APPENDIX A: ENGAGEMENT SUMMARY

As part of the Adams County Comprehensive Safety Action Plan (CSAP), community engagement played a critical role in helping us understand the lived experiences and safety concerns of those who walk, bike, drive, and ride across the project area every day.

Phase I Summary (Summer 2024 – Winter 2025)

The team began engagement with a review of prior, related efforts including input received in recent comprehensive, transportation, parks/trails, subarea, and corridor plans across Adams County and partner jurisdictions. These documents were reviewed to summarize engagement activities, capture context, and synthesize safety- and mobility-related findings. This approach ensured we: (1) honored and incorporated existing community input, (2) reduced survey fatigue by avoiding repetitive questions, and (3) targeted Phase II–III outreach to areas where input is missing or outdated. Key themes that emerged included a strong desire for connected, low stress walking and biking networks; improved first/last mile access to transit; concerns about speeding and unsafe crossings; and the need to maintain existing infrastructure while addressing growth related congestion.

- **Safety:** Communities consistently identified speeding, insufficient crossings, and gaps in sidewalks and bikeways as major concerns.
- **Connectivity:** Residents prioritized completing missing links, improving north–south routes, and strengthening first/last mile transit access.
- **Maintenance & congestion:** People want roadway and sidewalk maintenance addressed in tandem with safety and operational improvements such as signal timing.
- **Trails as transportation:** Parks and trail systems are valued not only recreationally but also as safe, connected travel corridors to key destinations.

Unincorporated Adams County

Engagement Key Points

Recent engagement for the Advancing Adams suite (Comprehensive Plan, Transportation Master Plan, and Parks, Open Space & Trails Master Plan) provides a robust baseline on mobility, growth, and safety. Communities emphasized a 20-minute community concept with safe, comfortable access to parks, services, and transit via low-stress walking and biking. Strengthening first/last-mile connections, addressing speeding and unsafe crossings, and building a consistent, connected network for walking, biking, and transit were recurring themes.

Plans Reviewed

Advancing Adams Comprehensive Plan

- **Plan Date:** September 27, 2022
- **Overview:** Countywide policy framework guiding land use, housing, environment, economic development, heritage, and corridors/subareas; developed in three phases.
- **Engagement Activities:** Multi-phase process with virtual and in-person methods: surveys, listening sessions, focus groups, youth engagement, outreach at county events, bilingual materials, social media, and briefings to boards/commissions.
- **Engagement Overview:** Engagement spanned Aug 2020–Jul 2022, adapting between virtual, hybrid, and in-person. Phases addressed existing conditions, foundation building, and draft plan/future land use map.
- **Key Findings:** Broad support for the 20-Minute Community Model; preferences for focused centers; calls for bike lane and trail connectivity, better wayfinding, and safe access to schools/parks. Barriers include rail/highways and limited access to waterways; emphasis on safe multimodal connections.

Advancing Adams Transportation Master Plan

- **Plan Date:** April 2022
- **Overview:** Guides mobility system through 2040 based on assessment of conditions and community needs.
- **Engagement Activities:** Two phases: grounding (education/outreach, website, online tools, stakeholder engagement) and plan-for-the-future (virtual workshop, polling, in-person events).
- **Engagement Overview:** Public education on existing conditions and opportunities, then refinement of recommendations via interactive polling and workshops.
- **Key Findings:** Improving safety surfaced as a top theme. Priorities: complete sidewalk gaps and crossings; connected bike network (on- and off-street), especially near RTD stations; address first/last-mile to transit; consider on-demand services; improve reliability.

Parks, Open Space & Trails (POST) Master Plan

- **Plan Date:** Fall 2022
- **Overview:** Update guiding park/open space/trail management and development; coordinated with Comp Plan and TMP.
- **Engagement Activities:** Shared engagement with Advancing Adams: research plus stakeholder input to shape guiding themes.

- **Engagement Overview:** Themes stressed equitable access to recreation; trails as both recreation and transportation; partnerships for regional connectivity.
- **Key Findings:** Community asked for accessible, well-maintained, and safe trails with stronger system connectivity; strategies include linking trails countywide, improving trails for varied abilities/uses, and enhancing wayfinding and safety along corridors.

Square Lake Subarea Plan

- **Plan Date:** January 7, 2022
- **Overview:** Joint effort with Arvada to plan a key gateway with context-sensitive mobility, land use, and open space connections.
- **Engagement Activities:** SAC/TAC, three open houses with online surveys and translated outreach; combination of virtual and outdoor engagement.
- **Engagement Overview:** Outreach adapted to pandemic constraints, with special effort to reach residents without easy digital access, and Spanish translation/interpretation available.
- **Key Findings:** Strong desire to walk (80%) and bike (65%) in the subarea despite limited facilities, indicating demand for safer pedestrian/bike connections, especially to/from Clear Creek Trail; needs include sidewalks, protected bike lanes, trail links, and safer bus stops.

Strasburg Subarea Plan (Adams & Arapahoe Counties)

- **Plan Date:** In progress at the time of review; kicked off August 2024
- **Overview:** 20-year plan to guide growth while preserving agricultural heritage and addressing transportation and safety priorities in Strasburg.
- **Engagement Activities:** Online survey (Aug–Sep 2024), kickoff at Hometown Days, two open houses (Nov 20 & Dec 2, 2024).
- **Engagement Overview:** Initial engagement identified transportation priorities and mode preferences; subsequent events validated findings and gathered ideas for recommendations.
- **Preliminary Findings to Date:** Top priorities: maintain what exists, improve safety, enhance walk/bike infrastructure, reduce speeding, address sidewalk/crossing gaps, and improve lighting; specific ideas include speed management on Wagner Rd/Colfax, safer school crossings, and regional shared-use path connections.

Phase II Summary (Fall 2024 - Spring 2025)

Phase II engagement built on the foundational review completed in Phase I by gathering location-specific feedback to better understand where community members experience safety, mobility, and connectivity challenges, as well as where transportation conditions feel unsafe or inadequate. This phase focused on validating technical analysis with lived experience and identifying gaps where concerns may not appear in the data but are strongly felt by residents. The input deepened our understanding of transportation conditions, refined priorities for Phase III, and highlighted several locations where community perceptions indicated a clear need for further analysis.

Online Engagement

To gather meaningful input from residents, the project team launched an interactive Social Pinpoint commenting map as the primary engagement tool. The platform gave community members a space to identify both urgent problem spots and broader travel patterns they experience during daily commutes and neighborhood trips. By allowing users to pinpoint specific locations and describe safety issues in their own words, the tool provided real-world insights that extend beyond what crash data alone can show.

Comments were categorized into key issue types, helping the project team understand the distribution of community concerns:

- General safety concerns: 38%
- Speeding: 12%
- Lack of bike lanes: 9%
- Poor crosswalks: 7%
- Cars not stopping: 7%
- Poor roadway conditions: 7%
- Lack of sidewalks: 6%
- Transit access challenges: 5%
- Red light running: 3%
- Distracted driving :1%
- Pedestrian behavior and visibility: 1%

Outreach Strategy

To maximize participation, participating agencies promoted the opportunity widely through government communication channels, including:

- Social media posts
- Project newsletters and updates

- Local jurisdiction and agency websites
- Direct links from partner organizations

This collaborative approach ensured that perspectives from every part of the county, whether urban, suburban, or rural, were included.

Participation Highlights

The response from the community was strong and insightful:

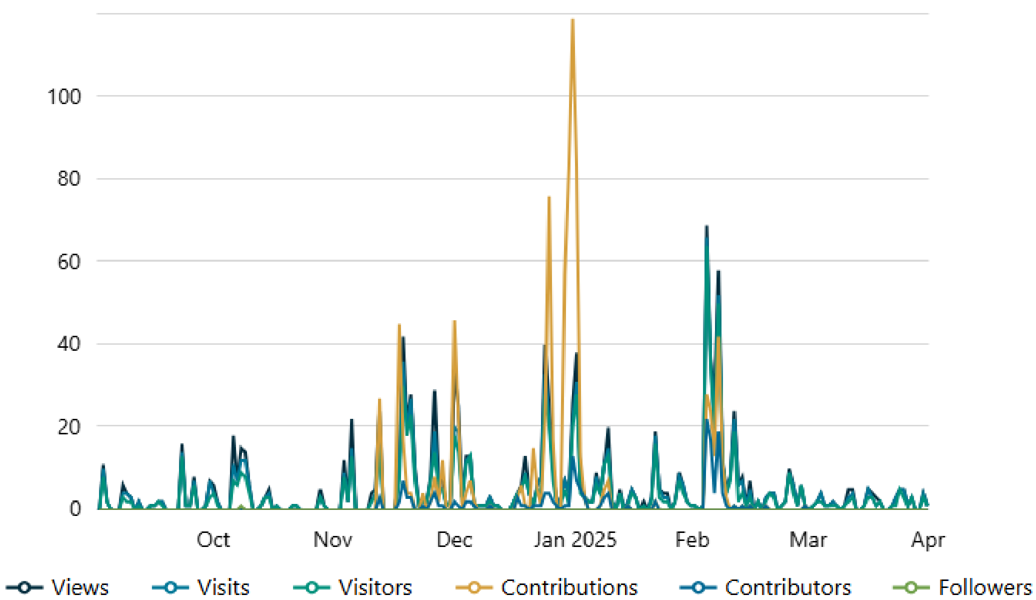
- 1,191 page views
- 1,029 total visits
- 664 unique visitors
- 853 total contributions (map pins and comments)
- 151 individual contributors

Of those 853 contributions, the project team manually added 541 of the 853 based on recent safety-related public feedback gathered during planning efforts by Aurora and Commerce City. This approach was intentional and was meant to acknowledge the extensive input already shared by community members and to avoid contributing to survey fatigue.

Rather than asking residents to repeat themselves, the team focused this outreach effort on validating what was already heard, identifying any new or emerging issues, and making it easy for community members to engage on their own terms. Using this strategy allowed the team to elevate recent public input while ensuring that the CSAP reflects a broad, regionally informed understanding of transportation safety concerns.

Monthly activity on the Social Pinpoint site showed distinct peaks in visits, views, and contributions during the project's active engagement periods.

Figure A.1. Social Pinpoint Site Traffic in Phase II



Key Takeaways

The community's feedback directly informed the CSAP recommendations and helped ensure that they reflect both quantitative safety data and qualitative lived experience. The insights gathered reinforced the need to focus on:

- Speed management in residential and arterial areas
- Safe pedestrian crossings and sidewalk access
- Intersections with high rates of failure-to-yield behaviors
- Gaps in active transportation infrastructure
- Localized concerns related to road conditions and visibility

This engagement effort reflects the participating agencies' commitment to a community-informed approach to traffic safety, where every voice helps build a safer system for all users.

When asked to select the top three improvements that would make them feel safer while traveling, respondents overwhelmingly prioritized intersection improvements (473 selections), followed by safer pedestrian/bicycle crossings (333) and better road maintenance (257).

Additional themes emerged around:

- More separation between bicycles and cars (222)
- Increased traffic signals (212)
- Better signage and visibility (162)

Lower priority items included speed bumps, reduced number of lanes, and increased police presence, suggesting a public desire for infrastructure-driven solutions over enforcement-based or restrictive strategies.

As illustrated in the following pie charts, the data underscores the community's emphasis on safer crossings, consistent infrastructure, and ongoing maintenance as key elements of a safer transportation network.

Figure A.2. Community Input by Comment Category

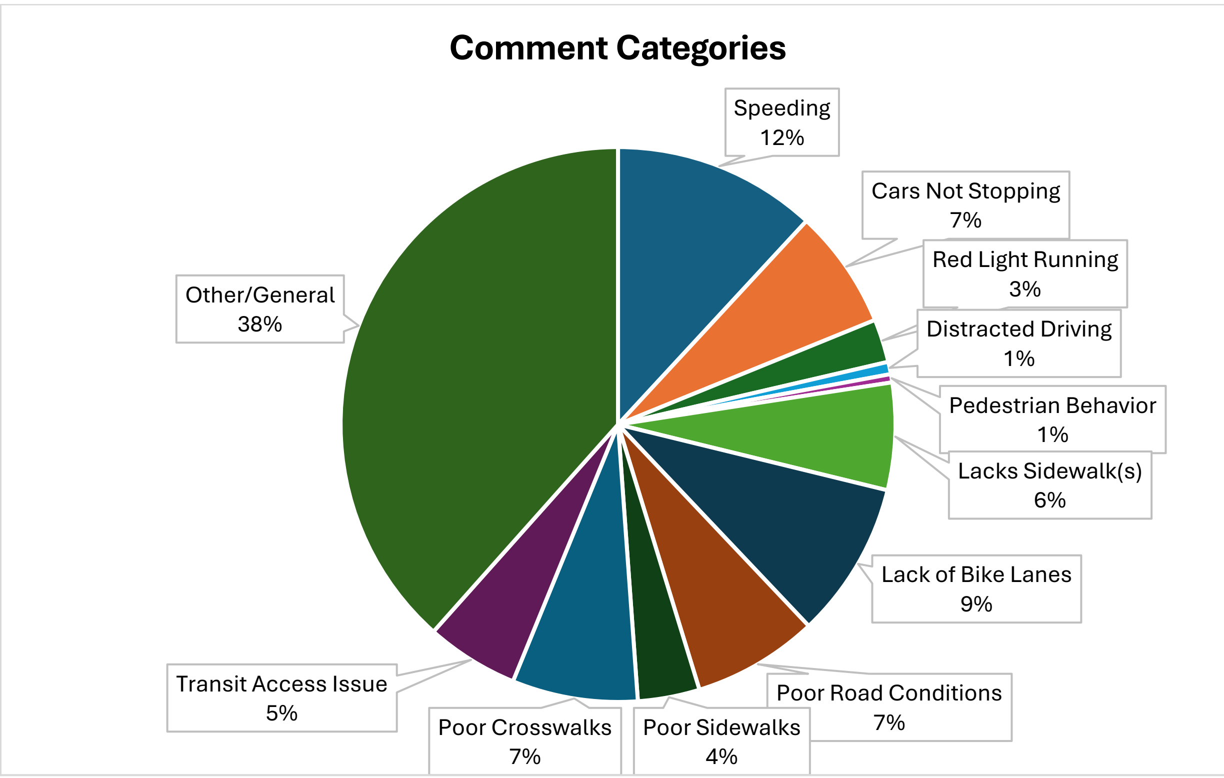
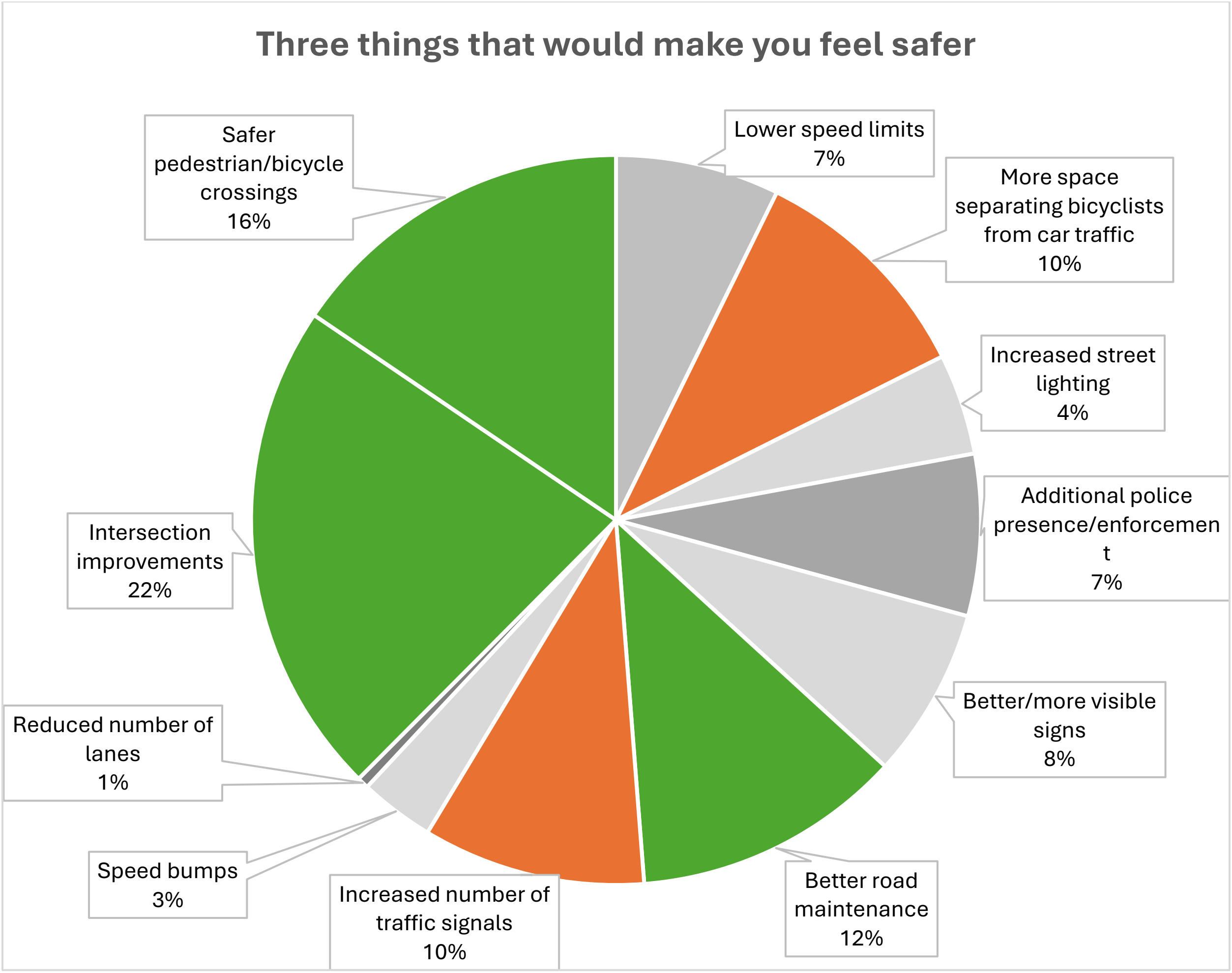


Figure A.3. Community Preferences for Safety Improvements



Top Thematic Concerns from Public Comments

The most frequently mentioned terms highlight community priorities and concerns:

- Speeding and traffic appear frequently, indicating concerns about vehicle speeds and congestion.
- Lighting, crosswalks, and sidewalks show up consistently, pointing to pedestrian infrastructure and visibility issues.
- Mentions of kids, school, and bikes emphasize safety for children and non-motorized users.

From mapped comments, there were more than 60 comment clusters where three or more pins were dropped within 0.3 miles of one another. The following section outlines key themes that emerged from the commenting map and survey input for the CSAP. This synthesis captures the most frequent concerns and provides a framework for aligning technical recommendations with public feedback.

Intersection Safety and Traffic Control

- Signals were the most requested improvement, frequently cited at key intersections like 168th Ave & 50th Ave, 120th Ave & Buckley Rd, and numerous locations near schools.
- Lack of left-turn arrows or protected turn lanes results in risky maneuvers, especially during peak traffic times.
- Roundabouts were either praised or criticized, some seen as too small or confusing, while others were requested as solutions.
- Red light running was mentioned often as a safety concern, particularly in school zones and on major arterials like US-85, 104th Ave, and 120th Ave.

Speeding and Driver Behavior

- Comments expressed widespread concerns about speeding, especially on arterial roads
- Speeding is particularly alarming near schools, parks, and crosswalks, where residents worry about children's safety.
- Repeated requests were made for traffic calming: speed bumps, roundabouts, narrowing lanes, and stronger enforcement (including cameras and police patrols).

Pedestrian and Bicyclist Safety

- The lack of sidewalks, crosswalks, and bike lanes is seen as a major barrier to safety and access across the project area.
- People often walk in the street due to missing or poorly maintained sidewalks.
- Dangerous crossings without signals, especially across multi-lane arterials, were commonly cited—residents expressed a desire for grade-separated crossings, flashing beacons, or better markings.
- Poor lighting exacerbates safety issues, particularly in early morning or evening hours.

Road and Infrastructure Conditions

- Numerous comments referenced potholes, poor pavement, and failing infrastructure on both local streets and key corridors.

- Intersections and roads are not designed for current traffic volumes—comments frequently cited backups, congestion, and bottlenecks, especially near I-76, Hwy 2, and US-85.
- Several roads were described as incomplete or confusing, particularly where they shift from two to one lane or lack proper signage.

School Zones and Neighborhood Access

- School traffic creates major congestion and safety issues, including illegal passing, double parking, and speeding in school zones.
- Parents consistently reported fear for their children's safety while walking or biking to school.
- Many neighborhoods feel cut off from key destinations (schools, shopping, parks) due to lack of safe crossings or transit access.

Train and Transit Issues

- There were repeated complaints about train crossings blocking traffic for long periods, particularly during rush hour.
- Comments requested grade-separated crossings or better notification systems to alert drivers and reroute them.
- Residents also noted a lack of transit connectivity to key destinations like rec centers, commercial areas, and senior housing.
- There were multiple requests for bus shelters, benches, and more frequent service.

Lighting and Visibility

- Poor lighting is a recurring concern, especially in newer developments and near open space or trail areas.
- Dark intersections and corridors reduce visibility for drivers and pedestrians, leading to increased crash risk.

"Other"

The most commonly mentioned topics include:

- Traffic Congestion (top concern)
- Signal Timing/Need (e.g., requests for new traffic signals or improved signal timing)
- Turning Conflicts (especially left turns without signals or poor sight lines)
- Poor Lighting and Visibility Issues (many tied to safety, especially at night)
- Lane/Striping Confusion (including sudden merges or unclear markings)
- Pedestrian Safety and School Zone Issues
- Train Delays (often blocking key intersections)

- Crime/Public Safety (requests for more patrols or concern about rising incidents)

Access to Parks and Open Space

- Many comments addressed unsafe or nonexistent access to open space, particularly for families walking or biking.
- Trail and greenway connectivity is lacking in several parts of the county, with calls for expanded sidewalks and crossings to link neighborhoods with parks and recreational amenities.

Safety and Speeding Concerns

- Multiple streets (especially Tennyson St and 64th Ave) flagged for high speeds and unsafe conditions, particularly near schools and residential areas. Residents strongly advocate for infrastructure that actively slows traffic, not just new striping or paint.

High Density Clusters of Comments

Based on the commenting map, engagement input clusters into six geographic areas where feedback was both dense and highly specific. The following summarizes each cluster's localized safety concerns and highlights initial prioritization signals informed by frequency, severity, and the urgency expressed by community members.

Cluster 1: North Central – Brighton, Hwy 7, Hwy 85 Corridor

Key Themes:

- High-speed corridors like Hwy 7 and Hwy 85 consistently flagged for excessive speeds and dangerous crossings.
- Brighton residents noted issues at 120th & Buckley and Hwy 85 & Bridge St, with complaints about light timing, long queues, and risky turning movements.
- Strong concerns about train crossings, especially Bridge St & Hwy 85, where delays and backups are routine.
- Need for better sidewalk access and more pedestrian-friendly crossings, particularly near shopping centers and civic destinations.

Cluster 2: Northeast – Lochbuie, Rural Subdivisions near I-76

Key Themes:

- Incomplete road networks, especially where roads suddenly shift between 2-lanes and 4-lanes.
- Multiple calls for widening roads (e.g., 168th, 120th) and better traffic controls at rural intersections.

- Safety issues related to limited lighting and lack of shoulders, making night driving hazardous.
- School zone speeding and inadequate crosswalks near new developments.

Cluster 3: East Central – Reunion, Belle Creek, 104th & Hwy 85 Vicinity

Key Themes:

- Speeding in neighborhoods like Reunion and Belle Creek, particularly during school drop-off/pick-up.
- Pedestrian barriers on 104th and 112th – too wide, not enough crossings, poor lighting.
- Numerous requests for stoplights or flashing crosswalks near schools and parks.
- Concern about cut-through traffic on local streets due to congestion on arterials.

Cluster 4: Southwest – Sherrelwood, Twin Lakes, Hwy 36 Vicinity

Key Themes:

- Frequent mentions of poor lighting and sidewalk maintenance, especially for older residents and transit users.
- Transit stops lack shelters, and gaps in first/last mile access are common.
- Several intersections flagged for dangerous turning, especially where sight distance is limited or signal timing is off.

Cluster 5: South Central – Federal Heights, Western Thornton

Key Themes:

- Pedestrian safety near mobile home parks and low-income housing.
- Speeding and lack of safe crossings on arterials like Federal Blvd and 92nd.
- Lack of trust that drivers will yield at unmarked or poorly lit crossings.

Cluster 6: West Central – Welby, Industrial Corridors, 56th/60th Corridor

Key Themes:

- Heavy truck traffic and industrial vehicle conflicts creating a sense of danger for pedestrians and cyclists.
- Lack of safe bike/ped infrastructure connecting residential areas to jobs or services.
- Cut-through driving and speeding along local streets used to bypass congestion.

Community Input for Unincorporated Adams County

Unincorporated Adams County (77 map comments)

Comments were geographically dispersed, with clusters in areas along Tennyson Street, Lowell Boulevard, and 168th Avenue, as well as around Belle Creek, the Government Center, and rural corridors like Highway 7 and 128th Avenue. These reflect a mix of rural and suburban conditions where infrastructure often hasn't kept pace with growth and shifting transportation demands.

The top comment categories in Unincorporated Adams County (county) were Other (25), Lacks Sidewalks (12), Lack of Bike Lanes (10) and Speeding (10).

Two specific comments in the unincorporated area of Arvada received numerous up-votes from other participants showing agreement among fellow community members:

- "The road condition along Tennyson is not great, especially the bike lanes, which are also too narrow. Vehicle traffic speeding is also an issue here." 5765 Tennyson Street
- "This road (Tennyson between 60th 52nd) is frequently biked as it connects with the clear creek trail. There is no bike lane and few lights. It feels very dangerous day or night as cars speed by 45+" 5770 Tennyson Street

Safety and Speeding Concerns

- Speeding was among the most cited issues, particularly along corridors like Highway 7, 128th Avenue, and rural roads lacking enforcement or calming infrastructure. Many residents described dangerous driving behavior and close calls with speeding vehicles.

Lack of Sidewalks and Connectivity

- Sidewalk gaps are a widespread concern, especially in areas where access to schools, parks, or transit is needed. Residents flagged streets like 168th Avenue, Lowell, and Belle Creek as unsafe or inaccessible for pedestrians.

Bike Infrastructure Gaps

- Numerous comments point to a lack of bike lanes or disappearing lanes, especially along regional connectors like Tennyson, Sable, and routes connecting to the Platte River Trail. Many respondents noted an inability to access major trails without riding in traffic.

Transit Access and Equity Issues

- Multiple bus stops were flagged as unsafe or lacking basic amenities. One bus stop on a high-speed corridor was described as debris-covered with no shelter, while another comment requested safer walking routes to reach regional bus service.

Infrastructure Deterioration and Design

- Poor road conditions, potholes, and faded or missing crosswalks. Several intersections flagged as dangerous due to poor visibility or inadequate traffic control (e.g., lacking turn signals or merge lanes).

Community Recommendations

- Call for protected bike lanes, sidewalk extensions, pedestrian bridges, better lighting, and intersection improvements. Suggested rethinking traffic light timing, installing stop signs, or building safer crossings near parks and schools.

Phase III Summary (Fall 2025)

Phase III built on the outcomes of Phase II by confirming alignment with the top safety corridors and intersections identified through prior community engagement and technical analysis conducted by the project team. This phase provided an opportunity for community members to review the proposed top locations and suggest additional areas they felt warranted consideration. Input from Phase III was used to confirm and refine the list of top locations and, where appropriate, identify additional locations for further analysis.

Online Engagement

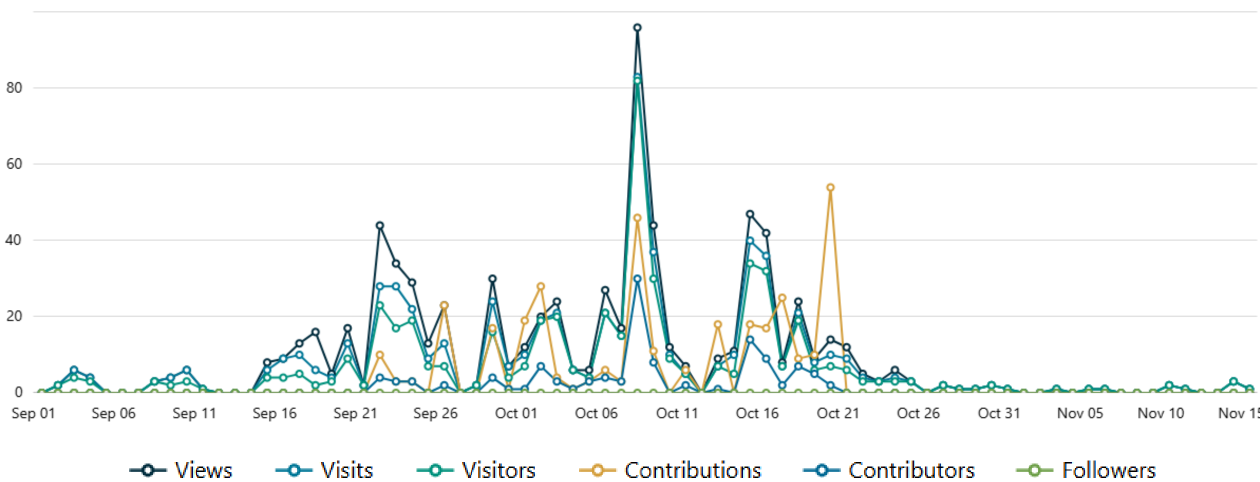
Social Pinpoint continued to serve as the primary online engagement platform throughout Phase III of public involvement. The platform hosted interactive mapping activities, surveys, and project information, allowing participants to review proposed top locations and provide location-based and general feedback at their convenience.

During Phase III, Social Pinpoint recorded the following about participation:

- **759 views** of the project site
- **619 visits**
- **412 unique visitors**
- **334 total contributions**, including:
    - 196 top intersection map pins
    - 49 top corridor map pins
    - 87 survey responses
    - 2 email subscriptions
- **113 contributors**, reflecting the number of individuals who actively submitted input

These engagement metrics demonstrate the community's continued use of the online platform to provide both quantitative and qualitative input, offering a consistent and accessible channel for participation throughout Phase III of the CSAP engagement process. Figure 2 illustrates overall website traffic during this phase.

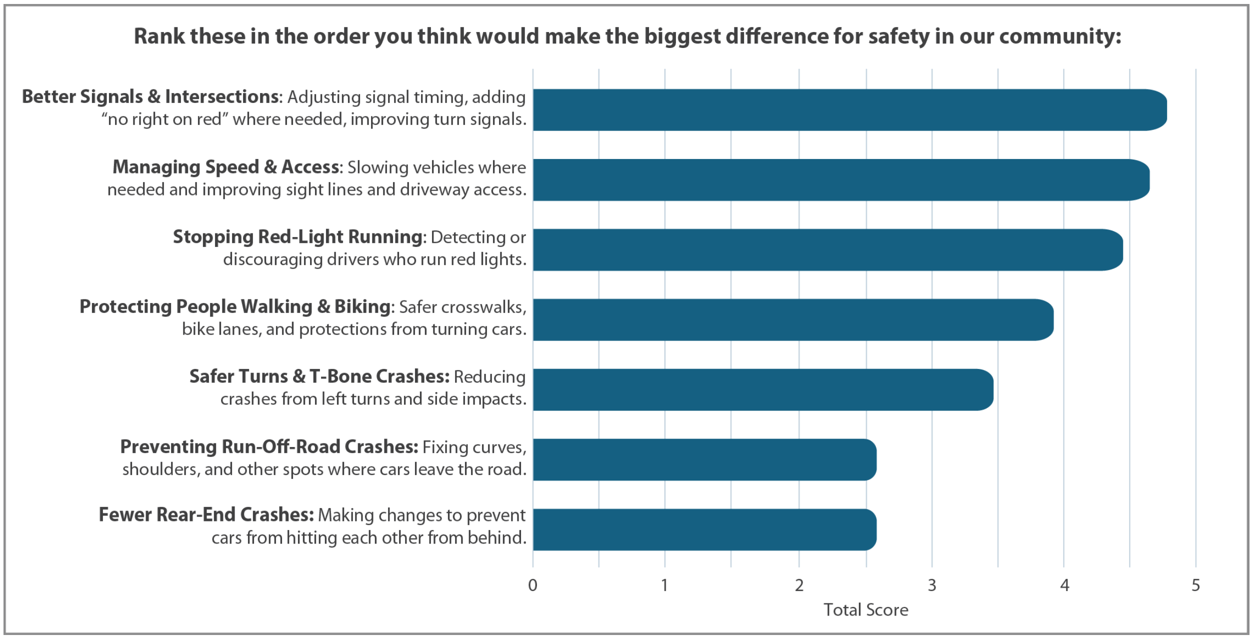
Figure A.4. Social Pinpoint Site Traffic in Phase III



Public Priorities for Safety Improvement Types

Participants were asked to rank categories of safety improvements based on which they believed would make the biggest difference for safety in their community. Overall, responses indicated a strong preference for intersection-focused and behavior-related strategies, particularly those that address signal operations, speed management, and red-light compliance.

Figure A.5. Survey Safety Ranking Results



Highest-ranked priorities centered on:

- Better signals and intersections, including signal timing adjustments, turn restrictions, and improved turn signals. This category received the strongest overall support, suggesting participants view intersection operations as a critical factor in improving safety.
- Managing speed and access, such as slowing vehicles, improving sight lines, and managing driveway access. Respondents consistently ranked speed-related strategies among the most impactful.
- Stopping red-light running, reflecting concern about risky driving behaviors and enforcement or deterrence strategies at intersections.

Mid-ranked priorities included:

- Protecting people walking and biking, with respondents recognizing the importance of safer crossings, bike facilities, and protection from turning vehicles.
- Reducing left-turn and side-impact (T-bone) crashes, indicating awareness of the risks associated with complex turning movements at intersections.

Lower-ranked priorities, while still viewed as beneficial, focused on:

- Reducing rear-end crashes, such as changes to prevent vehicles from striking one another from behind.

- Preventing run-off-road crashes, including improvements to curves, shoulders, and roadway edges.

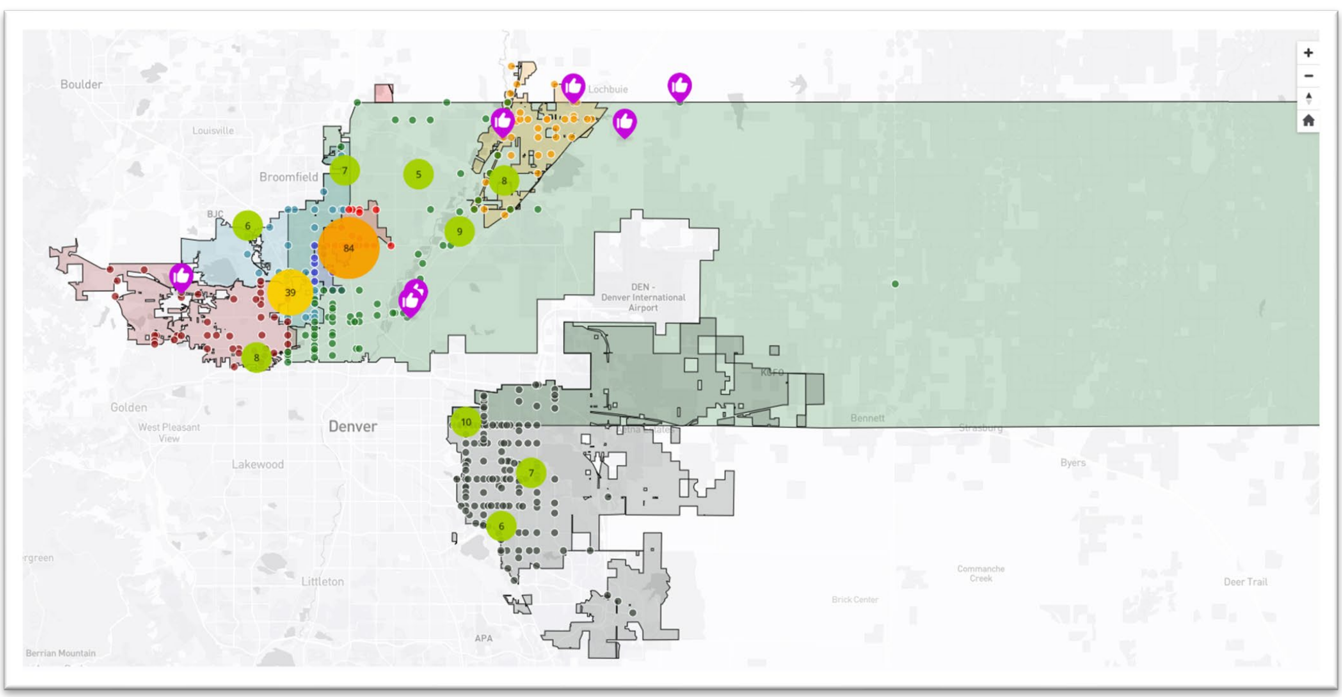
Respondents placed the greatest value on intersections and improvements along busy corridors, particularly strategies that influence driver behavior and reduce conflict points. Respondents also prioritized improvements that address speeds, signal operations, and -high-risk behaviors over more location-specific or roadway-edge treatments.

Top Intersections

As part of the CSAP, participating agencies invited community members to review a map of top intersections identified through a technical safety analysis and to indicate which locations they felt were most important for safety improvements. Participants were asked to place a "thumbs up" marker on top intersections and share comments describing why those locations mattered to them. In total, 196 location-based comments were submitted across the top intersections, with public input received from multiple jurisdictions and participation levels varying by area. Figure 4 shows the top intersections along with the community "thumbs up" responses, which help validate these locations as priorities.

Overall, public feedback largely validated the top intersections identified through technical analysis. Comments frequently reinforced known safety challenges related to vehicle speeds, pedestrian crossings, and complex intersection operations. While the volume of responses differed by jurisdiction, the themes raised were consistent across communities and aligned with the project wide, data-driven approach used to identify top locations.

Figure A.6. Map of Top Intersections and Validating Feedback



Project Wide Themes

Across all jurisdictions, several common themes emerged:

- Vehicle speeds and turning movements at busy arterial intersections
- Challenges for people walking, particularly at wide crossings and locations with limited pedestrian infrastructure
- Intersection complexity, including multiple lanes, high-traffic volumes, and competing movements
- Regional travel patterns, with several intersections serving both local access and through traffic

These recurring themes provided qualitative context that complements crash data and network screening results.

Unincorporated Adams County (32 Map Pins)

Level of Support

Public input for unincorporated areas was more limited in volume compared to incorporated jurisdictions. Participants consistently used the mapping tool to identify locations they experience as unsafe and to describe recurring safety issues rather than isolated incidents.

Key Themes

Comments from unincorporated areas revealed several consistent themes:

- Excessive speeds and aggressive driving, particularly along roadways functioning as cut-through routes or regional connectors
- Recurring crash history, with multiple respondents referencing frequent or severe crashes, including property damage and injuries
- Intersection and corridor complexity, including lack of turn lanes, limited sight distance, and congestion near freeway ramps
- Railroad crossings, with repeated requests for improved crossings, grade separation, or operational changes to reduce queuing
- Pedestrian safety concerns, especially near bus stops, schools, and neighborhood connections where safe crossing opportunities are limited
- Perceived gaps in implementation, including locations where studies or previous requests have been made but no improvements have occurred

Several comments also reflect frustration with jurisdictional or procedural barriers, such as difficulty advancing traffic calming measures or securing enforcement, even where speeding and safety issues have been documented.

Comments describe safety challenges that are consistent with known risk factors for serious crashes, including high speeds, complex movements near freeway and railroad infrastructure, and limited pedestrian accommodations.

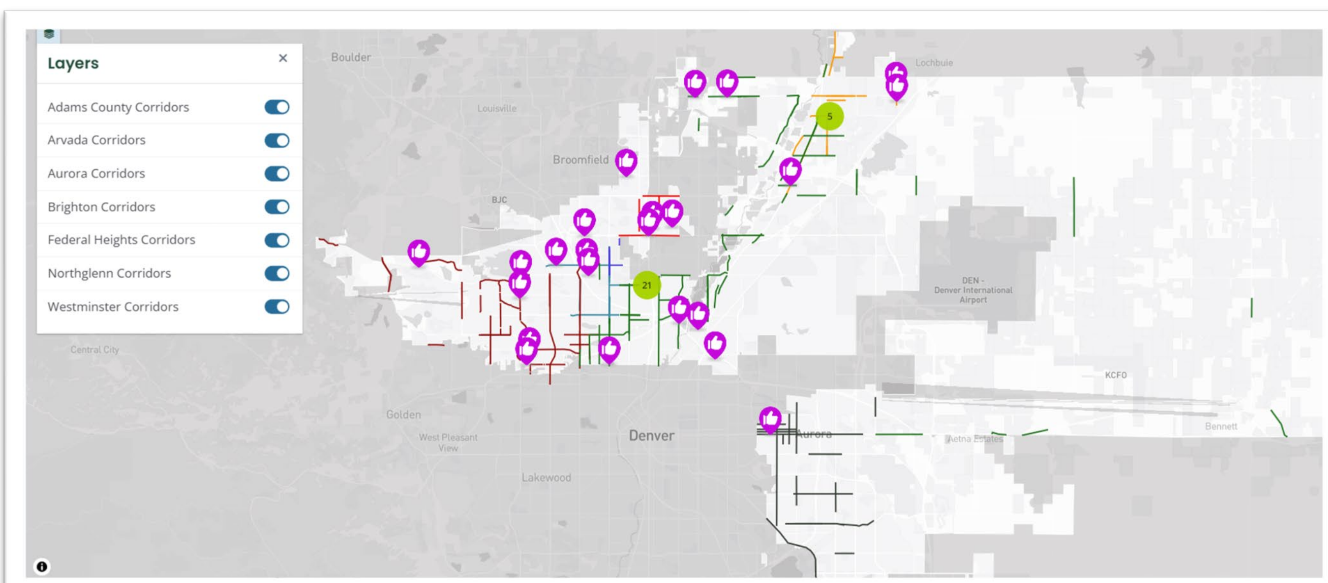
The nature of the feedback suggests that intersections in unincorporated areas often serve regional travel and freight movement, while also supporting local access, schools, transit stops, and neighborhood connections. Public input reinforces the importance of addressing safety at these locations through a countywide approach that considers both operational improvements and longer-term infrastructure solutions.

Top Corridors

Phase III public input on top corridors generally affirmed the corridor locations identified through technical analysis. Participants frequently used the thumbs-up feature to indicate agreement with the corridors shown and, in some cases, provided comments describing safety concerns experienced along entire roadway segments rather than at isolated locations. Figure 5 shows the top corridors along with the community "thumbs up" responses, which help validate these locations as priorities

Written feedback commonly referenced vehicle speeds, traffic volumes, pedestrian and bicycle exposure, and the cumulative effect of safety challenges along longer corridors. While the number of comments varied by jurisdiction, public input consistently aligned with the corridor-based approach used to identify top locations across the project area.

Figure A.7. Map of Top Corridors and Validating Feedback



Unincorporated Adams County (18 Map Pins)

Level of Support

In addition to multiple thumbs-up responses, several participants provided written comments on county–specific top corridors. While the number of comments was limited, they offered detailed observations about traffic conditions and safety concerns experienced along longer roadway segments.

Key Themes

- Congestion and growth pressure, particularly along corridors serving new or recent development and acting as alternatives to I-25
- Vehicle speeds and aggressive driving, with several corridors described as functioning like raceways or drag strips
- Freeway access and merging challenges, especially near I-25 interchanges and underpasses
- Pedestrian and bicycle infrastructure gaps, including missing sidewalks, lack of curb ramps, and discomfort using unprotected bike lanes
- School and community safety concerns, with references to students, schools, and neighborhood foot traffic along high-speed corridors
- Corridor condition and maintenance issues, including roadway surface concerns and underpasses perceived as unsafe or uncomfortable
- Desire for traffic calming approaches, with some comments expressing skepticism that widening alone would improve safety and suggesting alternative strategies

Several comments also referenced previous studies, unmet improvement requests, or uncertainty about previously proposed projects.

Comments on county–specific corridors provide qualitative context for the technical analysis by describing how safety challenges are experienced continuously along these routes. Feedback highlights the interaction among congestion, speed, and limited pedestrian accommodations, particularly in areas experiencing growth or serving as regional connectors. While written input was limited, the themes raised align with known corridor-level risk factors and support the identification of these corridors as priorities for further safety evaluation.

In-Person Engagement

The project team hosted five in-person engagement events during the Fall of 2025. These events mirrored the online mapping activity, allowing participants to validate top safety locations, share personal experiences, and suggest additional areas of concern. Attendees were generally receptive to the CSAP and expressed strong interest in roadway safety improvements, contributing valuable feedback to refine top locations for future action.

Across all events, several common themes emerged. Residents consistently cited speeding, unsafe intersections, and aggressive driving as major concerns, particularly near schools and high-traffic corridors. There was strong support for traffic calming measures such as speed bumps, enhanced enforcement, and improved signal timing. Pedestrian safety and walkability were recurring priorities, with requests for better crossings, sidewalks, and bike infrastructure. Participants also highlighted issues related to congestion, visibility hazards, and the need for more public safety messaging. These insights underscore the community's desire for both infrastructure improvements and behavioral interventions to enhance safety across the county.

Technical Advisory Committee

The Technical Advisory Committee (TAC) played a central role in shaping the CSAP by providing coordinated technical guidance from local, regional, state and federal partners. The following agencies were represented on the TAC:

- Adams County
- Arvada
- Aurora
- Brighton
- Commerce City
- Federal Heights
- Northglenn
- Thornton
- Westminster
- FHWA Colorado Division
- Colorado Department of Transportation
- DRCOG

Throughout the plan development, TAC members guided key elements of the plan including data analysis, prioritization methods, funding alignment, public engagement interpretation, dashboard development, and implementation strategy. Their feedback helped ensure the plan reflects regional coordination, systemic safety principles, federal grant competitiveness, and practical agency needs. By emphasizing corridor-based approaches, scalable project bundling, meaningful use of public input, clear interpretation of crash trends, and user-friendly data tools, the TAC reinforced the plan's data-driven foundation. Their contributions ultimately helped produce recommendations that are technically sound, regionally aligned, and implementable across the project area.

Funding, Policy, and Grant Competitiveness

TAC members emphasized the importance of ensuring the CSAP is positioned to support successful grant applications, particularly in the context of evolving federal guidance. Members noted the need to be mindful of terminology and framing to align with current federal expectations and regional funding priorities. There was strong interest in ensuring the plan supports applications to programs such as DRCOG and FHWA by emphasizing systemic and corridor-based approaches rather than isolated, stand-alone projects.

Several members highlighted that, given the administrative effort required to pursue federal funding, agencies are more likely to pursue bundled or multijurisdictional projects rather than smaller, individual improvements. TAC discussion reinforced the value of framing recommendations in a way that supports scalable, collaborative implementation.

Public Engagement and Use of Input

The TAC reviewed the project's approach to collecting and incorporating public engagement results. In response to TAC questions, the project team clarified that engagement activities were designed to gather high level input to validate top locations and identify common safety concerns, rather than solicit detailed design preferences at this stage. TAC members supported this strategy, noting that it preserves agency flexibility to select appropriate countermeasures and refine design elements during later phases of project development. They also advised the project team to highlight recurring themes from engagement summaries and ensure strong alignment between public feedback and the project's technical analysis. This guidance helped shape how public input was interpreted and carried forward into the CSAP.

Crash Trends and Data Insights

TAC members reviewed and discussed the key crash trends identified through technical analysis. Several agencies noted disproportionate number of pedestrian and motorcycle crashes within the fatal and serious injury (KSI) dataset, particularly in urban areas. Members also acknowledged the complexity of addressing motorcycle crashes and the importance of tailoring countermeasures based on crash type and context.

TAC input directly informed the plan's methodologies, engagement materials, prioritization structure, and implementation strategy, particularly through discussions of:

- Time-of-day trends, with more severe crashes occurring at night
- Lighting and roadway conditions, including the relationship between adverse weather and crash severity
- DUI-related crashes, noting limitations in trend analysis due to changes in state coding practices

- Fault considerations, particularly in pedestrian crashes, and how responsibility influences appropriate countermeasure selection

TAC members agreed that drilling down into location-specific crash patterns would be valuable for agencies when moving toward implementation.

Systemic Analysis and Prioritization

The TAC reviewed the project's systemic safety analysis, including the characteristics used to identify higher-risk roadway segments and intersections. Discussion clarified how fatal and serious injury crashes were weighted and how different roadway contexts (urban vs. rural) influence prioritization methods.

Members asked questions about specific data elements, such as transit routes, bicycle facilities, and areas of persistent poverty datasets, and how those were incorporated into the analysis. The project team explained limitations in available data granularity and emphasized consistency across jurisdictions. Overall, TAC feedback supported the systemic approach and its role in identifying top locations beyond traditional hot-spot analysis.

Tools, Dashboards, and Data Sharing

There was strong interest among TAC members in the development of dashboards and web-based tools to support ongoing use of the data. Agencies expressed a desire for tools that allow both regional and jurisdiction-specific views, with the ability to explore data at a more granular level for communication with staff, elected officials, and the public.

Discussion included:

- Hosting dashboards centrally through Adams County
- Compatibility with different platforms (e.g., PowerBI, ArcGIS, Envisio)
- Coordination with existing regional tools, such as DRCOG's crash dashboard
- The importance of minimizing duplication while still providing actionable, local-level insights

TAC members agreed that continued coordination on dashboard development and maintenance would be valuable as the plans move into implementation.

Implementation and Next Steps

TAC members asked for greater clarity on how recommended countermeasures would translate into project level details, including cost ranges and treatment options. The project team explained that the plan will provide a menu of countermeasures with associated cost ranges, while allowing agencies to refine scopes and estimates based on local priorities and funding strategies.

Members also expressed interest in having briefing materials for elected officials, emphasizing the value of clear, localized data when communicating safety needs and funding opportunities. In response, the project team confirmed that presentation materials would be developed to support these conversations.

Collectively, this guidance helped ensure the plan is not only technically defensible but also aligned with local capacity, regional coordination needs, and the evolving federal funding environment.

APPENDIX B: CRASH ANALYSIS METHODOLOGY

This memo summarizes the methodologies used to complete the crash analysis portion for the Adams County Comprehensive Safety Action Plan (CSAP), including development of crash profiles and identification of top intersections and corridors. The data used for these analyses covered the five-year time period from 2018 through 2022, as this was the most recent period of geocoded crash data available when the project began in 2024.

Additional limited analyses of crash data from 2023 and 2024 were conducted at the end of the project, when these datasets became available. This abbreviated analysis found similar crash patterns to the comprehensive analysis of crash data from 2018 through 2022. Findings of the 2023-2024 analysis are described at the end of this appendix.

Crash Data Collection and Preparation

Crash data was exported from DiExSys Vision Zero Suite (VZS) for the five-year period from 2018-2022 for all counties within and bordering the CSAP study area:

- Adams
- Arapahoe
- Broomfield
- Denver
- Jefferson
- Lincoln
- Morgan
- Washington
- Weld

Crashes from neighboring counties were included because a crash that occurs on a roadway forming the boundary between two jurisdictions may be coded to either jurisdiction. Crash data was exported from VZS on October 24, 2024.

The downloaded crashes were mapped in ArcGIS Pro using the latitude and longitude coordinates of each record and combined into one layer. The resulting crash dataset was clipped to each jurisdiction within the CSAP study area and buffered by 150 feet to capture crashes on the edge of each jurisdiction.

Data Cleaning

Crashes were reviewed in ArcGIS Pro. All fatal and serious injury crashes that were mapped outside the jurisdiction boundary were manually moved to the correct location. Any crashes that were noticeably outside of its jurisdiction border were relocated to the correct spot.

Multiple rounds of duplicate identification were conducted to remove duplicates from the dataset. In the first round, any crashes that had the same Report ID, Date, and Crash Location were removed.

A second round of duplicate identification compared serial numbers by year and report IDs. Because serial numbers are sometimes duplicated across different years, the year and serial number were combined in a new field. Duplicates of this new "year + serial number" field were flagged using the Python parser "isDuplicate," which marks the first instance of a value with a 0 and any repeated instance with a 1. Duplicated report IDs were also flagged using the same tool.

If both the year + serial number field and the report ID field were flagged as duplicates, the duplicate record was deleted. Records were manually checked if one field was flagged as a duplicate but the other was not. Through this process, 84 crashes were removed.

New coordinates were calculated in ArcGIS Pro to reflect the updated locations of crash points that were moved manually.

Sorting by Jurisdiction

A crash dataset was provided in GIS and Excel format for the eight jurisdictions included in this project:

1. Unincorporated Adams County (county)
2. Arvada
3. Aurora
4. Brighton
5. Commerce City
6. Federal Heights
7. Northglenn
8. Westminster

While Thornton and Bennett are a part of the project study area, individual crash datasets and analysis specific to these jurisdictions were not developed given they have separately developed safety plans.

Crashes that fell within 150 feet of a street that forms the boundary between two jurisdictions were included in both jurisdictions' datasets. For example, Federal Boulevard forms the boundary between Federal Heights and Westminster from 88th Avenue to 104th Avenue. A crash that occurred at the intersection of 92nd Avenue and Federal Boulevard was included in both the Westminster and Federal Heights dataset and subsequent analysis.

Organizing Data by Roadway/Land Use Context

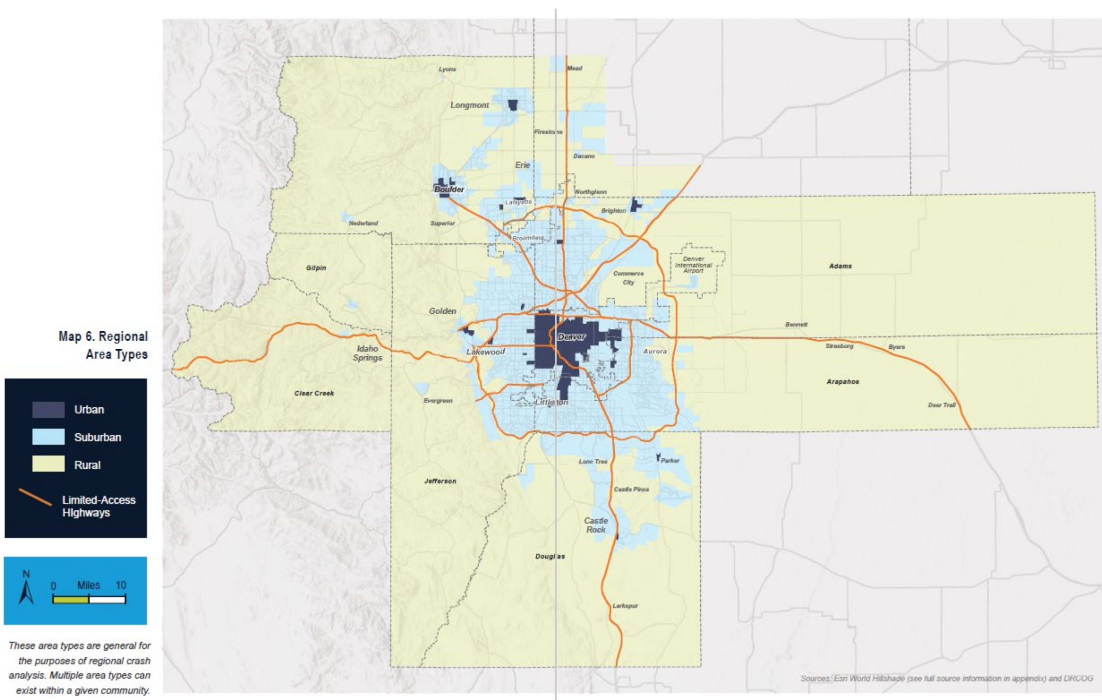
DRCOG's traffic signals layer was used to identify crashes that occurred at signalized and unsignalized intersections. Crashes within 250 feet of an intersection were tagged as signalized or unsignalized based on the data in the traffic signals layer.

The crashes were further coded by the four Regional Area Types defined in the DRCOG *Taking Action on Regional Vision Zero* Plan, as mapped in **Figure B.1**:

1. Urban
2. Suburban
3. Rural
4. Limited Access-Highway

Any crash on a boundary was coded into the denser area type.

Figure B.1. Regional Area Types from DRCOG Taking Action on Regional Vision Zero



Crashes that occurred on an interstate, E-470, or the portion of US 36 between I-25 and Colorado Ave in Boulder were tagged as occurring on limited access highways. To identify these crashes, the analyst applied the following filters:

- Road System = Interstate and Road Description = anything but Intersection or Intersection Related
- Road System = State Highway and Route Number = 470 and Road Description = anything but Intersection or Intersection Related

- Road System = State Highway and Route Number = 36 and Route Section = B and Road Description = anything but Intersection or Intersection Related

Crash Trends Analysis

Crash trends were analyzed for each of the eight jurisdictions in the project to understand how the frequency and severity of crashes by mode are changing year over year and identify the most common types of crashes. Data were analyzed for the years 2018 through 2022.

Crash types and trends were analyzed by jurisdiction for each regional area type within that jurisdiction (urban, suburban, rural, limited access highway). Potential contributing factor trends (such as weather conditions, lighting, speed, human contributing factors, etc.) were also reported when notable. This part of the analysis was completed in Excel using Pivot tables.

Crash Profiles Development

The top fatal and serious injury crash profiles were also developed for each of the eight jurisdictions, organized by regional area type when applicable. The crash profiles help reveal the major crash types that lead to fatal and serious injury crashes, and each crash profile corresponds to a set of proven safety countermeasures.

Crash profiles were identified by analyzing several details of crashes, including crash type, vehicle direction, and vehicle movements in Excel using Pivot tables. Crash narratives were reviewed for fatal and serious injury crashes that involved a pedestrian or bicyclist, as the other data attributes are not typically sufficient to understand which crash profile they represent.

The crash profiles identified for this project, and the criteria used to distinguish each, include

- Urban/Suburban Lane Departure
  - Head On, Overturning, and Sideswipe Opposite Direction crashes at non-intersections
  - Fixed Object or Parked Motor Vehicle Crashes
  - Ped/bike crash at signalized intersection where narrative matches the description
- Rural Lane Departure
  - Head On, Overturning, and Sideswipe Opposite Direction crashes at non-intersections
  - Fixed Object or Parked Motor Vehicle Crashes
  - Ped/bike crash at signalized intersection where narrative matches the description

- Left Turn at Signalized Intersections
  - Approach Turn at signalized intersection (except for when V1 is going straight)
  - Ped/bike crash at signalized intersection where narrative matches the description
- Broadside or Left-Turn at Unsignalized Location
  - Approach turn at unsignalized intersection or non-intersection
  - Broadside at unsignalized intersection or non-intersection
  - Ped/bike crash at signalized intersection where narrative matches the description
- Red-Light Running
  - Broadside at signalized intersection (excludes where V1 is making right turn)
  - Approach turn at signalized where V1 is going straight and V2 is making a left turn or u-turn
  - Ped/bike crash at signalized intersection where narrative matches the description
- Rear End
  - Rear end crash
- Pedestrian or Bicyclist Crossing Street at Unsignalized Location
  - A pedestrian crossing a street midblock or at an uncontrolled crossing (no signal or STOP sign for vehicles) was struck by a crossing vehicle
- Pedestrian or Bicyclist Crossing Against Signal
  - A pedestrian or bicyclist crossed when at a DON'T WALK signal and was struck by a vehicle that had the green signal.
- Right-Turn from Stop Sign into Pedestrian or Bicyclist
  - A driver turning onto a major street from a side street or driveway at an unsignalized intersection failed to yield to a crossing pedestrian or bicyclist traveling along the major street.
- Right-Turn on Red
  - Broadside crash at signalized where V1 is making right turn and V2 is anything but stopped at intersection or stopped in traffic
  - Pedestrian or bicyclist crash where the narrative fits the profile (a driver turning right on red failed to yield to a pedestrian or bicyclist in the crosswalk of the approach lane)
- Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk
  - A driver turning right at a signalized intersection failed to yield to a pedestrian or bicyclist in the crosswalk of the receiving lane
- Rear End Bike
  - Bike crash where a vehicle rear ended a bicycle

- Pedestrian in Road
    - Ped/bike crash where a pedestrian was in the roadway not related to attempting to cross

Top Intersection Identification Methodology

This section summarizes the methodology used to identify top intersections for each jurisdiction. The goal of this analysis was to select locations with the greatest need for and greatest likelihood to benefit from safety interventions.

Step 1: Assign Crashes to Intersections

Non-intersecting 250-foot buffers were created around each intersection used in the Level of Service of Safety (LOSS) analysis. This analysis is described in detail in Appendix D: LOSS Methodology. Non-freeway crashes were spatially joined to these buffers, with sums calculated for total, fatal, serious injury (Level A), and minor injury (Level B) crashes, as well as bike or pedestrian crashes resulting in a fatality or serious injury.

Step 2: Evaluate Intersections Using Top Intersection Criteria

Intersections were assessed using a series of criteria designed to identify locations with particularly concerning crash histories. These criteria included

1. LOSS Severity IV and ≥3 fatal or serious injury crashes
2. LOSS Severity III and ≥3 fatal or serious injury crashes and on the high risk network
3. ≥2 bike or pedestrian crashes resulting in fatal or serious injuries and on the high risk network
4. ≥ 5 crashes resulting in fatalities or Level A or B injuries. This threshold was equal to one standard deviation above the mean number of K+A+B crashes at each intersection studied in the LOSS analysis.
5. ≥ 41 total crashes. This threshold was equal to one standard deviation above the mean number of total crashes at each intersection studied in the LOSS analysis.

The 59 intersections meeting any of these criteria were identified as initial top intersections. The final list of top intersections was further refined, with some locations either removed or added based on input from the jurisdiction, results from the community input process, or where safety countermeasures were implemented during or after the study period.

Top Corridor Development Methodology

This section summarizes the methodology used for identifying top corridors in each participating jurisdiction. This analysis used a sliding window to assess the frequency of crashes along all roadways within each jurisdiction, with crashes weighted by severity. All analysis was completed in ArcGIS Pro version 3.4. Through this approach, three types of top corridors were identified for each jurisdiction: speed management, pedestrian crossing, and access management.

Step 1: Crash Weighting and Segmentation

The analysis resulted in three types of top corridors for each jurisdiction: speed management, pedestrian crossing, and access management. Prior to analysis, all crashes were assigned an equivalent property damage only (EPDO) weight based on crash costs reported in Colorado's 2023 annual report to the federal Highway Safety Improvement Program.[1] Because this assessment is based on historic crash data rather than predicting risk, fatal crashes were not grouped with serious injury crashes, allowing locations with a history of fatal crashes to carry more weight. EPDO weight conversions are shown in Table B.1.

Table B.1. Conversion of Crash Severity to EPDO Weights

Severity	CDOT Cost	EPDO Weight
Fatal (K)	$1,778,000	105
Serious Injury (A)	$1,016,000	60
Minor Injury (B)	$221,000	13
Possible Injury (C)	$120,000	7
Property Damage Only (O)	$17,000	1

Next, crashes were segmented based on location, with three separate crash layers developed as inputs into the three types of corridors, as follows:

Speed Management

Speed Management corridors represent roadways with high densities of non-intersection crashes, that are heavily weighted by severity. These corridors are likely to benefit from speed management safety interventions.

The crash layer that underpins the speed management corridors includes all crashes except

- Crashes on limited access highways
- Crashes where the roadway description is "intersection," "intersection related," "ramp," "roundabout," or "parking lot."

Access Management (or Intersection Control)

Access Management corridors represent roadways with high densities of crashes occurring at

[1] Available at https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-04/HSIP%28Colorado%29%202023%20Report.pdf.

driveways or unsignalized intersections. In most contexts, these fall on mixed-use or commercial arterial corridors where crashes could be mitigated by access management strategies. In some contexts, such as residential collector streets, corridors with this type of crash pattern are referred to as "Intersection Control Corridors" as the appropriate countermeasures would likely include intersection control improvements (particularly to address side-street stop controlled intersections) as opposed to access management improvements.

The crash layer that underpins the access management corridors includes all non-limited access highway crashes that meet the following criteria:

- Crashes where the road description is "at driveway access" OR
- Broadside or approach turn crashes that occurred at least 250 feet away from a signal.

Pedestrian Crossing

Pedestrian Crossing corridors represent roadways with high densities of crashes involving pedestrians or bicyclists crossing midblock or at other unsignalized locations. These corridors would typically benefit from evaluation of, and improvements to, pedestrian crossings and the frequency of pedestrian crossings.

The crash layer that underpins the pedestrian crossing corridors includes all non-limited access highway crashes that meet the following criteria:

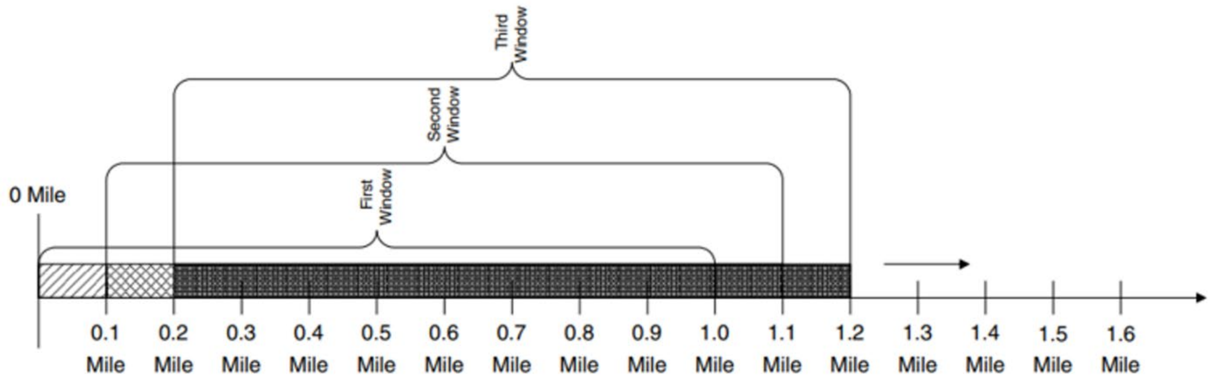
- Pedestrian and bike crashes where the road description is "non-intersection" OR
- Pedestrian and bike crashes that occurred at least 160 feet away from a signal.

Step 2: Sliding Window

To develop the top corridors, the analyst used a "sliding window" approach[2] to associate crashes with street segments. In this approach, crashes within a specified distance from a roadway are joined to a segment of specified length (the "window"). The window is then shifted slightly, and the process repeated, until the entire network has been assessed with a series of overlapping windows (Figure B.2). Compared to an approach based on analyzing discrete blocks, the sliding window approach accounts for collision density up- and downstream of each analysis window, making it more likely to identify systemic patterns. This approach also smooths errors in crash location reporting.

[2] Texas A&M Transportation Institute, 2017. "Innovative Tools and Techniques in Identifying Highway Safety Improvement Projects: Technical Report." Available at https://static.tti.tamu.edu/tti.tamu.edu/documents/0-6912-1.pdf.

Figure B.2. The sliding window approach attributes crashes to overlapping roadway segments, creating a smooth and accurate High Injury Network. (Source: Texas A&M Transportation Institute).



For this analysis, the window length was set to 5,280 feet, the window shift to 528 feet, and the crash search radius to 75 feet. Crashes were weighted using EPDO scores, as described above.

Step 3: Corridor Smoothing

The output from the sliding window analysis was smoothed using a Python script. The smoothing process connects nearby high-scoring segments and removes isolated short segments to create corridors of adequate length for intervention.

This process isolated segments that scored in the 98th percentile for crash frequency and smoothed them such that segments up to 1,320 feet apart were joined together. In some cases, the threshold was reduced to the 95th percentile based on client request or additional blocks along a segment were added based on local knowledge. For speed management corridors, the tool assessed all windows output from the sliding window script. For access management and pedestrian crossing corridors, only those windows with a score greater than 0 were included in the smoothing step.

Interpreting the Data

The corridors produced through this analysis represent roads with the highest frequency of non-intersection (speed management) crashes, driveway or unsignalized intersection (access management or intersection control) crashes, and crashes involving pedestrians and bicyclists crossing at unsignalized locations (pedestrian crossing).

Relation to Other Analyses

This analysis was intended to identify corridors where segment-level countermeasures can be implemented to improve safety. The resulting corridors complement the priority intersection locations by focusing on stretches of roadway where many non-intersection countermeasures would improve safety, such as traffic calming, new pedestrian crossing treatments, and new medians among others. This analysis differs from the High Risk Network as it is based on where crashes have happened in the past rather than predicting where they may occur in the future.

Because this analysis focused on crash frequency, the resulting corridors tend to be in suburban areas with higher traffic volumes. These corridors generally do not overlap with the segment-level LOSS analysis of rural roadways, where traffic volumes and crash frequencies tend to be substantially lower.

Limitations

This methodology, based on crash frequency alone, disproportionately yields high volume roads where exposure to crash risk is highest. Normalizing by traffic volume may yield different locations. Moreover, the weighting of crashes based on severity may (in isolated situations) skew results toward fatal crashes, when in fact the difference between a fatal and serious injury crash can sometimes be random.

Supplemental Crash Analysis with Updated Data

Crash data for 2023 and 2024 became available near the end of the project. This analysis was much more limited than the first, with the primary goal being to understand at a high-level if the crash data trends in 2023 and 2024 differed from the previous five years, and if so, did they differ enough to potentially impact the recommendations. Since the recommendations focus on both where to implement safety improvements (locations) and what types of countermeasures to implement, the analysis looked at both the crash types and locations. To do this, the project team replicated the crash trends analysis and top intersection identification steps with the more recent crash data.

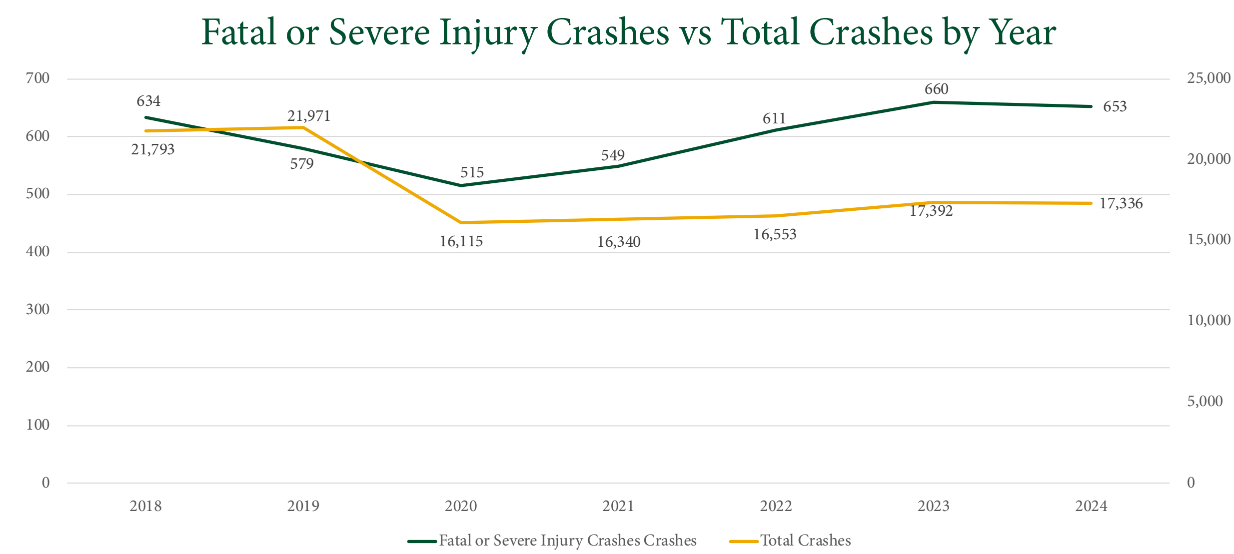
The results broadly show a similar pattern of the most common crash types in 2023-2024 as 2018-2022 that led to fatal and serious injury (namely: lane departure, pedestrian/bicycle, approach turn, and broadside crashes). Most top intersections and corridors remained the same with the updated data, with some slight variance. This analysis confirmed the recommendations presented in this safety action plan would address the crash types and majority of top locations revealed in the 2023-2024 data. The following sections describe the results in greater detail.

Crash Trends

The crash trends analysis was repeated to understand how the frequency and severity of crashes by mode are changing year over year and to identify the most common types of crashes. To make this analysis comparable to the original analysis, data were analyzed for the five-year period 2020 through 2024.

The analysis found that the total number of annual crashes remained roughly the same during the 2020-2024 time-period, but crashes resulting in deaths or serious injuries increased across all jurisdictions (Figure B.3). The top crash profiles from 2018-2022 that are addressed in this plan (bicycle/pedestrian, approach turn, broadside) are still the most prevalent in 2020-2024.

Figure B.3. Crash trends from 2018 through 2024

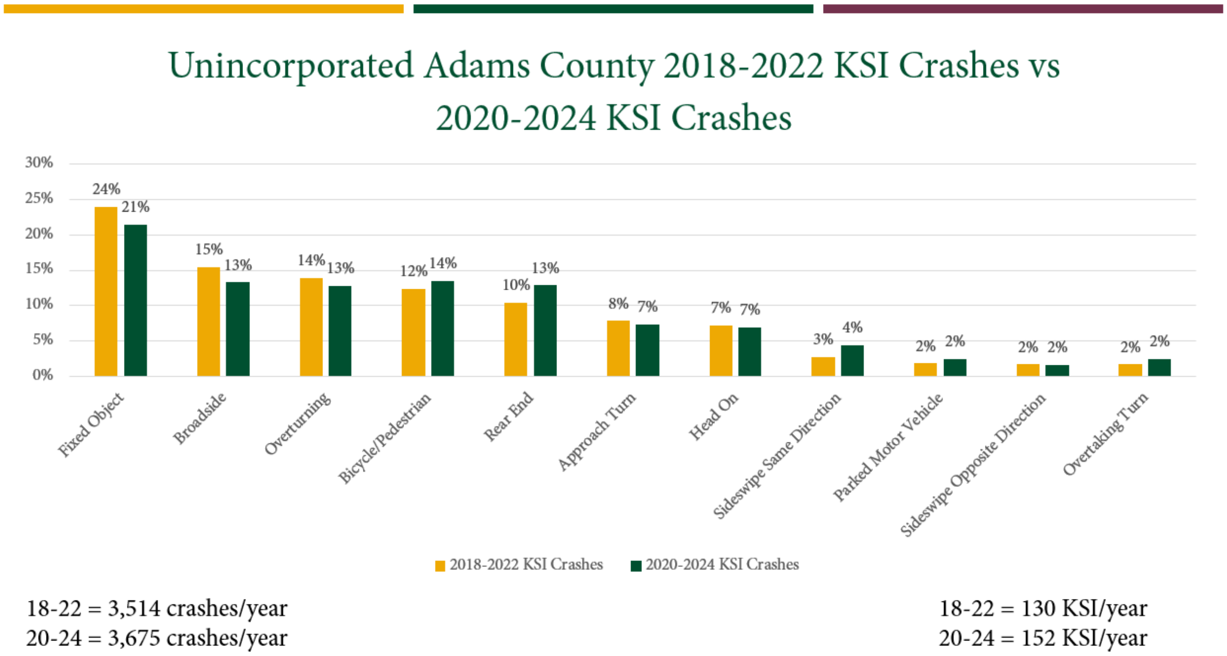


2018-2022 = 18,554 crashes/year
2020-2024 = 16,747 crashes/year

2018-2022 = 578 KSI/year
2020-2024 = 598 KSI/year

Figure B.4 shows how the top killed and seriously injured (KSI) crashes in the county by type differed between the 2018-2022 data set versus the 2020-2024 data set.

Figure B.4. Crash types resulting in fatal or serious injury crashes, 2018-2022 and 2020-2024



Top Intersection Identification

Using data from 2020-2024, the methodology to identify top intersections was repeated. Criteria based on crash counts were revised to reflect the updated dataset.

There was some variation in the intersections identified using the updated crash dataset, which is to be expected. Fatal crashes and those involving bicyclists or pedestrians, in particular, have a degree of randomness in when and where they occur, and at any given point in time some locations will either just barely meet the criteria or just barely not meet the criteria. As a result of shifting the time period of analysis by two years, some locations fell below the threshold and others rose above, but 83% of the top locations identified in the county remained the same.

While this analysis does not change recommendations made in this plan, the county may consider studying the additional intersections identified with updated crash data. These include the following locations:

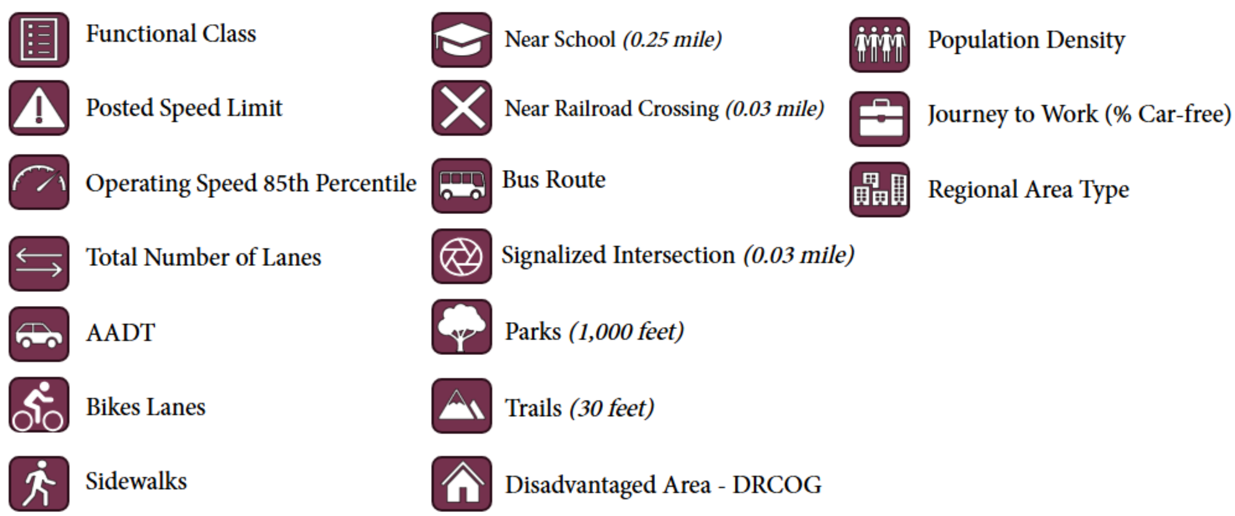
- Federal Blvd / I-76 EB Ramp
- Federal Blvd / W 52nd Ave
- Columbine Rd / Federal Blvd
- 62nd Ave / Federal Blvd
- 60th Ave / Federal Blvd
- 66th Pl / Federal Blvd
- 70th Ave / Pecos St / Samuel Dr

- 72nd Ave / Alan Dr
- 72nd Ave / Samuel Dr
- Broadway / US-36 EB Off Ramp
- 70th Ave / Federal Blvd
- Del Norte St / Pecos St
- 76th Ave / El Paso Blvd / Pecos St
- 84th Ave / Zuni St
- E 56th Ave / N Peoria St
- E 160th Ave / Quebec St
- 136th Ave / Buckley Rd / S 27th Ave (Buckley Rd)
- Bridge St / Telluride St
- 120th Ave / Buckley Rd / High Plains Pkwy
- Baseline Rd / Main St

APPENDIX C: SYSTEMIC ANALYSIS

In addition to the traditional crash evaluation, Safe Streets for All (SS4A) Safety Action Plans also require completion of a systemic analysis. Systemic analysis is a proactive approach to safety that identifies roadway features associated with an increased risk of crashes by comparing the crash history of the entire roadway network to a subset of that network with a particular feature (e.g. four or more lanes, signalized intersections, etc.). This approach to roadway safety planning allows locations with risk features to be identified, analyzed, and improved, regardless of their crash history[1]. A systemic analysis of 17 distinct characteristics was completed on all roadways (excluding limited access facilities and interstates) for all agencies as part of the Adams County Safety Action Plan (Figure C.1). In Unincorporated Adams County, posted speed limit data was not available, so this roadway characteristic was excluded from the systemic analysis.

Figure C.1. Systemic Analysis Characteristics



[1] Systemic analysis is often used to plan where safety treatments should be deployed throughout a network based upon the characteristics of the road at the locations under investigation. If roadway features associated with increased risk have been identified, the systemic approach to safety would dictate that safety treatments be installed at locations where those features are present, regardless of whether crashes have occurred there. An example of this approach to safety would be the application of curve warning signs and other curve safety countermeasures at all curves within a roadway network that meet certain criteria (e.g. radii less than 1060' and posted speed limits greater than 55 MPH).

Each of the characteristics were applied to the roadway network using the Equivalent Property Damage Only (EPDO) methodology described below. Then, the level of risk for each roadway characteristic was calculated. Roadway characteristics associated with a higher frequency or severity of crashes compared to the Unincorporated Adams County roadway network were considered overrepresented and thus an indicator of risk. Risk scores for each of the roadway characteristics were applied to segments of roadway and mapped to identify the systemic risk across the entire network.

EPDO Calculations

EPDO analysis is a crash analysis method that evaluates the safety of a given facility by assessing the combined effects of crash frequency and severity, placing greater weight on more severe crashes. In this approach, fatal and injury crashes are converted into an equivalent number of property damage only (PDO) crashes. This conversion is calculated by dividing the comprehensive cost of crashes at each severity level by the comprehensive cost of a PDO crash. Equation C.1 illustrates how EPDO weighting factors are derived, and Table C.1 presents the EPDO weights applied in the systemic analysis.

Equation C.1: EPDO Crash Weighting Factor

$$EPDO\ Crash\ Weighting\ Factor_x = \frac{Crash\ Cost_x}{PDO\ Crash\ Cost}$$

Where:

EPDO Crash Weighting Factor$_x$ = the crash weighting factor of a single crash of severity level (x)

Crash Cost$_x$ = the economic crash cost of crash severity level (x)

Table C.1. Equivalent Property Damage Only (EPDO) Crash Weights Using 2024 Dollars

Crash Severity	CDOT HSIP Crash Costs (2024)	EPDO Crash Weighting Factor (K = A)
Fatal Injury (K)	$1,869,000*	60.9
Suspected Serious Injury (A)	$1,066,000	60.9
Suspected Minor Injury (B)	$232,000	13.3
Possible Injury (C)	$126,000	7.2
Property Damage Only (O)	$17,500	1.0
*CDOT Highway Safety Improvement Program 2024 Annual Report – Crash Costs		

Table C.1 shows that in an EPDO analysis, more severe crashes have higher values or weights. This recognizes the significant personal and societal impact caused by loss of life or significant injury compared to the much less severe impact of damage to personal or public property, such as damage to a vehicle or infrastructure. Additionally, Table C.1 shows that fatal and serious injury crashes receive the same weight in the EPDO system. This weighting recognizes that fatal and serious injury crash outcomes are often the result of small differences in speed, angle, reaction time, and other factors. Equating the weights of fatal and serious injury crashes is an attempt to balance the results of the systemic analysis process and avoid placing too great of an emphasis on locations where fatal crashes occurred. Moreover, the equivalent weighting of fatal and serious injury crashes recognizes the long-term reduction in quality of life experienced by individuals that sustain serious injuries from crashes.

Equation C.2 shows how EPDO scores were calculated using the crash costs from Table C.1. To determine the total EPDO score for a given roadway segment, the number of crashes that occurred within the segment at each severity level is multiplied by the corresponding EPDO Crash Weighting Factor.

Equation C.2. EPDO Score Calculation

$$EPDO_{Total} = (K * EPDO_K) + (A * EPDO_A) + (B * EPDO_B) + (C * EPDO_C) + (O * EPDO_O)$$

Where:

K = the number of fatal crashes at a location
$EPDO_K$ = EPDO weight for fatal crashes
A = the number of serious injury crashes at a location
$EPDO_A$ = EPDO weight for serious injury crashes
B = the number of minor injury crashes at a location
$EPDO_B$ = EPDO weight for minor injury crashes
C = the number of possible injury crashes at a location
$EPDO_C$ = EPDO weight for possible injury crashes
O = the number of possible injury crashes at a location
$EPDO_O$ = EPDO weight for property damage only crashes

By employing Equation C.2 and the prescribed EPDO crash weighting factors, EPDO scores were calculated across the entire network of roads. The Average EPDO score was calculated for the entire network using the following equation (Equation C.3):

Equation C.3. Average EPDO Score for Unincorporated Adams County

$$\text{EPDO for Network} = 60{,}020$$

$$\text{Total Number of Centerline Miles} = 1723.5$$

$$\frac{\textit{EPDO for Network}}{\textit{Total Number of Centerline Miles}} = \frac{60{,}020}{1723.5} = 34.8\frac{\textit{EPDO}}{\textit{Centerline Mile}}$$

EPDO Scores were then calculated for each roadway characteristic and compared to the average EPDO for the entire network. A characteristic with an EPDO score of 115% or more of the network average would be considered overrepresented and thus a higher indicator of risk. EPDO scores of less than 115% would be considered proportionally represented. Thresholds of risk were determined based on the resulting percentages shown in Table C.2.

Table C.2. Systemic Risk Score Based on EPDO per Centerline Mile

EPDO per Centerline Mile	Risk Score
<115%	0
115% ≤ x < 130%	1
130% ≤ x < 145%	2
≥ 145%	3

Findings

The risk scores associated with each roadway characteristic as well as the values used in the calculations are provided in Table C.3. Categories that were overrepresented were given a score of 1, 2 or 3 as outlined in Table C.2. The risk scores from Table C.3 were applied to the Unincorporated Adams County roadway network to produce a Systemic Risk Map (provided in the Safety Analysis section of the report) showing roadways with higher or lower risk.

When interpreting the results of a roadway safety systemic analysis, it is important to remember that the approach identifies correlations between roadway features and crash risk, not causation. Because systemic analysis looks at patterns across a network, results can sometimes appear counterintuitive. For instance, a feature typically associated with safety—such as sidewalks—might be flagged as linked to higher risk. This does not mean sidewalks make roads less safe; rather, it may reflect that sidewalks are more common in high-activity areas with greater pedestrian exposure and traffic complexity, which increases the likelihood of severe crashes. These findings should be understood as indicators of where proactive safety measures may be most beneficial, not as judgments on the inherent safety of individual features.

Table C.3: Risk Score Calculations for Unincorporated Adams County

Potential Risk Factor	Categories	Fatal (K) Crashes	Serious Injury (A) Crashes	Minor Injury (B) Crashes	Possible Injury (C) Crashes	No Injury (PDO) Crashes	EPDO Score	Total # of Crashes	Total % By Type	Total # Centerline Miles	EPDO Per Centerline Mile	>115% of Average	>130% of Average	>145% of Average	Risk Score
TOTAL CRASHES		**98**	**358**	**738**	**2067**	**7552**	**60020**	**10813**	**100%**	**1723.5**	**34.8**	-	-	-	-
Functional Class	Local	8	50	107	249	1360	8108	1774	16%	526.5	15.4	N	N	N	0
	Collector	27	118	227	668	2239	18898	3279	30%	139.8	135.2	Y	Y	Y	3
	Arterial	39	125	255	720	2579	21142	3718	34%	975.0	21.7	N	N	N	0
	State Highway	24	65	149	430	1374	11872	2042	19%	82.1	144.5	Y	Y	Y	3
Operating Speed (85th Percentile)	0-10 mph	15	49	97	257	943	7981	1361	13%	309.3	25.8	N	N	N	0
	10-20 mph	3	12	27	99	425	2410	566	5%	116.1	20.8	N	N	N	0
	20-30 mph	12	43	93	287	1246	7899	1681	16%	268.4	29.4	N	N	N	0
	30-40 mph	13	73	145	457	1700	12156	2388	22%	231.5	52.5	Y	Y	Y	3
	40-50 mph	33	106	231	636	2230	18347	3236	30%	288.0	63.7	Y	Y	Y	
	50-60 mph	9	44	100	228	750	6949	1131	10%	270.9	25.7	N	N	N	0
	60-70 mph	5	24	27	78	164	2851	298	3%	161.9	17.6	N	N	N	0
	70+mph	8	7	18	25	94	1427	152	1%	77.3	18.5	N	N	N	0
	30 - 50 mph	46	179	376	1093	3930	30503	5624	52%	519.5	58.7	Y	Y	Y	3
Total Number of Lanes	0	15	27	70	249	750	6032	1111	10%	169.1	35.7	NA	NA	NA	-
	1 Lane	0	2	3	8	23	242	36	0%	104.9	2.3	N	N	N	0
	2 Lanes	58	247	472	1187	4640	38039	6604	61%	1414.4	26.9	N	N	N	0
	3 Lanes	1	0	4	11	59	252	75	1%	1.7	150.6	Y	Y	Y	3
	4 Lanes	20	73	165	523	1784	13408	2565	24%	29.3	457.7	Y	Y	Y	
	5 Lanes	4	7	20	77	248	1738	356	3%	2.5	682.1	Y	Y	Y	
	6 Lanes	0	2	4	12	48	309	66	1%	1.5	204.6	Y	Y	Y	
	≥ 3 Lanes	25	82	193	623	2139	15708	3062	28%	35.0	448.4	Y	Y	Y	3
AADT	≤3,000	39	120	229	526	2343	18859	3257	30%	1558.3	12.1	N	N	N	0
	3,001-6,000	6	49	81	222	760	6785	1118	10%	54.3	125.1	Y	Y	Y	3
	6,001-9,000	10	23	50	160	521	4348	764	7%	52.4	82.9	Y	Y	Y	
	9,001-15,000	6	42	105	282	1011	7361	1446	13%	29.9	246.4	Y	Y	Y	
	>15,000	37	124	273	877	2917	22667	4228	39%	28.6	792.1	Y	Y	Y	
	> 3,000 vpd	59	238	509	1541	5209	41161	7556	70%	165.2	249.2	Y	Y	Y	3
Bike Lanes	Yes	18	76	155	374	1425	11904	2048	19%	122.6	97.1	Y	Y	Y	3
	No	80	282	583	1693	6127	48116	8765	81%	1600.8	30.1	N	N	N	0
Sidewalks	Yes	17	91	171	584	2183	15239	3046	28%	188.4	80.9	Y	Y	Y	3
	No	81	267	567	1483	5369	44781	7767	72%	1535.1	29.2	N	N	N	0
Near School 1/4 mile	Yes	5	39	68	229	939	6172	1280	12%	93.6	65.9	Y	Y	Y	3
	No	93	319	670	1838	6613	53848	9533	88%	1629.9	33.0	N	N	N	0
Near Railroad Crossing .03 miles	Yes	4	10	25	46	150	1666	235	2%	16.1	103.4	Y	Y	Y	3
	No	94	348	713	2021	7402	58354	10578	98%	1707.4	34.2	N	N	N	0
Bus Route	Yes	42	144	305	1016	3356	26055	4863	45%	58.0	449.2	Y	Y	Y	3
	No	56	214	433	1051	4196	33965	5950	55%	1665.5	20.4	N	N	N	0
Signalized Intersection	Yes	26	144	294	907	3230	24024	4601	43%	17.4	1384.3	Y	Y	Y	3
	No	72	214	444	1160	4322	35997	6212	57%	1706.1	21.1	N	N	N	0
Parks (1,000')	Yes	38	144	263	748	2847	22814	4040	37%	345.8	66.0	Y	Y	Y	3
	No	60	214	475	1319	4705	37206	6773	63%	1377.7	27.0	N	N	N	0
Trails	Yes	2	2	2	8	24	352	38	0%	2.0	178.0	Y	Y	Y	3
	No	96	356	736	2059	7528	59668	10775	100%	1721.5	34.7	N	N	N	0
Disadvantaged Area - DRCOG	Yes	43	162	357	1138	4005	29431	5705	53%	247.8	118.8	Y	Y	Y	3
	No	55	196	381	929	3547	30589	5108	47%	1475.6	20.7	N	N	N	0
Population Density	≤500	30	82	150	290	1095	11999	1647	15%	1292.5	9.3	N	N	N	0
	501-2000	26	130	284	814	2805	21943	4059	38%	203.8	107.7	Y	Y	Y	3
	2001-3500	15	57	116	323	1203	9456	1714	16%	65.3	144.9	Y	Y	Y	
	3501-5000	10	26	59	218	764	5311	1077	10%	48.0	110.7	Y	Y	Y	
	5001-6500	10	29	59	181	771	5234	1050	10%	39.6	132.1	Y	Y	Y	
	6501-8000	3	21	44	135	529	3548	732	7%	40.3	88.0	Y	Y	Y	
	8001-10500	0	4	8	28	146	698	186	2%	17.0	40.9	Y	N	N	
	10501-12000	4	9	18	75	235	1806	341	3%	16.9	107.1	Y	Y	Y	
	12001-13500	0	0	0	3	4	26	7	0%	0.0	3788.1	NA	NA	NA	-
	≥ 501	68	276	588	1774	6453	47995.8	9159	85%	430.9	111.4	Y	Y	Y	3
Journey To Work (% Car-free)	≤1%	44	157	359	890	3459	26883	4909	45%	437.1	61.5	Y	Y	Y	3
	1%-2.5%	30	124	212	608	2096	18672	3070	28%	490.1	38.1	N	N	N	0
	2.5%-5%	22	74	157	540	1893	13716	2686	25%	788.4	17.4	N	N	N	0
	5%-10%	2	3	10	29	104	750	148	1%	7.9	95.5	Y	Y	Y	3
Regional Area Type	Rural	37	113	209	477	1603	16952	2439	23%	1349.6	12.6	N	N	N	0
	Suburban	61	244	526	1579	5853	42792	8263	76%	372.8	114.8	Y	Y	Y	3
	Urban	0	1	3	11	96	276	111	1%	1.1	254.5	Y	Y	Y	3

APPENDIX D: LOSS METHODOLOGY

INTRODUCTION

This report provides a summary of the methodology used to identify the intersection and rural segment Level of Service of Safety (LOSS) and crash diagnostics of the Adams County Comprehensive Safety Action Plan (CSAP) and how to interpret the data. All GIS analysis was conducted in ArcGIS Pro version 3.1. LOSS analysis was conducted in DiExSys Vision Zero Suite (VZS). This tool was developed specifically for analyzing safety performance of Colorado roadways and complies with Highway Safety Manual standards. VZS assesses intersection performance and diagnoses crash patterns based on intersection characteristics and traffic volumes.

METHODOLOGY: INTERSECTIONS

Step 1: Develop Intersection Layers

An intersection layer was developed or obtained for each jurisdiction, from which a selection of intersections was identified for further analysis.

Data Sources

Intersection layers were generated using the best datasets available. Datasets varied by jurisdiction, as follows:

1. Jurisdiction-provided intersection layer.
    a. Arvada
2. Intersection layer created in GIS using jurisdiction-provided street centerlines.
    a. Aurora
    b. Brighton
    c. Westminster
3. Intersection layer created using the Replica traffic volumes centerlines (Open Street Map base). This approach was used when centerline data were not available from the jurisdiction or were inadequate (e.g., poor topology) to efficiently create intersections.
    a. Commerce City
    b. Federal Heights
    c. Northglenn
4. Intersection layer created using CDOT roadway layers for local roads, major roads, highways, ramps, and frontage roads and supplemented with centerlines provided by the jurisdiction. This approach was used to obtain data on roadway surface type (paved vs. unpaved).

a. Unincorporated Adams County

Intersection Layer Creation

Figure D.1. An example of an intersection with nearly overlapping points prior to data cleaning.

For each jurisdiction, the roadway network lines were queried to remove extraneous functional classes (interstates, parking lots, alleys). The lines were then unsplit and dissolved on name and functional class. A point layer was created using the intersect tool on this dissolved layer.

The resulting point layer required substantial cleaning prior to analysis. For example, the intersect tool will produce two identical points where two lines intersect, while the imperfect nature of the input roadway datasets yields adjacent points in some locations (Figure D.1) and intersections where roadways do not actually meet in three-dimensional space.

These problems were resolved using the following steps:

1. Multipart features were transformed into singlepart features to ensure that each data record corresponded with a single point.
2. Identical points were deleted by adding XY coordinates to all points and deleting duplicate points using the delete identical tool.
3. Intersections within 50 feet of each other were identified by generating a near table and joining it to the intersection layer. Points with a duplicate near distance were labeled using the isDuplicate Python parser.
    a. Based on spot checking, duplicates within a certain distance (generally around 40 feet) were deleted.
    b. Remaining duplicates within 50 feet were individually assessed to determine whether they should be deleted.
4. Likely problem areas (roundabouts, ramps, elevated roadways) were visually scanned for inaccurate points.
5. Missing intersections were identified visually by comparing the point layer against locations of existing traffic signals, fatal crashes, and school parcels.

Modeled AADT data from Replica was spatially joined to the cleaned intersection layer twice to connect mainline and side road volumes to each intersection, retaining the maximum AADT value in the first join and the minimum AADT value in the second join.

Step 2: Select Intersections of Interest

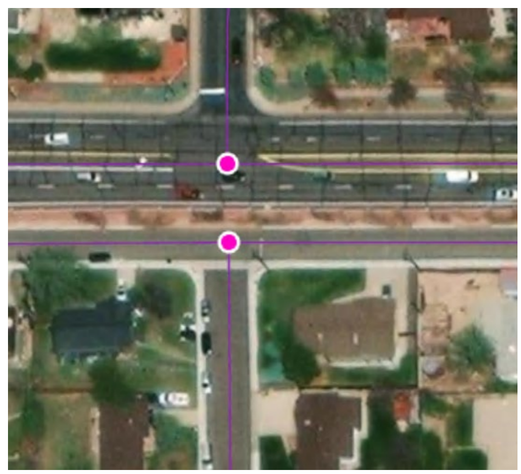
Selection Criteria

Given running LOSS analysis and Direct Diagnostics for every intersection in each jurisdiction was impractical and unnecessary, the following criteria was identified by the project team to narrow the analysis to the following most relevant intersection types:

- Intersections with at least 10 crashes
- Any intersection with one or more fatal crashes
- Any intersection with three or more serious injury crashes
- Any intersection with one or more pedestrian or bicycles crashes
- Any intersection adjacent to a school
- Any intersection with three or more public comments

Selection Methodology

Figure D.2. An example of two nearby intersections with very different characteristics.



A 250-foot search radius was used to spatially join crashes to each intersection. Prior to performing the join, points were snapped to the intersection layer such that crashes within 250 of an intersection were snapped to the nearest intersection. This approach was useful given the suburban context of the study area, where a simple 250-foot buffer around each intersection may result in a particular crash being joined to multiple intersections on very different roadways (Figure D.2). New fields were also created in the crash data allowing us to sum the number of fatal, serious (Level A) injury, bike, and pedestrian crashes joined to each intersection.

Two different approaches were used to identify intersections adjacent to schools:

- When parcel data was readily available for a jurisdiction, intersections within 100 feet of a school parcel were flagged.
- When parcel data was not available, imagery and school point data was used to manually identify intersections adjacent to schools.

Step 3: LOSS/Pattern Recognition

The Level of Service of Safety (LOSS) and Direct Diagnostics were identified for all the intersections that emerged from Step 2. These analyses used the Colorado-specific roadway data analytics tool Vision Zero Suite (VZS) by DiExSys. DiExSys has developed predictive Safety Performance Function (SPF) models that predict the number and severity of crashes expected to occur at different intersection facility types in Colorado given the traffic volumes on the cross streets. Based on information input into VZS for an intersection, the tool returns LOSS scores that quantify the intersection's performance in terms of the number and severity of crashes observed compared to the number and severity of crashes predicted by the SPF model. Separate models identify crash type patterns. Based on information input for an intersection, the tool uses statistical pattern analysis to identify crash types that are overrepresented at that intersection compared to similar intersections.[1]

Data Preparation

VZS assesses intersection performance based on several characteristics. Where possible, these characteristics were attached to intersection points in GIS; however, characteristics such as number of legs required manual analysis in Google Maps. **Table D.1** shows the inputs needed for VZS analysis and their sources.

Characteristics were matched to the facility type filters in VZS. Where actual characteristics differed from options in VZS, we identified the closest proxy model, erring on the side of a more conservative option to reduce the risk of missing a poorly performing intersection by comparing it to larger or more complex intersections. For example, an intersection along a roadway with five through lanes would be characterized as one with four through lanes.

Table D.1. Intersection characteristics and their sources.

Intersection Characteristic	Source
Mainline & side road AADT	Replica
Land use (urban or rural)	DRCOG
Signalized vs. unsignalized	DRCOG
Number of legs or roundabout	Visual determination in Google Maps
Number of lanes (mainline)	Visual determination in Google Maps
Divided / undivided / one-way	Visual determination in Google Maps

[1] See also FHWA 2011, "Level of Service of Safety and Diagnostic Analysis." https://highways.dot.gov/safety/learn-safety/noteworthy-practices/level-service-safety-and-diagnostic-analysis

Ramp	Centerline data or visual determination in Google Maps

An online map of AADT data was also consulted as a check to AADTs joined in GIS. In cases where the side road characteristics varied substantially on different sides of the intersection (e.g., changing from a collector to a local road), the side road AADT value was updated from the minimum AADT value joined in GIS to the volume of the larger segment of the roadway.

LOSS and Direct Diagnostics Analysis

VZS has the capability of analyzing multiple intersections of the same facility type at once using an uploaded .csv file. To perform these batch data pulls for LOSS, intersections were classified by facility type for VZS and separated into .csv files for each facility type and jurisdiction (e.g., urban 6-lane divided unsignalized 3-leg intersection). The .csv files included the coordinates for each intersection in that category (generated in GIS), the mainline and side road AADT values for each intersection, and the search radius to use for the analysis. Following the recommendation of DiExSys staff, 160 feet was selected as the search radius for these analyses. Crash filters in VZS were set to include only crashes labeled "at intersection" or "intersection related" for typical intersections, "roundabout" for roundabout intersections, and "ramp" for ramp intersections.

A similar approach was used to batch pull Direct Diagnostic patterns. Following the recommendation of DiExSys staff, each facility type was assessed using diagnostics for all crash severity levels and all traffic volumes within that facility type. While the tool provides the option to further segment each facility type by crashes resulting in injury and by AADT ranges, DiExSys staff recommended using the model for each facility type based on all crashes and all traffic volumes because these models include the most up-to-date data and are most appropriate for the type of network screening we are performing. The pattern recognition threshold was set to three or more crashes with a 95% confidence interval – that is, a pattern was defined as a type of crash observed three or more times during the study period and with a frequency that has only a 5% or less chance of occurring randomly, based on models of similar intersections.

Interpreting the Data

Data Provided

For each jurisdiction, a results table that aggregates the LOSS and Direct Diagnostics findings for all intersections was produced. This table includes

- A location ID from GIS (column A)
- The intersection name (column B)

- The number of severe and total crashes (columns C and D)
- The LOSS Severity and LOSS Total (columns E and F)
- The number of crash patterns diagnosed (column G)
- For each crash pattern diagnosed, the number of crashes observed (columns H through DF)

Raw outputs from DiExSys were also included in Excel and PDF form, organized by intersection type. These results have been joined to the intersection layers in GIS. In addition to these results, the GIS layers include counts of all fatal, level A injury, level B injury, level C injury, Property Damage Only (PDO), bike, and pedestrian crashes labeled "at intersection," "intersection related," "roundabout," or "ramp" that fall within 160 feet of each intersection. A data dictionary for the GIS file is provided at the end of this document.

Meaning of LOSS Scores

LOSS assesses crash frequency (LOSS Total) and severity (LOSS Severity) compared to other similar intersections. The LOSS score ranges from I to IV based on the crash rate percentile of a given location relative to all other locations in Colorado:

- LOSS I (<20th percentile) Lower potential for crash reduction.
- LOSS II (20th to 50th percentile) Lower to moderate potential for crash reduction.
- LOSS III (50th to 80th percentile) Moderate to high potential for crash reduction.
- LOSS IV (>80th percentile) High potential for crash reduction.

Intersections with LOSS III or IV exhibit a higher-than-average crash rate when compared to similar intersections. These intersections typically have a higher potential for crash reduction and may be good candidates for priority projects.

Direct Diagnostics

The Direct Diagnostic data is useful for identifying potential safety issues and solutions at intersections. Diagnostic patterns are identified for those crash types that occur more frequently than would be expected in a random distribution. If a pattern exists for a particular crash type (for example, broadside crash), it means this crash type is occurring at a higher rate than is expected compared to other similar intersections in Colorado. Understanding the diagnostics can help in identifying potential solutions at a given intersection. All diagnostic pattern types are included in the results provided, including those related to factors unlikely to be improved through engineering changes to the roadway.

Limitations

LOSS results for intersections where no crashes occurred within the study period and where AADT levels are very low should be interpreted with caution. These conditions were present in many intersections adjacent to schools. In multiple instances, a location with zero crashes during the study period received an LOSS Total of III or IV. DiExSys staff provided a highly technical explanation of why these results were occurring. The key takeaway is that VZS may overstate the potential for improving safety at intersections where no crashes have occurred and traffic volumes are low. We recommend excluding any intersections with zero crashes from further analysis.

Methodology: Rural Segments

A LOSS and Direct Diagnostics analysis was also performed for rural roadway segments in the study area. Unlike urban and suburban roadway segments, rural roadways typically have much larger intersection spacing, and thus potential LOSS issues on these segments of road may not be captured in the intersection analysis.

Step 1: Develop Segment Layer

A segment layer was developed for the CSAP study, from which a selection of segments was identified for further analysis. Given that some segments form the boundary between jurisdictions or continue through multiple jurisdictions, the segments were not split into jurisdictions prior to analysis.

The segment layer was generated by merging the following roadway layers from CDOT's Public Maps and Data site (downloaded January 31, 2025):

- Highways
- Major Roads
- Local Roads

These layers include linear reference system (LRS) attributes that meet the federal All Roads Network of Linear Referenced Data (ARNOLD) requirements. DiExSys uses ARNOLD inputs for route number, section, beginning mile point, and end mile point to locate segments in its analysis tools.

Step 2: Select Segments of Interest

Selection Criteria

LOSS and Direct Diagnostics analysis was performed for the following segment types to isolate the segments most relevant to this analysis:

- In a DRCOG-designated Rural Area Type
- With at least a half mile between intersections
- Of length at least one-half mile in higher volume locations (defined as having ADT of at least 1,000) and one mile in low volume areas

Selection Methodology

The merged CDOT road layer was clipped to the study area (buffered by 500 feet) and then clipped again with the DRCOG rural area types layer, which had been buffered by 50 feet. Roads that form the border between rural and suburban areas were kept in the dataset. In instances where the study area boundary resulted in fragmented segments (e.g., along CO 93), we retained portions of roadway that technically fall outside the study area.

Next, segments with at least a half mile between intersections were identified and kept for further analysis.

Segment Preparation

The resulting segments included fields from CDOT for number of lanes and divided/undivided roads. These fields were spot checked to ensure consistency with imagery available in ArcGIS Pro and Google Maps, then were updated to match the facility types available in DiExSys. For example, 1-lane undivided roads were updated to 2-lane roads. Similarly, short segments where the number of lanes differed from pre- and proceeding segments were updated to match the longer surrounding segments.

The cleaned segments were unsplit with dissolve fields set to the LRS identifier, section, road name, number of lanes, and divided. These lines were then re-split at intersection points. AADT data, which was available to the team based on Open Street Maps centerlines, was converted to points and joined to the segments, taking the median value in cases where multiple points were joined to the same segment.

Synthetic AADT values from Replica showed extremely low traffic volumes (10 or fewer cars per day) on many rural roadways in eastern Adams County. Volumes were not available for some roadways, all of which appear to be unpaved roads; in these cases, volumes were assumed to be approaching 0. Because AADTs input in DiExSys must be at least 50, volumes were set to 50 in cases where they were absent or below 50.

Following guidance from DiExSys, low-volume segments in truly rural areas were kept to at least one mile in length. In more suburban areas with higher traffic volumes, segments were kept to at least one-half mile. To achieve these lengths, some segments that had been split at intersections were manually merged. Segments that were less than one mile long and had under 1,000 estimated daily traffic were deleted if they could not be merged with an adjacent segment, either because there was no adjacent segment or the adjacent segment had a different LRS number.

Step 3: Match Selected Segments to Linear Referencing System

The selected segments were calibrated with updated beginning and ending mile markers to match the ARNOLD linear referencing system. First, the original merged road network from

CDOT was converted into a route using the "create routes" tool in the linear referencing toolbox using the from/to measures included in the attribute table. The resulting route became a reference point for locating the segments of interest in the LRS, using the "locate features along routes" tool. This tool interpolates mile points for the start and end of each segment based on the route layer and outputs the results in an event table. The resulting LRS event table was converted to a feature class using the "make route event layer" tool.

This new layer includes updated from/to mile points needed to analyze the segments of interest in DiExSys.

Step 4: LOSS/Pattern Recognition

The Level of Service of Safety (LOSS) and Direct Diagnostics were identified for the segments that emerged from Step 3. These analyses used the Colorado-specific roadway data analytics tool Vision Zero Suite (VZS) by DiExSys. DiExSys has developed Safety Performance Function (SPF) models that predict the number and severity of crashes expected to occur along different segment facility types in Colorado given traffic volumes and roadway features (number of lanes, divided/undivided, rural/urban, flat/mountainous). Based on information input into VZS for a segment, the tool returns LOSS scores that quantify the segment's performance in terms of the number and severity of crashes observed compared to the number and severity of crashes predicted by the SPF model. Separate models identify crash type patterns. Based on information input for a segment, the tool uses statistical pattern analysis to identify crash types that are overrepresented at that intersection compared to similar intersections.[2]

LOSS and Direct Diagnostics Analysis

VZS has the capability of analyzing multiple segments of the same facility type at once using an uploaded .csv file. To perform these batch data pulls for LOSS, segments were classified by facility type for VZS and separated into .csv files for the three facility types relevant to the flat, rural roads in the study: 2-lane undivided highways, 3-lane undivided highways, and 4-lane divided highways.

The .csv files included the LRS inputs highway number, section, beginning mile point, and ending mile point as well as AADT values from Replica. Crash filters in VZS were set to exclude any crashes labeled "at intersection," "intersection related," "roundabout," and "ramp".

A similar approach was used to batch pull Direct Diagnostic patterns. Following the recommendation of DiExSys staff, each facility type was assessed using diagnostics for all

[2] See also FHWA 2011, "Level of Service of Safety and Diagnostic Analysis." https://highways.dot.gov/safety/learn-safety/noteworthy-practices/level-service-safety-and-diagnostic-analysis

crash severity levels and all traffic volumes within that facility type. While the tool provides the option to further segment each facility type by crashes resulting in injury and by AADT ranges, DiExSys staff recommended using the model for each facility type based on all crashes and all traffic volumes because these models include the most up-to-date data and are most appropriate for the type of network screening we are performing. The pattern recognition threshold was set to three or more crashes with a 95% confidence interval – that is, a pattern was defined as a type of crash observed three or more times during the study period and with a frequency that has only a 5% or less chance of occurring randomly, based on models of similar segments.

Interpreting the Data

Data Format

Data were organized in Excel, PDF, and GIS formats, as described below.

A results table was produced that aggregated the LOSS and Direct Diagnostics findings for all segments. This table can be filtered by jurisdiction. This table includes

- A location ID used to join data in GIS (column A)
- The segment name and intersecting streets (column B)
- The jurisdiction (Column C)
- The number of severe and total crashes (columns D and E)
- The LOSS Severity and LOSS Total (columns F and G)
- The number of crash patterns diagnosed (column H)
- For each crash pattern diagnosed, the number of crashes observed (columns I through DH)

Raw outputs from DiExSys are also included in Excel and PDF form, organized by segment type. Tabular results were joined to the segments layer in GIS. Separate segment layers were created for each jurisdiction. Segments that intersect two jurisdictions were included in both datasets. In some instances, only a small portion of a segment may lie in a jurisdiction, given the challenges posed by the jurisdictions' boundaries.

The GIS layers are provided as .gdb files for each jurisdiction. The tables at the end of this document includes the schema for these files.

Meaning of LOSS Scores

LOSS assesses crash frequency (LOSS Total) and severity (LOSS Severity) compared to other similar segments. The LOSS score ranges from I to IV based on the crash rate percentile of a given location relative to all other locations in Colorado:

- LOSS I (<20th percentile) Lower potential for crash reduction.
- LOSS II (20th to 50th percentile) Lower to moderate potential for crash reduction.
- LOSS III (50th to 80th percentile) Moderate to high potential for crash reduction.
- LOSS IV (>80th percentile) High potential for crash reduction.

Generally, segments with LOSS III or IV exhibit a higher-than-average crash rate compared to similar segments. These segments typically have higher potential for crash reduction and may be good candidates for priority projects.

Direct Diagnostics

The Direct Diagnostic data is useful for identifying potential safety issues and solutions. Diagnostic patterns are identified for those crash types that occur more frequently than would be expected in a random distribution. If a pattern exists for a particular crash type (for example, wild animal crash), it means this crash type is occurring at a higher rate than is expected compared to other similar roadway segments in Colorado. Understanding the diagnostics can help in identifying potential engineering solutions at a given location. All diagnostic pattern types are included in the results provided, including those related to factors unlikely to be improved through engineering changes to the roadway.

Limitations

LOSS results for segments where no crashes occurred within the study period and where AADT levels are very low should be interpreted with caution, as the Empirical Bayes calculations with VZS may produce results that overstate the potential for improving safety at intersections where no crashes have occurred and traffic volumes are low. We recommend excluding any segments with zero crashes from further analysis.

The decision of where to split segments can profoundly impact analysis results. We attempted to mitigate this challenge by splitting segments consistently at intersections. However, the merging of segments to achieve one mile or greater lengths introduced inconsistency in segment splitting that may have impacted results.

GIS Layer Data Dictionaries

Table D.2. Data dictionary for intersection LOSS and diagnostics GIS data.

Field Name	Alias	Source	Description
OBJECTID	OBJECTID	GIS	ID generated by ArcGIS Pro
Location_ID	Location ID	GIS	Unique intersection ID
Name	Name	GIS / Centerline data	Names of cross-streets
Class	Class	GIS / Centerline data	Functional classes of cross street
AADT_max	AADT max	GIS / Replica data	Highest AADT of cross streets
AADT_min	AADT min	GIS / Replica data	Lowest AADT of cross streets
Signalized	Signalized	GIS / DRCOG data	1 indicates signalized; null unsignalized
LandUse	LandUse	GIS / DRCOG data	Urban or rural
POINT_X	Long	GIS	Longitude
POINT_Y	Lat	GIS	Latitude
Crash_Count	Crash_Count	GIS / spatial join	Number of crashes "at intersection" or "intersection related" within 160-foot radius
Count_Fatal_Crashes	Count_Fatal_Crashes	GIS / spatial join	Number of fatal crashes
Count_Level_A_Crashes	Count_Level_A_Crashes	GIS / spatial join	Number of level A injury crashes
Count_Level_B_Crashes	Count_Level_B_Crashes	GIS / spatial join	Number of level B injury crashes
Count_Level_C_Crashes	Count_Level_C_Crashes	GIS / spatial join	Number of level C injury crashes

Field Name	Alias	Source	Description
Count_PDO_Crashes	Count_PDO_Crashes	GIS / spatial join	Number of PDO crashes
Count_Bike_Crashes	Count_Bike_Crashes	GIS / spatial join	Number of bicyclist-involved crashes
Count_Ped_Crashes	Count_Ped_Crashes	GIS / spatial join	Number of pedestrian-involved crashes
Severe_Crashes	Severe Crashes	DiExSys	Number of fatal and injury crashes (all injury levels)
Total_Crashes	Total Crashes	DiExSys	Total number of crashes
LOSS_Severity	LOSS Severity	DiExSys	LOSS Severity
LOSS_Total	LOSS Total	DiExSys	LOSS Total
Count_of_Diagostic_Patterns	Count of Diagostic Patterns	DiExSys	Number of diagnostic patterns identified for this intersection
Property_Damage_Only__PDO_	Property Damage Only (PDO)	DiExSys	If pattern – number of crashes
Injury__INJ_	Injury (INJ)	DiExSys	If pattern – number of crashes
Fatal__FAT_	Fatal (FAT)	DiExSys	If pattern – number of crashes
Single_Vehicle_Accidents	Single Vehicle Accidents	DiExSys	If pattern – number of crashes
Two_Vehicle_Accidents	Two Vehicle Accidents	DiExSys	If pattern – number of crashes
Three_or_More_Vehicle _Accidents	Three or More Vehicle Accidents	DiExSys	If pattern – number of crashes
Unknown_Number_of _Vehicles	Unknown Number of Vehicles	DiExSys	If pattern – number of crashes

Field Name	Alias	Source	Description
On_Road	On Road	DiExSys	If pattern – number of crashes
Off_Road	Off Road	DiExSys	If pattern – number of crashes
Off_Road_Left	Off Road Left	DiExSys	If pattern – number of crashes
Off_Road_Right	Off Road Right	DiExSys	If pattern – number of crashes
Off_Road_at_Tee	Off Road at Tee	DiExSys	If pattern – number of crashes
Off_Road_in_Media n	Off Road in Median	DiExSys	If pattern – number of crashes
Unknown_Road_Loc ation	Unknown Road Location	DiExSys	If pattern – number of crashes
Overturning	Overturning	DiExSys	If pattern – number of crashes
Other_Non_Collision	Other Non Collision	DiExSys	If pattern – number of crashes
Vehicle_Cargo_or_D ebris	Vehicle Cargo or Debris	DiExSys	If pattern – number of crashes
Pedestrian	Pedestrian	DiExSys	If pattern – number of crashes
Broadside	Broadside	DiExSys	If pattern – number of crashes
Head_On	Head On	DiExSys	If pattern – number of crashes
Rear_End	Rear End	DiExSys	If pattern – number of crashes
Sideswipe	Sideswipe	DiExSys	If pattern – number of crashes
Sideswipe__Opposit e_Direction_	Sideswipe (Opposite Direction)	DiExSys	If pattern – number of crashes
Approach_Turn	Approach Turn	DiExSys	If pattern – number

Field Name	Alias	Source	Description
			of crashes
Overtaking_Turn	Overtaking Turn	DiExSys	If pattern – number of crashes
Parked_Motor_Vehicle	Parked Motor Vehicle	DiExSys	If pattern – number of crashes
Railway_Vehicle	Railway Vehicle	DiExSys	If pattern – number of crashes
Bicycle_or_Pedal_Cycle	Bicycle or Pedal Cycle	DiExSys	If pattern – number of crashes
Motorized_Bicycle	Motorized Bicycle	DiExSys	If pattern – number of crashes
Domestic_Animal	Domestic Animal	DiExSys	If pattern – number of crashes
Wild_Animal	Wild Animal	DiExSys	If pattern – number of crashes
Light_or_Utility_Pole	Light or Utility Pole	DiExSys	If pattern – number of crashes
Traffic_Signal_Pole	Traffic Signal Pole	DiExSys	If pattern – number of crashes
Sign	Sign	DiExSys	If pattern – number of crashes
Bridge_Rail	Bridge Rail	DiExSys	If pattern – number of crashes
Guard_Rail	Guard Rail	DiExSys	If pattern – number of crashes
Cable_Rail	Cable Rail	DiExSys	If pattern – number of crashes
Concrete_Barrier	Concrete Barrier	DiExSys	If pattern – number of crashes
Bridge_Abutment	Bridge Abutment	DiExSys	If pattern – number of crashes
Column_or_Pier	Column or Pier	DiExSys	If pattern – number of crashes

Field Name	Alias	Source	Description
Culvert_or_Headwall	Culvert or Headwall	DiExSys	If pattern – number of crashes
Embankment	Embankment	DiExSys	If pattern – number of crashes
Curb	Curb	DiExSys	If pattern – number of crashes
Delineator_Post	Delineator Post	DiExSys	If pattern – number of crashes
Fence	Fence	DiExSys	If pattern – number of crashes
Tree	Tree	DiExSys	If pattern – number of crashes
Large_Boulders_or_Rocks	Large Boulders or Rocks	DiExSys	If pattern – number of crashes
Rocks_in_Roadway	Rocks in Roadway	DiExSys	If pattern – number of crashes
Barricade	Barricade	DiExSys	If pattern – number of crashes
Wall_or_Building	Wall or Building	DiExSys	If pattern – number of crashes
Crash_Cushion	Crash Cushion	DiExSys	If pattern – number of crashes
Mailbox	Mailbox	DiExSys	If pattern – number of crashes
Other_Fixed_Object	Other Fixed Object	DiExSys	If pattern – number of crashes
Involving_Other_Object	Involving Other Object	DiExSys	If pattern – number of crashes
Road_Maintenance_Equipment	Road Maintenance Equipment	DiExSys	If pattern – number of crashes
Unknown_Accident_Type	Unknown Accident Type	DiExSys	If pattern – number of crashes
Total_Fixed_Objects	Total Fixed Objects	DiExSys	If pattern – number

Field Name	Alias	Source	Description
			of crashes
Total_Other_Objects	Total Other Objects	DiExSys	If pattern – number of crashes
Dry_Road	Dry Road	DiExSys	If pattern – number of crashes
Wet_Road	Wet Road	DiExSys	If pattern – number of crashes
Muddy_Road	Muddy Road	DiExSys	If pattern – number of crashes
Snowy_Road	Snowy Road	DiExSys	If pattern – number of crashes
Icy_Road	Icy Road	DiExSys	If pattern – number of crashes
Slushy_Road	Slushy Road	DiExSys	If pattern – number of crashes
Former_Material_Road	Former Material Road	DiExSys	If pattern – number of crashes
With_Road_Treatment	With Road Treatment	DiExSys	If pattern – number of crashes
Dry_with_Icy_Road_Treatment	Dry with Icy Road Treatment	DiExSys	If pattern – number of crashes
Wet_Icy_Road_Treatment	Wet Icy Road Treatment	DiExSys	If pattern – number of crashes
Snowy_with_Icy_Road_Treatment	Snowy with Icy Road Treatment	DiExSys	If pattern – number of crashes
Icy_with_Icy_Road_Treatment	Icy with Icy Road Treatment	DiExSys	If pattern – number of crashes
Slushy_with_Icy_Road_Treatment	Slushy with Icy Road Treatment	DiExSys	If pattern – number of crashes
Unknown_Road_Conditions	Unknown Road Conditions	DiExSys	If pattern – number of crashes
No_Adverse_Weather	No Adverse Weather	DiExSys	If pattern – number of crashes

Field Name	Alias	Source	Description
Rain	Rain	DiExSys	If pattern – number of crashes
Snow_or_Sleet_or_Hail	Snow or Sleet or Hail	DiExSys	If pattern – number of crashes
Fog	Fog	DiExSys	If pattern – number of crashes
Dust	Dust	DiExSys	If pattern – number of crashes
Wind	Wind	DiExSys	If pattern – number of crashes
Unknown_Weather	Unknown Weather	DiExSys	If pattern – number of crashes
Daylight	Daylight	DiExSys	If pattern – number of crashes
Dawn_or_Dusk	Dawn or Dusk	DiExSys	If pattern – number of crashes
Dark___Lighted	Dark - Lighted	DiExSys	If pattern – number of crashes
Dark___Unlighted	Dark - Unlighted	DiExSys	If pattern – number of crashes
Unknown_Lighting	Unknown Lighting	DiExSys	If pattern – number of crashes
Unknown	Unknown	DiExSys	If pattern – number of crashes
No_Impairment_Suspected	No Impairment Suspected	DiExSys	If pattern – number of crashes
Alcohol	Alcohol	DiExSys	If pattern – number of crashes
RX_Drugs_or_Medication	RX Drugs or Medication	DiExSys	If pattern – number of crashes
Illegal_Drugs	Illegal Drugs	DiExSys	If pattern – number of crashes
Alcohol_and_Drugs	Alcohol and Drugs	DiExSys	If pattern – number

Field Name	Alias	Source	Description
			of crashes
Not_Observed	Not Observed	DiExSys	If pattern – number of crashes
No_Apparent_Contributing_Factor	No Apparent Contributing Factor	DiExSys	If pattern – number of crashes
Asleep_at_the_Wheel	Asleep at the Wheel	DiExSys	If pattern – number of crashes
Illness	Illness	DiExSys	If pattern – number of crashes
Distracted_by_Passenger	Distracted by Passenger	DiExSys	If pattern – number of crashes
Inexperienced	Inexperienced	DiExSys	If pattern – number of crashes
Fatigue	Fatigue	DiExSys	If pattern – number of crashes
Preoccupied	Preoccupied	DiExSys	If pattern – number of crashes
Unfamiliar_with_Area	Unfamiliar with Area	DiExSys	If pattern – number of crashes
Emotionally_Upset	Emotionally Upset	DiExSys	If pattern – number of crashes
Evading_Law_Enforcement_Officer	Evading Law Enforcement Officer	DiExSys	If pattern – number of crashes
Physical_Disability	Physical Disability	DiExSys	If pattern – number of crashes
Unknown_Contributing_Factor	Unknown Contributing Factor	DiExSys	If pattern – number of crashes

Table D.3: Data dictionary for rural segment LOSS and diagnostic GIS data.

Field Name	Alias	Data Type	Source	Description
OBJECTID		Object ID	GIS	ID generated by ArcGIS Pro
Shape		Geometry	GIS	Geometry generated by ArcGIS Pro
UniqueID	UniqueID	Text	GIS	Unique ID based on LRS attributes
LRS_DiExSys	LRS_DiExSys	Text	GIS / CDOT	LRS route number
Section	Section	Text	GIS / CDOT	LRS section
BMP	BMP	Double	GIS / CDOT	Segment beginning mile point
EMP	EMP	Double	GIS / CDOT	Segment ending mile point
Notes	Notes	Text	GIS / CDOT	Segment name and intersecting streets
AADT_Bidirectional	AADT_Bidirectional	Long	GIS / Replica data	AADT on segment
AADT_DiExSys	AADT_DiExSys	Long	GIS / Replica data	AADT on segment with minimum value set to 50
Lanes	Lanes	Long	GIS / CDOT	Number of lanes
Divided	Divided	Text	GIS / CDOT	Divided/undivided
Name_long	Name_long	Text	GIS / CDOT	Road name
Jurisdiction	Jurisdiction	Text	GIS / spatial join	Names of jurisdiction(s) segment passes through
Location_ID	Location ID	Text	GIS	Unique ID based on LRS attributes

Field Name	Alias	Data Type	Source	Description
Name	Name	Text	GIS / CDOT	Road name
Severe_Crashes	Severe Crashes	Long	DiExSys	Number of fatal and injury crashes (all injury levels)
Total_Crashes	Total Crashes	Long	DiExSys	Total number of crashes
LOSS_Severity	LOSS Severity	Long	DiExSys	LOSS Severity
LOSS_Total	LOSS Total	Long	DiExSys	LOSS Total
Count_of_Diagostic_Patterns	Count of Diagostic Patterns	Long	DiExSys	Number of diagnostic patterns identified for this segment
Property_Damage_Only__PDO_	Property Damage Only (PDO)	Long	DiExSys	If pattern – number of crashes
Injury__INJ_	Injury (INJ)	Long	DiExSys	If pattern – number of crashes
Fatal__FAT_	Fatal (FAT)	Long	DiExSys	If pattern – number of crashes
Single_Vehicle_Accidents	Single Vehicle Accidents	Long	DiExSys	If pattern – number of crashes
Two_Vehicle_Accidents	Two Vehicle Accidents	Long	DiExSys	If pattern – number of crashes
Three_or_More_Vehicle_Accidents	Three or More Vehicle Accidents	Long	DiExSys	If pattern – number of crashes
Unknown_Number_of_Vehicles	Unknown Number of Vehicles	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
On_Road	On Road	Long	DiExSys	If pattern – number of crashes
Off_Road	Off Road	Long	DiExSys	If pattern – number of crashes
Off_Road_Left	Off Road Left	Long	DiExSys	If pattern – number of crashes
Off_Road_Right	Off Road Right	Long	DiExSys	If pattern – number of crashes
Off_Road_at_Tee	Off Road at Tee	Long	DiExSys	If pattern – number of crashes
Off_Road_in_Median	Off Road in Median	Long	DiExSys	If pattern – number of crashes
Unknown_Road_Location	Unknown Road Location	Long	DiExSys	If pattern – number of crashes
Overturning	Overturning	Long	DiExSys	If pattern – number of crashes
Other_Non_Collision	Other Non Collision	Long	DiExSys	If pattern – number of crashes
Vehicle_Cargo_or_Debris	Vehicle Cargo or Debris	Long	DiExSys	If pattern – number of crashes
Pedestrian	Pedestrian	Long	DiExSys	If pattern – number of crashes
Broadside	Broadside	Long	DiExSys	If pattern – number of crashes
Head_On	Head On	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
Rear_End	Rear End	Long	DiExSys	If pattern – number of crashes
Sideswipe	Sideswipe	Long	DiExSys	If pattern – number of crashes
Sideswipe__Opposite_Direction_	Sideswipe (Opposite Direction)	Long	DiExSys	If pattern – number of crashes
Approach_Turn	Approach Turn	Long	DiExSys	If pattern – number of crashes
Overtaking_Turn	Overtaking Turn	Long	DiExSys	If pattern – number of crashes
Parked_Motor_Vehicle	Parked Motor Vehicle	Long	DiExSys	If pattern – number of crashes
Railway_Vehicle	Railway Vehicle	Long	DiExSys	If pattern – number of crashes
Bicycle_or_Pedal_Cycle	Bicycle or Pedal Cycle	Long	DiExSys	If pattern – number of crashes
Motorized_Bicycle	Motorized Bicycle	Long	DiExSys	If pattern – number of crashes
Domestic_Animal	Domestic Animal	Long	DiExSys	If pattern – number of crashes
Wild_Animal	Wild Animal	Long	DiExSys	If pattern – number of crashes
Light_or_Utility_Pole	Light or Utility Pole	Long	DiExSys	If pattern – number of crashes
Traffic_Signal_Pole	Traffic Signal Pole	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
Sign	Sign	Long	DiExSys	If pattern – number of crashes
Bridge_Rail	Bridge Rail	Long	DiExSys	If pattern – number of crashes
Guard_Rail	Guard Rail	Long	DiExSys	If pattern – number of crashes
Cable_Rail	Cable Rail	Long	DiExSys	If pattern – number of crashes
Concrete_Barrier	Concrete Barrier	Long	DiExSys	If pattern – number of crashes
Bridge_Abutment	Bridge Abutment	Long	DiExSys	If pattern – number of crashes
Column_or_Pier	Column or Pier	Long	DiExSys	If pattern – number of crashes
Culvert_or_Headwall	Culvert or Headwall	Long	DiExSys	If pattern – number of crashes
Embankment	Embankment	Long	DiExSys	If pattern – number of crashes
Curb	Curb	Long	DiExSys	If pattern – number of crashes
Delineator_Post	Delineator Post	Long	DiExSys	If pattern – number of crashes
Fence	Fence	Long	DiExSys	If pattern – number of crashes
Tree	Tree	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
Large_Boulders_or_Rocks	Large Boulders or Rocks	Long	DiExSys	If pattern – number of crashes
Rocks_in_Roadway	Rocks in Roadway	Long	DiExSys	If pattern – number of crashes
Barricade	Barricade	Long	DiExSys	If pattern – number of crashes
Wall_or_Building	Wall or Building	Long	DiExSys	If pattern – number of crashes
Crash_Cushion	Crash Cushion	Long	DiExSys	If pattern – number of crashes
Mailbox	Mailbox	Long	DiExSys	If pattern – number of crashes
Other_Fixed_Object	Other Fixed Object	Long	DiExSys	If pattern – number of crashes
Involving_Other_Object	Involving Other Object	Long	DiExSys	If pattern – number of crashes
Road_Maintenance_Equipment	Road Maintenance Equipment	Long	DiExSys	If pattern – number of crashes
Unknown_Accident_Type	Unknown Accident Type	Long	DiExSys	If pattern – number of crashes
Total_Fixed_Objects	Total Fixed Objects	Long	DiExSys	If pattern – number of crashes
Total_Other_Objects	Total Other Objects	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
Dry_Road	Dry Road	Long	DiExSys	If pattern – number of crashes
Wet_Road	Wet Road	Long	DiExSys	If pattern – number of crashes
Muddy_Road	Muddy Road	Long	DiExSys	If pattern – number of crashes
Snowy_Road	Snowy Road	Long	DiExSys	If pattern – number of crashes
Icy_Road	Icy Road	Long	DiExSys	If pattern – number of crashes
Slushy_Road	Slushy Road	Long	DiExSys	If pattern – number of crashes
Former_Material_Road	Former Material Road	Long	DiExSys	If pattern – number of crashes
With_Road_Treatment	With Road Treatment	Long	DiExSys	If pattern – number of crashes
Curb	Curb	Long	DiExSys	If pattern – number of crashes
Delineator_Post	Delineator Post	Long	DiExSys	If pattern – number of crashes
Dry_with_Icy_Road_Treatment	Dry with Icy Road Treatment	Long	DiExSys	If pattern – number of crashes
Wet_Icy_Road_Treatment	Wet Icy Road Treatment	Long	DiExSys	If pattern – number of crashes
Snowy_with_Icy_Road_Treatm	Snowy with Icy Road	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
ent	Treatment			
Icy_with_Icy_Road_Treatment	Icy with Icy Road Treatment	Long	DiExSys	If pattern – number of crashes
Slushy_with_Icy_Road_Treatment	Slushy with Icy Road Treatment	Long	DiExSys	If pattern – number of crashes
Unknown_Road_Conditions	Unknown Road Conditions	Long	DiExSys	If pattern – number of crashes
No_Adverse_Weather	No Adverse Weather	Long	DiExSys	If pattern – number of crashes
Rain	Rain	Long	DiExSys	If pattern – number of crashes
Snow_or_Sleet_or_Hail	Snow or Sleet or Hail	Long	DiExSys	If pattern – number of crashes
Fog	Fog	Long	DiExSys	If pattern – number of crashes
Dust	Dust	Long	DiExSys	If pattern – number of crashes
Wind	Wind	Long	DiExSys	If pattern – number of crashes
Unknown_Weather	Unknown Weather	Long	DiExSys	If pattern – number of crashes
Daylight	Daylight	Long	DiExSys	If pattern – number of crashes
Dawn_or_Dusk	Dawn or	Long	DiExSys	If pattern – number of

Field Name	Alias	Data Type	Source	Description
	Dusk			crashes
Dark___Lighte d	Dark - Lighted	Long	DiExSys	If pattern – number of crashes
Dark___Unligh ted	Dark - Unlighted	Long	DiExSys	If pattern – number of crashes
Unknown_Ligh ting	Unknown Lighting	Long	DiExSys	If pattern – number of crashes
Unknown	Unknown	Long	DiExSys	If pattern – number of crashes
No_Impairmen t_Suspected	No Impairment Suspected	Long	DiExSys	If pattern – number of crashes
Alcohol	Alcohol	Long	DiExSys	If pattern – number of crashes
RX_Drugs_or_ Medication	RX Drugs or Medication	Long	DiExSys	If pattern – number of crashes
Illegal_Drugs	Illegal Drugs	Long	DiExSys	If pattern – number of crashes
Alcohol_and_D rugs	Alcohol and Drugs	Long	DiExSys	If pattern – number of crashes
Curb	Curb	Long	DiExSys	If pattern – number of crashes
Delineator_Post	Delineator Post	Long	DiExSys	If pattern – number of crashes
Not_Observed	Not Observed	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
No_Apparent_Contributing_Factor	No Apparent Contributing Factor	Long	DiExSys	If pattern – number of crashes
Asleep_at_the_Wheel	Asleep at the Wheel	Long	DiExSys	If pattern – number of crashes
Illness	Illness	Long	DiExSys	If pattern – number of crashes
Distracted_by_Passenger	Distracted by Passenger	Long	DiExSys	If pattern – number of crashes
Inexperienced	Inexperienced	Long	DiExSys	If pattern – number of crashes
Fatigue	Fatigue	Long	DiExSys	If pattern – number of crashes
Preoccupied	Preoccupied	Long	DiExSys	If pattern – number of crashes
Unfamiliar_with_Area	Unfamiliar with Area	Long	DiExSys	If pattern – number of crashes
Emotionally_Upset	Emotionally Upset	Long	DiExSys	If pattern – number of crashes
Evading_Law_Enforcement_Officer	Evading Law Enforcement Officer	Long	DiExSys	If pattern – number of crashes
Physical_Disability	Physical Disability	Long	DiExSys	If pattern – number of crashes
Unknown_Contributing_Factor	Unknown Contributing Factor	Long	DiExSys	If pattern – number of crashes

Field Name	Alias	Data Type	Source	Description
Shape_Length		Double	GIS	Segment length (feet)

APPENDIX E: HIGH RISK NETWORK IDENTIFICATION METHODOLOGY

As part of the Adams County CSAP, a High Risk Network was developed for each agency. The High Risk Network (HRN) analyzes specific roadway features and crash patterns to identify roadway features and surrounding contexts that are associated with an increased risk of crashes. By performing this analysis, road networks can be reviewed to pinpoint locations where a confluence of features associated with increased risk may present the potential for more dangerous conditions, regardless of whether crashes have occurred there in the past.

The HRN is different from a High Injury Network (HIN) because a HIN only analyzes crash history data. To produce the HRN for Unincorporated Adams County, the results of the systemic analysis for each of the roadway features (see Appendix C - Systemic Safety Analysis) were mapped onto the roadway network, creating a new segment each time the evaluated features changed, and total systemic scores were tallied for all segments. Next, a sensitivity analysis was performed to determine the percentage of network coverage included at a variety of total systemic score percentiles (Table E.1). The sensitivity analysis evaluated the number of roadway miles (as a percentage of the entire network) meeting the systemic threshold in comparison to percent of fatal and serious injury crashes included within the segments at each sensitivity level. Once performed, the sensitivity analysis allowed the project team, in conjunction with Adams County staff, to select a percentile rank to serve as the basis for the High Risk Network (i.e. segments with a systemic score greater than the selected percentile would be included in the first iteration of the HRN).

For Adams County, the 80th percentile (segments with systemic scores of 18 or greater) was selected to serve as the first iteration of the HRN due to capturing almost half of KSI crashes (45.5%) while only including 6.6% (113.6 miles) of the roadway network.

Table E.1. Systemic Scores and Corresponding Road Network Coverage

Percentile	Systemic Score	Length (mi)	% of Total Road Miles	% of KSI crashes
>75th	15	268.26	15.6%	64.8%
>80th	**18**	**113.60**	**6.6%**	**45.5%**
>90th	21	42.38	2.5%	29.4%
>95th	21	42.38	2.5%	29.4%
>99th	27	4.25	0.2%	3.1%

Smoothing Process

After selecting a percentile to represent the first iteration of the HRN, a "smoothing" process was initiated. The purpose of the smoothing process was to create a more cohesive HRN without significantly changing the results of the underlying analysis (i.e. generally changing less than 10% of the overall network through the addition or subtraction of segments).

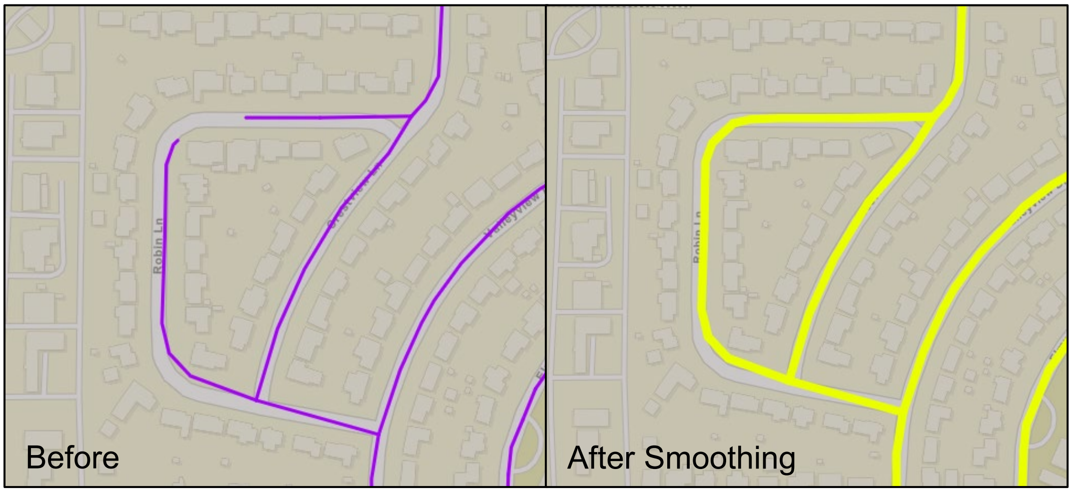
The first step was to review, on a map, the roadways associated with the percentile and associated systemic score selected during the first phase of the smoothing process. The team then evaluated systemic scores adjacent to the one selected to determine if a slight adjustment to the systemic score would provide a more cohesive network for smoothing. In the case of Adams County, no changes were made to the selected systemic score prior to conducting the rest of the smoothing process.

To ensure that the changes implemented as part of the smoothing process were conservative, the smoothing process followed several rules. A brief summary of the changes made and the rules followed during the smoothing process is provided herein.

Filling Short Gaps

Where a short gap (<150’) was present between two segments included in the HRN, the gap was automatically added to the HRN (Figure E.1).

Figure E.1. Before and After Filling in Short Segments or Gaps

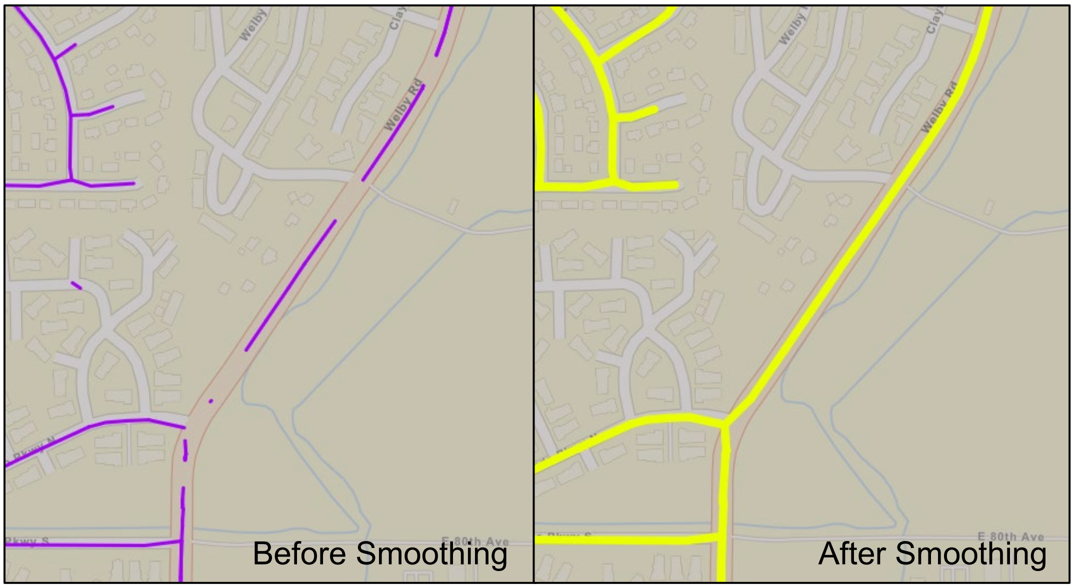


Larger Gaps

When a gap in the HRN was longer than 150’, the project team considered a variety of factors when determining whether to add or remove the segment(s) from the High Risk Network. In most cases the removal of segments was avoided.

Factors considered in whether to add a segment included the length of the HRN gap being evaluated, the systemic score of the segment(s) comprising the HRN gap, and the presence of key land uses (parks) or developments (educational facilities or multifamily housing) along the HRN gap (Figure E.2).

Figure E.2. Before and After Filling in Larger Segments or Gaps



In general, the shorter a segment (or group of segments) comprising the HRN gap, the greater the chance that the segment(s) were added to the HRN. This approach was derived from the project team's directive to minimize the overall changes necessary to the original HRN analysis. Additionally, the project team considered the systemic score(s) of the segment(s) that comprised a gap in the HRN. If the average systemic score of a segment or group of segments was close to the threshold for inclusion in the HRN, the project team was more likely to add it to the HRN. Ultimately, addressing larger gaps in the High Risk Network was a detailed process that required the project team to employ planning and engineering judgment. Decisions were made on a case-by-case basis and considered the individual characteristics of each segment.

Identifying High Risk Intersections

One result of the systemic analysis was that signalized intersections and features associated with them were often found to be associated with increased risk. As a result, the initial iteration of the HRN tended to include segments with signalized intersections while the surrounding area did not meet the threshold for inclusion in the HRN. These locations, which could be several hundred feet or further away from the nearest HRN segment, are referred to as "island" segments due to their remote location with respect to rest of the HRN. These island segments typically only included the intersection and its immediate vicinity (approximately 150' on each approach).

In order to create a more cohesive HRN and properly account for the island segments, the project team developed a network of High Risk Intersections (HRI). High Risk Intersections were considered part of the High Risk Network but were represented as an individual point rather than a segment. To be included as a HRI, a location needed to meet several criteria:

- Contain a single intersection plus approximately 150 feet in either direction[1]
- When evaluating the scores that comprised the total systemic score for the segment and adjacent segments, the only difference was the presence of an intersection
- Have adjacent segments (outside of the 150' intersection distance) that were significantly (2 or more points) lower than the systemic threshold identified for creation of the HRN

If these criteria were met, an island segment would be converted from a segment to a point on the HRN map. This change would only include the area within 150' (approximately 0.03 miles) of the intersection on all approaches; any portion of the island segment outside of that area would be removed from the HRN. A depiction of an island segment before and after the smoothing process is shown in Figure E.3.

Figure E.3. Before and After Identifying High Risk Intersections

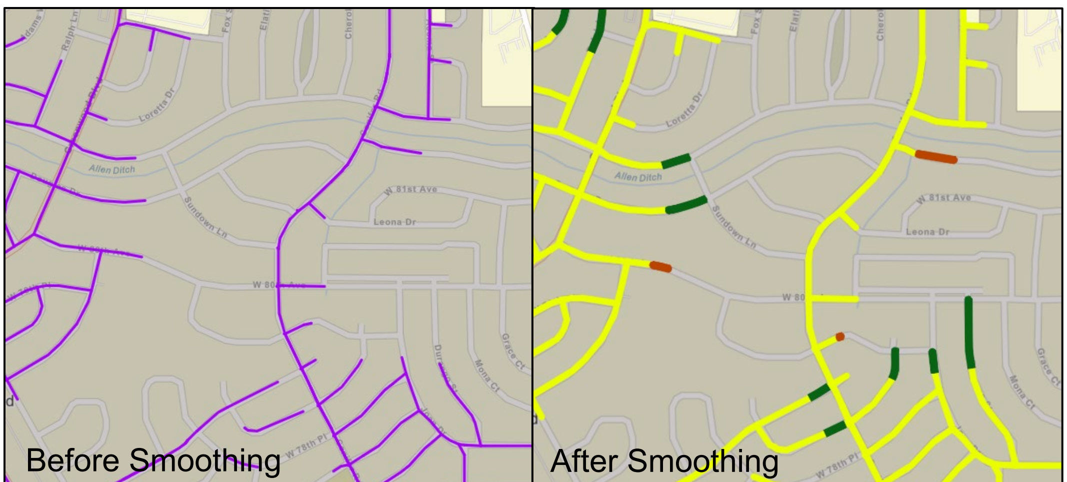
[1] In a small number of unique cases, an at-grade railroad crossing or signalized trail crossing were included as a HRI when adjacent segments didn't score high enough to be considered on the HRN.

It should be noted that High Risk Intersections were identified when they met the scoring criteria for being on the High Risk Network but scores on the adjacent segments did not. This does not mean they are the only intersections with high risk. Intersections with more than one leg falling on the High Risk Network would also be considered high risk.

Selecting Logical Start and End Points for the HRN

Due to the nature of the underlying Straight Line Diagram (SLD) data that acted as the foundation of the systemic analysis and the HRN, segments within the HRN would frequently start and end in seemingly random locations. To ensure the HRN would start and end at logical locations, the smoothing process moved the start/end points of any HRN segment to an intersection or to within 150' of an intersection (Figure E.4). This change was viewed as necessary because it would allow Adams County to more easily identify reasonable limits for potential projects using the HRN in the future.

Figure E.4. Before and After Identifying Logical Start and End Points



Legend
Purple: Network before smoothing
Yellow: Network after smoothing
Red: Segment removed from HRN
Green: Segment added to HRN

Finalized High Risk Network

Once the smoothing process was completed, the project team finalized the Unincorporated Adams County High Risk Network. The smoothed HRN for Unincorporated Adams County covered 116.5 miles (7% of the roadway network) and included 38.0% of the KSI crashes that occurred on Unincorporated Adams County roads. The Unincorporated Adams County High Risk Network is displayed in the Safety Analysis section of the report.

When evaluating risk on boundary roads, results may change from agency to agency. Review of the adjacent agency's HRN, provided below, is recommended to ensure a comprehensive evaluation of risk on boundary roads.

The map on the following page identifies the HRN locations per agency.


Combined HRIs
Adams County HRI
Arvada HRI
Aurora HRI
Brighton HRI
Commerce City HRI
Federal Heights HRI
Northglenn HRI
Westminster HRI
Combined HRNs
Adams County HRN
Arvada HRN
Aurora HRN
Brighton HRN
Commerce City HRN
Federal Heights HRN
Northglenn HRN
Westminster HRN
Date Printed: 03/17/2026

APPENDIX F: COUNTERMEASURES TOOLBOX

Appendix F presents a comprehensive list of countermeasures considered during this safety action plan, with guidance provided by CDOT. It also includes a matrix of crash profiles with applicable countermeasures, and a separate table of planning level cost estimates.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
Signal Timing	Leading Pedestrian Interval (LPI)	CMF ID: 9903	Gives pedestrians a head start when crossing an intersection and reduces crashes by making pedestrians more visible to right or left turning vehicles.	Maybe	Case by case in appropriate locations with additional analysis provided. Consider pedestrian facilities and usage.
	Prohibit Right Turn on Red	CMF ID: 5194	Eliminates the conflict between right-turning vehicles and pedestrians/bicyclists crossing the intersection or with cross-traffic.	Maybe	Case by case in appropriate locations with additional analysis.
	Red Protection / Decision Zone Detection	N/A	Predicts red light runner based on speed and distance. Delays the perpendicular green by a few seconds to prevent a near-miss and actual crashes.	Y	Needs additional analysis case by case. Additional equipment could be needed with considerations for maintenance.
	Appropriate Left Turn Signal Operation	CMF ID: 11252	At locations with visibility issues or limited gaps, only allows left turns with a green arrow. To be implemented when a pedestrian in the conflicting crosswalk activates a pedestrian signal or at certain times of day. Protected-permitted operations may mitigate crash issues where visibility is adequate and gaps are more available. Use a flashing yellow arrow (FYA) when permitted movements are allowed. FYAs can also be set to be gap dependent, such that a red arrow will continue (and the FYA will not begin) until there is a detected gap in opposing traffic.	Y	

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
	Protected-Only Right Turn Operation	N/A	Only allows right turns with a green arrow (requires exclusive right turn lane).	Maybe	Possibly case by case in appropriate locations with additional analysis.
Signal Timing (Continued)	Pedestrian Recall Signal Timing/Passive Detection	N/A	Automatically calls the walk phase every cycle or automated detection of pedestrians or bicyclists initiates a pedestrian/bicyclist call phase to allow crossing. Passive detection is still in its infancy and should be tested only on a pilot basis and monitored continuously.	Maybe	Possibly case by case in appropriate locations with additional analysis.
	Evaluate the Cycle Length	N/A	Adjusts the signal timing to reduce the wait time before the "WALK" phase.	Maybe	Possibly case by case in appropriate locations with additional analysis.
	Evaluate the "WALK" Phase	N/A	Extends the "WALK" (and associated flashing "DON'T WALK") phase to occur for a longer time period (at least for the full phase of the parallel green).	Maybe	Possibly case by case in appropriate locations with additional analysis.
	Signal Coordination	CMF ID: 9857	Synchronizes traffic signals in a corridor to create smooth traffic flow. Reduces stop-and-go driving and minimizes the likelihood of collisions at intersections. In corridors with closely spaced signals, results in tighter platoons of vehicles, creating larger gaps for left turning vehicles at unsignalized intersections and pedestrians crossings between signals. Signals can also be timed to reduce operating speed.	Y	Requires coordination with DRCOG, local agencies, and all stakeholders regarding updates and changes.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
Speed Management	Identify Target Speed and Countermeasures Needed for Compliance	NHTSA: Lower Speed Limits	Setting a context-sensitive speed limit is one of the most important factors in reducing fatal and serious injury crashes.	Y	Evaluating current conditions in a speed study does not typically lead to speed reduction. Project discussions to implement physical countermeasures with a follow-up study to evaluate speeds is the correct process.
	Speed Feedback Signs	CMF ID: 6686	Provides a message to drivers exceeding a threshold.	Y	Locals can fund installation, maintenance, and operation of signs.
	Traffic Calming	CMF ID: 131	Reduces vehicle speeds through horizontal curvature, lane shifts, speed tables, roundabouts, bulb outs, and narrowed lanes.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Lane Repurposing/Road Diet	CMF ID: 5554	Reallocates space and has been shown to reduce: rear-end and left-turn crashes, operating speeds, conflict points, and exposure to pedestrians.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Automated Speed Enforcement	CMF ID: 2926	Mitigates speeding through camera technology by automatically detecting and recording vehicles that exceed the speed limit.	Y	If local maintains, operates, and pays for installation; needs further discussion.
	Speed Limit Signs	CMF ID: 74	Is crucial for enhancing road safety and ensuring driver compliance.		
	Transverse Rumble Strips/Pavement Markings	CMF ID: 95	Enhances safety by providing tactile and auditory warnings to drivers, alerting them to upcoming hazards or changes in road conditions, thereby reducing the risk of accidents. Most appropriate for rural contexts.	N	Possibly case by case in appropriate locations.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
Visibility Improvements	Remove Obstacles that Impair Sightlines	CMF ID: 307	Insufficient sight distance and limited forward visibility can adversely affect safety and increases the risk of a collision by reducing reaction times and stopping distances. Adequate sight distance provides drivers with sufficient time to identify and appropriately react to all elements of the road environment, including other road users and hazards. Sight distances are particularly important in areas where pedestrians and bicyclists are known to cross the road.	Y	Consider maintenance, operations, and enforcement (for parking restrictions).
	Improve Signal Visibility	CMF ID: 3941	Removes obstructions, adds signal heads, adds signal heads in more visible locations, and/or adds advance warning signage or beacons.	Y	
	Advanced Warning Signage	CMF ID: 1684	Place ahead of signalized intersections, curves, or other hazards to inform drivers of upcoming conditions or actions they need to take.	Maybe	Case by case. Consider sign clutter and maintenance, along with vertical and horizontal curves.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
Bike & Pedestrian Improvements	New or Upgraded Pedestrian Crossing	CMF ID: 11181	Includes one or more of the following depending on context: high-visibility crosswalk and signs, shortened crossing distance, pedestrian refuge medians, raised crosswalks, rapid rectangular flashing beacon, pedestrian hybrid beacon, traffic signal, or overpass/underpass.	Maybe	Reference CDOT Crosswalk Guidance, FHWA Guidance, and MUTCD. Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Shorten Pedestrian Crossing Distance	N/A	Removes or narrows turn lanes, through lanes, or parking lanes and/or tightens the turn radius at an intersection to reduce the crossing distance and exposure of pedestrians at a crossing.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	New or Upgraded Bike Facility	CMF ID: 4096	Adds a dedicated bicycle facility that may include a bike lane, buffered bike lane, protected bike lane, cycle track, or shared-use path.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Setback of Shared Use Path	N/A	Bends the sidewalk or shared-use path parallel to a major street to cross the minor street 15 to 25 feet before the intersection to allow a driver to yield to the path crossing and cross traffic separately.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	New or Upgraded Sidewalks	CMF ID: 11246	Provides a designated space for pedestrians and separates them from travel lanes used by motorized vehicles.	Y	
	Barnes Dance (all pedestrian phase)	CMF ID: 4117	Allows pedestrians to cross in any direction without conflicts with vehicles.		
	Post-Mounted Delineators	CMF ID: 11300	Narrows the effective road width to allow bike lanes on either side, at corners, to reduce pedestrian crossing distance, etc. Maintenance and snow plowing are challenges.		

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
	Raised Median (or Pedestrian Refuge Median)	CMF ID: 2220	Separates motorized vehicles traveling in opposing directions and reduces the potential for head-on and sideswipe crashes. Allows for two-stage crossings.	Y	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc. Access restriction should be a strong consideration for medians.
	Evaluate Bus Stop Placement	CMF ID: 11181	Relocates a transit stop nearer to a designated crosswalk to reduce pedestrian walking distance, encourages safer crossing behavior, and improves access to transit.		
Geometry Changes	Positive Left Turn Offsets	CMF ID: 276	Improves the sight distance for drivers making left turns and reduces the likelihood of collisions with oncoming traffic.	Y	Needs further analysis.
	Dedicated Turn Lanes	CMF ID: 3948	Includes auxiliary turn lanes that provide physical separation between turning traffic (that is slowing or stopped) and adjacent through traffic at approaches to intersections or driveways.	Y	Needs further analysis for ROW and volume.
	Tighten the Turn Radius	CMF ID: 10264	Tightens the turn radius at intersections to slow turning vehicles, reduce exposure, and increase visibility of pedestrians.	Maybe	Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Convert Full Movement Access to RIRO or 3/4 Movement	N/A	Restricts left turn movements at uncontrolled intersections to reduce vehicle conflicts, reduce crashes, and improve the movement of traffic.	Y	
	Remove or Offset Right-Turn Lane to Increase Visibility	N/A	Eliminates or shifts right turn lanes to improve the vantage of a driver turning onto or crossing a major street that may be blocked by right turning vehicles in an exclusive right turn lane.	Maybe	Needs further analysis.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
	Enhanced Curve Delineation	FHWA Proven Safety Countermeasures	Improves safety by clearly marking curves with signs, reflectors, and pavement markings, helps drivers navigate safely, and reduces the risk of run-off-road accidents.	Y	Consider maintenance and operations.
	Increase Shoulder Width	CMF ID: 8342	Enhances safety by providing additional space for emergency stops, breakdowns, and non-motorized users, reduces the risk of collisions, and improves overall traffic flow.	Y	
	Roadside Design Improvements at Curves	FHWA Proven Safety Countermeasures	Includes flattened side slopes (more applicable to highway geometries), widened shoulders, or widened clear zones to provide drivers a chance to regain control of a vehicle. Helps to mitigate run-off-road and head-on crashes. Includes guardrails where warranted.	Y	
Segment Improvements	Remove or Consolidate Access Points	CMF ID: 179	Reduces conflict points between vehicles and pedestrians, enhances overall safety by streamlining traffic flow, and minimizes potential collision areas.	Y	
	No-Passing Zone	N/A	Enhances safety by preventing dangerous passing maneuvers in areas where visibility and road conditions make passing particularly hazardous.	Maybe	Reference CDOT No Passing Sign guidance. Needs further analysis per location. Depends on type of roadway, segment, volume, truck volumes, etc.
	Wider Edge Lines	CMF ID: 4737	Increases visibility of the edge of roadway to reduce the incidence of vehicles leaving the road.	Y	Consider maintenance and operations.
	Raised Pavement Markers	CMF ID: 5498	Includes reflective roadway markers installed above the pavement surface to improve lane delineation, visibility, and driver guidance, particularly during nighttime or wet conditions.		

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
	Rumble Strips	CMF ID: 3358	Includes shoulder and centerline rumble strips to provide auditory and tactile feedback if motorists exit the travel lane.	Y	
	High Friction Surface Treatment	CMF ID: 10342	Applies aggregates to maintain or increase friction, which can increase motorists' ability to stop and reduce crashes (wet or dry conditions).	Y	
	Parking Changes	CMF ID: 9253	Uses parking to alter the nature of the street. Adding parking narrows effective road width and/or eliminating parking allows the striping of bike lanes or bulbouts to improve visibility at intersections.		
	Lane Narrowing	CMF ID: 7827	Reduces speeds and provides space for other users.		
	Safety Edge	CMF ID: 9205	Primarily addresses crash types related to roadway departures by creating a safer, more traversable edge for vehicles.	Y	
Intersection Improvements	Roundabout	CMF ID: 9157	Uses circular intersections that safely and efficiently move traffic. Features channelized, curved approaches to reduce vehicle speed, entry yield control to give right-of-way to circulating traffic, and counterwise flow around a central island to minimize conflict points.	Y	Needs further analysis.
	Double Post/Oversized Stop Sign	CMF ID: 1661, 1692	Includes double posting or using oversized stop signs to enhance safety by increasing their visibility, ensuring that drivers are more likely to notice and obey them, thereby reducing the risk of intersection-related collisions. Is most appropriate in rural context with long gaps	Maybe	Case by case. Consider maintenance.

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
			between stop control or where stop sign visibility is poor.		
	All-Way Stop or Signal	CMF ID: 320	Includes converting a stop-controlled intersection to a signalized intersection or a two-way stop to an all-way stop.	Maybe	Case by case. Complete ICAT analysis first.
	Hardened Centerline	CMF ID: 3352	Extends the centerline of a road to the crosswalk using delineators or other means and reduces left turning motorist speeds, which can minimize left turn crashes into pedestrians.	Maybe	Case by case. Consider maintenance.
	Stop Bars	CMF ID: 1692	Enhances pedestrian safety and improves driver compliance.		
	Intersection Conflict Warning Systems	CMF ID: 8474	Provides real-time warnings to drivers about the presence of cross traffic. Particularly effective at two-way stop intersections, where drivers may not see the stop sign on the major road.		
	Red Light Cameras	CMF ID: 420	Enhances safety by automatically detecting and recording vehicles that run red lights, deters traffic violations, and reduces the risk of intersection-related collisions.	Maybe	Case by case. Reference CDOT Red Light Running Cameras Implementation Guidelines.
Countywide improvements	Regular Maintenance of Crosswalk	N/A	Maintain crosswalks to be clearly visible at all times.	Maybe	Depends on resources.
	Evaluate Yellow and All-Red Change Intervals	CMF ID: 4221	Confirms that the yellow and red change intervals are appropriately timed and assessed frequently.	Y	
	Backplates with Retroreflective Borders	CMF ID: 1410	When added to a traffic signal head, improves the visibility of the illuminated face of the signal by introducing a controlled-contrast background.	Y	

Category	Countermeasure	Source	Description	CDOT Support (Y/N)	CDOT Guidance
	One Signal Head per Lane	CMF ID: 1485	Increases the visibility of signal heads and reduces the potential for motorist confusion about signal phase.	Y	
	Regular Maintenance of Faded Signage/Striping on Major Roads	N/A	Enhances safety by ensuring that traffic control devices remain visible and effective, helps drivers navigate safely, and reduces the risk of collision.	Maybe	Depends on resources.
	ADA Compliant Directional Curb Ramps and Push Buttons	N/A	Includes retrofitting existing curbs or constructing new curbs to comply with ADA standards, while also providing two ramps per intersection corner (from the sidewalk grade to the street crossing grade) to direct pedestrians in the correct orientation of the crosswalk. As compared to diagonal curb ramps, directional curb ramps can shorten the crossing distance, minimize pedestrian conflict with traffic, and improve visibility and predictability of pedestrians.	Y	
	Evaluate Bus Stop Placement	CMF ID: 2080	Includes placing most stops far-side to allow pedestrians to cross behind the bus and to improve visibility of crossing pedestrians for drivers waiting at the signal. In some cases, nearside or midblock stops are more appropriate. NACTO provides guidance on applicability of stop locations.		
	Lighting	CMF ID: 7774	Improves visibility of the intersection and roadway and mitigates vehicle-vehicle conflicts and vehicle-pedestrian/bicyclist conflicts.	Y	Resources need to be considered - maintenance and operations.

Countermeasure Matrix

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
Leading Pedestrian Intervals (LPI)			✓								✓		
Prohibit Right Turn on Red										✓			
Red Protection / Decision Zone Detection					✓								
Appropriate Left Turn Signal Operation			✓										
Protected-Only Right Turn Operation										✓	✓		
Pedestrian Recall Signal Timing/Passive Detection								✓					
Evaluate the Cycle Length								✓					
Evaluate the "WALK" Phase								✓					
Install Left-turn FYA													
Provide Split Phases													
Signal Coordination				✓	✓	✓	✓	✓					✓
Identify Target Speed and Countermeasures Needed for Compliance	✓	✓		✓	✓	✓	✓	✓					
Speed Feedback Signs	✓			✓	✓	✓	✓	✓					
Traffic Calming	✓	✓		✓	✓	✓	✓	✓					

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
Lane Repurposing/Road Diet	✓	✓		✓	✓	✓	✓	✓					✓
Automated Speed Enforcement	✓	✓		✓	✓	✓	✓	✓					
Speed Limit Signs	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓
Speed Hump/Table													
Transverse Rumble Strips/Pavement Markings		✓		✓	✓	✓							
Remove Obstacles that Impair Sight Lines			✓	✓		✓	✓		✓	✓			
Improve Signal Visibility					✓	✓							
Additional Streetlights													
High-Visibility Crosswalks													
Advanced Warning Signage	✓	✓			✓	✓							
New or Upgraded Pedestrian Crossing							✓		✓	✓	✓		
Shorten Pedestrian Crossing Distance							✓	✓	✓		✓		
New or Upgraded Bike Facility												✓	
Setback of Shared-Use Path									✓		✓		

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
New or Upgraded Sidewalks													✓
Barnes Dance (all pedestrian phase)			✓					✓		✓	✓		
Post-Mounted Delineators									✓	✓	✓	✓	
Barrier Separated Bike Lanes													
Pedestrian Hybrid Beacon (PHB)													
Rectangular Rapid Flashing Beacon (RRFB)													
Raised Median (or Pedestrian Refuge Median)	✓			✓			✓	✓					✓
Install Pedestrian Countdown Timer													
Raised Pedestrian Crosswalks													
Move Bus Stop Closer to Pedestrian Crossing													
Positive Left Turn Offsets				✓									
Dedicated Left Turn Lane at Intersection						✓							
Change Right-turn Lane Geometry													

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
Tighten the Turn Radius									✓	✓	✓		
Convert Full Movement Access to RIRO or 3/4 Movement				✓									
Remove or Offset Right-Turn Lane to Increase Visibility				✓									
Enhanced Curve Delineation	✓	✓											
Increase Shoulder Width		✓											
Roadside Design Improvements at Curves		✓											
Remove or Consolidate Access Points				✓		✓							
No-Passing Zone		✓											
Wider Edge Lines	✓	✓											
Raised Pavement Markers													
Rumble Strips		✓											
High Friction Surface Treatment		✓		✓	✓	✓	✓						
Chicanes or Lateral Shift							✓						✓
Parking Changes				✓			✓	✓	✓	✓			✓
Lane Narrowing							✓	✓				✓	✓

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
Repurpose Lanes													
Safety Edge		✓											
Roundabout			✓	✓	✓	✓							
Double Post/Oversized Stop Sign				✓									
All-Way Stop or Signal				✓									
Hardened Centerline			✓										
Stop Bars				✓	✓								
Intersection Conflict Warning Systems				✓									
Reduced Left-Turn Conflict Intersection													
Red Light Cameras					✓								
Regular Maintenance of Crosswalk			✓				✓		✓	✓	✓		
Evaluate Yellow and All-Red Change Intervals					✓	✓							
Backplates with Retroreflective Borders					✓	✓							
One Signal Head per Lane					✓	✓							
Regular Maintenance of Faded Signage/Striping on Major Roads	✓	✓					✓		✓	✓			

Countermeasure	Urban/ Suburban Lane Departure	Rural Lane Departure	Left Turn at Signalized Intersection	Broadside or Left-Turn at Unsignalized Intersection	Red-Light Running	Rear End	Pedestrian or Bicyclist Crossing Street at Unsignalized Location	Pedestrian or Bicyclist Crossing Against Signal	Right-Turn from Stop Sign into Pedestrian or Bicyclist	Right-Turn on Red	Right-Turn on Green into Pedestrian or Bicyclist in Parallel Crosswalk	Rear End into Bicycle	Pedestrian on Roadway
ADA Compliant Directional Curb Ramps									✓	✓	✓		
Upgrading to 12" LED Signal Heads					✓	✓							
Evaluate Bus Stop Placement									✓	✓	✓		✓
Lighting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Diagonal Diverter			✓	✓			✓						
Half Closure				✓			✓						
Prohibit U-Turns													
Full Closure				✓		✓	✓		✓				✓

Countermeasure Cost Estimates

Number	Countermeasure	Complexity	Cost Range	Details
1	Safety edge ($ per mile) + 4' mill and overlay	Low	$65,000	Low scenario: Typical conditions.
		Medium	$70,000	Typical scenario: Assume 4' wide mill and overlay (2"). $400 per ton. CDOT Item 403-00720.
		High	$75,000	High complexity scenario: Challenging conditions. If terrain is difficult, shoulder needs prep, or asphalt is particularly expensive.
2	Retiming traffic signal	Low	$1,500 – $2,500	Very simple intersection scenario: Few approaches, existing detector data, minimal modeling.
		Medium	$2,500 – $4,500	Typical intersection scenario: 4 approaches, turning movements, pedestrian phases, field data collection, consultant/agency work.
		High	$4,500 – $7,500+	High complexity scenario: Complex intersection/or high performance/with corridor coordination and heavy data collection/or adaptive signal control refinement
3	Retroreflective backplates per signal head	Low	$200	Add retroreflective tape border to existing backplate, easy access, minimal traffic control.
		Medium	$500	Replace existing backplate with one that has retroreflective border built in, typical size, standard material, moderate access.
		High	$1,000	More complex job: Large or multi-section signal heads, mast arms high up, full replacement with high-grade material (prismatic retroreflective sheeting), significant traffic control.
4	Replacing traffic signal head (each)	Low	$800 - $1,500	Simple replacement scenario: Same size, LED module, easy access, same mounting, minimal traffic control.
		Medium	$1,500 - $3,000	Moderate scenario: 3-section LED head with updated visor/backplate, moderate access issues, some traffic control.
		High	$3,000 - $5,000+	More complex scenario: 5-section head, high mounting, mast arm, need to upgrade wiring or supports, traffic control, possible pole work.

Number	Countermeasure	Complexity	Cost Range	Details
5	Converting pedestal to mast arm	Low	$20,000 - $40,000	Low scenario: Small intersection, short mast arms, minimal foundation work, existing signal heads usable.
		Medium	$40,000 - $80,000	Medium scenario: Standard 4-approach intersection, mast arms of moderate length, new heads or some upgrades, moderate foundation, typical wiring work, permits.
		High	$80,000 - $150,000+	High complexity scenario: Long mast arms, large spans, heavy wind loading, new signal heads, major foundation work, advanced design, difficult terrain or staging/traffic control.
6	Raised pavement markings *(Examples include buttons, cat eyes, snowplowable markers, etc. embedded in or mounted on the road surface)*	Low	$800 - $1,500 per mile	Low scenario: Basic non-snowplowable markers, simple spacing, minimal traffic control.
		Medium	$1,500 - $3,000 per mile	Medium scenario: Typical.
		High	$3,000 - $6,000+ per mile	High scenario: Snowplowable markers, recessed or inlaid, more frequent spacing, heavy traffic control, difficult access.
7	8-inch edge line per mile	Low	$8,000	Low scenario: One side, minimal prep, standard paint.
		Medium	$10,000	Medium scenario: Both sides, higher quality/reflective paint, some traffic control.
		High	$20,000	High scenario: Typical conditions with expected costs based on this complexity level.
8	Installing a pedestrian hybrid beacon	Low	$75,000	Low complexity scenario: Midblock location or intersection with existing poles, baseline infrastructure, minimal new wiring/power work, simple push-button, minimal sidewalk/ADA ramp upgrades.
		Medium	$180,000	Moderate complexity scenario: Needs new poles, new signal heads, crosswalk ramp upgrades, better visibility features, moderate traffic control, some utility or electrical work.
		High	$250,000	High complexity scenario: Challenging site (many lanes to cross, long crosswalks), overhead or mast arm beacons, significant foundation work, major sidewalk/ADA ramp upgrades, possibly new power service, complex traffic control, possibly landscaping or other.

Number	Countermeasure	Complexity	Cost Range	Details
9	High visibility crosswalk	Low	$1,500 - $3,500	Basic high-visibility crosswalk scenario: Ladder or continental pattern, durable paint or thermoplastic, existing pavement decent, minimal prep, minimal traffic control, one crossing (one street width).
		Medium	$3,500 - $7,000	Typical case scenario: Larger crossing (wider road, multiple lanes), more durable material, signs, ramp work, better traffic control, may include lighting/reflections etc.
		High	$7,000 - $12,000+	High complexity/premium scenario: Very wide crossing, elaborate materials (inlaid, preformed, maybe decorative), full compliance/ramp work, multiple enhancements, possibly new power for lighting, severe traffic/weather demands, concrete work or pavement work.
10	Adding pedestrian crossings	Low	$10,000	Basic marked crosswalk scenario: Striping on existing pavement (e.g., two-lane street), basic signs, minimal prep, no signals or ADA ramps needed.
		Medium	$30,000	High-visibility crosswalk plus enhancements scenario: Striping, signage, maybe flashing warning lights or RRFB, curb ramps/ADA, traffic control.
		High	$100,000	Signalized or heavily enhanced crossing scenario: Pedestrian signal heads/push buttons, lighting, possibly refuge island or median, more complex pavement/curb work, substantial traffic control.
11	Installing a pedestrian countdown timer (each)	Low	$2,000 - $5,000 per intersection	Simple retrofit scenario: Add a countdown module to existing pedestrian signal head, controller compatible, wiring in place, access easy, minimal traffic control.
		Medium	$5,000 - $10,000 per intersection	Moderate installation scenario: New pedestrian heads or upgrading existing ones; needing some controller or wiring work; access more difficult; some traffic control required.
		High	$10,000 - $20,000+ per intersection	Complex case scenario: High visibility or large countdown display; height or mast arm issues; possibly replacing multiple heads; full controller upgrades; heavy traffic control/staging; integrating with other signal upgrades.
12	Implementing automated speed enforcement cameras	Low	$50,000 - $100,000 for setup + first year of operation	Baseline/small scale scenario: One fixed speed camera, moderate traffic volume, existing power and pole infrastructure, using vendor or leased system, basic enforcement, minimal ongoing extras.

Number	Countermeasure	Complexity	Cost Range	Details
		Medium	$100,000 - $300,000 per camera over first few years; total program costs possibly $500,000-$2 M+ depending on how many units and how big coverage area is	Typical urban deployment scenario: Several cameras (e.g., covering school zones or multiple hot-spots), full installation with power/networking, signage, vendor contracts or in-house citation processing, regular maintenance and calibrations.
		High	$250,000 - $500,000+ per location/per year scale	High-end/extensive program scenario: Advanced/mobile + fixed + point-to-point cameras, high imaging quality, solar setups, many locations, extensive enforcement (legal support), lots of signage/public outreach, possibly integrated into broader ITS/smart city systems
13	Implementing no right turn on red at an intersection (*Add $3,000 for Synchro)*	Low	$500 - $2,000	Static NRTOR sign scenario: A standard sign (R10-11 MUTCD "No Turn On Red") + mounting, pole or attach to existing structure, basic installation.
		Medium	$15,000	Dynamic/Blank-Out NRTOR sign scenario: LED or blank-out sign, controller interface, possibly activation triggers (pedestrian push button/detection or time-of-day), wiring, possibly higher visibility materials.
		High	$50,000	More complex/conditional RTOR restriction scenario: Includes signal modifications, pedestrian detection, enhanced signage/backplates, possibly higher maintenance, maybe retrofits to existing signal phasing.

Number	Countermeasure	Complexity	Cost Range	Details
14	Installing an RRFB at a midblock crossing	Low	$10,000 - $20,000	Lower-end case scenario: Nothing major to build, solar-powered RRFB, using existing poles or minimal new poles, easy access, minimal traffic control.
		Medium	$30,000 - $50,000	Typical case scenario: Wired or solar system, new poles where needed, push buttons, ADA ramps or sidewalk adjustments, traffic control, signage, permits.
		High	$50,000 - $150,000	High complexity case scenario: Wide crossing, median or refuge island installation, multiple beacons (both sides + in median), extensive electrical work or battery/solar + robust system, more traffic control, slope or foundation issues.
15	Narrowing travel lanes (*Assumes no drainage work*)	Low	$15,000 - $30,000	Minimal change scenario: Restriping: narrowing lanes to nominal width, repainting lines, removing old extra lane lines, no major curb work, minimal traffic control.
		Medium	$30,000 - $50,000	Moderate effort scenario: Restriping + adding bike lane or shoulder, some signs changed, maybe minor curb or gutter adjustments.
		High	$50,000 - $80,000+	Higher effort scenario: More comprehensive reconfiguration: adjusting curbs, sidewalks, drainage, possible small widening elsewhere, more durable materials, significant traffic control.
16	Converting a two-way stop to a four-way stop	Low	$500 - $2,500	Minimal/simple scenario: Low-volume, residential intersection; existing posts usable; install 2 new stop signs + "ALL WAY" plaques + stop bars; minimal sight distance work; minimal traffic control required.
		Medium	$2,500 - $8,000	Moderate scenario: More traffic, need new posts, possible relocation of posts, stop bars/crosswalk repainting, visibility improvements, some advance signs, possibly reflective hardware, traffic control.
		High	$8,000 - $20,000+	Complex/constrained site scenario: Wider roads, multi-lane, visibility improvements like tree removal/trimming/lighting; new foundations; larger signage; both installation and design fees; maybe additional crosswalk work or signal coordination; heavy traffic control.
17	Pedestrian Refuge Island (*Assumes no ROW takes)*	Low	$350.000 - $1 M	Simple mid-block island scenario: Short length, minimal width—just enough to provide refuge, basic curb, visible crosswalk, minimal utilities issues.

Number	Countermeasure	Complexity	Cost Range	Details
		Medium	$1 M - $2 M	Medium scenario: Longer length, wider island (6-8 ft), full curb, ADA curb ramps, signage/lighting, moderate traffic control.
		High	$2 M - $4 M+	High complexity scenario: Large island, decorative materials, significant ADA features, lighting, major pavement removal or realignment, drainage, heavy traffic control, possibly utility relocation).
18	Adding sidewalk	Low	$200,000 - $300,000/mile	Low scenario: Single sidewalk, basic concrete, minimal prep.
		Medium	$300,000 - $500,000/mile	Medium scenario: Sidewalk on one side, some driveways and curb ramps, minor grading, drainage.
		High	$500,000 - $800,000+/mile	High complexity scenario: Both sides, curb and gutter, stormwater, utility relocations, lighting, higher finishes, landscaping.
19	Road Diet	Low	$25,000 – $50,000/mile	Minimal intervention scenario: Just restriping, lane markings, repainting, maybe adding minor signage.
		Medium	$100,000 – $750,000/per mile	Moderate upgrade scenario: Restriping + bike lanes, pedestrian crossings, curb ramps, some sidewalk or refuge island work.
		High	$1 M+/mile	Full/High complexity scenario: Includes milling/overlay, curb extensions, full bicycle/pedestrian infrastructure, signal modifications, drainage work.
20	Rebuilding corners to provide curb extensions	Low	$5,000 - $15,000	Paint post scenario: Typical conditions with expected costs based on this complexity level.
		Low-Medium	$20,000 - $25,000	Low complexity/minimal extension scenario: Small bulb-out, minor sidewalk work, minimal demolition, existing drainage okay.
		Medium	$25,000 - $45,000	Moderate complexity scenario: Medium bulb-out, full curb and gutter/sidewalk work, ADA ramps, detectable warnings, some drainage or pavement patching.
		High	$45,000 - $70,000+	High complexity scenario: Large extension, heavy demolition, utilities relocation, major curb ramp adjustments, complex drainage, possibly aesthetic or landscaping work.

Number	Countermeasure	Complexity	Cost Range	Details
21	Daylighting an intersection (*Clearing sightlines by removing or relocating visual obstructions near the corners)*	Low	$2,000 – $10,000	Minimal daylighting scenario: Trimming/removing low vegetation, removing or relocating small signs, adjusting/removing small obstructions within reach from sidewalk/ROW; minimal traffic control.
		Medium	$10,000 – $40,000	Moderate daylighting scenario: Removing larger vegetation or trees, relocating small poles or minor infrastructure, more significant sign removal/relocation, possibly partial sidewalk or curb adjustments, some traffic control.
		High	$40,000 – $200,000+	Extensive daylighting scenario: Involves utility pole relocation, removal of large trees, major sign structures, regrading terrain, possibly repaving portions to improve approach lines of sight, significant traffic control.
22	Resetting fixed object	Low	$500 - $2,000 each	Small sign (no foundation, light supports).
		Low-Medium	$5,000 - $30,000+	Large sign/overhead sign structure.
		Medium	$3,000 - $15,000+	Light pole/street lighting poles.
		Medium-High	$2,000 - $10,000+	Guardrail terminal or end treatments (if relocating end anchors).
		High	$10,000 - $50,000+	Utility poles (involving service disconnection, re-wiring).
23	Changing geometry at an intersection to improve line of sight	Low	$25,000 - $100,000	Remove/trim obstructions (vegetation, small signs), move stop line, adjust curb return, possibly repaving small area, minor grading. Little or no utility/drainage work.
		Medium	$100,000 - $1 M	Realign one approach to reduce skew, rebuild or regrade approach profile, adjust curb radii, rebuild sidewalk, relocate utilities/signage. Some pavement reconstruction.
		High	$1 M - $3 M	Realign entire leg(s) or roadway, acquire ROW, significant grading or earthmoving, adjust vertical alignment, possibly build new pavement, drainage, structures. Could include intersection widening or full reconstruction.
24	Changing right-turn lane geometry	Low	$100,000 - $250,000 (Minimal)	Add modest right-turn lane pavement/striping in existing alignment with minimal widening, minor curb adjustment, little utility relocation.

Number	Countermeasure	Complexity	Cost Range	Details
		Medium	$250,000 - $500,000 (Moderate)	Add a fully dedicated right turn lane: widen approach, new pavement base, curb and gutter, adjust sidewalks or crosswalks, some utility/drainage work, decent turn storage length.
		High	$500,000 - $1 M+ (Major)	Significant widening, major drainage/utility relocation, possible acquisition of ROW, long turning storage, high design complexity, curb/sidewalk upgrades, possibly traffic signal modifications.
25	Installing raised medians at an intersection	Low	$200,000 - $500,000	Low complexity scenario: Narrow raised median (say 2-4 ft), simple curb, minimal landscaping, good existing pavement base, few utility/ drainage conflicts.
		Medium	$500,000 - $1 M	Moderate complexity scenario: Wider median (5-10 ft), curb and gutter, modest landscaping (grass, shrubs), drainage adjustment (inlets, etc.), possible utility or sign relocation.
		High	$1 M - $3 M	High complexity/decorative scenario: Wide median with full planting, irrigation, high quality curb, possibly decorative surfacing, major drainage/utility relocation, possibly lighting, special finishes.
26	Rumble strips (*Assumes low mobilization cost*)	Low	$3,000/mile	Asphalt pavement in good condition, shoulder or edge rumble strips, minimal traffic control, accessible location.
		Medium	$3,000 - $10,000/mile	Centerline or shoulder strips, some traffic control, decent width of rumble, pavement prep required, maybe two directions.
		High	$10,000 - $20,000+ /mile	Concrete or rough pavement needing prep/repair, centerline strips on high traffic road, substantial traffic control or lane closures, mobilization into remote area.
27	Installing a left turn lane at an intersection (*Includes design cost*)	Low	$150,000 - $280,000	Road already wide; only striping + minor pavement widening; minimal utility/sidewalk/curb work; short turn storage.
		Medium	$280,000 - $650,000	Need pavement widening, new base, curb/gutter, sidewalk/ADA ramps, some utility/ drainage adjustment; decent length of turn storage.
		High	$650,000 - $900,000+	Major widening, significant earthwork, relocating utilities, significant drainage work, long storage, right-of-way needed, heavy traffic control, possibly signal adjustments.

Number	Countermeasure	Complexity	Cost Range	Details
28	Improving left-turn lane offset	Low	$50,000 - $150,000	Minor offset improvement scenario: Modest shift, using restriping, some pavement widening, minimal curb/ramp work, existing base adequate, utilities out of the way.
		Medium	$150,000 - $500,000	Moderate improvement scenario: Significant offset shift (several feet), pavement widening, curb/gutter, sidewalk ramps, drainage or utility adjustments, perhaps lighting/signage adjustments.
		High	$500,000 - $1 M+	Major/large improvement scenario: Large offset change, extensive pavement reconstruction, major widening, utility relocation, acquiring ROW, major features like landscaping or complex curbs or large approach realignments.
29	Raised pedestrian crossing (*Assumes no drainage work*)	Low	$25,000 - $60,000	Simple raised crosswalk scenario: Narrow road, good existing pavement, minimal grading/drainage work, basic materials, simple crosswalk size (10-15 ft width), ramps and ADA features included
		Medium	$60,000 - $100,000	Moderate raised crosswalk scenario: Wider street, more lanes, more elevation, concrete or better finish, possibly better lighting/signage, more traffic control needed
		High	$100,000 - $1 M+	Full raised intersection or large scale crossing scenario: Includes all approaches, more lanes, substantial site prep, drainage utilities moved, heavy finish, decorative or high visibility materials, possibly aesthetic/streetscape enhancements
30	Installing a bike lane per mile (*Assumes public engagement*)	Low	$30,000 – $80,000	Painted/basic bike lane scenario: On existing pavement, no widening, striping and signage, minimal modifications
		Medium	$80,000 – $350,000	Buffered bike lane scenario: Adds buffer from traffic, wider stripe, possibly minor modifications, signage
		High	$350,000 – $750,000+ depending on how much infrastructure change is needed	Protected bike lane scenario: Physical separation (e.g., flex posts, curb, planters, vertical elements), enhanced signage, possibly lighting, curb/gutter work.
31	ADA compliant curb ramp (per ramp)	Low	$7,000 - $10,000	Basic new curb ramp scenario: Good site, no utility conflicts, minimal sidewalk tie-in. Install one ramp, standard truncated warning surface, standard concrete work.

Number	Countermeasure	Complexity	Cost Range	Details
		Medium	$10,000 - $20,000	More typical urban corner ramp scenario: Sidewalk tie-in, possibly replacing curb, adjusting driveway, minor traffic control. Includes demo, sidewalk connection, truncated domes, concrete forming, pour, finish.
		High	$20,000 - $75,000+	Complex ramp scenario: Steep slope site, utility conflicts, driveway or curb and gutter modifications, full sidewalk reconstruction, traffic control, possibly landscaping. Might involve more grading, complex formwork, higher concrete cost, possibly needing sidewalk.
32	Improving pavement friction	Low	$25,000 - $60,000/mile	Low-level/basic scenario: Chip seal or light surface seal, minimal prep, existing pavement mostly in decent shape, one or two traffic lanes, minimal traffic control.
		Medium	$60,000 - $280,000/mile	Moderate treatment (multiple curves or long curve sections over mile segments) scenario: Similar enhancements on all curves in the segment, possibly in-lane pavement warning markings, maybe dynamic or enhanced signs, more delineators, full reflective materials.
		High	$280,000 - $700,000+/mile	High/premium scenario: High friction surfacing material (polymer overlay, epoxy, ceramic, etc.), or concrete grinding/grooving, possibly full lane treatments, significant traffic control, long life target.
33	Enhancing delineation for a horizontal curve	Low	$3,000 - $10,000/curve	Basic enhancements (spot curve/single curve treatment) scenario: Add/re-install chevrons, upgrade sign sheeting, add post-mounted delineators, upgrade pavement striping in the curve, maybe some reflective markers.
		Medium	$20,000 - $75,000+/mile	Moderate treatment (multiple curves or long curve sections over mile segments) scenario: Similar enhancements on all curves in the segment, possibly in-lane pavement warning markings, maybe dynamic or enhanced signs, more delineators, full reflective materials.
		High	$75,000 - $125,000+/mile	High treatment/premium delineation scenario: More robust equipment (LED or dynamic chevron or warning signs, speed feedback, large or custom signs), intensive pavement markings, many delineators, possibly raised markers, all reflective materials, enhanced.

Number	Countermeasure	Complexity	Cost Range	Details
34	Installing median barriers	Low	$280,000 - $400,000/mile	Cable scenario: Typical conditions with expected costs based on this complexity level.
		Low-Medium	$150,000 - $300,000/mile	Metal scenario: Cable median barrier (three-cable, high tension, posts installed in median, moderate terrain, median slope manageable, sites not too constrained).
		Medium	$400,000 - $600,000+/mile	Concrete scenario: Metal beam guardrail (W-beam or similar).
		High	$600,000 - $1 M+/mile	Constrained site scenario: Precast concrete barrier/rigid concrete median barrier. High-end/difficult terrain/constrained site (steep slopes, constrained median width, major foundation work, drainage/utility conflicts, high traffic control cost).
35	Installing a speed hump	Low	$3,000 - $8,000	Basic scenario: Simple asphalt hump, standard size, minimal site prep, existing pavement in good shape, minimal signage/markings.
		Medium	$8,000 - $15,000	Moderate scenario: More robust design, pavement repair, new warning signs, paint or reflective markings, moderate traffic control.
		High	$15,000 - $25,000+	Higher complexity/"enhanced" scenario: Larger or custom hump design, possibly rubber or modular, more signage, visible markings, site prep, possibly curb adjustment/driveway tie-ins, aesthetic features.
36	Installing a single lane roundabout	Low	$1 M - $2 M	Basic scenario: Typical conditions with expected costs based on this complexity level.
		Medium	$2 M - $3 M	Moderate scenario: Typical conditions with expected costs based on this complexity level.
		High	$3 M - $5 M	High scenario: Typical conditions with expected costs based on this complexity level.

Top Intersections and Associated Countermeasures

Intersection ID	Responsible Agency	Intersection Name	Recent Improvements Completed*	Recent Improvement Details	Included in a Capital Improvement Plan	Previous Planning Effort Completed	Planned Improvements (outside of Planning Studies)	Crash Profiles	Bike/Ped Summary	Engagement Feedback	Notes
2808	AdCo	84th Ave / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Left Turn at Signalized Intersection: Total(12), N(1), S(4), E(5), W(2) ; Pedestrian or Bicyclist: Total(3), E(2) ; Rear End: Total(34), N(6), S(11), E(9), W(6) ; Red-Light Running: Total(10), N(3), S(6), W(1) ; Right Turn on Red: Total(1), S(1)	Pedestrian (Ped 1) was crossing W 84th Avenue at Pecos Street from south to north. Vehicle 2 was travelling east in lane one on W 84th Avenue at Pecos Street. Vehicle 2's front collided with Ped 1's left side. Ped 1 rolled over Vehicle 2, coming to rest in the roadway. Vehicle 2 came to rest on the right shoulder, facing east on all four wheels. Ped 1 was transported prior to my arrival.	Pedestrian behavior at this intersection should be addressed - people crossing the street near but not at the crosswalk to get to King Soopers	"Based on public feedback, a new ped crosswalk east on 84th could be helpful for those trying to get to King Soopers. Delineators recommended for curb extensions in all corners."
2147	CDOT	77th Ave / Vasquez Blvd	-	-	-	-	-	Left Turn at Signalized Intersection: Total(10), N(5), S(4), W(1) ; Red-Light Running: Total(13), N(6), S(4), E(1), W(2) ; Rear End: Total(16), N(3), S(11), E(1), W(1) ; Right Turn on Red: Total(1), W(1)	-	Intersection setup is odd with intersections directly on either side (E/W) consider adding and coordinating signals here. (three intersections) Very dangerous for pedestrians.	Need to reconfigure this intersection, either make the parallel roads RIRO or properly channelize them and pull them back from the intersection so that you can tighten the radii and curbs at the primary intersection. Also need cat tracks through the intersection to guide drivers.
3869	Collaboration	84th Ave / Huron St / Greenwood Blvd	-	-	-	-	-	Left Turn at Signalized Intersection: Total(13), N(1), S(6), E(2), W(4) ; Pedestrian or Bicyclist: Total(2), S(1), W(1) ; Red-Light Running: Total(14), N(1), S(4), E(5), W(4) ; Rear End: Total(18), N(1), S(8), E(6), W(3)	" TU1 SB Huron making an EB turn onto W 84th Ave. PED was crossing in the marked crosswalk on a walk signal. TU1 did no see PED in crosswalk. TU1 collided with the PED in the crosswalk. PED was transported to the hospital. PED suffered a sprained ankle."	-	-
3033	CDOT	Dahlia St / 74th Ave	X	New traffic signal and curb ramp improvements	-	-	-	Left Turn at Signalized Intersection: Total(8), N(1), E(3), W(4) ; Pedestrian or Bicyclist: Total(5), N(2), S(2), W(1) ; Red-Light Running: Total(13), N(2), S(1), E(8), W(2) ; Rear End: Total(17), N(3), S(2), E(11), W(1)	"Vehicle 1 was on Dahlia St. turning right onto E. 74th Ave. Bicycle was in the cross walk riding north to south. Both vehicles had a green light. Vehicle 1 collided with bicycle in the cross walk. Both Vehicle and bicycle moved to final rest. Traffic Unit 1 (SUV) was traveling southbound Dahlia Street. Traffic Unit 2 (Pedestrian) was traveling southbound in the east crosswalk at Dahlia and Highway 224. The SUV turned left to eastbound Highway 224 and collided with the pedestrian in the crosswalk in the left lane. Pedestrian came to final rest 14 feet farther east. The SUV came to final rest 9 feet east of the point of impact. Vehicle #1 was traveling northbound on Dahlia St. making a left turn onto Highway 224. Pedestrian #2 was crossing Highway 224 heading northbound in the crosswalk. Vehicle #1 collided its front end with the pedestrian. Vehicle #1 came to final rest facing west in the # 1 lane of westbound Highway 224. Pedestrian #2 came to final rest across the #1 and #2 lanes. "	-	-
3119	CDOT	70th Ave / Washington St	-	-	-	-	-	Left Turn at Signalized Intersection: Total(9), N(3), S(5), W(1) ; Pedestrian or Bicyclist: Total(4), N(1), S(1) ; Rear End: Total(29), N(8), S(9), E(7), W(5) ; Red-Light Running: Total(14), N(4), S(4), E(2), W(4) ; Right Turn on Red: Total(1), E(1)	"VEHICLE #1 SOUTHBOUND WASHINGTON STREET IN LEFT TURN LANE TO EASTBOUND 70TH AVENUE. PEDESTRIAN NORTHBOUND WASHINGTON STREET CROSSING 70TH AVENUE EASTBOUND LANES ON THE WALK HAND. DRIVER OF VEHICLE #1 DID NOT SEE THE PEDESTRIAN AND COLLIDED WITH THE PEDESTRIAN IN THE CROSSWALK. VEHICLE #1 MOVED FROM FINAL REST. Vehicle #1, a bicyclist, was on Highway 224 (70th Avenue) in the dirt median approximately 30' east of Washington Street. Vehicle #2 was Highway 224 (70th Avenue) eastbound in the #2 lane stopped at a red light at Washington Street. The eastbound traffic light turned green and Vehicle #2 started to accelerate. Vehicle #1 attempted to cross the eastbound traffic lanes going southbound from the median approximately 30' east of the intersection. The side of Vehicle #1 collided with the front of Vehicle #2. Vehicle #1 ultimately got trapped under the right front wheel and was pushed eastbound to final rest. The rider of Vehicle #1 collided with the front of Vehicle #2 and was ejected to the south. Vehicle #1 came to final rest under the right front tire of Vehicle #2. Vehicle #2 came to final rest in the #2 lane on its wheels facing east. Traffic Unit 1 (bicycle) traveling northbound Washington Ave on left side of highway. Traffic Unit 2 (car) stopped at light for westbound Highway 224 at Washington in right lane. Light for Highway 224 turned green. Traffic unit 2 accelerated from stop and Traffic Unit 1 entered intersection, veering left out of intersection but crossing Highway 224. Traffic Unit 1 collided right side to Traffic Unit 2 front left corner at 22 feet west of the intersection and 10 feet into the right lane. Both remained in contact and traveled westbound, coming to stop in right lane 108 feet west of intersection. Vehicle 1 (Pedestrian) exited a vehicle that was facing north on Washington St and 70th Ave walking to the west. Vehicle 2 was turning left onto southbound Washington St from 70th Ave. Vehicle 2's front collided with Vehicle 1's right side. Both Vehicle's were moved prior to my arrival. "	-	This intersection needs a connection to the Clear Creek Trail and the crosswalks should not take you to a triangle median with no ADA ramps. Connectivity of the bike/ped facilities is desperately needed south of this intersection.
1393	Collaboration	120th Ave / Sable Rd	-	-	-	-	-	Left Turn at Signalized Intersection: Total(33), N(8), S(25) ; Rear End: Total(51), N(12), S(8), E(5), W(17), NE(2), NW(3), SE(3), SW(1) ; Red-Light Running: Total(11), N(5), S(1), E(2), W(3) ; Right Turn on Red: Total(2), N(2)	-	-	Recommend improved signage for crosswalks in right turn lanes. Collaboration with Brighton
1239	CDOT	Sheridan Blvd / I-70 WB on Ramp	-	-	-	-	-	Left Turn at Signalized Intersection: Total(8), N(8) ; Pedestrian or Bicyclist: Total(1) ; Red-Light Running: Total(8), N(2), S(5), W(1) ; Rear End: Total(10), N(5), S(5)	-	Poor Lighting	-
1006	CDOT	56th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(7), N(3), S(4) ; Pedestrian or Bicyclist: Total(2), E(1) ; Red-Light Running: Total(4), N(3), W(1) ; Rear End: Total(16), N(13), S(2), W(1)	"TRAFFIC UNIT #1 (PEDESTRIAN) WAS WALKING EASTBOUND ON HIGHWAY 287 NEAR THE CROSSWALK AT 56TH AVE. TRAFFIC UNIT #2 WAS TRAVELING SOUTHBOUND ON HIGHWAY 287 APPROACHING 56TH AVE. IN THE RIGHT LANE. TRAFFIC UNIT #2 ATTEMPTED TO AVOID TRAFFIC UNIT #1 BY BRAKING AND SWERVING TO THE LEFT. TRAFFIC UNIT #2S RIGHT FRONT STRUCK TRAFFIC UNIT #1S LEFT SIDE. TRAFFIC UNIT #2 CAME TO A CONTROLLED STOP ON THE RIGHT SHOULDER FACING SOUTH. TRAFFIC UNIT #1 WENT AIRBORNE FOR AN UNKNOWN DISTANCE TRAVELED ONTO THE RIGHT SHOULDER WHERE HE CAME TO FINAL REST FACING NORTH. Vehicle 2 was southbound on Federal Blvd at W. 56th Ave in the #2 lane. Pedestrian was crossing west to east across Federal Blvd to catch a northbound bus. RTD bus causing visual obstructions. Pedestrian not in crosswalk area. Pedestrian walked into the path of Vehicle 2 and Vehicle 2 ran over the foot of the Pedestrian. Driver transported pedestrian to hospital. "	-	Delineators recommended to compliment the striping in the NW corner and narrow the outside lane of travel. While this could be interpreted as on street parking, it would not be recommended in the middle of the intersection.
1244	CDOT	Federal Blvd / 1-70 WB on Ramp	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(9), N(9) ; Red-Light Running: Total(6), N(3), S(3) ; Rear End: Total(12), N(6), S(5), W(1)	-	-	-
3078	CDOT	124th Ave / US-85	-	-	-	US 85 PEL	Closure of intersection with construction of DDI at 120th.	Rear End: Total(61), N(27), S(28), E(2), W(1), NW(1), SW(1) ; Red-Light Running: Total(5), S(3), W(2) ; Left Turn at Signalized Intersection: Total(2), N(2) ; Right Turn on Red: Total(1), S(1)	-	A pedestrian and bike bridge over the train tracks and 85 would be great in this location so pedestrians and bicyclist could you utilize this road going to the Adams County regional Park/ fairgrounds/ paths.	"Engagement feedback has indicated a desire for a bike/ped bridge over US 85 and the RR. Recommend triangle median islands in the meantime. Delineators recommended to tighten the right turn radii and for the striped triangle medians."
3870	Collaboration	84th Ave / Essex Dr / Washington St	-	-	-	-	-	Left Turn at Signalized Intersection: Total(3), N(2), S(1) ; Pedestrian or Bicyclist: Total(2) ; Rear End: Total(33), N(3), S(6), E(19), W(1), SW(1) ; Red-Light Running: Total(10), N(4), S(4), E(1), W(1) ; Right Turn on Red: Total(5), S(2), E(3)	"TU2 N/B WASHINGTON ST, #1 LANE WITH GREEN SIGNAL. PED1 E/B 84TH AVENUE AGAINST RED SIGNAL. PED1 DASHED FROM BEHIND VEHICLE, AND TU2 STRUCK PED1 WITH FRONT OF VEHICLE. PED 1 AIRBORNE APPROXIMATELY 54FT BEFORE COMING TO REST. TU2 MOVED OUT OF TRAFFIC. Pedestrian #1 was riding his bicycle SB on the sidewalk parallel to Washington St. approaching E 84th Ave. Traffic Unit #2 was attempting to make a WB turn from Washington St. to EB 84th Ave. P #1 claims to yield and then travels through crosswalk. TU #2 claims to look and did not see anyone before proceeding into the intersection. P #1 strikes TU #2 front to passenger side. Both parties exited the roadway prior to my arrival."	-	-
2329	CDOT	80th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(4), N(1), E(2), W(1) ; Pedestrian or Bicyclist: Total(3), W(1), SE(1) ; Rear End: Total(39), N(10), S(20), E(3), W(5) ; Red-Light Running: Total(11), N(1), S(5), E(1), W(4) ; Right Turn on Red: Total(1), E(1)	-	-	-
1218	CDOT	CO-224 / I-25 NB Ramp	-	-	-	-	-	Red-Light Running: Total(29), N(3), E(19), W(7) ; Left Turn at Signalized Intersection: Total(1), W(1) ; Rear End: Total(10), N(3), S(1), E(2), W(4) ; Right Turn on Red: Total(2), N(2)	-	-	-
1398	CDOT	120th Ave / US-85	-	-	-	-	Diverging Diamond Interchange	Left Turn at Signalized Intersection: Total(12), N(1), S(2), E(9) ; Pedestrian or Bicyclist: Total(2) ; Rear End: Total(64), N(14), S(33), E(11), W(4) ; Red-Light Running: Total(8), N(2), S(3), E(2), W(1) ; Right Turn on Red: Total(1), E(1)	-	Should not be able to turn left onto 120th Ave, a bridge over 85 would make this a much better road to use and would connect disconnected communities, a bike path through this intersection and into the commerce city bike system, there needs to be two through lanes on 120th to help with traffic volume, the train to the east of this intersection further complicates the congestion	-
3068	CDOT	104th Ave / US-85	-	-	-	US-85 PEL	-	Pedestrian or Bicyclist: Total(1) ; Rear End: Total(84), N(21), S(22), E(9), W(29), NW(1), SW(1) ; Red-Light Running: Total(13), N(3), S(3), E(4), W(3) ; Left Turn at Signalized Intersection: Total(1), N(1)	-	11 Comments - Upgrading bus platform, moving bus platform further from the roadway, congested, convert rightmost (westbound) lane into a through and right turn lane, total deathtrap, Concerns about ease of access to Belle Creek Neighborhood to the north, Fast traffic through this intersection, widen and push sidewalk further away from traffic, 7 Comments about the railroad crossing just east of this intersection.	"Enlarge triangle median islands and pull crosswalks back to make them more visible to approaching vehicles. Delineators recommended for narrowing of the right turn lane, for the striped triangle median island and to compliment the striping on the north side of 104th, east of US 85. Recommend improved signage for crosswalks in right turn lanes. Public feedback recommends opening the outside WB lane into a shared through/right lane.
1880	CDOT	54th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(4), N(1), S(3) ; Pedestrian or Bicyclist: Total(1) ; Red-Light Running: Total(3), N(1), E(1), W(1) ; Rear End: Total(15), N(4), S(9), E(1)	The pedestrian was crossing Highway 287 when the front of a vehicle traveling northbound collided with the pedestrian. The vehicle fled the scene.	-	-
480	CDOT	168th Ave / US-85	-	-	-	US-85 PEL, Weld/ Adams County Line Crossroads Alignment Study	-	Rear End: Total(52), N(20), S(23), E(6), W(3) ; Red-Light Running: Total(11), N(4), S(5), E(1), SE(1) ; Right Turn on Red: Total(3), N(1), S(1), E(1) ; Left Turn at Signalized Intersection: Total(2), S(1), E(1)	-	-	-
2976	CDOT	Brighton Rd / 104th Ave	-	-	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(29), N(11), S(14), W(2), SE(2) ; Pedestrian or Bicyclist: Total(1), N(1) ; Rear End: Total(6), E(1), W(5)	-	Should be a 4-way stop - too much traffic for a 2-way stop, speed is excessive, no bike/ped infrastructure, would be helpful to connect to the regional bike trail system in Thornton from Reunion	-
1219	CDOT	Broadway / US-36 WB Ramp	-	-	-	-	-	Left Turn at Signalized Intersection: Total(11), N(11) ; Rear End: Total(22), N(8), S(4), E(3), W(5), NE(1), SE(1) ; Red-Light Running: Total(25), N(11), S(12), W(2)	-	-	-
3017	CDOT	CO-224 / York St	-	-	-	-	Safety Improvements	Left Turn at Signalized Intersection: Total(6), N(1), S(2), E(3) ; Pedestrian or Bicyclist: Total(1), W(1) ; Rear End: Total(22), N(4), S(6), E(6), W(5), NE(1) ; Red-Light Running: Total(7), N(2), S(1), E(1), W(3)	PEDESTRIAN 1 WAS TRAVELING ON THE RIGHT SHOULDER FOG LINE OR IN LANE #2 OF WB HWY 224. VEHICLE 2'S RIGHT FRONT COLLIDED WITH PEDESTRIAN 1'S RIGHT SIDE APPROXIMATELY 227.6 EAST OF MP 1.8. VEHICLE 2 CAME TO A CONTROLLED STOP ON THE RIGHT SHOULDER OF HWY 224. PEDESTRIAN 1 WAS TRANSPORTED TO DENVER HEALTH WHERE IT WAS DETERMINED SHE HAD SUSTAINED SERIOUS BODILY INJURY.	-	This intersection needs a connection to the Clear Creek Trail and the crosswalks should not take you to a triangle median with no ADA ramps. Connectivity of the bike/ped facilities is desperately needed south of this intersection.
3782	AdCo	72nd Ave / Pecos St	-	-	-	Pecos Study	-	Left Turn at Signalized Intersection: Total(9), N(7), S(1), E(1) ; Pedestrian or Bicyclist: Total(5), N(2), E(3) ; Red-Light Running: Total(5), S(4), W(1) ; [illegible]	"TRAFFIC UNIT 2 WAS SOUTHBOUND ON N. PECOS ST. IN THE LEFT LANE APPROACHING W. 72ND AVE. TRAFFIC UNIT 1 (PEDESTRIAN) WHO WAS WEARING DARK COLORED CLOTHING WAS CROSSING N. PECOS ST. AT W. 72ND AVE. (WEST TO EAST) AGAINST A NO-CROSSING SIGNAL. TRAFFIC UNIT 2 PROCEEDED INTO THE INTERSECTION ON A GREEN LIGHT AND STRUCK THE PEDESTRIAN IN THE CROSSWALK. THE PEDESTRIAN WAS THROWN ACROSS THE INTERSECTION AND CAME TO REST NEAR THE SOUTH EDGE OF THE INTERSECTION IN THE SOUTHBOUND LANES OF N. PECOS ST. TRAFFIC UNIT 2 CONTINUED SOUTH THROUGH THE INTERSECTION. TRAFFIC UNIT 2 TURNED AROUND AND RETURNED TO THE INTERSECTION AND WAS PARKED BLOCKING THE PEDESTRIAN FROM BEING HIT BY ANY OTHER VEHICLES. Vehicle 1 was northbound Pecos Street in the left lane. The pedestrian was crossing Pecos Street westbound on the north side of the intersection with West 72nd Avenue. The front end of Vehicle 1 collided with the left side of the pedestrian. Vehicle 1 came to a controlled stop in both lanes. The pedestrian came to final rest in the left lane of norhtbound Pecos Street, north of the intersection. [illegible]"	-	Delineators recommended for bulbouts in the NE and SW corners.
1960	CDOT	64th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	[illegible]	[illegible]	-	-
1389	Collaboration	120th Ave / Peoria St	-	-	-	120th Ave Corridor Study	-	[illegible]	-	Please put in a right turn lane from Peoria onto 120th Ave. going east.	Collaboration with Commerce City and Brighton
3016	CDOT	CO-224 / 74th Ave	-	-	-	-	-	[illegible]	-	-	-
2840	CDOT	88th Ave / I-76 Service Rd	-	-	-	-	-	[illegible]	-	-	Hard to tell if you are able to go southbound off I76 ramp onto SB service road. If not, build a curb to prevent that movement and make it more clear where drivers can/should go.
1391	Collaboration	120th Ave / Quebec St	-	-	-	-	-	[illegible]	-	-	Collaboration with Thornton
2593	AdCo	96th Ave / Monaco Blvd	-	-	-	Monaco/ McKay TIP Project	-	[illegible]	-	The stop sign should be a traffic light. The traffic on 96th backs all the way back to the roundabout at HWY 76	-
2817	AdCo	84th Ave / Zuni St	X	Interim signal timing changes	-	-	-	[illegible]	[illegible]	-	"Evaluate Ped push buttons for ADA compliance. Delineators recommended for bulbout/curb extension in SE corner.
104	Collaboration	CR 19 / 168th Ave	-	-	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(1), S(1)	-	-	Collaboration with Weld County
2110	AdCo	73rd Ave / Washington St	-	-	-	-	Washington St Signal Retiming	[illegible]	-	-	-
1501	CDOT	136th Ave / US-85	-	-	-	US-85 PEL	-	[illegible] Total(56), N(32), S(17), E(1), W(6) ; Red-Light Running: Total(8), N(2), S(6)	-	-	-
1243	CDOT	Federal Blvd / I-70 EB on Ramp	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(1), S(1); Pedestrian or Bicyclist: Total(1) ; Red-Light Running: Total(5), N(3), S(1), E(1); Rear-End: Total(8), N(4), E(1), S(3)	"Traffic Unit 1 (pedestrian) was walking westbound across the northbound lanes of Highway 287 (Federal Boulevard) and the Interstate 76 on ramp into oncoming traffic and not in a cross walk. Traffic Unit 2 was traveling northbound on Highway 287 (Federal Boulevard) and the Interstate 76 on ramp in the #1 lane. The front-right corner of Traffic Unit 2 collided with Traffic Unit 1. Traffic Unit 1 struck the windshield of Traffic Unit 2 and then came to final rest in front of Traffic Unit 2. Traffic Unit 2 came to a stop facing northbound on all 4 wheels in the #1 lane.	-	-
3084	CDOT	160th Ave / Holly St	X	New traffic signal	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(14), N(11), S(3) ; Rear End: Total(3), N(2), E(1)	-	-	-
3649	CDOT	Ralston Rd / Sheridan Blvd			-	-	-	Rear End: Total(39), N(16), S(12), E(11) ; Red-Light Running: Total(8), N(1), S(3), E(3), W(1)	-	-	Appears to have very heavy truck traffic. Not sure that including peds at this intersection is safe. Consider mid-block crossings elsewhere.
3034	CDOT	Dahlia St / Frontage Rd	X	Converted to all way stop	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(40), N(1), S(1), E(8), W(28), NE(1), SW(1) ; Pedestrian or Bicyclist: Total(2), S(2) ; Rear End: Total(5), N(2), E(1), W(2)	VEHICLE #1 WAS TRAVELING SOUTHBOUND ON DAHLIA STREET NEAR INTERSTATE 76TH FRONTAGE ROAD. PEDESTRIAN #1 WAS TRAVELING SOUTHBOUND ON DAHLIA STREET NEAR INTERSTATE 76TH FRONTAGE ROAD. VEHICLE #1 COLLIDED ITS RIGHT SIDE MIRROR INTO PEDESTRIAN #1S LEFT ARM. VEHICLE #1 AND PEDESTRIAN #1 WERE MOVED PRIOR TO ME ARRIVING ON SCENE.	-	-
2509	CDOT	Cottonwood Dr / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(6), N(3), S(3) ; Pedestrian or Bicyclist: Total(2), E(1), W(1) ; Rear End: Total(25), N(13), S(9), E(1), W(1), NW(1) ; Red-Light Running: Total(18), N(7), S(5), W(6)	VEHICLE #1 WAS WESTBOUND ON COTTONWOOD DRIVE, APPROACHING A RED LIGHT AT FEDERAL BLVD. TRAFFIC UNIT #2 (BICYCLE) WAS SOUTHBOUND ON THE SIDEWALK APPROACHING THE CROSSWALK. THE DRIVER OF VEHICLE #1 DID NOT OBSERVE THE BICYCLE RIDER AND BEGAN ITS TURN ONTO FEDERAL BLVD; VEHICLE #1 THEN COLLIDED WITH THE BICYCLE IN THE CROSSWALK. VEHICLE #1 WAS MOVED TO THE PARKING LOT WITH NO DAMAGE. THE BICYCLE WAS MOVED TO THE SIDEWALK.	-	Recommend improved signage for crosswalks in right turn lanes.
2699	AdCo	Del Norte St / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Left Turn at Signalized Intersection: Total(6), N(1), S(5) ; Red-Light Running: Total(9), N(3), S(3), W(3) ; Rear End: Total(16), N(8), S(7), W(1)	-	-	Delineators recommended mostly for the SW corner of the intersection where the SB outside lane is quite wide.
3081	CDOT	160th Ave / Riverdale Rd	-	-	-	CO-7 BRT	-	Broadside or Left-Turn at Unsignalized Intersection: Total(8), N(8) ; Rear End: Total(6), N(2), E(3), W(1)	-	-	-
1961	AdCo	64th Ave / Lowell Blvd	-	-	-	-	Signal Retiming with dedicated left turn phasing	Left Turn at Signalized Intersection: Total(6), N(5), E(1) ; Red-Light Running: Total(10), N(1), S(2), E(5), W(2) ; Rear End: Total(7), N(4), E(1), W(2) ; Right Turn on Red: Total(2), N(1), E(1)	-	-	Extend curb in southeast corner to narrow through lane.
717	CDOT	67th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Red-Light Running: Total(4), N(1), E(1), W(2) ; Left Turn at Signalized Intersection: Total(1), N(1) ; Rear End: Total(1), N(1)	-	-	-
3712	AdCo	70th Ave / Pecos St / Samuel Dr	-	-	X	Pecos Study, 70th Ave CIP Project	-	Pedestrian or Bicyclist: Total(1), N(1) ; Red-Light Running: Total(3), S(1), W(2) ; Left Turn at Signalized Intersection: Total(1), S(1) ; Rear End: Total(14), N(6), S(3), E(2), W(1) ; Right Turn on Red: Total(1), W(1)	VEHICLE #1 AND #2 WERE BICYCLES TRAVELING NORTH ON PECOS STREET IN THE SOUTHBOUND LANES JUST SOUTH OF SAMUEL DRIVE. VEHICLE #3 WAS STOPPED AT THE RED LIGHT TRAVELING EAST ON SAMUEL DRIVE JUST WEST OF PECOS STREET. VEHICLE #3 PROCEEDED TO TURN RIGHT ON PECOS STREET AFTER CLEARING THE INTERSECTION. VEHICLE #3 COLLIDED ITS FRONT WITH VEHICLE #1 AND #2. ALL THREE VEHICLES CAME TO REST NEAR POINT OF IMPACT.	-	Delineators recommended to tighten the turn radii and narrow the EB receiving lane on 70th Ave.
1918	AdCo	58th Ave / Washington St	-	-	-	-	Washington St Signal Retiming	Pedestrian or Bicyclist: Total(1), E(1) ; Red-Light Running: Total(4), N(1), S(2), W(1) ; Left Turn at Signalized Intersection: Total(2), S(2) ; Rear End: Total(14), N(1), S(9), E(3), W(1)	Vehicle 1 was traveling Eastbound on 58th Avenue near Washington Street. Pedestrian 1 was conducting traffic control on the Eastside of the intersection at 58th Avenue and Washington Street. Vehicle 1 began turning Northbound onto Washington Street. The front of Vehicle 1 struck Pedestrian 1. Pedestrian 1 remained on scene. Vehicle 1 continued Northbound. Vehicle 1 returned to the scene of the crash after his phone number was obtained through the Colorado Information Analysis Center.	-	"Striping in this intersection is so bad that in some cases there are no lines. Upgraded striping should be a priority. Delineators recommended for the striped triangle median island. "
1504	AdCo	136th Ave / Riverdale Rd	X	Oversized double sided stop signs with reflective post strips.	-	-	-	Total: 16; 2 fatal, 6 A, 2 B, 5 alcohol involved, 14 dark unlit, 14 fixed object	-	It would be great to have bike lanes/paths to connect Thornton north of 120th with Riverdale Regional Park and access to the Platte River Trail.	-
4000	CDOT	CO-224 / I-25 SB Ramp	-	-	-	-	-	Left Turn at Signalized Intersection: Total(1), E(1) ; Rear End: Total(3), S(1), E(2) ; Red-Light Running: Total(2), N(1), W(1)	-	-	-
906	AdCo	55th Ave / Pecos St	X	Raised median, left turn lanes, additional lane in each direction	-	-	-	Rear End: Total(7), N(3), S(4) ; Red-Light Running: Total(1), N(1)	-	-	-
526	CDOT	74th Ave / I-76 EB off Ramp	-	-	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(28), N(24), E(1), NE(2), NW(1)	-	-	-
1944	AdCo	62nd Pkwy / Pecos St	X	New signal		Pecos Study	-	Broadside or Left-Turn at Unsignalized Intersection: Total(5), S(3), W(2) ; Rear End: Total(3), S(1), W(2)	-	-	-
524	CDOT	65th Pl / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Pedestrian or Bicyclist: Total(3), W(1) ; Broadside or Left-Turn at Unsignalized Intersection: Total(1), S(1) ; Rear End: Total(7), N(3), S(3)	"PEDESTRIAN #1 WAS CROSSING HIGHWAY 287 (FEDERAL BLVD) FROM EAST TO WEST. TRAFFIC UNIT #2 WAS NORTHBOUND ON HIGHWAY 287 (FEDERAL BLVD) IN THE LEFT LANE. PEDESTRIAN #1 COLLIDED WITH TRAFFIC UNIT #2 RIGHT SIDE. PEDESTRIAN #1 WAS MOVED FROM FINAL REST PRIOR TO INVESTIGATION. TRAFFIC UNIT #2 WAS MOVED FROM FINAL REST PRIOR TO INVESTIGATION. Vehicle #1 was traveling northbound on Highway 287 towards W. 65th Pl. Pedestrian #1 was walking northbound Highway 287 towards W. 65th Pl. Pedestrian #1 attempted to cross Highway 287 where there is no crosswalk. Vehicle #1 collided its front to the side of Pedestrian #1. Pedestrian #1 was moved from final rest. Vehicle #1 moved from final rest. Traffic unit 1, a pedestrian was on foot crossing Federal Blvd. near Longfellow Pl. in an eastbound direction, not in a designated crosswalk. Vehicle 2 was southbound on Federal Blvd. in the number 1 lane. Vehicle 2 collided with Traffic unit 1. Vehicle 2 fled the scene. Traffic unit 1 came to rest in the southbound number 1 lane."	-	-
1191	CDOT	144th Ave / US-85	-	-	-	US-85 PEL	-	Broadside or Left-Turn at Unsignalized Intersection: Total(2), E(1), W(1) ; Rear End: Total(10), N(6), S(1), W(2), NW(1)	-	-	-
2066	CDOT	72nd Ave / Vasquez Blvd	-	-	-	-	-	Left Turn at Signalized Intersection: Total(9), N(2), S(3), E(2), W(2) ; Pedestrian or Bicyclist: Total(1) ; Rear End: Total(40), N(13), S(13), E(1), W(13) ; Red-Light Running: Total(15), N(1), S(6), E(7), W(1) ; Right Turn on Red: Total(1), N(1)	-	Dangerous biking conditions, Lack of bike lanes	Engagement feedback indicates a desire for a bike lane here.
3793	Collaboration	Buckley Rd / 120th Ave	-	-	X	-	Commerce City: Intersection improvments and new Southbound right turn lane	6 approach turn, 3 broadside, 2 overtaking, 17 rear end, 1 sideswipe opposite direction, 3 sideswipe same direction, 1 traffic signal pole or equipment, 1A crash, 1 rain, 1 snow/sleet/hail	-	This intersection has serious traffic and safety issues. There's heavy congestion, especially with no turn lanes on Buckley southbound and missing turn signals for northbound traffic. People speed and run red lights, making it dangerous. Walking and biking are not safe or accessible in the area due to the lack of infrastructure.	This intersection needs a signal upgrade to allow for dedicated left turn phasing, particularly for the NB and SB approaches. Collaboration with Commerce City
3533	AdCo	Elmwood Ln / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Pedestrian or Bicyclist: Total(1), W(1) ; Red-Light Running: Total(4), N(1), S(2), W(1) ; Left Turn at Signalized Intersection: Total(2), S(2) ; Rear End: Total(3), S(3)	VEHICLE #1 WESTBOUND ELMWOOD LANE MAKING A LEFT ONTO SOUTHBOUND PECOS STREET. PEDESTRIAN IN THE CROSSWALK ON THE WEST SIDE OF PECOS STREET. VEHICLE #1 ACCELERATING THROUGH THE TURN COLLIDED WITH THE PEDESTRIAN. PEDESTRIAN LANDED ON THE HOOD AND WINDSHIELD OF VEHICLE #1. DRIVER OF VEHICLE #1 SLAMMING ON HIS BRAKES LAUNCHED PEDESTRIAN INTO THE ROADWAY. VEHICLE #1 MOVED FROM FINAL REST. PEDESTRIAN AT FINAL REST IN THE RIGHT LANE OF SOUTHBOUND PECOS STREET.	-	Delineators recommended for bulbouts/curb extensions in all 4 corners.
2303	CDOT	Colorado Blvd / 160th Ave	-	-	-	CO-7 BRT	-	Left Turn at Signalized Intersection: Total(13), S(1), E(11), W(1) ; Pedestrian or Bicyclist: Total(1) ; Red-Light Running: Total(7), N(4), E(3) ; Rear End: Total(10), E(7), W(2)	TU1 was on a bicycle north bound on the south bound side of the roadway on Colorado Blvd approaching E 160th Ave on a red light. TU2 was east bound on E 160th Ave approaching Colorado Blvd on a green light. For unknown reason TU1 failed to stop for the red light. TU1 collided with the front passenger corner of TU2. TU2 swerved to the left in an attempt to avoid TU1 and drove off the left side of the roadway. TU1 bicycle came lodged under TU2. Rider TU1 was ejected and came to rest on the south east corner of the intersection.	-	-
3742	AdCo	76th Ave / El Paso Blvd / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Left Turn at Signalized Intersection: Total(4), N(4) ; Pedestrian or Bicyclist: Total(1), S(1) ; Red-Light Running: Total(7), N(2), S(4), W(1) ; Rear End: Total(12), N(4), S(5), E(2), W(1)	VEHICLE #1 WAS TRAVELING WEST BOUND ON EL PASO BLVD AT PECOS ST IN THE LEFT TURN LANE. THE PEDESTRIAN WAS RIDING A BICYCLE EAST BOUND IN THE CROSSWALK ON PECOS ST AT EL PASO BLVD. VEHICLE #1 ATTEMPTED TO MAKE A LEFT TURN ONTO SOUTH BOUND PECOS ST AND FRONT END COLLIDED WITH THE PEDESTRIAN. VEHICLE #1 WAS DRIVEN FROM FINAL REST. THE PEDESTRIAN WALKED FROM FINAL REST.	-	Delineators recommended for bulbouts/curb extensions on all corners.
3920	Collaboration	CR 45 / 168th Ave / Hayesmount Rd	X	Flashing beacons and LED bordered stop signs	X	Weld/ Adams County Line Crossroads Alignment Study	Near term AWSC, long term roundabout	Broadside or Left-Turn at Unsignalized Intersection: Total(10), E(7), W(3) ; Pedestrian or Bicyclist: Total(1) ; Rear End: Total(1), E(1)	Vehicle 1 (bicycle) was travelling east on 168th Avenue approaching Hayesmount Road. Vehicle 2 was travelling south on Hayesmount Road and 168th Avenue. Driver 1 failed to stop at stop sign and travelled into the intersection. Vehicle 1's front collided with Vehicle 2's front passenger side. Driver 1 was ejected and collided with Vehicle 2's passenger side windshield. Vehicle 1 was moved prior to my arrival, Driver 1 was transported. Vehicle 2 came to a controlled stop on the right shoulder, facing south on all four wheels.	-	Collaboration with Weld County
321	CDOT	60th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Pedestrian or Bicyclist: Total(1), S(1) ; Red-Light Running: Total(3), N(2), S(1) ; Left Turn at Signalized Intersection: Total(2), S(2) ; Rear End: Total(10), N(7), S(3)	TRAFFIC UNIT #1, WAS SOUTHBOUND ON HIGHWAY 287 (FEDERAL BOULEVARD) IN THE LEFT LANE. TRAFFIC UNIT #2, A PEDESTRIAN, WAS CROSSING FEDERAL BOULEVARD FROM THE WEST TO THE EAST IN THE CROSSWALK AT 60TH AVENUE. THE FRONT OF TRAFFIC UNIT #1 COLLIDED WITH TRAFFIC UNIT #2 IN THE CROSSWALK. TRAFFIC UNIT #1 FLED THE SCENE TRAVELING SOUTHBOUND ON FEDERAL BOULEVARD. TRAFFIC UNIT #2 CAME TO REST IN THE LEFT LANE OF FEDERAL BOULEVARD IN THE INTERSECTION.	Sidewalks along Federal are either missing or in disrepair, making it incredibly uncomfortable to travel by bike or foot along this corridor to the train and bus station.	-
2064	CDOT	70th Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Left Turn at Signalized Intersection: Total(3), S(3) ; Pedestrian or Bicyclist: Total(1), S(1) ; Red-Light Running: Total(10), N(9), E(1) ; Rear End: Total(11), N(6), S(4), E(1)	TRAFFIC UNIT #1 WAS SOUTHBOUND FEDERAL BLVD IN THE RIGHT THROUGH LANE, FAILED TO STOP FOR A RED LIGHT AT 70TH AVE AND COLLIDED WITH TRAFFIC UNIT # 2 (PEDESTRIAN), WHICH WAS WALKING WESTBOUND IN THE NORTH CROSSWALK. AFTER THE COLLISION, TRAFFIC UNIT #2 WAS THROWN APPROXIMATELY 82 FEET INTO THE 4 WHEEL TRAFFIC UNIT #1 FLED THE SCENE.	-	-
198	CDOT	70th Ave / Broadway	-	-	-	-	-	Left Turn at Signalized Intersection: Total(6), N(2), E(1), W(3) ; Red-Light Running: Total(11), N(1), S(5), E(4), W(1) ; Rear End: Total(17), N(3), S(5), E(5), W(4)	-	-	-
1238	CDOT	Sheridan Blvd / I-70 EB on Ramp	-	-	-	-	-	Red-Light Running: Total(9), N(2), S(3), E(4) ; Left Turn at Signalized Intersection: Total(1), N(1) ; Rear End: Total(9), N(6), S(3)	-	Poor Lighting	-
1916	AdCo	58th Ave / Logan Ct	X	Signal Coordination	-	-	-	Pedestrian or Bicyclist: Total(1), N(1) ; Red-Light Running: Total(3), N(1), E(2) ; Left Turn at Signalized Intersection: Total(1), N(1) ; Rear End: Total(17), N(1), E(9), W(7)	VEHICLE #1 WAS NORTHBOUND ON LOGAN COURT TURNING LEFT ONTO 58TH AVENUE. A PEDESTRIAN WAS TRAVELING NORTH TO SOUTH IN THE CROSSWALK. VEHICLE #1 FAILED TO YIELD AND STRUCK THE PEDESTRIAN WITH ITS FRONT END KNOCKING THE PEDESTRIAN DOWN HITTING HER HEAD IN THE PROCESS. VEHICLE #1 MOVED TO THE SHOULDER WITH NO DAMAGE. THE PEDESTRIAN WAS ABLE TO WALK ON HER OWN VOLITION AND MOVED TO THE SIDEWALK.	-	Delineators recommended for tightening of turn radii on south side of intersection.
3047	CDOT	Denver St / Frontage Rd / US-85	-	-	-	US-85 PEL	-	Broadside or Left-Turn at Unsignalized Intersection: Total(9), N(2), S(4), E(3) ; Rear End: Total(4), N(3), S(1)	-	-	-
2864	CDOT	88th Ave / Kiowa-Bennett Rd	-	-	-	-	-	Broadside or Left-Turn at Unsignalized Intersection: Total(6), E(2), W(4) ; Rear End: Total(2), N(1), S(1)	-	-	-
3679	CDOT	Sheridan Blvd / 52nd Ave	-	-	-	Sheridan Blvd Corridor Study	-	Left Turn at Signalized Intersection: Total(4), S(1), E(2), W(1) ; Pedestrian or Bicyclist: Total(1), E(1) ; Rear End: Total(20), N(14), S(3), E(1), W(2) ; Red-Light Running: Total(3), N(1), S(2)	VEHICLE 1 WAS TRAVELING EASTBOUND ON WEST 52ND AVENUE AT HIGHWAY 95. VEHICLE 2 WAS TRAVELING NORTHBOUND ON HIGHWAY 95 AT W. 52ND AVE IN THE NUMBER 2 LANE. VEHICLE 1 CROSSED HIGHWAY 95 AT W. 52ND AVE. VEHICLE 2 WAS TRAVELING THROUGH THE INTERSECTION. VEHICLE 1 WENT THROUGH THE RED LIGHT AND VEHICLE 2 COLLIDED ITS FRONT WITH THE REAR TIRE OF VEHICLE 1. BOTH VEHICLES MOVED PRIOR TO INVESTIGATION.	-	-
3722	AdCo	78th Ave / York St	X	New signal and timings	-	-	-	Left Turn at Signalized Intersection: Total(3), N(2), E(1) ; Red-Light Running: Total(4), N(2), S(1), E(1) ; Rear End: Total(3), N(1), S(2) ; Right Turn on Red: Total(1), N(1)	-	-	-
1963	AdCo	64th Ave N / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Left Turn at Signalized Intersection: Total(1), N(1) ; Rear End: Total(4), N(1), S(2), E(1) ; Red-Light Running: Total(2), S(2)	-	-	Delineators recommended for the NW corner, to better define the space.
1249	Collaboration	100th Ave / McKay Rd	-	-	-	-	Design effort for McKay from north of this intersection down to 96th Ave	Pedestrian or Bicyclist: Total(1), E(1) ; Left Turn at Signalized Intersection: Total(2), N(2) ; Rear End: Total(2), S(2) ; Right Turn on Red: Total(1), E(1)	UNIT #1 BICYCLE EASTBOUND ON 100TH AVENUE INTO INTERSECTION WITH MCKAY ROAD AGAINST RED SIGNAL LIGHT. LEFT SIDE UNIT #1 STRUCK BY FRONT END UNIT #2 AS UNIT #2 SOUTHBOUND MCKAY ROAD INTO INTERSECTION ON GREEN SIGNAL LIGHT. POST IMPACT UNIT #1 DRIVER EJECTED FROM BICYCLE COMING TO REST SOUTH OF INTERSECTION WEST SIDE OF ROADWAY. UNIT #1 COMING TO REST IN FIELD OFF WEST SIDE OF MCKAY ROAD SOUTH OF INTERSECTION . UNIT #2 COMING TO STOP SOUTHBOUND MCKAY ROAD ON ROADWAY SOUTH OF INTERSECTION.	-	Collaboration with Thornton
1215	Collaboration	Huron St / 148th Ave	-	-	-	-	-	Left Turn at Signalized Intersection: Total(10), S(10) ; Rear End: Total(1), S(1) ; Red-Light Running: Total(2), N(2)	-	-	Collaboration with Westminster
3086	CDOT	160th Ave / Quebec St	-	-	-	CO-7 BRT	-	Rear End: Total(15), E(10), W(4) ; Red-Light Running: Total(2), E(1), W(1) ;	-	-	-
1377	AdCo	Brighton Rd / 120th Pkwy	X	Failed detection was replaced	-	-	-	3 approach turn, 8 broadside, 4 rear end, 1 sideswipe same direction, 1 wild animal, 1K crash, 1A crash, 1B crash, 1fog/smog/smoke	-	This intersection needs safety upgrades. A turn signal and adjusted signal timing on Brighton are needed. People frequently run red lights, and there have been many crashes in recent years. A turn lane on Brighton Rd would also help improve traffic flow and safety.	-
1946	CDOT	63rd Ave / Federal Blvd	-	-	-	Federal Blvd BRT Study	-	Rear End: Total(6), N(4), S(2)	-	-	-
1982	AdCo	64th Ave S / Pecos St	-	-	-	Pecos Study	Pecos Signal Retiming	Left Turn at Signalized Intersection: Total(1), N(1) ; Rear End: Total(8), N(6), S(1), W(1) ; Red-Light Running: Total(1), N(1) ; Right Turn on Red: Total(1), E(1)	-	-	-
3121	CDOT	74th Ave / Vasquez Blvd	-	-	-	-	-	Rear End: Total(22), N(5), S(9), E(7), W(1) ; Red Light Running: Total(1), E(1) ; Right Turn on Red: Total(1), E(1)	-	Horrible backups headed east in evenings	The raised median completely blocks the crosswalk on the west leg.
1221	CDOT	160th Ave / I-25 NB on Ramp	-	-	-	-	-	Left Turn at Signalized Intersection: Total(6), E(2), W(4) ; Red-Light Running: Total(10), N(1), S(1), E(7), W(1) ; Rear End: Total(5), N(1), E(4)	-	-	-

*Crash data that informed these recommendations went through 2022. Some or all of these concerns may have been addressed with the recent improvement project. Follow up analysis should be conducted prior to implementing any additional countermeasures.

Top Rural Segments and Associated Countermeasures

Location ID	Responsible Agency	Rural Segment Name and Span	Recent Improvements Completed*	Recent Improvement Details	Included in a Capital Improvement Plan	Previous Planning Effort Completed	Planned Improvements (outside of Planning Studies)	Crash Profiles	Bike/Ped Summary	Engagement Feedback	Notes	AdCo Comments
1134993_0.00_1.19	Collaboration	88th Ave from Dahlia St to I-76	-	-	-	-	-	Total (157); Approach Turn (14); Broadside (24); Fixed Object (22); Head On (6); Overtaking Turn (3); Overturning (5); Pedestrian (3); Rear End (47); Sidswipe Opposite (5); Sideswipe Same(28);	350091 - Hit and Run, No associated data ;	Exit backs up often during rush hour leading to backups on 76	-	-
44_2.75_3.67	CDOT	104th Ave from McKay Rd to South Platte River	-	-	-	-	-	Total (91); Approach Turn (5); Broadside (7); Head On (5); Rear End (62); Sideswipe Same Direction (4); Fixed Object (7)	-	-	-	-
1135762_0.00_0.83	AdCo	Monaco St from Brighton Rd to 96th Ave	X	Signage and Striping for the curve	-	-	-	Total (62); Approach Turn (13); Broadside (6); Head On (5); Rear End (18); Sideswipe Same Direction (6); Fixed Object (5);Overturning (3); Overtaking Turn (5); Weather (3)	-	-	-	Experimenting with putting "curve ahead" or "slow" pavement markings down near the curve.
1135096_0.00_1.38	AdCo	Dahlia St from 88th Ave to I-76	-	-	-	-	-	Total (108); Approach Turn (9); Broadside (43); Head On (4); Rear End (28); Sideswipe Same Direction (5); Sideswipe Opposite Direction (3); Fixed Object (11);Overturning (3); Overtaking Turn (5); Bike/Ped (2); Weather (12)	350091 - Hit and Run, No associated data ; 242274 - VEHICLE #1 WAS TRAVELING SOUTHBOUND ON DAHLIA STREET NEAR INTERSTATE 76TH FRONTAGE ROAD. PEDESTRIAN #1 WAS TRAVELING SOUTHBOUND ON DAHLIA STREET NEAR INTERSTATE 76TH FRONTAGE ROAD. VEHICLE #1 COLLIDED ITS RIGHT SIDE MIRROR INTO PEDESTRIAN #1S LEFT ARM. VEHICLE #1 AND PEDESTRIAN #1 WERE MOVED PRIOR TO ME ARRIVING ON SCENE.	Congestion makes Dahlia and the Frontage road intersection unusable during rush hour. Perhaps it needs a light to clear out traffic here.	-	-
1132880_0.13_0.64	AdCo	144th Ave from Potomac St to Sable Rd	-	-	-	Sable Blvd Plan	Widening and reconstructing the intersection of 144th and Sable Blvd.	Total (49); Approach Turn (3); Broadside (33); Fixed Object (3); Rear End (7); Weather (4)	-	-	Most of the crashes on this segment occurred at the intersection with Sable.	Owned by Adams, maintained by Brighton. This segment may be affected by the intersection with Sable, which will follow Brighton's Sable Blvd design effort. https://brightonco.gov/CivicAlerts.aspx?AID=2740&ARC=4349 . This is only in design now, no construction funding identified
7_70.32_70.87	CDOT	160th Ave from Colorado Blvd to 2,700 feet west	X	Resurfacing Completed in 2024/2025	-	CO-7 BRT	-	Total(44); Approach Turn (14); Broadside (7); Rear End(15); Sideswipe Same Direction (4); Fixed Object (3)	-	-	-	-
1135914_0.32_1.28	AdCo	Buckley Rd from Cameron Dr to 120th Ave	-	-	-	-	-	Total (24); Head On (5); Rear End (7); Sideswipe Opposite (3); Fixed Object (7); Weather (10)	-	-	Consider centerline rumble strips and restriping to make the add lane a left turn lane for Cameron Drive.	-
1135606_0.07_1.29	AdCo	Riverdale Rd from 136th Ave to 138th Pl	-	-	X	-	Add 2' shoulder, rumble strips, signing, striping, and guardrail from Yosemite to 160th Ave in 2028/2029.	Total (23); Fixed Object (17); Overturning (5)	-	It would be great to have bike lanes/paths to connect Thornton north of 120th with Riverdale Regional Park and access to the Platte River Trail.	-	-
7_72.87_73.43	CDOT	160th Ave from Quebec St to Ulster St	X	Resurfacing Completed in 2024/2025	-	CO-7 BRT	-	Total(33); Head On (4); Rear End (18); Broadside (3)	-	-	-	-
1133665_1.99_2.99	Collaboration	168th Ave from CR 19 to CR 21	-	-	-	Weld/Adams County Line Crossroads Alignment Study	Realign the portion of Yosemite with an S-curve to meet the Weld County portion of Yosemite. Roundabout at 168th Ave.	Total (20); Fixed Object (15); Weather (4)	-	-	This road is in very poor condition and needs to be repaved.	-
85_236.01_236.72	CDOT/ Collaboration	US-85 from 168th Ave to north of CR 2 1/2	-	-	-	US-85 PEL	-	Total(145); Approach Turn (7); Broadside (18); Fixed Object (20); Sideswipe Same Direction (22); Rear End (68)	-	Intersection of 85 and 168th : The light for the left turn lane that goes to 168th quits working often. I have sat at that light for more than 10 light cycles watching every turning lane but that one get a green arrow. It is very dangerous to try to exit that lane when it is not working. ; The roundabouts are death traps during rush hour, they're unsafe with the high volumes of traffic they see.	-	-
1135604_0.53_1.21	AdCo	Riverdale Rd from 112th Ave to Quebec St	-	-	-		-	Total (17); Fixed Object (10);Rear End (2) Overturning (2) Broadside (2) Weather (2)	-	Difficult intersection (112th and Riverdale). Cars on Riverdale always speeding, difficult to see oncoming cars. Narrow passage. Generally difficult for bikers ; Pre-school traffic -congestion	-	-
85_233.10_234.17	CDOT/ Collaboration	US-85 from 144th Ave to Bromley Ln	-	-	-	US-85 PEL	-	Total(192); Approach Turn (6); Broadside (5); Fixed Object (18); Overturning (5); Rear End (115); Bike/Ped (3); Sideswipe Opposite (3); Sideswipe Same (26);	162385 - Right turn into ped;	Intersection of US 85 and Bromley Ln : Needs bike lanes and longer light cycles to allow for cyclists to cross before being pushed through the intersection by cars and trucks. ; no merge lane for turning traffic that does not yeild.	Consider signalizing the channelized right turn lanes.	-
7_75.39_75.96	CDOT	160th Ave from Lima St to Riverdale Rd	X	Resurfacing Completedd in 2024/2025	-	CO-7 BRT	-	Total (27); Broadside (9); Fixed Object (7); Rear End (8)	-	-	-	-
1133665_0.98_1.99	Collaboration	168th Ave from CR 17 to CR 19	-	-	-	Weld/Adams County Line Crossroads Alignment Study	Realign the portion of Yosemite with an S-curve to meet the Weld County portion of Yosemite. Roundabout at 168th.	Total (24); Fixed Object (17)	-	-	This road is in very poor condition and needs to be repaved.	168th and Quebec has a planning document stating realignment (https://adcogov.org/sites/default/files/482_0.pdf)
36_79.45_80.80	CDOT	Colfax Ave from Denver Ave to Imboden Rd	-	-	-	-	-	Total (27); Broadside (10); Fixed Object (8); Rear End (3); Overturning (5); Overtaking Turn (4);Head On (3)	-	-	-	-
1135601_0.50_1.47	AdCo	Colorado Blvd from 168th Ave to 160th Ave	-	-	X	-	Thornton: New signal in 2027/2028 at 168th and Colorado	Total (60); Approach Turn (13); Broadside (17); Fixed Object (8); Rear End (17); Weather (6)	-	-	-	-
1135606_1.64_4.41	AdCo	Riverdale Rd from 160th Ave to E-470	-	-	X	-	Add 2' shoulder, rumble strips, signing, striping, and guardrail from Yosemite to 160th Ave in 2028/2029.	Total (47); Broadside (9); Fixed Object (20); Rear End (5); Overturning (9); Weather (2)	-	-	-	-
1131953_4.98_6.97	AdCo	Imboden Rd from 104th Ave to 120th Ave	-	-		-	-	Total (11); Fixed Object (2);Overturning (6); Weather (1)	-	-	-	-
1131953_6.97_7.97	AdCo	Imboden Rd from 120th Ave to 128th Ave	-	-	X	-	-	Total (10); Overturning (8); Weather (0)	-	-	Recommendation to pave this road with shoulders, safety edge, wide stripes and rumble strips. In the interim, perform routine grading and soil stabilization techniques.	Adams County may (very big may) be building out this roadway between now and 2030 using fuel impact enterprise funding.
1135600_0.29_0.97	AdCo	Colorado Blvd from 146th Ave to 151st Ave	-	-	-	-	-	Total (10); Fixed Object (7); Weather (0)	-	-	-	-
1133665_0.00_0.98	AdCo	168th Ave from west of Holly St to CR 17	-	-	-	Weld/Adams County Line Crossroads Alignment Study	-	Total (10); Fixed Object(2); Head On (2); Broadside (2); Overturning (2); Weather (3)	-	-	-	-
1132694_1.07_2.70	AdCo	Old Victory Rd from Provost Rd to US-36	X	Resurfacing in 2025	X	-	Realign the horizontal S-curve north of US 36. Design in 2027 and construction in 2028/2029.	Total (16); Fixed Object (5);Overturning (11); Weather (1)	-	-	-	-
1135817_0.34_1.86	AdCo	Brighton Rd from 126th Ave to E-470	-	-	-	-	-	Total (8); Sideswipe Same Direction (3); Fixed Object (2)	-	-	-	-
1135936_1.00_2.02	AdCo	Picadilly Rd from 120th Ave to 128th Ave	X	Repaving in 2024	-	-	-	Total (8); Fixed Object (4)	-	-	-	-

Location ID	Signal Timing						Speed Management				Visibility			Bicycle and Pedestrian Improvements						Geometry								Segment Improvements							Intersection Improvements							Countywide Improvements			
	Leading Pedestrian Interval (LPI)	Prohibit Right Turn on Red	Red Protection/ Decision Zone Detection	Appropriate Left Turn Signal Operation	Evaluate Cycle Length	Evaluate the "Walk" Phase	Identify target speed and countermeasures needed for compliance	Speed Feedback Signs	Traffic Calming	Transverse Rumble Strips / Pavement Markings	Remove Obstacles that Impair Sight Lines	Improve Signal Visibility	Advanced Warning Signage	New or Upgraded Pedestrian Crossing	Shorten Pedestrian Crossing Distance	New or Upgraded Bike Facility	New or Upgraded Sidewalks	Raised Median (or Pedestrian Refuge Median)	Evaluate Bus Stop Placement	Positive Left Turn Offsets	Dedicated Turn Lanes	Tighten the Turn Radius	Convert Full Movement Access to RIRO or 3/4 Movement	Remove or Offset Right Turn Lane to Increase Visibility	Roadside Design Improvements at Curves	Enhanced Curve Delineation	Increase Shoulder Width	Remove or Consolidate Access Points	No-Passing Zone	Wider Edge Lines	Raised Pavement Markers or Rumble Strips	High Friction Surface Treatment	Lane Narrowing	SafetyEdge	Roundabout	Double Post / Oversized Stop Sign	All-Way Stop or Signal	Hardened Centerline	Stop Bars	Intersection Conflict Warning Systems	Red Light Cameras	Regular Maintenance of Crosswalks	Evaluate Yellow and All-Red Change Intervals	Backplates with Retroreflective Borders	Regular Maintenance of Faded Signage / Striping on Major Roads
1134993_0.00_1.19			X	X			X			X		X	X				X	X	X				X		X	X				X			X	X		X	X		X			X	X	X	X
44_2.75_3.67		X	X	X									X														X			X	X			X							X			X	
1135762_0.00_0.83													X								X						X	X	X	X	X			X	X	X	X		X	X					X
1135096_0.00_1.38	X		X	X									X				X										X		X	X	X	X		X	X	X	X					X	X	X	X
1132880_0.13_0.64			X	X									X								X						X			X	X			X	X		X			X			X	X	X
7_70.32_70.87		X	X	X			X						X			X	X				X									X	X			X	X				X		X			X	X
1135914_0.32_1.28											X		X								X						X		X	X	X	X		X						X					X
1135606_0.07_1.29							X						X												X	X	X			X	X			X											X
7_72.87_73.43		X	X				X						X			X	X													X	X			X					X		X				X
1133665_1.99_2.99																											X			X	X			X	X										X
85_236.01_236.72		X	X										X							X	X	X	X				X			X	X			X	X				X				X		
1135604_0.53_1.21							X	X	X	X	X		X			X									X	X	X			X				X	X		X		X	X					X
85_233.10_234.17	X	X	X	X	X	X							X	X	X	X						X	X	X			X			X	X			X					X			X	X		
7_75.39_75.96							X						X			X	X						X	X						X	X			X		X		X	X						X
1133665_0.98_1.99																											X			X	X			X	X										X
36_79.45_80.80							X						X														X	X	X	X	X			X	X	X	X	X	X						X
1135601_0.50_1.47			X	X			X			X		X	X								X						X			X	X	X		X	X		X		X				X	X	X
1135606_1.64_4.41										X			X												X	X	X			X	X			X		X	X		X						X
1131953_4.98_6.97													X														X		X	X	X			X											X
1131953_6.97_7.97																																													
1135600_0.29_0.97													X												X	X	X		X	X	X			X											X
1133665_0.00_0.98													X														X			X				X					X						X
1132694_1.07_2.70										X															X	X	X		X	X	X			X											X
1135817_0.34_1.86													X														X			X	X			X											
1135936_1.00_2.02																											X			X	X			X											X

Crash data that informed these recommendations went through 2022. Some or all of these concerns may have been addressed with the recent improvement project. Follow up analysis should be conducted prior to implementing any additional countermeasures.

Top Corridors and Associated Countermeasures

Responsible Agency	Corridor Name and Span	Corridor Type	Recent Improvements Completed*	Recent Improvement Details	Included in a Capital Improvement Plan	Previous Planning Effort Completed	Planned Improvements (outside of Planning Studies)	Engagement Feedback	AdCo Comments
CDOT	Sheridan Blvd from south of 52nd Ave to north of Ralston Rd	Speed Management	-	-	-	Sheridan Blvd Corridor Study	-	(3) No sidewalks or bike lanes, speeding vehicles, don't feel comfortable walking pets along Sheridan, Lighting needs to be improved	-
AdCo	Pecos St from north of 84th Ave to I-76	Access Management Speed Management	-	-	-	Pecos Study	-	(1) This strip of Pecos between 72nd and the 36 on ramp is troublesome. There are a lot of people that make what I will call 'questionable' left turns out of the businesses on either side of the street. This is compounded by a large number of people jaywalking. (1) Intersection Related - people crossing near intersection not at it	-
Collaboration	84th Ave from Huron St to Zuni St	Access Management Speed Management	-	-	-	-	-	(1) Another big hill with no bike lane. Narrow sidewalks which make going down a steep hill really scary. (1) Intersection Related - people crossing near intersection not at it	Most of the northern ROW is Federal Heights. We have the southern portion.
CDOT	CO-224 from Washington St to east of Dahlia St	Speed Management	-	-	-	-	CDOT: Add sidewalk from Washington to US-85	(1) Sidewalk in such a bad shape nobody can use it needs improvement really bad	-
AdCo	72nd Ave from Pecos St to Zuni St	Access Management Speed Management	-	-	-	72nd Ave Study	-	(1) The road goes through a residential area and along a school park, and while I understand it's normal for people to drive 10 over the limit in a lot of places, people often drive even faster than that. At night, people like to race on this road	-
CDOT	Federal Blvd from south of 52nd Ave to north of 70th Ave	Speed Management Pedestrian Crossing	-	-	-	Federal Blvd BRT Study	-	(1) Sidewalks along Federal are either missing or in disrepair, making it incredibly uncomfortable to travel by bike or foot along this corridor to the train and bus station.	-
CDOT	CO-224 from east of Brannan Pl to east of Dahlia St	Access Management	-	-	-	-	CDOT: Add sidewalk from Washington to US-85	(1) Sidewalks in such a bad shape nobody can use it needs improvement really bad	CDOT has a project this coming year that will also add sidewalk to the north side of this corridor where it is missing from Washington to US 85
CDOT	104th Ave from west of McKay Rd to east of US-85	Speed Management	-	-	-	Thornton 104th Ave Project	Road widening to a five lane section with bike lanes, shared use paths, sidewalks and a TWLTL.	(7) There is only a two lane road heading east and west down 104th, with heavy traffic volume. A new lane or more signals could help. A traffic light at Brighton and 104th would be good; When trying to ride bikes as a family, no safe way to access the riverdale bike path coming from belle creek/reunion. There is no bike path or sidewalk; Need bike connection thru Belle Creek to connect west ; No sidewalk or bike lanes down 104th to open space; 104th is terrible. There is no bike lane, no sidewalk, terrible traffic; (7) Congestion related to the railroad is very problematic. Intersection Related: Brighton Rd and 104th Ave and US85 and 104th	-
Collaboration	Washington St from south of 52nd Ave to south of 88th Ave	Speed Management	-	-	-	-	-	-	Thornton owns Washington Street from Coronado Pkwy South to e 88th Avenue.
AdCo	Dahlia St from 74th Ave to I-76	Access Management Speed Management	X	One lane in each direction, TWLTL, on street bike lanes, curb, gutter, sidewalk and lighting.	X	-	Adams County has a planned CIP project from 70th Ave to CO-224 that will pick up as phase two of the recently completed project - construction anticipated 5+ years	-	-
Collaboration	120th Ave from Sable Blvd to Peoria St	Speed Management	-	-	-	120th Ave Corridor Study	-	(1) Intersection Related: Please put a stoplight here and let cars turn either way. It is a hazard and is dangerous for students.	Collaboration with Commerce City and Brighton
AdCo	72nd Ave from Galapago St to Pecos St	Access Management Speed Management	-	-	-	-	-	-	-
AdCo	York St from 58th Ave to 78th Ave	Speed Management	-	-	X	-	-	-	-
CDOT	US-85 from north of 104th Ave to south of I-76	Speed Management	-	-	-	US-85 PEL	-	Traffic Congestion; Intersection Related: 104th Ave and US 85	-
CDOT	US-85 from north of 120th south to Ragweed Draw	Speed Management	-	-	-	US-85 PEL	-	Intersection Related Only: 120th and US 85 - Congestion, no bike ped access	-
Collaboration	McKay Rd from north of 104th Ave to South Platte River	Speed Management	-	-	-	Monaco-Mckay TIP Project	-	(1) Cars speed up and don't want to stop for bicylists or pedestrians	Collaboration with Thornton
AdCo	York St from 78th Ave to 88th Ave	Speed Management	X	Road widening, intersection improvements at 78th Ave, street lighting and drainage improvements.	-	-	-	-	-
AdCo	Dahlia St from 69th Ave to 74th Ave	Access Management Speed Management	X	Road widening, providing three lanes, on street bike lanes, curb, gutter, sidewalk, and lighting.	X	-	Adams County has a planned CIP project from 70th Ave to CO-224 that will pick up as phase two of the recently completed project - construction anticipated 5+ years	-	-
AdCo	Lowell Blvd from 52nd Ave to 68th Ave	Speed Management	-	-	-	-	-	(2) Bicycling along Lowell is unpleasant because certain sections lose their detached trail / sidewalk and force pedestrians and cyclists to travel through parking lots.	-
AdCo	70th Ave from Pecos St to Broadway St	Speed Management	-	-	X	Pecos Study	-	-	-
CDOT	Vasquez Blvd from I-76 to south of 76th Ave	Speed Management	-	-	-	-	-	(1) People not respecting stop signs to crowded need some kind of traffic lights to improve the safety of everyone pedestrian and drivers.	-
AdCo	78th Ave from Steele St to west of Washington St	Speed Management	-	-	X	-	-	-	-
CDOT	124th Ave from Brighton Rd to Peoria St	Speed Management	-	-	-	-	-	Intersection Related Only: Bike ped crossing bridge location at US 85 and 124th Ave	-
Collaboration	Tennyson St from 52nd Ave to 64th Ave	Pedestrian Crossing	-	-	-	-	Arvada: Bike lanes, improved sidewalk from 60th to 64th, and RRFB at 60th Ave	Pedestrian and bike safety are major concerns along this road. There are limited and substandard sidewalks and no safe crossings. The road is wide and has speeding traffic, with few traffic lights. There's a need for midblock crossings, improved crosswalks, and shared-use paths. The road lacks bike lanes or pedestrian infrastructure despite frequent use and many connected destinations.	Collaboration with Arvada
AdCo	64th Ave from Pecos St to Tennyson St	Speed Management	-	-	-	Pecos Study	-	(1) Intersection Related - intersection is unsafe for pedestrians	-
CDOT	160th Ave east of Yosemite St to west of Holly St	Speed Management	-	-	-	CO-7 BRT	-	-	-
Collaboration	136th Ave from Granby St to Brighton Rd	Speed Management	-	-	-	-	-	-	Collaboration with Brighton
AdCo	Brighton Rd from north of 80th Ave to south of 88th Ave	Speed Management	-	-	X	-	-	-	-
CDOT	US-85 from South of E-470 to Elmwood Cemetery	Speed Management	-	-	-	US-85 PEL	-	-	-
Collaboration	144th Ave from Brighton Rd to east of Farmlore Dr	Access Management	-	-	-	-	-	-	I'm a bit surprised with this one. There are relatively few access points on this segment of road. Portion of road on east end is Brighton ROW. Quite of bit on new construction and homes.
Collaboration	Lowell Blvd from south of Chestnut Ln to north of King Way	Speed Management	-	-	-	-	-	(1) There are no bike lanes. For having a school nearby, and being a route to US 36 & Sheridan station a bike lane here would make transit a lot easier and safer.	Collaboration with Westminster

Corridor Name and Span	Access Management										Speed Management												Bicycle and Pedestrian					
	Raised Median (or Pedestrian Refuge Median)	Dedicated Turn Lanes	Remove or Consolidate Access Points	Convert Full Movement Access to RIRO or 3/4 Movement	Signal or All-Way Stop	Roundabout	High Friction Surface Treatment	Wider Edge Lines	Safety Edge	Speed Management (Consider all Speed Management Countermeasures)	Identify Target Speed and Countermeasures Needed for Compliance	Speed Feedback Signs	Traffic Calming	Lane Repurposing/Road Diet	Automated Speed Enforcement	Signal Coordination	Roundabout	No-passing Zone	Wider Edge Lines	Raised Pavement Markers or Rumble Strips	High Friction Surface Treatment	Safety Edge	Lighting	New or Upgraded Bike Facility	New or Upgraded Sidewalks	Raised Median (or Pedestrian Refuge Median)	New or Upgraded Pedestrian Crossing	Speed Management (Consider all Speed Management C ountermeasures)
Sheridan Blvd from south of 52nd Ave to north of Ralston Rd											X	X	X	X	X	X							X	X	X			
Pecos St from north of 84th Ave to I-76	X		X	X							X	X	X	X	X	X											X	
84th Ave from Huron St to Zuni St	X		X	X			X			X	X	X	X	X	X	X					X			X	X		X	
CO-224 from Washington St to east of Dahlia St											X	X	X	X	X	X	X		X			X			X			
72nd Ave from Pecos St to Zuni St	X		X	X	X	X		X		X	X	X	X	X	X		X		X						X	X	X	
Federal Blvd from south of 52nd Ave to north of 70th Ave			X	X							X	X	X	X	X	X			X				X	X	X	X	X	X
CO-224 from east of Brannan Pl to east of Dahlia St	X		X	X	X	X				X														X	X			
104th Ave from west of McKay Rd to east of US-85											X	X	X	X	X	X	X		X			X		X	X			
Washington St from south of 52nd Ave to south of 88th Ave					X						X	X	X		X	X			X									
Dahlia St from 74th Ave to I-76	X	X	X	X	X	X				X	X	X	X		X		X											
120th Ave from Sable Blvd to Peoria St	X		X	X	X						X	X	X		X	X			X									
72nd Ave from Galapago St to Pecos St	X		X	X	X	X		X		X	X	X	X	X	X		X		X						X	X	X	
York St from 58th Ave to 78th Ave											X	X	X	X	X	X	X		X	X		X						
US-85 from north of 104th Ave to south of I-76											X	X			X				X			X						
US-85 from north of 120th south to Ragweed Draw											X	X			X				X								X	
McKay Rd from north of 104th Ave to South Platte River											X	X	X		X			X	X	X		X					X	
York St from 78th Ave to 88th Ave											X	X	X	X	X	X	X		X	X		X						
Dahlia St from 69th Ave to 74th Ave	X	X	X	X	X	X				X	X	X	X		X		X											
Lowell Blvd from 52nd Ave to 68th Ave											X	X	X	X	X		X	X						X	X			
70th Ave from Pecos St to Broadway St											X	X	X	X	X		X											
Vasquez Blvd from I-76 to south of 76th Ave											X	X			X				X								X	
78th Ave from Steele St to west of Washington St											X	X	X	X	X			X	X			X						
124th Ave from Brighton Rd to Peoria St											X	X	X				X		X			X						
Tennyson St from 52nd Ave to 64th Ave			X	X	X	X		X	X														X	X	X	X	X	X
64th Ave from Pecos St to Tennyson St	X		X	X							X	X	X	X	X	X											X	
160th Ave east of Yosemite St to west of Holly St											X	X	X		X				X					X	X			
136th Ave from Granby St to Brighton Rd											X	X	X		X		X		X			X						
Brighton Rd from north of 80th Ave to south of 88th Ave											X	X	X		X		X		X	X		X						
US-85 from South of E-470 to Elmwood Cemetery											X	X			X				X		X							
144th Ave from Brighton Rd to east of Farmlore Dr		X	X	X	X	X		X	X	X																		
Lowell Blvd from south of Chestnut Ln to north of King Way											X	X	X		X		X							X				

**Crash data that informed these recommendations went through 2022. Some or all of these concerns may have been addressed with the recent improvement project. Follow up analysis should be conducted prior to implementing any additional countermeasures.*

APPENDIX G: PROJECT PRIORITIZATION METHODOLOGY

Introduction

This appendix describes the methodology used to prioritize transportation safety projects as part of the Safety Action Plan. The prioritization process was built upon the results of the crash analysis and systemic safety analysis and incorporated study goals related to safety, community priorities and need. The outcome of this process was a set of ranked location lists that agencies can use to identify priority projects and advance them into cost estimation and benefit cost analysis.

Overview of the Prioritization Process

Project prioritization was grounded in data driven analysis and refined through community and agency input. The crash and systemic analyses serve as the foundation for identifying candidate locations, including top intersections, corridors, and rural segments where applicable. These locations were then evaluated using a consistent scoring framework aligned with three primary project goals:

- Safety
- Community Priority
- Historically Underserved and High Community Need

In addition to scoring, ownership and maintenance responsibilities were identified for candidate locations. Ownership affects funding eligibility, implementation responsibility, and project delivery timelines.

Project Ownership Categories

For each participating agency, candidate projects were grouped into the following categories:

- Local Projects: Roads, intersections, or signals that are fully owned and maintained by the local agency.
- Collaboration Projects: Roads, intersections, or signals that are owned or maintained by more than one agency and require coordination or partnership to implement improvements.
- CDOT Owned and Operated Projects: Roads, intersections, or signals that are fully owned and operated by the Colorado Department of Transportation.

For Adams County and the City of Brighton, an additional category of rural segments is included to reflect their roadway context.

Project Prioritization

Separate scoring frameworks were developed for intersections, corridors, and rural segments to reflect differences in scale, risk characteristics, and available data. Each framework used the same overarching project goals and relied on weighted criteria to generate a composite score for each candidate location.

The categories established for prioritization include the following:

- Equivalent Property Damage Only (EPDO) Score
- Level of Service of Safety (LOSS)
- High Risk Network (HRN)
- Community Input
- Areas of Persistent Poverty

Top Intersections

Top intersections were prioritized using criteria that emphasize crash severity, systemic risk, community input, and historically underserved communities. Each criterion was assigned a score and weight, and the total weighted score was used to rank projects.

The intersection prioritization criteria include:

Table G.1. Top Intersections Prioritization Criteria

Project Goal	Category	Description	Scoring	Weight
Safety	Equivalent Property Damage Only (EPDO) Score	365.4 is the equivalent of 6 fatal or serious injury crashes	Category Scores are proportional to the EPDO score of the intersection with anything above 365.4 getting the maximum score	25%
Safety	Level of Service of Safety	What is the highest LOSS score (either Total or Severity)?	LOSS IV total or severity = Full Score LOSS III total or severity = ½ Full Score LOSS I/II = 0	25%
Safety	High Risk Network	Is the project on the HRN?	Yes = Full Score No = 0	20%

Project Goal	Category	Description	Scoring	Weight
Community Priority	Community Input	Number of comments within a ¼ mile buffer of project area	5 or greater comments = Full Score 2 to 4 comments = 2/3rds Full Score 1 comment = 1/3rd Full Score 0 comments = 0	15%
Historically Underserved / High Community Need	Area of Persistent Poverty (AOPP)	Within or on the border of AOPP areas.	Yes = Full Score No = 0	15%

Top Corridors

Top corridors were prioritized using a similar framework, with adjustments to reflect corridor length and coverage-based metrics. Scoring was normalized by centerline mile to ensure comparability across corridors.

The corridor prioritization criteria include:

Table G.2. Top Corridors Prioritization Criteria

Project Goal	Category	Description	Scoring	Weight
Safety	Equivalent Property Damage Only (EPDO) Score	974.4 is the equivalent of 16 fatal or serious injury crashes	Category Scores are proportional to the EPDO per Centerline Mile score of the corridor with anything above 974.4 getting the maximum score	50%
Safety	High Risk Network	Is the project on the HRN?	Scores are proportional to the percent of HRN coverage, with 100% getting the maximum score. *y = (x/100) * 20, where x is the percent of HRN*	20%

Project Goal	Category	Description	Scoring	Weight
Community Priority	Community Input	Number of comments within a ¼ mile buffer of project area (includes engagement from both rounds of online feedback)	10 or greater comments = Full Score 4 to 9 comments = 2/3rds Full Score 1 to 3 comments = 1/3rd Full Score 0 comments = 0	15%
Historically Underserved / High Community Need	Area of Persistent Poverty	Within or on the border of AOPP areas.	Scores are proportional to the percent of AOPP coverage, with 100% getting the maximum score. *y = (x/100) * 15, where x is the percent of AOPP*	15%

Top Rural Segments

For agencies with rural roadway networks, rural segments were prioritized using a hybrid of intersection and corridor criteria. This approach reflects the safety challenges unique to rural contexts while maintaining consistency with the overall methodology.

Rural segment criteria include:

Table G.3. Top Rural Segments Prioritization Criteria

Project Goal	Category	Description	Scoring	Weight
Safety	Equivalent Property Damage Only (EPDO) Score	487.2 is the equivalent of 8 fatal or serious injury crashes	Category Scores are proportional to the EPDO per Centerline Mile score of the corridor with anything above 487.2 getting the maximum score	25%
Safety	Level of Service of Safety	What is the LOSS score?	LOSS IV total or severity = Full Score LOSS III total or severity = ½ Full Score	25%

Project Goal	Category	Description	Scoring	Weight
			LOSS I/II = 0	
Safety	High Risk Network	Is the project on the HRN?	Scores are proportional to the percent of HRN coverage, with 100% getting the maximum score. *y = (x/100) * 20, where x is the percent of HRN*	20%
Community Priority	Community Input	Number of comments within a ¼ mile buffer of project area (includes engagement from both rounds of online feedback)	3 or greater comments = Full Score 2 comments = 2/3rds Full Score 1 comment = 1/3rd Full Score 0 comments = 0	15%
Historically Underserved / High Community Need	Area of Persistent Poverty	Within or on the border of AOPP areas.	Scores are proportional to the percent of AOPP coverage, with 100% getting the maximum score. *y = (x/100) * 15, where x is the percent of AOPP*	15%

Scoring and Ranking

For relevant intersections, corridors, and rural segments, individual criterion scores were multiplied by their assigned weights and summed to produce a total project score. Projects were then ranked from highest to lowest score within each ownership and facility type category. This structure ensured that projects were compared against similar efforts and implementation contexts.

APPENDIX H: PLAN REVIEW

Long Range Planning

The following recommendations apply to two of the county's key guidance documents, the Comprehensive Plan and the Transportation Master Plan. Taken together, the recommended updates intend to more fully integrate safety into the county's culture and way of doing business. Staff will consider inclusion of these as the referenced planning and guidance documents are updated over time.

Comprehensive Plan

Table H.1. Comprehensive Plan Update Recommendations

Recommended Updates	Reference or Change Location	Importance and Justification
Include a summary of the Safety Action Plan following the section titled, "What is a Transportation Master Plan"	Chapter 1, Page 5	Elevates the SAP as a key tool for advancing future planning efforts and affirms the SAP's role in shaping policy across planning disciplines.
Add Safety Action Plan (SAP) to Figure 1-4	Chapter 1, Page 9	Elevates the SAP as a key tool for advancing future planning efforts and affirms the SAP's role in shaping policy across planning disciplines.
For any existing or new strategic or priority corridors, include a note on how they were identified in the SAP and a summary of related safety concerns	Chapter 8, Page 78	Informs strategic planning decisions while ensuring key concerns and priorities are reflected in the planning framework.

Transportation Master Plan

Table H.2. Transportation Master Plan Update Recommendations

Recommended Updates	Reference or Change Location	Importance and Justification
Add Safety as a lense in Section 1.3.1	Chapter 1, Section 1.3, Page 1.3	Emphasizes safety as a core factor in assessing conditions helps ensure future investments address risks and support informed decision-making.
Add a bullet emphasizing the importance of safety and the integration of identified countermeasures	Chapter 1, Section 1.4, Page 1.4	Prioritizes safety in planning and early decision-making helps address known risks and ensures alignment with community priorities.
Incorporate key findings from the SAP into Section 1.5, under the Safety subsection	Chapter 1, Section 1.5, Page 1.5	Ensures safety insights from the SAP are reflected in planning priorities, and helps ground safety decisions in data.
Include a summary of the SAP within the section addressing safety and innovation	Chapter 2, Section 2.4.4, Page 2.11	Connects insights from the SAP to safety and innovation, and positions the SAP as a key driver of forward-thinking planning.
Add subsection 3.3.5 – Roadway Network Safety Improvements to highlight how SAP findings inform long-range development planning	Chapter 3, Section 3.5, Page 3.6	Strengthening the link between safety data and long-range planning ensures that safety priorities directly inform future decisions.
Add a summary about safety to Section 3.4.2 to reflect key findings and priorities	Chapter 3, Section 3.4.2, Page 3.14	Updating roadway classifications to reflect safety infrastructure supports accurate classification and ensures alignment with safety-related needs.
Incorporate the SAP as a reference for future roadway project planning	Chapter 3, Section 3.6, Page 3.20	Highlighting the importance of safety for future roadway network design ensures that projects are guided by established safety priorities and data-driven insights.

Recommended Updates	Reference or Change Location	Importance and Justification
Add SAP-prioritized segments and corridors to Table 3.1	Chapter 3, Section 3.6, Page 3.23	Reflecting safety-driven planning priorities in table helps ensure clearer alignment with investment decisions.
Update crash data in Table 4.1	Chapter 4, Section 4.3, Page 4.4	Citing the most current data and aligning with the SAP ensures decision-making is based on the most accurate and up-to-date information.
Include discussion on pedestrian crossing improvements identified in the SAP	Chapter 4, Section 4.4.2, Page 4.7	Highlighting pedestrian safety needs and supporting targeted infrastructure improvements addresses priorities identified in the SAP and informs future design considerations.
Add any SAP-identified projects to Tables 8.1 – 8.6	Chapter 8, Section 8.1.1.1, Page 8.2	Aligning long-term investments with safety priorities streamlines funding and implementation while reinforcing the commitment to reducing traffic injuries and fatalities.
Update Table 8.7 to align performance measures and metrics with the SAP	Chapter 8, Section 8.2, Page 8.15	Ensuring consistent tracking and evaluation reinforces accountability for safety outcomes and supports targeted improvements.
Update Section 8.3.1 with additional funding sources that can be used for transportation safety improvement projects.	Chapter 8, Section 8.3.1, Page 8.18	Providing a more comprehensive inventory of potential funding sources increases the likelihood of project implementation.