
CITY OF THORNTON
December 2024
120L THORNTON/BRIGHTON
Safer People
Safer Vehicles
Post-Crash Care
THORNTON
VISION ZERO
Safer Speeds
Safer Roads
SPEED LIMIT 25
THORNTON
Travel Without Tragedy

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C.D. No. 2024-294

R E S O L U T I O N

A RESOLUTION ADOPTING THE THORNTON VISION ZERO ACTION PLAN AND ESTABLISHING A GOAL OF ELIMINATING TRAFFIC FATALITIES AND SERIOUS INJURIES BY 2040.

WHEREAS, 42 people died and another 222 were seriously injured in crashes on City of Thornton roads between 2018 and 2022; and

WHEREAS, death and serious injuries on the transportation network are not acceptable for those who work, live, or play in the City; and

WHEREAS, Vision Zero is the commitment to reduce traffic deaths to zero using the Safe System Approach which recognizes that humans make mistakes, human bodies have limited ability to tolerate crash impacts, and that making mistakes on the roadway should not lead to death; and

WHEREAS, the 2022 Thornton Transportation and Mobility Master Plan includes a recommendation to develop and adopt a Vision Zero Action Plan to create a safe transportation system for all road users; and

WHEREAS, the Thornton Vision Zero Action Plan was developed based on a comprehensive traffic safety analysis, public outreach and stakeholder engagement, and the impact of transportation safety on underserved communities; and

WHEREAS, the Thornton Vision Zero Action Plan identifies strategies to improve transportation safety so all road users including pedestrians, bicyclists, transit users, and vehicle users can travel around the City without tragedy.

WHEREAS, the City Council has determined that it is in the best interest of the residents of the City to formally adopt the Thornton Vision Zero Action Plan.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF THORNTON, COLORADO, AS FOLLOWS:

1. The Thornton Vision Zero Action Plan as attached is hereby adopted to achieve the goal of zero fatal and serious injury crashes on the City's roads by 2040.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Thornton, Colorado, on December 17, 2024.

C.D. No. 2024-294

CITY OF THORNTON, COLORADO

DocuSigned by:
Jan Kulmann
442A426A356B495...

Jan Kulmann, Mayor

ATTEST:

Signed by:
D67962BD4ECE4A2...

Kristen N. Rosenbaum, City Clerk

Acknowledgments

Mayor

- Jan Kulmann

City Councilmembers

- Kathy Henson – Ward 1
- Justin Martinez – Ward 1
- Jessica Sandgren – Ward 2
- Roberta Ayala – Ward 2
- Tony Unrein – Ward 3
- David Acunto – Ward 3
- Chris Russell – Ward 4
- Karen Bigelow – Ward 4

City of Thornton

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- Bradley Cline, Police Sergeant
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Focus Group Members

- Adams County
- City of Northglenn
- City of Westminster
- Colorado Department of Transportation (CDOT)
- Denver Regional Council of Governments (DRCOG)
- Regional Transportation District (RTD)
- E-470 Public Highway Authority
- Smart Commute
- 27J Schools
- Adams 12 Five Star Schools
- Mapleton Public Schools
- Denver Regional Mobility and Access Council (DRMAC)
- Creating S.P.A.C.E.
- That's How I Roll Foundation
- Bicycle Colorado

Regional Partner Agencies

- Regional Transportation District (RTD)
- Denver Regional Council of Governments (DRCOG)
- Colorado Department of Transportation (CDOT)
- USDOT Federal Highway Administration

Consultant Team

- Fehr & Peers
- CIG
- Toole Design

Key Terms

ABBR	KEY TERM
CTP	Comprehensive Transportation Plan
CRF	Crash Reduction Factor
CSAP	Comprehensive Safety Action Plan
DUI	Driving Under the Influence
FHWA	Federal Highway Administration
HSIP	Highway Safety Improvement Program
ITE	Institute of Transportation Engineers
KSI	Killed or Severe Injury crashes
LRSP	Local Roadway Safety Plan
NHTSA	National Highway Traffic Safety Administration
PCF	Primary Crash Factor
PDO	Property Damage Only Crashes
PHB	Pedestrian Hybrid Beacon
RAISE	Rebuilding American Infrastructure with Sustainability and Equity Program (USDOT)
RRFB	Rectangular Rapid-Flashing Beacon
SS4A	Safe Streets for All program (USDOT)
TAB	Transportation Advisory Board (Auburn)
USDOT	US Department of Transportation

Preventing fatalities should be a goal. I wish there was more pedestrian safety planning alongside city planning. Did you know there are new apartments on 104th and Colorado across from a grocery store and restaurants—walkable distance right? But no, you have to cross Colorado to get there.

- Thornton Community Member

Being an avid runner and biker myself, I wish this city was more bike-able and walk-able. Many times I find myself turning around because of dangerous intersections and not wanting to become a statistic.

- Thornton Community Member

Chapter 1

TRAVEL WITHOUT TRAGEDY

The City of Thornton is taking a bold step toward eliminating fatal and serious injury traffic crashes on city streets through the city's first ever Vision Zero Action Plan. This Action Plan includes a list of projects and actions recommended for the city to implement through 2040 to create a safe transportation system for all roadway users, including pedestrians, bicyclists, transit users, and vehicle users. The goal is to improve traffic safety on all city streets so residents and visitors can ***travel*** *around Thornton* ***without tragedy****.*

What is Vision Zero?

Vision Zero is a long-term strategy to eliminate all traffic fatalities and severe injury crashes, while increasing safe, healthy, and equitable mobility for all. Vision Zero is based on the philosophy that we have the power to prevent people from being killed or seriously injured in car crashes. This is a departure from traditional views of traffic safety, where a certain number of crashes are expected and when they do happen, they are considered unfortunate accidents due to human error. Vision Zero contends that fatalities due to car crashes are preventable through a multi-disciplinary approach that brings together stakeholders and partners to create and maintain traffic safety systems using a **Safe System Approach**.

Vision Zero is not a slogan, not a tagline, not even just a program. It is a fundamentally different way to approach traffic safety.

Traditional Approach		Vision Zero
Traffic deaths are ***inevitable***	→	Traffic deaths are ***preventable***
Perfect human behavior	→	Integrate ***human failing*** in approach
Prevent ***collisions***	VS →	Prevent ***fatal and severe crashes***
Individual responsibility	→	***Systems*** approach
Saving lives is ***expensive***	→	Saving lives is ***not expensive***

Safe System Approach

This plan was developed using the principles of the Federal Highway Administration's (FHWA's) Safe System Approach, which recognizes that humans make mistakes and that human bodies have limited ability to tolerate crash impacts. Making mistakes on the roadway should not lead to death. There are six principles and five elements that form the basis of the Safe System Approach. These principles and elements form the basis of the safety analysis approach used in this plan and provide the framework for the Action Plan.

The six principles of the Safe System Approach acknowledge that death and serious injury are unacceptable, humans make mistakes, humans are vulnerable, responsibility is shared, safety is proactive, and redundancy is crucial. These principles are addressed through a comprehensive approach to the transportation system that touches five different elements, as shown in **Figure 1**:

Figure 1. Safe System Approach Elements

Source: U.S. Department of Transportation (2022).

Safer People

Encourage responsible driving and safe behaviors among all road users. Focus on ensuring that everyone can travel safely and reach their destination without harm.

Safer Vehicles

Increase the availability of vehicle features and systems that prevent crashes and reduce the severity of crashes for both occupants and others on the road.

Post-Crash Care

Enhance crash survival rates by ensuring quick access to emergency medical care. Create a safe environment for first responders and prevent further crashes through effective traffic incident management.

Safer Roads

Design roadways to reduce the chances of human error and minimize injuries. Prioritize safety for all road users, especially those who are most vulnerable, by creating environments that encourage safer behaviors.

Safer Speeds

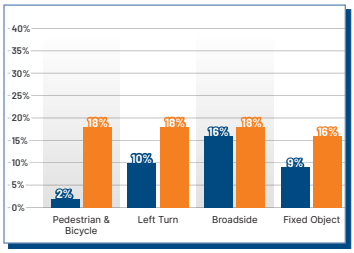
Promote safer speeds on all types of roads by using thoughtful design, setting appropriate speed limits, and implementing targeted education and outreach, along with fair enforcement.

Plan Context

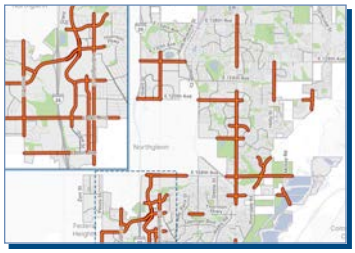
Adoption of a Vision Zero Action Plan was a key directive of the city's 2022 Transportation and Mobility Master Plan. Development of this plan was funded by a Safe Streets and Roads for All (SS4A) planning grant from the US Department of Transportation. Like many communities in Colorado and around the nation, Thornton is taking a proactive approach in identifying and prioritizing local infrastructure that will greatly benefit from safety improvements to help reduce the number of severe crashes that result in fatality or serious injury.

Plan Contents

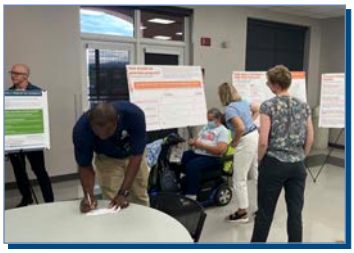
This plan includes the following major items:



- **A Comprehensive Traffic Safety Analysis** *that identifies common severe crash types and locations, with particular focus on vulnerable road users (people outside of vehicles).*



- **A High Injury Network+ High Risk Network (HIN+HRN)** *that maps the streets in Thornton with the highest risk for severe crashes.*



- **Public Outreach and Stakeholder Engagement** *that captures the perceived safety issues of the community and ensures action items correspond with local needs.*

- **A Toolbox of Systemic Safety Interventions** *so the city can systemically address the most severe crash types.*

- **An Equity Index** *to identify and prioritize historically marginalized communities of Thornton.*

- **An Action Plan** *that identifies strategies to improve safety through both engineering solutions and other actions.*

- **A supplemental Prioritization Guide** *(see **Appendix A**) for staff to implement safety projects based on identified prioritization criteria.*

Thornton generally has a good system of trails. The main problem I have with walking or biking in Thornton is where trails cross a major road the crossings are not safe.

- Thornton Community Member

I hope we focus on slowing cars down. This doesn't necessarily mean lowering speed limits, but rather making infrastructure changes that reduce speeding. Fewer cars on the road will mean fewer crashes.

- Thornton Community Member

Chapter 2

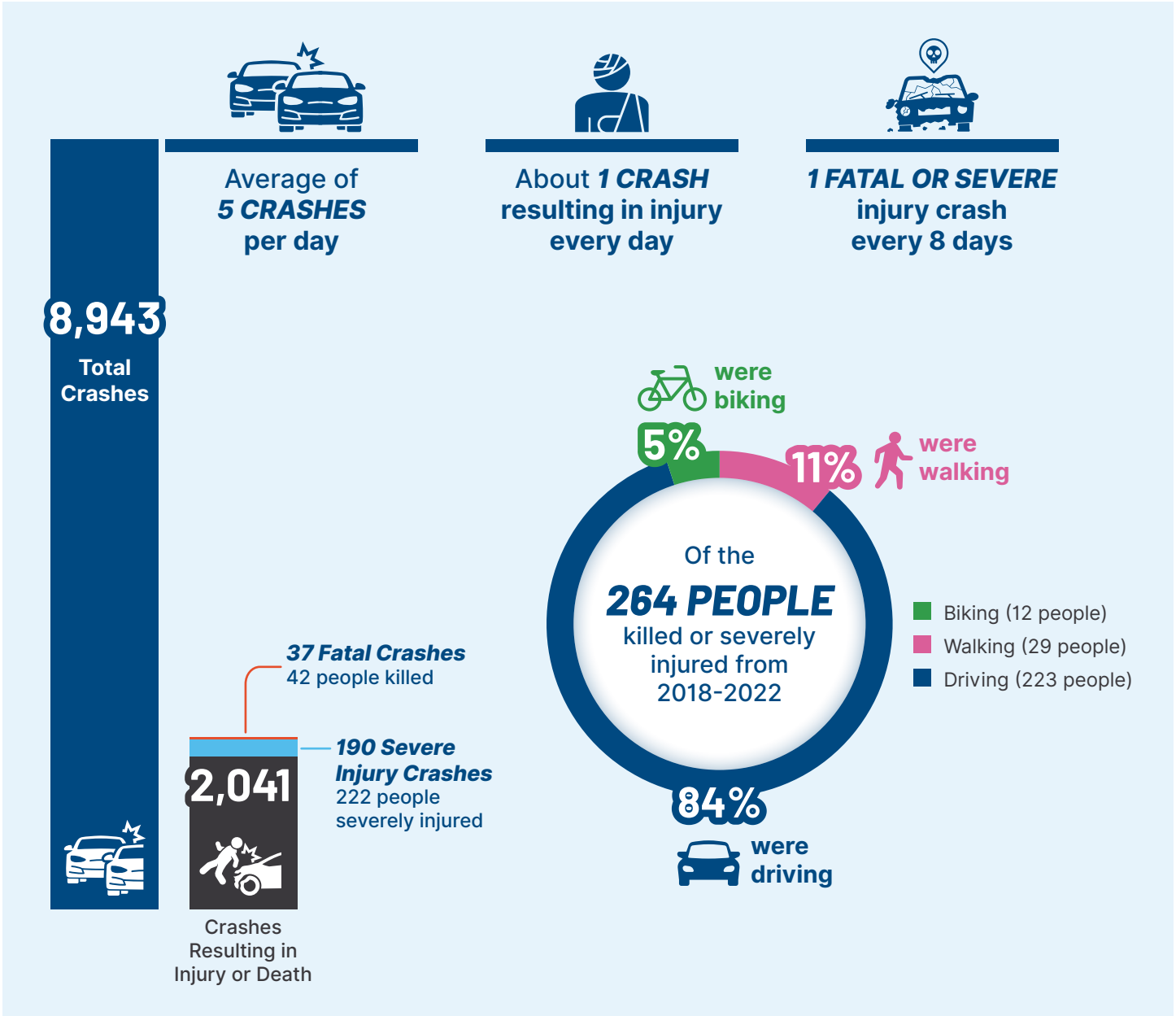
TRAFFIC SAFETY ANALYSIS

Crash Data Overview

Between 2018 and 2022, Thornton's streets[1] experienced 8,943 crashes involving 17,700 people.

Figure 2 shows that 2,000 crashes (almost a quarter of the total) resulted in injury or death. Thirty-seven people were killed and 190 people were severely injured in motor vehicle crashes during this time.

Figure 2. Summary of Crash Data, 2018-2022



1 Crashes occurring on I-25 and E-470 are excluded from this dataset.

Figure 3 shows the distribution of all crashes by severity.

Figure 3. Crashes in Thornton, 2018-2022

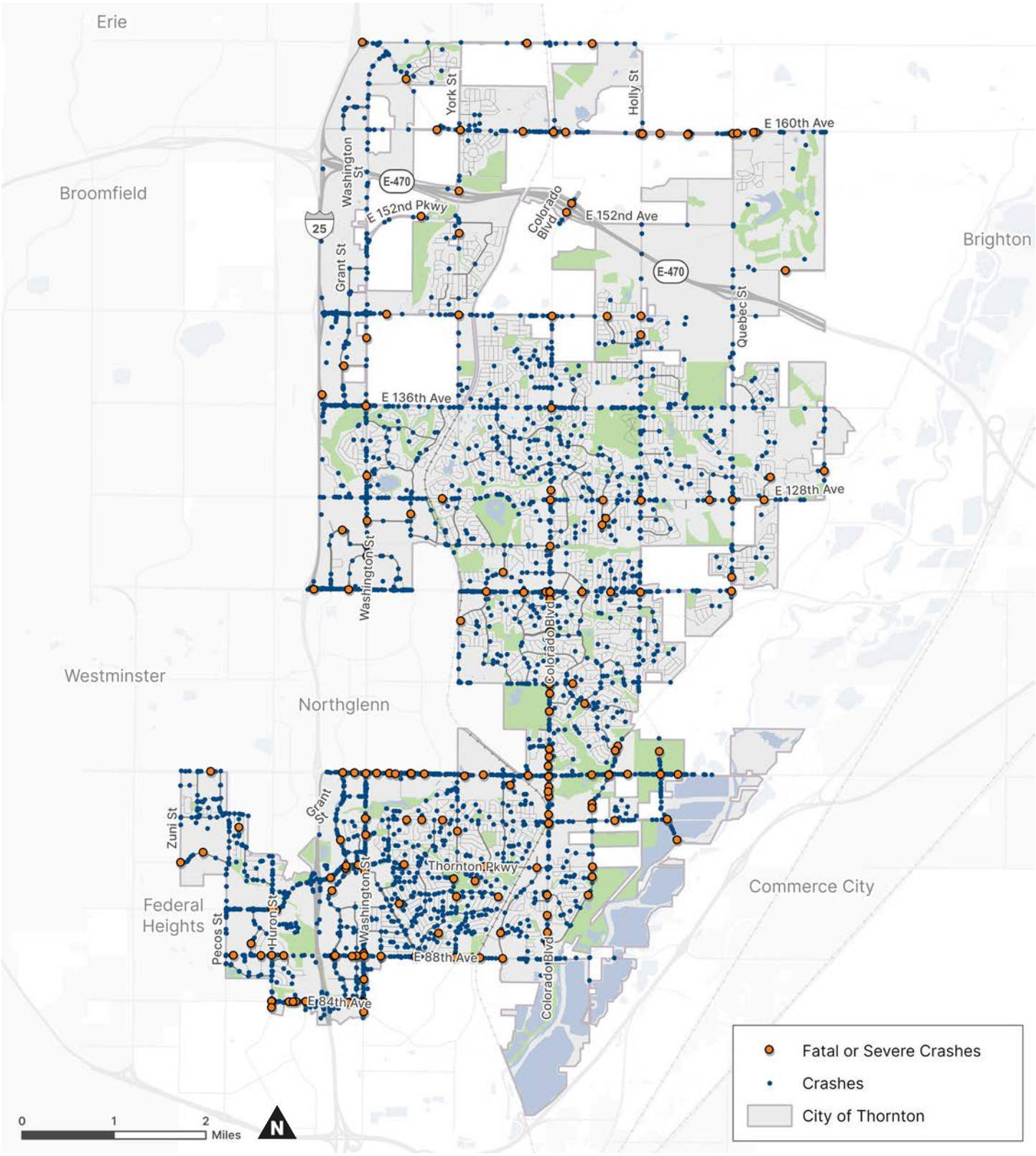
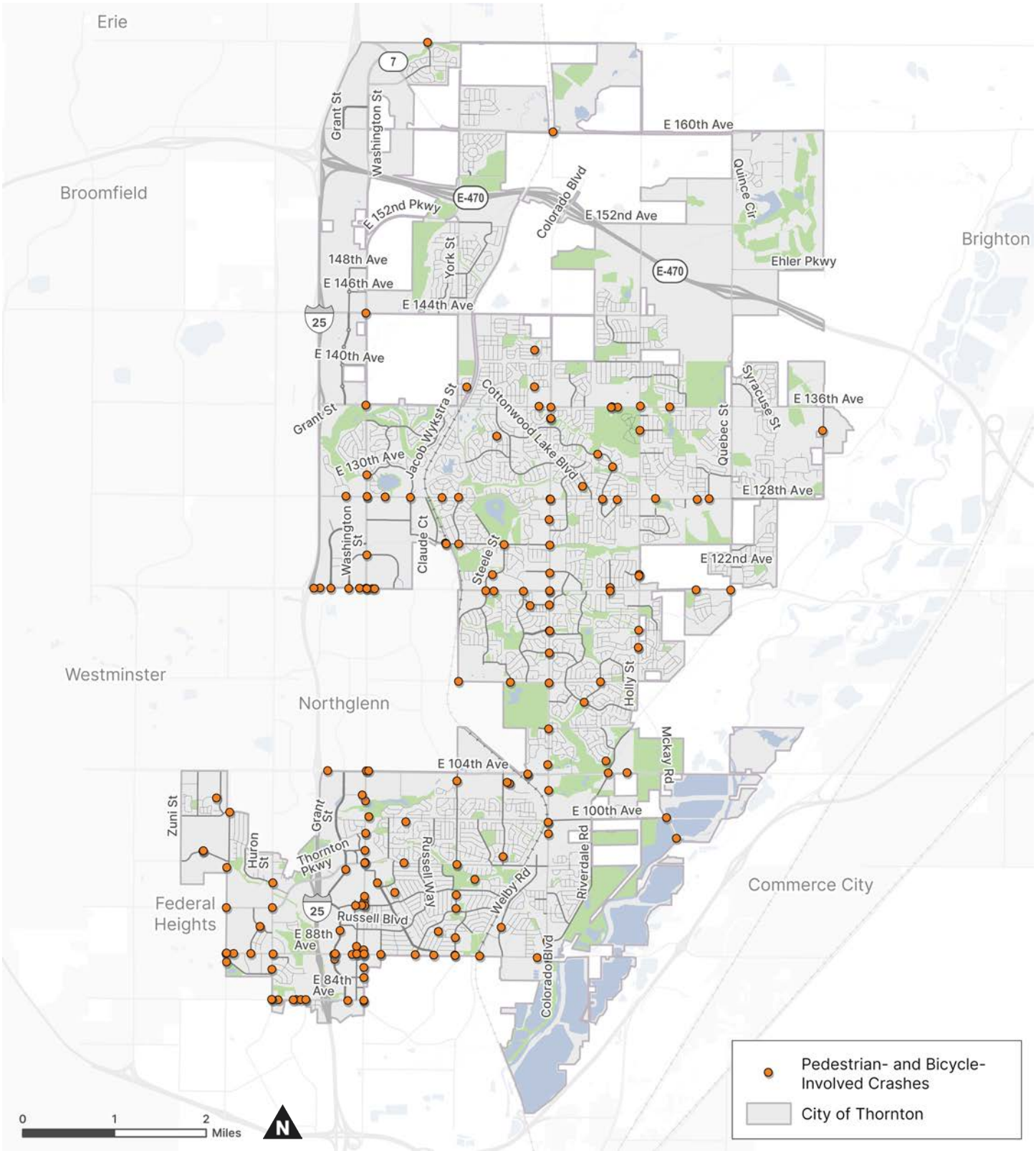


Figure 4 shows the distribution of pedestrian and bicycle crashes in Thornton, regardless of severity.

Figure 4. Pedestrian- and Bicycle-Involved Crashes



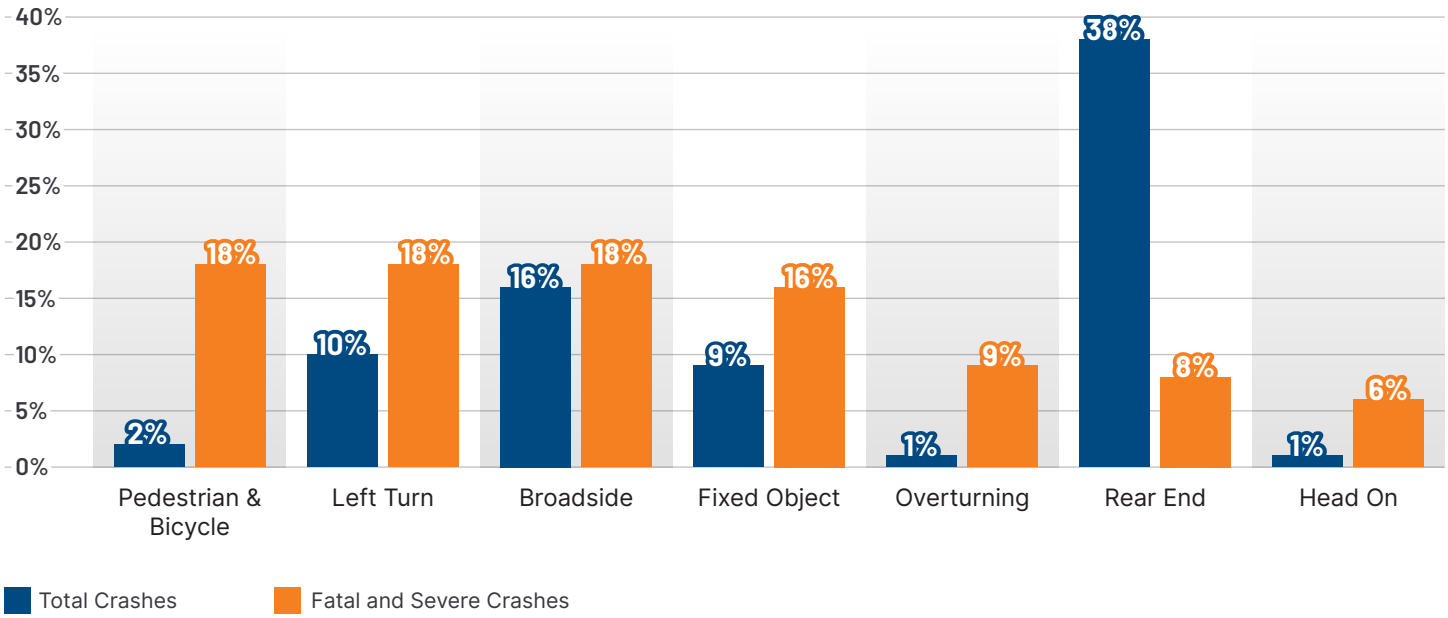
Key Crash Types

Seventy percent of fatal and severe injury crashes in Thornton involve one of four types (see Figure 5):

- *Pedestrian- or bicyclist-involved crashes*
- *Left turn crashes*
- *Broadside (right angle/T-bone) crashes*
- *Fixed object (run-off-the-road)*

While rear-end crashes are the most common crashes in Thornton, they are much less likely to be severe. The focus of this Action Plan is on mitigating fatal and severe injury crashes, including the four listed here that are most likely to result in severe injury or death.

Figure 5. Fatal and Serious Injury Crashes by Crash Type



Pedestrians & Bicyclists are Disproportionately Affected

Only 2% of all crashes in Thornton involved a pedestrian or bicyclist, but these crashes represented 18% of fatal and severe injury crashes.

This means that even though bicyclists and pedestrians are involved in fewer crashes, they are much more likely to be severely injured or killed. This is why a focus on vulnerable road users, or those using the road outside of vehicles, is critical in safe roadway design. Regardless of travel mode, people moving in Thornton should be able to do so safely.

Thornton's High Injury Network + High Risk Network

The High Injury Network + High Risk Network (HIN+HRN) includes the street segments with the highest risk for severe crashes in Thornton.

The HIN+HRN (shown in **Figure 6**) was developed using two analyses, one that accounted for historic crashes and one that accounted for potential future crashes based on contextual risk factors. A description of the methodology used to develop the HIN+HRN is provided in **Appendix B**. The HIN+HRN is a key tool the city will use to prioritize safety projects by focusing interventions at locations where they are likely to have the greatest impact.

Historic Crashes

The historic crash analysis identified the streets in Thornton where a disproportionately high number of fatal and severe injury crashes happened between 2018 and 2022. This is the High Injury Network.

Potential Future Crashes

The potential future crash analysis identified streets with a high concentration of contextual factors that are most associated with severe crashes. This analysis revealed where severe or fatal crashes are likely to happen in the future, even if severe crashes have not occurred as frequently in the past. The result of this analysis is the High Risk Network.

The following contextual factors were found to be most associated with fatal and severe injury crashes:

- *Streets with high traffic volumes*
- *Intersections with traffic signals*
- *Streets with high vehicle speeds*
- *Low-income areas*
- *Streets approaching transit stops*
- *Streets adjacent to commercial areas*
- *Locations where community members expressed traffic safety concerns*

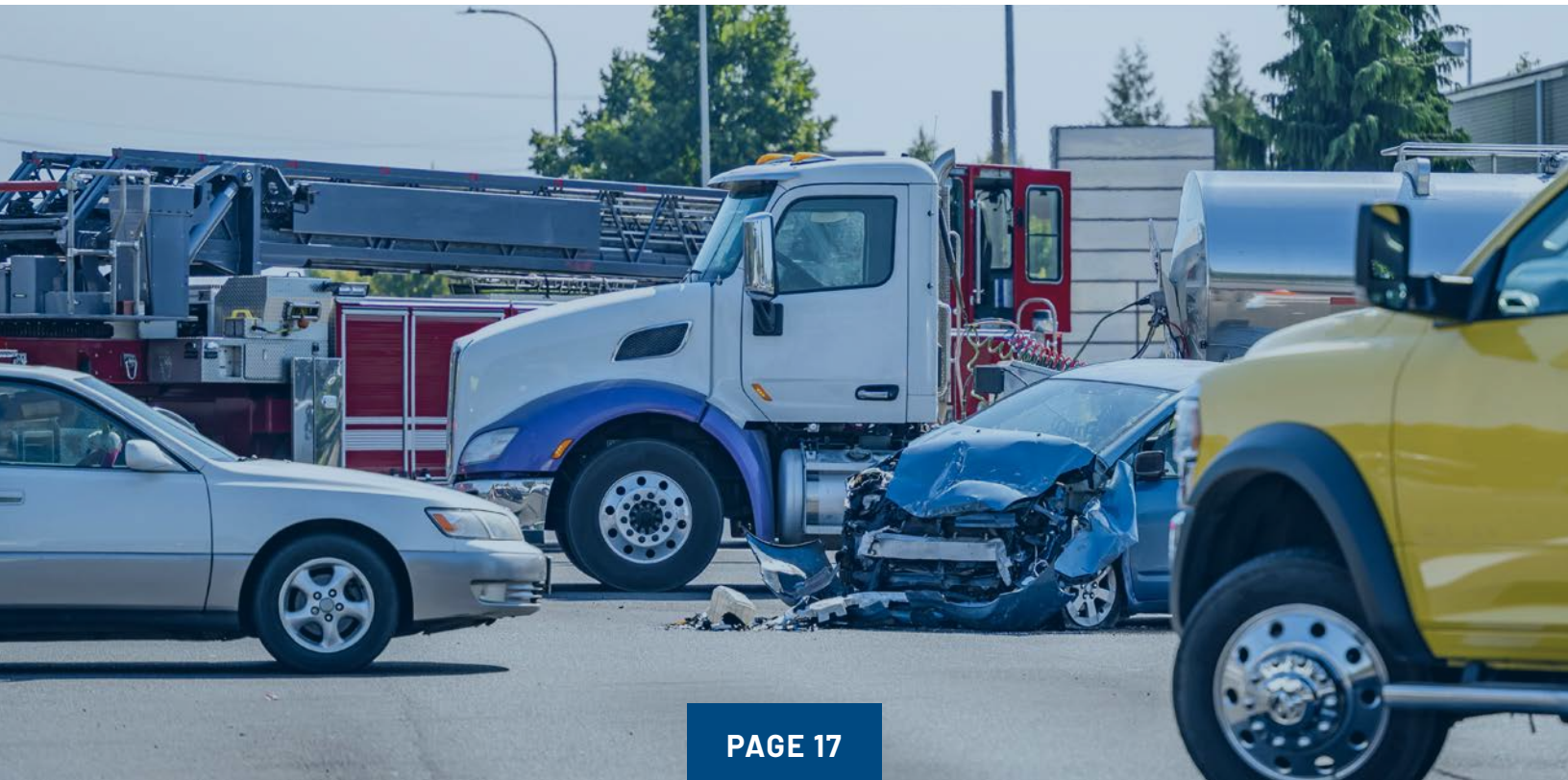
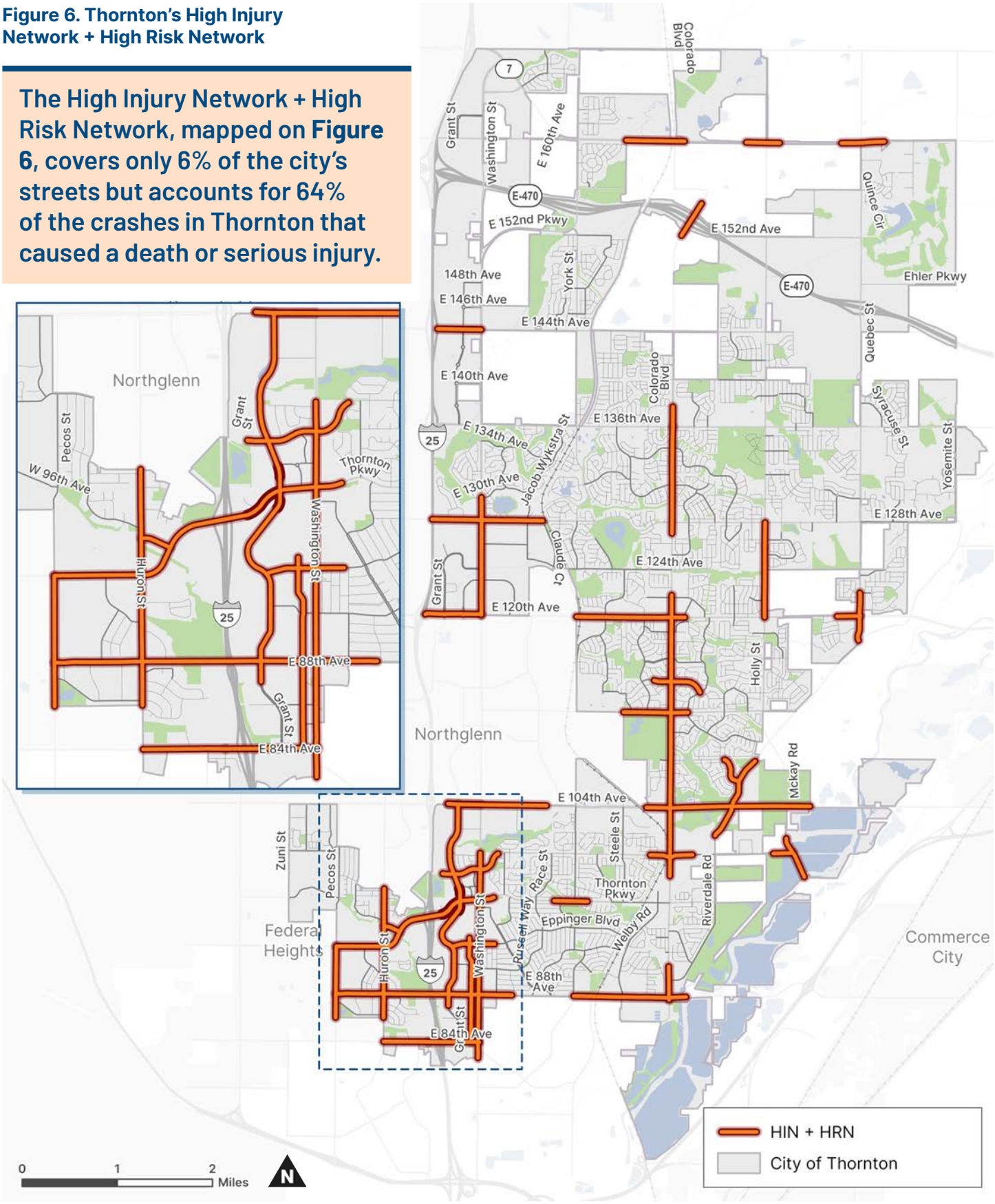
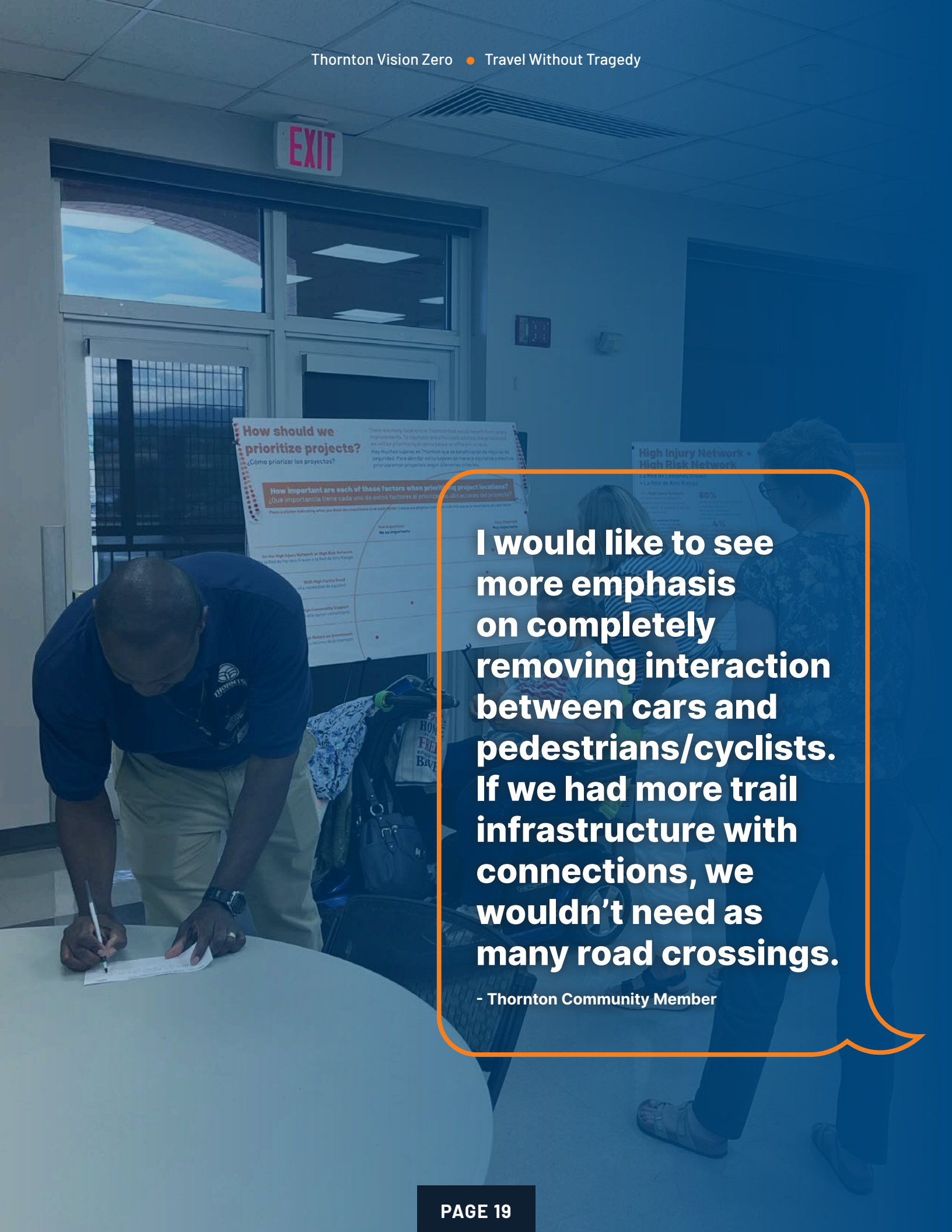


Figure 6. Thornton's High Injury Network + High Risk Network

The High Injury Network + High Risk Network, mapped on Figure 6, covers only 6% of the city's streets but accounts for 64% of the crashes in Thornton that caused a death or serious injury.





I would like to see more emphasis on completely removing interaction between cars and pedestrians/cyclists. If we had more trail infrastructure with connections, we wouldn't need as many road crossings.

- Thornton Community Member

Chapter 3

COMMUNITY & STAKEHOLDER INPUT

Community engagement was a critical component to identifying traffic safety concerns and potential solutions in Thornton. Engagement included two primary phases of outreach with the public as well as a stakeholder working group and a focus group with regional partners.

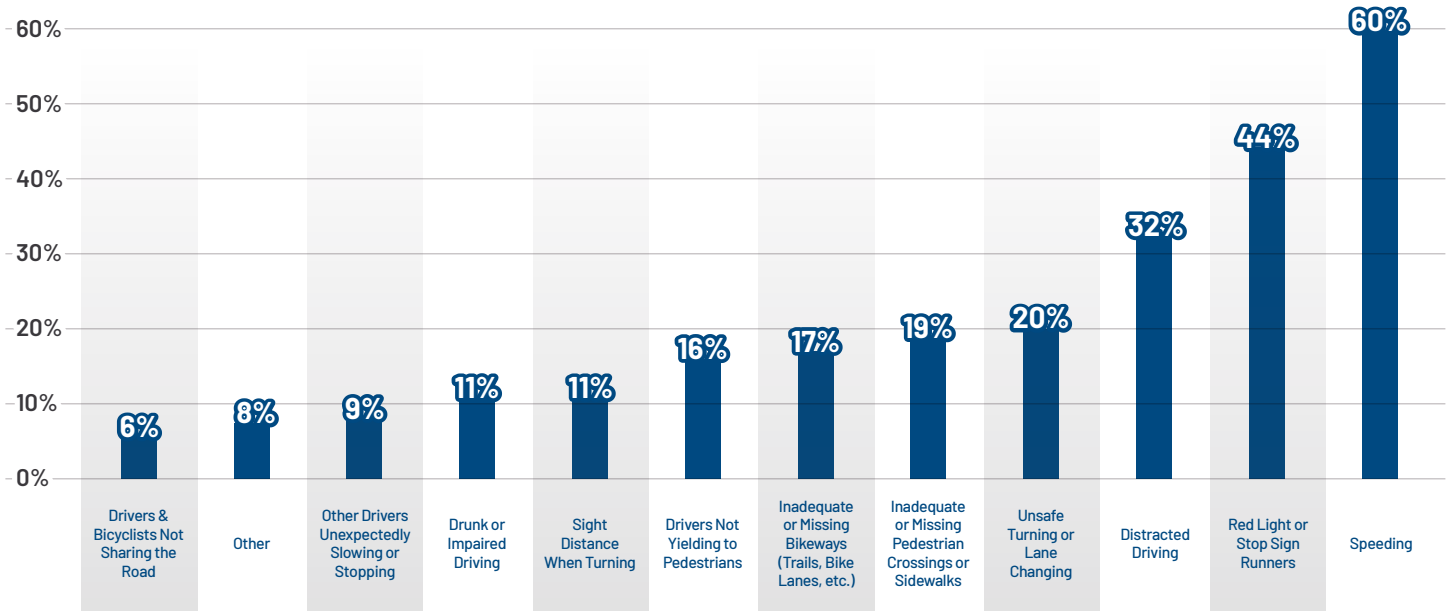
Identifying Issues - Phase 1 Community Outreach

The first phase of public outreach occurred in the spring of 2024 when the community was invited to participate in an online survey to identify their top traffic safety concerns and the streets they feel are most unsafe. The survey was promoted in both English and Spanish through a combination of traditional media and social media, by connecting with over 20 organizations (including HOAs, Smart Commute, school districts, etc.) that covered a diverse cross-section of the community, and tabling at four community events in different areas of the city. The survey was available in 10 languages.

Over 300 community members responded to the survey.

The survey revealed the top traffic safety concerns, shown in **Figure 7**.

Figure 7. Top Traffic Safety Concerns Reported by Community Members



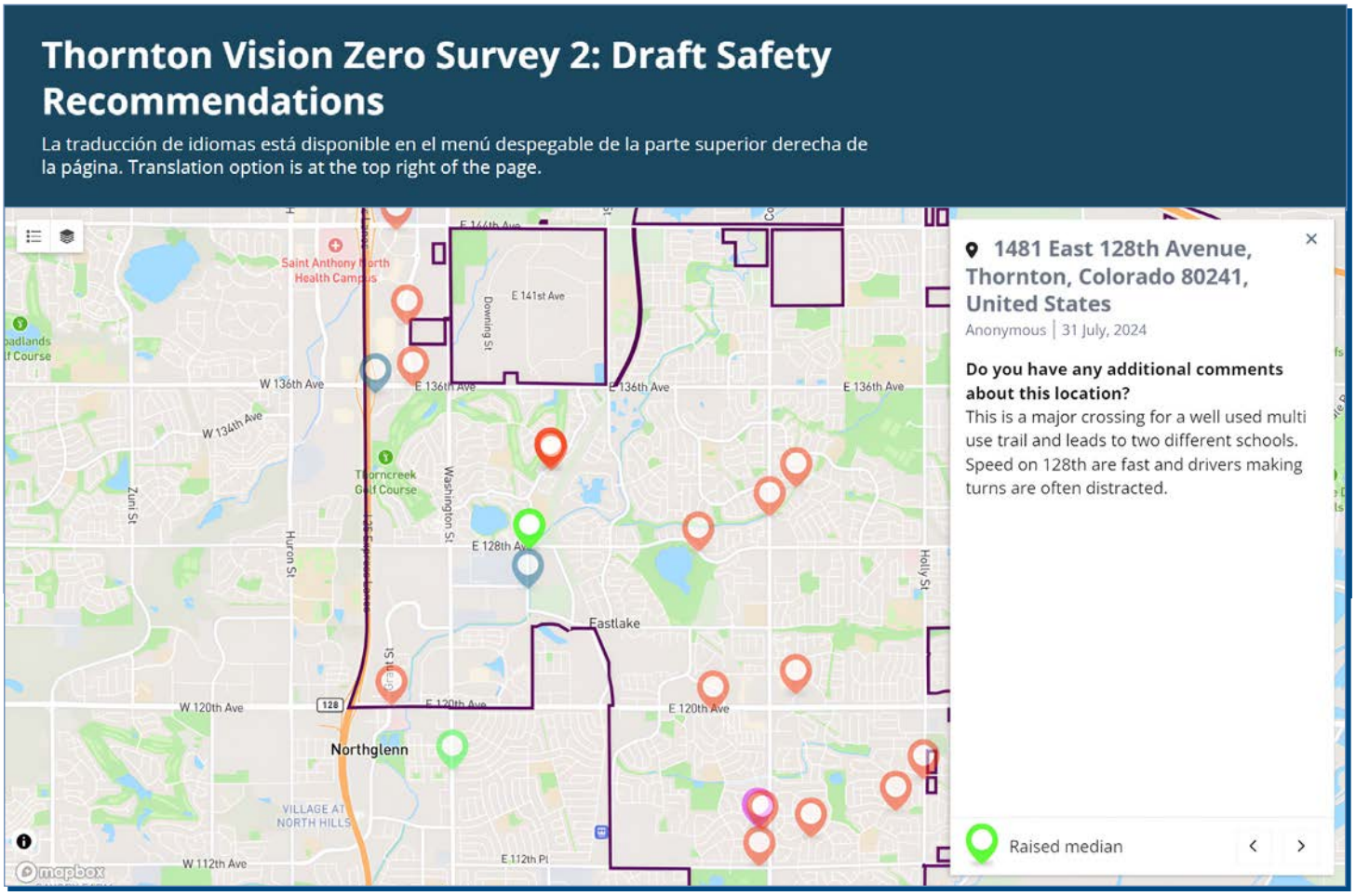
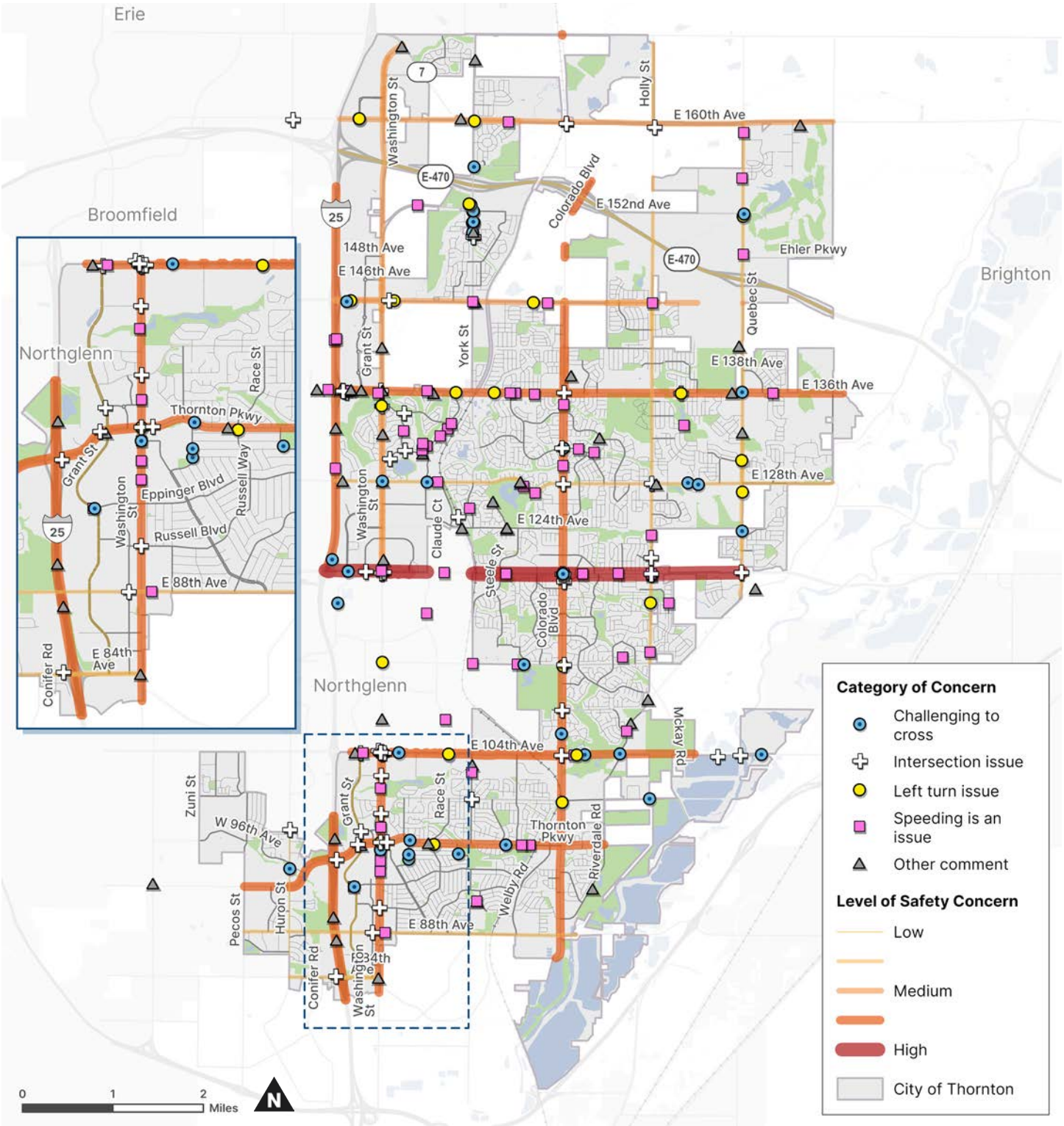


Figure 8 illustrates map comments received during the survey revealing where in Thornton community members are most concerned about traffic safety. Corridors that survey respondents indicated as the most concerning are shown on the map as "High Safety Concern," based on the percentage of respondents that indicated the corridor as a high safety concern.

Figure 8. Phase One: Understanding Community Concerns



In an analysis of open-ended comments provided in the phase one survey, respondents revealed safety improvements they would like to see on Thornton's streets.

Most Common Safety Improvements Desired by Community Members

- *Enforce unsafe behavior (speeding, red-light/stop-sign running, distracted driving)*
- *More all-way stops and traffic lights*
- *Traffic calming in residential neighborhoods and around schools*
- *More bike lanes, trails, sidewalks, and crossings of busy streets*
- *Improve traffic signal coordination and pot-hole repair*
- *Improve visibility of road users at intersections*

Vetting Priorities & Solutions – Phase 2 Community Outreach

The second phase of community engagement occurred in summer 2024. Draft safety recommendations were shared with community members via a community open house held on June 24th at the Margaret Carpenter Recreation Center and a follow-up online survey available July 1 – 31 in English and Spanish.

Local Spanish-language media, including Telemundo, Conecta Colorado, and Conecta Por La Mañana, published video content about the project and helped promote the survey. The survey was also promoted in person at the Healthy Farmers Market, through a press release and in Thornton's weekly T-Mail E-Newsletter, and via social media posts. The survey received 79 responses.

99% of respondents were very supportive or mostly supportive of the draft recommendations.

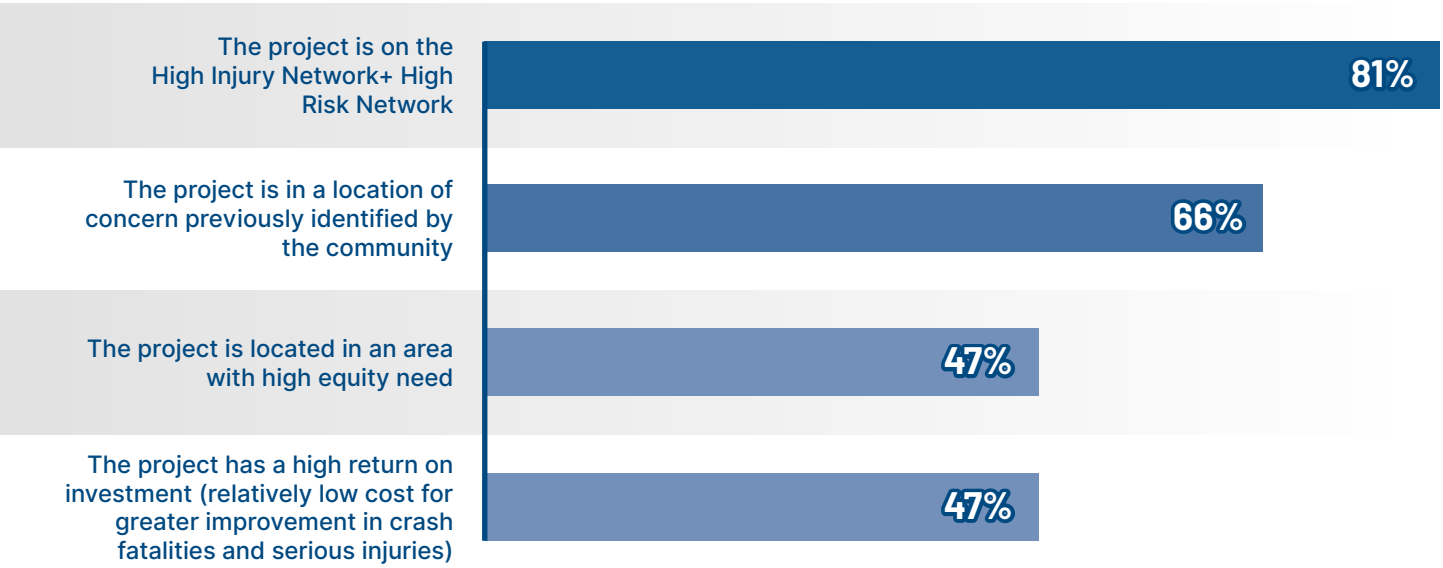
The most common comments received in Phase 2 included the following concerns and desires:

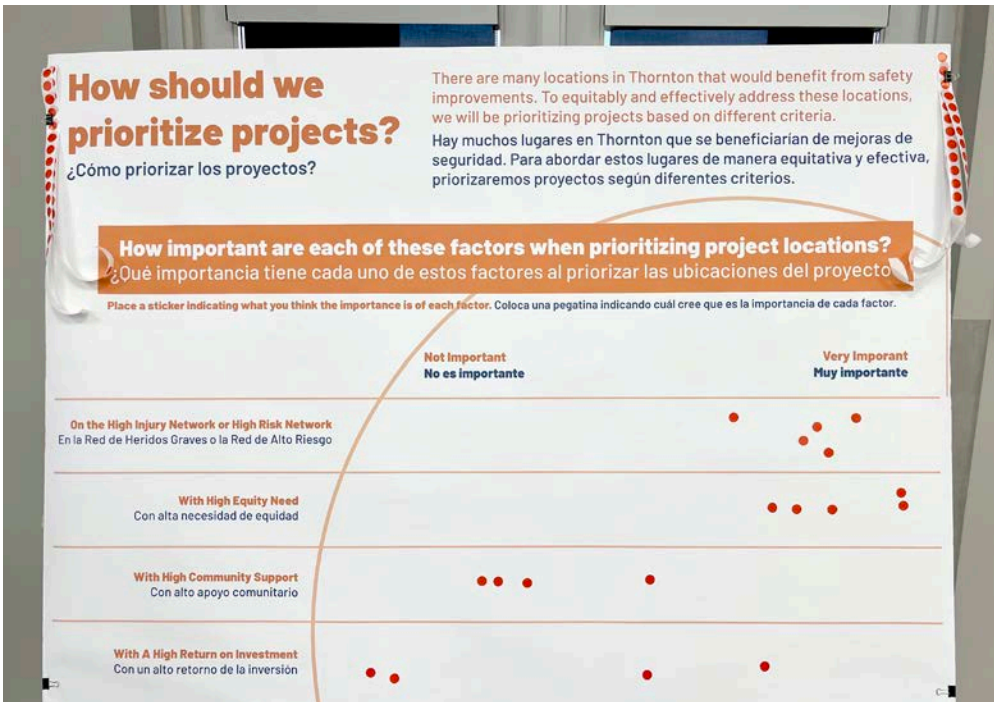
- *Speeds need to be reduced in Thornton*
- *Automated enforcement, such as red-light cameras, received a mix of support and concern*
- *Concern about traffic impacts of projects*
- *Support for physical roadway changes to slow traffic and physically separate pedestrians and bicyclists from vehicles*
- *Concerns about both drivers and pedestrians being distracted*

How Should Safety Projects be Prioritized?

Survey respondents were asked how they want projects prioritized and indicated support for all four prioritization factors presented (see **Figure 9**). Projects on the High Injury Network + High Risk Network as well as those in a location of concern previously identified by community members were prioritized slightly higher than the other factors.

Figure 9. Which Factors are Very Important When Prioritizing Project?



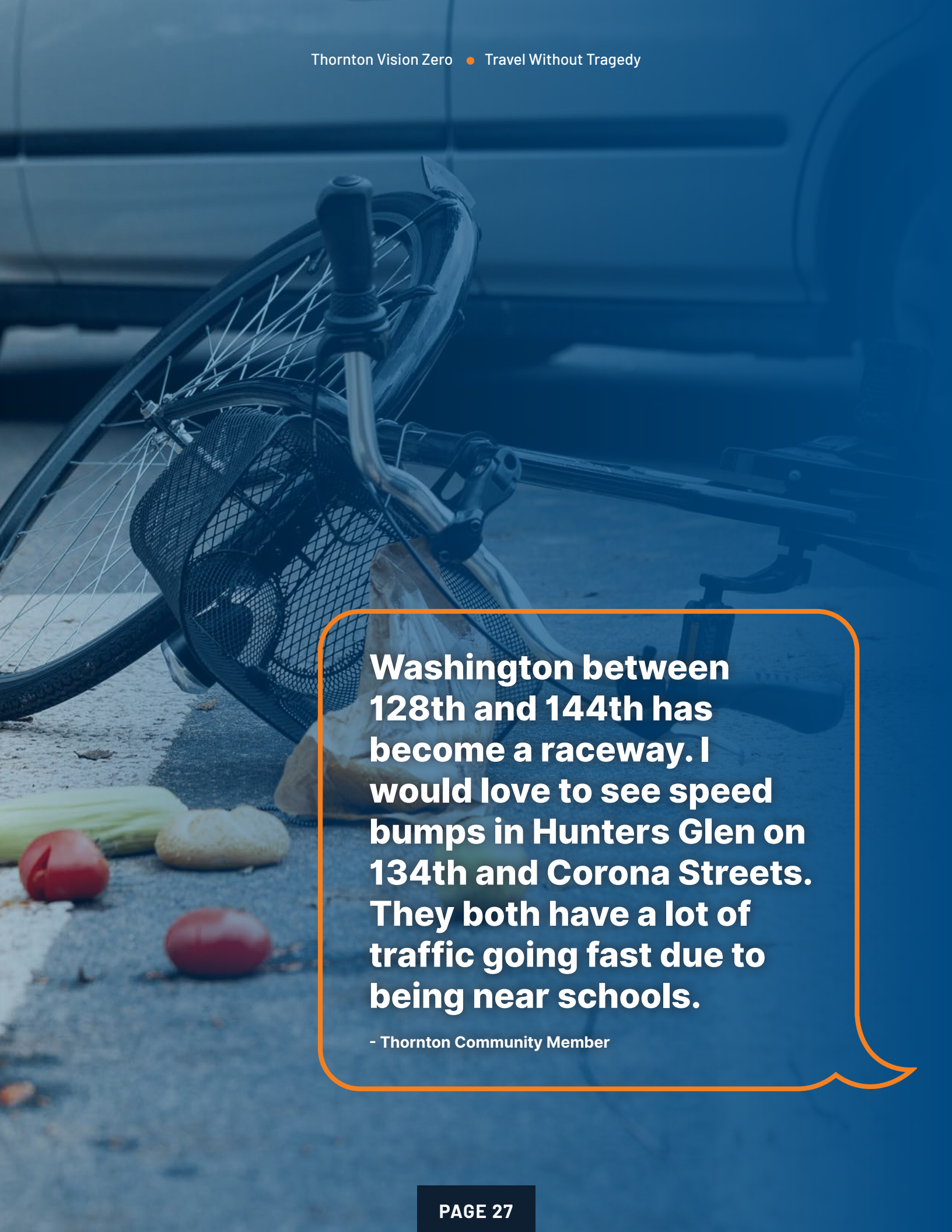


Stakeholder Engagement

A stakeholder group with representatives of key city departments met three times over the course of the project at key milestones. The group coordinated projects and programs and guided recommendations in the Action Plan. Stakeholders included representatives from Traffic Engineering, Infrastructure and Utilities, Capital Projects, Development, Parks & Open Space, the Police Department, and the Fire Department.

Engagement also included a focus group with regional partners to coordinate regional goals, partnership opportunities, and other relevant regional safety projects as well as gather input to guide recommendations. Regional partners that were invited to participate in the focus group included representatives from school districts, E-470, SmartCommute, Regional Transportation District (RTD), Denver Regional Council of Governments (DRCOG), Colorado Department of Transportation (CDOT), Denver Regional Mobility and Access Council (DRMAC), Adams County, Northglenn, Westminster, and Creating SPACE, a Denver nonprofit that provides education on differences and disabilities.

A comprehensive summary of the outreach process, survey results, and stakeholder and focus group meeting notes is provided in **Appendix C**.



Washington between 128th and 144th has become a raceway. I would love to see speed bumps in Hunters Glen on 134th and Corona Streets. They both have a lot of traffic going fast due to being near schools.

- Thornton Community Member

Chapter 4

CRASH PROFILES & SAFETY INTERVENTION TOOLBOX

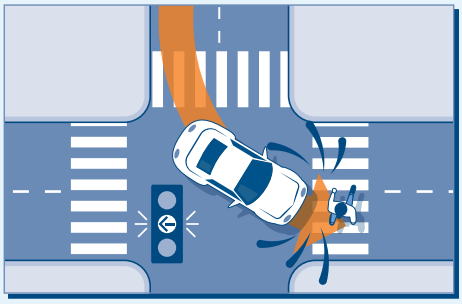
Nine different crash profiles were identified in Thornton that represent the most common crash types that result in fatal and severe injury crashes. Collectively these nine crash types represent 70% of severe crashes that occurred in Thornton from 2018 to 2022.

Identifying these crash profiles helps determine the most effective safety interventions for locations that have experienced or may experience these types of crashes. Each crash profile includes a list of engineering safety interventions that the city can apply to mitigate the crash, with descriptions provided in the subsequent **Safety Interventions** section.

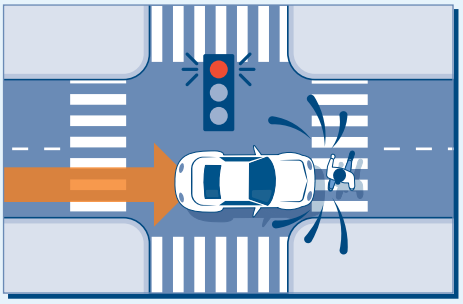
Crash Profiles

Run-Off-The-Road Crashes

Left Turn Crash at Signalized Intersections

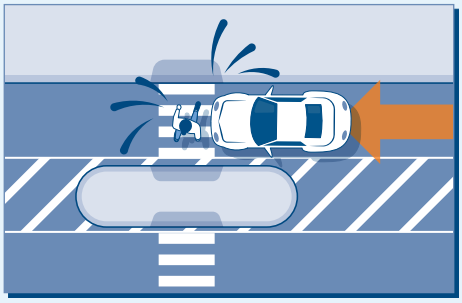


Red-Light Running Crashes

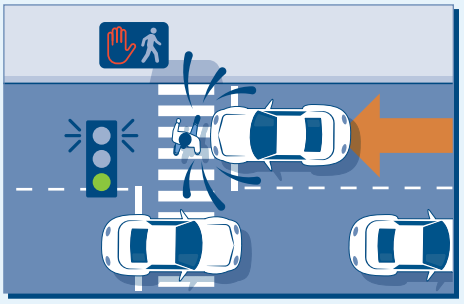


Broadside or Left Turn Crash at Unsignalized Intersections or Driveways

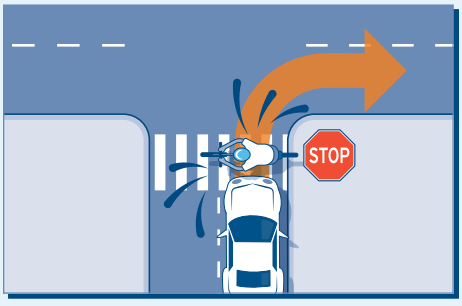
Pedestrian or Bicyclist Crossing Major Street at Unsignalized Locations



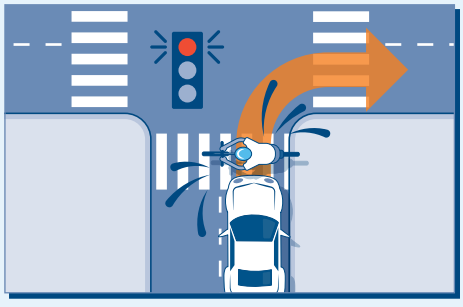
Pedestrian or Bicyclist Crossing Against the Signal



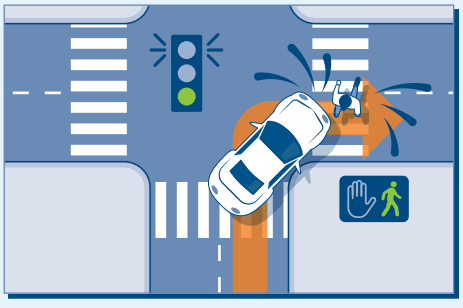
Side-Street Crosswalk Crash



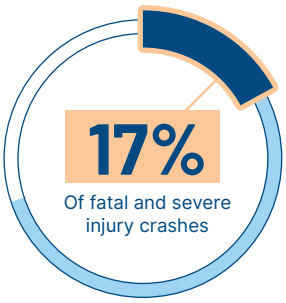
Right Turn on Red Pedestrian or Bicyclist Crash



Right Turn Pedestrian Crash at Signalized Intersections



Run-Off-The-Road Crashes



- Run-Off-The-Road Crashes
- Other Crash Profiles

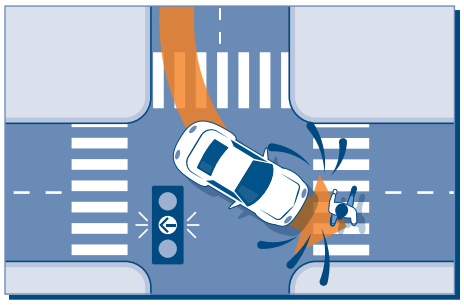
Combined crash profiles make up 70% of severe crashes

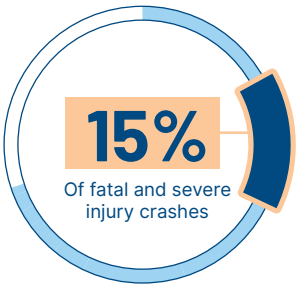
A driver departed the travel lane and struck a fixed object (tree, traffic light, fence, etc.) or pedestrian or bicyclist in the parallel sidewalk or bikeway.

Safety Interventions

- **Speed management**
- **Raised median**
- **Guardrail (rural settings)**
- **Advance warning signs**
- **Outside or median edge line**
- **Rumble strips (rural settings)**
- **Lighting**
- **Shoulder (rural settings)**

Left Turn Crash at Signalized Intersections





- Left-Turn Crash at Signalized Intersections
- Other Crash Profiles

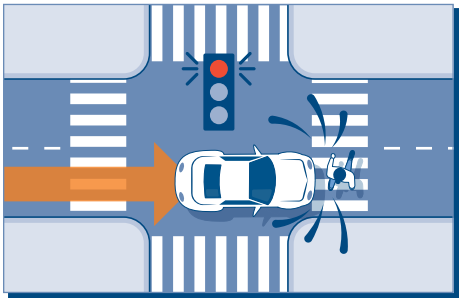
Combined crash profiles make up 70% of severe crashes

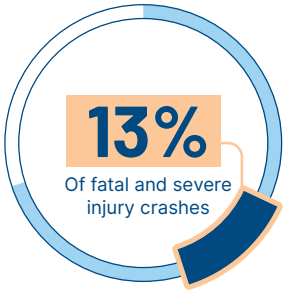
A driver turning left failed to yield to an oncoming vehicle or bicyclist, or pedestrian or bicyclist in the crosswalk.

Safety Interventions

- **Appropriate left turn signal operation (i.e., protected-only, protected-permitted, flashing yellow arrows)**
- **Shift left turn lanes for visibility (positive offset)**
- **Gap dependent flashing yellow arrow**

Red-Light Running Crashes





- Red-Light Running Crashes
- Other Crash Profiles

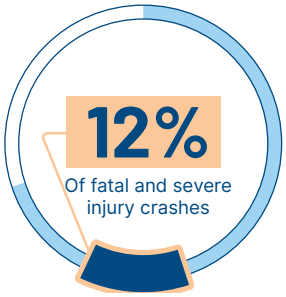
Combined crash profiles make up 70% of severe crashes

A driver ran the red light resulting in a broadside crash or striking a crossing pedestrian or bicyclist in the crosswalk/bikeway.

Safety Interventions

- **Speed management**
- **Improve signal visibility**
- **Red clearance interval detection**
- **Advance warning signs (rural to urban transitions)**
- **Signal timing/coordination**
- **Roundabouts**
- **Retroreflective backplates**
- **Adjust yellow and all-red signal phasing**
- **Red light cameras**

Broadside or Left Turn Crash at Unsignalized Intersections or Driveways



- Broadside or Left-Turn Crash at Unsignalized Intersections or Driveways
- Other Crash Profiles

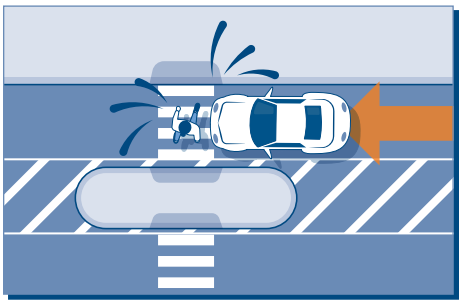
Combined crash profiles make up 70% of severe crashes

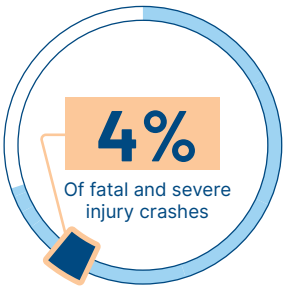
A driver turning onto, from, or crossing an arterial or collector street at a STOP controlled intersection or driveway failed to yield to cross traffic, opposing traffic, or a pedestrian or bicyclist.

Safety Interventions

- **Speed management**
- **Signalize intersection**
- **Shift left turn lanes for visibility (positive offset)**
- **Restrict left turns**
- **Remove visibility obstructions**

Pedestrian or Bicyclist Crossing Major Street at Unsignalized Locations





- Pedestrian or Bicyclist Crossing Major Street at Unsignalized Locations
- Other Crash Profiles

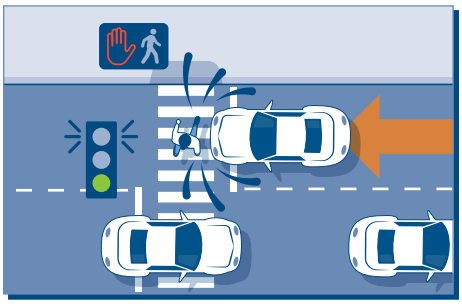
Combined crash profiles make up 70% of severe crashes

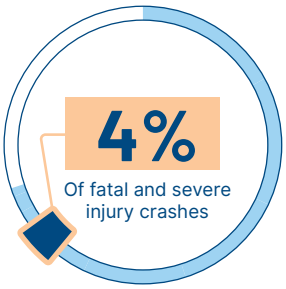
A pedestrian crossing an arterial or collector street midblock or at an uncontrolled crossing (no signal or STOP sign for vehicles) was struck by a crossing vehicle.

Safety Interventions

- **Speed management**
- **Pedestrian refuge medians**
- **High visibility crosswalk and signs**
- **New or improved pedestrian crossing**
- **Shorten crossing distance**
- **Signalized crossings or flashing device**
- **Regular maintenance of crosswalks**
- **Directional curb ramps**
- **Underpass or overpass**

Pedestrian or Bicyclist Crossing Against the Signal





- Pedestrian or Bicyclist Crossing Against the Signal
- Other Crash Profiles

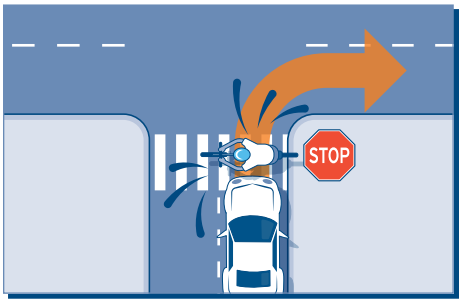
Combined crash profiles make up 70% of severe crashes

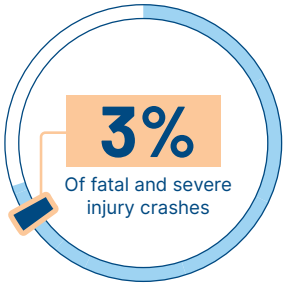
A pedestrian or bicyclist crossed when at a DON'T WALK signal and was struck by a vehicle that had the green signal.

Safety Interventions

- **Speed management**
- **Pedestrian refuge medians**
- **Directional curb ramps**
- **Adjust WALK phase signal timing (includes cycle length)**
- **Shorten crossing distance**

Side-Street Crosswalk Crash





- Side-Street Crosswalk Crash
- Other Crash Profiles

Combined crash profiles make up 70% of severe crashes

A driver turning onto a major street from a side street at an unsignalized intersection failed to yield to a crossing pedestrian or bicyclist traveling along the major street.

Safety Interventions

Remove visibility obstructions

Regular maintenance of crosswalk

Tighten turn radius

New or improved pedestrian crossing

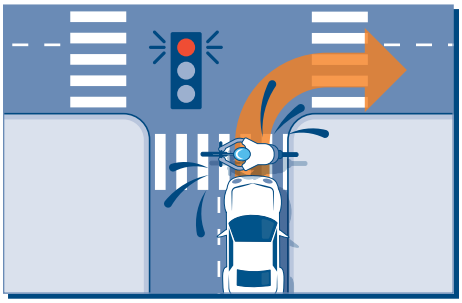
- *Pedestrian refuge median*
- *High visibility crosswalk and signs*
- *Signalized crossings*
- *Shorten the crossing distance*
- *Underpass or overpass*

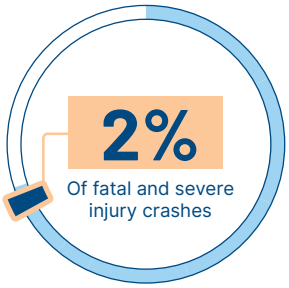
Shorten crossing distance

Directional curb ramps

Setback of shared-use path

Right Turn on Red Pedestrian or Bicyclist Crash





- Right-Turn on Red Pedestrian or Bicyclist Crash
- Other Crash Profiles

Combined crash profiles make up 70% of severe crashes

A driver turning right on red failed to yield to a pedestrian or bicyclist in the crosswalk of the approach lane.

Safety Interventions

Prohibit right turn on red

Directional curb ramps

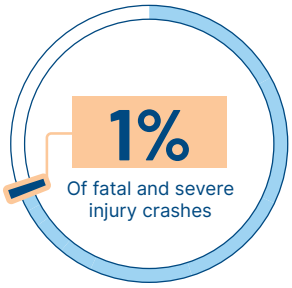
Setback of shared-use path

Protected right turn operations

Regular maintenance of crosswalk

Improve slip lane

Right Turn Pedestrian Crash at Signalized Intersections



- Right-Turn Pedestrian Crash at Signalized Intersections
- Other Crash Profiles

Combined crash profiles make up 70% of severe crashes

A driver turning right at a signalized intersection failed to yield to a pedestrian or bicyclist in the crosswalk of the receiving lane.

Safety Interventions

Leading Pedestrian Interval (LPI)

Improve slip lane

Protected right turn operations

Regular maintenance of crosswalk

Shorten crossing distance

Raised crossing

Tighten turn radius

Directional curb ramps

Safety Interventions

The Safe System Approach is a multifaceted approach to create safer streets. The following list of safety interventions provides a toolbox for Thornton to apply at strategic locations or systemically across the city, (starting with high priority areas) to create Safer Roads.

The interventions are largely physical and operational changes to mitigate the occurrence of the common severe crash types observed in Thornton. They allow and encourage safer behaviors by roadway users and facilitate safe travel by the most vulnerable users (pedestrians and bicyclists, in particular). The interventions are all aimed at reducing speed, increasing visibility, and/or minimizing potential conflict points in time and space.

Some safety interventions may require complete reconstruction of the road while others are simpler fixes.

Speed Management

Evaluate to reduce speed limit. Modify roadway design and operations, such as narrowing lanes, adding curves and lane shifts, or adjusting signal coordination, to encourage slower speeds and pair with automated speed enforcement.

Advance Warning Signs

Signs and markings to warn drivers of a curve in the road, a traffic signal, or pedestrian crossing.

Lighting

Streetlights to improve visibility for drivers at night.

Urban Travel Lane Departure Countermeasures

To mitigate run-off-the-road crashes in urban and suburban contexts:

- **Raised median** - *To prevent vehicles from drifting into opposing traffic.*
- **Outside or median edge line** - *A painted edge line stripe to indicate the edge of the travel lane.*

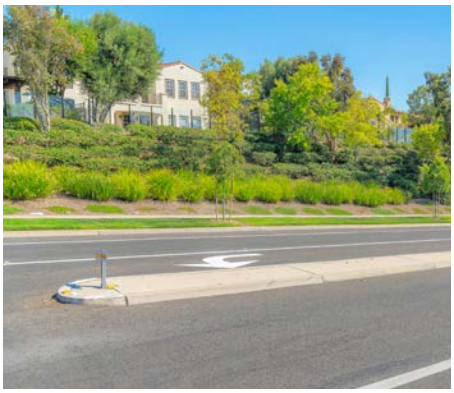
Rural Travel Lane Departure Countermeasures

To mitigate run-off-the-road crashes in rural contexts:

- **Shoulder** - *Paved area along a roadway that gives drivers more recovery area to regain control in the event of a roadway departure.*
- **Guardrail** - *Deflects vehicles that inadvertently depart the travel lane from striking other roadside hazards (e.g., steep banks, trees, light poles, etc.).*
- **Rumble strip** - *Milled element in the pavement adjacent to the travel lane to alert drivers through vibration and sound that their vehicle has left the travel lane.*

Appropriate Left Turn Operations

At locations with visibility issues or limited gaps, only allow left turns with a green arrow. This can also 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. Flashing yellow arrows 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.



Red-Light Running Countermeasures

Evaluate the effectiveness/ feasibility of the following, generally in this order:

- **Retroreflective backplates** – *To improve signal visibility at night.*
- **Signal visibility** – *Remove obstructions, add signal heads, add signal heads in more visible locations, and/ or add advance warning signage or beacons.*
- **Signal timing coordination** – *With nearby traffic signals to minimize risky behavior.*
- *Adjust yellow and all-red intervals.*
- **Red clearance interval detection** – *Technology that can detect when a vehicle is likely to run a red light and extend the all-red interval.*
- **Red light camera** – *Automated enforcement of red-light running using a camera.*

Roundabout

A circular configuration in place of a traffic signal that lowers vehicle speeds and the angle of conflicts, which reduce severe crashes.

Restrict Left turns/ Positive Offset Left turn/Signal/Roundabout

Utilize one of the following to mitigate left turn crashes at driveways and unsignalized intersections:

- *Restrict either left turns onto a major road or all left turns at an unsignalized intersection using a raised median. This also restricts cross traffic.*
- **Positive offset** - *Improve visibility for drivers making a left turn from a major street by shifting the left turn lane location.*
- **Right turn lane adjustment** - *Eliminate or shift 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.*
- *Install a new traffic signal or roundabout.*

Remove Visibility Obstructions

Trim back vegetation, remove on-street parking, or remove other obstructions near an intersection to improve visibility of drivers.

New or Improved Pedestrian Crossing

Add one or more of the following to an unsignalized location:

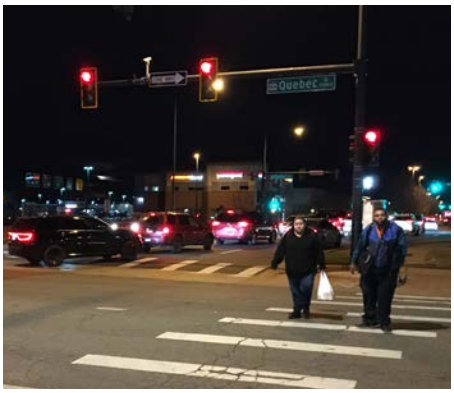
- **High visibility crosswalk and signs** – *Including increased lighting.*
- **Shorten crossing distance** - *Remove or narrow turn lanes, through lanes, or parking lanes and/or tighten the turn radius at an intersection to reduce the crossing distance and exposure of pedestrians at a crossing.*
- **Pedestrian refuge median** *– so pedestrians can cross in two stages and to increase visibility of crossing pedestrians.*
- **Rapid Rectangular Flashing Beacon (RRFB)** – *Pedestrians activate a flashing beacon prior to crossing.*
- *New traffic signal (or Pedestrian Hybrid Beacon).*
- **Underpass or overpass** - *A pedestrian tunnel or bridge at high volume areas to separate vehicle traffic and people walking, rolling, or biking.*

Regular Maintenance of Crosswalk

Maintain crosswalks to be clearly visible at all times.

Shorten Crossing Distance

Remove or narrow turn lanes, through lanes, or parking lanes and/or tighten the turn radius or set back the crosswalk at an intersection to reduce the crossing distance and exposure of pedestrians at a crossing



LPI (Leading Pedestrian Interval)

The “WALK” phase at a signal starts 3-7 seconds before vehicles get a green light.

Directional Curb Ramps

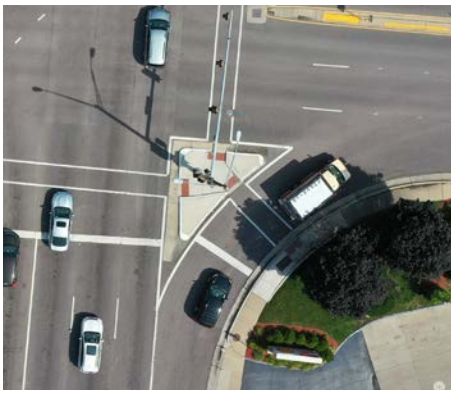
Provide two ramps per intersection corner (from the sidewalk grade to the street crossing grade) to direct pedestrians in the correct orientation of the crosswalk. As compared to diagonal curb ramps, directional curb ramps can shorten the crossing distance, minimize pedestrian conflict with traffic, and improve visibility and predictability of pedestrians.

Protected Right Turn Operations

Only allow right turns with a green arrow (requires exclusive right turn lane).

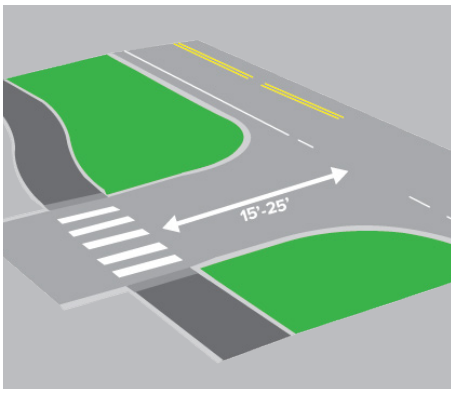
Tighten Turn Radius

Tighten the turn radius at an intersection to slow turning vehicles, reduce exposure, and increase visibility of pedestrians.



Improve Slip Lane

Remove the right turn slip lane at an intersection or change the angle to slow turning vehicles and increase visibility of pedestrians.



Adjust WALK Phase Signal Timing

Evaluate the following signal timing adjustments to increase the frequency and length of the WALK phase at a signalized intersection to minimize risky pedestrian crossing behavior:

- **Shorten cycle length** - *Adjust the signal timing to reduce the wait time before the "WALK" phase.*
- **Extend or automate the "WALK" phase** - *Extend or automate the "WALK" (and associated flashing "DON'T WALK") phase to occur for the full length of the parallel street green phase.*

Pedestrian Refuge Medians

A median so pedestrians can cross in two stages while also increasing driver visibility of crossing pedestrians.

Setback of Shared-Use Path

Bend the sidewalk or shared-use path to cross the minor street 15 to 25 feet prior to the intersection to allow a driver to yield to the path crossing and cross traffic separately.

Matching Safety Interventions and Crash Types

Table 1 shows the consolidated safety interventions that should be considered to mitigate each crash type. Each safety intervention may have different levels of effectiveness for different crash types.

Table 1. Safety Interventions Applicable to Each Crash Profile

SAFETY INTERVENTION	Run-Off-The-Road Crashes	Left Turn Crash at Signalized Intersections	Red-Light Running Crashes	Broadside or Left Turn Crash at Unsignalized Intersections or Driveways	Pedestrian or Bicyclist Crossing Major Street at Unsignalized Locations	Pedestrian or Bicyclist Crossing Against the Signal	Side-Street Crosswalk Crash	Right Turn on Red Pedestrian or Bicycle Crash	Right Turn Pedestrian Crash at Signalized Intersections
Speed management	•		•	•	•	•			
Advance warning signs	•		•						
Medians/refuge medians	•			•	•	•			
Lighting	•								
Urban travel lane departure countermeasures	•								
Rural travel lane departure countermeasures	•								
Appropriate left turn operations (including FYA)		•							
Red-light running countermeasures			•						
Roundabout			•	•					
Restrict left turns/positive offset left turn/ signalize/roundabout		•		•					
Remove visibility obstructions				•			•		
New or improved pedestrian crossing					•		•		
Regular maintenance of crosswalk					•		•	•	•
Shorten crossing distance					•	•	•		•
Adjust WALK phase signal timing						•			
Directional curb ramps						•	•	•	•
Tighten turn radius							•		•
Setback of shared-use path							•	•	
Prohibit right on red								•	
Improve slip lane								•	•
Protected right turn operations								•	•
Leading Pedestrian Interval (LPI)									•

I think pedestrian and bicycle-focused solutions would be a big help. Many pedestrians that jaywalk seem to do so at areas where there are large distances between pedestrian crossing locations. Installing RRFBs on certain roads between intersections might be beneficial.

- Thornton Community Member

Ensure feedback and ideas and needs are being elicited more from those areas where projects will be prioritized. I support more projects down south for the equity and incident density aspects. I want to make sure those solutions implemented there have more input by those people.

- Thornton Community Member

Chapter 5

EQUITY CONSIDERATIONS

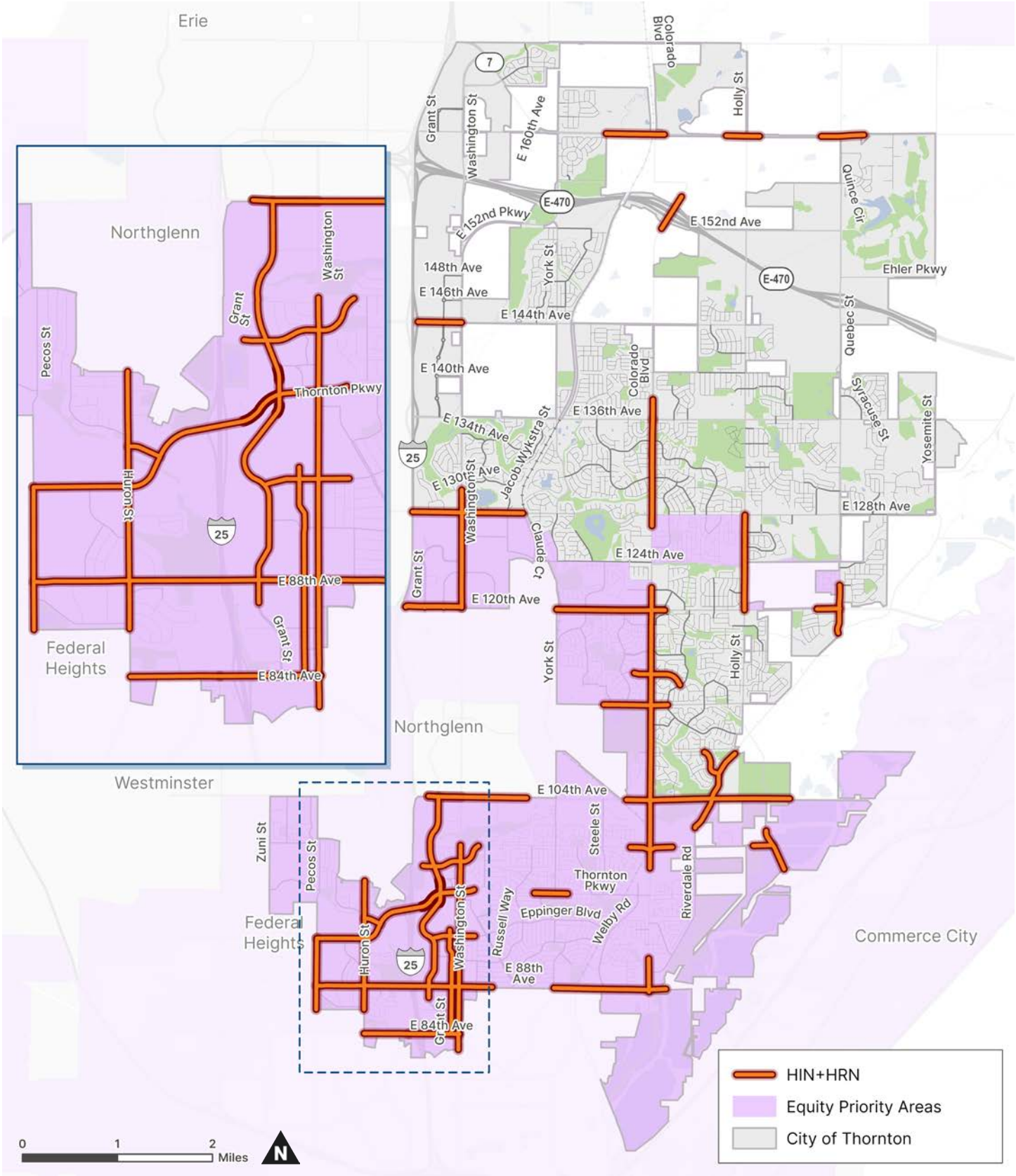
Nationwide, traffic fatalities disproportionately occur in communities of color and lower income communities.[2]

Figure 10 shows historically marginalized areas in Thornton. The map uses the Denver Regional Council of Governments (DRCOG) Equity Index, which considers 10 demographic indicators. Indicators include measures of poverty, such as percent of households spending more than 30% of their income to pay rent or a mortgage, as well as mobility measures, such as vehicle availability and disability status.

Areas of Thornton that scored in the 65th percentile or above on DRCOG's equity index were identified as locations with a high equity need. **These areas accounted for 71% of fatal and severe injury crashes in the city from 2018-2022, despite having 59% of the city's population.** The equity index map is one factor considered in project prioritization (see **Appendix A** for how the Equity Index was factored into prioritization). Projects that fall within the area identified as historically marginalized may also be eligible for certain grant funds.

2 Glassbrenner, D., Herbert, G., Reish, L., Webb, C., & Lindsey, T., (2022, September). Evaluating disparities in traffic fatalities by race, ethnicity, and income (Report No. DOT HS 813 188). National Highway Traffic Safety Administration. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813188

Figure 10. DRCOG Equity Index



We shouldn't be looking at these improvements as a "return on investment" when we're talking about resident safety. Instead of waiting for something like this to happen in certain areas, we should be proactive about PREVENTING them from happening in the first place!

- Thornton Community Member

Chapter 6

ACTION PLAN

Thornton is committed to Vision Zero and has determined a path forward to eliminating severe and fatal crashes by 2040. The recommended actions outlined in this section will help the city achieve this goal. The Action Plan identifies the responsible party, partners to collaborate with, and timeline. While many actions in this plan will be a collaborative effort of multiple departments within the city as well as other agencies, Thornton's Infrastructure Department will lead oversight of implementation of this plan.

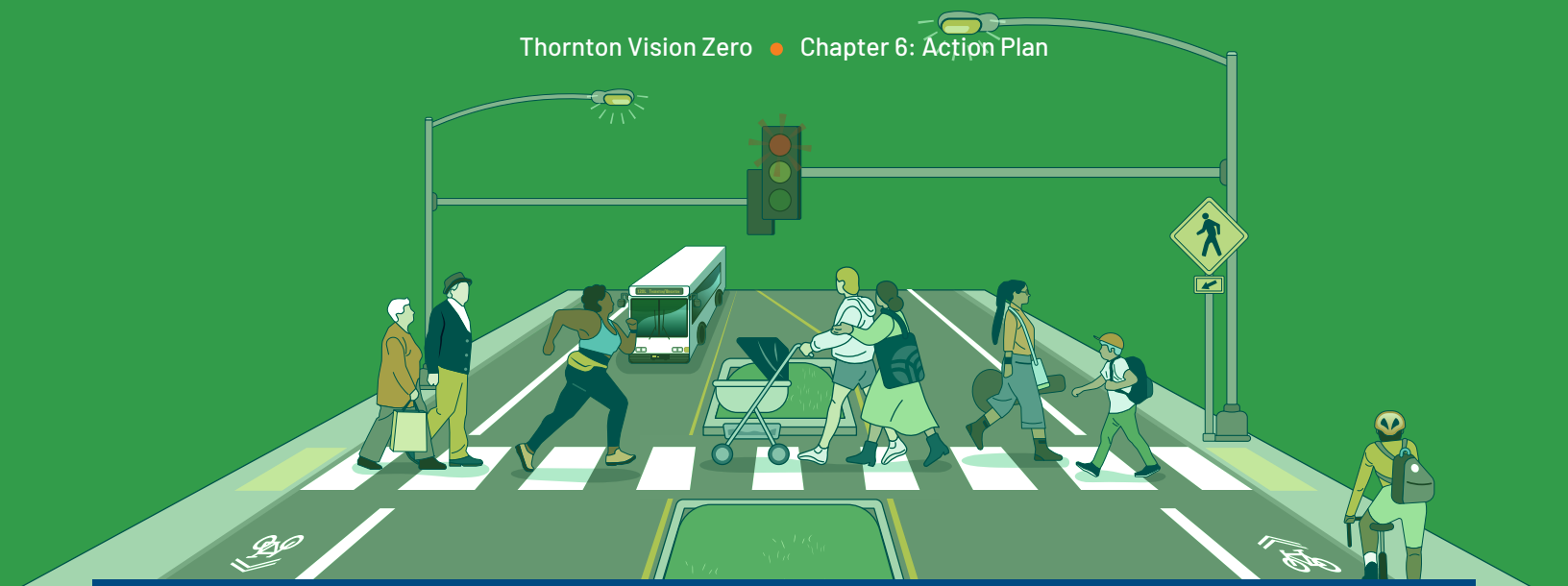
These projects are just the beginning. Thornton's commitment to safe streets and roads for all will continue beyond this list. Thornton will annually track progress and update this Action Plan every five years to continue improving Thornton's roadways until all who move through Thornton can ***travel without tragedy****.*

Safe System Approach

The Safe System Approach incorporates five elements that comprehensively address safety within the road system.

Because the city has more control over road design, construction, and enforcement, the biggest opportunity for increasing safety falls within the "Safer Roads" and "Safer Speeds" elements, of the Safe System Approach. While many of the actions and funds will be directed to these two elements, Thornton should also take actions, as appropriate and feasible, to support safer people, safer vehicles, and post-crash care.

Each element can be addressed through capital projects (construction), policy and funding, enforcement and education, collaboration, and performance monitoring and reporting.



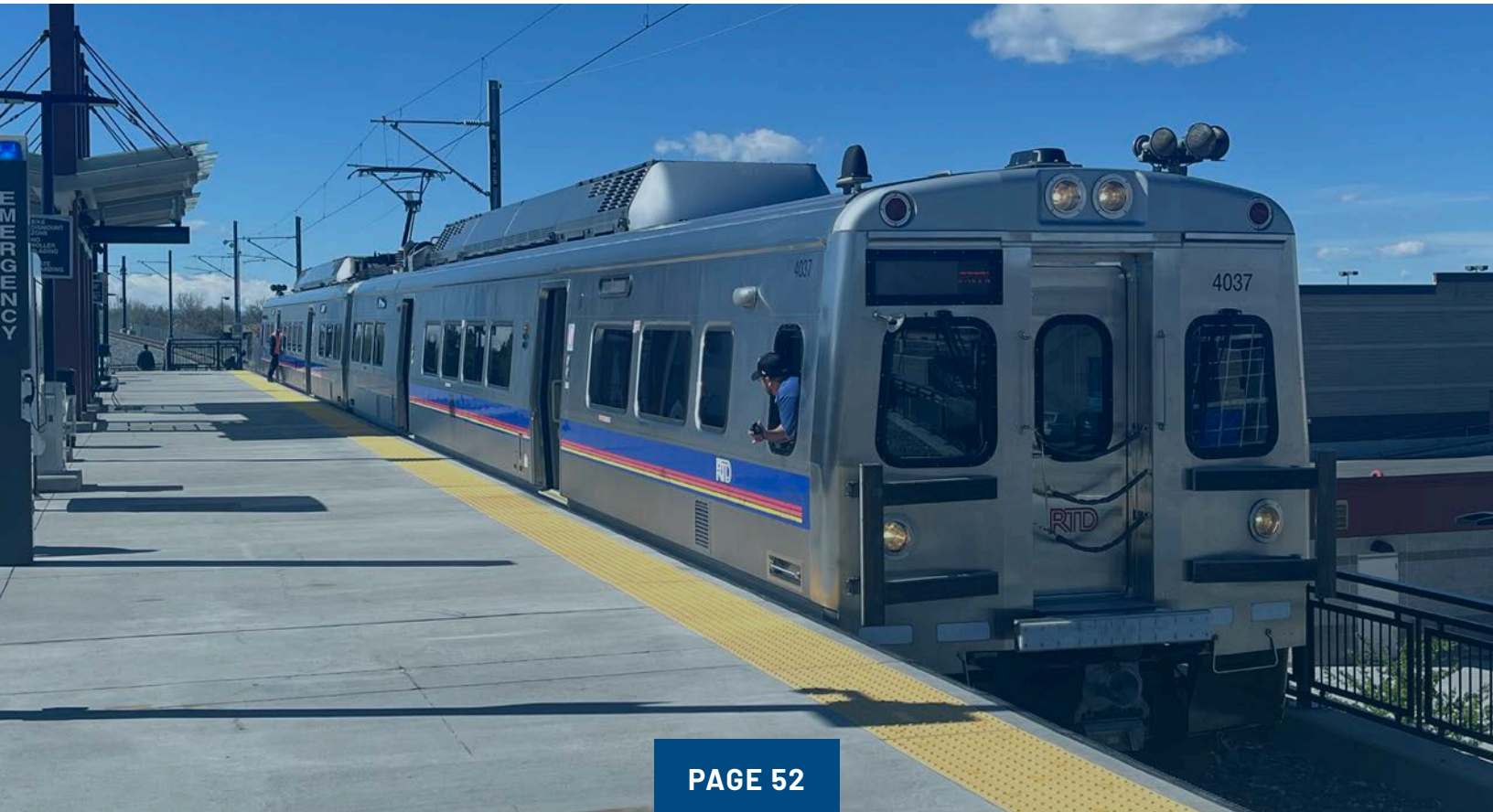
Safer Roads

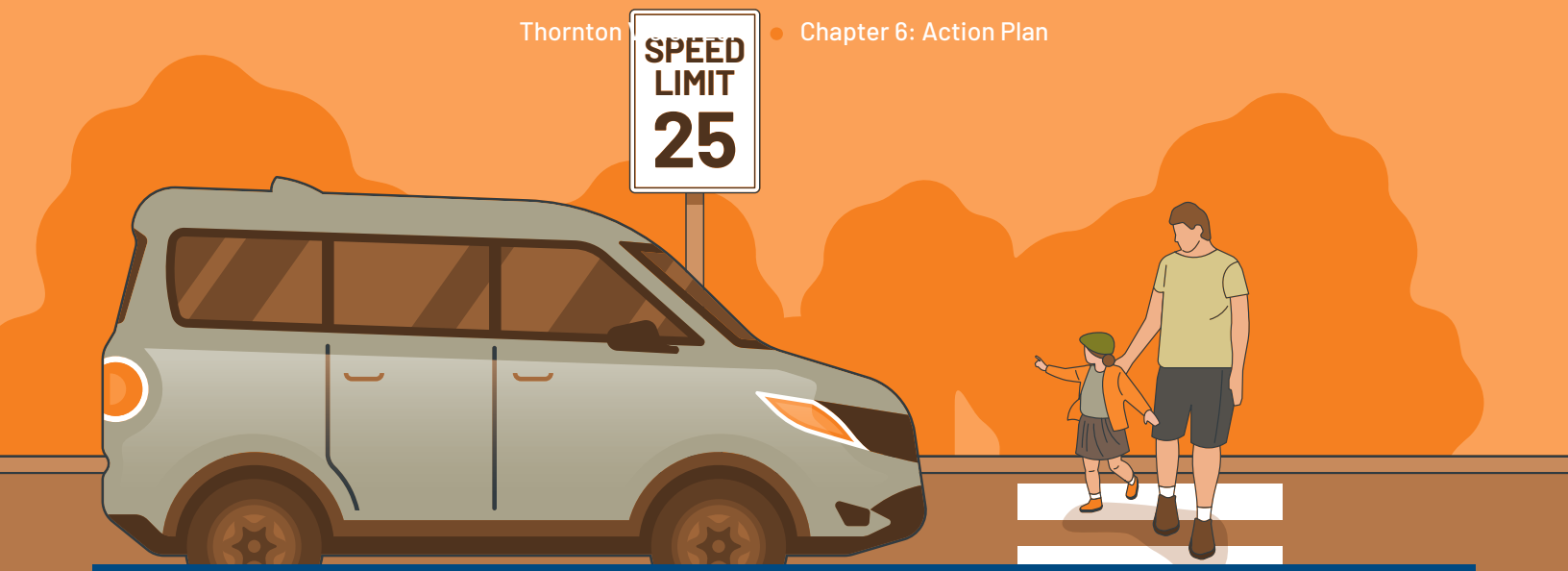
Design roadways to reduce the chances of human error and minimize injuries. Prioritize safety for all road users, especially those who are most vulnerable, by creating environments that encourage safer behaviors.

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Capital Projects				
Implement Safety Interventions at Priority Project Locations	See Priority Safety Projects and supplemental **Prioritization Guide (Appendix A)**.	Infrastructure		2030
Implement Systemic Safety Interventions Across the City	See Systemic Safety Interventions.	Infrastructure		2040
Implement Quick-Build Solutions	Develop and deploy quick-build solutions—such as temporary barriers, paint, or signage—to rapidly address urgent safety issues while more permanent infrastructure changes are being planned. These solutions provide immediate benefits and allow for real-time testing and community feedback.	Infrastructure	Police	2035

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Policy & Funding				
Prioritize Safety in Capital Improvement Projects	Embed safety as a top priority in the Capital Improvement Project process, ensuring that infrastructure investments contribute to safer transportation systems.	Infrastructure	Parks	2030
Update City Street Standards with Vision Zero Principles	Revise city street standards to integrate Vision Zero principles, focusing on eliminating traffic fatalities and severe injuries through design and policy changes. This should include left turn and right turn policies (to prioritize protected turns), signal timing (crosswalks, LPI, etc.), and target operating speed among others.	City Development, Infrastructure	Parks	2030
Prioritize Safety in Street Improvement Projects Triggered by Development	Update Traffic Impact Analysis standards to mandate that street improvement projects triggered by new developments incorporate safety enhancements aligned with Vision Zero goals.	City Development	Infrastructure, Parks	2030
Secure a Sustainable Funding Source	Work to secure a sustainable local Vision Zero funding source each year to implement high priority projects, and systemic safety improvements, and to match grant funding opportunities.	Infrastructure	Police	Ongoing
Enforcement & Education				
Combine Safety Improvements with Publicity	Pair safety improvement projects with publicity campaigns to raise awareness and encourage public engagement in road safety efforts.	Infrastructure	Communications	Ongoing

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Collaboration				
Coordinate with RTD for Safer Bus Stops	Work with the Regional Transportation District (RTD) to relocate bus stops where necessary to ensure safer pedestrian crossings and access.	Infrastructure	RTD	Ongoing
Vision Zero Public Concerns Map	Develop and maintain an interactive Vision Zero concerns map where residents can report locations with safety issues.	Infrastructure	City Development - GIS	Ongoing
Performance Monitoring & Reporting				
Track Crash Data Before and After Safety Improvements	Systematically track and analyze crash data before and after implementing safety improvements to measure effectiveness and guide future interventions.	Infrastructure	Police, CDOT	Ongoing





Safer Speeds

Promote safer speeds on all types of roads by using thoughtful design, setting appropriate speed limits, and implementing targeted education and outreach, along with fair enforcement.

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Policy & Funding				
Update Street Design Guidelines	Revise street design guidelines to prioritize safety and reflect changes to design speeds, turning radius, and other systemic safety countermeasures.	City Development	Infrastructure, Police, Fire, Parks	2030
Establish Target Operating Speeds and Reduce Posted Speed Limit	Establish context-based target operating speeds and lower speed limits, as appropriate, to match those targets. Pair with appropriate design and enforcement measures to reduce the likelihood and severity of crashes.	Infrastructure	Police	2030
Match Design Speed with Posted Speed	Ensure that the design speed of streets matches the posted speed limit, creating environments that encourage safer driving behavior.	City Development	Infrastructure	2030
Enforcement & Education				
Expand Automated Enforcement	Increase the use of automated enforcement tools, such as photo radar, coupled with high-visibility signage and publicity, to deter speeding and red-light violations.	Police	Infrastructure, Legal	2030

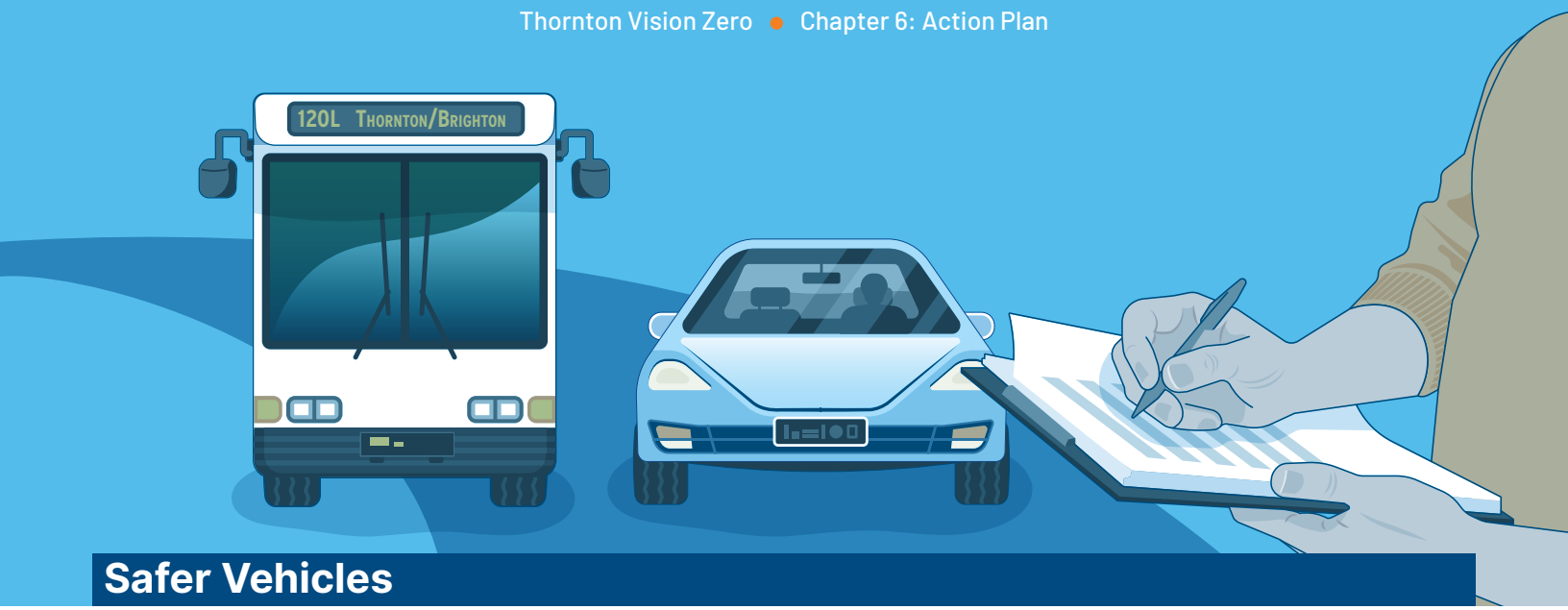
Safer People

Encourage responsible driving and safe behaviors among all road users. Focus on ensuring that everyone can travel safely and reach their destination without harm.

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Policy & Funding				
Develop a Safe Ride Home Program	Develop partnerships to offer promotional codes for free or discounted rides home from establishments or events in Thornton to reduce the potential for DUI, drowsy driving, or distracted driving. This program may be focused on high-risk holidays or event days or applied more broadly to weekend nights.	Police	Communications, Rideshare operators, RTD, local businesses	2030
Enforcement & Education				
Publicized Sobriety Checkpoints	Regularly conduct and widely publicize sobriety checkpoints in high-risk areas and times for DUIs to deter impaired driving and enhance road safety.	Police	Communications	Ongoing

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Safe Routes to School Program	Conduct Safe Routes to School studies for all K-12 campuses in Thornton to identify and address barriers to safe walking and biking for students. Prioritize campuses on or near the High Injury Network + High Risk Network.	Infrastructure	School Districts	2035
Match Fines with Safety Outcomes	Adjust fines for traffic violations to reflect the severity of safety risks posed, with higher fines for repeat offenders and behaviors that have a direct impact on public safety.	Police	Legal	2030
Educate Businesses on High Injury Network + High Risk Network Corridors	Conduct targeted education to businesses along the HIN+HRN (e.g., use caution when exiting driveways). Educational materials could include pamphlets, stickers, window displays, etc. For drinking establishments or restaurants, this could also include information to reduce driving under the influence (e.g., safe ride home number, local taxi number, etc.).	Economic Development	Communications, Chamber of Commerce, local businesses.	2030
Pair Education with Key Engineering Countermeasures	Educational materials can be used to teach people how to use new and unfamiliar safety features, such as Pedestrian Hybrid Beacons (PHBs), roundabouts, or protected bikeways. These materials can consist of informational signs or demonstration videos, and should be presented in multiple languages, including English and Spanish.	Infrastructure	Communications	2030

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Enforcement Priorities Mandate	Use crash history and the High Injury Network + High Risk Network corridors as one criterion for where to concentrate enforcement efforts. This may require additional police department funding.	Police	Infrastructure	2030
Collaboration				
Implement Action Plan and Facilitate Interdepartmental Safety Meetings	Implement the Action Plan and establish regular meetings between Infrastructure, Police Department, Fire Department, City Development, Parks & Open Space, and Communications to collaboratively identify unsafe behaviors, enforce regulations, and communicate safety initiatives to the public.	Infrastructure	Police, Fire, City Development, Parks & Open Space, Communications	Ongoing



Safer Vehicles

Increase the availability of vehicle features and systems that prevent crashes and reduce the severity of crashes for both occupants and others on the road.

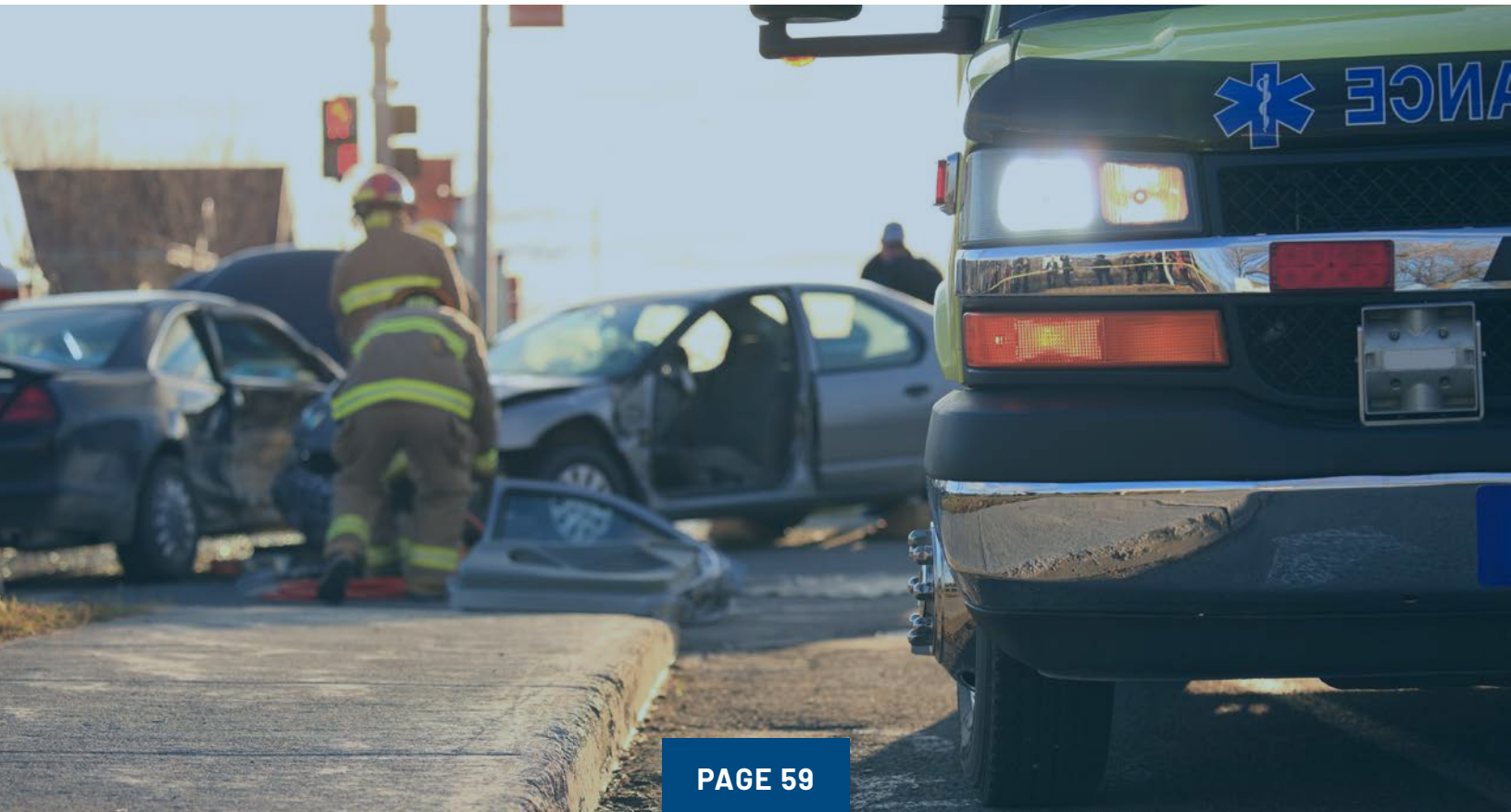
ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Policy & Funding				
Connected and Autonomous (CAT) Vehicle Readiness Planning	Prepare to address the challenges posed by CAT technology. Some strategies for preparation include educating the public on current and future safety features and limitations, developing signing and striping standards, and conducting reviews of equity implications.	Infrastructure	Communications	2040
Enforcement & Education				
Enforcement of Existing Laws Related to Vehicle Safety	Strengthen enforcement of existing vehicle safety laws, such as seatbelt use and vehicle maintenance, to reduce crash risks and improve overall safety.	Police	Legal, Communications	2030
Collaboration				
DRCOG Vision Zero Working Group	Maintain active involvement in the Denver Regional Council of Governments (DRCOG) Vision Zero Working Group to collaborate on regional safety initiatives and advocate for stronger vehicle safety legislation at the state and federal levels.	Infrastructure	DRCOG, neighboring jurisdictions	Ongoing

Post-Crash Care

Enhance crash survival rates by ensuring quick access to emergency medical care. Create a safe environment for first responders and prevent further crashes through effective traffic incident management.

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Capital Projects				
Ensure Emergency Vehicle Preemption at All Signalized Intersections	Install and work with first responders to ensure emergency vehicle preemption (EVP) is working properly at all traffic signals in Thornton to reliably give approaching emergency vehicles a green signal.	Infrastructure	Fire	Ongoing
Enforcement & Education				
Participate in SHRP2 TIM Responder Training Program	Encourage first responders to participate in the FHWA second Strategic Highway Research Program (SHRP2) National Traffic Incident Management (TIM) Responder Training Program to coordinate response to traffic incidents, increase clearance times, and improve safety for both responders and motorists.	Police, Fire, medical providers, tow companies	Infrastructure	2030

ACTION	DESCRIPTION	RESPONSIBLE PARTY	PARTNERS	TIMELINE
Collaboration				
Deploy Response Team to Investigate Severe and Fatal Crashes	Employ an internal, multi-departmental communication strategy in response to severe and fatal collisions. The protocol should outline a path forward for Infrastructure staff to be a part of an investigation of severe and fatal collisions, ensuring a multi-disciplinary response team focused both on the behavioral and engineering elements of a collision. Development of this multi-disciplinary team can also support timely data sharing among city departments and identify quick-build solutions.	Police	Infrastructure, Fire	2030



Priority Safety Projects

Given inherent limitations in resources, the time needed for project design and construction, and the scale of improvements needed, it will not be possible for the city to implement all the safety interventions needed across the city at the same time.

Therefore, this plan includes a list of priority project locations where safety interventions are likely to have the greatest impact. These locations will generally be prioritized for safety interventions.

Safety interventions at locations not currently identified as a priority can and should still occur during the same timeframe as priority locations either as part of the systemic safety improvement program or as opportunities arise from other projects and programs.

The priority project locations for safety interventions in Thornton are a mix of intersection projects and corridor projects. Corridor projects include access management/pedestrian crossing improvement projects and speed management projects.

Intersection Projects

Priority intersection project locations were identified based on crash history, the High Injury Network + High Risk Network, the equity index, and community input.

Most of the priority intersections fall in the HIN+HRN and/or in areas identified by the equity index. Eighty percent of priority intersections fall within areas identified as high equity need and 86% are in the HIN+HRN. Those that are not in the HIN+HRN were included because they were either found to have a high crash rate or multiple community members identified a traffic safety concern at that location. **Appendix B** includes a more detailed methodology for how priority intersections were identified. This process resulted in **69 priority intersection projects**.

For each priority intersection, one or more of the top nine crash profiles were identified as the primary traffic safety concern based on crash history and existing intersection operations. Given the crash profile(s) associated with each intersection and the existing operations, potential safety interventions were also identified for each location. As part of implementation, the city should evaluate applicability and feasibility of each recommended safety intervention to mitigate the observed or potential crash type.

Table 2 lists associated safety interventions to be considered at each project location and priority intersection projects are mapped in **Figure 11**. Guidance for how to prioritize implementation of these projects is provided in the supplemental **Prioritization Guide** (see **Appendix A**) based on additional prioritization criteria.

Table 2. Priority Project Matrix

Intersection projects are not shown in any priority order. See the supplemental **Prioritization Guide (Appendix A)** for guidance on prioritizing these projects. **Note that orange highlighted intersections will require interagency collaboration.**

ID	INTERSECTION	SUSPECTED PRIMARY CRASH TYPE	Red-light Running Countermeasures	Appropriate Left turn operations	Protected Right turn Operations	Restrict Left turns/Positive Offset Left turn/Signalize / Roundabout	Remove Visibility Obstructions	Prohibit Right-on-Red	Leading Pedestrian Interval (LPI)	Adjust WALK Signal	Regular Maintenance of Crosswalk	Install Directional Curb Ramps	Tighten Turn Radius	Shorten the Crossing Distance	Install Refuge Median	New or Improved Pedestrian Crossing	Setback Shared Use Path
1	E 128th Ave & Emerson St	Side-street Crosswalk Crash					•					•	•	•		•	•
2	Colorado Blvd & E 88th Ave	Right turn Pedestrian Crash at Signalized Intersection, Pedestrian or Bicyclist Crossing Against the Signal			•				•	•					•		
3	E 128th Ave & Washington St	Right turn on Red Pedestrian or Bicycle Crash, Red Light Running	•					•			•	•	•	•			
4	E 84th Ave & Washington St	Red Light Running, Right turn Pedestrian Crash at Signalized Intersection, Pedestrian or Bicyclist Crossing Against the Signal	•					•	•	•	•	•	•	•	•		
5	Conifer Rd & W 84th Ave	Right turn on Red Pedestrian or Bicycle Crash, Left turn Crash at Signalized Intersection		•				•			•	•				•	
6	E 104th Ave & Washington St	Red Light Running, Right turn Pedestrian Crash at Signalized Intersection, Pedestrian or Bicyclist Crossing Against the Signal	•						•	•	•	•		•			
7	Pennsylvania St & Washington Center Pkwy & Washington St	Right turn on Red Pedestrian or Bicycle Crash, Red Light Running	•					•			•	•	•				•
8	E 120th Ave & Grant St	Right turn on Red Pedestrian or Bicycle Crash, Red Light Running, Pedestrian or Bicyclist Crossing Against the Signal	•					•	•	•	•	•	•	•	•		
9	Colorado Blvd & E 112th Ave	Left turn Crash at Signalized Intersection, Right turn on Red Pedestrian or Bicycle Crash, Red Light Running	•	•				•			•	•	•	•			
10	Colorado Blvd & E 115th Ave	Red Light Running, Right turn on Red Pedestrian or Bicycle Crash	•					•			•	•	•	•			
11	Colorado Blvd & E 120th Ave	Red Light Running, Right turn Pedestrian Crash at Signalized Intersection	•						•		•						
12	Colorado Blvd & E 136th Ave	Red Light Running	•								•	•					
13	Corona St & E 88th Ave	Red Light Running, Pedestrian or Bicyclist Crossing Major Street at Unsignalized Location, Left turn Crash at Signalized Intersection	•	•						•	•	•		•			
14	E 112th Ave & Steele St	Side-street Crosswalk Crash					•				•	•					•
15	Holly St & E 121st Ave	Side-street Crosswalk Crash, Broadside or Left turn Crash at Unsignalized Intersection or Driveway				•	•					•					•
16	Washington St & E 130th Ave	Right turn Pedestrian Crash at Signalized Intersection							•		•	•	•				
17	E 144th Ave & Washington St	Red Light Running	•														

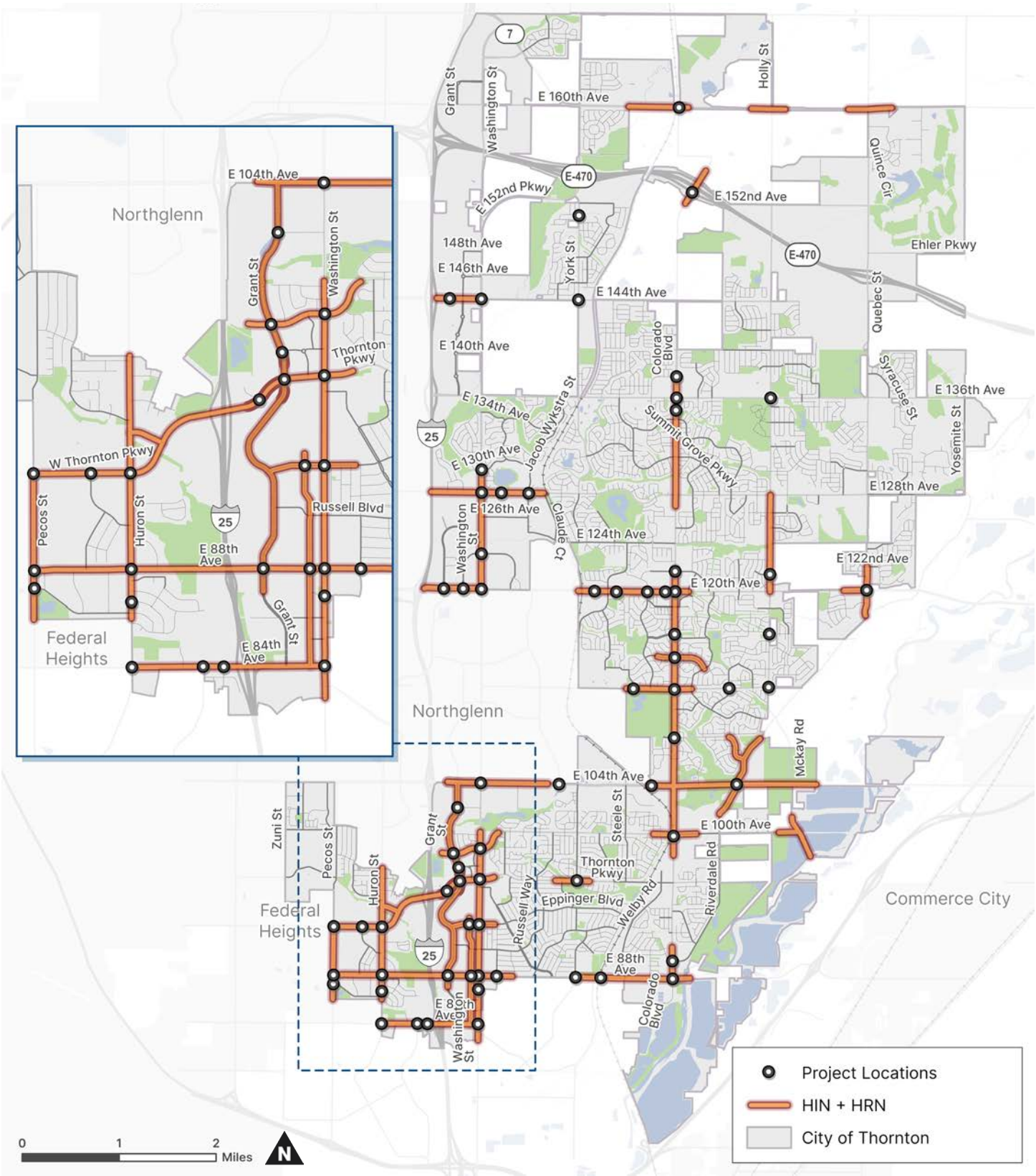
ID	INTERSECTION	SUSPECTED PRIMARY CRASH TYPE	Red-light Running Countermeasures	Appropriate Left turn operations	Protected Right turn Operations	Restrict Left turns/Positive Offset Left turn/Signalize / Roundabout	Remove Visibility Obstructions	Prohibit Right-on-Red	Leading Pedestrian Interval (LPI)	Adjust WALK Signal	Regular Maintenance of Crosswalk	Install Directional Curb Ramps	Tighten Turn Radius	Shorten the Crossing Distance	Install Refuge Median	New or Improved Pedestrian Crossing	Setback Shared Use Path
18	E 88th Ave & Grant St	Pedestrian or Bicyclist Crossing Against the Signal, Right turn Pedestrian Crash at Signalized Intersection, Left turn Crash at Signalized Intersection		•				•	•	•	•	•	•	•	•		
19	E 88th Ave & Welby Rd	Right turn on Red Pedestrian or Bicycle Crash						•			•	•	•				
20	E 88th Ave & Washington St	Red Light Running, Right turn on Red Pedestrian or Bicycle Crash, Right turn Pedestrian Crash at Signalized Intersection, Pedestrian or Bicyclist Crossing Against the Signal	•					•	•	•	•	•	•	•			
21	Huron St & W 88th Ave	Red Light Running, Left turn Crash at Signalized Intersection	•	•							•	•		•			
22	Pecos St & Milky Way	Side-street Crosswalk Crash					•				•	•				•	•
23	Pecos St & W 88th Ave	Left turn Crash at Signalized Intersection, Red Light Running	•	•							•	•					
24	E 120th Ave & Pennsylvania St	Left turn at Signalized Intersection, Red Light Running, Right turn on Red Pedestrian or Bicyclist Crash	•	•			•	•			•	•		•			
25	E 120th Ave & Saint Paul St	Side-street Crosswalk Crash					•				•	•					•
26	E 120th Ave & Washington St	Pedestrian or Bicyclist Crossing Against the Signal, Right turn Pedestrian Crash at Signalized Intersection, Red Light Running	•						•	•	•	•		•	•		
27	Sheldon Dr & Washington St	Left turn Crash at Signalized Intersection		•							•	•					
28	Thornton Pkwy & Washington St	Red Light Running, Right turn on Red Pedestrian or Bicyclist Crash	•					•			•	•	•	•			
29	Colorado Blvd & E 135th Dr & E 135th Pl	Pedestrian or Bicyclist Crossing Major Street at Unsignalized Location										•				•	
30	Grant St & E 102nd Ave	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
31	E 144th Ave & Lincoln St	Red Light Running	•														
32	E 88th Ave & Rainbow Ave & York St	Pedestrian or Bicyclist Crossing Against the Signal, Right turn on Red Pedestrian or Bicyclist Crash, Left turn Crash at Signalized Intersection		•				•		•	•	•	•	•			
33	Huron St & Planet Pl & Star Point Plr	Side-street Crosswalk Crash					•				•	•				•	•
34	W Thornton Pkwy & Pecos St	Left turn Crash at Signalized Intersection		•													
35	W 84th Ave & Acoma Way	Broadside or Left turn Crash at Unsignalized Intersection or Driveway				•											

ID	INTERSECTION	SUSPECTED PRIMARY CRASH TYPE	Red-light Running Countermeasures	Appropriate Left turn operations	Protected Right turn Operations	Restrict Left turns/Positive Offset Left turn/Signalize / Roundabout	Remove Visibility Obstructions	Prohibit Right-on-Red	Leading Pedestrian Interval (LPI)	Adjust WALK Signal	Regular Maintenance of Crosswalk	Install Directional Curb Ramps	Tighten Turn Radius	Shorten the Crossing Distance	Install Refuge Median	New or Improved Pedestrian Crossing	Setback Shared Use Path
36	Thornton Pkwy & Civic Center Dr	Left turn Crash at Signalized Intersection		•													
37	Colorado Blvd & Woodglen Blvd	Left turn Crash at Signalized Intersection		•							•	•	•	•			
38	E 128th Ave & Lafayette St	Left turn Crash at Signalized Intersection, Red Light Running	•	•							•	•					
39	Eppinger Blvd & Pearl St	Pedestrian or Bicyclicts Crossing Major Street at Unsignalized Location									•	•					
40	Eppinger Blvd & Washington St	Red Light Running, Left turn Crash at Signalized Intersection, Pedestrian or Bicyclist Crossing Against the Signal, Right turn Pedestrian Crash at Signalized Intersection.	•	•				•	•	•	•	•					
41	Huron St & W Thornton Pkwy	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
42	E 104th Ave & Riverdale Rd	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
43	E 98th Ave & Grant St	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
44	Colorado Blvd & E 138th Ave	Left turn Crash at Signalized Intersection		•													
45	E 97th Ave & Grant St	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
46	E 88th Ave & Pearl St	Red Light Running, Left turn Crash at Signalized Intersection, Right turn Pedestrian Crash at Signalized Intersection	•	•					•		•	•	•				
47	Madison St & E 120th Ave	Left turn Crash at Signalized Intersection		•							•	•					
48	Grant St & Thornton Pkwy	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
49	Thornton Pkwy & Gale Blvd	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
50	Colorado Blvd & E 160th Ave	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
51	E 112th Ave & Holly St	Red Light Running	•														
52	Holly St & E 117th Ave	Broadside or Left turn Crash at Unsignalized Intersections or Driveways, Side-street Crosswalk Crash				•	•					•				•	•
53	E 144th Ave & York St	Left turn Crash at Signalized Intersection, Red Light Running	•	•													

ID	INTERSECTION	SUSPECTED PRIMARY CRASH TYPE	Red-light Running Countermeasures	Appropriate Left turn operations	Protected Right turn Operations	Restrict Left turns/Positive Offset Left turn/Signalize / Roundabout	Remove Visibility Obstructions	Prohibit Right-on-Red	Leading Pedestrian Interval (LPI)	Adjust WALK Signal	Regular Maintenance of Crosswalk	Install Directional Curb Ramps	Tighten Turn Radius	Shorten the Crossing Distance	Install Refuge Median	New or Improved Pedestrian Crossing	Setback Shared Use Path
54	Holly St & E 136th Ave	Right turn Pedestrian Crash at Signalized Intersection							•		•						
55	E 104th Ave & Irma Dr	Left turn Crash at Signalized Intersection, Red Light Running	•	•													
56	E 104th Ave & Fox Run Pkwy	Left turn Crash at Signalized Intersection, Red Light Running, Pedestrian or Bicyclist Crossing Against the Signal, Right turn on Red Pedestrian or Bicyclist Crash	•	•				•		•	•	•		•	•		
57	E 98th Ave & Washington St	Left turn at Signalized Intersection, Red Light Running, Right turn Pedestrian Crash	•	•					•		•	•					
58	E 112th Ave & Cherry Dr	Broadside or Left turn Crash at Unsignalized Intersections or Driveways.				•											
59	York St and E 151st Ave	Pedestrian or Bicyclist Crossing Major Street at Unsignalized Location														•	
60	Thornton Pkwy & York St	Pedestrian or Bicyclist Crossing Against the Signal, Left turn Crash at Signalized Intersection, Red Light Running	•	•						•	•	•		•	•		
61	Colorado Blvd & E 100th Ave	Right turn Pedestrian Crash at Signalized Intersection, Red Light Running, Left turn at Signalized Intersection	•	•					•		•	•	•				
62	Colorado Blvd & E 108th Ave	Left turn at Signalized Intersection		•							•	•					
63	Colorado Blvd & E 121st Ave	Red Light Running, Left turn at Signalized Intersection,Pedestrian or Bicyclist Crossing Against the Signal	•	•						•	•	•		•			
64	Colorado Blvd & Cypress Dr & Riverdale Rd	Left turn at Signalized Intersection, Right turn Pedestrian Crash at Signalized Intersection.		•					•		•	•	•				
65	W 84th Ave & Huron St	Left turn at Signalized Intersection		•							•	•					
66	Quebec St & E 120th Ave	Left turn at Signalized Intersection, Red Light Running.	•	•													
67	Colorado Blvd & E 470 Ramp	Broadside or Left turn Crash at Unsignalized Intersections or Driveways.				•	•										
68	E 120th Ave & 3900 120th Ave	Red Light Running	•														
69	E 120th Ave & Driveway at 2500 E 120th Ave	Broadside or Left turn Crash at Unsignalized Intersections or Driveways, Pedestrian or Bicyclicts Crossing Major Street at Unsignalized Location				•										•	

Priority intersection projects are mapped in **Figure 11**.

Figure 11. Priority Project Locations



Access Management and Pedestrian Crossing Corridors

Several corridors and intersections in Thornton are candidates for further study of access management. These locations have high rates of left turn crashes, broadside crashes, or bicycle or pedestrian involved crashes not associated with a signalized intersection and would benefit from an access management plan.

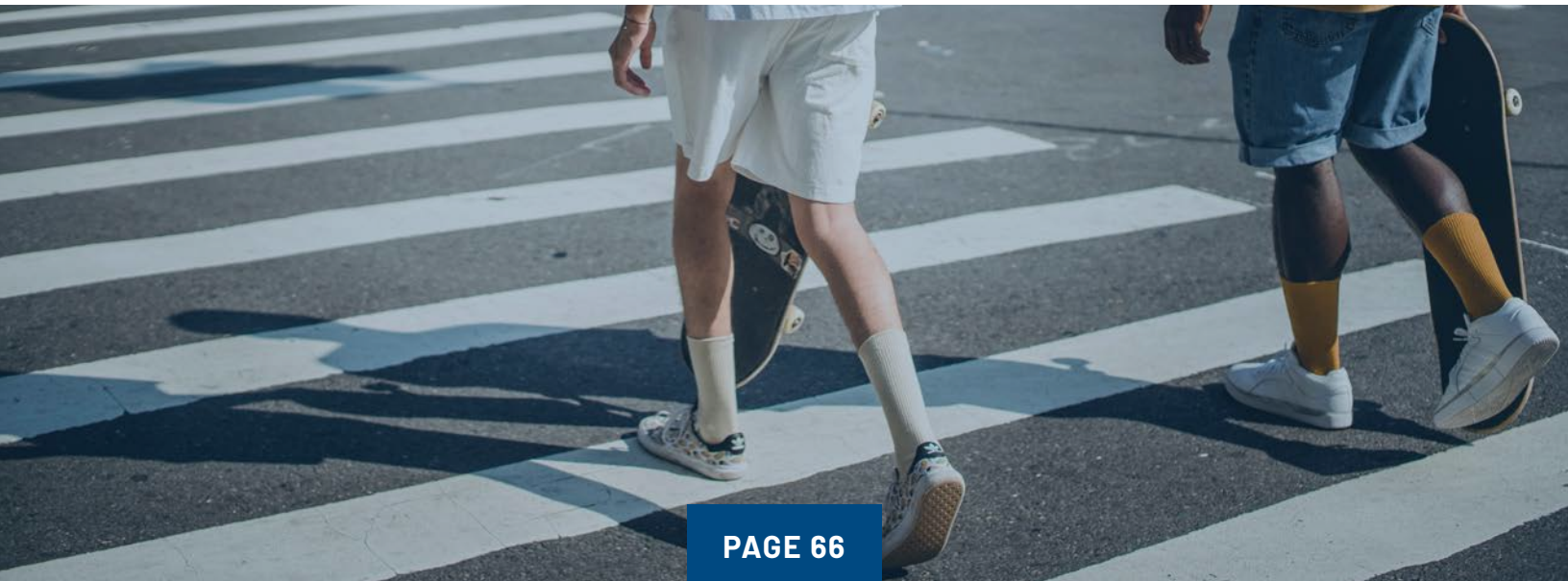
Access management is about controlling how and where vehicles can enter or exit major roads, at driveways or intersections. It helps keep traffic flowing smoothly and reduces the chances of crashes. By carefully planning where vehicles can turn or cross, the city can mitigate left turn crashes, broadside crashes, and pedestrian and bicycle crashes. Access management with medians and pedestrian and bicycle crossing treatments can also mitigate pedestrian and bicyclist conflicts with vehicles.

The following corridors and intersections are prioritized for further study of access management and potential improved pedestrian crossings. All the corridors identified here are along the HIN +HRN and are within or along areas identified by the equity index. (These corridors are mapped in **Figure 13**):

- *Washington Street from 84th Avenue to Thornton Parkway*
- *Colorado Boulevard from 100th Avenue to 121st Avenue*
- *Huron Street from 88th Avenue to 97th Avenue*
- *84th Avenue from Huron Street to I-25*
- *88th Avenue from Grant Street to Corona Street*
- *88th Avenue from York Street to Devonshire Street*
- *104th Avenue from Washington Street to Irma Drive*

For these locations, the city should assess applicability of the safety interventions under the following crash profiles:

- *Broadside or left turn crash at unsignalized intersections or driveways*
- *Pedestrian or bicyclist crossing major street at unsignalized locations*



Speed Management Priority Corridors

Speed management involves setting appropriate speed limits, designing streets that encourage safe speeds, and enforcing posted speeds. It is important because slower speeds reduce the chances of crashes and make roads safer for everyone—drivers, pedestrians, and bicyclists alike (see **Figure 12**).

Speeding was the greatest safety concern cited by community members and is the most common underlying factor in fatal and severe injury crashes.

When vehicles travel at lower speeds, there is more time to react, and crashes that do happen are less likely to cause severe injuries or fatalities. Speed management is a key part of creating safer streets and will be a critical element in achieving Vision Zero.

The risk for severe crashes is highest in locations with high traffic volumes, high vehicle operating speeds, and high concentrations of pedestrians and bicyclists. Priority street segments for speed management safety interventions include those in equity areas where these factors are high, segments that the city has already identified for intervention, and those in the following corridors in the HIN+HRN. All are mapped in Figure 13.

- *Washington Street from 84th Avenue to 98th Avenue*
- *Washington Street from 120th Avenue to 130th Avenue*
- *Washington Street from 144th Avenue to 146th Avenue*
- *Colorado Boulevard from 100th Avenue to 121st Avenue*
- *84th Avenue from Huron Street to Washington Street*
- *88th Avenue from I-25 to Colorado Boulevard*
- *120th Avenue from I-25 to Colorado Boulevard*

Speed management will consider the following suite of interventions to reduce speeds to safer levels:

- *Evaluate to reduce speed limit.*
- *Modify roadway design and operations, such as narrowing lanes, adding curves and lane shifts, or adjusting signal coordination to encourage slower speeds*
- *Pair with automated speed enforcement.*

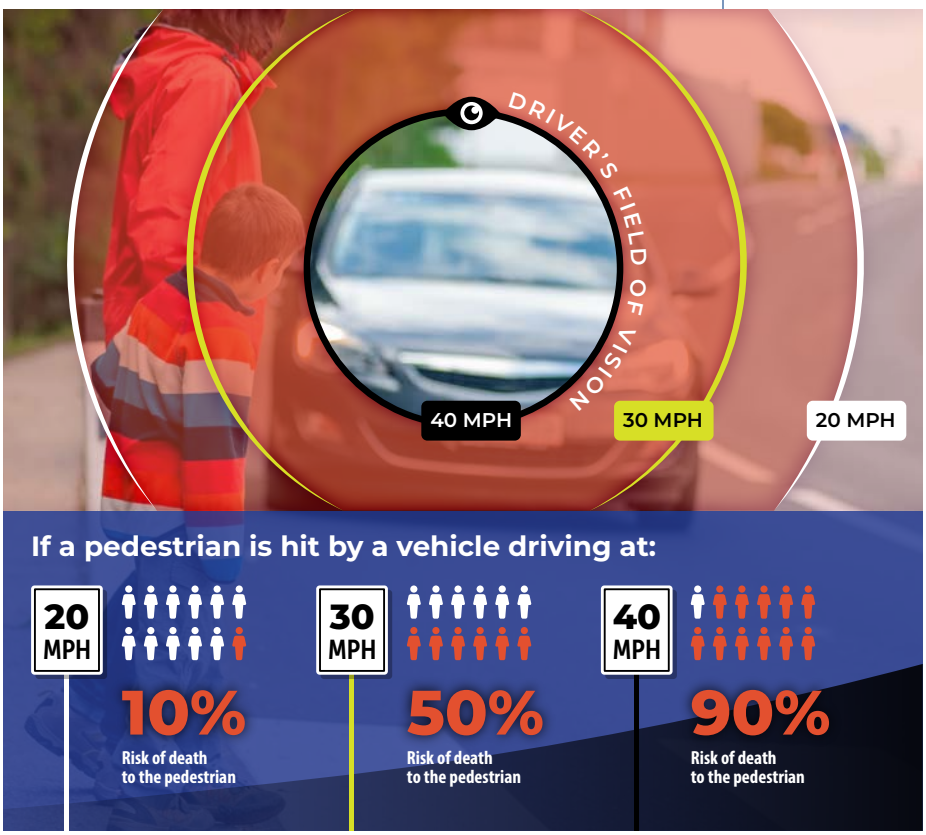
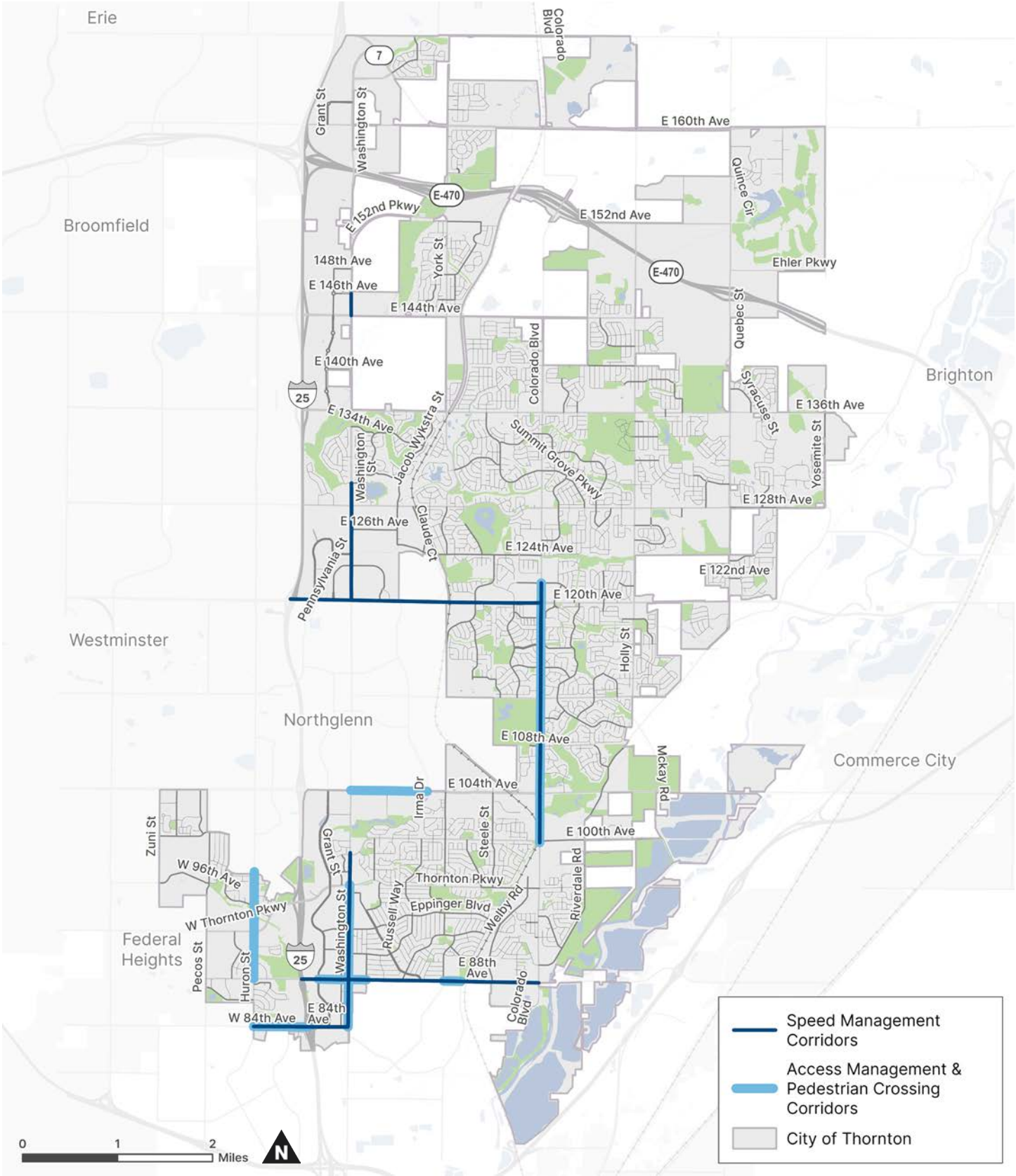


Figure 12. Impact of Driver's Speed on Crash Survival Rate
Source: U.S. Department of Transportation (2018)

Figure 13. Corridors Prioritized for Safety Improvements



Systemic Safety Improvements

While the city is working toward implementing safety interventions at the highest priority locations, Thornton should also advance systemic safety improvements throughout, recognizing that long-term, widespread safety requires addressing risks and vulnerabilities throughout the whole transportation network.

By implementing safety interventions systemically, the city would take a proactive approach to prevent crashes at more locations than just those with an existing crash history.

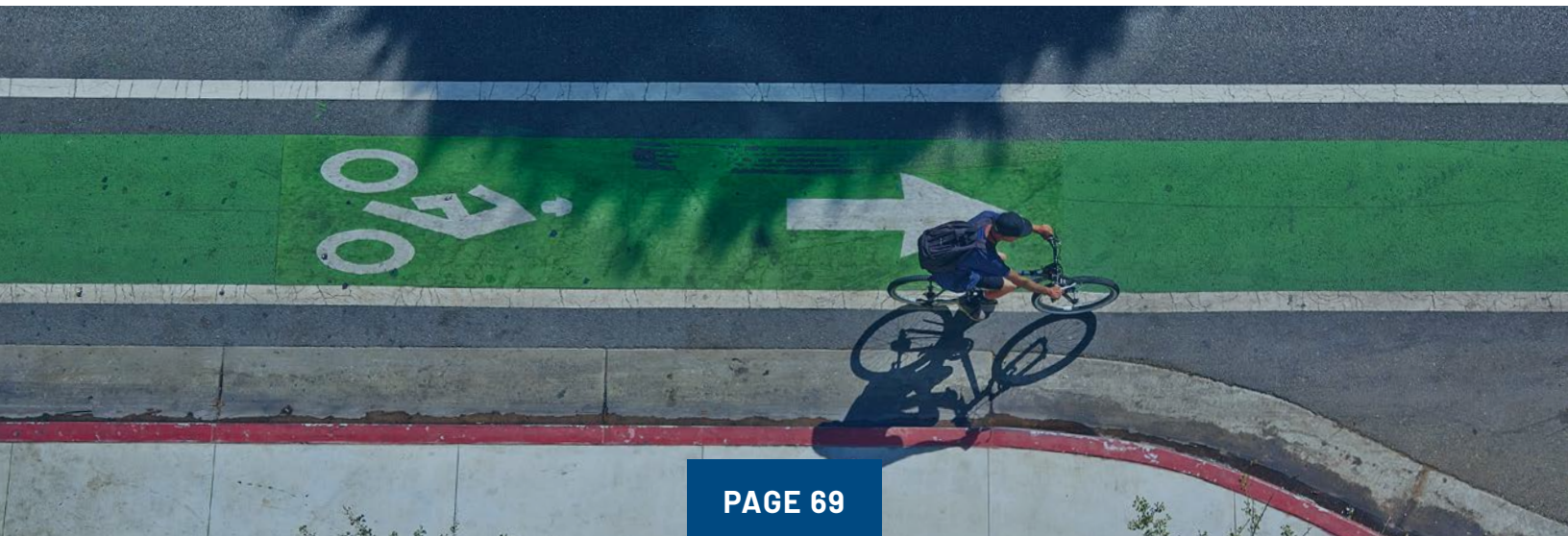
An example of systemic safety improvements that should be implemented across the city include the following:

Left Turn Improvements

- *Adjust left turn signal phasing at signalized intersections per a to-be-developed city left turn policy guidance.*
- *Install four-section heads for left turn signal phasing (whenever a traffic signal is upgraded or installed) to allow for flexible left turn operations and use of flashing yellow arrow during permitted phases.*
- *Apply access management strategies on major corridors.*
- *Design uncontrolled left turn lanes when there are opposing left turn lanes to have positive offset.*

Pedestrian & Bicycle Improvements

- *Install directional curb ramps at all intersections in the city with pedestrian crossings.*
- *Apply pedestrian/bicycle crossing safety interventions on major streets.*
- *Regularly maintain marked pedestrian crossings to be clearly visible.*
- *Apply appropriate turn radius and geometry design of right turn slip lanes to achieve the desired turning speed and driver visibility.*
- *Design multi-use trails that are parallel to major streets to be setback 15 to 25 feet prior to stop-controlled intersections and major driveways to allow a driver to yield to the path crossing and cross traffic separately.*



Red-Light Running Improvements

- *Install retro-reflective backplates on all signal heads in the city.*
- *Coordinate signal timing on arterial road corridors.*
- *Evaluate and potentially adjust yellow and all-red signal phasing.*
- *Apply speed management safety interventions on major streets.*

Systemic improvements can be implemented as stand-alone systemic safety projects at multiple locations across the city, or when opportunities arise during other related construction projects, such as street reconstruction, as part of new development, as part of traffic signal upgrades/installation, or as part of other street maintenance programs. Where applicable, these interventions should be reflected in the city's street design and traffic signal design standards.

Performance Monitoring & Reporting

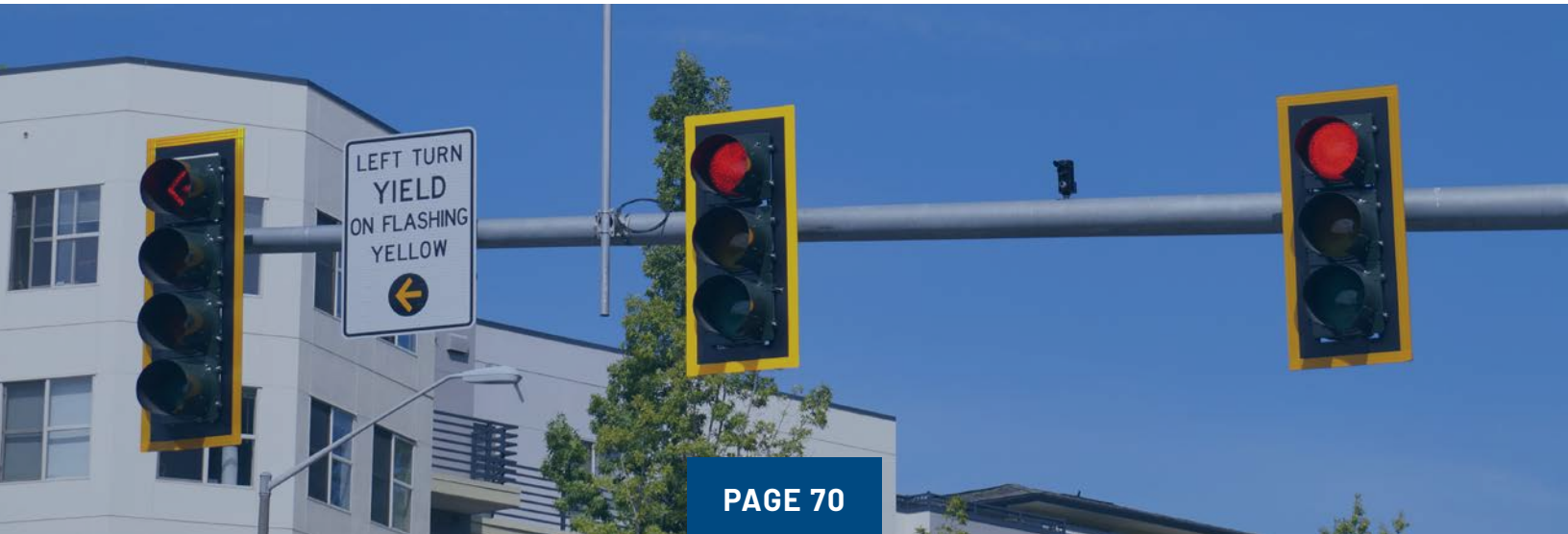
To monitor progress toward implementing the Vision Zero Action Plan and provide transparency to the public, the city will annually track progress using both output-based metrics and outcome-based metrics. Outputs are metrics the city has direct control of, such as implementing projects. Outcomes are the measures of effectiveness that the city is hoping to influence, such as number of crashes, but has no direct control over. Both metrics may be tracked via the city's online Vision Zero dashboard or an annual report.

Output Metrics

- *Priority projects implemented or in-progress*
- *Systemic safety improvements implemented or in-progress*
- *Action items implemented or in-progress*

Outcome Metrics

- *Annual fatal and severe injury crashes on Thornton streets*
- *Annual pedestrian-involved and bicycle-involved crashes on Thornton streets*
- *Annual fatal and severe injury crashes in areas with high equity need*
- *Annual pedestrian-involved and bicycle-involved crashes in areas with high equity need*



APPENDICES

A. Prioritization Guide

B. Analysis Methodology

C. Outreach Summary & Meeting Notes

D. Benefit-Cost Analysis Calculations