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.

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City and County of Denver RSA Process

The Denver Vision Zero Action Plan is a five-year plan to achieve zero traffic deaths and serious injuries by 2030. The Denver Vision Zero program provides traffic safety professionals a unique opportunity to work as part of a dedicated traffic safety improvement program by collaborating with law enforcement, first-responders, government officials, and other stakeholders.

The 20th Street corridor is part of Denver’s High Injury Network (HIN). The HIN has been identified in City and County of Denver (CCD) as part of the Vision Zero initiative as the network of corridors with the highest number of fatal and injury crashes for all travel modes. The choice of Road Safety Audit (RSA) corridors is driven by their proximity to the Equity Index Areas, 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, people with disabilities, and those without vehicles. Figure 1 shows the project location between Osage Street and N Broadway.

RSAs are formal examinations of selected roadway entities from a safety performance viewpoint. All RSAs are performed by an independent multidisciplinary 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 safety improvements for all road users. RSAs can be used in any phase of project development from planning to preliminary engineering to design to 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 improvements. The RSA team reviews police crash reports, reviews local agency crash data, and conducts field observations during different times of the day such as day/night and peak/non-peak hours.
RSA Team

Gaurav Vasisht of Felsburg Holt and Ullevig (FHU) led the independent multidisciplinary RSA team, which included:

- Gaurav Vasisht, PE, PTOE, RSP21, FHU
- Ryan Saline, PE, FHU
- Clay Gattey, EIT, FHU
- Faith Kelley, EIT, FHU
- Charles Alexander, PE, AICP, RSP1, Fehr & Peers
- Patrick Picard, AICP, RSP1, Fehr & Peers
- Hilda Ofori-Addo, Fehr & Peers

The RSA team conducted this audit to the best of its ability within the time allotted. The initial recommendations are based on background information provided during the Kickoff and Preliminary Findings Meeting, an evaluation of historic crash data, and both day and night field reviews, as discussed previously. This information assisted the RSA team in identifying potential opportunities to improve the safety performance of 20th Street from Osage Street to N Broadway. This information was initially presented to stakeholders at the Preliminary Findings Meeting. 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.
Background Information, Observations, and Recommendations

The following section provides background information, crash review, comments from the RSA Pre-Audit Meeting, observations from the field review, and recommendations for the 20th Street corridor and for each study intersection. Appendix A includes a comprehensive list of all recommendations, including location, countermeasures, crash modification factors (i.e., factors used to compute expected number of crashes after implementing a countermeasure), return on investment (a subjective low, medium and high rating), and planning-level cost estimate.

Pre-Audit Meeting

The RSA team met virtually on Thursday, September 16, 2021, via Microsoft Teams with CCD staff Mike King (CCD Project Manager), David DiGiacomo, and Abi Subramanian to discuss background information and the RSA schedule. Denver District 9 resident Rob Toftness was also present. The RSA Pre-Audit Meeting presentations can be found in Appendix B. Information presented and discussed at the Pre-Audit/Kickoff Meeting is included in this section under background information, crash review, and comments provided by City staff and RSA stakeholders.

Observation Process

The RSA team began the observation period by driving the 20th Street corridor in both directions in its entirety, followed by driving every approach to each intersection. The corridor-wide observations are based on the general observations made by the RSA team during the windshield review and while conducting the walking field reviews. Observations included road user behavior, traffic signal operations, Americans with Disabilities Act (ADA) facility conditions including ramps and sidewalks, sign visibility, design deficiencies, bicycle infrastructure, spot speed measurements, and windshield review.

Field reviews were conducted on:

- Saturday/Sunday, September 25/26 (RSA Day 1) – 10:00 PM to 12:30 AM
- Monday, September 27 (RSA Day 2) – 4:00 PM to 6:00 PM (Game-Day)
- Monday, September 27 (RSA Day 2) – 8:00 PM to 9:00 PM (Game-Day)
- Tuesday, September 28 (RSA Day 3) – 7:00 AM to 9:30 AM, 12:00 PM to 1:00 PM
- Wednesday, September 29 (RSA Day 4) – As Needed

Further information regarding presentations and site visits can be found in the RSA Intent Memorandum included in Appendix C. The weather was clear with a mean high temperature of 85 degrees Fahrenheit. The observation periods consisted of driving and walking the road and observing road users. Information provided in this report does not reflect the opinion of any one 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 recommendations listed below have been grouped into:

i. Short-term: (Less than 1 year) Denoted by a green circle
ii. Medium-term: (1 to 3 years) Denoted by a blue square
iii. Long-term: (More than 3 years) Denoted by a black diamond

Appendix A summarizes the recommendations and includes a planning level cost estimate. This estimate is based on the following assumptions:

i. Low: Operational Improvements
ii. Medium: Up to $100,000
iii. High: Greater than $100,000

The RSA team met virtually on Thursday, October 6, 2021, via Microsoft Teams, to present preliminary findings during the Post-Audit presentation to CCD staff Mike King (CCD Project Manager), Rolf Eisinger, David DiGiacomo, Karen Good, and Abi Subramanian; Denver District 9 resident Rob Toftness was also present. Observations and potential opportunities for improvements were discussed during this meeting. The presentation slides from this meeting are provided in Appendix D.
**20th Street Corridor**

The following section provides background information, observations, and recommendations for the 20th Street corridor, including intersection geometry, user behavior, signal control, and multimodal infrastructure.

**Background Information**

Between Osage Street and Arapahoe Street, 20th Street is a two-way arterial. It has two southbound travel lanes from Osage Street to Lawrence Street and one southbound travel lane from Lawrence Street to Arapahoe Street. It has two northbound travel lanes (plus one express lane) from Arapahoe Street to Little Raven Street and one northbound travel lane from Little Raven Street to Osage Street. 20th Street is a one-way arterial from Arapahoe Street to N Broadway with three northbound travel lanes.

*Figure 3* shows the roadway characteristics of the corridor.

*Figure 3. Project Area Speed Limits and Average Annual Daily Traffic*

Through most of the project limits, the posted speed limit is 30 miles per hour (MPH) from Osage Street to Blake Street and 25 MPH from Blake Street to N Broadway. Sidewalks are provided throughout the entire project area. There are no bike lanes on 20th Street, but numerous cross-streets in the project area provide buffered bike-lines. Annual Average Daily Traffic (AADT) varies within the project limits from 31,000 vehicles per day (vpd) near the northwest portion of the corridor to 9,700 vpd toward the southeast end of the corridor (*Figure 3*).
Crash Review

Between March 2017 and March 2020, there were a total of 618 crashes along 20th Street within the RSA project limits. Figure 4 illustrates the corridor crash map, and Figure 5 shows crashes by intersection.

- 3 fatal crashes were reported.
- 14 serious injury (KSI) crashes were reported.
- 41 crashes involved pedestrians.
- 16 crashes involved cyclists.
- 22 percent of total crashes were between 3:00 PM and 6:00 PM; 43 percent of KSI crashes were between 12:00 AM and 3:00 AM.
- Total crashes: 39 percent Rear End, 27 percent Broadside, and 20 percent Sideswipe.
- KSI crashes: 64 percent Pedestrian, 29 percent Fixed Object, and 7 percent Bicycle.
Crash Data Summary

The following summarize the corridor-wide crash data and present common trends at intersections and along midblock segments:

- Rear End, Sideswipe, and Broadside crashes at intersections accounted for the highest number of crashes, which may be influenced by back-of-queue sight distance issues, inadequate clearance intervals, sight triangles, and signal coordination.
- Spot speed samples collected by the RSA team indicate average speed might be a factor in crash causation. This is especially relevant between Blake Street and the I-25 ramps.
- Pedestrian and bicycle activity along 20th Street represents 71 percent of KSI crashes (10 of 14).
- Total crash frequency was generally even throughout the day but elevated during the PM peak period. This can primarily be associated with high levels of traffic commuting to and from downtown Denver.
- A majority of KSI crashes (10 of 14) occurred between 9:00 PM and 3:00 AM, which was influenced by elevated pedestrian activity and nightlife activities along the corridor.
- The highest crash frequencies were observed at the 20th Street & N Broadway/California Street intersection and the 20th Street & I-25 Northbound ramp intersection.
Comments Provided by City Staff and RSA Stakeholders During Pre-Audit Meeting

- The 20th Street corridor is a primary route between downtown Denver and I-25. This route serves significant peak hour traffic volumes but has seen changing traffic patterns over the last 18 months due to the impact of the COVID-19 pandemic on office occupancy and general activity downtown.
- Due to its proximity to Coors Field, the corridor also experiences significant pedestrian activity during Colorado Rockies games, which often coincide with the end of the PM peak period.
- There is an ongoing City Vision Zero project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to improve safety for vehicles, pedestrians, and bicycles while addressing wrong-way driving and roadway geometry issues.
- 20th Street and Chestnut Street was identified as a key intersection for Rapid Response. Signal retiming, leading pedestrian intervals, pavement markings, and bike lanes are all proposed. The section of Chestnut between 20th and 29th has been identified for improvements through the Neighborhood Transportation Management Program (NTMP) in 2022. Regional Transportation District (RTD) is completing the design now for a signal rebuild at 20th and Chestnut.
- Several hit-and-run crashes have been noted recently along the 20th Street corridor.
- Several crashes have involved bicyclists traveling the wrong way in protected bike lanes.
- Project stakeholders also noted several things to consider during field visits that may not be captured in the recent crash history:
  - Development of McGregor Square in the west corner of 20th Street & Wazee Street has increased pedestrian activity along the corridor near Coors Field, especially before/after Rockies games.
  - Traffic conditions late on Saturday nights are drastically different from conditions on weekday nights and may benefit from a dedicated field visit.
  - Several modes of observations should be considered during field visits, including walking, biking, and driving.
- Field observations were delayed from their initial dates due to active construction for an RTD project that was taking place on the 20th Street corridor.

Observations

The following subsections summarize general observations that apply to the project corridor as a whole.

Road Users

The following road users were observed along the corridor (Figure 6):

- Vehicles
- Tractor trailers
- School buses
- Motorcycles
- Bicyclists/shared scooters
- Pedestrians
- RTD buses

Figure 6. Examples of Roadway Users
Concerns

- Roadway lane assignment is likely a contributor due to limited guidance at study intersections.
- High pedestrian activity between Larimer Street & Chestnut Street in the evening and late-night is related to stadium and nightlife.
  - Pedestrians throughout the corridor were observed crossing against the walk signal.
  - Pedestrian walk signals at most intersections between Blake Street and N Broadway cycle out before the end of the corresponding green phase.
  - High micromobility usage was observed on roadways, bike lanes, sidewalks, and multiuse trails.
- The corridor regularly experiences traffic congestion. Congestion was noted during the peak hours due to morning and afternoon commuting to/from downtown via I-25.
  - Peak hour volumes were lower than expected, likely due to the lack of downtown office activity.
- Corridor infrastructure is poorly maintained in some locations:
  - Many pedestrian signal heads are broken or damaged.
  - Numerous signs are in poor condition at the west end of the corridor.
  - Some signs are knocked down or missing.
  - The underpasses have poor lighting and lack retroreflective object markings/delineation.
  - Pavement markings are faded and not adequately retroreflective.
  - HOV/Express Lane designations on northwest bound 20th Street are unclear.
  - Signal head backplates are not uniform throughout the corridor and do not provide retroreflective tape.
  - Several curb and gutter locations were damaged throughout the corridor.
  - Potholes from utility locates on sidewalks, crosswalks, travel lanes, and multiuse trails were inadequately repaired and pose challenges to non-motorized users.
  - Curb ramps and sidewalks do not meet ADA criteria in multiple places due to ramp locations and pavement conditions.
- Sight distance issues were noted in locations due to a combination of maintenance issues, design issues, and landscaping.
- Left-turn operation on the corridor varies. The RSA team observed permissive, protected/permissive, and protected at different locations on the corridor.
  - Permissive left turn operations are difficult for drivers to simultaneously judge gaps in traffic and yield to pedestrians.
- Numerous instances of conflict between pedestrians and turning vehicles were observed:
  - There was a high rate of non-compliance of No Right on Red conditions on the northwest end of the corridor.
  - Turning vehicles often conflicted with multiuse trail users, northwest of 20th Street and Blake Street.
- Signal progression was observed to be higher than 25 MPH in the downtown segment.
- Lane assignment signs are not above corresponding lanes.
- Many locations lack adequate spacing between on-street parking and intersections.

Comments/Concerns Provided by Emergency Services

- Well-functioning Opticom is critical to emergency response. Figure 8 illustrates a mast arm with proper emergency response infrastructure.
- Denver Fire Department (DFD) would like a better understanding of the detection zone of the Opticom, especially when DFD has to use opposing traffic’s lane during congestion.
- DFD is not sure if all the intersections’ Opticom Emergency Vehicle Preemption (EVP) are working.
- Red-light running occurs because of delays and driver frustration.
- Vehicles occasionally drive the wrong direction through one-way streets to avoid congestion.

The 20th Street RSA looked at pedestrian facilities at each intersection and along segments between intersections. Even though this audit was not a comprehensive ADA compliance audit, good ADA and pedestrian facility design practices and recommendations were kept in consideration. The following summarize some of the key aspects considered:

- **Curb ramp widths**: In general, the curb ramp widths were adequate and did not narrow excessively as compared to approaching sidewalk width.
- **Curb ramp clear landing areas**: Inadequate landing areas were noted at multiple intersection locations and channelizing islands along the corridor.
- **Push button location**: In general, push button locations followed Manual on Uniform Traffic Control Devices (MUTCD) requirements.
- **Pedestrian signal visibility**: Pedestrian signals had good visibility in general.
- **Directional vs. diagonal curb ramps**: Most of the curb ramps were diagonal ramps, which is not recommended.
- **Detectable warnings/truncated domes**: Most locations along the corridor had detectable warnings even though these were provided at ramps that do not meet other ADA requirements.
- **Sidewalk condition, width and offset from roadway**: The sidewalks in the corridor were generally adequate for a positive pedestrian experience.

**Figure 7. Example ADA Issue – No Truncated Domes/Detectable Warnings**

**Figure 8. Emergency Response – Opticom**
20th Street Corridor-wide Recommendations

The following recommendations are based on the collaborative effort of the RSA multidisciplinary team and stakeholder interviews. Corridor-wide recommendations are based on the team’s experience driving and walking the corridor.

1. Striping
   Pedestrian striping and vehicle markings along the corridor were observed to be faded in many locations.

   **Recommendation:**
   - Complete a routine maintenance effort to restripe the corridor.

2. Backplates
   Although most traffic signals on the corridor feature backplates, few if any feature reflective borders (Figure 9). Federal Highway Administration includes backplates with retroreflective borders on their list of proven safety countermeasures. Backplates were observed to be a consistent size throughout the corridor, but signal indication varied.

   **Recommendations:**
   - Add reflective borders to backplates.
   - Provide larger signal indications.

3. Traffic Signal Maintenance
   The RSA team observed routine and rehabilitation maintenance issues at traffic signals along the corridor. Maintenance issues included traffic signal bulbs and pedestrian signal heads not functioning properly. It is possible additional maintenance issues are occurring that were not observed by the RSA team.

   **Recommendation:**
   - Complete a routine and rehabilitation maintenance effort of traffic signals on the corridor.

4. Lane Guidance
   The RSA team observed that driver confusion occurred in part due to lane assignment. The mast arms at many of the older signals did not have the length to provide lane guidance over the corresponding lane. This issue potentially led to crashes as vehicles were observed making turns from the wrong lanes.

   **Recommendations:**
   - Provide pavement lane markings at locations where the overhead lane signs cannot properly guide vehicles.
   - Upgrade signal mast arms to provide lane assignment signs over the appropriate lanes. Consider the use of a supplemental intersection lane control sign on signal/light poles.

5. Streetlights
   The RSA team observed that some streetlight fixtures are not working (e.g., missing fixtures and broken bulbs). There were numerous locations where overgrown vegetation shielded the streetlights. Street lights were observed to be out for both street lighting and sidewalk lighting. Pedestrian lighting was observed to be limited along the corridor and non-existent underneath the underpasses.

   **Recommendations:**
   - Complete a routine and rehabilitation maintenance effort of streetlights on 20th Street.
   - Provide lighting under the three bridges between Wazee Street and Chestnut Street.
6. **Landscaping**

The RSA team observed that unmaintained landscaping interfered with numerous signs, streetlights, and signals.

**Recommendations:**
- Complete a landscaping maintenance effort on 20th Street.

7. **Signal Timing & Coordination**

The RSA team observed vehicle operating speeds of over 30 MPH in the downtown portion of the study area especially in times of congestion. It is assumed vehicles are attempting to remain in the corridor progression and, in turn, run red lights. Pedestrian crossing timings were observed to be short in many locations.

**Recommendations:**
- Consider a progression study for the 20th Street corridor.
- Review pedestrian crossing times across all intersections and increase if necessary. Consider different phasing plans for nighttime.
- Consider changing signal progression to 25 MPH east of Blake Street.
- Consider all pedestrian phases between Blake Street and Larimer Street at night.
- Consider a Leading Pedestrian Interval (LPI) at locations along the corridor.

8. **Surface, Curb, & Gutter**

The RSA team observed surface, curb, and gutter damage throughout the corridor.

**Recommendation:**
- Complete rehabilitation maintenance of surface, curb, and gutter.

9. **ADA Compliance**

The RSA team observed several potential ADA compliance issues, including missing or substandard curb ramps/landings; cracked or heaving sidewalks; utility or signal poles that narrow the path of travel; poor state of repair of the roadway surface, curb, and gutter; and signal equipment that is not working. Because the RSA team did not do a complete ADA audit, other ADA compliance issues may exist.

**Recommendation:**
- Complete rehabilitation maintenance or upgrade facilities to be ADA compliant.

10. **Left Turn Operations**

A mixture of permitted (perm), protected/permissive (prot/perm), and protected-only (prot) left turn operations exist on the corridor. Failure to yield right-of-way crashes resulting from left-turns are common at some locations on the corridor. The RSA team recommends consideration of four-section heads with flashing yellow arrows. Four-section heads allow the City to operate left turns differently by time of day while avoiding the “yellow trap” under certain scenarios. **Figure 10** provides left turn phasing illustrations.

**Recommendation:**
- Consider four-section heads with flashing yellow.

**Table 1** summarizes the RSA team’s proposals for left turn operations at traffic signals along the corridor.
Table 1 – Recommended Left Turn Operations

<table>
<thead>
<tr>
<th>Intersecting Street</th>
<th>Movement</th>
<th>Existing Phase</th>
<th>Recommended Phase</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrence Street</td>
<td>SBL</td>
<td>Perm</td>
<td>Prot</td>
<td>128 conflicting pedestrians during the PM peak hour</td>
</tr>
<tr>
<td>Larimer Street</td>
<td>NBL</td>
<td>Perm</td>
<td>Prot</td>
<td>119 conflicting pedestrians during the PM peak hour</td>
</tr>
<tr>
<td>Market Street</td>
<td>SBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>The cross product volume has been met, and critical related crashes have been equaled</td>
</tr>
<tr>
<td>Blake Street</td>
<td>NBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>160 conflicting pedestrians during the PM peak hour</td>
</tr>
<tr>
<td>Wazee Street</td>
<td>NBL</td>
<td>Perm</td>
<td>Prot</td>
<td>132 conflicting pedestrians during the PM peak hour and 53 conflicting bikes during the AM peak hour</td>
</tr>
<tr>
<td>Chestnut Place</td>
<td>NBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>126 conflicting pedestrians during the AM peak hour and 161 conflicting pedestrians during the PM peak hour</td>
</tr>
<tr>
<td>Chestnut Place</td>
<td>SBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>The cross product volume has been met, and critical related crashes have been exceeded (4 in 3 years)</td>
</tr>
<tr>
<td>Chestnut Place</td>
<td>EBL</td>
<td>Prot/Perm</td>
<td>Prot/Perm (FYA)</td>
<td></td>
</tr>
<tr>
<td>Chestnut Place</td>
<td>WBL</td>
<td>Prot/Perm</td>
<td>Prot/Perm (FYA)</td>
<td></td>
</tr>
<tr>
<td>Little Raven Street</td>
<td>WBL</td>
<td>Perm</td>
<td>Perm (FYA)</td>
<td></td>
</tr>
<tr>
<td>Little Raven Street</td>
<td>EBL</td>
<td>Perm</td>
<td>Perm (FYA)</td>
<td></td>
</tr>
<tr>
<td>Little Raven Street</td>
<td>NBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>63 conflicting bicycles during the PM peak and 32 conflicting bicycles during the AM peak</td>
</tr>
<tr>
<td>Little Raven Street</td>
<td>SBL</td>
<td>Perm</td>
<td>Perm (FYA)</td>
<td></td>
</tr>
<tr>
<td>I-25 NB Ramps</td>
<td>SBL</td>
<td>Prot/Perm (FYA)</td>
<td>Prot</td>
<td>The critical number of left turn related crashes has been exceeded, and the cross product volume has been met</td>
</tr>
<tr>
<td>I-25 SB Ramps</td>
<td>NBL</td>
<td>Prot/Perm</td>
<td>Prot</td>
<td>30 conflicting bicycles during the PM peak</td>
</tr>
</tbody>
</table>

Note: 20th Street is coded as North-South by DOTI  
EBL = Eastbound Left  
NBL = Northbound Left  
SBL = Southbound Left  
WBL = Westbound Left  
Perm = Permissive-only  
Prot = Protected-only  
Prot/Perm = Protected/Permissive  
FYA = flashing yellow arrow

Signal Equipment

Most of the signal equipment in the corridor is outdated and/or damaged, especially the signal poles and mast arms.

Recommendation:

- Replace signal equipment

Opticom

Recommendation:

- Coordinate with DFD to clarify Opticom operations, i.e., detection range and zones; adjust Opticom, as necessary.
I. 20th Street & Broadway

Background Information

The easternmost intersection of the project study area is the five-leg intersection of 20th Street & Broadway (Figure 11). This intersection provides access to both downtown Denver and the nearby interstate along 20th Street. At this intersection, 20th Street consists of three through lanes, with a right turn lane northbound and two left turn lanes southbound. Pedestrian crossings are provided across all lanes.

Left turns from 20th Street are permitted and have a negative offset at this intersection. 20th Street has a posted speed limit of 25 MPH throughout this intersection.

![Figure 11. 20th Street & Broadway](image)

Crash Review

Between March 2017 and March 2020, there were a total of 71 crashes at the intersection of 20th Street & Broadway. Table 2 displays a summary of crash history for the intersection.

- 30 Sideswipe crashes constitute 42 percent of crashes.
- 27 Broadside crashes constitute 38 percent of crashes.
- 46 percent of crashes were caused by turning from the wrong lane/lane violations.
- There were no KSI crashes at this intersection.
- 63 percent of all crashes were in the northwest direction.
Table 2 – 20th Street & Broadway Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NB</th>
<th>SB</th>
<th>NW</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>71</td>
<td>0</td>
<td>0</td>
<td>14%</td>
<td>17%</td>
<td>63%</td>
<td>6%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>42%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>10%</td>
<td>73%</td>
<td>0%</td>
</tr>
<tr>
<td>Broadside</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>19%</td>
<td>7%</td>
<td>67%</td>
<td>7%</td>
</tr>
<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turned from wrong lane/</td>
<td>46%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>11%</td>
<td>67%</td>
<td>22%</td>
</tr>
<tr>
<td>lane violation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making right turn</td>
<td>44%</td>
<td>0%</td>
<td>0%</td>
<td>13%</td>
<td>7%</td>
<td>73%</td>
<td>7%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, evening, late night and weekend (late night) field reviews:

- Drivers made a right on red from 20th Street despite “No Turn On Red” signs.
- There is a high volume of broadside crashes due to vehicles turning from the wrong lane on 20th Street.
- Lane assignment and guidance confused drivers:
  - Driver was observed traveling the wrong way on California Street.
  - There is no distinction on the lane assignment sign between hard left versus soft left and hard right versus soft right
- Striping is faded.
- Signing is confusing for drivers:
  - Signs vary in size.
  - “Do Not Enter” signs on California Street are not visible from 20th Street.
- There is high pedestrian delay.
**Recommendations**

The following recommendations are suggested for the intersection. See Figure 12 for general improvements sketch.

13. Enhance positive guidance for turning movements.
   - Add pavement legend arrows.
   - Improve dotted lines through the intersection with high contrast markings.

   - Add far-side “No Right on Red” sign.
   - Improve signage indicating no right onto California Street from 20th Street.

15. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

16. Consider bulb-outs on California Street.

![Figure 12. 20th Street & Broadway Recommendation Map](image-url)
II. 20\textsuperscript{th} Street & Stout Street

Background Information

The 20\textsuperscript{th} Street & Stout Street intersection is a four-leg intersection (Figure 13). This intersection provides access to the nearby interstates along 20\textsuperscript{th} Street, as well as downtown commercial access. At this intersection, 20\textsuperscript{th} Street is a one-way street consisting of three through lanes westbound.

Northbound and eastbound left turns are permitted at this intersection. 20\textsuperscript{th} Street has a posted speed limit of 25 MPH throughout this intersection.

![Figure 13. 20\textsuperscript{th} Street & Stout Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 13 crashes at the intersection of 20\textsuperscript{th} Street & Stout Street. Table 3 displays a summary of crash history for the intersection.

- No KSI crashes were recorded at the intersection
- 7 Broadside crashes constitute 54 percent of crashes
- All pedestrian crashes occurred in the northeast direction.
### Table 3 – 20th Street & Stout Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>NE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td><strong>Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>54%</td>
<td>0%</td>
<td>0%</td>
<td>43%</td>
<td>57%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in **Appendix E**.

### Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- 2 pedestrian crashes were caused by left turns from Stout Street not yielding to pedestrians in the crosswalk.
- Double right turn is not necessary based on volume.
- There is a high volume of northbound left movements (from Stout Street to 20th Street) during the PM peak hour.
- Traffic on 20th Street consistently clears out before the green phase ends.
- The pedestrian signal cycles out before the corresponding green across 20th Street.
**Recommendations**

The following recommendations are suggested for the intersection. See **Figure 14** for general improvements sketch.

1. Consider LPI (combine with “No turn on Red” sign).
2. Extend the walk phase across 20th Street to cycle out with the green phase.
3. Remove the dead tree on the west side of Stout Street approaching 20th Street to improve driver visibility.
4. Reevaluate all-red phase timing.
5. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.
6. Remove double-right.
7. Consider bulb-outs on 20th Street.

![Figure 14. 20th Street & Stout Street Recommendation Map](image-url)
III. 20th Street & Champa Street

Background Information

The 20th Street & Champa Street intersection is a four-leg intersection (Figure 15). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a one-way street consisting of three through lanes westbound.

The westbound left turn is permitted at this intersection. 20th Street has a posted speed limit of 25 MPH throughout this intersection.

Figure 15. 20th Street & Champa Street

Crash Review

Between March 2017 and March 2020, there were a total of 9 crashes at the intersection of 20th Street & Champa Street. Table 4 displays a summary of crash history for the intersection.

- No KSI crashes were recorded at the intersection.
- 5 Broadside crashes constitute 56 percent of crashes.
- Crashes were relatively evenly spread among approaches.
Table 4 – 20th Street & Champa Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NW</td>
<td>33%</td>
<td>44%</td>
<td>22%</td>
</tr>
<tr>
<td>SW</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>SE</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadside</td>
<td>56%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Bicycle with other vehicle</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver Action</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed to stop at signal</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Improper turn/turn from wrong lane</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Movement</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Making left turn</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The pedestrian signal cycles out before the corresponding green across 20th Street.
- Street parking spaces do not meet minimum clearance requirements to the intersection.
- Pedestrian lighting along the south side of 20th Street is mostly damaged/non-functioning.
Recommendations

The following recommendations are suggested for the intersection. See Figure 16 for general improvements sketch.

24. DOTI to coordinate with Downtown Denver Partnership and fix pedestrian lighting.

25. Extend the walk phase across 20th Street to cycle out with the green phase.

26. Remove parking spaces within minimum clearance to intersection.

27. Reevaluate all-red phase timing.

28. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

29. Intersection hardening on east corner.

30. Consider bulb-outs on 20th Street.

Figure 16. 20th Street & Champa Street Recommendation Map
IV. 20\textsuperscript{th} Street & Curtis Street

Background Information

The 20\textsuperscript{th} Street & Curtis Street intersection is a four-leg intersection (Figure 17). This intersection provides access to the nearby interstates along 20\textsuperscript{th} Street, as well as downtown commercial access. At this intersection, 20\textsuperscript{th} Street is a one-way street consisting of three through lanes westbound.

The northbound left turn is permitted at this intersection. 20\textsuperscript{th} Street has a posted speed limit of 25 MPH throughout this intersection.

![Figure 17. 20\textsuperscript{th} Street & Curtis Street](image)

Crash Review

Due to the low total number of crashes (less than 10) and lack of any KSI crashes, crash history was not analyzed at the 20\textsuperscript{th} Street & Curtis Street intersection.

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

- Project stakeholders noted an ongoing City project along 20\textsuperscript{th} Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The double right turn is not necessary based on volume.
- Drivers were observed using the exclusive right turn lane as a through lane.
- Street parking spaces violate minimum clearance to the intersection.
Recommendations

The following recommendations are suggested for the intersection. See Figure 18 for general improvements sketch.

31. Remove parking spaces within the minimum clearance to the intersection.

32. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

33. Remove the double right.

34. Consider bulb-outs on 20th Street.
V. 20th Street & Arapahoe Street

Background Information

The 20th Street & Arapahoe Street intersection is a four-leg intersection (Figure 19). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a two-way street consisting of two through lanes westbound and one eastbound. Southbound and westbound left turns are permitted at this intersection. 20th Street has a posted speed limit of 25 MPH throughout this intersection.

![Figure 19. 20th Street & Arapahoe Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 12 crashes at the intersection of 20th Street & Arapahoe Street. Table 5 displays a summary of crash history for the intersection.

- All crashes were Property Damage Only (PDO) at the intersection.
- 6 Broadside crashes constitute 50 percent of crashes.
- 58 percent of all crashes were in the southwest direction.
Table 5 – 20th Street & Arapahoe Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>SW</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>33%</td>
<td>58%</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>42%</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Failed to yield to ROW</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted an ongoing City project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The pedestrian signal cycles out before the corresponding green across 20th Street.
- Pavement markings for right turns from 20th Street exist on the westbound approach but not on the eastbound approach.
- The luminaire on the southeast corner is not functioning.
Recommendations

The following recommendations are suggested for the intersection. See Figure 20 for general improvements sketch.

35. Extend the walk phase across 20th Street to cycle out with the green phase.

36. Add pavement markings for the eastbound right turn from 20th Street.

37. Consider removing the signal head for the eastbound approach.

38. Evaluate the reflectivity and sizing of “Do Not Enter” sign for the eastbound approach.

39. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

40. Add medians/pedestrian refuges on 20th Street on both sides of the intersection to decrease exposure and slow traffic.

41. Add a channelizing island for the westbound left turn from 20th Street onto Arapahoe Street.

42. Convert the eastbound right turn and the westbound left turn to flashing yellow arrows instead of green ball.

43. Add a wrong-way bike sign (R5-1B).

44. Consider bulb-outs on 20th Street.

Figure 20. 20th Street & Arapahoe Street Recommendation Map
VI. 20th Street & Lawrence Street

Background Information

The 20th Street & Lawrence Street intersection is a four-leg intersection (Figure 21). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

Eastbound and southbound left turns are permitted at this intersection. 20th Street has a posted speed limit of 25 MPH throughout this intersection.

![Figure 21. 20th Street & Lawrence Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 25 crashes at the intersection of 20th Street & Lawrence Street. Table 6 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 16 Broadside crashes constitute 64 percent of crashes.
- 1 pedestrian crash was observed at the intersection.
Table 6 – 20th Street & Lawrence Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>NE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>25</td>
<td>1</td>
<td>0</td>
<td>38%</td>
<td>38%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside/head on</td>
<td>64%</td>
<td>0%</td>
<td>0%</td>
<td>44%</td>
<td>31%</td>
<td>25%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>16%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>4%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>28%</td>
<td>0%</td>
<td>0%</td>
<td>57%</td>
<td>29%</td>
<td>14%</td>
</tr>
<tr>
<td>Failed to yield to ROW</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted an ongoing City project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The pedestrian signal cycles out before the corresponding green across 20th Street.
- Three wrong-way bicycle crashes were recorded.
- The HOV lane starts between Arapahoe Street & Lawrence Street.
Recommendations

The following recommendations are suggested for the intersection. See Figure 22 for general improvements sketch.

45. Extend the walk phase across 20th Street to cycle out with the green phase.

46. Add pavement markings for the eastbound left turn movement from 20th Street.

47. Add a wrong-way bicycle sign (R5-1B).

48. Reinforce the HOV lane with signs and pavement legends.

49. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

50. Redesign the bike lane transition across the intersection to mitigate right turn conflict.

51. Confirm adequate space is available and add medians/pedestrian refuges on 20th Street.

52. Add signal heads for wrong-way bikes.

53. Add a flashing yellow signal head for the eastbound left turn or protected-only phasing.

54. Consider bulb-outs on 20th Street.

Figure 22. 20th Street & Lawrence Street Recommendation Map
VII. 20th Street & Larimer Street

Background Information

The 20th Street & Larimer Street intersection is a four-leg intersection (Figure 23). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

Westbound and southbound left turns are permitted at this intersection. 20th Street has a posted speed limit of 25 MPH throughout this intersection.

Figure 23. 20th Street & Larimer Street

Crash Review

Between March 2017 and March 2020, there were a total of 26 crashes at the intersection of 20th Street & Larimer Street. Table 7 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 50 percent of recorded crashes were in the northwest direction.
- 1 pedestrian crash was observed at the intersection.
### Table 7 – 20th Street & Larimer Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>SW</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>26</td>
<td>1</td>
<td>1</td>
<td>50%</td>
<td>31%</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside/head on</td>
<td>35%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>22%</td>
<td>11%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>23%</td>
<td>100%</td>
<td>100%</td>
<td>33%</td>
<td>50%</td>
<td>17%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>75%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Exceeded posted/safe speed</td>
<td>12%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted an ongoing City project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- It was noted after the meeting that a protected bike lane project along Larimer Street is currently in design.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

### Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The pedestrian signal cycles out before the corresponding green across 20th Street.
- The southbound left turn movement from Larimer Street to 20th Street has a large travel distance.
- High pedestrian activity was observed, especially on weekends and during baseball games, and six pedestrian crashes were recorded at the intersection.
Recommendations

The following recommendations are suggested for the intersection. See Figure 24 for general improvements sketch.

55. Extend the walk phase across 20th Street to cycle out with the green phase.
56. Add pavement markings for the eastbound approach on 20th Street.
57. Consider LPI across 20th Street.
58. Consider prohibiting right on red turns.
59. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.
60. Convert the westbound left turn to protected phasing.
61. Add medians/pedestrian refuges on 20th Street.
62. Consider an all pedestrian phase at night.
63. Consider bulb-outs on Larimer Street.

Figure 24. 20th Street & Larimer Street Recommendation Map
VIII. 20\textsuperscript{th} Street & Market Street

Background Information

The 20\textsuperscript{th} Street & Market Street intersection is a four-leg intersection (Figure 25). This intersection provides access to the nearby interstates along 20\textsuperscript{th} Street, as well as downtown commercial access. At this intersection, 20\textsuperscript{th} Street is a two-way street consisting of two through lanes in each direction.

Northbound left turns are permitted, and eastbound left turns are protected/permissive at this intersection. 20\textsuperscript{th} Street has a posted speed limit of 25 MPH throughout this intersection.

Figure 25. 20\textsuperscript{th} Street & Market Street

Crash Review

Between March 2017 and March 2020, there were a total of 35 crashes at the intersection of 20\textsuperscript{th} Street & Market Street. Table 8 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 11 Broadside crashes constitute 31 percent of crashes.
- A left turn was the movement responsible for the KSI crash.
- 7 pedestrian crashes were observed at the intersection.
Table 8 – 20th Street & Market Street Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>NE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>35</td>
<td>1</td>
<td>0</td>
<td>41%</td>
<td>28%</td>
<td>31%</td>
</tr>
<tr>
<td>Broadside/head on</td>
<td>31%</td>
<td>0%</td>
<td>0%</td>
<td>27%</td>
<td>18%</td>
<td>55%</td>
</tr>
<tr>
<td>Pedestrian crash</td>
<td>20%</td>
<td>100%</td>
<td>0%</td>
<td>29%</td>
<td>29%</td>
<td>43%</td>
</tr>
<tr>
<td>Bicycle crash</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Failed to yield to ROW</td>
<td>29%</td>
<td>100%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td>Making left turn</td>
<td>40%</td>
<td>100%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted an ongoing City project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- Due to its proximity to Coors Field, the corridor also experiences significant pedestrian activity during Colorado Rockies games, which often coincide with the end of the PM peak period.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- The pedestrian signal cycles out before the corresponding green across 20th Street.
- LPI exists across 20th Street.
- High pedestrian activity was observed, especially on weekends and during baseball games, and seven pedestrian crashes were recorded at the intersection.
- Police close the eastbound left turn during the end of Rockies games.
- Eastbound left turn queues back to Blake prior to Rockies game.
Recommendations

The following recommendations are suggested for the intersection. See Figure 26 for general improvements sketch.

64. Extend the walk phase across 20th Street to cycle out with the green phase.
65. Convert the eastbound left turn to protected-only.
66. Install “No Turn on Red” signs.
67. Add medians/pedestrian refuges on 20th Street.
68. Consider an all pedestrian phase in the evening.
69. Consider bulb-outs on Market Street.

Figure 26. 20th Street & Market Street Recommendation Map
IX. 20th Street & Blake Street

Background Information

The 20th Street & Blake Street intersection is a four-leg intersection (Figure 27). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

Southbound left turns are permitted, and westbound left turns are permitted/protected at this intersection. 20th Street has a posted speed limit of 30 MPH to the west and 25 MPH to the east of the intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 29 crashes at the intersection of 20th Street & Blake Street. Table 9 displays a summary of crash history for the intersection.

- Four KSI crashes were recorded at the intersection.
- 1 fatal crash was recorded at the intersection.
- Failure to stop at the signal was the cause of the fatal crash.
- Five pedestrian crashes were observed at the intersection.
Table 9 – 20th Street & Blake Street Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>29</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver Action</th>
<th>NW</th>
<th>SW</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed to yield to ROW</td>
<td>28%</td>
<td>41%</td>
<td>21%</td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>57%</td>
<td>14%</td>
<td>29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Movement</th>
<th>NW</th>
<th>SW</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making left turn</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted an ongoing City project along 20th Street from Blake Street to Arapahoe Street. The goal of the project is to address wrong-way driving and roadway geometry issues.
- Due to its proximity to Coors Field, the corridor also experiences significant pedestrian activity during Colorado Rockies games, which often coincide with the end of the PM peak period.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- Police close Blake Street north of 20th during Rockies games, and police close south of 20th at the conclusion of the Rockies game.
- High pedestrian activity was observed, especially on weekends and during Rockies games.
Recommendations

The following recommendations are suggested for the intersection. See Figure 28 for general improvements sketch.

70. Consider a “No Right Turn on Red” sign on the southbound approach due to the express lane.
71. Add pavement markings where the HOV lane exists.
72. Add additional guidance signs indicating that the right lane is the I-25 North Express Lane Only.
73. Provide individual lane control signs on 20th Street.
74. Consider an all pedestrian phase in the evening.
75. Convert the westbound left turn to protected-only phasing.
76. Consider crash attenuator at the median between the HOV lane and 20th Street.
77. Consider bulb-outs on Blake Street.

Figure 28. 20th Street & Blake Street Recommendation Map
X. 20th Street & Wazee Street

Background Information

The 20th Street & Wazee Street intersection is a three-legged intersection (Figure 29). This intersection provides access to the nearby interstates along 20th Street, as well as downtown commercial access. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

Westbound left turns are permitted at this intersection. 20th Street has a posted speed limit of 30 MPH at the intersection.

![Figure 29. 20th Street & Wazee Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 15 crashes at the intersection of 20th Street & Wazee Street. Table 10 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 6 Rear End crashes constitute 40 percent of crashes.
- 53 percent of crashes occurred in the northwest direction.
- 1 pedestrian crash was observed at the intersection.
### Table 10 – 20th Street & Wazee Street Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>NE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>15</td>
<td>1</td>
<td>0</td>
<td>53%</td>
<td>13%</td>
<td>33%</td>
</tr>
<tr>
<td>Rear end</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian crash</td>
<td>7%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Bicycle with other vehicle</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Harmful Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>27%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Comments Provided by City Staff and RSA Stakeholders during Pre-Audit Meeting
- Due to its proximity to Coors Field, the corridor also experiences significant pedestrian activity during Colorado Rockies games, which often coincide with the end of the PM peak period.
- Development of McGregor Square adjacent to Wazee Street will increase pedestrian activity.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

### Observations
The RSA team made the following observations during the morning, afternoon, and evening field reviews:
- There is heavy micromobility use in the multiuse trail crossing Wazee Street.
- Drivers making a left from 20th Street have difficulty finding a gap in traffic and pedestrians (one near miss observed).
- One bike crash resulted from an eastbound right driver failing to yield ROW and striking a bike in the crosswalk across Wazee Street.

### Underpass
- Lighting is poor in the underpass.
  - Light is installed on only one of the four bridges between Wazee Street and Chestnut Place.
  - Where installed, some lights were out.
Recommendations

The following recommendations are suggested for the intersection. See Figure 30 for general improvements sketch.

Wazee Street

1. Add bike crossing sign and yield to ped/bike for the eastbound approach on 20th Street.
2. Convert to protected-only left; will require new signal head.

Underpass

3. Add roadside delineators along the right side of 20th Street.
4. Add signage to indicate shared path.
5. Move transition from 25 MPH to 35 MPH to west of Chestnut Place.
6. Install an advance warning sign indicating speed reduction from 35 MPH to 25 MPH on 20th Street.
7. Add additional lighting in the (north leg) underpass to illuminate the multiuse trail and travel lanes.

Figure 30. 20th Street & Wazee Street Recommendation Map
XI. 20th Street & Chestnut Place

Background Information

The 20th Street & Chestnut Place intersection is a full movement four-leg intersection (Figure 31). This intersection provides access into downtown east along 20th Street and to the interstates west along 20th Street. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

All left turns are protected/permisssive at this intersection. 20th Street has a posted speed limit of 30 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 26 crashes at the intersection of 20th Street & Chestnut Place. Table 11 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 50 percent of crashes occurred in the northwest direction.
- 4 pedestrian crashes were recorded.
Table 11 – 20th Street & Chestnut Place Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>26</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Broadsided/Head on</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver Action</th>
<th>NW</th>
<th>SE</th>
<th>NE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed to yield to ROW</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Movement</th>
<th>NW</th>
<th>SE</th>
<th>NE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making left turn</td>
<td>31%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- Project stakeholders noted 20th and Chestnut was identified as a key intersection for Rapid Response. Signal retiming, LPI, pavement markings, and bike lanes are all proposed. The section of Chestnut between 20th and 29th has been selected for improvements. RTD is completing the design now for a signal rebuild at 20th and Chestnut.
- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- There is high micromobility use in the multiuse trail crossing Chestnut Place.
- There is high pedestrian activity and turning traffic in the evening before Rockies games.
- There were four pedestrian crashes
  - Two from turning vehicles not yielding to pedestrians (1 southbound left, 1 westbound right)
  - One bike crash resulted from an eastbound right not yielding to a bike in the crosswalk across Chestnut Place.
- Some crossings are missing pedestrian countdown timers.
## Recommendations

The following recommendations are suggested for the intersection. See Figure 32 for general improvements sketch.

1. **Install No Right on Red for Chestnut Place approach** – with periodic enforcement.

2. **Move bike crossing sign** for the eastbound approach closer to the intersection and correct height for driver visibility and consider adding a sign on the left side as well.

3. **Add turning vehicles yield to bike/ped signs.**

4. **Add pedestrian countdown timers** where missing.

5. **West of Chestnut Place, restripe westbound 20th Street lanes narrower** to increase the edge line distance from the sidewalk (similar to 1st Avenue at Denver Country Club).

6. **Add a bulb-out** on the north corner of Chestnut Place as part of planned approach lane reduction from 3 lanes to 2 lanes.

7. **Convert lefts on 20th Street to protected-only** and add flashing yellow to permissive phase on Chestnut Place – will require new signal heads.

![Figure 32. 20th Street & Chestnut Place Recommendation Map](image)
XII. 20th Street & Little Raven Street

Background Information

The 20th Street & Little Raven Street intersection is a full movement four-leg intersection (Figure 33). This intersection provides access into downtown east along 20th Street and to the interstates west along 20th Street. At this intersection, 20th Street is a two-way street consisting of two through lanes in each direction.

All left turns are permitted at this intersection, except for the westbound left turn, which is protected/permissive. 20th Street has a posted speed limit of 30 MPH throughout this intersection.

Figure 33. 20th Street & Little Raven Street

Crash Review

Between March 2017 and March 2020, there were a total of 30 crashes at the intersection of 20th Street & Little Raven Street. Table 12 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 14 Broadside crashes constitute 47 percent of crashes.
- 47 percent of crashes occurred in the northwest direction.
- 1 pedestrian crash was observed at the intersection.
Table 12 – 20th Street & Little Raven Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NW</th>
<th>SE</th>
<th>NE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>30</td>
<td>1</td>
<td>0</td>
<td>47%</td>
<td>27%</td>
<td>17%</td>
<td>7%</td>
</tr>
<tr>
<td>Broadside</td>
<td>47%</td>
<td>0%</td>
<td>0%</td>
<td>29%</td>
<td>57%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>7%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Harmful Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
<td>43%</td>
<td>43%</td>
<td>14%</td>
<td>0%</td>
</tr>
<tr>
<td>Failed to yield to ROW</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making left turn</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>20%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- There is high micromobility use in the multiuse trail crossing Little Raven Street.
- Two bike/pedestrian crashes resulted from drivers on Little Raven Street making a right on red (ROR).
- One bike crash resulted from a northbound left driver from Little Raven Street to 20th Street not yielding to a bike.
- A high number of vehicles make a ROR from Little Raven Street to 20th Street despite signage prohibiting the movement.
- A tree blocks one of the No ROR signs on the northbound approach on Little Raven Street.
Recommendations

The following recommendations are suggested for the intersection. See Figure 34 for general improvements sketch.

- Periodic enforcement of no right turn on red.
- Add a bike crossing sign for the eastbound approach on 20th Street.
- Extend medians on 20th Street across the crosswalk to create a pedestrian refuge and slow turning vehicles combined with shifting the crosswalk back.
- Convert pedestrian ramps to directional ramps on the north side of 20th Street.
- Repair the heaved sidewalk on the north corner.
- Convert eastbound left and westbound left to protected-only; will require new signal heads.
- Add a flashing yellow arrow for northbound left and southbound left movements; will require new signal heads.
- Consider a flashing yellow arrow for the eastbound right from 20th Street to Little Raven Street.
- Consider removing 150 feet of barrier between I-25 northbound lanes and 20th Street lanes on the far side of Little Raven Street to allow easier bus movement and the bus stop to be moved to the far side.

**Figure 34. 20th Street & Little Raven Street Recommendation Map**
XIII. 20th Street & I-25 Northbound

Background Information

The 20th Street & I-25 Northbound intersection is a restricted movement four-leg intersection (Figure 35). This intersection provides access into downtown along 20th Street and to the interstates at the ramp. At this intersection, 20th Street is a two-way street consisting of two through lanes eastbound and one through lane westbound.

Eastbound left turns are protected/permissive at this intersection. 20th Street has a posted speed limit of 30 MPH throughout this intersection.

![Figure 35. 20th Street & I-25 Northbound Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 52 crashes at the intersection of 20th Street & I-25 northbound. Table 13 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- A crash involving the highway barrier caused the KSI crash.
- 62 percent of crashes occurred in the northwest direction.
- 3 pedestrian crashes were observed at the intersection.
### Table 13 – 20th Street & I-25 Northbound Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NE</th>
<th>SE</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>52</td>
<td>1</td>
<td>0</td>
<td>19%</td>
<td>19%</td>
<td>62%</td>
</tr>
<tr>
<td>Highway barrier</td>
<td>23%</td>
<td>100%</td>
<td>0%</td>
<td>8%</td>
<td>8%</td>
<td>83%</td>
</tr>
<tr>
<td>Broadside/ head on</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>63%</td>
<td>38%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>22%</td>
<td>44%</td>
<td>33%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>0%</td>
<td>67%</td>
</tr>
<tr>
<td>Making left turn</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

### Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- There is high micromobility use in the multiuse trail.
- A high volume of vehicles make a ROR from two lanes from the I-25 northbound off-ramp to 20th Street.
- There were three pedestrian crashes:
  - Two from northbound right vehicles making a ROR from the I-25 off-ramp to 20th Street and not yielding to pedestrians
  - Pedestrians crossing westbound right on-ramp to 20th Street feel exposed (low yield compliance by drivers).
  - Crosswalk markings are almost completely worn.
- Pedestrians were confused as to what side of 20th Street to be on; observed pedestrians crossing mid-block instead of navigating this intersection.
- Drivers were observed traveling 40 MPH on the westbound approach to the I-25 northbound on-ramp despite the recommended 25 MPH turn.
- There was a lot of scuffing from vehicles making a right onto I-25 northbound.
- Signs are missing reflectivity, worn, and/or covered in graffiti.
Recommendations

The following recommendations are suggested for the intersection. See Figure 36 for general improvements sketch.

101. No ROR for northbound right; will need to couple this with occasional targeted enforcement.

102. Add a yield to bike/ped sign for the eastbound left movement.

103. Improve pavement markings for the westbound right pedestrian crossing.

104. Install new signs with better reflectivity.

105. Add a radar speed sign for westbound 20th Street vehicles approaching the right turn onto the I-25 northbound ramp.

106. Add RRFB for the westbound right pedestrian crossing.

107. Add right turn arrow signal heads for the northbound right to more effectively indicate no ROR side.

Figure 36. 20th Street & I-25 Northbound Recommendation Map
XIV. 20<sup>th</sup> Street & I-25 Southbound

Background Information

The 20<sup>th</sup> Street & I-25 southbound intersection is a restricted movement four-leg intersection (Figure 37). This intersection provides access into downtown along 20<sup>th</sup> Street and to the interstates at the ramp. At this intersection, 20<sup>th</sup> Street is a two-way street consisting of two through lanes eastbound and one through lane westbound.

Westbound left turns are protected/permissive, and northbound left turns are permitted at this intersection. 20<sup>th</sup> Street has a posted speed limit of 30 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 35 crashes at the intersection of 20<sup>th</sup> Street & I-25 southbound. Table 14 displays a summary of crash history for the intersection.

- 33 crashes were PDO at the intersection.
- 14 Broadside crashes constitute 40 percent of crashes.
- 51 percent of crashes occurred in the northwest direction.
Table 14 – 20th Street & I-25 Southbound Crash Summary

<table>
<thead>
<tr>
<th>Harmful Event</th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SE</th>
<th>NW</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>35</td>
<td>0</td>
<td>0</td>
<td>20%</td>
<td>51%</td>
<td>29%</td>
</tr>
<tr>
<td>Broadside</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
<td>57%</td>
<td>29%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Driver Action</td>
<td>FTY</td>
<td>0%</td>
<td>0%</td>
<td>13%</td>
<td>63%</td>
<td>25%</td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>23%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
<td>17%</td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>38%</td>
<td>54%</td>
</tr>
<tr>
<td>Movement</td>
<td>37%</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>38%</td>
<td>54%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

Observations

The RSA team made the following observations during the morning, afternoon, and evening field reviews:

- There is a high volume of westbound left turning vehicles from 20th Street to the I-25 southbound on-ramp.
- Two pedestrian crashes resulted from westbound left not yielding to pedestrians in the crosswalk.
- There is high micromobility use on the multiuse trail crossing the I-25 southbound on-ramp.
- There are no lane markings for the eastbound approach on 20th Street.
Recommendations

The following recommendations are suggested for the intersection. See Figure 38 for general improvements sketch.

108. Add lane guidance markings for the southbound double left from the I-25 southbound off-ramp to 20th Street to mitigate sideswipe crashes,

109. Add lane markings on the 20th Street approach in the eastbound direction.

110. Evaluate adding a No ROR for eastbound 20th Street.

111. Convert the westbound left to protected-only.

Figure 38. 20th Street & I-25 Southbound Recommendation Map
Appendix A. RSA Recommendations Table
Appendix B. RSA Pre-Audit Meeting Presentation
Appendix C. RSA Intent Memorandum
Appendix D. Preliminary Findings Presentation