary factors contributing to crashes, especially significant injury crashes.
- A systemic analysis of roadway characteristics and risk factors that have greater potential to contribute to crashes in the future.
- Review of existing plans, policies, and roadway design standards to identify where updates could help the City reduce significant injuries and maintain a baseline of zero fatalities.
- Overview of community and stakeholder engagement and how it influenced development and prioritization of recommendations.
- Recommendations (countermeasures) to address crash hot spots and sections of the City's roadway network with higher levels of systemic (future) risk.
- Next steps to guide the City on tracking implementation of the SAP and evaluating its effectiveness over time.
- All elements required of a safety action plan to be eligible for implementation funding through future SS4A grants, including:
    - Leadership commitment and goal setting
    - Planning structure

- Safety analysis
- Engagement and collaboration
- Equity considerations
- Policy and process changes
- Strategy and project selections
- Progress and transparency

Safe Systems Approach

Figure 1. Safe Systems Approach Diagram

This SAP was funded through the federal Safe Streets and Roads for All (SS4A) program and follows the Federal Highway Administration's (FHWA) Safe Systems Approach. There are five (5) objectives of The Safe Systems Approach: **Safe Road Users, Safe Vehicles, Safe Speeds, Safe Roads, and Post Crash Care**. Additionally, there are 6 principles:

- Death/Serious injury is unacceptable,
- Humans make mistakes
- Humans are vulnerable
- Responsibility is shared
- Safety is proactive, and
- Redundancy is crucial.

The safe systems approach expects the roadway system to be planned, designed, and operated to be forgiving of inevitable human mistakes so that serious injuries are less likely to occur.

Existing Policy Foundation

The team reviewed relevant local and regional plans to understand the guiding policy basis for enhanced roadway safety in Castle Plans and the development of this SAP. Below is a list of the plans reviewed and the relevant policy direction from each.

- **Castle Pines Comprehensive Plan (2021)[1]:** This plan establishes the 20-year planning horizon for the City and articulates the community's shared values. Castle Pines residents, leaders, and business owners were engaged in the process of updating this plan and identified that certain arterial roadways that pass through residential neighborhoods may need to implement traffic calming measures. Several policies, which are listed below, were identified within this plan that

[1] City of Castle Pines. (2021). Castle Pines Comprehensive Plan. https://www.castlepinesco.gov/wp-content/uploads/2021/07/Castle-Pines-Comprehensive-Plan-Update_web-quality.pdf

solidify the City's commitment to providing a safe, equitable, and comprehensive street network.

Transportation Element

- **Goal T-2:** Develop a safe, efficient, multi-functional transportation network designed to promote connections to local destinations and to facilitate cost-effective operations and maintenance.
  - T-2.2 Ensure consistency with local, regional, and statewide transportation plans.
  - T-2.3 Improve bike, pedestrian, and vehicle circulation, traffic facilities, and access issues at peak times around existing and future school sites.
  - T-2.4 Support traffic calming and streetscape design on local streets to reduce traffic speeds while increasing the comfort and safety for pedestrians and bicyclists.
  - T-2.7 Strengthen the character of residential neighborhoods through enhanced arterial road design using smaller lane widths, additional landscaping, and pedestrian crossings.
  - T-3.2 Provide landscaped medians within arterial streets, where possible, to provide safety islands where pedestrians can pause when crossing the streets.
  - T-3.3 Complete a system of connected on-street and off-street bicycle facilities along or parallel to major roads.
  - T-3.4 Create comfortable and safe pedestrian connections and crossings that encourage walking.
  - T-3.5 Establish street standards that support accessibility for all users in all existing and future bicycle and pedestrian improvements.
  - T-3.7 Mitigate the barriers presented by major transportation corridors by providing safe and convenient multimodal crossings, bridges, or underpasses.

Economic Development Element

- Goal ED-2: Establish vibrant and pedestrian-friendly community activity centers to encourage socialization, entertainment, and local events.
  - ED-2.3 Enhance pedestrian circulation that connects activity centers to residential neighborhoods through a system of trails and sidewalks.
- Goal ED-3: Retrofit the Business District to create a stronger mixed-use downtown feel with unique sit-down restaurants, office, retail, and housing.
  - ED-3.2 Encourage retrofitting traditional auto-oriented retail centers to comfortably and safely accommodate pedestrian and bicycle connections.

- **Transportation Master Plan (2017)[2]:** This plan builds upon the 2017 Comprehensive Plan by identifying multiple implementation measures that address the City's infrastructure needs,

[2] Douglas County. (2017). Castle Pines Master Transportation Plan. https://www.castlepinesco.gov/wp-content/uploads/2019/09/Master-Transportation-Plan.pdf

while supporting the Comprehensive Plan's goals and objectives. Below are the goals and objectives stated in this plan that are relevant to the efforts of this SAP.

- **Goal I:** Develop a safe, efficient, multi-functional transportation network designed to promote connections to local destinations.
  - Support traffic calming and streetscape design on local streets.
- **Goal II:** Facilitate cost-effective operations and roadway maintenance strategies.
  - Improve efficiency of travel along principal arterials through smooth traffic flows.
- **Goal III:** Develop the bicycle infrastructure network to support increased commuting trips and serve the needs of all types of cyclists.
  - Create a continuous paved path system around the City, connecting neighborhoods, parks, schools, and commercial areas.
  - Complete a system of connected on-street and off-street bicycle facilities along or parallel to major roads.
  - Develop programs that encourage bicycling activity, including education and training.
- **Goal IV:** Increase pedestrian connectivity, accessibility, safety, and comfort.
  - Create comfortable and safe pedestrian connections and crossings that encourage walking.
  - Complete a system of connected on-street and off-street pedestrian facilities along or parallel to major roads.
  - Develop programs that encourage pedestrian activity, including education and training.

- **2040 Douglas County Transportation Master Plan (2019)[3]:** This plan established a long-range vision for a multimodal transportation system for Douglas County. Goals, objectives, policies, and strategies were established within this plan, and below is an example of one of these sets of goals and underlying actions that align closely with this SAP.
  - Goal 7-1: Develop an efficient, multifunctional transportation network designed to ensure safety, promote user access, and facilitate cost-effective operations and maintenance.
    - Objective 7-1C: Consider safety a major element of transportation improvements in the County.
      - Policy 7-1C.1: Design transportation corridors that are safe for all users and sensitive to the community context.
      - Policy 7-1C.2: Encourage design solutions to enhance both vehicular and non-vehicular user safety, including but not limited to pedestrian, bicycle, and wildlife corridor grade-separated crossings, and roundabouts, where feasible, as an alternative to traffic signals.

[3] Douglas County. (2019). 2040 Transportation Master Plan. https://www.douglas.co.us/documents/2040-transportation-master-plan.pdf/

- **Denver Regional Council of Governments (DRCOG) Taking Action on Regional Vision Zero (2020)[4]:** This report establishes a target of zero fatalities and serious injuries on the Denver region's transportation system. The City of Castle Pines is within the DRCOG-designated region. Notable concerns expressed by stakeholders during the report's development included distracted driving speeding, red light and stop sign running, and unsafe turning or lane changing.
    - Several themes are identified within this plan, along with actions that help to realize each of the themes. Below are a few actions that relate to the efforts of this SAP.
        - Investments in active transportation and multimodal options that improve the safety and convenience of healthy and active travel choices.
        - Projects and programs to help manage travel demand and provide safe, convenient alternatives to single-occupant vehicle travel to help reduce emissions and congestion.
        - A wide range of transportation investments, from new roadway and interchange capacity to new rapid transit service and multimodal corridor improvements to pedestrian and bicycle connections.
        - A renewed focus on approaches that enhance and ensure safety for all users, incorporating the safety action plan, Taking Action on Regional Vision Zero.

Crash Analysis

Method

The team evaluated historic crash data for a period of five (5) years between January 1, 2018, and December 31, 2022. The crash data only included City-owned and maintained roads. Colorado Department of Transportation (CDOT) state highways and private roads were not included because Castle Pines does not have jurisdiction over these facilities.

The analysis looked at the number, location, and type of crashes that occurred, as well as the average severity of crashes at various locations across the City. The purpose of this evaluation was to identify crash patterns and trends as well as locations where fewer, but more severe crashes occurred.

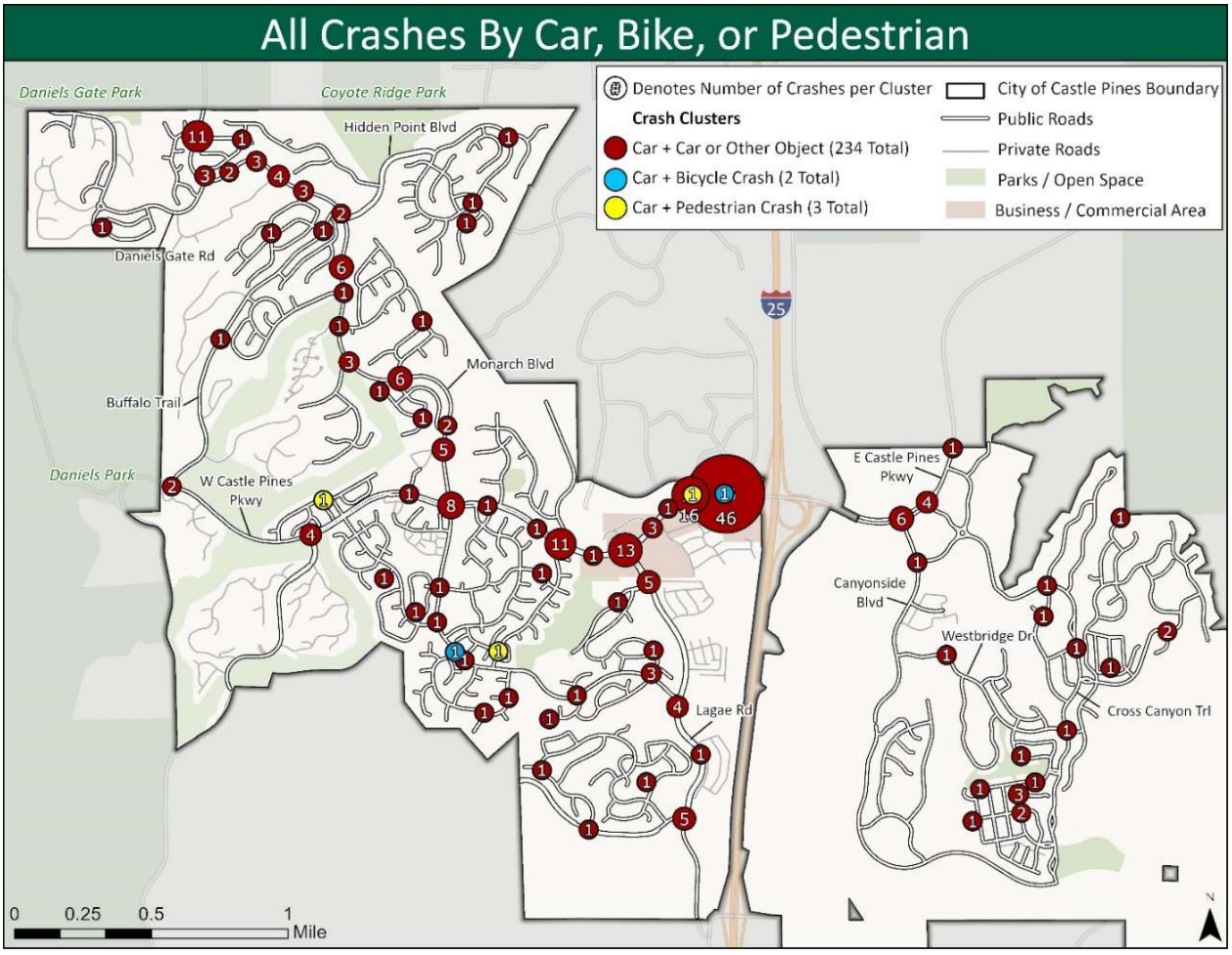
Findings

Crash Overview

Over the five-year study period, a total of 239 reported crashes were recorded. Two of the crashes involved a bicycle, and 3 crashes involved pedestrians. Figure 2 shows where each of these crashes occurred. The circled numbers signify the number of reported crashes that occurred at a given location.

[4] Denver Regional Council of Government (DRCOG). (2020). Taking Action on Regional Vision Zero. https://drcog.org/sites/default/files/Taking_Action_on_Regional_Vision_Zero_ADOPTED_061620.pdf

Figure 2. Crashes by Mode of Travel



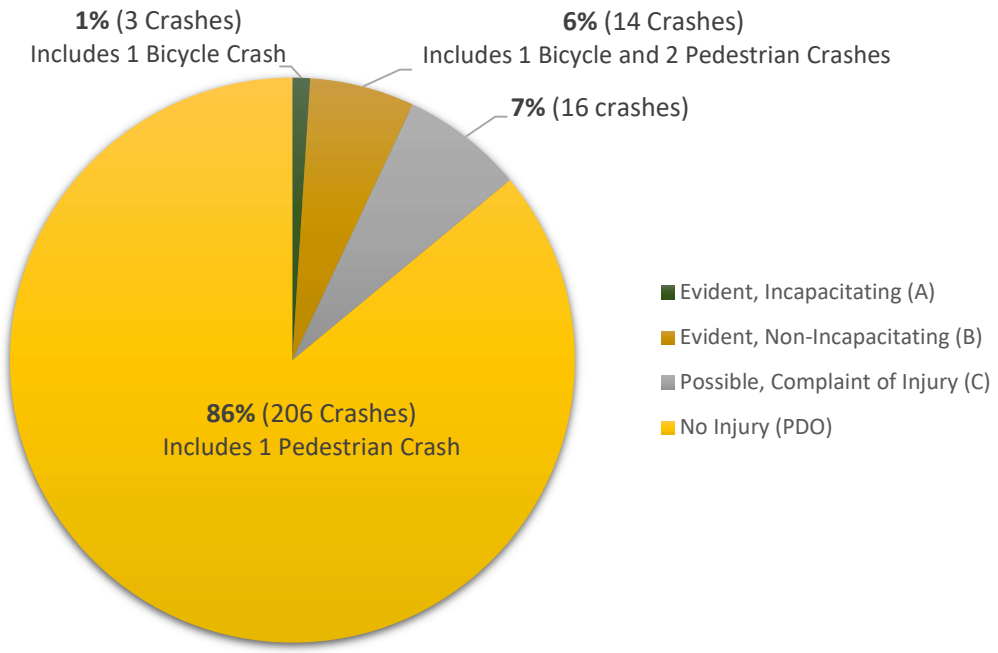
While no fatal crashes were reported during the crash period, 33 of the crashes resulted in either a Type A (Incapacitating)[5], Type B[6] (Non-Incapacitating) or Type C[7] (Complaint of Injury) Injury Crash. The remaining 206 crashes resulted in Property Damage Only (PDO) (Figure 3).

[5] Type A (Incapacitating): Serious injury that prevents a person from walking, driving, or engaging in normal activities that they could perform prior to the accident.

[6] Type B (Non-Incapacitating or Visible Injury): Any minor injury that is evident to someone besides the injured person at the scene of the accident.

[7] Type C (Complaint of Injury): Potential injuries that are claimed or indicated by behavior but not any visible wounds.

Figure 3. Percent of Crashes by Severity



Over time, reported crashes in Castle Pines generally increased, with the highest number of crashes being reported in 2021 and 2022 (Figure 5). When evaluating where crashes occurred, it was determined that 59.4% of crashes occurred at an intersection or were intersection-related, while 34.7% of crashes were not intersection-related (Figure 4).

Figure 5. Crash Count by Accident Location

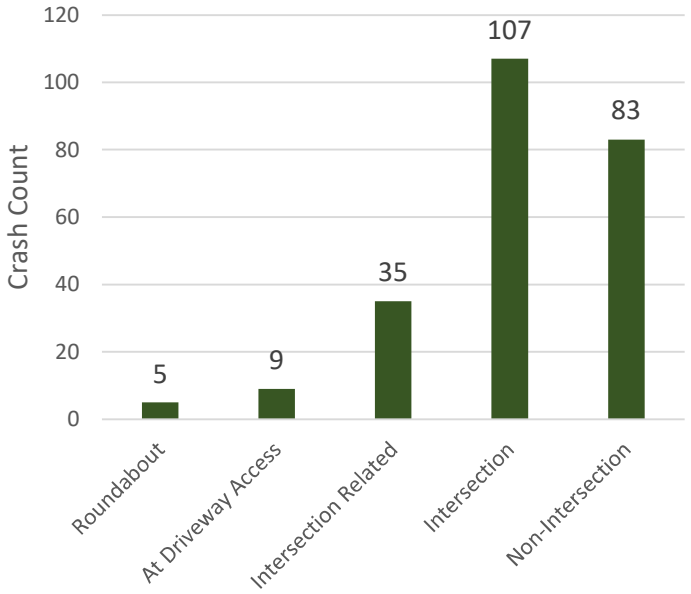
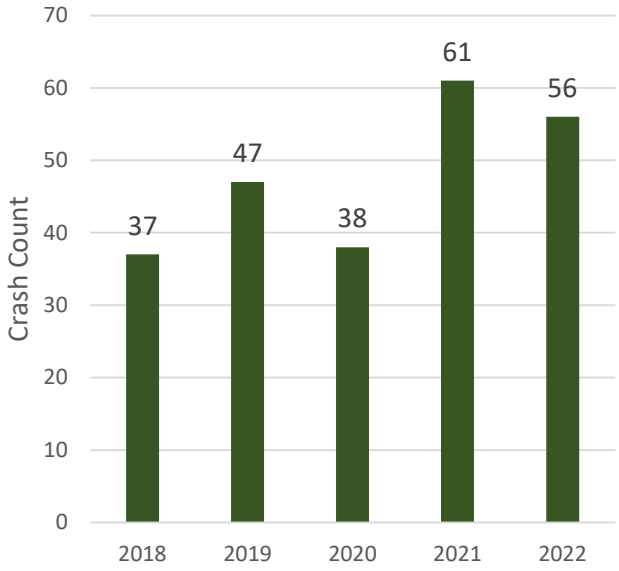
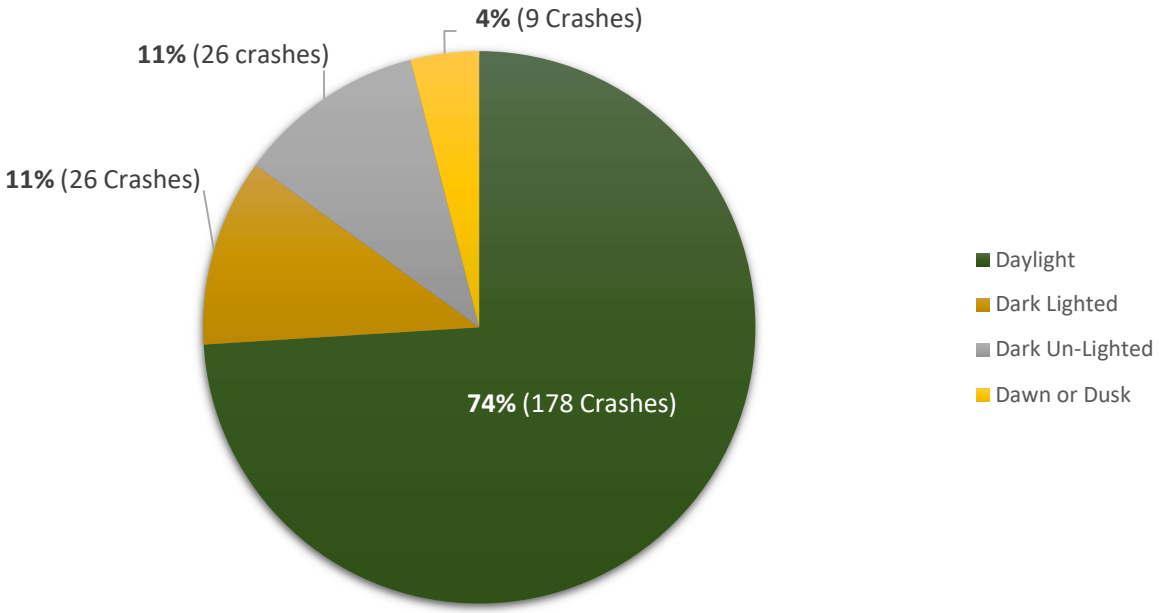


Figure 4. Crash Count by Year



As shown in Figure 6, the majority of crashes, 74% (178 crashes) occurred during daylight conditions. Of the 22% of crashes (52 crashes) that happened in dark-lighted or dark un-lighted conditions, nearly 70% (37 crashes) involved a wild animal or some sort of fixed object such as a fence, sign, debris, parked car, or curb.

Figure 6. Percent of Crashes by Lighting Condition



CDOT's Crash Data Dashboard provides statistics on crash data across the state[8] and indicates that rear-end crashes are the crash type that is reported most frequently (43% of crashes statewide), followed by "front to side" crashes (26% of crashes), which includes both broadside and angle crashes. Crashes involving a parked car are also common (9.7%). In Castle Pines, rear-end crashes were the most common type (31%), broadside and approach turn crashes made up 18.5%, and collisions with parked cars made up 9.6% of crashes. A breakdown of crash by type is shown in Table 1. What is unique to Castle Pines is that 7.5% of crashes involved a wild animal. Across the state, wild animal crashes only made up 4% of total crashes.

The goal of the safe systems approach is to reduce the number of severe crashes occurring, making the City's lack of fatal crashes and lower than average percentage of broadside and approach turn crashes significant. Reducing crash types with the highest number and percentage of injury crashes would help the City achieve an eventual goal of a substantial reduction in significant injury crashes. The types with the highest number of injuries included rear-end, broadside, and parked motor vehicle crashes. The types with the highest percentage of injury to total crashes involved bicyclists, pedestrians, and objects. Additionally, each of the embankment and sideswipe opposite direction crashes resulted in injury.

[8] Workbook: CDOT Crash Summary (state.co.us)

Crash Type and Severity

Consistent with the Safe Systems Approach, the goal of this project was to reduce the severity of crashes in Castle Pines. The first step was to understand the types of crashes occurring most frequently, and those crashes that resulted in the highest percentage of injury.

As shown in Table 1, rear end crashes were the most common, encompassing 31% of the total crashes, of which 16% resulted in injury. Other more common crash types included broadside, parked motor vehicle, wild animal, sideswipe same direction, and approach turn crashes. Of these crash types, broadside, wild animal and approach turn crashes resulted in the highest percentages of injury. The remaining crash types encompassed less than 5% of the total crashes, but many of the fixed object crashes and crashes involving a bicycle or pedestrian resulted in more severe crashes than the types already mentioned.

Table 1. 2018-2022 Reported Crashes / Crash Type by Severity

Crash Type	Crash Count		Total Crashes	Percent of Total	Percent of Injury to Total Crashes
	PDO*	Injury (A,B,C)*			
Rear End	62	12	74	31.0%	16%
Broadside	25	5	30	12.6%	17%
Parked Motor Vehicle	23	0	23	9.6%	0%
Wild Animal	16	2	18	7.5%	11%
Sideswipe Same Direction	15	0	15	6.3%	0%
Approach Turn	12	2	14	5.9%	14%
Curb or Island	8	3	11	4.6%	27%
Overtaking Turn	8	0	8	3.3%	0%
Fence or Fence Part	7	0	7	2.9%	0%
Other Fixed Object	5	2	7	2.9%	29%
Traffic Sign or Post or Overhead Sign Structure	7	0	7	2.9%	0%
Other Object	3	1	4	1.7%	25%
Traffic Signal Pole or Equipment	4	0	4	1.7%	0%
Pedestrian	1	2	3	1.3%	67%
Bicycle or Pedal Cycle	0	2	2	0.8%	100%
Head On	2	0	2	0.8%	0%
Trees or Shrubs	2	0	2	0.8%	0%
Vehicle Cargo or Debris	2	0	2	0.8%	0%
Culvert or Headwall	1	0	1	0.4%	0%
Delineator Post	1	0	1	0.4%	0%
Embankment or Ditch	0	1	1	0.4%	100%
Large Boulder	1	0	1	0.4%	0%

Crash Type	Crash Count		Total Crashes	Percent of Total	Percent of Injury to Total Crashes
	PDO*	Injury (A,B,C)*			
Light or Utility Pole	1	0	1	0.4%	0%
Sideswipe Opposite Direction	0	1	1	0.4%	100%
Totals	**206**	**33**	**239**	**100%**	**100%**

*PDO – Property Damage Only

*Injury A (Serious Injury), B (Visible Injury), C (Complaint of Injury)

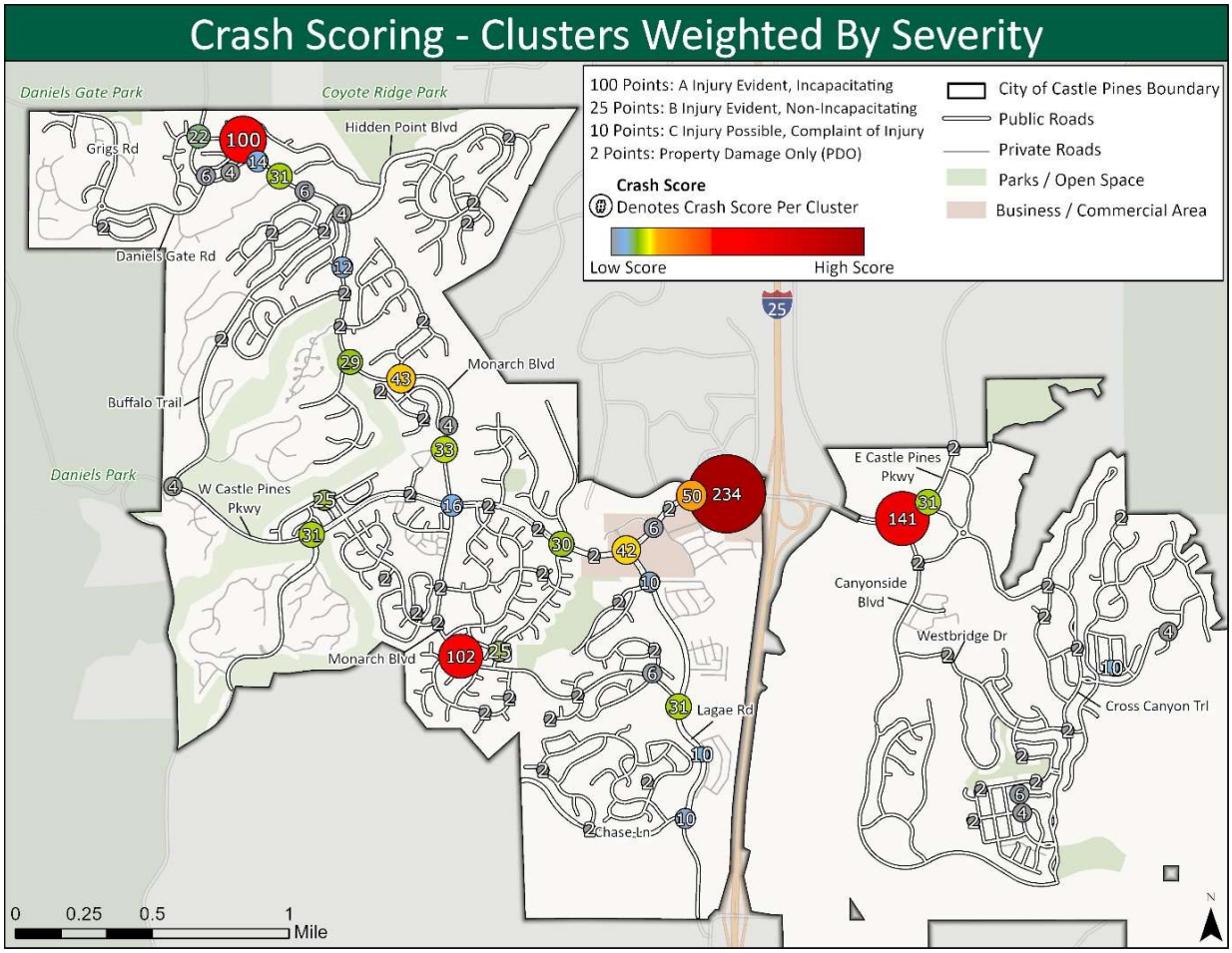
Network Severity

There is a quantifiable cost associated with every crash, ranging from $1.8M for a fatal crash to $5,700 for a property damage only crash. Using the cost of crashes as a basis for weighing crash severity, each crash type was assigned a relative score.

- Type A Injury (Incapacitating) – 100 points
- Type B Injury (Non-Incapacitating) – 25 points
- Type C Injury (Complaint of Injury) – 10 points
- Property Damage Only – 2 points

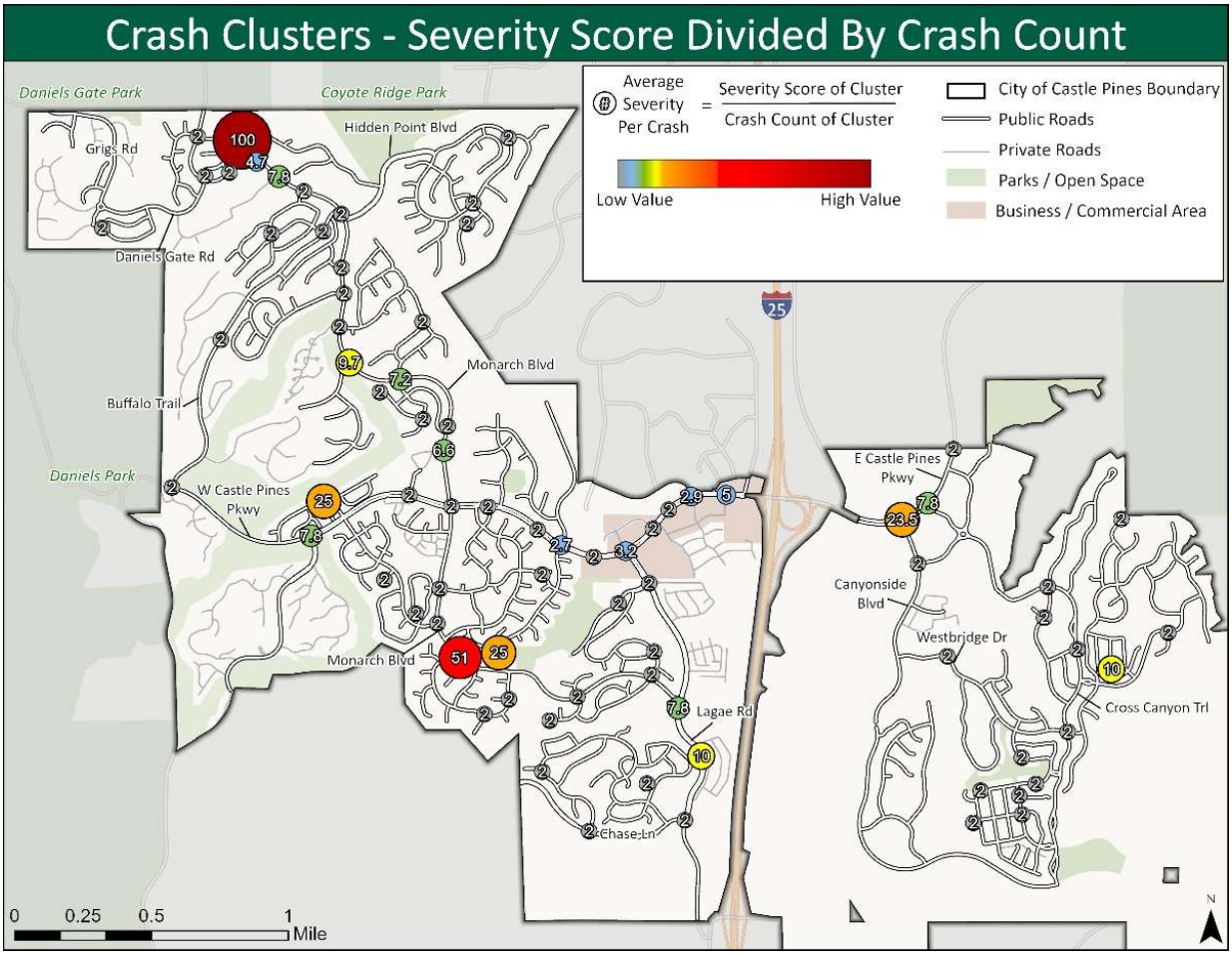
These scores were applied to each crash on the network. The resulting scores by location, are shown on Figure 7 below. Larger numbers generally represent areas where more severe crashes occurred. In the case of Castle Pines Parkway at Debbie Lane or Canyonside Boulevard, the combination of the number of crashes and the severity of those crashes, resulted in a higher score.

Figure 7. Weighted Crash Scores



Seeking to better understand locations that resulted in a higher percentage of severe crashes than others, the weighted crash scores were divided by the total number of crashes to determine average crash severity by location. Figure 8 shows the results of this analysis. The closer the score is to 2, the fewer injury crashes occurred at that location. Locations with an average score approaching 10 or higher are those where a high percentage of the overall crashes at that location resulted in an injury. In the four cases where the average score is 25 or higher, only one crash occurred, but it was either a Type A or Type B crash, resulting in a higher score.

Figure 8. Crash Severity Divided by Crash Count



Crash Hot Spot Locations

Using the total crash scores, weighted crash scores, and average crash severity, shown in Figures 7, 8, and 9, throughout this section, a list of top crash hot spot locations was identified and is shown in Table 2, below. These locations were generally prioritized based on either total number of crashes and/or the average crash severity.

Table 2. Top Crash Locations

Location (In priority order)	Total Crashes	Weighted Crash Score	Avg Crash Severity
1) Castle Pines Pkwy/Debbie Ln	44	228	5.2
2) Castle Pines Pkwy/Charter Oaks Dr	15	46	3
3) Castle Pines Pkwy/Lagae Rd	12	40	3.3
4) Castle Pines Pkwy/Canyonside Blvd	6	141	23.5
5) Monarch Blvd/Briar Cliff Dr	6	43	7.17
6) Monarch Blvd/Glen Oaks Ave	3	29	9.7
7) Castle Pines Pkwy/Cross Canyon Trl	3	29	9.7
8) Monarch Blvd/Esperanza Dr	3	29	9.7

Location (In priority order)	Total Crashes	Weighted Crash Score	Avg Crash Severity
9) Monarch Blvd/Bristlewood Ln	5	33	6.6
10) Castle Pines Pkwy/Yorkshire Dr	11	30	2.7
11) Monarch Blvd/Tapadero Way/Serena Ave	10	20	2
12) Monarch Blvd/Brambleridge Dr	6	12	2
13) Lagae Rd/Mira Vista Ln	5	10	2
14) Lagae Rd/Chase Ln	5	10	2

Systemic Analysis

Method

A systemic analysis was completed to evaluate roadway characteristics and determine locations where the potential for future crashes was higher. Those locations may or may not have an existing crash pattern. A total of nine (9) risk factors were considered in this analysis including:

- Functional Classification
- Posted Speed Limit
- Total Number of Thru Lanes
- Presence of Shoulder or Bicycle Lane
- Presence of Sidewalk
- Median Type
- Sidewalk
- Zoning
- Crosswalks

For each of these factors, data regarding existing crashes, existing crashes per lane mile, crash reduction factors, and proven safety countermeasures were evaluated. Scores were then applied to each of the risk factors, yielding a relative level of risk both for local roads and collector/arterial roads. Figure 9 shows the results of this analysis.

Findings

Using the nine (9) risk factors as a starting point, the total number of crashes and crashes per lane mile for each category of road were calculated. As shown in Table 3, a total of 46 crashes occurred on local roads, all of which were 25 mph, 2-lane roadways and zoned as “other” (primarily residential). Crashes associated with other risk factors such as presence of bike lane, sidewalk, median type, and crosswalk zones varied slightly.

Table 3. Risk Scores for Local Roads

Potential Risk Factor	Categories	Total # of Crashes	Total % By Type	2018 - 2022 Crash History: Total # Lane Miles	2018 - 2022 Crash History: Crashes Per Lane Mile	Risk Score
Total Number of Crashes		46	100%	39.8	1.2	N/A
Functional Classification	Local	46	100%	39.8	1.2	1
Speed Limit	15 mph	0	0%	0.02	0	0
	20 mph	0	0%	0.1	0	1
	25 mph	46	100%	39.7	1.2	2
	30 mph	0	0%	0	0	-
	35 mph	0	0%	0	0	-
	40 mph	0	0%	0	0	-
Total Number of Thru Lanes	2 Lanes	46	100%	39.8	1.2	0
	3 Lanes	0	0%	0	0	-
	4 Lanes	0	0%	0	0	-
	5 Lanes	0	0%	0	0	-
Presence of Shoulder or Bicycle Lane	Yes	1	2%	0.9	1.1	1
	No	45	98%	38.9	1.2	2
Median Type	None	42	91%	39.0	1.1	0
	Raised - Traffic Circle	0	0%	0.02	0	0
	Raised	4	9%	0.8	5.3	1
	Depressed	0	0%	0	0	-
	Painted	0	0%	0	0	-
Sidewalk	Yes	45	98%	37.2	1.2	0
	No	1	2%	2.6	0.4	3
Zoning	Other	46	100%	38.8	1.2	1
	Business/Commercial	0	0%	0.1	0	3
	Adjacent to School	0	0%	0.9	0	2
	Business/Commercial, Adjacent to School	0	0%	0	0	-
Crosswalk Zones	None	34	74%	37.3	0.9	2
	Striped Crossing	7	15%	2.3	3.1	1
	Crossing with Pedestrian Flashers	5	11%	0.2	23.3	2
	Crossing at Signal	0	0%	0	0	-

As shown on Table 4, the vast majority of crashes (193 crashes) occurred on collector or arterial roads. More than half of those crashes occurred on a road with a posted speed of 40 miles per hour, the presence of a shoulder or bike lane, median divided, and/or had a zoning of “other” (primarily residential). Roadway characteristics associated with crashes on collector and arterial roads varied significantly more than on local roads.

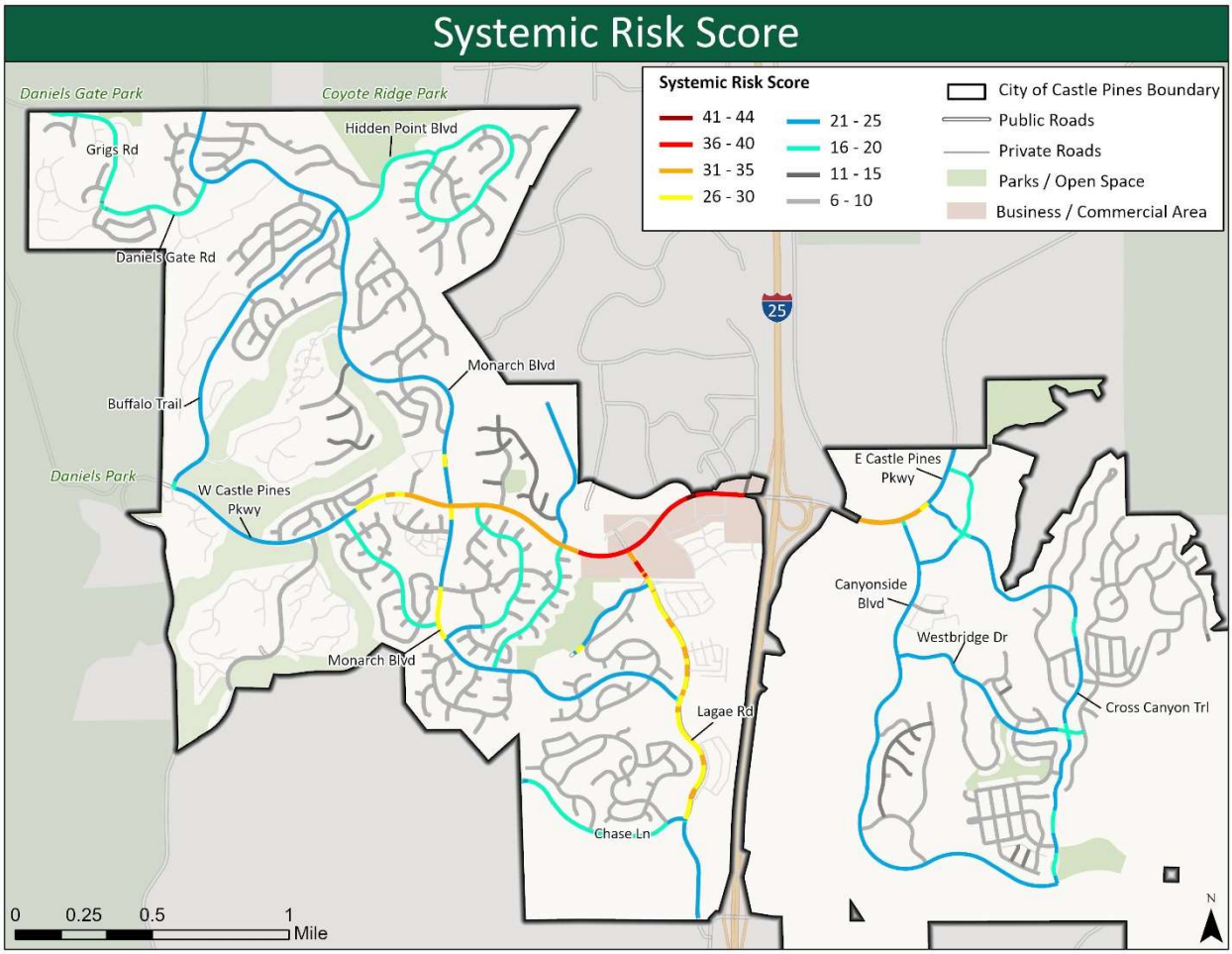
The evaluation above, showing the types of roads where crashes occurred, combined with research on proven safety countermeasures and crash reduction factors, was used to identify risk scores for each category of risk on local and collector/arterial roads. On collector and arterial roads, determining a level of risk was challenging because the risk could be quite high for a bicycle or pedestrian, but low for a vehicle. As a result, on arterial/collector roads, risk scores were assigned for vehicles and bicyclists/pedestrians separately. To determine the final level of risk on arterial/collector roads, a portion (75%) of the vehicular risk, and a portion (25%) of the bicycle/pedestrian risk was combined to determine a final score. The risk scores for all roads were applied to the roadway network. The result is shown on Figure 9. Roadways with higher risk scores include segments of Castle Pines Parkway, Monarch Boulevard, and Lagae Road.

Table 4. Risk Scores for Collector and Arterial Roads

				2018 - 2022 Crash History				
Potential Risk Factor	**Categories**	**Total # of Crashes**	**Total % By Type**	**Total # Lane Miles**	**Crashes Per Lane Mile**	**Vehicle Risk Score**	**Bike/ Ped Risk Score**	**Risk Score**
Total Number of Crashes		193	100%	20.5	9.4			
Functional Classification	Collector	22	11%	12.5	1.8	4	5	**4**
	Arterial	171	89%	8.1	21.1	6	8	**7**
Speed Limit	15 mph	9	5%	0.3	26.8	0	1	**0**
	20 mph	1	1%	0.5	1.9	1	2	**1**
	25 mph	13	7%	5.8	2.2	2	3	**2**
	30 mph	4	2%	1.3	3.0	4	5	**4**
	35 mph	66	34%	10.7	6.2	5	7	**6**
	40 mph	100	52%	1.9	54.0	6	10	**7**
Total Number of Thru Lanes	2 Lanes	77	40%	17.1	4.5	0	0	**0**
	3 Lanes	12	6%	0.9	13.3	3	3	**3**
	4 Lanes	43	22%	2.3	18.5	7	7	**7**
	5 Lanes	61	32%	0.2	261.9	8	8	**8**
Presence of Shoulder or Bicycle Lane	Yes	102	53%	14.2	7.2	1	4	**2**
	No	91	47%	6.3	14.3	3	6	**4**
Median Type	None	60	31%	13.7	4.4	4	3	**4**
	Raised - Traffic Circle	9	5%	0.5	18.1	3	3	**3**
	Raised	113	59%	4.2	27.2	2	4	**3**
	Depressed	2	1%	0.2	8.3	2	4	**3**
	Painted	9	5%	2.0	4.5	3	5	**4**
Sidewalk	Yes	193	100%	19.6	9.9	0	0	**0**

				2018 - 2022 Crash History				
Potential Risk Factor	**Categories**	**Total # of Crashes**	**Total % By Type**	**Total # Lane Miles**	**Crashes Per Lane Mile**	**Vehicle Risk Score**	**Bike/ Ped Risk Score**	**Risk Score**
	No	0	0%	1.0	0	1	5	**2**
Zoning	Other (*Generally Residential)	103	53%	18.7	5.5	1	1	**1**
	Business/Commercial	64	33%	0.7	94.8	6	4	**6**
	Adjacent to School	8	4%	1.0	7.8	4	6	**5**
	Business/Commercial, Adjacent to School	18	9%	0.1	128.9	10	8	**10**
Crosswalk Zones	None	51	26%	16.8	3.0	2	8	**4**
	Striped Crossing	20	10%	3	7.1	4	6	**5**
	Crossing with Pedestrian Flashers	33	17%	0.5	70.9	3	4	**3**
	Crossing at Signal	89	46%	0.5	186.8	5	4	**5**

Figure 9. Systemic Risk map



Policy, Process and Design Guidance

Policy / Process

Part of the safety analysis was a comprehensive review of the City's transportation policies and mobility design standards. The purpose was to identify prospective additions or amendments that could, through plans, policies, or standards, enhance multimodal safety and contribute to reducing significant injuries and maintaining a baseline of zero fatalities.

This included a review of the City's most current Comprehensive Plan, Transportation Master Plan, Parks and Recreation Comprehensive Plan, Roadway Design and Construction Standards, and Final Trails Master Plan. This section covers recommended changes intended to improve roadway safety for all ages, abilities, and modes.

- **Develop and adopt a Complete Streets Policy or Resolution –** This would reinforce and formalize the City's commitment to the design, retrofit, and construction of streets to accommodate safe travel by all users and can better position the City for the pursuit of certain grants (i.e. CDOT Revitalizing Main Street Grants, Safe Routes to School Grants).

- **Develop and adopt a Bicycle / Pedestrian Master Plan –** This would provide the City with a list of prioritized, phased recommendations based on needs, community concerns, and crash hot spots. It could also include a Safe Routes to School map identifying priority projects for safe walking / biking to and from schools. A prioritized list would enable staff to be more methodical in the allocation of City funds and competitive in the pursuit of grants.
- **Trails Master Plan Amendment -** The City's Trails Master Plan does not currently have a prioritized or phased list of projects. Because trails serve a critical role in off-street multimodal travel throughout the community, a prioritized list would enable staff to be more methodical in the allocation of City funds and competitive in the pursuit of grants.
- **Annual Resurfacing Projects** - As part of annual roadway resurfacing projects, the City should maximize opportunities to stripe new bike lanes (minimum 4 feet in width, not including the gutter) on collector and arterial roads where they don't currently exist. Unless the City already has a list and map of planned on-street bicycle facilities, these should be identified through the Bicycle / Pedestrian Master Plan (see prior recommendation).
- **Crosswalk Policy –** Consider development and adoption of a new policy that discourages the placement of crosswalks in locations where adequate stopping sight distance (per the AASHTO Greenbook) is not provided. If speeds can be reduced to allow for adequate stopping sight distance, then crosswalks can be considered.

Design Guidance

The following recommendations are based on a review of the City's Roadway Design and Construction Standards (2022). Some are shown as tracked changes to make clear what revisions are recommended.

Page 5-7, Section 5.3:

- Driveway openings shall be located at the point of optimum sight distance along the street. For openings and driveways to commercial establishments, there shall be sufficient space cleared of any obstructions so that drivers entering or exiting the property are given sufficient sight distance to enable them to make proper and safe turning movements, as outlined in section 7.11.4 of these standards. The profile of a driveway approach and the grading of the adjacent area shall be designed so that when a vehicle is located on the driveway outside the travel lanes of the street, the driver can see a sufficient distance in both directions to enable the driver to safely enter the street without impeding traffic flow.

Page 5- 10: Section 5.5.4 Sight Distance: Sight distance for curb openings to private property shall consist of a sight triangle conforming to the requirements of these Roadway Standards.

- Change language to say, "conforming to section 7.11.4 of these Roadway Standards."

Page 6-1: 6.1.2 Scoping the TIS:

- The Applicant is strongly suggested to discuss projects with City staff prior to starting the TIS. The Applicant may request a meeting or phone conversation. Topics for discussion may include project phasing, trip generation, directional distribution of traffic, trip assignment, study area definition, intersections requiring capacity or level of service (LOS) analysis, analysis time periods, traffic safety analysis, truck traffic limitations, signal timing policies, and methods for projecting interim and buildout volumes as applicable. The potential effects on bicycle /

pedestrian facilities and travel should also be reviewed by the applicant and discussed with City staff, if applicable.

Page 6-3: 6.2.3 Existing Conditions:

- Add a fifth item to list (Items 1 -4) such that on-street bicycle / pedestrian facilities and off-street trail facilities are assessed as part of the existing conditions within the study area.

Page 6-6, Item 5 (Traffic Safety):

- In discussion of potential safety strategies, add a provision requiring applicant or developer to refer to recommendations in the Safe Streets for All Comprehensive Safety Action Plan (2024). In addition, if the proposed project overlaps with or would potentially exacerbate a crash problem identified in the SAP, consider requiring that applicants evaluate the most up to date crash data (2023 or later).

Page 7-1: 7-2 Roadway Design and Technical Criteria

Basic considerations in the design of circulation systems must recognize the following factors:

- Safety – for both vehicular and pedestrian/bicycle traffic
- Enable vehicular and pedestrian and bicycle access
- Minimize pedestrian-/bicycle vehicular conflicts

Pages 7-2 & 7-3, Table 7-1, Summary of Roadway Construction Standards

- Curbs and Walks – While 4 foot is the minimum design standard for compliance with the Americans with Disabilities Act (ADA), it's recommended that the minimum be increased to a 6-foot-wide sidewalk if attached to the curb and a minimum of 5 feet if separated by a buffer, for Local and Local Special Use designations.
- Table 7-1 should specify that sidewalks are required on both sides of the street and bike lanes should be included in the description of street sections, as applicable.
- Table 7-1 should consider removing or updating maximum design traffic volumes to be applicable to current roadway volumes.
- Functional Classification – The functional classifications listed in the Roadway Design Manual, the Transportation Master Plan, and existing GIS data need to be reconciled. The discrepancies between functional classification in each of these resources prevents identification of appropriate standards by roadway. Table 5 below shows the functional classifications associated with each of these three resources. Additionally, when the functional classification is applied to roads in the City, the 2024 GIS data and the 2007 Transportation Master Plan need to be reconciled. Between 2007 and 2024, many roads were reclassified from collector to arterial roads. As a result, many, if not all of those roads are unable to meet the current arterial road standards such as number of lanes, right-of-way width, street sections, and design/posted speeds in the Roadway Design Manual.

Table 5: Variations in Functional Classification

Resource	Year	Functional Classification Categories
Roadway Design Manual	2022	Principal Arterial, Minor Arterial, Major and Minor Collector, Local Special Use (Commercial and Industrial), Local Special Use (Entry Street), Local, and Local (Cul-de-sac)
Transportation Master Plan	2007	Interstate Highway, Arterial, Collector, Other
GIS Data	2024	Arterial, Collector, Local, Private

Page 7-14, Figure 7-9. Collector Typical Section

- Recommend reducing lane widths from 12-feet to 11-feet for traffic calming purposes and increasing bike lane width from 7-feet to 8-feet. Accounting for 2-foot gutter pans on each side of road, this would accommodate 6-foot-wide bike lanes and allow for greater separation between bicyclist and motorists than 5-foot lanes.

Pages 7-16 & 17: Figures 7-10 and 7-11

- The Minor Arterial Typical Sections show high speed mountable curbs along edge of roadway. Please consider whether inclusion of this curb type presents an increased safety concern in the event of vehicle departure from the roadway and whether vertical curb and gutter, as shown on Figure 7-9, could reduce risk.

Page 7-21, Section 7.4. Sidewalks, Trails, and Curb Ramps –

- Contact the City to determine whether there are planned designated City of Castle Pines Bicycle Facilities or existing or planned designated school routes that need to be considered in the design.
- Recommend modifying this text as, Development Review. In completing a development application review (checklist), applicants must contact the city to determine whether there are planned bicycle or pedestrian facilities or existing / planned school routes in the area to be affected by development that need to be considered in the design.

Page 9-5, Section 9.6.8 - Bike Lanes

- Include specifications about the materials to be used for striping of bike lanes for enhanced durability (e.g. thermoplastic paint).

Page 9-6: Section 9.6.8.1 - Bike Lane Width

As currently written, 'The minimum bike lane width on a roadway with no curb and gutter is 5 feet. On a roadway with curb and gutter, the minimum width of a bike lane is 5 feet, measured from the face of curb. Exceptions shall be approved by the City on a case-by-case basis.'

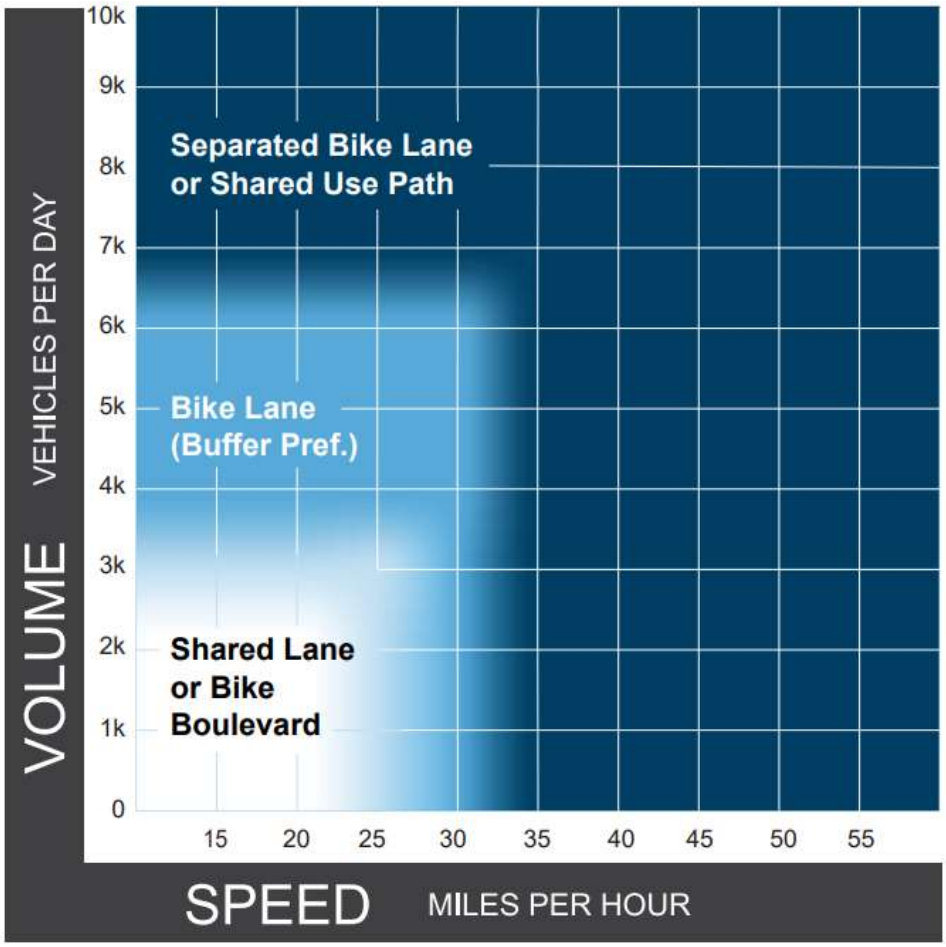
This language suggests that the 2-foot gutter pan is counted as rideable surface area. If that is the case, actual riding surface could be limited to 2 -3 feet in some cases. If this is an accurate interpretation, this is inconsistent with NACTO's design guidance, "The recommended width of a bike lane is 1.5m(5 feet) from the face of a curb or guardrail to the bike lane stripe" and AASTO's "If the [longitudinal] joint is not smooth, 1.2m(4 feet) of ridable surface should be provided."

- Please consider revisions to clarify that a minimum of 4-5 feet of rideable surface area, not including the gutter pan, is the standard.

Page 9-6: Bike Facility / Lane Types

The existing document identifies some facility types but does not provide sufficient detail to guide facility type selection. Using guidance from FHWA's Bikeway Selection Guide, as shown in Figure 10, consider inclusion of a comparable exhibit in the standards to help staff and project applicants select the appropriate facility type; shared lane, standard bike lane, buffered bike lane, or protected bike lane.

Figure 10. USDOT Federal Highway Administration Preferred Bikeway Type Chart



Page 9-6: 9.6.8.4 Shared Lanes

- In reference to local roadways with low volumes and speeds, recommend including an intended maximum volume (less than 2,500 vpd) and desired maximum posted speed (i.e. 25 mph).

Page 9-6: 9.6.8.5 Buffered Bike Lanes

- Include a new sub-section on and reference to design guidance for vertically separated /protected bike lanes. New section should follow Section 9.6.8.5.

Public Engagement

Receiving feedback and expertise from partners and members of the Castle Pines community has been critical to development of the SAP. To ensure the SAP meets the current and future needs of the community, the project team used various methods of online and in-person engagement to solicit feedback. This was done through collaboration with stakeholders, an oversight committee, and the public. A summary of project engagement activities and how they have helped shape recommendations are described below. An expanded overview of public engagement completed for the SAP is provided in Appendix A.

Oversight Committee

Consistent with FHWA's guideline for SAP certification, an oversight committee was formed to help guide the project and ensure the SAP aligns with community goals and expectations. Members of this committee included representatives from the Colorado Department of Transportation (CDOT), the Denver Regional Council of Governments (DRCOG), City Staff and the City Council. This committee met twice during SAP development to discuss the project and provide feedback on the draft recommendations. Comments from committee members were considered in the development of final recommendations included later in this SAP.

For the first meeting, each member of the committee offered useful guidance on key considerations related to roadway safety in general, the crash analysis specific to Castle Pines, and the unique needs of the system's most vulnerable users including bicyclists and pedestrians, youth, the elderly, and the disabled.

In the second meeting, the project team provided the committee with a complete overview of the historical crash analysis and systemic analysis, followed by a discussion of the draft recommendations. Committee members provided comments, which were accounted for in an updated set of final recommendations.

During the final two months of plan development, the committee member from DRCOG reached out to City Staff to request inclusion of select recommendations into a regional Safe Streets for All application. Staff and the project team collaborated and ultimately four projects (recommendations) were included and will be considered for grant funding.

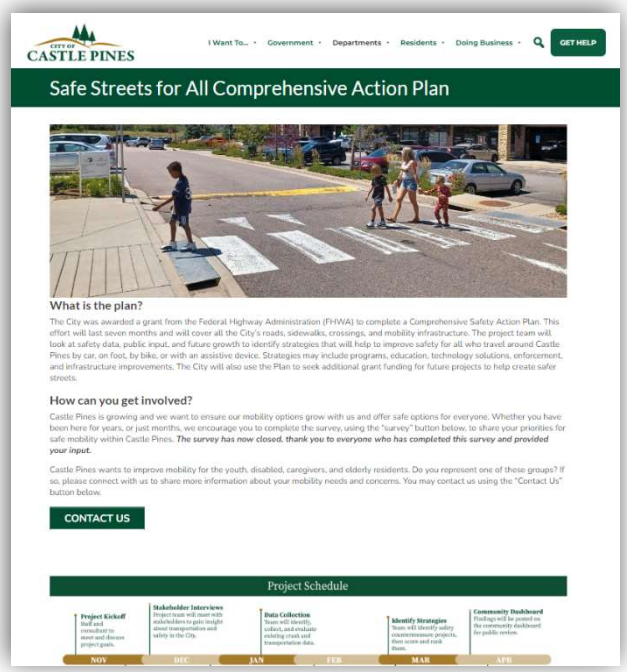
Following plan adoption, the City Staff member and City Council member who served on the committee will be most directly involved in implementation and monitoring of the Action Plan. With support from other members of the committee, other Castle Pines staff, and community partners, they will pursue implementation of the prioritized projects listed in Tables 8 and 9 of this plan. Moreover, they will use the on-line community dashboard (https://www.castlepinesco.gov/strategic-plan/) to report on implementation project over time.

Community Outreach Activities

Key methods of community engagement used during the SAP's development included the following:

- **Project Webpage:** The Safe Streets for All Comprehensive Action Plan project webpage was added to the City's website and included links to the project survey and a "contact us" form. The project website had 286 users view the page 385 times from November 2023 to April 2024.
- **Flyer:** A one-page flyer was developed to inform people about the project and provide opportunities for them to interact. QR codes and weblinks were included for people to be able to access the project webpage and participate in the community survey. The flyer was distributed by Castle Pines staff to Ziggi's, The Exchange Coffee House, Pho 5, Dukes, Pinos, and Las Fajitas.
- **Survey:** The on-line community survey focused on key concerns by topic and location, identifying community priorities and areas for potential improvement. The survey opened on November 16, 2024, and was distributed through social media, school communication platforms, the community newsletter, and website. The survey stayed open for six weeks and a total of 551 responses were received.

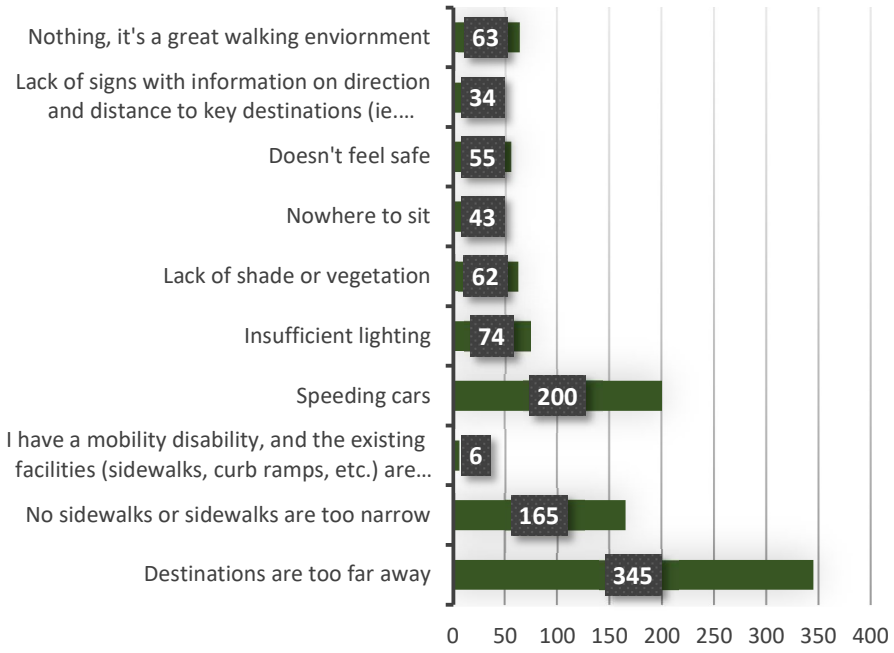
Figure 11. A link to the project webpage was included on the City's website.



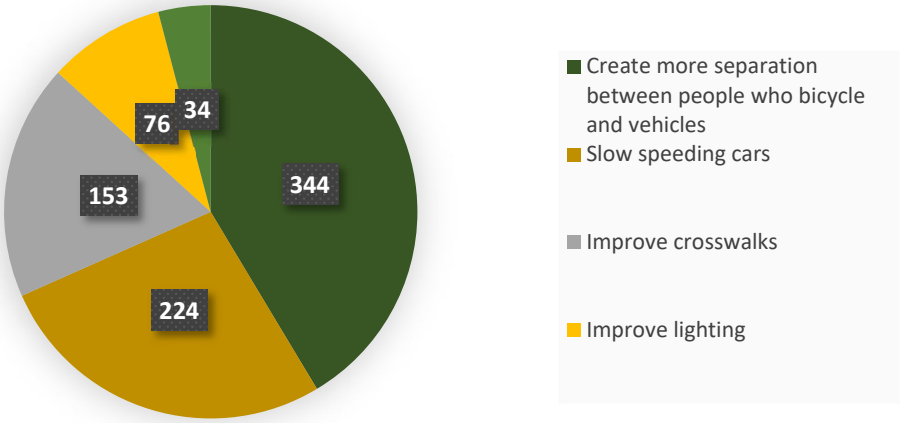
551 responses were received on the survey!

Survey participants were asked about their mode of travel within Castle Pines, whether they walk or bike and how they feel when doing so. They were also asked about any barriers that prevent them from walking or biking and what kinds of improvements would encourage more multi-modal travel. Notably, 22% of survey respondents were age 65 and over, and one respondent was handicapped, which helps inform how the system could be made safer for the elderly and disabled. A few highlighted survey responses are shown below.

What prevents you from walking to destinations in Castle Pines more often?



What do you think are the most beneficial ways to improve conditions for biking in Castle Pines?



Are there specific locations in Castle Pines where transportation safety is a concern for you? If so, briefly tell us where and why?

With 351 open-ended responses to this question, 37% included Monarch in their answer for this question. Several reoccurring themes were presented in response to this question. The top three themes identified are 1) speed, especially along Monarch & Castle Pines Pkwy and within the Canyons

neighborhood, 2) crossing streets as a non-motorist feels unsafe, and 3) congestion during school drop off/pickup. Below are a few sample responses that help to encapsulate some of the sentiments shared for this question.

"Yes. Speed of cars and pure unawareness and/or blatant disregard for speed limit and crosswalks on Monarch between Lagae and Castle Pines Parkway. I have stood at the crosswalk with a stroller and multiple children, and still had cars not only not stop but blow by way over the speed limit while attempting to cross."

"Yorkshire Drive between Monarch and Castle Pines Parkway. Cars speed frequently and there are many dog walkers and children crossing the street."

"Castle pines Parkway and Monarch. High traffic volume, speeding and inattentive drivers. Also, Daniels Gate drive and Monarch. Very heavy traffic in the mornings speed and inattentive drivers. Monarch in the open space for Speeding and aggressive driving."

"How is there no pedestrian connection between The Canyons and the rest of Castle Pines? There is no way to safely walk from The Canyons to anywhere else. Insufficient lighting and speeding cars make walking and bicycling unsafe in The Canyons. I realize it is a "dark skies" community, but safety is more important."

"Crossing Monarch due to fast, inattentive drivers."

"Crossing Castle Pines Parkway anywhere. Cars don't look for pedestrians in cross walks. Don't feel safe crossing the street by businesses or grocery store."

"All schools. The large number of cars that line up to drop off and pick up their children create a traffic hazard and congestion. Can't a solution be found for this with the school district?"

- **Focus Groups:** Three focus group meetings were held to specifically solicit input from stakeholders on school access and safety, bicyclist / pedestrian safety, and mobility for the elderly, disabled, and care givers. Anyone who indicated interest in participating was invited to one of the three focus groups detailed below.
    a. **School Safety Representatives:** Representatives from local schools, including teachers, parents, and administrative personnel were contacted to be part of the school safety-focused forum.
    b. **Bicycle & Pedestrian Representatives**: Local bicycle and pedestrian representatives were contacted to be part of the bicycle and pedestrian-focused forum.
    c. **Elderly Citizens and Caregivers:** Residents and caregivers from the Legacy Village community, which is a retirement community located within Castle Pines, were invited to participate at the final forum to provide feedback about the elderly demographic and their priorities for traffic and transportation safety.

  The focus group meetings were hosted in the months of January & February 2024. Details about each of these events are included in Table 6. Each forum followed a similar style and agenda.

The project team introduced the project to participants, explaining the study's goals, objectives, and timeline. The team also provided context about the data and engagement that would be used to help shape safety recommendations. The team then facilitated discussions with the groups where participants were able to voice their concerns and ideas on how to improve multimodal safety. An online interactive map was provided for the virtual events, and a physical map board was used for the in-person event so that participants could pinpoint specific locations for their comments. The mapping exercise gave participants the ability to identify challenges, problems, and opportunities for improvement.

Table 6: Public Forum Information

Name	Date/Time	Location	Intended Audience	Recorded Attendees
Forum #1: School Safety	1/24/2024, 5:30-6:30p	Virtual	Residents who live near schools, parents of students, school employees	7
Forum #2: Bike & Pedestrian Safety	1/24/2024, 5:30-6:30p	Virtual	People who walk or bike in the community	7
Forum #3: Elderly, Caregiver and Disabled	2/7/2024, 3:30-4:30p	In-Person at Legacy Village Senior Living Community	Older population	6

Key Takeaways

Several key issues rose to the top as the project team engaged with the public and stakeholders. The top five themes include walking, biking, driving, schools, and speed. A detailed explanation of these engagement themes is included in the engagement summary, found in Appendix A. The top three takeaways from the community engagement process were:

- **Mobility choices are influenced by safety concerns.** Most community members drive a personal vehicle to travel within Castle Pines, but many are interested in walking and biking. Barriers such as speeding cars, missing sidewalk segments or biking facilities, and distance to destinations disincentivize non-vehicular modes of travel.
- **Arterials are areas of safety concerns.** Monarch Boulevard was mentioned the most when people were asked about transportation safety concerns. There are several areas along Monarch where visibility is an issue, and most intersection crossings feel unsafe to people.

"Speeding is a major problem right now. Not only is it a concern just driving around, walking across the street or being outside, it puts the wildlife (and drivers) at risk of catastrophic collisions… There are ways to calm traffic speeds without enforcement but added enforcement would also help."
– Survey Respondent

Crossing intersections, most commonly along Monarch or Castle Pines Parkway, as a pedestrian or cyclist feels unsafe and uncomfortable to people.

- **School access and student safety are a priority.** Student safety is a top priority and residents are concerned about kids traveling to school by bike or on foot given missing sidewalk connections and a feeling that there is a lack of safe crossings.

Location-Based Feedback

Based on feedback from the focus groups and the survey, a map of location-based input was developed to highlight some of the key areas of concern. Figure 12, and corresponding Table 7, illustrate where the top 3 comments were received relating to intersections, roadways segments, schools, parks, and places. This map-based input, along with crash data and the systemic evaluation informed the recommendations described later in this document. The letters and numbers shown on the map correspond to those provided in the subsequent table.

Figure 12. Mapped Location-Based Survey and Forum Comments

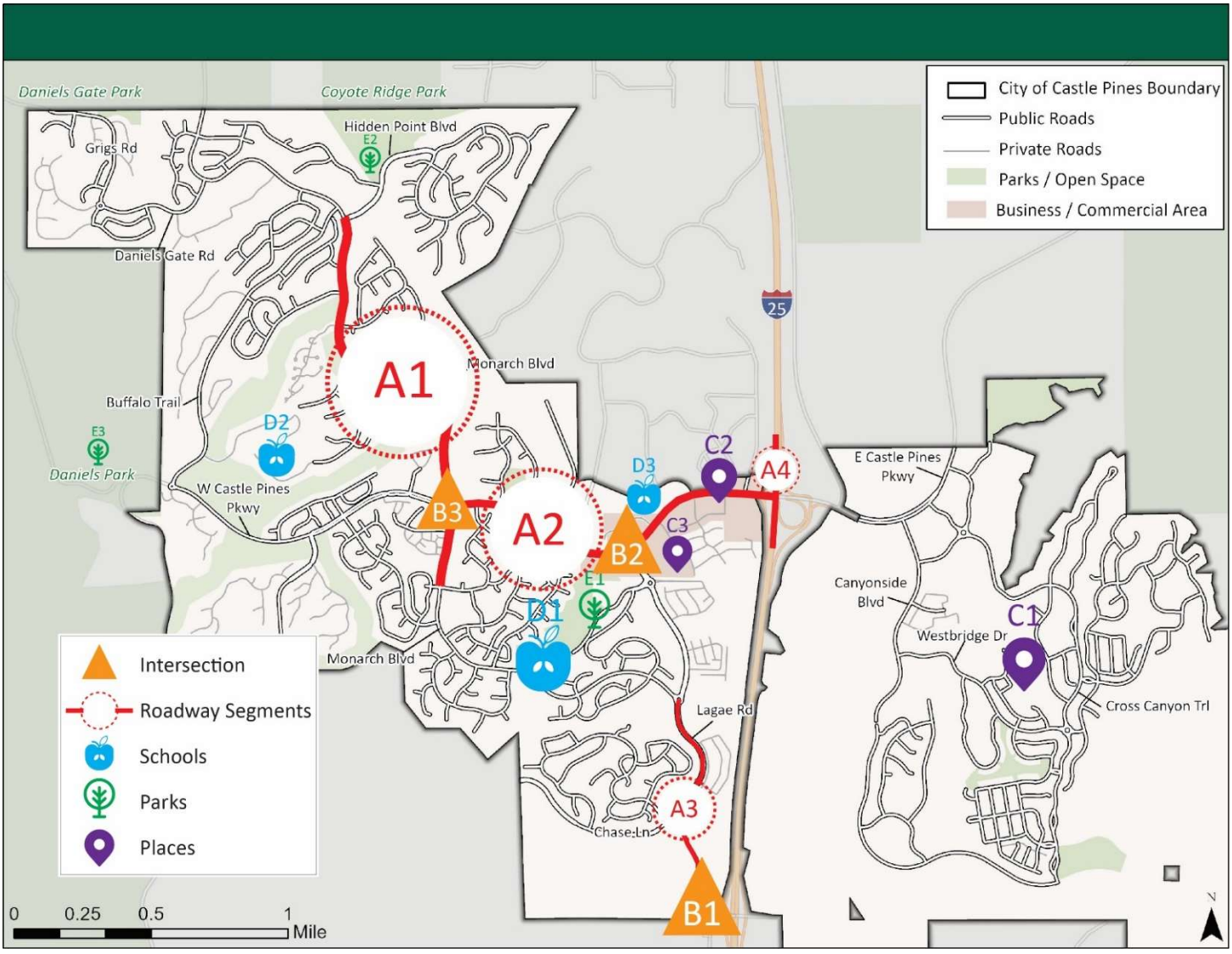


Table 7: Summarized Location Based Responses

A	Roadway Segments	# of Comments	Summary of Responses
1	Monarch Blvd	116	Too many speeding cars. Bike lanes need improvement and are dangerous because of the lack of separation and potholes, which causes cyclists to enter the vehicular lane. Drivers lack awareness and as a pedestrian it feels unsafe to cross Monarch, even in the crosswalks. The road is generally in need of repair. More traffic lights and visible crosswalks are needed.
2	Castle Pines Parkway	83	Speeding is rampant. Need safer access across I-25 to connect to the newer development and trails. Drivers lack awareness and it doesn't feel safe as a pedestrian or cyclist. Missing sidewalk connections, most notably around the shopping center.
3	Lagae Rd	25	Speeding cars even with the roundabouts in place. Better separation between cars and cyclists is needed.
4	I-25	19	Crossing I-25 on Castle Pines Pkwy as a pedestrian or cyclist is very dangerous. Interchange is very congested.
B	Intersections	**# of Comments**	**Summary of Comments**
1	Lagae Rd & Happy Canyon Rd	20	Bad visibility and speeding cars make this a very dangerous intersection. Happy Canyon makes a dangerous turn, which causes cars to back up. Multiple people said they have witnessed accidents. Need a traffic signal here.
2	Lagae Rd & Castle Pines Pkwy	17	Very busy intersection with speeding cars. Feels very unsafe as a pedestrian to use the crosswalk – several people talked about having a close brush with a car as a pedestrian.
3	Castle Pines Pkwy & Monarch Blvd	12	Dangerous intersection for pedestrians. Again, several comments about cars not paying attention to pedestrians in the crosswalk and almost causing an accident. Vehicles blow through right hand turn on red.
C	Places	**# of Comments**	**Summary of Comments**
1	The Canyons	26	No pedestrian or cyclist-friendly way to travel from The Canyons across I-25 to the west side of City. Speeding is a major issue.
2	Business District	8	Missing pedestrian and cyclist connections to this area. More sidewalks are needed within the shopping center.
3	King Soopers	5	Would like to be able to walk/bike to King Soopers, but current conditions don't make this feel safe.

D	Schools	# of Comments	Summary of Comments
1	American Academy	20	Needs to be a school zone to ensure safety for children. Speeding near American Academy is prevalent. Crossing Yorkshire to get to American Academy is very dangerous.
2	Buffalo Ridge	10	Crossing near the school is dangerous due to speeding cars.
3	DCS Montessori	5	Lots of backed up cars and congestion during pickup/drop off.
E	Parks	**# of Comments**	**Summary of Comments**
1	Elk Ridge Park	3	Crosswalk is needed to get to Elk Ridge Park. A bridge would be best because people drive too fast on Lagae/Happy Canyon.
2	Coyote Ridge	1	Lots of kids riding bikes and existing blind turns that could cause an accident.
3	Daniels Park	1	Would love to see a trail connection to Daniels Park.

Recommendations

This SAP was developed to help proactively identify traffic safety trends and develop recommendations that would help to reduce and eventually eliminate significant injuries on the City's roadway network.

Top Crash Locations

Recommendations for the top crash locations were identified through a review of historic crash data, field visits, community input, and staff feedback. Table 8 provides a summary of the recommendations for the 14 priority locations along with general timelines for when they could be deployed. Near term projects are expected to occur within 1-2 years, mid-term projects within 3-5 years, and long-term projects, greater than 5 years.

Table 8: Recommendations for Top Crash Locations

Location (In priority order)	Recommendations	Timeline for Implementation (near, mid and long term)
Castle Pines Pkwy/Debbie Ln	1) Consider signage indicating where to access businesses. 2) Add high friction surface treatment on Castle Pines approaches to the intersection. 3) Convert left turn traffic signals to flashing yellow arrow and restrict left turns when a pedestrian pushes the button to cross. 4) Add retroreflective backplates on all signal heads. 5) Add signage and striping on northbound and southbound approaches to clarify lane assignments and split phase the northbound and southbound approaches to the signal. 6) Add "Do Not Block The Box" striping on Debbie Lane at the 7-11 entrance.	• Mid • Near/Mid • Near • Near • Near • Near
Castle Pines Pkwy/Charter Oaks Dr	1) Add high friction surface treatment on Castle Pines approaches to the intersection. 2) Convert left turn traffic signals to flashing yellow arrow and restrict left turns when a pedestrian pushes the button to cross. 3) Add retroreflective backplates for all signal heads. 4) Update striping within the intersection.	• Near • Near • Near • Near
Castle Pines Pkwy/Lagae Rd	1) Conduct a stopping sight distance evaluation for eastbound vehicles. 2) Add high friction surface treatment on Castle Pines approaches to the intersection. 3) Convert left turn traffic signals to flashing yellow arrow and restrict left turns when a pedestrian pushes the button to cross. 4) Add retroreflective backplates on all signal heads.	• Near • Near • Near • Near
Castle Pines Pkwy/Canyonside Blvd	1) Observe future crash patterns to determine if the traffic signal has addressed historic crash patterns. 2) Review yellow and red clearance times to ensure adequate time for downhill vehicles to stop.	• Mid • Near
Monarch Blvd/Briar Cliff Dr	1) Conduct a pilot project and install Streiter Lite reflectors to reduce wildlife crashes. 2) Work with property management company to improve maintenance of landscaping causing poor sight distance.	• Near • Near
Monarch Blvd/Glen Oaks Ave	1) Conduct a pilot project to install zig zag roadway striping on the approaches to the crosswalk to slow vehicles. 2) Conduct regular maintenance of landscaping to improve sight distance to approaching trail users.	• Mid • Near

Location (In priority order)	Recommendations	Timeline for Implementation (near, mid and long term)
Castle Pines Pkwy/Cross Canyon Trl	1) Add rumble strips along the edge line and/or deflectors to improve visibility of the unique westbound geometry.	• Near
Monarch Blvd/Esperanza Dr	1) Add high friction surface treatment on Monarch.	• Near
Monarch Blvd/Bristlewood Ln	1) Remove the inside northbound lane and expand the raised median to provide a median refuge for pedestrians. Start the northbound left turn lane after the crosswalk.	• Mid/Long
Castle Pines Pkwy/Yorkshire Dr	1) Convert left turn signal heads to flashing yellow arrow and restrict left turns when a pedestrian pushes the button to cross. 2) Add retroreflective backplates on all signal heads.	• Near • Near
Monarch Blvd/Tapadero Way/Serena Ave	1) Double post eastbound and westbound stop signs and add stop bar pavement markings. 2) Either install optical speed bars to reduce southbound speeds approaching the intersection or conduct a pilot project with zig zag roadway striping approaching the crosswalk in both directions. 3) Conduct a pilot project and install Streiter Lite reflectors to reduce wildlife crashes.	• Near • Near • Near
Monarch Blvd/Brambleridge Dr	1) Conduct pilot project and install Streiter Lite reflectors to reduce wildlife crashes.	• Near
Lagae Rd/Mira Vista Ln	1) Improve the signage striping and lane configuration when approaching the roundabout from the north. 2) Divert bicycles up to the sidewalk when approaching the roundabout from all directions.	• Near • Mid
Lagae Rd/Chase Ln	1) Install a roundabout.	• Mid/Long

Systemic Recommendations

The evaluation of risk factors on Castle Pines roadways, along with the public engagement and field visits, informed a set of systemic recommendations. For example, the 7.5% of wildlife crashes on Castle Pines roadways is nearly double the percentage of wildlife crashes occurring on roads statewide. Additionally, many of the bike lanes in Castle Pines are only 4 feet in width, including the gutter pan, while the design standard is a minimum of 4 feet, not including the gutter. Finally, limited sight distance at several locations on Monarch Boulevard, north of Castle Pines Parkway, is an issue. For drivers exiting side streets and pedestrians and bicyclists crossing the road, approaching vehicles have limited sight distance when coming around corners or over hills.

A total of 26 systemic recommendations were identified. Some apply to specific locations, but most could be applied at multiple locations throughout the network. These recommendations fall under the following categories:

- General
- Arterial & Collector
- Schools
- Bicyclists and/or Pedestrians
- Location Specific
- Signing & Striping
- Construction Zones

Table 9 provides a summary of the systemic recommendations in order of priority and includes the timelines when each could be deployed. A more detailed table which includes a crash summary, field notes, more detailed recommendations, and next steps is included in Appendix B.

Table 9: Systemic Recommendations (in order of priority)

Category	Recommendation	Timeline for Implementation (near, mid, and long term)
Bikes/Peds	Construct a new bicycle and pedestrian bridge over I-25	Long
Bikes/Peds	Consider restricting right turn on red and modifying signal timing to allow dedicated pedestrian phases or leading pedestrian intervals.	Near/Mid
Bikes/Peds	Zig zag roadway striping approaching trail crossings, in combination with RRFB's.	Mid
Schools	Evaluate traffic flow around schools and install bulb outs at crosswalks	Mid
Bicyclists	Bring bike lanes up to minimum width standards during resurfacing projects (as feasible)	Mid/Long
Bicyclists	Provide bail outs to transition bikes to the sidewalk when adequate on-street facilities do not exist	Mid
Location Specific	Monarch south of Castle Pines Pkwy: Narrow vehicle lanes to 10 feet and provide buffered bike lane. Install raised crosswalks with RRFB's.	Near/Mid
Pedestrians	Complete missing sidewalk gaps	Mid
Bicyclists	Increase the frequency of the existing street sweeping program to address debris in bike lanes	Near
Schools	Conduct a safe routes to school study for each of the schools	Mid
Location Specific	Monarch north of Castle Pines Pkwy: Evaluate 85th percentile speeds, stopping sight distance and sight triangles for side streets. Determine a safe speed then install physical features to achieve compliance with the target speed.	Near/Mid
Arterial/Collector	Install red protect technology at signals and evaluate yellow and red clearance times.	Near
Location Specific	Monarch, north of Castle Pines Parkway: Pilot project to install lower nighttime speed limits.	Near/Mid
Arterial/Collector	Install high friction surface treatments on roads requiring quick stopping due to geometry or speeds	Near
Signage/Striping	Evaluate frequency of existing striping contract	Near

Category	Recommendation	Timeline for Implementation (near, mid, and long term)
Location Specific	The Canyon: Consider installation of no parking signs on one side of the street when the distance from face of curb to face of curb is 28 feet or less. Update design standards to require adequate width to allow parking on both sides of the street.	Near
Location Specific	Castle Pines Parkway & Cross Canyon Trail: Extend raised median to obtain compliance of restricting turning movements and add lighting.	Mid/Long
General	Consider the installation of cameras that can detect distracted drivers.	Mid
General	Educational Campaign for young and elderly. Education of newer traffic conditions and controls, when to slow down.	Near
General	Conduct speed studies and install speed feedback signs and other traffic calming measures where appropriate. Work with Douglas County Sheriff to enforce speeds.	Mid
Schools	DCS Montessori School: Connect Yorkshire Drive and Charter Oaks Drive and widen Charter Oaks Drive to allow a shoulder for drop off and pick up.	Mid/Long
General	Educational campaign on roundabouts.	Near
General	Restrict permissive left turns at signalized intersections where negative left turn offsets exist. At unsignalized intersections where approach turn crashes are more common, consider an all way stop or roundabout.	Near/Mid
Location Specific	Castle Pines Parkway: Work with CDOT to add signage on I-25 off ramp indicating that vehicles who desire to turn left at Debbie Lane should use the inside right turn lane.	Near
Construction Zones	Ensure a qualified traffic engineer reviews and approves any traffic control plans and that field inspection with necessary adjustments are implemented.	Near
Signing & Striping	Identify standard for RRFB's and update signage to meet the standard.	Near/Mid

Examples of improvements that could be made at top crash locations are shown in Figures 13 – 15. Figure 13 provides a visual representation of the proposed improvements at Castle Pines Parkway and Debbie Lane. Figure 14 provides a visual representation of one option for implementation of recommended improvements at Monarch Boulevard/Tapadero Way/Serena Avenue. Other potential options for improvement at this intersection are noted in Table 8. Figure 15 shows a proposed systemic improvement to provide bail outs that would transition bicyclists to the sidewalk when adequate on-street facilities do not exist. While this improvement is shown at a roundabout, it would also be appropriate at locations where the on-street bike lane is inadequate (i.e. less than four feet in width, exclusive of the gutter).

Figure 13. Proposed Improvements of Castle Pines Pkwy & Debbie Ln

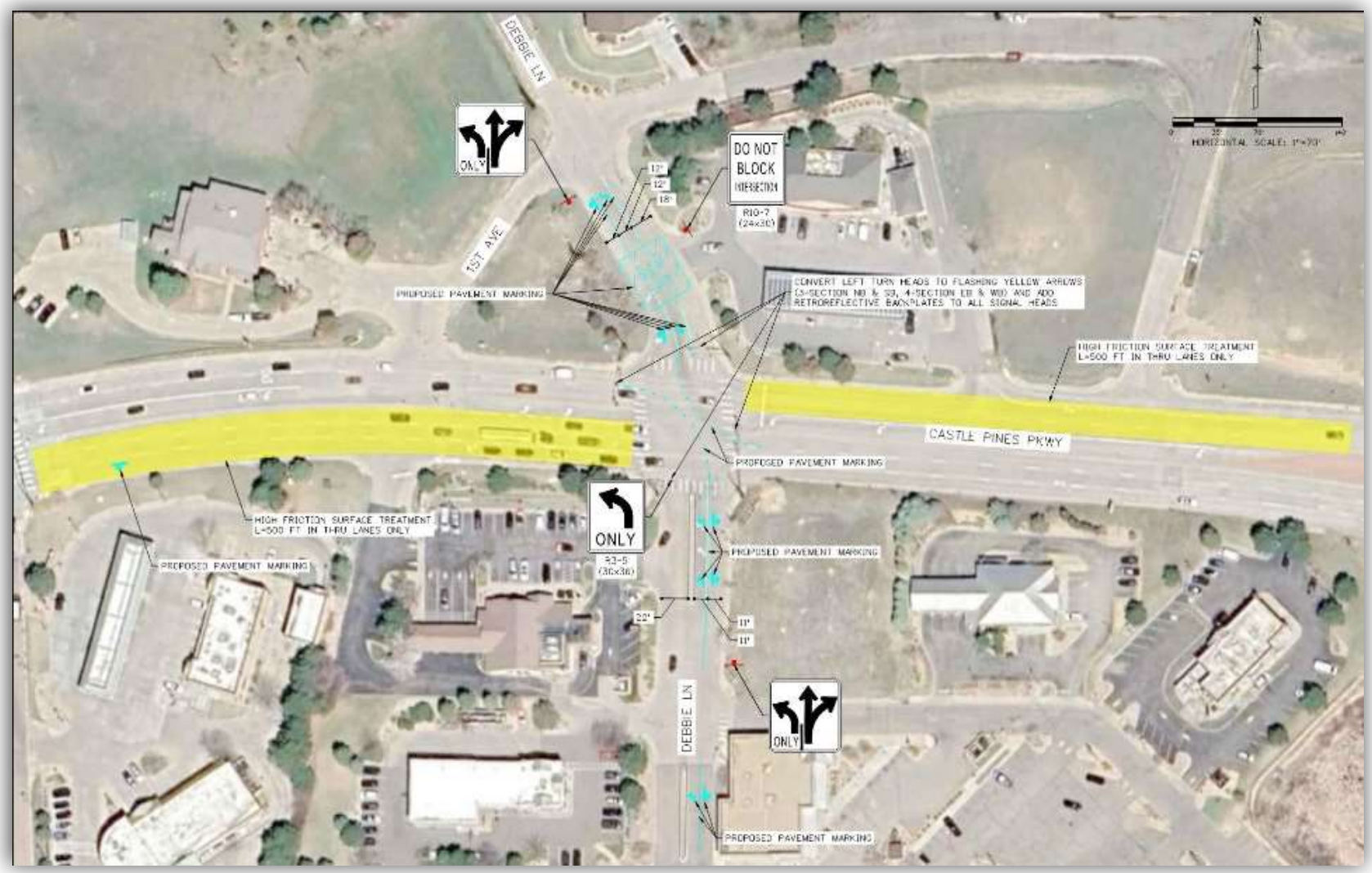
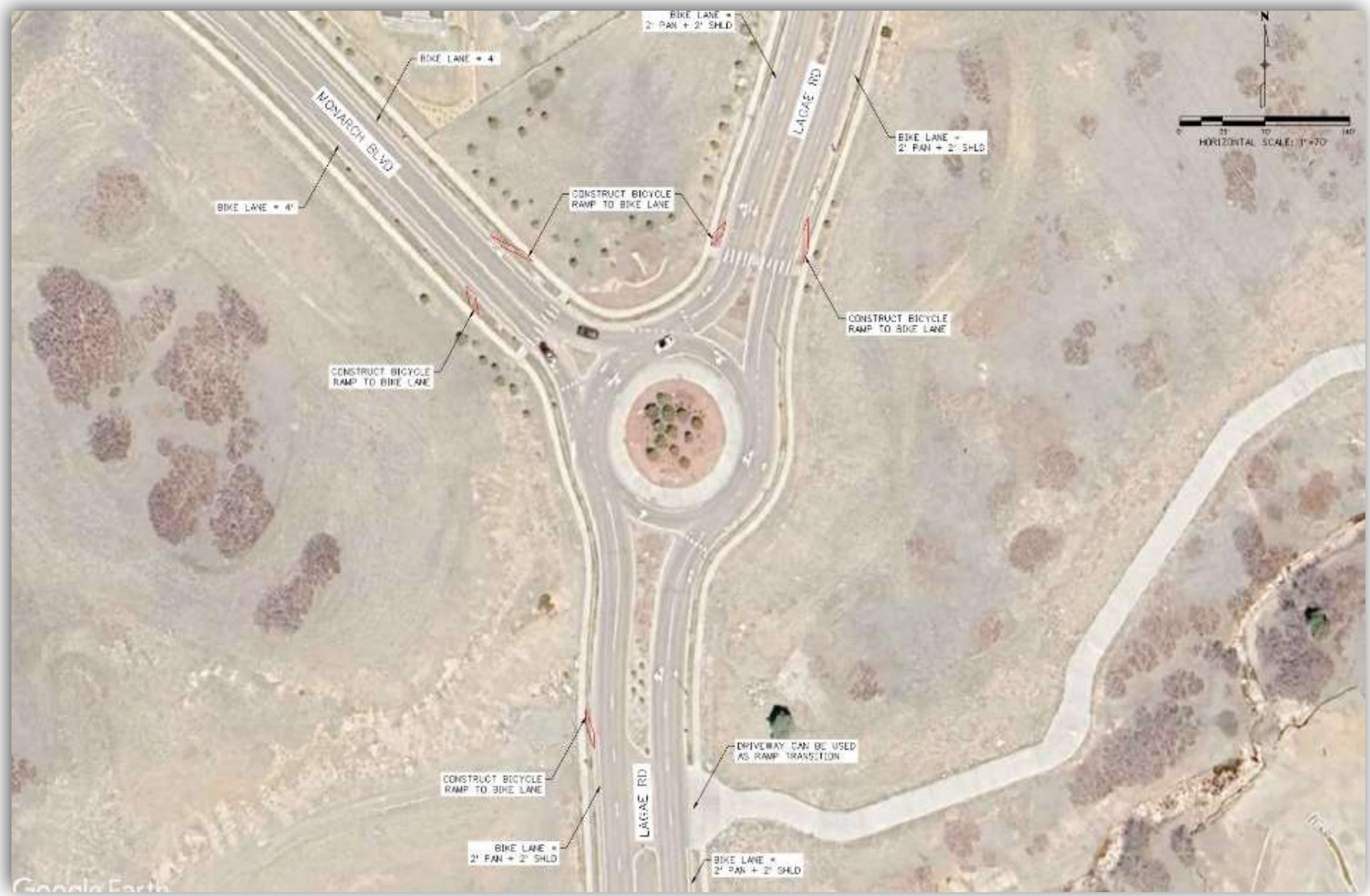


Figure 14. Proposed Improvements to Monarch Blvd. & Serena Ave

Figure 15. Proposed Systemic Improvement for Bicyclists



Project Prioritization

The top crash locations and systemic recommendations were prioritized differently. As noted in the discussion of crash data, the top crash locations were prioritized based on the total number of crashes and average crash severity.

Systemic recommendations were prioritized based on three factors: safety impact, equity of improvement, and public priority. As shown in Table 10, each of the systemic recommendations was scored based on whether it had a high (5 points), medium (3 points), or low (1 point) safety impact. Equity was broken up based on whether the improvement primarily impacted vulnerable road users (bicyclists and pedestrians), kids or the elderly (3 points), young and elderly drivers (2 points), or all users/all drivers (1 point). Public priority was based on frequency of comments related to an improvement and was scored based on high (3 points), medium (2 points), or low (1 point). The scores for each of the systemic improvements are listed below.

Table 10: Recommendations by Priority Table

Recommendation	Safety Impact	Equity	Public Priority	Total Score
Construct a new bicycle and pedestrian bridge over I-25	5	3	3	**11**
Consider restricting right turn on red and modifying signal timing to allow dedicated pedestrian phases or leading pedestrian intervals.	5	3	3	**11**
Zig zag roadway striping approaching trail crossings, in combination with RRFB's.	5	3	3	**11**
Evaluate traffic flow around schools and install bulb outs at crosswalks	5	3	3	**11**
Bring bike lanes up to minimum width standards during resurfacing projects (as feasible)	5	3	3	**11**
Provide bail outs to transition bikes to the sidewalk when adequate on-street facilities do not exist	5	3	3	**11**
Monarch south of Castle Pines Pkwy: Narrow vehicle lanes to 10 feet and provide buffered bike lane. Install raised crosswalks with RRFB's.	5	3	3	**11**
Complete missing sidewalk gaps	3	3	3	**9**
Increase the frequency of the existing street sweeping program to address debris in bike lanes	3	3	3	**9**
Conduct a safe routes to school study for each of the schools	3	3	3	**9**
Monarch north of Castle Pines Pkwy: Evaluate 85th percentile speeds, stopping sight distance and sight triangles for side streets. Determine a safe speed then install physical features to achieve compliance with the target speed.	5	1	3	**9**
Install red protect technology at signals and evaluate yellow and red clearance times.	5	1	3	**9**

Recommendation	Safety Impact	Equity	Public Priority	Total Score
Monarch, north of Castle Pines Parkway: Pilot project to install lower nighttime speed limits.	5	1	3	9
Install high friction surface treatments on roads requiring quick stopping due to geometry or speeds	5	1	2	8
Evaluate frequency of existing striping contract	5	1	2	8
The Canyon: Consider installation of no parking signs on one side of the street when the distance from face of curb to face of curb is 28 feet or less. Update design standards to require adequate width to allow parking on both sides of the street.	5	1	1	7
Castle Pines Parkway & Cross Canyon Trail: Extend raised median to obtain compliance of restricting turning movements and add lighting.	5	1	1	7
Consider the installation of cameras that can detect distracted drivers.	5	1	1	7
Educational Campaign for young and elderly. Education of newer traffic conditions and controls, when to slow down.	3	2	2	7
Conduct speed studies and install speed feedback signs and other traffic calming measures where appropriate. Work with Douglas County Sheriff to enforce speeds.	3	1	3	7
DCS Montessori School: Connect Yorkshire Drive and Charter Oaks Drive and widen Charter Oaks Drive to allow a shoulder for drop off and pick up.	1	3	3	7
Educational campaign on roundabouts.	3	1	2	6
Restrict permissive left turns at signalized intersections where negative left turn offsets exist. At unsignalized intersections where approach turn crashes are more common, consider an all way stop or roundabout.	3	1	1	5
Castle Pines Parkway: Work with CDOT to add signage on I-25 off ramp indicating that vehicles who desire to turn left at Debbie Lane should use the inside right turn lane.	3	1	1	5
Ensure a qualified traffic engineer reviews and approves any traffic control plans and that field inspection with necessary adjustments are implemented.	1	1	2	4
Identify standard for RRFB's and update signage to meet the standard.	1	1	1	3

Next Steps – Progress Tracking

The SAP serves as a roadmap for the City to improve its transportation network to better accommodate safe multimodal travel for all ages and abilities. A key to success is the City's ability to track safety improvements as they occur and measure effectiveness over time. Select members of the Planning Oversight Committee for this project (or comparable designees) will be responsible for reviewing this SAP on an annual basis using the following metrics. The annual results will be used to measure the effectiveness of this SAP over time.

- **Review past, current, and predicted safety trends:** Using the historic crash data in the SAP as a baseline, evaluate whether the number and severity of crashes at the 14 priority locations is declining year over year.
- **System-Wide Tracking:** Using the historic crash data in the SAP as a baseline, evaluate whether there is a decrease in the number and severity of crashes per 1,000 people (residents).
- **Implementation:** Track and annually report on the number of SAP recommendations implemented.
- **Tracking results of pilot projects.** Collect data from locations where pilot projects are implemented to determine if treatments are reducing crashes.
- **Inform and Engage the Community:** Post an annual summary report on the City's website that highlights the progress that has been achieved toward meeting the City's goal of reducing significant injury crashes and maintaining the baseline of zero fatalities.

Appendix A: Public Engagement

Building on the public engagement summary provided in the main report, this Appendix provides additional detail on the methods used to engage the Castle Pines community and what was heard through the process. The results of engagement, along with the quantitative data compiled, were a critical piece to informing the SAP's recommendations and enabled the project team to develop countermeasures truly responsive to the community's needs, concerns, and perspectives.

Key Takeaways

Through various engagement touchpoints with the community, several key takeaways became clear to the project team in relation to safe streets in Castle Pines. The top three takeaways were:

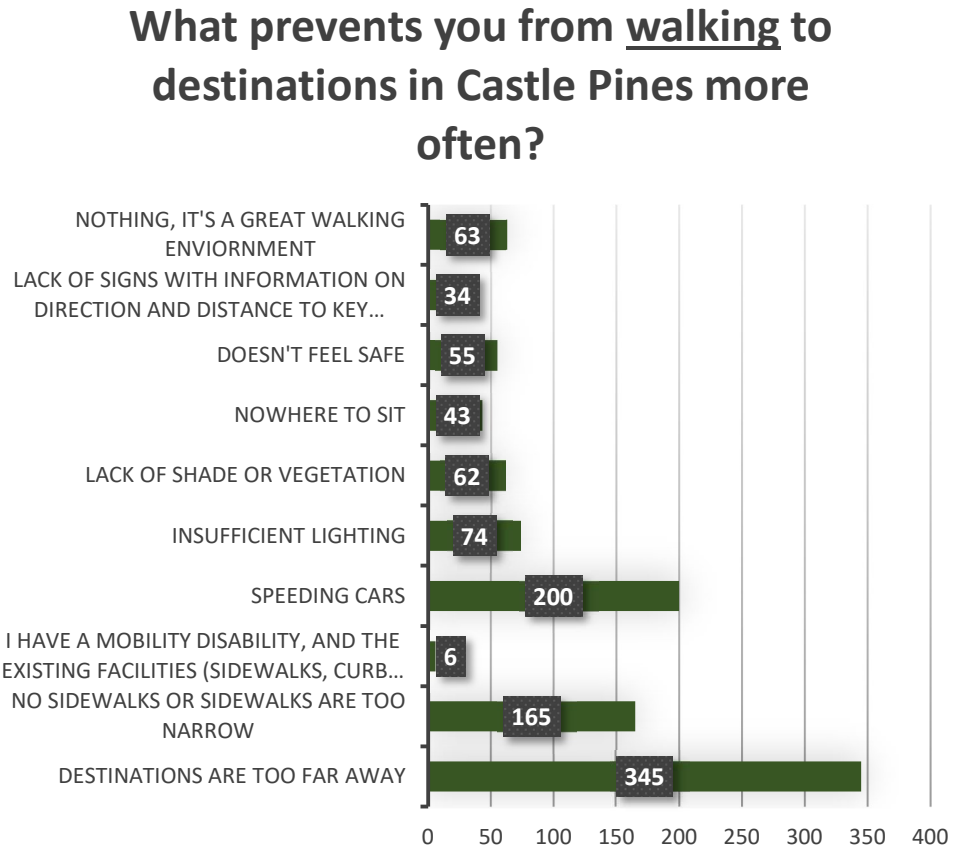
- Mobility choices are influenced by safety concerns. Most community members drive a personal vehicle to travel within Castle Pines, but many are interested in walking and biking. Barriers such as speeding cars, missing walking or biking connections, and length to destinations disincentivize non-vehicular modes of travel.
- Arterials are areas of safety concerns. Monarch Boulevard was mentioned the most when people were asked about transportation safety concerns. There are several areas along Monarch where visibility is an issue, and most intersection crossings feel unsafe to people. Crossing intersections, most commonly along Monarch or Castle Pines Parkway, as a pedestrian or cyclist feels unsafe and uncomfortable to people in the current environment.
- School access and student safety: Student safety is a top priority, and residents are concerned about kids traveling to school by bike or on foot, given missing sidewalk connections and the lack of safe crossings that currently exist.

Activities

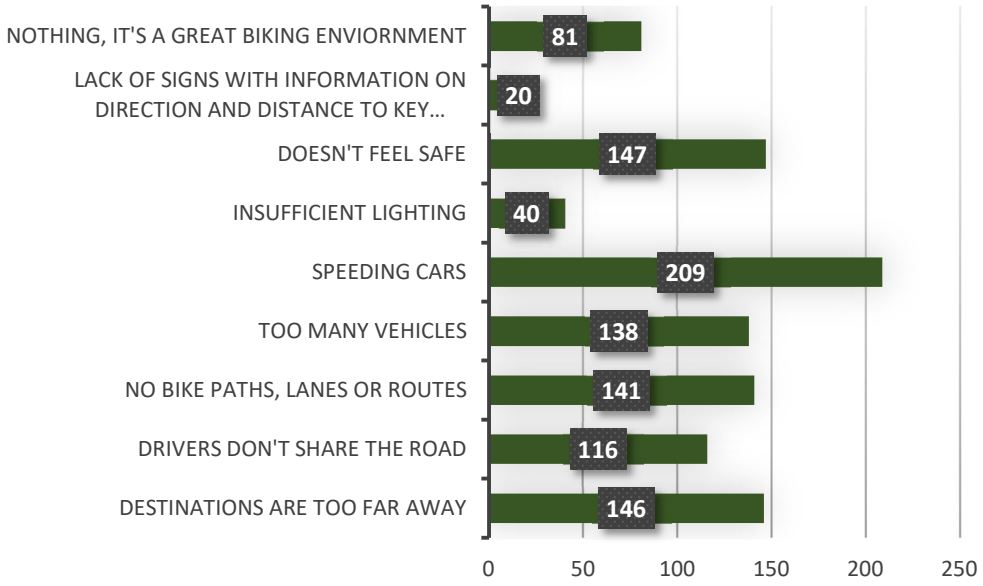
Several engagement opportunities were developed to hear from the community.

- **Project Webpage:** The Safe Streets for All Comprehensive Action Plan project webpage was added to the City's website. This webpage described the SAP and how people could get involved. Links to the project survey and a contact us form were displayed on this page for people to interact. The project website had 286 users view the page 385 times.
- **Flyer:** A one-page flyer was developed to inform people about the project and provide opportunities for them to interact. QR codes and weblinks were included for people to be able to access the project webpage and participate in the community survey. The flyer was distributed by Castle Pines staff to several popular destinations in the community, such as Ziggi's Coffee, Duke's Steakhouse, and the public library.
- **Survey:** The community survey focused on gathering information on key concerns by topic and location, identifying community priorities and areas for improvement. The survey opened on November 16, 2024, and was distributed through social media, school communication platforms, the community newsletter, and website. The survey stayed open for six weeks and a total of 551 responses were received. Survey participants were asked about their mode of travel within Castle Pines, whether they walk or bike and how they feel when doing so. They were also

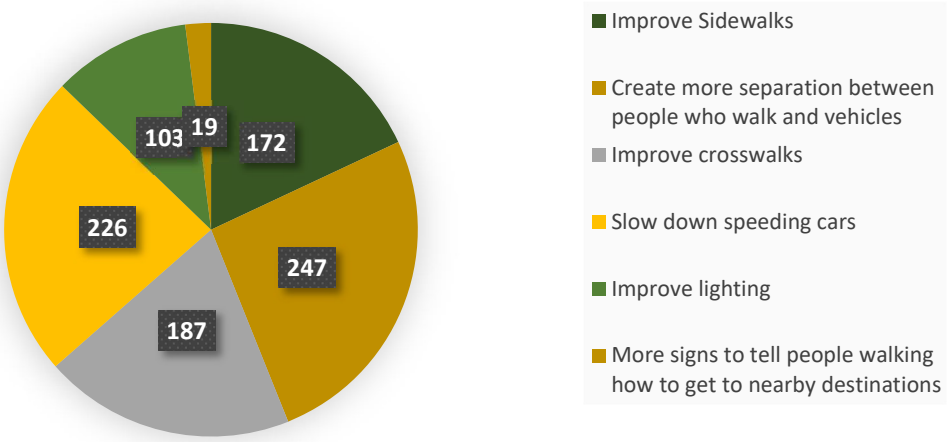
asked about any barriers that prevent them from walking or biking and what kinds of improvements would encourage more multi-modal behavior. A few highlighted survey responses are shown in the figures below.



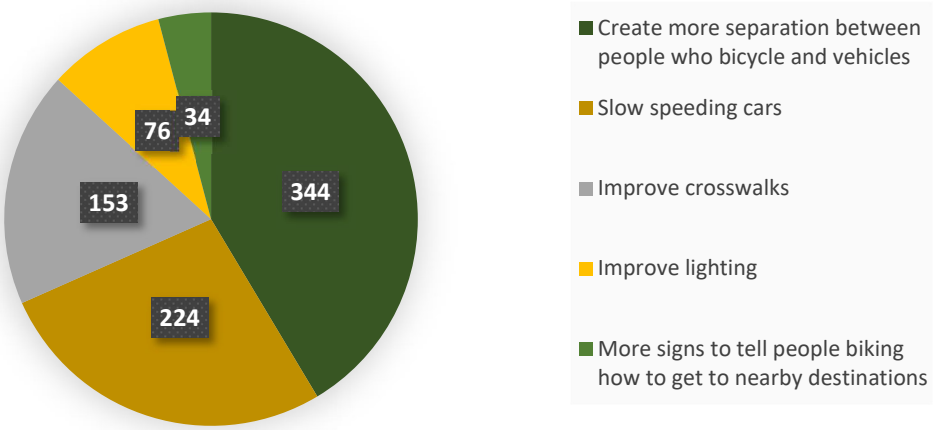
What prevents you from biking to destinations in Castle Pines more often?



What do you think are the most beneficial ways to improve conditions for walking in Castle Pines?



What do you think are the most beneficial ways to improve conditions for biking in Castle Pines?



- **Public Forums:** Three public forums focused on engaging with groups in the community that provided a unique perspective on safety and mobility. The groups were identified based on community demographics and community concerns voiced in the survey responses. As shown in Table 11, the three forums focused on school safety, bike and pedestrian safety, and the elderly, disabled and care givers. The forums were hosted in the months of January & February 2024. Each forum followed a similar style and agenda. The project team introduced the project to participants, explaining the study's goals, objectives, and timeline. The team also provided context about the data and engagement that would be used to help shape safety recommendations. After speaking, the team facilitated discussions with the groups where participants were able to voice their concerns and ideas. An online interactive map was provided for the virtual events, and a physical map board was used for the in-person event so that participants could pinpoint specific locations of concern with their comments. This mapping exercise was open-ended, giving participants the ability to identify challenges, problems, and opportunities for transportation safety.

Table 11: Public Forum Information

Name	Date/Time	Location	Intended Audience	Attendees
Forum #1: School Safety	1/24/2024, 5:30-6:30p	Virtual	Residents who live near schools, parents of students, school employees	7
Forum #2: Bike & Pedestrian Safety	1/24/2024, 5:30-6:30p	Virtual	People who walk or bike in the community	7
Forum #3: Elderly, Caregiver and Disabled	2/7/2024, 3:30-4:30p	In-Person at Legacy Village Senior Living Community	Older population	6

Oversight Committee

Consistent with FHWA's guideline for SAP certification, an oversight committee was formed to help guide the project and ensure the SAP aligns with community goals and expectations. Members of this committee included representatives from the Colorado Department of Transportation (CDOT), the Denver Regional Council of Governments (DRCOG), City staff, and the City Council. This committee met twice during SAP development to discuss the project and provide feedback on the draft recommendations. Comments from committee members were considered in the development of final recommendations included later in this SAP.

Equity Considerations

Outreach for the project was conducted with the underlying intent to hear a broad range of perspectives from community members across ages, physical abilities, and modal preferences. To this end, information on the project, including opportunities to engage, was disseminated to the community through several outlets in both digital and hardcopy formats. This resulted in positive outcomes, with over 550 residents completing the project survey. In addition, as explained above, forums were held with the elderly, disabled, and residents especially interested in safe mobility for students, bicyclists, and pedestrians. Because of physical ability, level of awareness, and level of physical exposure, these groups tend to be more vulnerable when unsafe conditions exist in the transportation network. Forums with these groups were held so that recommendations could be equitably responsive to their concerns and needs rather than solely addressing the needs and concerns of motorists.

Summary of Themes

Based on the review of all community engagement touchpoints, several themes have emerged that fall into five main categories:

1. Walking
2. Biking
3. Driving
4. Schools
5. Speed

Walking

"Hazardous place for pedestrians. I have had a couple of near misses here, crossing from the east side of Lagae toward Walgreens. Lots of right hand turns onto Pkwy and cars aren't always aware of pedestrians crossing." – Survey Respondent

Through the various community engagement touchpoints, several residents shared that they have a desire to walk more within Castle Pines, but given the current conditions, they do not feel safe doing so. When asked in the community survey whether people walk to destinations in Castle Pines, only 9% responded that they do every day, while 39% responded they do sometimes (a few times a month), 38% responded never, and 12% said often (a few times a week). The leading factor preventing people from walking is that destinations are too far away, which resulted in 32% of the responses. Many respondents also cited missing sidewalk connections as a barrier to walking. Feeling unsafe using crosswalks was also mentioned many times in the survey and during forums. People often talked about how unsafe it feels to cross at intersections, even within designated crosswalks, because cars do not stop for them or do not see them altogether. Factors contributing to this unsafe feeling were hills, curves, and blind spots that make it difficult for motorists to see the crosswalks. It was also mentioned that at certain times of the day, glaring sunlight limits motorists' ability to see pedestrians and crosswalks. At designated intersection crosswalks, many people noted that cars turning right at a red light often don't notice, or don't look to see if a pedestrian is within

the crosswalk. Nine different people mentioned in the survey and during the forums that they had a near miss with a vehicle as a pedestrian.

Biking

Much like what was heard about walking, it was often heard during engagement that people are interested in biking within Castle Pines, but don't feel safe or comfortable doing so given the current conditions. Overwhelmingly, people in Castle Pines do not choose biking as their main mode of transportation. When asked in the community survey, 66% of respondents said they never ride their bike to destinations in Castle Pines. When asked what prevents them from biking, 20% cited speeding cars. Other top responses were: Doesn't feel safe and destinations are too far away (14%), no bike lanes paths or routes and too many vehicles (13%). Poor road maintenance was also mentioned 22 times in both the survey comments and the engagement forums; mostly when talking about why people choose not to bike on the road. Monarch Blvd, Castle Pines Pkwy, and the I-25 crossing have all been identified as popular cycling routes. Notably, these three roadway segments are also considered to be some of the most uncomfortable or least safe routes, according to community input. It was suggested several times in the survey and in the forums that a dedicated and protected bike lane along these key areas should be installed (for segments where they don't already exist).

Driving

"Blind spots caused by sun impact crosswalks at Monarch & Hyland Hills at certain times of the day." – Survey respondent

Engagement revealed that personal vehicles are the primary mode of travel in Castle Pines. Ninety-four (94) % of survey participants said they mostly travel by car compared to 4% who walk and 1% by bicycle. When asked how many cars their household owns, 59% responded with two vehicles, and 34% responded with three or more. Another issue raised by respondents was sight lines due to topography at various locations. Several comments were made during the forums about steep hills and sharp turns impacting drivers' ability to see crosswalks and traffic signals in some cases. Respondents mentioned traffic circles seven times in the survey and had mixed input. Several people suggested incorporating them as a way to reduce speeds and others expressed frustration with their presence and the fact that many drivers seem to have a hard time navigating them.

Schools

"Speeding through the school zone is rampant. I live across the street and see this daily." – Survey Respondent

Children's safety when traveling to and from schools is clearly a top community priority given the number of times it was mentioned during engagement. Frequent speeding near schools was a common point of concern and many people suggested development of school zone speed limits to help improve safety. Survey and forum participants also talked about crosswalks near schools and the fact that many of them are not visible to drivers due to impediments such as hills, curves, and blind spots, and even time of day when the sun is in drivers' eyes. It was suggested multiple times that flashing beacon lights be installed at these crosswalks to increase visibility and user safety.

Vehicle Speeds

Speeding is a concern that was frequently raised through the engagement process. It was mentioned 35 times when survey respondents were asked for open-ended comments about transportation safety in Castle Pines. Forum participants complained about speeding 14 different times, solidifying it as a major issue and one that people recognize needs to be addressed. Specific locations where speeding was mentioned most frequently include Monarch Boulevard, Castle Pines Parkway, and around schools. Several people mentioned that steep (down) hills contribute to this issue, and several times it was suggested that enforcement and traffic calming elements be developed to ensure safer speeds.

> *"Speeding is a major problem right now. Not only is it a concern just driving around, walking across the street or being outside, it puts the wildlife (and drivers) at risk of catastrophic collisions… There are ways to calm traffic speeds without enforcement but added enforcement would also help." – Survey Respondent*

Location Based Feedback

Based on feedback from both the public forums and the community survey, a map of location-based input was developed to highlight key issues. Figure 16, and corresponding Table 12, illustrate where the top 3 comments were received related to intersections, roadway segments, schools, parks, and other destinations. This map along with the crash data was used, in part, to develop safety recommendations for specific locations in Castle Pines.

Figure 16. Mapped Location Based Responses

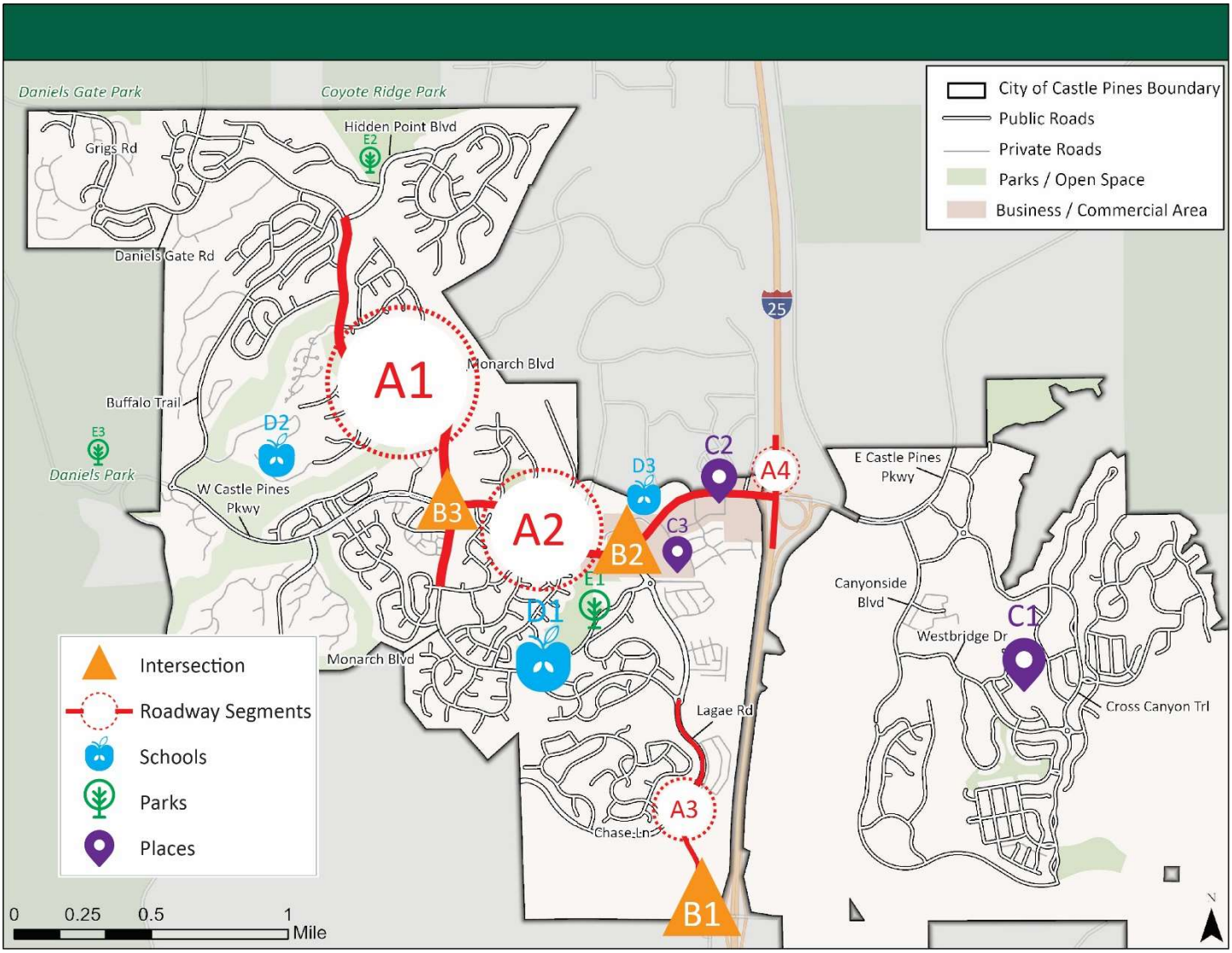


Table 12. Summarized Location Based Responses

A	Roadway Segments	# of Comments	Summary of Responses
1	Monarch Blvd	116	Too many speeding cars. Bike lanes need improvement and are dangerous because of the lack of separation from vehicles and potholes, which causes cyclists to enter the vehicular lane. Drivers lack awareness and as a pedestrian it feels unsafe to cross Monarch, even in the crosswalks. The road is generally in need of repair. More traffic lights and visible crosswalks are needed.
2	Castle Pines Parkway	83	Speeding is rampant. Need safer access across I-25 to connect to the newer development and trails. Drivers lack awareness and it doesn't feel safe as a

			pedestrian or cyclist. Missing sidewalk connections, most notably around the shopping center.
3	Lagae Rd	25	Speeding cars even with the roundabouts in place. Better separation between cars and cyclists is needed.
4	I-25	19	Crossing I-25 on Castle Pines Pkwy as a pedestrian or cyclist is very dangerous. Interchange is very congested.
B	Intersections	**# of Comments**	**Summary of Comments**
1	Lagae Rd & Happy Canyon Rd	20	Bad visibility and speeding cars make this a very dangerous intersection. Happy Canyon makes a dangerous turn, which causes cars to back up. Multiple people said they have witnessed accidents. Need a traffic signal here.
2	Lagae Rd & Castle Pines Pkwy	17	Very busy intersection with speeding cars. Feels very unsafe as a pedestrian to use the crosswalk – several people talked about having a close brush with a car as a pedestrian.
3	Castle Pines Pkwy & Monarch Blvd	12	Dangerous intersection for pedestrians. Again, several comments about cars not paying attention to pedestrians in the crosswalk and almost causing an accident. Vehicles blow through right hand turn on red.
C	Places	**# of Comments**	**Summary of Comments**
1	The Canyons	26	No pedestrian or cyclist-friendly way to travel from The Canyons across I-25 to the west side of City. Speeding is a major issue.
2	Business District	8	Missing pedestrian and cyclist connections to this area. More sidewalks are needed within the shopping center.
3	King Soopers	5	Would like to be able to walk/bike to King Soopers, but current conditions don't make this feel safe.
D	Schools	**# of Comments**	**Summary of Comments**
1	American Academy	20	Needs to be a school zone to ensure safety for children. Speeding near American Academy is prevalent. Crossing Yorkshire to get to American Academy is very dangerous.
2	Buffalo Ridge	10	Crossing near the school is dangerous due to speeding cars.
3	Montessori	5	Lots of backed up cars and congestion during pickup/drop off.
E	Parks	**# of Comments**	**Summary of Comments**

1	Elk Ridge Park	3	Crosswalk is needed to get to Elk Ridge Park. A bridge would be best because people drive too fast on Lagae/Happy Canyon.
2	Coyote Ridge	1	Lots of kids riding bikes and existing blind turns that could cause an accident.
3	Daniels Park	1	Would love to see a trail connection to Daniels Park.

Overlapping Engagement

Several plans were reviewed to gain a better understanding of how traffic safety is viewed within the region and where alignment occurs with the Safe Streets for All engagement process in Castle Pines. Below is a list of the plans that were reviewed, what was heard from the Castle Pines community, and how they relates.

- **Denver Regional Council of Governments (DRCOG) Taking Action on Regional Vision Zero (2020)**[9]**:** This report establishes a target of zero fatalities and serious injuries on the Denver region's transportation system, of which Castle Pines is a part. Engagement conducted for the regional plan found that distracted driving was, by far, the top traffic safety concern in the Denver region, while speeding, red light and stop sign running, and unsafe turning or lane changing were also concerns. Speeding was also one of the top concerns voiced by Castle Pines community members during the SAP's development. In addition, community members often expressed concern about driver's unawareness when making right-hand turns through crosswalks, which aligns closely with what was heard through development of the regional plan.
- **Castle Pines Comprehensive Plan (2021)**[10]**:** This report establishes the 20-year planning horizon for the City and articulates the community's shared values. Castle Pines residents, leaders, and business owners were engaged in the process of updating this plan and expressed that certain arterial roadways that pass through residential neighborhoods may need to implement traffic calming measures. During the SAP's development, several community members suggested implementing traffic calming elements to help reduce speeds and ensure safer roadways for all modes of transportation. Congestion issues at school sites, and the lack of connections between bicycle and pedestrian facilities, were also two things highlighted in the Comprehensive Plan that many community members cited during the SAP's development.
- **2040 Douglas County Transportation Master Plan (2019)**[11]**:** This plan establishes a long-range vision for a multimodal transportation system for Douglas County. Stakeholder engagement and community outreach helped to inform the plan and establish the vision. Citizen surveys collected during plan development consistently showed interest in trail connectivity, safety, and

[9] Denver Regional Council of Government (DRCOG). (2020). Taking Action on Regional Vision Zero. https://drcog.org/sites/default/files/Taking_Action_on_Regional_Vision_Zero_ADOPTED_061620.pdf
[10] City of Castle Pines. (2021). Castle Pines Comprehensive Plan. https://www.castlepinesco.gov/wp-content/uploads/2021/07/Castle-Pines-Comprehensive-Plan-Update_web-quality.pdf
[11] Douglas County. (2019). 2040 Transportation Master Plan. https://www.douglas.co.us/documents/2040-transportation-master-plan.pdf/

expansion. The need for safer and more accessible trail connections is also something that was heard from Castle Pines residents during the SAP's development.

Appendix B: Data Used for Recommendations

Table 13. Crash Hot Spot Recommendations and Next Steps

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
1	Castle Pines Pkwy/Debbie Lane	44	228	5.2	21 rear end crashes of which 13 were eastbound through vehicles 17 broadside and approach turn crashes (8 involved eastbound through and westbound left turning vehicles and many were identified as failing to stop for the red light, 3 of the approach turn crashes were westbound vehicles failing to stop for the red light and hitting southbound left turning vehicles) Vehicles have been observed turning left out of the 7-11 on Debbie Lane, blocking traffic heading north past the 7-11 driveway, which then spills into	Add signage prior to the intersection (heading eastbound) to alert drivers of where to access the businesses. Add high friction surface treatment on the Castle Pines intersection approaches to help vehicles stop more quickly. Convert signal heads to flashing yellow arrow for all left turn movements and add retroreflective back plates for all signal heads. Add signage and striping on NB and SB approaches to clarify lane assignments and split phase the northbound and southbound	Conduct a stopping sight distance evaluation of the eastbound approach that looks at typical and congested conditions. Identify appropriate placement for business signage. Identify whether signal equipment upgrades or a full signal rebuild are required to upgrade to flashing yellow arrow left turn signal heads. Conduct a traffic analysis to determine whether northbound and southbound split phased signal timings can be accommodated.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					the intersection. Southbound vehicles have also been observed waiting longer than necessary to ensure they can safety turn left with the existing permissive left turn phasing.	approaches to the signal. Add "Do Not Block The Box" striping on Debbie Lane, at the 7-11 entrance.	
2	Castle Pines Pkwy/Charter Oaks Dr/Village Square Dr	15	46	3	8 rear end crashes (5 eastbound and 3 westbound), 4 approach turn/broadside crashes (all at fault vehicles were headed westbound, both approach turn crashes involved westbound left and eastbound through vehicles), 1 pedestrian, 1 overtaking turn, and 1 vehicle cargo or debris crashes Faded striping was observed at the intersection.	Add high friction surface treatment on the Castle Pines intersection approaches to help vehicles stop more quickly. Convert signal heads to flashing yellow arrow for all left turn movements and add retroreflective back plates to all signal heads. Update striping within the intersection.	Identify whether signal equipment upgrades or a full signal rebuild are required to upgrade to flashing yellow arrow left turn signal heads.
3	Castle Pines Pkwy/Lagae Rd	12	40	3.3	4 rear end crashes (2 were eastbound and didn't stop for the	Conduct a stopping sight distance evaluation to	Conduct a stopping sight distance evaluation of the eastbound approach

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					vehicles in front of them), 4 approach turn/broadside crashes (both approach turn crashes involve westbound left and eastbound through vehicles), 2 fixed object, 1 sideswipe same direction, and 1 other object	determine whether eastbound vehicles are experiencing poor sight distance with or without queued vehicles. If so, install a signal ahead sign with a flashing beacon. If stopping sight distance is poor when vehicles are queued, consider vehicle detection that triggers the flashing beacon only when vehicles are queued to the point that is problematic for stopping. Add high friction surface treatment on the Castle Pines intersection approaches to help vehicles stop more quickly. Convert signal heads to flashing yellow arrow for all left turn movements and add retroreflective back	that looks at typical and congested conditions. Identify whether signal equipment upgrades or a full signal rebuild are required to upgrade to flashing yellow arrow left turn signal heads.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
						plates to all signal heads.	
4	Castle Pines Pkwy/Canyonside Blvd	6	141	23.5	3 approach turn crashes involving a northbound left turning vehicle and an eastbound through vehicle All crashes occurred prior to the installation of the traffic signal.	Continue to observe crash patterns at this intersection to see if the traffic signal has improved intersection safety. Additionally, review yellow and red clearance times to ensure vehicles have adequate time to stop when going downhill.	Review yellow and red clearance times.
5	Monarch Blvd/Briar Cliff Dr	6	43	7.17	3 of these crashes involved a deer, 1 was a broadside crash, 1 overtaking turn, and one other object Landscaping looking left from Briar Cliff is overgrown, creating poor sight distance of approaching vehicles.	Conduct a pilot project and install Streiter Lite reflectors (reflect headlights to create an optical illusion of a fence and alert deer to oncoming vehicles) or Deer Deter devices (alert deer to oncoming vehicles by combining a strobe light effect with ultrasonic high pitched sounds) to reduce the number of wildlife crashes that occur near this intersection.	Work with maintenance department to determine whether Streiter Lite reflectors or Deer Deter Devices are preferred based on required maintenance and cost. Reach out to property management companies to address overgrown landscaping.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
						Work with the property management company to improve maintenance of landscaping causing poor sight distance.	
6	Monarch Blvd/Glen Oaks Ave	3	29	9.7	The one injury crash involved a pedestrian crossing that resulted in a rear end collision with 3 vehicles. Sight distance looking left out of Glen Oaks is very poor and the trail coming from the north is very steep with overgrown landscaping that reduces visibility of approaching bicycles or pedestrians until they are at the intersection.	Conduct a pilot project to install zig zag roadway striping on the approaches to the crosswalk to slow vehicles. If the pilot project does not slow vehicles, install raised medians to the east and west of this intersection to slow vehicles as they approach the pedestrian crosswalk. Install a raised pedestrian crossing and place another "pedestrian crosswalk ahead" sign with flashing beacon in the median, aligned with the existing crosswalk ahead sign. Then conduct a speed study	Conduct a speed study to identify existing operating speeds. Install zig zag striping, then test speeds again. Determine whether additional improvements are required to slow vehicles. Prepare a maintenance plan for landscaping in the area.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
						to see if a reduction of the posted speed limit can be justified. Conduct regular maintenance of landscaping to improve sight distance to approaching trail users.	
7	Castle Pines Pkwy/Cross Canyon Trl	3	29	9.7	2 out of 3 of these crashes were run off the road crashes and all of them occurred in the dark. One was a DUI, one driver fell asleep at the wheel, and the third involved an Elk that ran into the road. The right-in/right-out access was observed to have very poor compliance.	Add rumble strips along the edge line, and/or deflectors to improve visibility of the unique westbound geometry until the road is widened to the ultimate configuration.	
8	Monarch Blvd/Esperanza Dr	3	29	9.7	The injury crash was a driver who had a seizure and ran off the road, another fell asleep behind the wheel, and the third is unknown.	Add high friction surface treatment on Monarch to help vehicles stop more quickly.	

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					Approaching the intersection from the west, vehicles are traveling downhill right after coming around a curve, making it difficult to stop if needed. Vehicles exiting Experanza have poor sight distance looking left.		
9	Monarch Blvd/Bristlewood Ln	5	33	6.6	All 5 crashes were rear ends and 2 involved a pedestrian crossing. The existing northbound left turn lane extends through the RRFB.	Remove the inside northbound lane and expand the raised median to provide a pedestrian refuge. Add an RRFB in the median and start the northbound left turn lane after the crosswalk.	
10	Castle Pines Pkwy/Yorkshire Dr	11	30	2.7	4 rear end crashes (one occurred during construction), 3 broadside (2 of these occurred during construction), 2 fixed object, 1 wild animal, and 1 sideswipe same direction crash. 4 of these crashes involved drivers under the age of 21	Convert left turn signal heads to flashing yellow arrow and restrict left turns when a pedestrian pushes the button to cross. Add retroreflective back plates for all signal heads.	Identify whether signal equipment upgrades or a full signal rebuild are required to upgrade to flashing yellow arrow left turn signal heads.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					years old, a fifth crash noted driver inexperience, and 2 involved drugs or alcohol.		
11	Monarch Blvd/Tapadero Way/Serena Ave	10	20	2	4 rear end crashes (3 in the northbound direction, 1 involved a crossing pedestrian), 2 broadside crashes (both involved eastbound vehicles that did not stop at the stop sign), 2 wild animal crashes, 1 sideswipe same direction, and one head on (driver could not steer due to snow and ice) Existing landscaping prevents visibility of the stop sign at Tapadero Way. The posted speed limit changes from 45 mph, north of this intersection, to 35 mph in the City.	Double post the eastbound and westbound stop signs and add stop bar pavement markings or remove the landscaping in the southwest corner that is obstructing the STOP sign. Either install optical speed bars to reduce southbound speeds approaching the intersection or conduct a pilot project to install zig zag roadway striping approaching the crosswalk in both directions. If these measures do not reduce speeding, install crosswalk ahead signage in both directions with flashing beacons and a wide median just	Work with maintenance department to determine whether Streiter Lite reflectors or Deer Deter Devices are preferred based on required maintenance and cost.

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
						south of the City limit that would force vehicles to maneaver around it to slow down. Conduct a pilot project and install Streiter Lite reflectors or Deer Deter Devices.	
12	Monarch Blvd/Brambleridge Dr	6	12	2	2 rear end crashes, 2 wild life crashes, 1 fixed object, and 1 overtaking turn crash. 3 of these crashes occurred at night (1 involved a DUI and two involved deer).	Install Streiter Lite reflectors (reflect headlights to create an optical illusion of a fence and alert deer to oncoming vehicles) or Deer Deter devices (alert deer to oncoming vehicles by combining a strobe light effect with ultrasonic high pitched sounds).	Work with maintenance department to determine whether Streiter Lite reflectors or Deer Deter Devices are preferred based on required maintenance and cost.
13	Lagae Rd/Mira Vista Ln	5	10	2	3 of the crashes involved southbound drivers entering the roundabout. One drifted into the wrong lane, one was traveling too quickly, and the third was distracted with directions.	Improve the signage, striping and lane configuration when approaching the roundabout from the north. (i.e. the SB lane assignment sign indicates two lanes of travel through the roundabout and fails	

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					The signage and striping heading southbound into the roundabout is not consistent or accurate. The NB bike lane becomes a sharrow within the RAB.	to show the third (right turn only lane). The sign showing lane assignments thru the intersection also does not match the arrows on the ground (i.e. sign shows shared LT and separate thru while striping on the ground shows separate thru, shared TR, and a dedicated right turn lane. Additionally, on the northbound approach, divert bicycles up to the sidewalk when approaching the RAB to remove additional conflicts through the intersection.	
14	Lagae Rd/Chase Ln	5	10	2	2 broadside crashes (both involved inexperienced drivers), 2 fixed object, and 1 sideswipe same direction crash North of this intersection, Lagae is widened to 4 lanes	Install a roundabout to address the unique intersection geometry. In the interim, Install additional signage and striping to clarify lane positioning through the intersection. On the southbound approach, add	

#	Location (in priority order)	Total Crashes	Weighted Crash Score	Severity / Total Crashes	Crash Summary / Field Notes	Recommendations	Next Steps
					with a median, but south of the intersection it remains 2 lanes, without a median. As a result vehicles must shift as they travel through the intersection.	signage and striping indicating the southbound outside lane becomes a dedicated right turn lane. Adjust the EB approach to prevent NBL turning vehicles from encroaching on EB left turning vehicles waiting at the stop sign, and add puppy tracks thru the intersection to guide eastbound left turning vehicles.	

Table 14. Systemic Recommendations

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Bicyclists / Pedestrians)	The highest crash location is Castle Pines Parkway, adjacent to the interstate. This section of roadway has several access points and intersections, is the only way for bicyclists and pedestrians to traverse the interstate, and does not provide a dedicated facility for bicyclists. Additionally, residents have indicated that crossing I-25 is congested and feels unsafe as a bicyclist or pedestrian.	Evaluate the feasibility of a separate bicycle and pedestrian bridge to get vulnerable users across I-25.	High	Vulnerable Road Users/Kids/Elderly	High	**11**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Bicyclists / Pedestrians)	During public engagment, many residents expressed concerns about vehicles not paying attention to bicyclists and pedestrians, particularly at the higher volume, signalized intersections.	Conduct a traffic analysis of existing traffic signals to determine the traffic impact of restricting right turn on red at all signals where bicycle and pedestrian activity is desired. Also, program the flashing yellow arrow left turn signal heads to restrict left turns when pedestrians activate the pedestrian crossing. Alternatively, consider whether an all pedestrian phase or leading pedestrian interval would be feasible at signalized intersections.	High	Vulnerable Road Users/Kids/Elderly	High	**11**
Systemic (Bicyclists / Pedestrians)	Safe trail crossings are needed to access City Parks.	Consider zig zag road striping approaching trail crossings, in combination with RRFB's to slow vehicles. The zig zag striping would require approval from FHWA prior to experimenting with this countermeasure.	High	Vulnerable Road Users/Kids/Elderly	High	**11**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Schools)	School traffic causes congestion on surrounding roadways, resulting in poor sight lines to pedestrians and cyclists in crosswalks, and the need for these users to maneauver thru stopped or parked cars.	Work with Douglas County Sheriff and the neighboring communities to evaluate traffic flow around schools and identify ways to reduce the impact of traffic congestion on surrounding roadways. This could include turning restrictions during certain times of day, or better connections for non-motorized travel to the school. Additionally, install bulbouts that prevent parking for a distance of 20-50 feet in front of a crosswalk and consider whether adequate crosswalks are being provided to address the majority of users.	High	Schools/Young Kids/Vulnerable Road Users	High	**11**
Systemic (Bicyclists)	Bike lanes across the city are generally 4 feet in width, including the gutter pan. The standard for bike lane width is 4 feet, not including the gutter pan.	As resurfacing projects are completed, evaluate the feasibility of restriping to accommodate a minimum 4 foot wide bike lane, exclusive of the gutter pan. As feasible, physical separation of the bike lane from vehicle travel lanes is preferred.	High	Vulnerable Road Users	High	**11**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Bicyclists)	While the City is working to provide wider bike lanes on major roads, adequate width bike lanes are not provided or feasible on certain segments of road due to the need for turn lanes.	When a bike lane transitions from an adequate (minimum 4 foot wide bike lane, exclusive of the gutter pan) to an inadequate bike lane or sharrow, provide a bail out that allows bicyclists to easily transition from the bike lane to the sidewalk and back again when the bike lane becomes of adequate width. This type of transition should also be provided at all roundabouts to ensure safe transition through the intersection.	High	Vulnerable Road Users	High	**11**
Systemic (Monarch South of Castle Pines Parkway)	Monarch, south of Castle Pines Parkway is approximately 38 feet wide from edge of curb to edge of curb. Most of it is striped with two 13 foot wide vehicle travel lanes and a 6 foot wide bicycle lane on either side.	Restripe the vehicle travel lanes to 10 feet in width and add a physical buffer between the vehicles and bicycle lanes. At intersections with crosswalks, install raised pedestrian crosswalks and RRFB's.	High	Vulnerable Road Users/Kids/Elderly	High	**11**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
	Residents mentioned a desire for safe bicycle and pedestrian travel on Monarch along with safer crossings.					
Systemic (Pedestrians)	Arterial roads across the City have missing sidewalk gaps.	Complete missing sidewalk gaps, focusing on high speed arterial and collector roads and safe routes to schools first.	Medium	Vulnerable Road Users/Kids/Elderly	High	**9**
Systemic (Bicyclists)	During public engagment, many residents commented on the narrow bike lanes and the fact that they are regularly filled with debris, forcing them to move into the travel lane (which was uncomfortable for several)	Increase the frequency of the existing street sweeping program on collector and arterial roads to ensure that bicyclists have a safe place to travel. Also consider the expansion of street sweeping on local roads.	Medium	Vulnerable Road Users	High	**9**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Schools)	Safe crosswalks are needed around schools.	Conduct a safe routes to school study to identify the primary walking routes to each school, location of missing sidewalk gaps, and appropriate placement of crosswalks. Consider sight distance when identifying placement of crosswalks, and consider reduced speed zones for crosswalks across arterial and collector roads where a traffic signal is not currently provided.	Medium	Schools/Young Kids/Vulnerable Road Users	High	**9**
Systemic (Monarch North of Castle Pines Parkway)	Monarch, north of Castle Pines Parkway experienced 22 rear end crashes, of which 18 occurred at an intersection with an RRFB. Another 9 crashes occurred as the result of wild life entering the road. The road experiences significant sight	Conduct an evaluation of 85th percentile speeds, stopping sight distance, and sight triangles for side streets along Monarch to determine a safe speed limit for Monarch. If lower than currently posted, evaluate whether raised medians, raised pedestrian crossings, all-way stops, rounadabouts, speed cameras, or other features are feasible to provide compliance of a lower posted speed limit.	High	All Users	High	**9**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
	distance issues as a result of horizontal and vertical curves, which has likely contributed to these crashes. Furthermore, as a whole, Monarch has experienced 51 crashes, or 21% of the crashes in the City.					
Systemic (Arterial & Collector)	All 30 broadside crashes occurred at intersections along Collector and Arterial Roads and the more severe crashes occurred at higher volume intersections with higher speeds and/or more lanes.	Install red protect technology at all traffic signals, which will hold the red if someone is anticipated to run the red light. Also, evaluate the yellow and red clearance times to ensure that they are long enough to allow vehicles to stop or proceed thru the intersection.	High	All Users	High	**9**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Monarch North of Castle Pines Parkway)	Approximately 20% of crashes occurred at night	Conduct a pilot project to install lower night time speed limits on Monarch, north of Castle Pines Parkway, to increase the reaction time of drivers in poor lighting conditions. When implementing day and night speed limits, do not use reflective material on the daytime speed limit so that only the night time speed limit reflects when headlights hit it. If night time speeds are not effective, conduct a lighting study across the City and identify locations where additional street lighting would improve visibility and allow for better reaction times when interacting with other roadway users and wildlife.	High	All Users	High	**9**
Systemic (Arterial & Collector)	There have been a total of 74 rear end crashes, of which all but 4 occurred on arterial or collector roads. Additionally, 20% of crashes (49 of	Install a high friction surface treatment on roads with higher speeds and roadway geometry or other factors that require quick stopping. The priority should be high speed arterial and collector roads with poor sight distance or the presence of wild life or	High	All Users	Medium	**8**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
	239) occurred in road conditions that were something other than dry (i.e. snowy, slushy, muddy, wet).	pedestrians, followed by other high speed roads.				
Systemic (Signage & Striping)	Crosswalks and lane lines are faded.	Evaluate whether the existing striping contract occurs frequently enough. Also evaluate durability of paint types.	High	All Users	Medium	**8**
Systemic (The Canyon)	The crash data indicates that 9.6% of crashes involved a parked vehicle. 40% of those occured in the Canyons where the roadway is only 28 feet from edge of curb to edge of curb. Assuming vehicles are parking on both sides of the	Consider installation of no parking signs on one side of the street when the distance from face of curb to face of curb is 28 feet or less. Also consider updating design standards to ensure adequate roadway width is required for new developments.	High	All Drivers	Low	**7**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
	street, there is only 14 feet for two vehicles to pass.					
Systemic (Castle Pines Parkway & Cross Canyon Trail)	During field evaluations it was observed that vehicles do not comply with the existing left turn restrictions out of Cross Canyon Trail.	Extend the raised median through this intersection to obtain compliance of the restricted turning movements and add lighting.	High	All Drivers	Low	**7**
Systemc (General)		Consider the installation of cameras that can detect distracted drivers. If implemented, work with Douglas County Sheriff to provide enforcement.	High	All Users	Low	**7**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (General)	28 crashes involved inexperienced drivers.	Conduct an educational campaign for young & elderly drivers. Make them more aware of situations when they should slow down and educate them on newer traffic conditions such as roundabouts or flashing yellow arrow left turn signal heads. Where possible, provide more intuitive and simplified signage, striping and signal timings.	Medium	Young & Elderly Drivers	Medium	**7**
Systemic (General)	Many residents expressed concerns about speeding on Castle Pines Parkway, Monarch, and with The Canyons neighborhood.	Conduct speed studies and install speed feedback signs and other traffic calming measures at select locations where 85th percentile speeds are more than 4mph over the posted speed limit, where drivers have poor sight distance, and/or have the potential to interact with pedestrians (i.e. adjacent to schools, parks or other high pedestrian trip generators). Additionally, work with Douglas County Sheriff to conduct enforcement of these locations. Work with Douglas County Sheriff to enforce these locations as feasible.	Medium	All Users	High	**7**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (DCS Montessori School)	Public input indicates a high level of congestion during pick up and drop off at this school. The only vehicular access is from a high speed arterial roadway (Castle Pines Parkway) where a traffic signal would not be feasible due to the proximity of the signal at Village Square Drive.	Work with Douglas County to connect Yorkshire Drive and Charter Oaks Drive, thereby improving access and circulation to the school. Also, work with residents and Douglas County to determine whether widening of Charter Oaks Drive to allow a shoulder (on the south side of the road) for drop off and pick up would be a supported alternative to drop off and pick up on Castle Pines Parkway.	Low	Schools/Young Kids	High	**7**
Systemic (General)	Public engagement has indicated a lack of understanding for how to travel through a roundabout, both as a driver and as a pedestrian.	Conduct an educational campaign that helps residents understand who has the right-of-way when traveling in a roundabout, and how a pedestrian or bicycle should travel through the intersection.	Medium	All Users	Medium	**6**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (General)	Intersections with negative left turn offsets result in a higher risk for approach turn crashes as the presence of opposing left turn vehicles results in poor sight distance of approaching vehicles.	At signalized intersections where negative left turn offsets occur, restrict left turns to protected only operations to reduce/prevent approach turn crashes. At unsignalized intersections where approach turn crashes are more common, consider whether conversion of the intersection to an all way stop or a roundabout would improve safety.	Medium	All Users	Low	**5**
Systemic (Castle Pines Parkway)	Multiple accesses between the I-25 off ramp and Debbie Lane cause situations where vehicles are weaving across traffic to access the 7-11 or to turn left at Debbie Lane. One-quarter of the sideswipe crashes occurred in this area.	Work with CDOT to add signage at the off ramp indicating that vehicles who want to turn left at Debbie Lane should use the inside right turn lane. Monitor whether the signage results in less weaving and improved compliance. If weaving continues to be a concern at this location, conduct a traffic study evaluating the impact of restricting access at Beverly Boulevard and/or the 7-11.	Medium	All Drivers	Low	**5**

	Observations	Recommendations	Safety Impact (High, Medium, Low)	Equity of Improvement (VRU/Kids/Elderly, Young & Elderly Drivers, All Users/Drivers)	Public Priority (High, Medium, Low)	Total
Systemic (Construction Zones)	14 crashes occurred during road construction.	Ensure that a qualified traffic engineer reviews and approves any traffic control plans before implementation. Also, ensure that a field inspection of traffic control setup and devices is conducted and any necessary adjustments are made during the review of field conditions.	Low	All Users	Medium	**4**
Systemic (Signage & Striping)	Signage for RRFB's is not consistent (multiple types of signs, only some are double backed, and only some include crosswalk ahead signage)	Identify a preferred standard, use existing sign inventory to identify where changes need to be made, and update all signage to meet the identified standard.	Low	All Users	Low	**3**