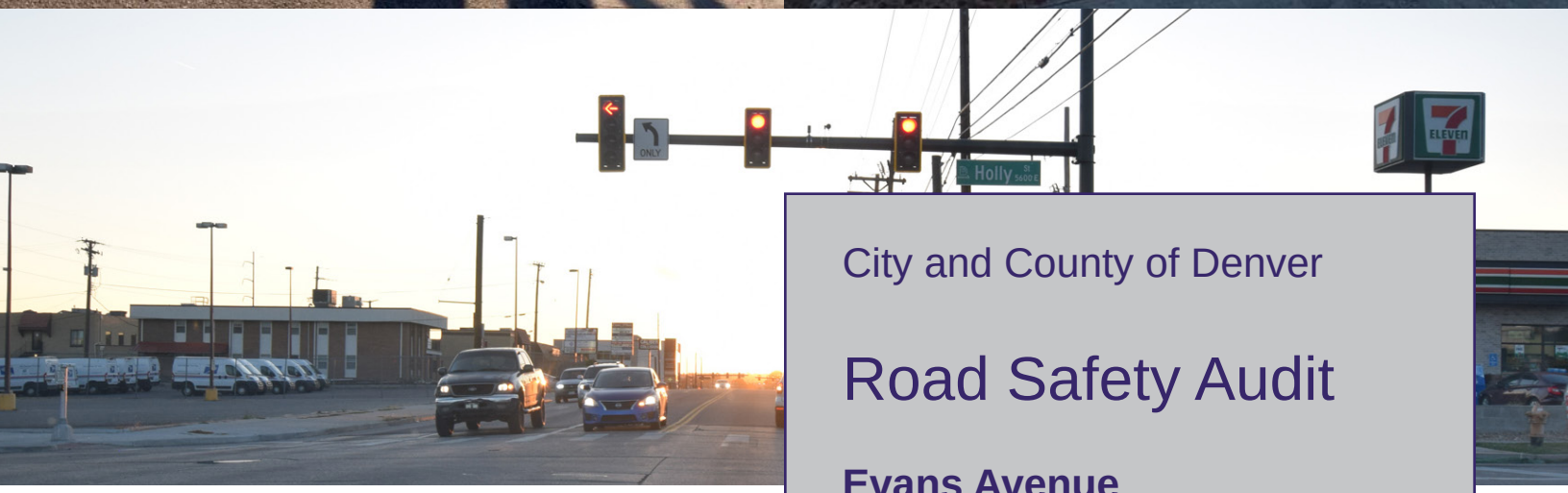

City and County of Denver

Road Safety Audit

Evans Avenue
(Colorado Blvd. to Quebec St.)

DENVER
THE MILE HIGH CITY

Y2K ENGINEERING

Final

December 01, 2023

Prepared by: Y2K Engineering LLC.

NOT FOR CONSTRUCTION – Recommendations contained in this document are intended ONLY for use by the local agency in determining possible future changes at the RSA location.

Information provided in this report does not reflect the opinion of any one team member. The recommendations reflect the collective suggestions of all team members based on their individual education, training, and experience.

RSA team:

- *Yung Koprowski, Y2K Engineering (Evans Ave RSA Lead)*
- *Jennifer Bartlett, City and County of Denver (City Project Manager)*
- *Eileen Yazzie, Y2K Engineering (Consultant Project Manager)*
- *Rae Stephani, Y2K Engineering*
- *Trevor Root, Y2K Engineering*
- *Alan Berry, Y2K Engineering*
- *Mike King, City and County of Denver*
- *Michael Wallin, Area Engineer DOTI*
- *Sylvia Lopo, Area Engineer DOTI*

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City and County of Denver RSA Process

The 2017 Denver Vision Zero Action Plan is a five-year plan to achieve zero traffic deaths and serious injuries by 2030. In 2022, the City recommitted to this goal through a new, bold Vision Zero Action Plan. The Denver Vision Zero program provides traffic safety professionals a unique opportunity to work as part of a dedicated traffic safety improvement program, in collaboration with law enforcement, first-responders, government officials, and other stakeholders. This project will be part of the City and County of Denver's (CCD) formal Vision Zero Road Safety Audit (RSA) program.

The corridor chosen for this RSA is part of Denver's *High Injury Network (HIN)*. The HIN has been identified in CCD as part of the Vision Zero initiative as the network of corridors with the highest number of fatal and injury crashes from all modes of travel. The choice of RSA corridors is driven by their proximity to the Communities of Concern, i.e. areas of Denver where more vulnerable populations live. As stated in Denver's Vision Zero statement, these areas are places with higher speeds, in closer proximity to schools and high school density, elderly populations, disability populations, and those with no vehicle ownership.

RSAs are formal examinations of selected roadway entities from a safety performance viewpoint. All RSAs are performed by an independent, multi-disciplinary team and are highly benefited by including one or more professionals trained in performing RSAs. An RSA qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used in any phase of project development from planning and preliminary engineering, design and construction. RSAs can also be used on any sized project from a minor intersection and roadway retrofits to long corridors The RSA team considers the safety of all road users, qualitatively estimates and reports on potential road safety issues and identifies opportunities for safety improvement. The RSA team reviews police crash reports and conducts field observations during different times of the day such as day/night and peak/ non-peak hours.

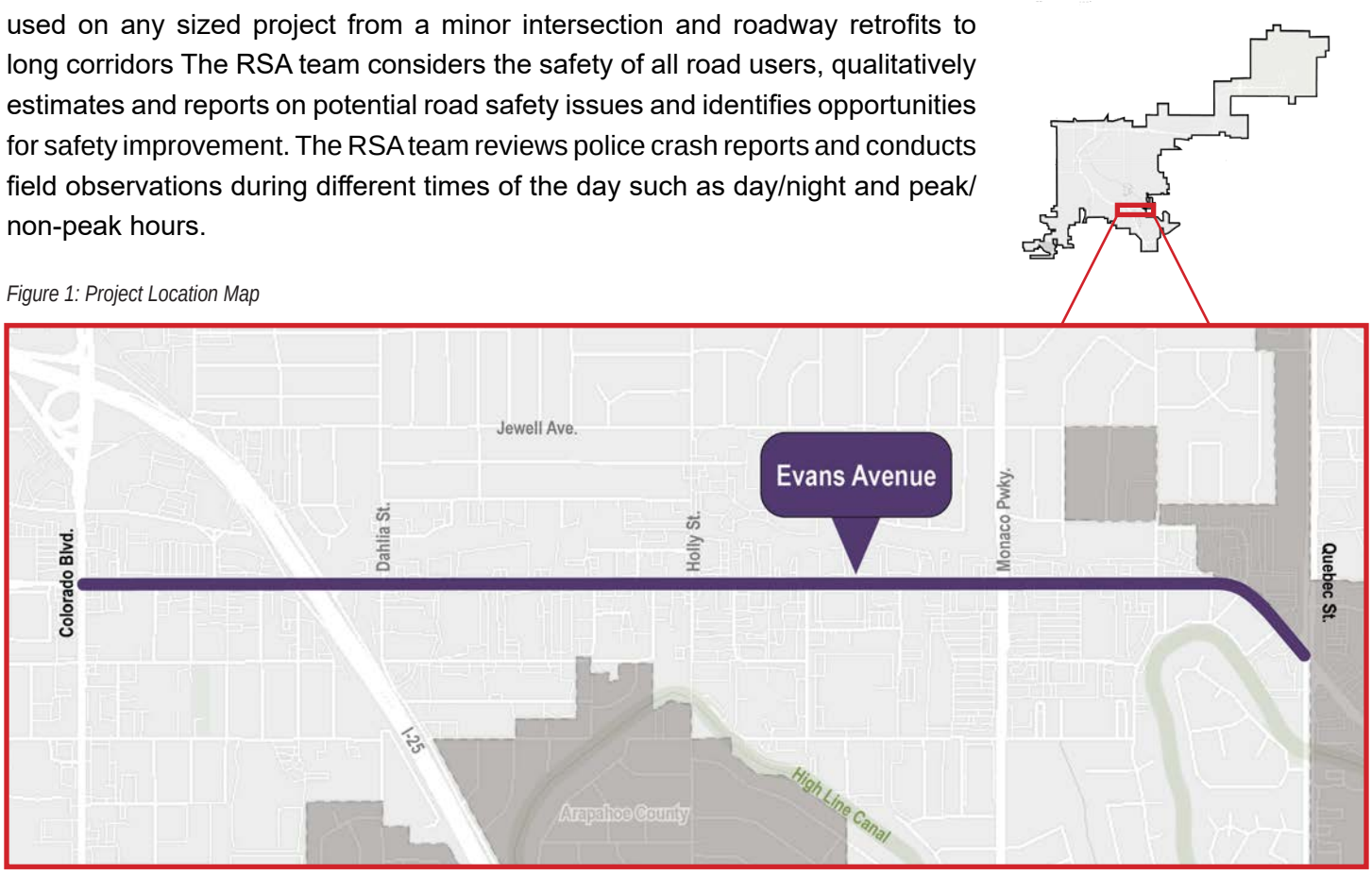


Figure 1: Project Location Map

RSA Team

The independent, multi-disciplinary RSA team was led by Yung Koprowski of Y2K Engineering.

The RSA team included:

- Yung Koprowski, Y2K Engineering (Evans Ave RSA Lead)
- Jennifer Bartlett, City and County of Denver (City Project Manager)
- Eileen Yazzie, Y2K Engineering (Consultant Project Manager, Transit)
- Rae Stephani, Y2K Engineering, Traffic Operations
- Trevor Root, Y2K Engineering, Civil/ADA
- Alan Berry, Y2K Engineering
- Mike King, City and County of Denver
- Michael Wallin, Area Engineer DOTI
- Sylvia Lopo, Area Engineer DOTI

The RSA team conducted this audit to the best of its abilities within the time allotted. The initial recommendations are based upon background information provided during the Kick-Off and Preliminary Findings Meeting, a limited evaluation of recent crash data, and both day and night field reviews, as discussed in the following sections. This information assisted the RSA team identify potential opportunities to improve the safety performance of the Evans Avenue corridor. While every attempt has been made to identify potential safety issues, the safety performance of the roadway remains the responsibility of the roadway owner and roadway users.

Figure 2: RSA Team Post-Walk Debrief

Background Information, Observations, and Recommendations

The following sections describe the background information, crash review, comments from the RSA Pre-Audit Meeting, observations from the field review, and recommendations for the Evans Avenue corridor and for each study intersection. A comprehensive list of all recommendations including location, recommendation, observation addressed, crash modification factors, return on investment, and planning-level cost estimate is included in **Appendix A**.

Pre-Audit Meeting

The RSA team met with CCD Staff and RSA Stakeholders to discuss and present background information and the RSA schedule on Monday, September 25th from 1pm-2:30pm. This meeting was held virtually over Microsoft Teams, the PowerPoint slide deck for which can be found in **Appendix B**. Information presented and discussed at the Pre-Audit Meeting is included in the following sections under background information, crash review, and comments provided by City Staff and RSA Stakeholders.

Observation Process

The RSA team began the observation period by walking the entirety of the corridor from West to East in the afternoon on Day 1, followed by driving the entirety of the corridor in both directions at night the same day which included recording every approach to every signalized intersection. The second day of observations saw the RSA team walking the entirety of the corridor from West to East in the morning, followed by a debrief meeting that day. The corridor wide observations are based on the general observations the team made during the walking reviews as well as the windshield review. Observations included traffic signal operations, ADA facility conditions including ramps and sidewalks, bicycle infrastructure, lane and sidewalk widths with a measuring stick, and transit operations.

Daytime field reviews were conducted on Monday, September 25th from 3pm-5pm and on Tuesday. September 26th from 7am-9am. The nighttime windshield review was conducted on Monday, September 25th from 7pm-9pm. The specific times of site visits can be found in the RSA Intent Memo, a copy of which is located in **Appendix C**. The weather on Day 1 was sunny and clear with a high of 83 degrees Fahrenheit, and a low of 81 degrees Fahrenheit during the observation period. The weather was clear and sunny on Day 2 as well with a high of 65 degrees Fahrenheit, and a low of 56 degrees Fahrenheit during the observation period. Information provided in this report does not reflect the opinion of any one RSA team member.

Recommendation Process

The recommendations reflect the collective suggestions of all team members based on their individual education, training, and experience. The safety and mobility of all road users are considered. The corridor-wide recommendations are divided by travel mode and/or specific safety issue:

1. *Pedestrians*
2. *Transit*
3. *Bicycling*
4. *Operations/Roadway/Utilities/Other*

Intersection specific recommendations are based on observations in the following categories:

1. *Pedestrian/Bike/Transit*
2. *Operations*
3. *Infrastructure*

The RSA team presented the preliminary findings to CCD Staff and RSA Stakeholders, on Wednesday, October 11 from 10am-12pm virtually on Microsoft Teams. Observations and potential opportunities for improvements were discussed during this meeting. The presentation slides from this meeting are provided in **Appendix D**.

Evans Avenue (Colorado Blvd. to Quebec St.): Corridor-Wide

The following section provides background information, observations, and recommendations for the Evans Avenue Corridor as a whole.

Background Information

Evans Avenue is a major east-west arterial in southern Denver. The RSA study area consists of an approximately 2-mile stretch of Evans from S Colorado Blvd. to S. Quebec St - which serves as the border between the City and County of Denver and Arapahoe County. Lane widths vary drastically along the corridor, but the average cross-section consists of 2 travel lanes in each direction, and a center turn lane with RT/LT lanes added and dropped at various intersections. The posted speed limit along Evans within the study area is 35MPH, with 11 signalized intersections and directional average daily traffic (ADT) volumes ranging from 19,296 vehicles per day (VPD) to 11,470 VPD along various segments with a total corridor volume 25,000-36,000 VPD.

There are sidewalks - although of drastically differing widths, separation, and quality - along a majority of both sides of the corridor. There is no bicycle infrastructure along Evans itself, although there are several designated bike facilities that currently cross the corridor at Birch St., Dahlia St., and Oneida St. There are 25 bus stops along Evans within the study area, with 4 bus routes (21, 46, 65, and 73) that interact with the corridor - 21 being the primary east-west route. The RTD Colorado Station is accessible from Evans Ave at Birch St and is served by the E and H light-rail lines. The majority of the corridor is zoned as commercial mixed-use. There is residential at the eastern-most portion of the corridor in the form of several multi-family apartment buildings.

Figure 3: Signalized Intersection Count and ADT Volumes

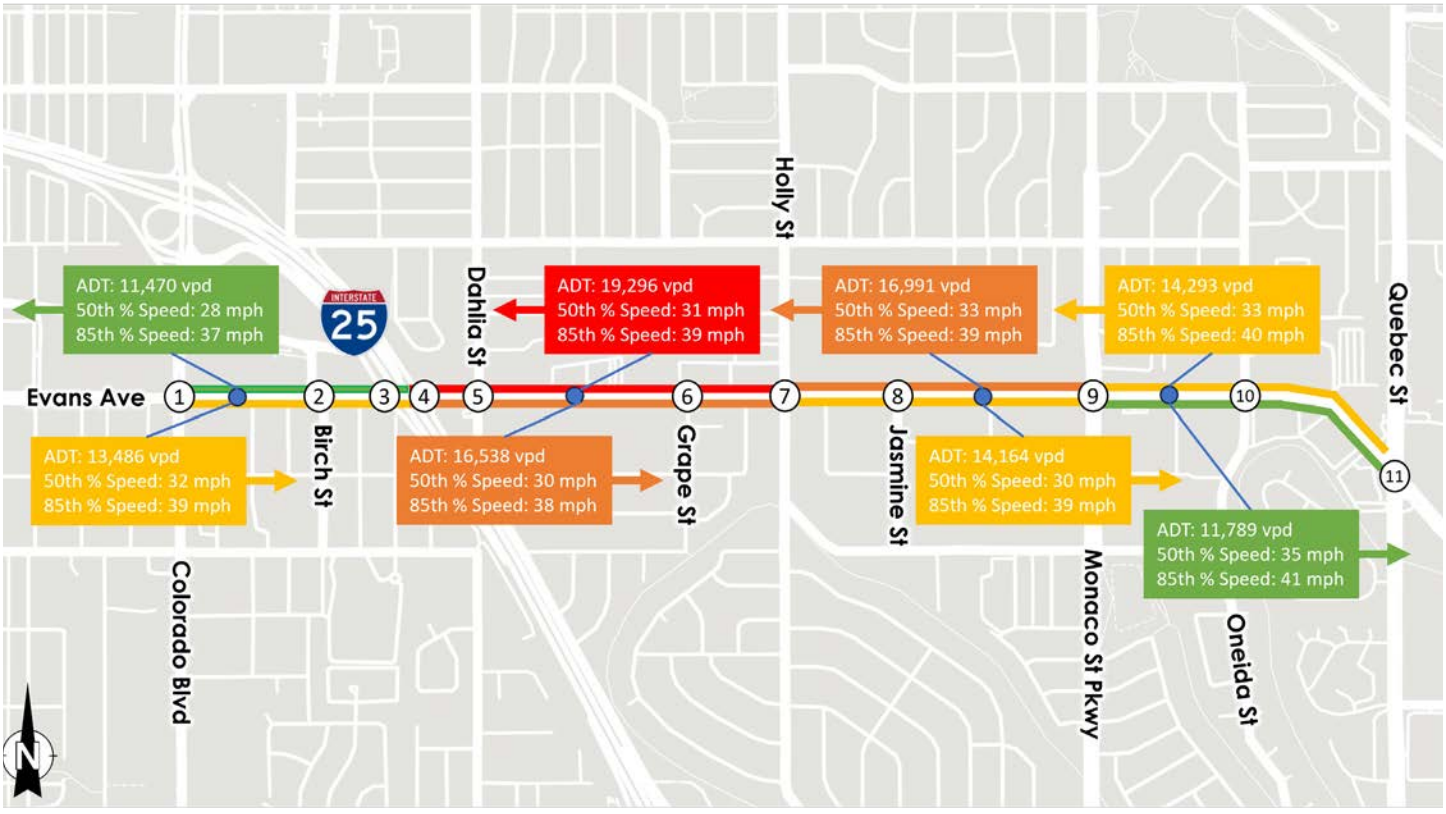


Figure 4: Existing Pedestrian Network

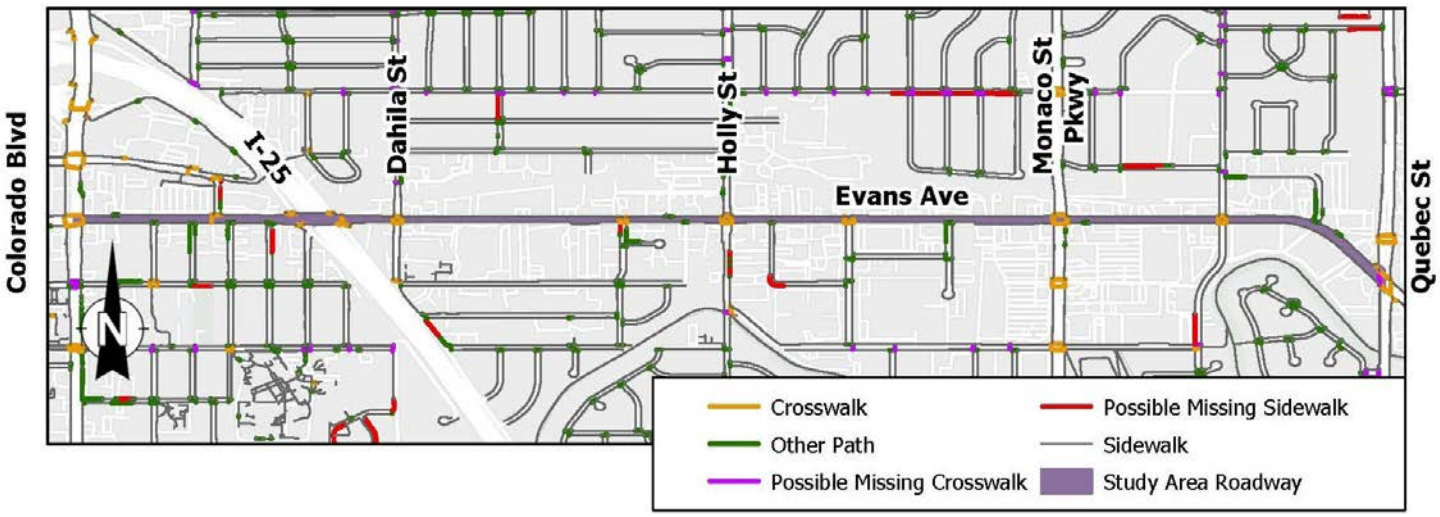


Figure 5: Existing Bike Network

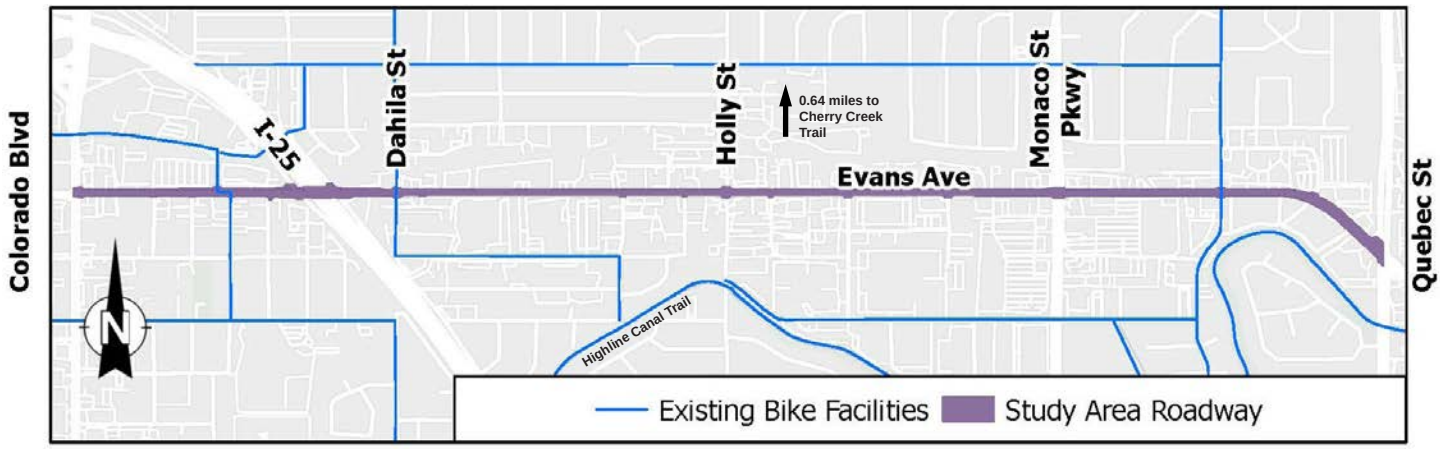
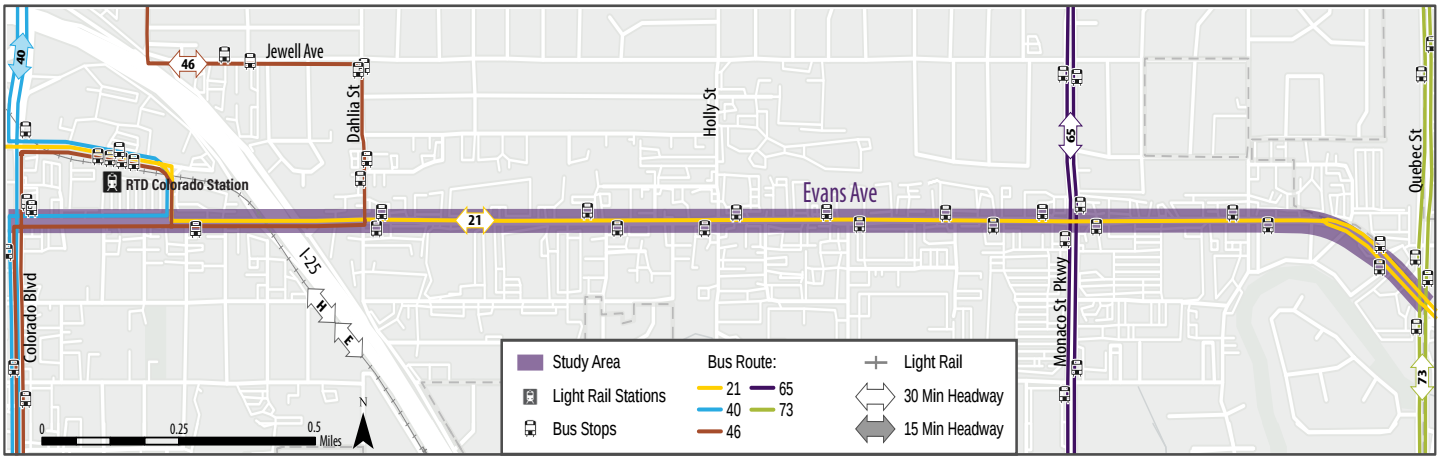


Figure 6: Existing Transit Network



Crash Review

Between January 1, 2017 and August 19th, 2023, there were 1,540 total crashes along Evans Avenue within the study area. Key highlights include:

- 4 fatal crashes:
    - *Colorado Blvd/Evans Ave. (12/15/2017 at 10:40am, ID:2017836366) - Driver of a vehicle making a SB LT collided with a NB vehicle going straight. The driver of the SB vehicle was at fault for stopping in the middle of traffic.*
    - *6100 Block of Evans Ave (11/18/2019 at 4:57pm, ID:2019734842) - A pedestrian was struck while crossing the street by a WB vehicle.*
    - *5000 Block of Evans Ave (6/18/2021 at 2:27am, ID:2021345053) - A pedestrian was struck while crossing the road by a WB vehicle. The vehicle was at fault for careless driving.*
    - *7100 Block of Evans Ave (6/24/2021 at 1:48am, ID:2021357793) - A vehicle traveling southeast on wet pavement ran off the right side of the row and collided with a tree. The driver was driving under the influence and exceeded the safe/posted speed limit*

- 20 serious injury crashes with in the study area
- 24 crashes involved pedestrians or cyclists
- ~64% of all crashes occurred at signalized intersections
- Total crashes are unequally distributed toward the west end of the corridor
- Rear-end crashes were the most frequent harmful event of all crashes (40%)
- Of the rear-end crashes that occurred on Evans, the majority (60%) of crashes occurred in the WB direction.
- 45% of all crashes occurred while going straight
- 437 LT crashes at many intersections - potentially caused by permissive LT operations
- 3 out of 10 KSI crashes and 50% of fatal crashes involved pedestrians

Figure 7: Crash Heat Map

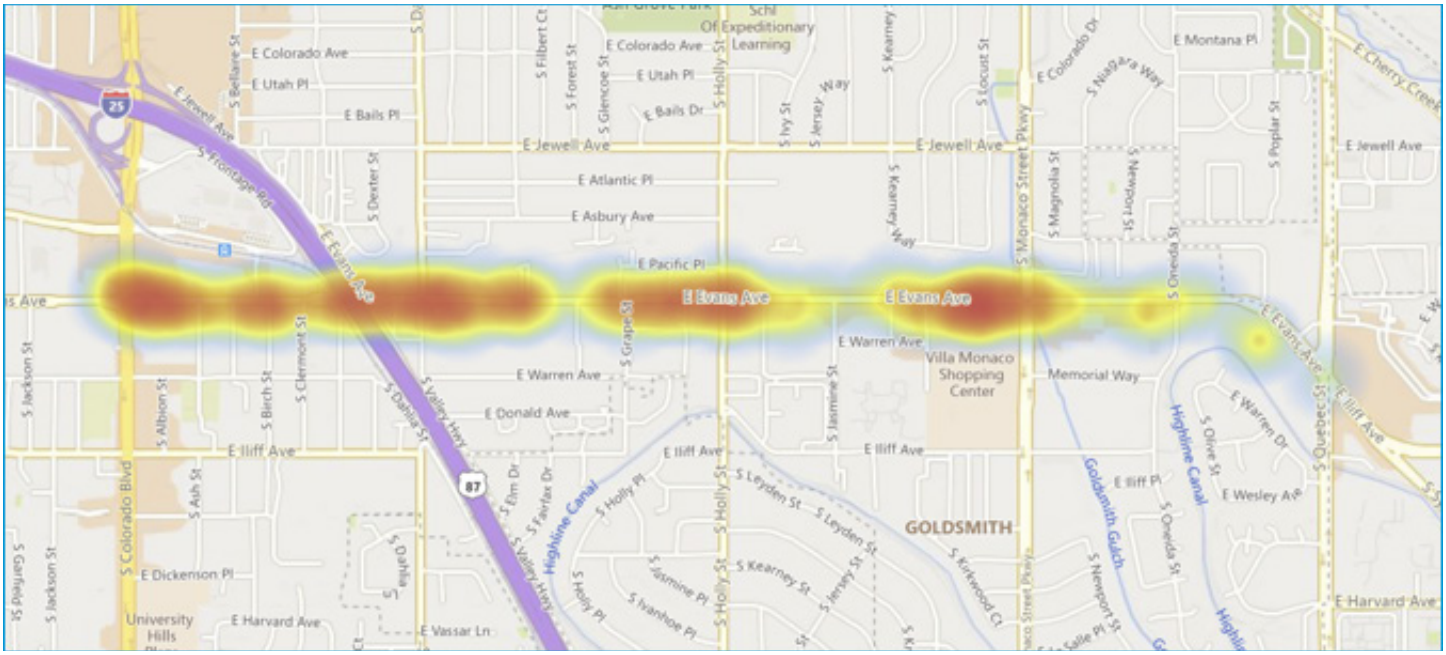


Figure 8: Total Crashes by Location

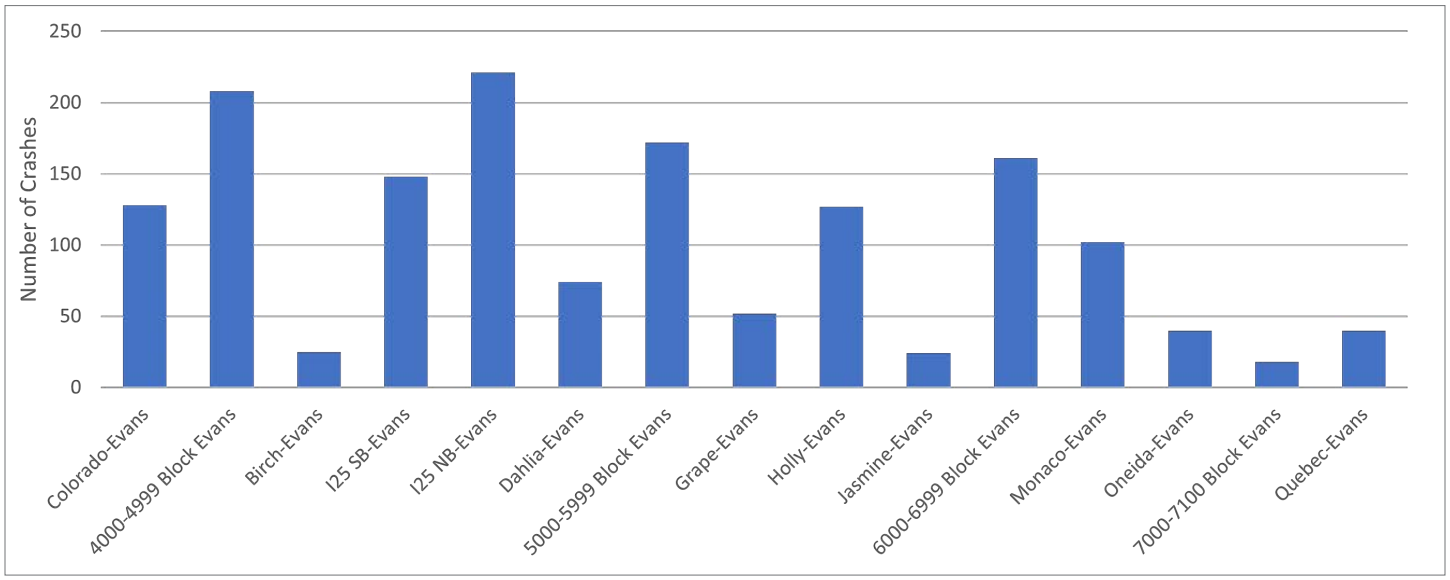


Figure 9: KSI Crashes by Location

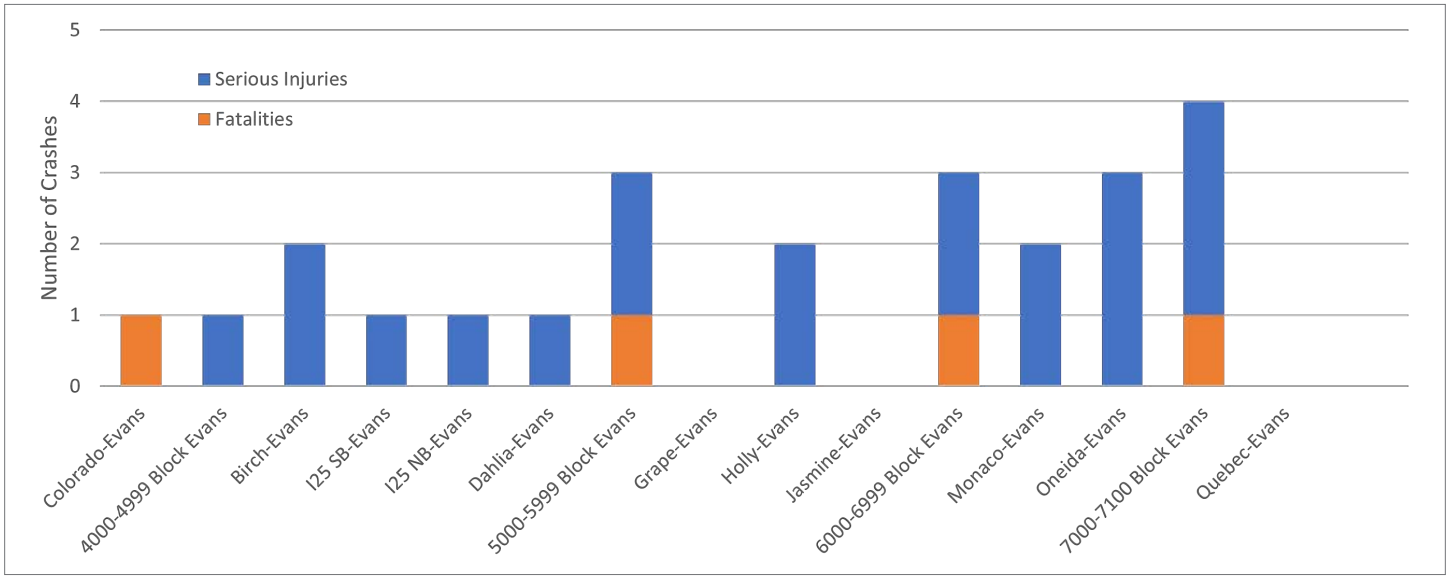


Figure 10: Crashes by Harmful Event

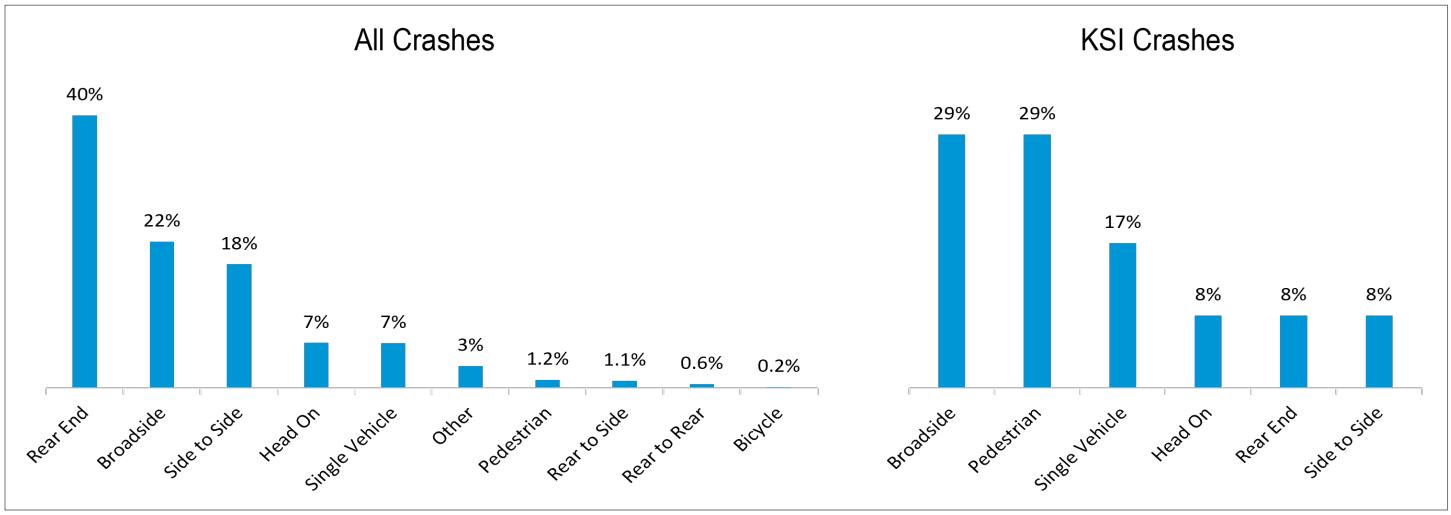
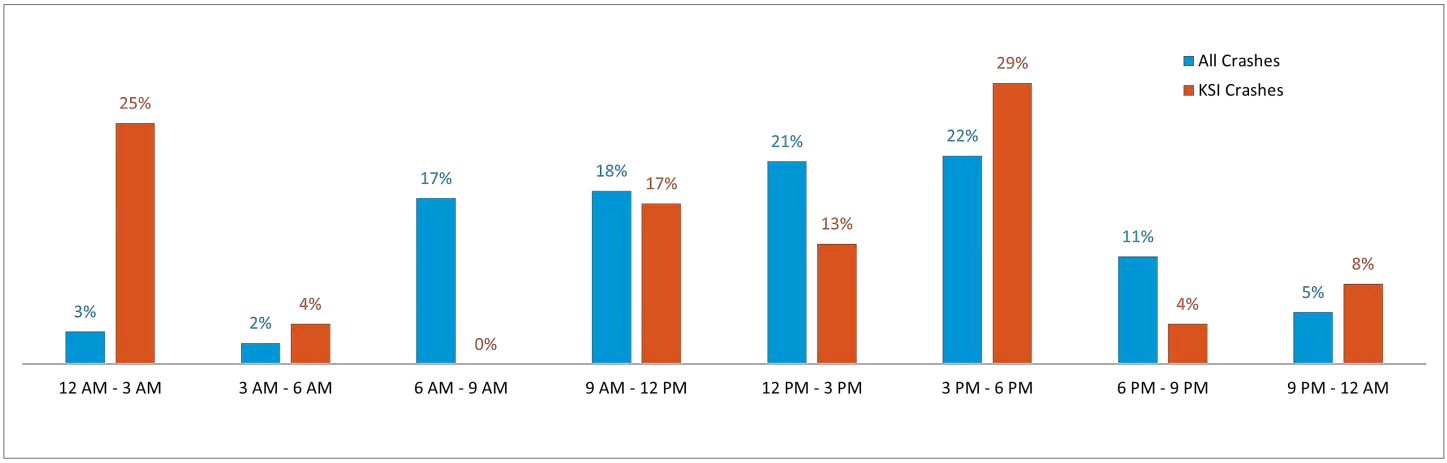


Figure 11: Crashes by Time of Day



Comments Provided by City Staff and RSA Stakeholders During Pre-Audit Meeting

- Quebec/Evans intersection improvements are currently under construction
- There is exceptionally high car-use at Highline Academy for student drop-off and pick-up
- There have been previous intersection improvements at Dahlia and Evans / Holly and Evans with audible pedestrian signals (currently only installed by citizen request) with positive feedback from citizens
- There are a high number of WB crashes - time of day and glare from the Sun could be a major contributing factor in these
- Adjacent property owners are responsible for greenscaping and maintaining vegetation in the public ROW
- There are a high number of auto-centric businesses and land uses directly on the corridor
- Previous work has uncovered challenging coordination efforts with utility companies

Observations and Recommendations

The following summarizes users observed during the RSA, things being down well, and general observations that apply to the corridor as a whole as well as corresponding recommendations.

Road Users

The following road users were observed during the RSA field walk: Rollers (skateboarders/scooters/etc.), bicyclists, motorcyclists, pedestrians, transit users, drivers, and trucks (commercial/shipping).

Things Being Done Well

The RSA team noted several existing roadway features that appear to foster safer operations in the study area including:

- Implementation of current codes/standards for new development
- Recent signal rebuilds
- Effective Signal timing
- Efficient Transit operations / speed

Figure 12: Observed Road Users

Figure 13: Examples of Things Being Done Well

Corridor-Wide Pedestrian Observations, Issues, and Recommendations:

Sidewalks

- Sidewalks at new developments have detached or attached sidewalks of 8' width. Most sidewalks along the remainder of the corridor are attached to the curb and many are 4 feet wide or less
- While sidewalks do exist in much of the segment, many people were observed utilizing the adjacent parking lots to walk; walking near the busy street is uncomfortable due to the noise, safety concerns about being hit by vehicles, and the stress of navigating traffic
- Width of most segments do not meet City standards (<8 feet) and many have locations less than 32 inch area clear required by ADA
- Utility poles are consistently placed in the sidewalk throughout the corridor
- Temporary construction signage and fencing were placed in the sidewalk blocking pedestrian travel
- The lack of shade / prominent heat island effect was noticeable

Figure 14: Examples of Sidewalk Observations

CW1: Recommend to rehabilitate sidewalks as necessary
CW2: Recommend to acquire right-of-way / easements / license agreements and coordinate with adjacent properties to construct sidewalks around obstructions (e.g. utility poles)
CW3: Recommend to review policies/procedures for ensuring temporary traffic control signs don't impact sidewalk accessibility

Driveways

- Many steep driveways cause severe cross slope issues
- Many legacy driveways exist on the corridor with buildings, parking, and fencing immediately adjacent to sidewalks - these driveways no longer serve a purpose

Figure 15: Examples of Driveway Observations

CW4: Rehabilitate driveways to provide a 36" sidewalk wraparound with 2% max cross slope
CW5: Coordinate with property owners to eliminate unnecessary driveways, combine access points, or reduce widths
CW6: Consider mountable curb instead of driveway in some low-volume locations where there may be ROW constraints

Utility Poles

- Utility Poles are located in the middle of sidewalks and prevent direct travel on narrow sidewalks

Figure 16: Examples of Utility Pole Observations

CW7: Construct detached sidewalk to provide an accessible path behind all utility poles
CW8: Coordinate with utility providers to phase under-grounding of overhead distribution lines in conjunction with right-of-way acquisition (not high-voltage transmission lines)

CW9: Coordinate with electric and communication utilities for consolidation/reduction of poles by using strategically placed larger poles with utility line co-location or under-grounding service connections where detached sidewalk isn't feasible

Curb Ramps

- Curb Ramps are generally installed at nearly all curb returns, although many are not strictly ADA-compliant
- Curbs ramps vary in style throughout the corridor
- Many new curb ramps were installed with a vertical curb in the pedestrian path that isn't compliant with ADAAG
- Observed newly constructed curb ramps with slopes exceeding 8.3% max running slope or the 10% max flare slopes

Figure 17: Examples of Curb Ramp Observations

CW10: Conduct ADA audit of curb ramps and driveways for slopes, flares, landings, and sight triangle visibility - see Appendix E for criteria to consider in the ADA audit
CW11: Rebuild most curb returns along the corridor in conjunction with corridor improvements

Corridor-Wide Transit Observations, Issues, and Recommendations:

Bus Stops

- High number of transit users observed especially at the eastern end of the corridor
- Several bus stops are on the near-side of the intersection
- Many bus stops lack amenities (0 bus shelters, only 7 benches - 4EB, 3WB)
- Busiest Stop (WB Evans & Quebec) location encourages midblock crossings

Figure 18: Examples of Bus Stop Observations

CW12: Relocate bus stops to be consistently on the far side of the intersection and within 150ft of a signalized crossing
CW13: Evaluate and upgrade bus stop amenities

Corridor-Wide Bicycle Observations, Issues, and Recommendations:

Bicycles

- Many bicyclists observed traveling N/S across the corridor in the streets
- Bicyclists observed utilizing sidewalk on Birch St. north of Evans due to awkward crossing if wanting to use road

Figure 19: Examples of Bicycle Observations

CW14: Continue focusing on parallel routes to Evans for bicycle travel

CW15: Consider bicycle facility improvements for Holly as a N/S route due to proximity between the Highline Canal and Cherry Creek Trails; Coordinate with Bike Planning to identify/improve N/S crossings

Corridor-Wide Operations/Roadway/Utilities/Other Observations, Issues, and Recommendations:

Streetlights

- Some streetlight fixtures are missing/not working creating portions of darkness in the corridor

Figure 20: Examples of Streetlight Observations

CW16: Conduct rehabilitation maintenance of streetlights

CW17: Perform lighting analysis and construction/upgrade of streetlights throughout the corridor to provide uniform lighting

CW18: Consider making lighting standard enhancements at intersections (2 luminaires per corner for large intersections)

Business Parking

- Several businesses along the corridor had or have parking in front of their business that creates long lengths of sidewalk that are sloped and in potential conflict with vehicles. Drivers would be backing onto Evans to exit the parking space. Sufficient parking appeared to be available behind businesses and on side streets.

Having parking right off an arterial road, such as Evans Ave, where vehicles have to back out directly onto the street, can pose safety risks for several reasons:

Figure 21: Examples of Business Parking Obser-

- Traffic Flow Disruption: Backing out onto a busy road can disrupt the flow of traffic. Vehicles backing out may cause other drivers to slow down, stop, or change lanes abruptly, leading to a potential increase in rear-end collisions.
- Increased Vulnerability / Safety Risk: Vehicles backing out onto a busy road are more vulnerable to being struck by passing vehicles, especially if drivers on the arterial road are not expecting a vehicle to suddenly emerge from a parking space.
- Pedestrian Safety Concerns: Pedestrians walking along the arterial road may also be at risk if parked vehicles obstruct their view of approaching traffic. Pedestrians may not be readily visible to drivers backing out of parking spaces.

CW19: Explore prohibiting angle or parallel parking directly adjacent to Evans Ave. Work with businesses to convert these spaces to corridor amenities such as sidewalks, parks, and gardens

Signal Equipment

- Two crossings have audible pedestrian crossings, most do not
- Some crossings are not adequately timed for pedestrian crossings
- Some crossings do not have pedestrian countdowns
- Some signal heads are 8”

Figure 22: Examples of Signal Equipment Observations

CW20: Upgrade all pedestrian signals to countdown signals with audible crossings as requested / per City policy. When the proposed final rule of PROWAG (anticipated Summer 2024) is adopted, accessible pedestrian signals shall be required to have an audible and vibrotactile walk indication (for all new installations and all alterations of existing pedestrian signals)

CW21: Complete a rehabilitation maintenance sweep of all intersections along Evans

Turning Operations

- A mixture of permitted (perm) and permitted/protected (perm/prot) LT operations exist on the corridor

CW22: Recommended LT Operation Changes:

	NB	SB	EB	WB
Colorado Blvd	Protected	Protected	Permissive/Protected**	Permissive/Protected**
Birch St	N/A	Permissive	Permissive	Permissive
I-25 SB Ramps	N/A	Permissive	N/A	Protected
I-25 NB Ramps	Permissive	N/A	~~Permissive/Protected~~ Protected	N/A
Dahlia St	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)
Grape St	Permissive	~~Permissive~~ (Remove)	Permissive	Permissive
Holly St	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)
Jasmine St	Permissive	N/A	Permissive	Permissive
Monaco St Pkwy	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)	Permissive/Protected (FYA)
Oneida St	Permissive	Permissive	Permissive	Permissive
Quebec St	Protected	Protected	Protected	Protected

**RED* *text indicates the recommended LT operation change*

***If intersection improvement project changes the geometry to negative offset LT lanes, then change the operation to Protected-Only due to the restricted sight visibility*

CW23: Consider a NO RIGHT TURN ON RED policy and methodology for determining implementation

CW24: Review, assess, and consider modification to land use/zoning to align with SE-NPI recommendations

Evans Avenue (Colorado Blvd. to Quebec St.): Intersections

The following section provides background information, observations, and recommendations at specified intersections. The recommendations diagrams for each intersection are conceptual and not meant to serve as final design or implementation plans.

Colorado Blvd and Evans Ave

At the intersection with Colorado Blvd, WB Evans consists of 4 through lanes (2 each direction) a dedicated LT lane, and a dedicated RT lane. The west bound left operates as a protected-only LT. There are sidewalks on all sides and corners of the intersection of varying quality and size. Both Evans and Colorado are major arterials. There is an ongoing safety project at this intersection with the recommendations contained within this report being coordinated with that design.

Figure 23: Colorado Blvd Intersection

Crash Review

- Total crashes: 128
- KSI crashes: 1
- Fatal Crashes: 1
- (12/15/2017 10:40 AM) 1 KSI (Fatality), SBLT vehicle at fault for stopping in traffic, collided with a NB vehicle going straight
- Majority of crashes were broadside (49) due to the driver failing to yield ROW(18); (NB-16; SB-7; EB-9; WB-13)
- 29 rear-end crashes (NB - 10; SB - 1; EB – 8; WB - 10)
- The direction and action of the driver of the vehicle involved in the bicycle crash were not reported.

Observations

Infrastructure

- Large, unnecessary amounts of space facilitates high-speed turning movements
- Wide streets with no refuge or separation of lanes
- Drainage issues at NE Corner
- No advanced warning sign to for WB RT drop at Colorado

Operations

- Far side mount signals difficult to see during peak sun glare times
- Lack of adequate lighting at night
- LT vehicles were still making the turn when turn signal changed to yellow and red
- Insufficient timing for EB/WB protected left - 5 second phase before through/permitted phase

Figure 24: Colorado Blvd and Evans Ave Observations

WB Crossing over Evans | SW Corner of Intersection (Facing West) | NE Corner of Intersection

Recommendations

COL1: Install near side, side mount signals

COL2: Extend curbs on NW, NE and SW corner to narrow the crossing of Evans Ave - eliminate WB RT drop lane

COL3: Extend curb and fix drainage of NE corner to narrow the crossing of Colorado Blvd

COL4: Install raised medians on north and south legs of the intersection

COL5: Install/Upgrade luminaires on all corners to have two on each corner over each crosswalk

COL6: Evaluate signal timing for EB/WB permissive LT

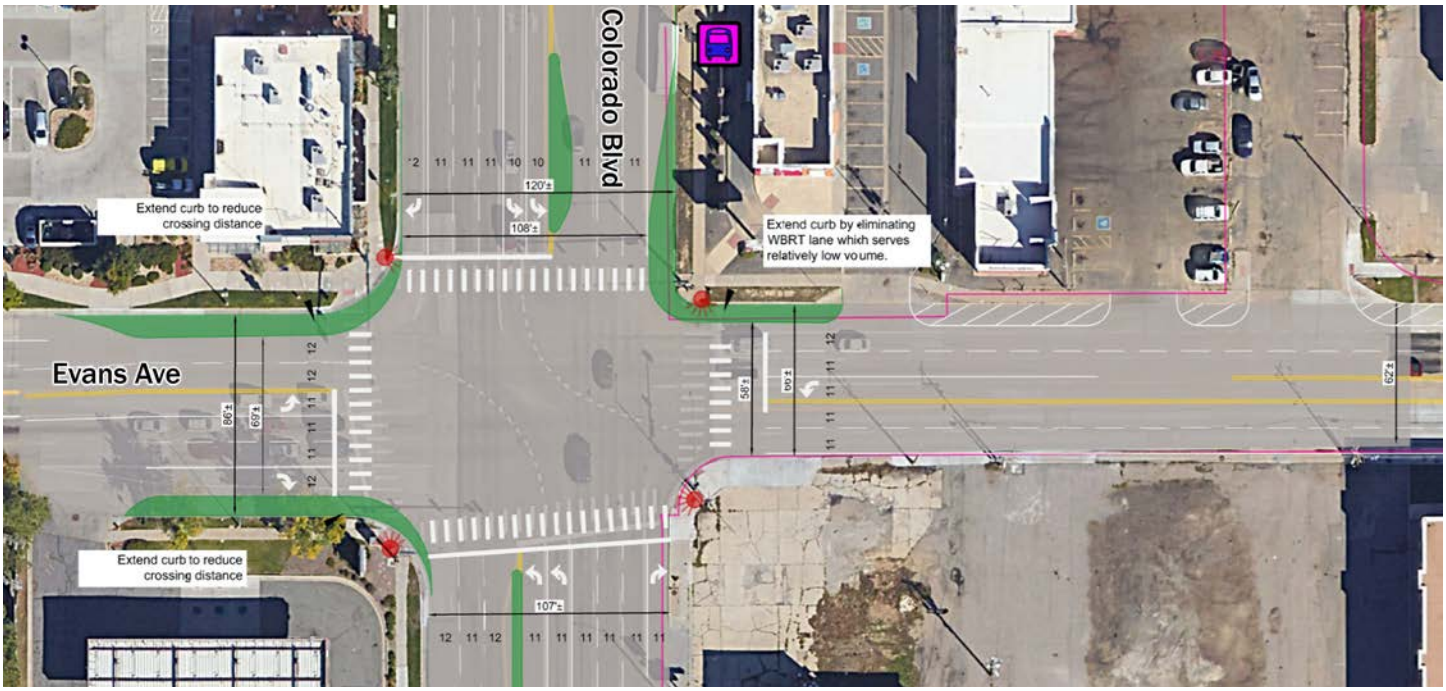
COL7: If maintained, add advanced warning sign for WBRT drop at Colorado

COL8: Install pedestrian countdown timer on NW corner for WB travelers

COL9: Construct sidewalk where gaps exist

COL10: If intersection improvements include medians on the east and west legs creating negative offset LT lanes, then change the operation to protected-only due to restricted sight visibility

Figure 25: Colorado Blvd and Evans Ave Recommendations Diagram



Ash St and Evans Ave

Evans and Ash is an unsignalized intersection east of Colorado Blvd that provides access to the RTD Colorado Station parking lot on the north side.

Crash Review

N/A

Observations

Pedestrians/Bike/Transit

- Pedestrians were observed crossing midblock here. They appeared to be coming from a new apartment building at 2180 S. Colorado Blvd

Figure 26: Ash St and Evans Ave Observations

Ash Facing South

Evans Facing West

Recommendations

ASH1: Evaluate the potential for a midblock crossing of Evans Ave at Ash St

Figure 27: Ash St and Evans Ave Recommendations Diagram

Birch St and Evans Ave

Evans and Birch is a signalized intersection east of Colorado Blvd that provides access to the RTD Colorado Station park-and-ride lot on the north side as well as the Colorado Center commercial development

Figure 28: Birch St Intersection

Crash Review

- Total crashes: 25
- KSI crashes: 2
- Fatal Crashes: 0
- 1 KSI was a broadside crash where a WB vehicle collided with a vehicle due to careless driving
- Majority of crashes were rear-end (10) due to careless driving (6); (EB-7; WB-3)
- The pedestrian crash (KSI) involved a WB vehicle that struck a pedestrian– the WB driver was at fault for an unreported action

Observations

Pedestrians/Bike/Transit

- High number of pedestrians and bicyclists observed crossing
- Bikes cut through parking lot rather than use road

Infrastructure

- There is no sidewalk along the east side of Birch north of Evans

Operations

- Poor sight distance on south leg
- Offset intersection makes LTs from Birch onto Evans a potential conflict with crossing traffic

Figure 29: Birch St and Evans Ave Observations

Birch Facing South | Evans Facing East | Evans Facing East

Recommendations

BIR1: Evaluate installing median on the east leg of the intersection that allows for WBLT; Prohibit NBLT

from Birch

BIR2: Improve sign visibility for "No Ped/Bike Crossing" on the south side of the Evans for the east leg crossing (between the offset roads)

BIR3: Install sign for "Bikes Cross with Pedestrian Signal" on the south side of Evans for the west leg crossing; add dashed green bicycle lane through the intersection, parallel to the crosswalk.

BIR4: Move ped crossing button located on NW corner to the other side of the pole

BIR5: Construct sidewalk along the east side of Birch, north of Evans

BIR6: Replace and upgrade legacy traffic equipment (span wires) with poles

BIR7: Implement leading pedestrian interval, increase pedestrian walking time

Figure 30: Birch St and Evans Ave Recommendations Diagram

Interstate 25 Interchange and Evans Ave

The I25 and Evans interchange is a complex signalized series of intersections connecting Colorado's primary north/south interstate with Evans Ave. There are RT slip lanes at every exit from the interstate.

Crash Review

SB on/off ramps

- Total crashes: 148
- KSI crashes: 1
- Fatal Crashes: 0
- The one KSI was a single-vehicle crash that occurred when a SB vehicle collided with a fixed object due to speeding
- Majority of crashes were rear-end (74) due to careless driving (SB-62; EB-4; WB-5;
- 33 side-to-side crashes (SB-28; EB-2; WB-3)

Figure 31: I25 Interchange

NB on/off ramps

- Total crashes: 221
- KSI crashes: 1
- Fatal Crashes: 0
- The KSI crash was a head-on collision between EB and NB vehicles. The EB vehicle was at fault for careless driving.
- Majority of crashes were rear-end (128) due to careless driving (87); (NB-145; SB-24; EB-13; WB-19; Other-19)
- 36 side-to-side crashes (NB-21; SB-8; EB-2; WB-5)

Observations

Infrastructure

- The concrete zone on the north side of the bridge is an undefined space without an accessible path

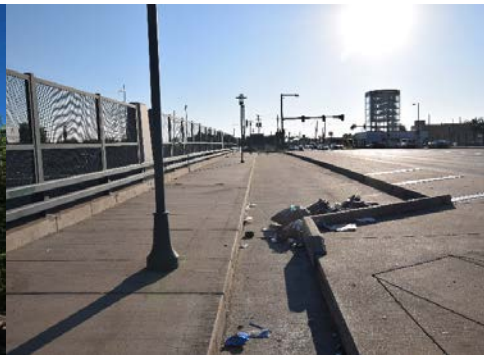
Operations

- High-speed coming off I25 with free-RT movements onto Evans
- No lighting of slip lanes at night
- Extremely limited visibility for both drivers and pedestrians of on/off ramps and pedestrian crossings
- Only one pedestrian light working out of 8 existing
- Turning guidelines are not optimal for the WB to SB LT movement
- Combination of green ball and straight or turn arrows used at the interchange
- Drivers from the I25 NB off-ramps queue and wait, sometimes blocking lanes on Evans Ave, to make EB LT at Dahlia St

Figure 32: I25 Interchange Observations

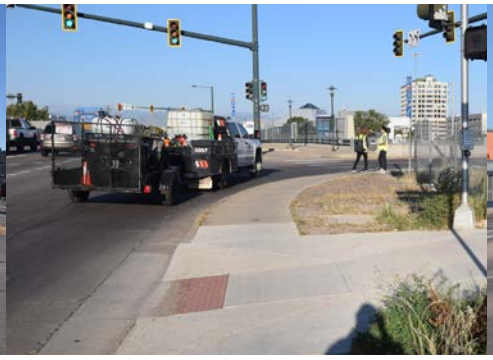
SB Off-Ramp

SB On-Ramp

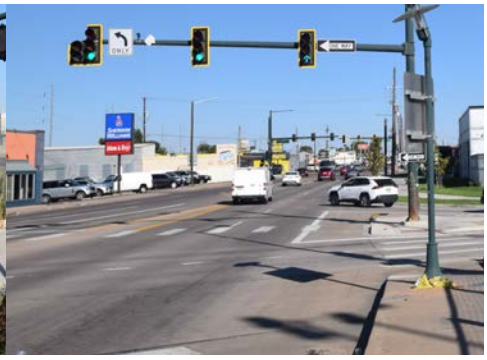


Concrete Zone - Bridge

NB Off-Ramp



NB On-Ramp



Evans Facing East

I251: Standardize use of green ball and green arrow signal heads
I252: Re-stripe WBLT onto southwest on-ramp dotted stripe to follow more closely with how drivers make the acute turn
I253: Install lighting on slip ramps at the NW corner and SE corner of the interchange
I254: Evaluate visibility and sight-lines for all on/off ramps; where geometric improvements are not feasible, increase pedestrian crossing visibility, add pedestrian push buttons and LPIs to signals on north side of Evans
I255: Improve pedestrian lighting on both sides of the bridge
I256: Bulb out curb on I-25 NB on-ramp (NE Corner) and consider adding vertical barriers to slim travel lane on WB to NB turning movements
I257: Relocate existing yield signs for vehicles turning from WB to NB in advance of crosswalk
I258: Improve north side of bridge concrete zone and define accessible pedestrian walkway
I259: Construct N/S ped crossing on west side of interchange
I2510: Monitor operations of the NB LT from the I25 NB off-ramp to the EB LT lane from Evans to Dahlia; if risky behavior continues, make improvements to encourage drivers to use the Jewell Ave exit available north of the interchange and/or interconnect the Dahlia LT operation to be more responsive to the demand for the EBLT movement

Figure 33: I25 Interchange Recommendations Diagram

Dahlia St and Evans Ave

The Dahlia St and Evans Ave intersection is a signalized intersection with 2 through lanes in each direction and a center turn lane along the Evans approach. On the northern leg of Dahlia, there is a single wide NB receiving lane, and 3 lanes on the SB approach (1 RT, 1 through, and 1 LT). On the southern leg of Dahlia, there is one wide SB receiving lane and 2 lanes on the NB approach (1 LT, 1 through)

Figure 34: Dahlia St Intersection

Crash Review

- Total crashes: 74
- KSI crashes: 1
- Fatal Crashes: 0

- The one KSI was a pedestrian crash where a SB vehicle struck a pedestrian. The driver's action was not reported.
- Majority of crashes were rear-end (32) due to careless driving (23); (NB-1; SB-2; EB-4; WB-23; Other-2)
- 17 side-to-side crashes (SB-5; EB-7; WB-5)

Observations

Pedestrians/Bike/Transit

- Many pedestrians observed using bus stop
- Budget Rent-a Car backs large vehicles into parking spots adjacent to sidewalks that overhang into the limited sidewalk area around bus stop
- Numerous trailers and trucks observed

Infrastructure

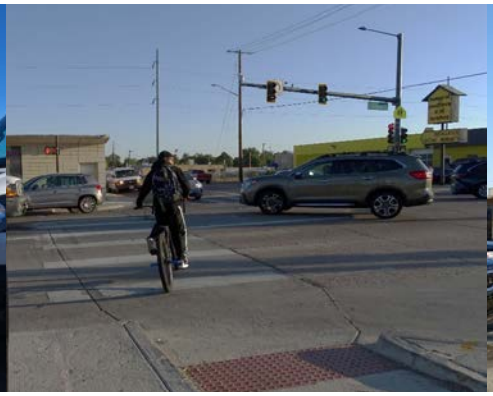
- The SB RT lane is a heavy turning movement with substandard turn lane width of 9 feet

Operations

- Permissive NB/SB lefts conflict with drivers making RTs on red from the opposing direction, creating a complex and risky convergence; Many near misses observed. Operations further impacted by high volumes of school traffic at certain times of the day

Figure 35: Dahlia St and Evans Ave Observations

Budget Rental Vehicle Overhang



Bicyclist Crossing While Vehicles Fail to Yield

NB to WB Truck - Turned on Red Due to Lack of Gap in Permissive LT

Recommendations

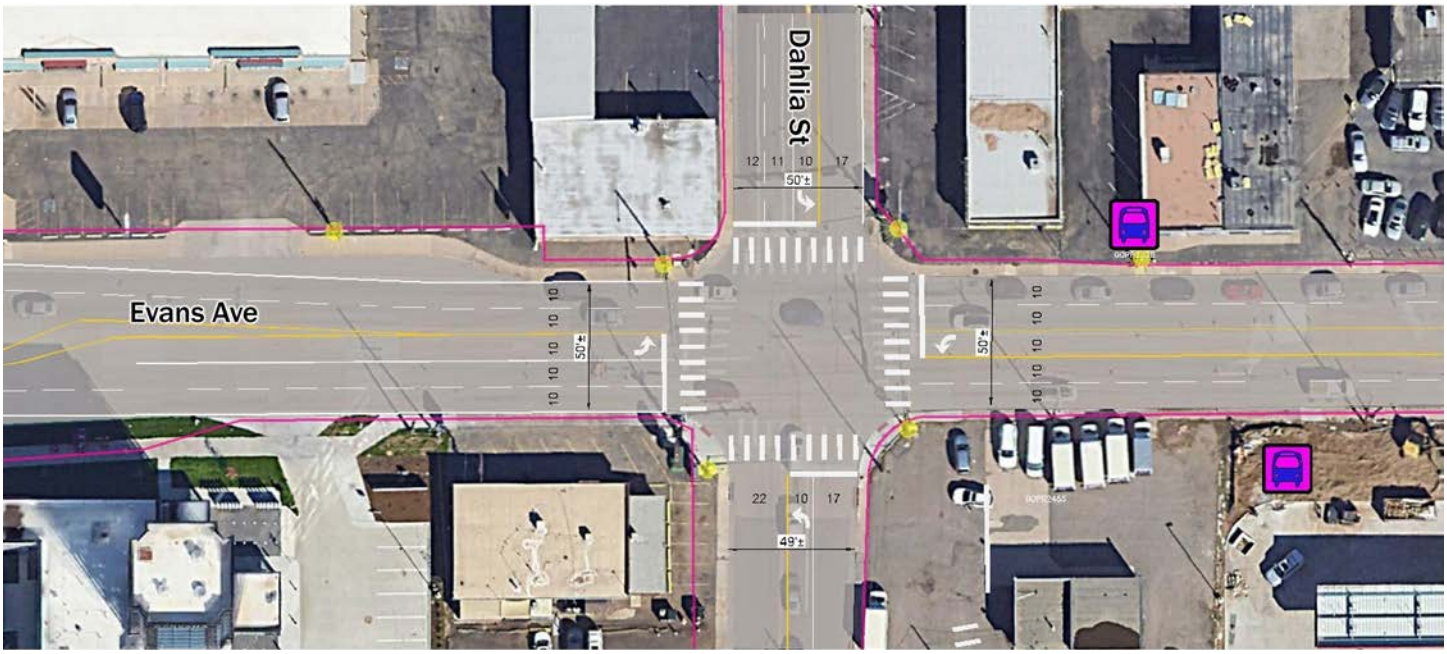
DAH1: Widen SB RT lane on north side of intersection by shifting all lanes equally to the east and reducing width of the NB receiving lane, re-stripe south leg to match with zero offset LTs

DAH2: Move bus stop further east to the landscape area adjacent to gas station to avoid conflict with small sidewalk space near Budget Rent-a-Car or enforce and mitigate the bus stop encroachment from the business

DAH3: Evaluate whether trucks could be prohibited on certain side streets

DAH4: Protect N/S lefts by time of day to accommodate demand and minimize permissive left/ opposing right conflict

Figure 36: Dahlia St and Evans Ave Recommendations Diagram



Grape St and Evans Ave

The Grape St and Evans Ave intersection is a signalized intersection with 2 through lanes in each direction and a center turn lane along the Evans approach. On the offset northern leg of Grape, there is parking access to businesses and residential units. The southern leg consists of 1 lane in each direction with the NB approach functioning as a LT/Through/RT lane.

Figure 37: Grape St Intersection

Crash Review

- Total crashes: 52
- KSI crashes: 0
- Fatal Crashes: 0
- Majority of crashes were rear-end (23) and side-to-side (16) due to careless driving (18) and lane violations (10); (NB-2; SB-2; EB-24; WB-11)
- The pedestrian crash (non-KSI) involved a vehicle traveling southeast that struck an EB pedestrian. The driver's action was not designated.

Observations

Pedestrians/Bike/Transit

- No pedestrian ramps at crosswalks
- No pedestrian heads on E/W approach on Grape

Infrastructure

- Narrow, substandard EB/WB LT lanes (7.5')

Operations

- Long school pick-up/drop-off car line forms here starting from Dahlia -> Warren > Grape > and finally onto Evans itself
- Offset NB/SB legs

Figure 38: Grape St and Evans Ave Observations

Grape St Intersection Facing North | Highline Academy Queue | Evans Facing East

Figure 39: Observed Pick-Up Circulation of Highline Academy

Recommendations

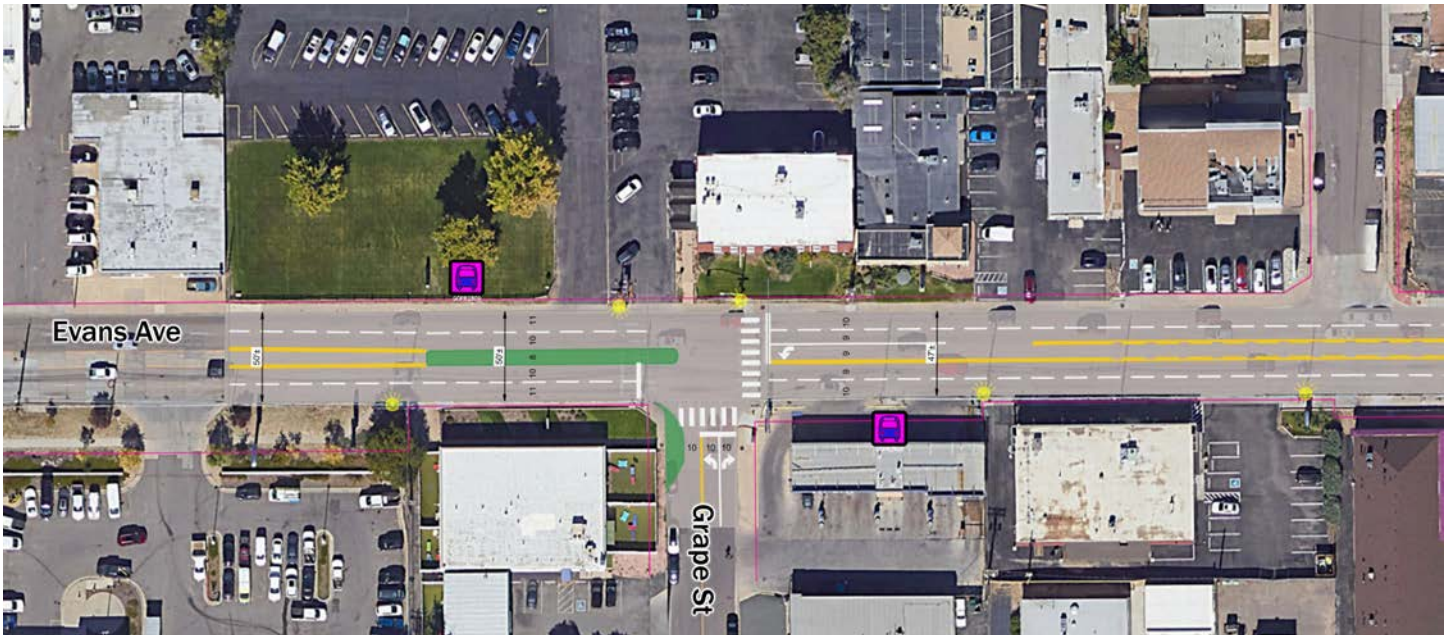
GRA1: Encourage shared access agreements of northern properties

GRA2: Work with commercial properties on north side of intersection to consolidate driveway access, install RT ONLY sign and prohibit LT out of northern leg, or operate with a split phase if full access on the north leg remains

GRA3: Identify minimum required lane widths and expand roadway as needed to accommodate absolute minimum of 9'. Remove the EBLT and replace with median or striping

GRA4: Create circulation plan for Highline Academy - School schedule adjustments may be necessary
GRA5: Maintain WBLT Lane so that queues associated with the Highline Academy school traffic do not block through lanes on Evans - obtain new ROW from 5470 E Evans Ave and widen intersection
GRA6: Construct pedestrian curb ramps at signalized marked crosswalks. Add NO PEDESTRIAN signs if crosswalk is eliminated with improvements

Figure 40: Grape St and Evans Ave Recommendations Diagram



Holly St and Evans Ave

The Holly St and Evans Ave intersection is a signalized intersection with 2 through lanes in each direction and a center turn lane along the Evans approach. On the northern leg of Holly, there is 1 RT lane, 1 through lane, and 1 LT lane on the SB approach, and 2 receiving lanes. On the southern leg, there is 1 SB receiving lane, 1 NB LT lane, and 2 NB through-lanes.

Figure 41: Holly St Intersection

Crash Review

- Total crashes: 127
- KSI crashes: 2
- Fatal Crashes: 0
- One of the KSI crashes was a rear-to-side crash where NB vehicle struck another NB vehicle. The vehicle at fault was cited for careless driving.
- Majority of crashes were broadside (41) due to failing to yield ROW (12); (NB-8; SB-7; EB-11; WB-10; Other-5)
- The pedestrian crash (KSI) involved a vehicle that struck a WB pedestrian at the intersection – the vehicle was at fault for careless driving

Observations

Pedestrians/Bike/Transit

- Recently rebuilt with audible signals
- Poor pedestrian access to SE corner business (7/11)
- No midblock opportunities between traffic signals
- Observed being used as an informal bike route
- First north side bus stop bench identified on the corridor (no other bus stops along north side of Evans between Colorado and Holly)

Infrastructure

- Narrow substandard EB/WB LT lanes
- Overhead utility line maze

Operations

- NB through/right rarely used as through lane
- A lot of honking and impatient drivers every cycle
- Recently rebuilt with reflective backplates and Flashing Yellow Arrow (FYA)

Figure 42: Holly St and Evans Ave Observations

SE Corner 7/11

Audible Walk Signals

Recommendations

HOL1: Install signage on mast arm to increase awareness of NB lane configuration

HOL2: Increase pedestrian access to business on the SE corner; Citywide: incorporate pedestrian access into site plan review on new developments

HOL3: Consider designated N/S bike route/bikeway on Holly St

HOL4: Eastbound Evans; assess and work with commercial property owners to evaluate moving bus stop to farside

Jasmine St and Evans Ave

The Jasmine St and Evans Ave intersection is a signalized T-intersection with 2 through lanes in each direction and a center turn lane along the Evans approach. The south leg of Jasmine does not have any lane markings and operates as a single shared lane in each direction. The northern leg of Jasmine is an offset driveway and provides access to parking for businesses - it is not part of the traffic signal operation.

Figure 43: Jasmine St Intersection

Crash Review

- Total crashes: 24
- KSI crashes: 0
- Fatal Crashes: 0
- Majority of crashes were rear-end (9) and broadside (8) due

careless driving (8); (NB-1; SB-3; EB-4; WB-9)

- The remaining crashes were side-to-side (5), head-on (1), and single-vehicle (1)

Observations

Operations

- Newer signal but curb ramps are not designed to current standards.

Recommendations

JAS1: Consider prohibiting SBLT out of northern driveway west of the intersection

JAS2: Add curb extension on SE corner to narrow the crossing of Jasmine

Figure 44: Jasmine St and Evans Ave Observations

Evans Facing East

Leyden St and Evans Ave

The Leyden St and Evans Ave intersection is an unsignalized T-intersection with 2 through lanes in each direction and 1 center turn-lane along the Evans approach. The south leg of Leyden does not have any lane markings and operates as a single shared lane in each direction. There is no north leg.

Figure 45: Leyden St Intersection

Crash Review

N/A

Observations

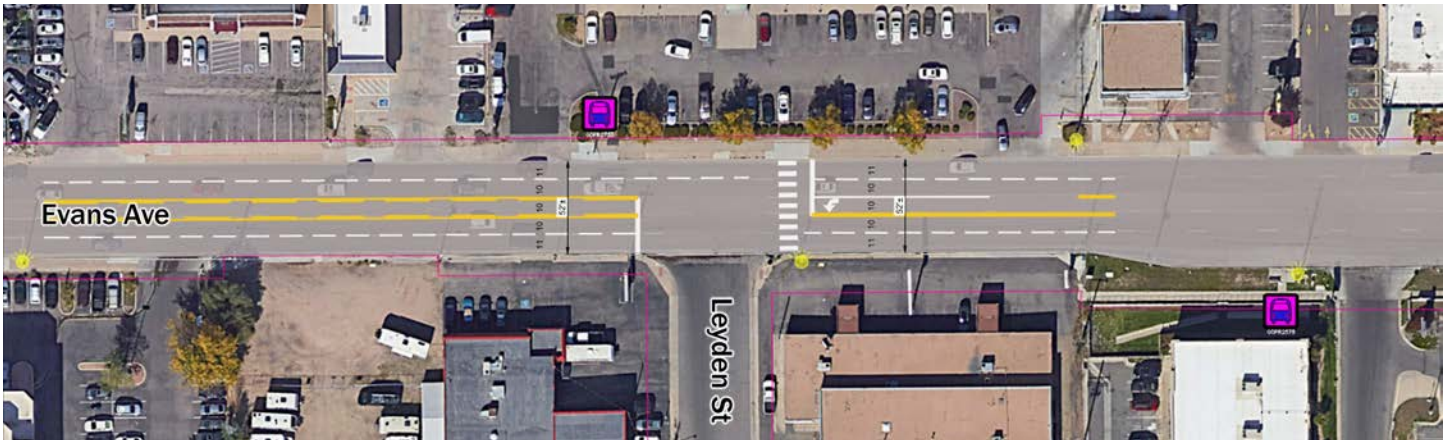
Pedestrians/Bike/Transit

- Many pedestrians were observed crossing midblock through heavy traffic about 900 feet east of Jasmine St (traveling to and from the McDonald's)

Recommendations

LEY1: Consider construction of a signalized midblock crossing at Leyden St (800 feet east of Jasmine)

Figure 46: Leyden St and Evans Ave Recommendations Diagram



Monaco St Pkwy and Evans Ave

Figure 47: Monaco St Pkwy Intersection

The Monaco St Pkwy and Evans Ave intersection is a signalized intersection with 2 through lanes in each direction, a LT lane, and a RT lane on the west leg of Evans, and 2 through lanes in each direction, and a LT lane on the east leg. The north leg of Monaco Pwky consists of 3 SB through-lanes, 2 SBLT lanes, and 2 NB receiving lanes. The southern leg of Monaco Pwky consists of 3 SB receiving lanes, 2 NBLT lanes, 2 NB through-lanes, and 1 NBRT lane,

Crash Review

- Total crashes: 102
- KSI crashes: 2
- Fatal Crashes: 0
- One KSI crash was a broadside where a NB vehicle collided with an EB vehicle. The NB vehicle was at fault for another contributing factor that is not specified
- Majority of crashes were rear-end (45) due to careless driving (30); (NB-10; SB-8; EB-18; WB-9)
- The pedestrian crash (KSI) involved an EB vehicle that struck a pedestrian who was not crossing at the intersection crosswalk – it was not designated who was at fault

Figure 48: Monaco St Pkwy and Evans Ave Observations

Evans Facing East Showcasing SE Corner

Monaco Facing North

Observations

Pedestrians/Bike/Transit

- Good pedestrian access to Walgreen's

Infrastructure

- Wide curb radius at corners facilitate high turning speeds
- The EB lane width is very wide closest to curb east of Monaco Pwky

Operations

- Permissive left in evening hours resulted in long turn queues
- NB receiving lane of Monaco Pkwy is 30 feet wide but only striped as two lanes, while SB lanes are striped as three lanes with same width

Recommendations

MON1: Stripe third NB lane on Monaco

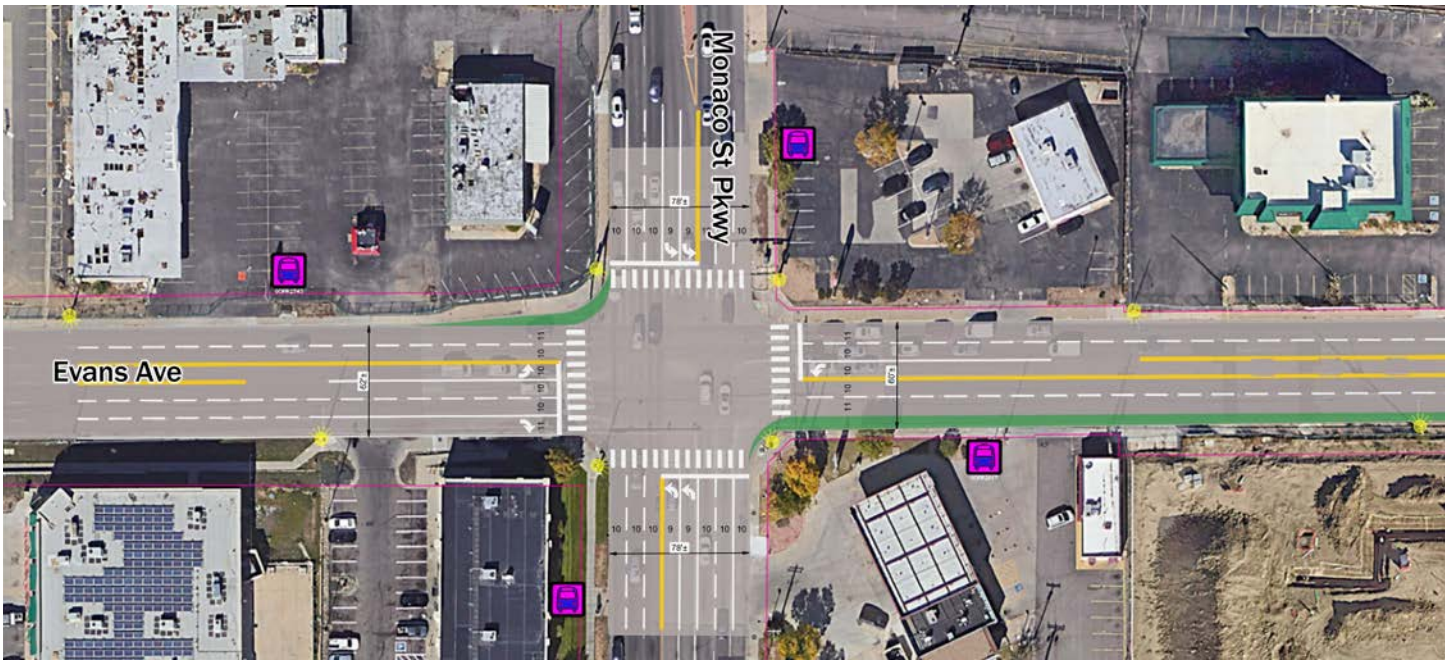
MON2: Review and revise the signal timing at add protected LT phase from EB Evans to NB Monaco in the evening hours

MON3: Install/upgrade luminaires so there are two on every corner

MON4: Reduce curb radius on SE and NW corners so that drivers have to navigate the turns at a reduced speed

MON5: Narrow EB curb lane east of the intersection and upgrade sidewalk facilities

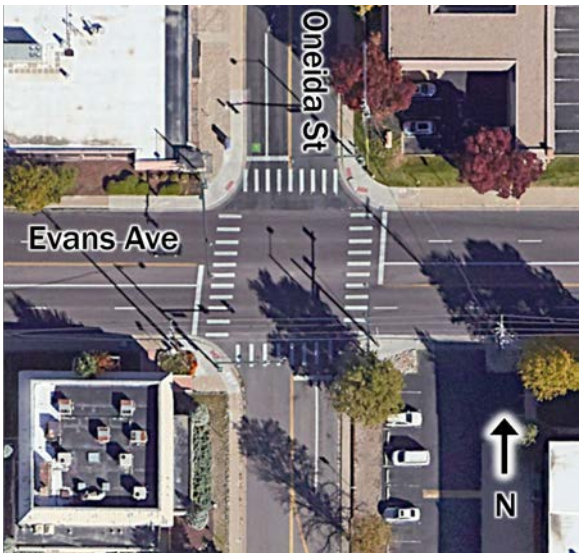
Figure 49: Monaco St Pkwy and Evans Ave Recommendations Diagram



Oneida St and Evans Ave

The Oneida St and Evans Ave intersection is a signalized intersection with 2 through lanes in each direction and a center turn lane along the Evans approach. The north leg consists of 1 SB through-right lane, 1 SBLT lane, and 1 wide NB receiving lane. The south leg consists of 1 NB through-right lane, 1 NBLT lane, and 1 wide SB receiving lane.

Figure 50: Oneida St Intersection



Crash Review

- Total crashes: 40
- KSI crashes: 3
- Fatal Crashes: 0
- One of the KSI was a broadside crash where a WB vehicle making a LT collided with an EB vehicle. The WB vehicle failed to yield the ROW
- Another KSI involved a WB vehicle going straight that collided with another WB vehicle because they followed too closely, a motorcyclist involved in the collision was seriously injured
- Majority of crashes were broadside (12), rear-end (11), and side-to-side (8) due to careless driving (7) or failing to yield ROW (7); (NB-2; SB-3; EB-12; WB-12; Other-2)
- The remaining KSI crash involved a NB vehicle that struck a WB crossing pedestrian due to careless driving

Observations

Pedestrians/Bike/Transit

- Single bike box located on SB RT lane is not the appropriate application

Infrastructure

- EB permissive left creates conflict with pedestrian crossings, observed multiple LT vehicles failing to yield

Operations

- EB/WB lanes width very wide closest to curb on all sides of intersection

Figure 51: Oneida St and Evans Ave Observations

Evans Facing West - Note Wide Lane | Denver 'D-Route Bicycle' Wayfinding Sign | Evans Facing East

Recommendations

ONE1: Paint directional arrows on N/S lanes or provide alternative lane configuration guidance

ONE2: Remove Center TWLT lane east of intersection and continue median that was recently built at Quebec with limited access to side streets, but not driveways

ONE3: Widen sidewalks on the south side by narrowing travel lanes or adding sidewalk south of existing utility easement

ONE4: Increase pedestrian crossing visibility, include enhanced striping and LPI

ONE5: Remove the single green bike box and consider striping bike lanes through the intersection

Figure 52: Oneida St and Evans Ave Recommendations Diagram

Quebec St and Evans Ave

The Quebec St and Evans Ave intersection is a signalized intersection that is currently undergoing massive construction and realignment from Arapahoe County.

Figure 53: Quebec St Intersection

Crash Review

- Total crashes: 40
- KSI crashes: 0
- Fatal Crashes: 0
- Majority of crashes were rear-end (14) and broadside (9) due to careless driving (10); (NB-2; SB-3; EB-9; WB-5; Other-4)
- The pedestrian crash (non-KSI) involved an EB vehicle that struck a pedestrian – the vehicle was at fault for careless driving

Observations

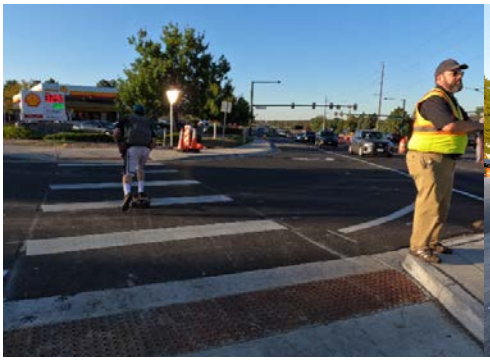
Pedestrians/Bike/Transit

- Busiest bus stop on the corridor (North side)
- MANY pedestrians observed crossing over raised median across from bus stop near Pontiac Way, a cyclist was observed lifting their bicycle over the median

Infrastructure

- RTs on NW and SE corners are very wide due to skew of intersection and function as free flow lanes
- Lighting is not present on channelized RT lanes at the NW and SE corners of the intersection

Figure 54: Quebec St and Evans Ave Observations



Wide NW RT Lane on NW Corner

Evans Facing West - Note Bus Stop

Quebec Facing South - Taken From NW Corner

Recommendations

QUE1: Extend median further west along Evans Ave for access management

QUE2: Consider adding a signalized midblock crossing at Pontiac Way (700 ft west of Quebec St) and move bus stop closer; consider sight distance on horizontal curve

QUE3: Add lighting and yield signs and pavement markings to the channelized RT lanes; consider narrowing the channelized RT lanes or adding a raised crosswalk or truck apron; create a standard for channelized RT lanes that includes these enhancements