City and County of Denver

Vision Zero Road Safety Audit

Park Avenue/22nd Street: 38th Avenue/Fox Street to Broadway

SEPTEMBER 2021 – DRAFT
MARCH 2022 – FINAL

Felsburg Holt and Ullevig
Fehr & Peers
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 Park Avenue and 22nd Street corridors are 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 along Park Avenue and 22nd Street between 38th Avenue/Fox Street and 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, RSP1, FHU
- Ryan Saline, PE, FHU
- Clay Gattey, EIT, FHU
- Charles Alexander, PE, AICP, RSP1, Fehr & Peers
- Patrick Picard, AICP, RSP1, Fehr & Peers
- Hilda Ofori-Addo, Fehr & Peers

Onsite interviews were conducted with:

- Division Chief Cory J. DeBaere, Denver Fire Department (DFD)

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 Park Avenue from 38th Avenue/Fox Street to N Broadway and 22nd Street from Blake 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 Park Avenue and 22nd Street corridors and for each study intersection. Appendix A includes a comprehensive list of all recommendations, including location, countermeasures, crash modification factors (i.e., factor 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

On Monday, August 9, 2021, via Microsoft Teams, the RSA team met virtually with CCD staff Mike King (CCD Project Manager), Rolf Eisinger, David DiGiacomo, Karen Good, and Abi Subramanian; Denver Police Department Staff Lieutenant Robert Rock and Sergeant David Albi; and DFD Division Chief Cory DeBaere to discuss background information and the RSA schedule. 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 Park Avenue and 22nd Street corridors in both directions in their 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:

- Monday, August 9 (RSA Day 1) – 1:00 PM to 3:00 PM
- Monday, August 9 (RSA Day 1) – 4:00 PM to 6:00 PM and 8:00 PM to 9:00 PM
- Tuesday, August 10 (RSA Day 2) – 7:00 AM to 9:30 AM, 12:00 PM to 1:00 PM
- Wednesday, August 11 (RSA Day 3) – As Needed
- Monday, August 16 (RSA Day 4) – 5:30 PM to 7:00 PM (Game-Day)
- Wednesday, August 17 (RSA Day 5) – 12:30 PM to 2:30 PM

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 92 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

On Wednesday, August 18, 2021, via Microsoft Teams, the RSA team presented the 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 Police Department Staff Lieutenant Robert Rock and Sergeant David Albi; and DFD Division Chief Cory DeBaere. Observations and potential opportunities for improvements were discussed during this meeting. The presentation slides from this meeting are provided in Appendix D.
Park Avenue & 22nd Street Corridors

The following section provides background information, observations, and recommendations for the Park Avenue and 22nd Street corridors, including intersection geometry, user behavior, signal control, and multimodal infrastructure.

Background Information

Park Avenue is a two-way arterial between 38th Avenue/Fox Street and Wewatta Street/Delgany Street intersections, and a one-way arterial south of the Wewatta Street/Delgany Street intersection to Broadway. It runs north/northwest and consists of three travel lanes in each direction within RSA limits. The one-way arterial that runs southeast, 22nd Street, consists of three travel lanes within RSA limits. 22nd Street is parallel to Park Avenue one block south as illustrated on Figure 2 and connects with Park Avenue north of Wewatta Street/Delgany Street to form a two-way street.

![Figure 2. Project Area Speed Limits and Average Annual Daily Traffic](image)

Through most of the project limits, the posted speed limit is 30 miles per hour (MPH), with the exception of the northernmost segment of Park Avenue, which is posted at 35 MPH. Portions of 22nd Street are signed as 25 MPH toward the southeast segment of the roadway. Sidewalks are provided throughout the entire project area. There are no bike lanes on Park Avenue or 22nd Street, but numerous cross-streets in the project area provide bikeways. Annual Average Daily Traffic (AADT) varies within the project limits from 58,900 vehicles per day (vpd) near the north to 10,400 vpd toward the southern end of the corridor (Figure 2).
Crash Review

Between March 2017 and March 2020, there were a total of 447 crashes at intersections along Park Avenue and 22nd Street intersections within the RSA project limits. Figure 3 illustrates the corridor crash map, and Figure 4 illustrates crashes by intersection.

- 5 fatal crashes were reported.
- 2 of the fatal crashes were documented in this analysis: 1 fatal crash at the Park Avenue & N Broadway intersection and 1 at the 22nd Street Block 1000 just west of N Broadway.
- 3 additional fatal crashes were reported outside the study period: 1 fatal crash at Park Avenue & Fox Street, 1 at Park Avenue & Wewatta Street, and 1 at the 22nd Street Block 1000 just west of N Broadway.
- 14 serious injury (KSI) crashes were reported.
- 27 crashes involved pedestrians or cyclists.
- 17 percent total crashes occurred between 3:00 PM and 6:00 PM; 27 percent KSI crashes occurred between 9:00 PM and 12:00 AM.
- Total crashes: 42 percent Rear End, 26 percent Sideswipe, and 25 percent Broadside.
- KSI crashes: 35 percent Broadside, 30 percent Pedestrian, and 20 percent Rear End.

Figure 3. Corridor Crash Map
Crash Data Summary

The following summarize the corridor-wide crash data and present common trends at intersections and along 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 during peak hours.
- Pedestrian activity along Park Avenue & 22nd Street represents 35 percent of KSI crashes in the corridors.
- Crash frequency was generally even throughout the day. Peak hour traffic entering and exiting downtown was a large factor in the Property Damage Only (PDO) crashes, whereas pedestrian activity during the evening and night was a large factor in the KSI crashes.
- The highest crash frequencies were observed at the Park Avenue & I-25 northbound ramp intersection.

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

- The Park Avenue and 22nd 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.
- Department of Transportation & Infrastructure (DOTI) staff noted 3 fatal crashes that occurred after the crash analysis study period.
- Project stakeholders noted several recent improvements to the corridor after the crash study 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.
- The southbound left turn traffic signal at Park Avenue & Globeville Road was replaced with a four-section flashing yellow arrow signal head. This movement is now controlled using protected-only phasing during the AM peak hour and protected/ permissive phasing at all other times. This improvement was requested by Denver Police and met warrants for protected-only phasing during the AM peak hour.
- DOTI staff will send a summary of signal timing data to the RSA team.
- The northbound left turn operation at the Park Avenue & Broadway/Arapahoe Street intersection was converted to protected-only phasing in 2018.
- Progression adjustments were made in 2018 along 22nd Street to adjust the sudden yellow phase experienced by drivers at Lawrence Street. Stakeholders requested that the RSA team evaluate crash frequency over time to understand the impact of this progression on crash frequency at this intersection.
- Progression was also reevaluated and retimed in March 2020 for the entire downtown district. Stakeholders requested that the RSA team review progression during field audits to see if any new safety problems were identified from this exercise.
- Project stakeholders also noted that a common problem along this corridor is drivers turning from the wrong lane due to confusion along one-way streets.
- DOTI staff is scheduled to meet with the City Councilor’s Office on Wednesday, August 11, and will report feedback and findings to the RSA team.

Observations

The following subsection summarizes general observations that apply to the project corridor as a whole.

Road Users

The following road users were observed along the corridor (Figure 5):

i. Vehicles
ii. Tractor trailers
iii. School buses
iv. Motorcycles
v. Bicyclists
vi. Pedestrians
vii. RTD buses

Figure 5. Examples of Roadway Users

Concerns

- Roadway lane assignment is likely a contributor due to limited guidance at study intersections.
- High pedestrian activity at the majority of study intersections is related to retail/commercial and bus activity.
- The corridor regularly experiences traffic congestion. Congestion was noted during the peak hours due to morning and afternoon commuting into downtown.
- Sidewalks are poorly maintained in locations.
- There is limited retroreflective tape on signal heads throughout the corridor.
- Pavement markings are faded and not adequately retroreflective.
• Traffic and pedestrian signals were missing or damaged in locations along the corridor. **Figure 6** illustrates a non-operational traffic signal along the corridor.

• Sight distance issues were noted in many locations due to a combination of maintenance issues, design issues, and landscaping.

• Opticom was not provided continuously throughout the corridor for emergency response in the core of downtown. It was noted that this is by design since fire preemption in a tightly spaced fixed time corridor would have difficulty recovering with the volume of emergency response calls.

• User lane preference created an uneven lane usage on Park Avenue and 22\textsuperscript{nd} Street.

• Left turn operation on the corridor varies. The RSA team observed permissive, permissive/protected, and protected at different locations on the corridor.

• Signs directing mandatory movements at intersections (such as left turn only) are not provided consistently.

**Comments/Concerns Provided by Emergency Services**

• Well-functioning Opticom is critical to emergency response. **Figure 7** illustrates a mast arm with proper emergency response infrastructure.

• 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) is working.

• Red-light running occurs because of delays and driver frustration.

• Vehicles occasionally drive the wrong direction through one-way streets to avoid congestion.

**Pedestrian Facility Considerations**

The Park Avenue/22\textsuperscript{nd} 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.
Upcoming Improvements

The following projects are part of upcoming improvements in the study area:

- 41st Street and Fox Street next steps study
- Traffic signal and civil improvements at Park Avenue & I-25 North Ramps/I-70 Ramps as part of CCD FY18 HSIP Pkg 4 (100% federal grant). Construction advertisement is anticipated January 2023.
- Park Avenue & Wewatta Street/Delgany Street intersection signal rebuild

Park Avenue & 22nd 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. Backplates and Signal Indications
   Although most traffic signals on the corridor feature backplates, few if any feature reflective borders (Figure 8). 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. Pole mounted signal heads are not 12” signal balls at most locations.

   Recommendations:
   - Add reflective borders to backplates.
   - Provide larger pole mounted signal indications (12-12-12).

2. Traffic Signal Maintenance
   The RSA team observed multiple routine and rehabilitation maintenance issues at traffic signals along the corridor. These included non-functioning traffic signal bulbs and pedestrian signal heads. It is possible that 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 corridors.
3. 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 use of supplemental intersection lane control sign on signal/light poles.

4. 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.

**Recommendations:**
- Complete a routine and rehabilitation maintenance effort of streetlights on Park Avenue & 22nd Street.

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

**Recommendations:**
- Complete a landscaping maintenance effort on Park Avenue & 22nd Street.

6. 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.

**Recommendations:**
- Consider a progression study for the Park Avenue & 22nd Street corridor.
- Review pedestrian crossing times across all intersections and increase if necessary.
- Consider a Leading Pedestrian Interval (LPI) at locations along the corridor.

7. Surface, Curb, & Gutter
The RSA team observed surface, curb, and gutter damage throughout the corridor.

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

8. 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.
9. Left Turn Operations

A mixture of permitted (perm), protected/permission (prot/perm), and protected-only (prot) left turn operations exist on the corridor (Figure 9). 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.

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

Table 1 summarizes the RSA team’s proposals for left turn operation at traffic signals along the corridor.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>NBLT</th>
<th>SBLT</th>
<th>EBLT</th>
<th>WBLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globeville (E/W)</td>
<td>Perm</td>
<td>Prot/Prot</td>
<td>Perm Prot or FYA</td>
<td>Perm Prot or FYA</td>
</tr>
<tr>
<td>Wewatta/Delgany (E/W)</td>
<td>Prot</td>
<td>Prot</td>
<td>Prot Perm or Perm w/ FYA</td>
<td>Perm FYA</td>
</tr>
</tbody>
</table>

10. 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.

11. Opticom

**Recommendation:**
- DOTI to coordinate with DFD to further analyze and clarify Opticom operations, i.e., detection range and zones; provide new or adjust Opticom, as necessary.
I. Park Avenue & 38th Avenue & Fox Street

Background Information

The northernmost intersection of the project study area is the three-leg intersection of Park Avenue & 38th Avenue & Fox Street (Figure 10). This intersection provides access to the nearby interstate along Fox Street, as well as residential and commercial access along 38th Avenue and further down Fox Street. At this intersection, Park Avenue consists of two through lanes, with a channelized right turn lane northbound and two left turn lanes southbound. Pedestrian crossings are provided across all lanes.

Eastbound left turns from 38th Avenue are permitted and have a negative offset at this intersection. Southbound left turns from Fox Street are protected. Park Avenue has a posted speed limit of 35 MPH throughout this intersection.

![Figure 10. Park Avenue & 38th Avenue & Fox Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 24 crashes at the intersection of Park Avenue & 38th Avenue & Fox Street. Table 2 displays a summary of crash history for the intersection.

- 13 Rear End crashes constitute 54 percent of crashes.
- 50 percent of crashes were caused by following too closely.
- There were no KSI crashes at this intersection.
- 46 percent of the Rear End crashes were in the eastbound direction.
Table 2 – Park Avenue & 38th Avenue & Fox Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SB</th>
<th>NB</th>
<th>EB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>29%</td>
<td>33%</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear end</td>
<td>54%</td>
<td>0%</td>
<td>0%</td>
<td>31%</td>
<td>23%</td>
<td>46%</td>
</tr>
<tr>
<td>Curb/traffic signal</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Followed too closely</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>25%</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 a left turn</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
<td>75%</td>
</tr>
</tbody>
</table>

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

- January 2021 – Park Avenue & 38th Avenue/Fox Street: A northbound/westbound through motorist was traveling at a high rate of speed and exited 38th Avenue right west of the intersection, colliding with a tree.
- Comments and recommendations were received separately from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.

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

- Sight distance issues exist along Park Avenue and 38th Avenue.
- Sight distance is an issue traveling southbound due to vertical curve.
- Lighting is insufficient on Park Avenue in the I-25 underpass south of the intersection.
- Signing/striping is unclear for northbound right turns onto Fox Street. Drivers frequently cross the solid white line, creating weaving conflicts.
- The existing northbound approach angle directs vehicles into the northeast pedestrian refuge.
- Pedestrian refuge islands are too small.
- Pedestrian ramps are not directional.
**Recommendations**

The following recommendations are suggested for the intersection. See Figure 11 for a map of general improvements.

12. Provide advanced warning signs for the signal on Park Avenue and 38th Avenue. Existing advanced signing is inadequate.

13. Add signage that differentiates right turns for Fox Avenue and I-25 southbound.


15. Provide nearside signal head on signal pole for northbound and eastbound movements.

16. Readjust northbound stop bar so it guides vehicles to the receiving lanes.

17. Reconstruct channelized right turns and pedestrian islands.

18. Full intersection reconstruction/redesign with emphasis on route continuity.

**Figure 11. Park Avenue & 38th Avenue & Fox Street Recommendation Map**

It should be noted that the 41st and Fox Next Steps Study (October 2021) outlines the following near-, mid-, and long-term recommendations:

1. On the east side of Fox Street, remove the I-25 ramp related traffic movement from the local intersection traffic.
2. Use smaller curb radii at the intersection to reduce right turning vehicle speeds and improve pedestrian safety.
3. Maintain eastbound to northbound double left turns to maintain traffic capacity.
4. Separate right turns from the intersection to create single decision crosswalk areas to simplify driver and pedestrian yielding decisions.
5. Create perpendicular pedestrian crosswalks across the right turn lanes located upstream from the curves so that crosswalks are clearly in the driver’s field of vision and to separate the driver’s yielding decision points from each other (yield to pedestrians in the crosswalk, yield to through vehicles on 38th Avenue).
6. Consider raised table crossings and HAWK signal installation at pedestrian crossings of right turn lanes.
7. Build an overpass for Huron Street over 38th Avenue to tie into the intersection as a fourth leg.
II. Park Avenue & I-25 North Ramps/I-70 Ramps

Background Information

The Park Avenue & I-25 North Ramps/I-70 Ramps intersection is a three-leg intersection (Figure 12). This intersection provides access to the nearby interstates, as well as commercial access along Park Avenue. At this intersection, Park Avenue consists of two through lanes, with a channelized right turn lane northbound and two left turn lanes southbound. Pedestrian crossings are provided across all lanes.

Southbound and westbound left turns are protected at this intersection. Park Avenue has a posted speed limit of 35 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 82 crashes at the intersection of Park Avenue & I-25 North Ramps /I-70 Ramps. Table 3 displays a summary of crash history for the intersection.

- 2 KSI crashes were recorded at the intersection.
- 38 Rear End crashes constitute 46 percent of crashes.
- 23 Sideswipe crashes constitute 28 percent of crashes.
- 35 percent of crashes were caused by following too closely.
- 87 percent of Rear End crashes were in the northbound direction.
- 83 percent of all crashes were in the northbound direction.
Table 3 – Park Avenue & I-25 North Ramps / I-70 Ramps Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SB</th>
<th>NB</th>
<th>WB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>82</td>
<td>2</td>
<td>0</td>
<td>11%</td>
<td>83%</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td>SB</td>
<td>NB</td>
<td>WB</td>
</tr>
<tr>
<td>Rear end</td>
<td>46%</td>
<td>50%</td>
<td>0%</td>
<td>5%</td>
<td>87%</td>
<td>9%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>28%</td>
<td>0%</td>
<td>0%</td>
<td>27%</td>
<td>68%</td>
<td>5%</td>
</tr>
<tr>
<td>Broadside</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>83%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td>SB</td>
<td>NB</td>
<td>WB</td>
</tr>
<tr>
<td>Followed too closely</td>
<td>35%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>93%</td>
<td>7%</td>
</tr>
<tr>
<td>Lane violation</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>27%</td>
<td>73%</td>
<td>0%</td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td>SB</td>
<td>NB</td>
<td>WB</td>
</tr>
<tr>
<td>Making right turn</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>67%</td>
<td>25%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.
- The team was informed after the RSA that traffic signal and civil improvements will be completed at this location as a part of CCD FY18 HSIP Pkg 4 (100% federal grant). Construction advertisement is anticipated in January 2023.

Observations

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

- The current yield condition for the channelized northbound right turn to the I-70 East & I-25 North on-ramp does not effectively control vehicles.
- No traffic control exists for vehicles using the I-25 off-ramp to go north on Park Avenue.
- Pedestrian islands are damaged.
Recommendations

The following recommendations are suggested for the intersection. See Figure 13 for a map of general improvements.

19. Add a signal for northbound right turns onto I-25 north and I-70 east.

20. Extend median concrete barrier approximately 130’ toward the intersection stop bar.


22. Reconstruct damaged pedestrian islands.

Figure 13. Park Avenue & I-25 North Ramps / I-70 Ramps Recommendation Map
III. Park Avenue & Globeville Road

Background Information

The Park Avenue & Globeville Road intersection is a four-leg intersection (Figure 14). This intersection provides access to the nearby interstates, as well as residential and commercial access along Globeville Road. At this intersection, Park Avenue consists of two through lanes and provides turning movements at each approach. Pedestrian crossings are provided across all lanes.

Northbound, westbound, and eastbound left turns are permitted at this intersection with the southbound left turn being protected/permissive. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

![Figure 14. Park Avenue & Globeville Road](image)

Crash Review

Between March 2017 and March 2020, there were a total of 57 crashes at the intersection of Park Avenue & Globeville Road. Table 4 displays a summary of crash history for the intersection.

- 4 KSI crashes were recorded at the intersection.
- 25 Rear End crashes constitute 44 percent of crashes.
- 18 Broadside crashes constitute 32 percent of all crashes and 50 percent of KSI crashes.
- 2 pedestrian crashes and 1 bicycle crash were recorded.
- 100 percent of the pedestrian and bicyclist crashes were in the westbound direction.
- 49 percent of all crashes were in the northbound direction.
Table 4 – Park Avenue & Globeville Road Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SB</th>
<th>NB</th>
<th>EB</th>
<th>WB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>57</td>
<td>4</td>
<td>0</td>
<td>14%</td>
<td>49%</td>
<td>9%</td>
<td>28%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear end</td>
<td>44%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>68%</td>
<td>4%</td>
<td>24%</td>
</tr>
<tr>
<td>Broadside</td>
<td>32%</td>
<td>50%</td>
<td>0%</td>
<td>22%</td>
<td>44%</td>
<td>11%</td>
<td>22%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>4%</td>
<td>50%</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>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Followed too closely</td>
<td>26%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>67%</td>
<td>0%</td>
<td>27%</td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>16%</td>
<td>75%</td>
<td>0%</td>
<td>44%</td>
<td>11%</td>
<td>11%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Movement</strong></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>16%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>0%</td>
<td>33%</td>
</tr>
</tbody>
</table>

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

- No comments were provided at the Pre-Audit Meeting specific to the intersection.
- Comments and recommendations were received separately 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 sidewalk ends on the west side of Park Avenue and only the wayfinding sign indicates how to get to the Platte River Trail.
- There is a high volume of westbound left turning vehicles.
- The sidewalk on Park Avenue is a shared-use trail with steady bike/scooter use.
Recommendations

The following recommendations are suggested for the intersection. See Figure 15 for a map of general improvements.

23. Convert Globeville Road approaches to a four-section head and operate with a flashing yellow arrow for eastbound/westbound left with the option for protected-only phasing.

24. Switch through lane assignment on Globeville Road from left lane to right lane.

25. Add LPI across Park Avenue.

26. Add pedestrian wayfinding sign on the southwest corner directing to the sidewalk on the west side of Park Avenue.

27. Restripe crosswalks at the intersection.

28. Add “Turning vehicles yield to bike and pedestrians” in all directions.

29. Convert northbound and southbound left to protected-only lefts given the volume/speed of traffic and corresponding multiuse trail.

30. Replace the pedestrian signal with a countdown signal.

Figure 15. Park Avenue & 38th Globeville Road Recommendation Map
IV. Park Avenue & Wewatta Street/Delgany Street

Background Information

The Park Avenue & Wewatta Street intersection is a four-leg intersection (Figure 16). This intersection provides access to the nearby interstates and downtown along Park Avenue, as well as industrial access along Wewatta Street. At this intersection, Park Avenue consists of four through lanes and provides turning movements at each approach. Pedestrian crossings are provided across all lanes.

Northbound and southbound left turns are protected, westbound lefts are permitted, and eastbound left turns are protected/permissive at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Figure 16. Park Avenue & Wewatta Street

Crash Review

Between March 2017 and March 2020, there were a total of 46 crashes at the intersection of Park Avenue & Wewatta Street. Table 5 displays a summary of crash history for the intersection.

- 45 crashes were PDO at the intersection.
- 15 Rear End crashes constitute 33 percent of crashes.
- 1 crash involved a pedestrian.
Table 5 – Park Avenue & Wewatta Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NE</th>
<th>NW</th>
<th>SW</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>46</td>
<td>1</td>
<td>0</td>
<td>10%</td>
<td>39%</td>
<td>2%</td>
<td>49%</td>
</tr>
<tr>
<td>Most Harmful Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear end</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>47%</td>
<td>0%</td>
<td>47%</td>
</tr>
<tr>
<td>Broadside/head on</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
<td>38%</td>
<td>8%</td>
<td>38%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Most Harmful Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Followed too closely</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>13%</td>
<td>63%</td>
<td>0%</td>
<td>25%</td>
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<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal/disregarded other device</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</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 left turn</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>29%</td>
<td>29%</td>
<td>14%</td>
<td>29%</td>
</tr>
</tbody>
</table>

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

- A southbound through motorist was traveling at a high rate of speed and exited the roadway, colliding with a traffic signal pole and concrete barriers/fencing in the south corner of the intersection.
- Comments and recommendations were received separately from District 9’s multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.
- The team was informed after the RSA that a signal rebuild is anticipated at this location.

Observations

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

- Westbound left turn light is dimmed, making it difficult for vehicles to identify when to turn.
- Two pedestrian push buttons on the northern corners of the intersection may cause pedestrian confusion.
- There are wide pedestrian crossings, especially across Park Avenue.
- There is steady bike and pedestrian traffic.
- The sidewalk along Park Avenue is a shared-use trail.
Recommendations

The following recommendations are suggested for the intersection. See Figure 17 for a map of general improvements.

31. Add a flashing yellow arrow for left turns from Wewatta Street and Delgany Street and yield to pedestrian signs.

32. Consider converting to protected-only given the long crossing distance and pedestrian activity.

33. Replace left turn signal head with a brighter head.

34. Extend medians across the intersection as a pedestrian refuge to slow turning vehicles.

Figure 17. Park Avenue & Wewatta Street Recommendation Map
V. Park Avenue & Wazee Street

Background Information

The Park Avenue & Wazee Street intersection is a one-way four-leg intersection (Figure 18). This intersection provides an exit out of downtown along Park Avenue and parking lot access along Wazee Street. At this intersection, Park Avenue consists of four northwest through lanes. Pedestrian crossings are provided across all lanes.

Northbound and westbound left turns are permitted at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Figure 18. Park Avenue & Wazee Street

Crash Review

Between March 2017 and March 2020, there were a total of 21 crashes at the intersection of Park Avenue & Wazee Street. Table 6 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 9 Broadside crashes constitute 43 percent of crashes.
- 8 left turn crashes constitute 38 percent of crashes.
- 67 percent of all crashes were in the northwest direction.
Table 6 – Park Avenue & Wazee Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NE</th>
<th>NW</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>24%</td>
<td>67%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td>24%</td>
<td>67%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td>24%</td>
<td>67%</td>
<td>10%</td>
</tr>
<tr>
<td>Broadside</td>
<td>43%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>44%</td>
<td>22%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>13%</td>
<td>88%</td>
<td>0%</td>
</tr>
<tr>
<td>Lane violation</td>
<td>29%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>50%</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td>24%</td>
<td>67%</td>
<td>10%</td>
</tr>
<tr>
<td>Improper turn</td>
<td>24%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Making left turn</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

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

- Comments and recommendations were received separately 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 observation during the morning, afternoon, and evening field reviews:

- Left turn crashes were caused by lane violations, turning from the wrong lane, and improper turns. The RSA team observed that the lane assignment was confusing.
Recommendations

The following recommendations are suggested for the intersection. See Figure 19 for a map of general improvements.

- There are no immediate recommendations for the Park Avenue & Wazee Street intersection. However, a check of line-of-sight in the vicinity of the intersections, including at the parking lot exit onto Park Avenue (east corner) would be beneficial.

Figure 19. Park Avenue & Wazee Street Recommendation Map
VI. Park Avenue & Blake Street

Background Information

The Park Avenue & Blake Street intersection is a one-way four-leg intersection (Figure 20). This intersection provides an exit out of downtown along Park Avenue and downtown access along Blake Street. At this intersection, Park Avenue consists of four northwest through lanes. Pedestrian crossings are provided across all lanes.

Westbound left turns are permitted at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 21 crashes at the intersection of Park Avenue & Blake Street. Table 7 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 9 Broadside crashes constitute 43 percent of crashes.
- 9 left turn crashes constitute 43 percent of crashes.
- 81 percent of all crashes were in the northwest direction.
- 1 pedestrian crash was observed at the intersection.
Table 7 – Park Avenue & Blake Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SW</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>19%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>43%</td>
<td>0</td>
<td>0</td>
<td>11%</td>
<td>89%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>24%</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>5%</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn from wrong lane/improper turn</td>
<td>38%</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>14%</td>
<td>0</td>
<td>0</td>
<td>33%</td>
<td>67%</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>43%</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Making right turn</td>
<td>10%</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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- “No Double Turn” sign is mounted on the east pole.
- There are signal poles in the pedestrian landing area.
- There is a high volume of westbound right turning vehicles from Blake Street to Park Avenue.
Recommendations

The following recommendations are suggested for the intersection. See Figure 21 for a map of general improvements.

35. Add countdown timers for pedestrian signals.
36. Retroreflective tape.
37. Provide Opticom.
38. Consider LPI across Park Avenue.
39. Replace “No Double Turn” sign with appropriate lane control sign.
40. Install bulb-outs and reduce curb radii.
41. Install larger signal heads on poles.

Figure 21. Park Avenue & Blake Street Recommendation Map
VII. Park Avenue & Market Street

Background Information

The Park Avenue & Market Street intersection is a one-way four-leg intersection (Figure 22). This intersection provides an exit out of downtown along Park Avenue and downtown access along Market Street. At this intersection, Park Avenue consists of four northwest through lanes. Pedestrian crossings are provided across all lanes.

Northbound left turns are permitted at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 8 crashes at the intersection of Park Avenue & Market Street. Table 8 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 4 Broadside crashes constitute 50 percent of crashes.
- 75 percent of all crashes were in the northeast direction.
- 2 pedestrian crashes were observed at the intersection.
Table 8 – Park Avenue & Market Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NE</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></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>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</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>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Turned from wrong lane</td>
<td>25%</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>
</tr>
<tr>
<td>Making left turn</td>
<td>50%</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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- Pedestrian phase across Park Avenue ends 12 seconds before signal phase.
- There are no countdown timers for pedestrian signals.
- There is good lighting in the intersection area.
- There is one additional lane on Park Avenue immediately downstream of intersection.
- Business vehicles were parked on sidewalks in loading zones.
Recommendations

The following recommendations are suggested for the intersection. See Figure 23 for a map of general improvements.

42. Modify timing to extend pedestrian phase at least on southeast leg (across Park Avenue) to match green phase.
43. Provide countdown timers for pedestrian signals.
44. Retroreflective tape.
45. Bulb-outs/corner hardening.
46. Install large signal heads on poles.

Figure 23. Park Avenue & Market Street Recommendation Map
VIII. Park Avenue & Larimer Street

Background Information

The Park Avenue & Larimer Street intersection is a one-way four-leg intersection (Figure 24). This intersection provides an exit out of downtown along Park Avenue and downtown access along Larimer Street. At this intersection, Park Avenue consists of four northwest through lanes. Pedestrian crossings are provided across all lanes.

Westbound left turns are permitted at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 21 crashes at the intersection of Park Avenue & Larimer Street. Table 9 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 7 Broadside crashes constitute 33 percent of crashes.
- Vehicles turning from the wrong lane constitute 57 percent of crashes.
- Left turns constitute 62 percent of crashes.
- 86 percent of all crashes were in the northwest direction.
- 2 pedestrian crashes were observed at the intersection.
Table 9 – Park Avenue & Larimer Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SW</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turned from wrong lane/improper turn</td>
<td>57%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a left turn</td>
<td>62%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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.

- Most improper turns (from wrong lane) were from northbound Park Avenue making a left turn onto Larimer Street.
- There is improperly assigned road signage per lane at the intersection.
Recommendations

The following recommendations are suggested for the intersection. See Figure 25 for a map of general improvements.

47. Remove lane control sign from the mast arm and place lane sign on northwest corner pole.
48. Add pavement markings intersection lane control.
49. Adjust signal timing on Park Avenue to coordinate with downstream signals and control speeds.
50. Bulb-outs/corner hardening.
51. Consider converting left lane to turn lane only.

Figure 25. Park Avenue & Larimer Street Recommendation Map
IX. Park Avenue & Lawrence Street

Background Information

The Park Avenue & Lawrence Street intersection is a one-way four-leg intersection (Figure 26). This intersection provides an exit out of downtown along Park Avenue and downtown access along Lawrence Street. At this intersection, Park Avenue consists of three northwest through lanes. Pedestrian crossings are provided across all lanes.

Northbound left turns are permitted at this intersection. Park Avenue has a posted speed limit of 30 MPH throughout this intersection.

Figure 26. Park Avenue & Lawrence Street

Crash Review

Between March 2017 and March 2020, there were a total of 23 crashes at the intersection of Park Avenue & Lawrence Street. Table 10 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 11 Broadside crashes constitute 48 percent of crashes.
- 91 percent of Broadside crashes occurred in the northeast direction.
- 1 pedestrian crash was observed at the intersection.
### Table 10 – Park Avenue & Lawrence Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>NE</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>23</td>
<td>1</td>
<td>0</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>48%</td>
<td>0%</td>
<td>0%</td>
<td>91%</td>
<td>9%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>13%</td>
<td>100%</td>
<td>0%</td>
<td>33%</td>
<td>67%</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>43%</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a left turn</td>
<td>13%</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**

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- Drivers making a northbound left at Broadway are speeding through this intersection to make the light at Larimer Street.
- The left lane on Park Avenue is used much less than the other two lanes.
- Park Avenue and Broadway intersections on Lawrence Street are closely spaced and not coordinated, and therefore, may be contributing to the high instance of red light running on Lawrence Street at Park Avenue.
Recommendations

The following recommendations are suggested for the intersection. See Figure 27 for a map of general improvements.

52. Install optically programmed signal heads on the Lawrence Street approach to the Broadway intersection to mitigate red light running at Lawrence Street/Park Avenue.

53. Provide bulb-outs/corner hardening (corridor-wide).

54. Add missing sidewalk on Park Avenue between Broadway and Lawrence Street.

Figure 27. Park Avenue & Lawrence Street Recommendation Map
X. Park Avenue & N Broadway & Arapahoe Street

Background Information

The Park Avenue & N Broadway & Arapahoe Street intersection is a six-leg intersection (Figure 28). This intersection provides an exit out of downtown along Park Avenue and downtown access along N Broadway. N Broadway is a major north-south connection in this area. At this intersection, Park Avenue consists of two northwest through lanes. Pedestrian crossings are provided across all lanes.

Northbound left turns are protected, and the southbound left turns are protected/permissive at this intersection. Park Avenue 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 Park Avenue & N Broadway. Table 11 displays a summary of crash history for the intersection.

- A fatal crash was recorded at the intersection. It involved a northbound left turning vehicle failing to yield to right-of-way and striking a southbound vehicle.
- 3 KSI crashes were recorded at the intersection.
- 15 Broadside crashes constitute 43 percent of all crashes and 67 percent of KSI crashes.
- 2 pedestrian crashes were observed at the intersection.
- 80 percent of crashes occurred in the northbound direction.

![Figure 28. Park Avenue & N Broadway](image-url)
### Table 11 – Park Avenue & N Broadway Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>35</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadsided</td>
<td>43%</td>
<td>67%</td>
<td>100%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Head on</td>
<td>11%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>31%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a left turn</td>
<td>60%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>NB</th>
<th>NW</th>
<th>SB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>80%</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td>Broadsided</td>
<td>93%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Head on</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a left turn</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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 no sidewalk on the north side of Park Avenue between Lawrence Street and Broadway.
- The marked pedestrian crossing on the south leg of Arapahoe Street is very wide and uncontrolled.
- There is a steady volume of pedestrians crossing.
- There is a high volume of traffic on Broadway and Park Avenue.
Recommendations

The following recommendations are suggested for the intersection. See Figure 29 and Figure 31 for maps of general improvements.

55. Provide positive guidance for turning.
56. Modify northbound left turn geometry through change in assigned receiving lanes.
57. Convert southbound left to protected-only (98 ped/hr in crosswalk on southeast leg of Park Avenue).
58. Replace overhead guide sign on Broadway (to I-25 left only) with appropriate guide sign for urban arterial (route guidance).
59. Provide bulb-outs/corner hardening to reduce crossing distance.
60. Narrow the south leg of Arapahoe Street to one lane at the crosswalk.

Figure 29. Park Avenue & N Broadway Recommendation Map
Figure 30. Park Avenue & N Broadway Existing Geometry

Figure 31. Park Avenue & N Broadway Proposed Geometry
XI. 22nd Street & Blake Street

Background Information

The 22nd Street & Blake Street intersection is a one-way four-leg intersection (Figure 32). This intersection provides access into downtown along 22nd Street and Blake Street. At this intersection, 22nd Street consists of four southeast through lanes. Pedestrian crossings are provided across all lanes.

Southbound left turns are permitted at this intersection. 22nd Street has a posted speed limit of 30 MPH throughout this intersection.

![Figure 32. 22nd Street & Blake Street](image)

Crash Review

Between March 2017 and March 2020, there were a total of 18 crashes at the intersection of 22nd Street & Blake Street. Table 12 displays a summary of crash history for the intersection.

- All crashes were PDO at the intersection.
- 7 Broadside crashes constitute 39 percent of all crashes.
- 78 percent of crashes occurred in the southeast direction.
- 1 pedestrian crash was recorded.
### Table 12 – 22nd Street & Blake Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>78%</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>39%</td>
<td>0%</td>
<td>0%</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</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>28%</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
<td>20%</td>
</tr>
</tbody>
</table>

### Comments Provided by City Staff and RSA Stakeholders during Pre-Audit Meeting
- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:
- High speeds approach the intersection from the Wewatta Street & Park Avenue intersection.
- Vehicles run the red light to make it into downtown.
- “Left Turn Must Turn Left at Market Street” sign is relatively small for observed travel speeds and shielded by vegetation.
Recommendations

The following recommendations are suggested for the intersection. See Figure 33 for a map of general improvements.

61. Improve signage at the intersection. Clearly identify direction of travel and future lane drops.
62. Consider constructing bulb-outs on Blake Street to slow turning vehicles.
63. Consider installing speed reduction devices to reduce vehicle speeds through the intersection into downtown.
64. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

Figure 33. 22nd Street & Blake Street Recommendation Map
XII. 22nd Street & Larimer Street

Background Information

The 22nd Street & Larimer Street intersection is a one-way four-leg intersection (Figure 34). This intersection provides access into downtown along 22nd Street and Larimer Street. At this intersection, 22nd Street consists of three southeast through lanes. Pedestrian crossings are provided across all lanes.

Southbound left turns are permitted at this intersection. 22nd Street has a posted speed limit of 25 MPH throughout this intersection.

Crash Review

Between March 2017 and March 2020, there were a total of 7 crashes at the intersection of 22nd Street & Larimer Street. Table 13 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 3 crashes involved vehicles failing to stop at the signal.
- 4 Broadside crashes occurred, representing 57 percent of the crashes at the intersection.
- 86 percent of crashes occurred in the southwest direction.
Table 13 – 22nd Street & Larimer Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crashes</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td>Most Harmful Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>57%</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>13%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Driver Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>43%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Failed to yield ROW</td>
<td>29%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a left turn</td>
<td>29%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- High speeds approach the intersection from the 22nd Street & Market Street intersection.
- Vehicles run the red light to remain in the proper corridor progression. This is recorded in the crash data as well.
- Inefficient lane use was observed. Turns from improper lanes were noted.
Recommendations

The following recommendations are suggested for the intersection.

65. Construct bulb-outs on Larimer Street to slow turning vehicles. See Figure 35 for an improvements sketch.

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

![Figure 35. 22nd Street & Larimer Street Recommendation Map](image)
XIII. 22nd Street & Lawrence Street

Background Information

The 22nd Street & Lawrence Street intersection is a one-way four-leg intersection (Figure 36). This intersection provides access into downtown along 22nd Street and Lawrence Street. At this intersection, 22nd Street consists of three southeast through lanes. Pedestrian crossings are provided across all lanes.

Southbound left turns from 22nd Street are permitted at this intersection. 22nd Street has a posted speed limit of 25 MPH throughout this intersection.

![Image of 22nd Street & Lawrence Street intersection]

Crash Review

Between March 2017 and March 2020, there were a total of 28 crashes at the intersection of 22nd Street & Lawrence Street. Table 14 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 12 crashes involved vehicles failing to stop at the signal.
- 21 Broadside crashes occurred, representing 75 percent of total crashes and 100 percent of KSI at the intersection.
- 79 percent of crashes occurred in the southeast direction.
Table 14 – 22nd Street & Lawrence Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
<th>SE</th>
<th>NE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>28</td>
<td>1</td>
<td>0</td>
<td>79%</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>75%</td>
<td>100%</td>
<td>0%</td>
<td>81%</td>
<td>19%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</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/disregard device</td>
<td>46%</td>
<td>100%</td>
<td>0%</td>
<td>92%</td>
<td>8%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- High speeds approach the intersection from the 22nd Street & Larimer Street intersection.
- Vehicles run the red light to remain in the proper corridor progression.
- Inefficient lane use was observed. Turns from improper lanes were noted.
Recommendations

The following recommendations are suggested for the intersection. See Figure 37 for a map of general improvements.

67. Construct bulb-outs on Lawrence Street to slow turning vehicles.

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

Figure 37. 22nd Street & Lawrence Street Recommendation Map
XIV. 22nd Street & Arapahoe Street

Background Information

The 22nd Street & Arapahoe Street intersection is a one-way four-leg intersection (Figure 38). This intersection provides access into downtown along 22nd Street and Arapahoe Street. At this intersection, 22nd Street consists of three southbound through lanes. Pedestrian crossings are provided across all lanes. Southbound left turns are permitted at this intersection. 22nd Street has a posted speed limit of 25 MPH throughout this intersection.

Figure 38. 22nd Street & Arapahoe Street

Crash Review

Between March 2017 and March 2020, there were a total of 8 crashes at the intersection of 22nd Street & Arapahoe Street. Table 15 displays a summary of crash history for the intersection.

- 0 KSI crashes were recorded at the intersection.
- 3 Broadside crashes occurred.
- 75 percent of crashes occurred in the southeast direction.
Table 15 – 22nd Street & Arapahoe Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>Total Crashes</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All</strong></td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>SE</strong></td>
<td>75%</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>SW</strong></td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>NW</strong></td>
<td>67%</td>
<td>0%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Comments Provided by City Staff and RSA Stakeholders during Pre-Audit Meeting</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No comments were provided specific to the intersection at the Pre-Audit Meeting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments and recommendations were received separately from District 9's multimodal transportation advisory group representative, Rob Toftness. These are included in this report in Appendix E.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Observations**

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

- High speeds approach the intersection from the 22nd Street & Lawrence Street intersection.
- Vehicles run the red light to remain in the proper corridor progression.
- Inefficient lane use was observed. Turns from improper lanes were noted.
Recommendations

The following recommendations are suggested for the intersection. See Figure 39 for a map of general improvements.

69. Construct bulb-outs on Arapahoe Street to slow turning vehicles.

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

Figure 39. 22nd Street & Arapahoe Street Recommendation Map
XV. 22nd Street 1000 Block

Background Information

The 22nd Street Block 1000 segment is a one-way segment along 22nd Street between Arapahoe Street and N Broadway (Figure 40). At this segment, 22nd Street consists of three southeast through lanes. 22nd Street has a posted speed limit of 25 MPH throughout this segment.

Crash Review

Between March 2017 and March 2020, there were a total of 5 crashes in this segment of 22nd Street. Table 16 displays a summary of crash history for the intersection.

- 1 fatal crash was recorded in the study period. CCD also provided details of an additional fatal crash that occurred outside the crash study period.
- The fatality that occurred in the study period occurred when a driver of a vehicle traveling eastbound on 22nd Street struck a pedestrian crossing midblock.
- 4 Rear End crashes occurred, representing 40 percent of the total crashes.
### Table 16 – 22nd Street 1000 Block Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Most Harmful Event</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear End</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>20%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Followed too closely</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Careless driving</td>
<td>40%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Going straight</td>
<td>60%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

- **October 2020 – 100 Block 22nd Street:** A pedestrian (wheelchair user) was crossing 22nd Street midblock between Arapahoe Street and Broadway when they were struck by a motorist traveling southbound on 22nd Street.
- Comments and recommendations were received separately 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:

- High speeds approaching the intersection from the 22nd Street & Arapahoe Street intersection come to a quick stop due to Broadway’s signal progression.
- Multiple crashes occurred at the alley.
- The alley is signed as one-way into 22nd Street from both directions.
**Recommendations**

The following recommendations are suggested for the intersection. See **Figure 41** for a map of general improvements.

71. Construct bulb-outs north of 22nd Street at the alley to prevent drivers from unexpectedly bypassing queues to turn left at Broadway.

72. Consider adding a “Do Not Block Alley” sign.

**Figure 41. 22nd Street Block 1000 Recommendation Map**
XVI. 22nd Street & N Broadway

Background Information

The 22nd Street & N Broadway intersection is a one-way four-leg intersection (Figure 42). This intersection provides access into downtown along 22nd Street and N Broadway. N Broadway is a major north-south connection in this area. At this intersection, 22nd Street consists of two southeast through lanes. Pedestrian crossings are provided across all lanes.

Southbound, northbound, and eastbound left turns are permitted at this intersection. 22nd Street has a posted speed limit of 25 MPH throughout this intersection.

Figure 42. 22nd Street & N Broadway

Crash Review

Between March 2017 and March 2020, there were a total of 47 crashes at the intersection of 22nd Street & N Broadway. Table 17 displays a summary of crash history for the intersection.

- 1 KSI crash was recorded at the intersection.
- 15 crashes involved lane violations.
- 21 Sideswipe crashes occurred, representing 45 percent of the total crashes at the intersection.
- 72 percent of crashes occurred in the southeast direction.
### Table 17 – 22nd Street & N Broadway Street Crash Summary

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>KSI</th>
<th>Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Crashes</strong></td>
<td>47</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Most Harmful Events</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadside</td>
<td>32%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>45%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Driver Action</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stop at signal</td>
<td>15%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Lane violation</td>
<td>32%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marking a right turn</td>
<td>45%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>NB</th>
<th>SB</th>
<th>SE</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>15%</td>
<td>6%</td>
<td>72%</td>
<td>2%</td>
</tr>
<tr>
<td>KSI</td>
<td>20%</td>
<td>7%</td>
<td>67%</td>
<td>0%</td>
</tr>
<tr>
<td>Fatal</td>
<td>5%</td>
<td>10%</td>
<td>86%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

- No comments were provided specific to the intersection at the Pre-Audit Meeting.
- Comments and recommendations were received separately 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:

- Broadway timing interrupts progression on 22nd Street.
- Northbound right turns from Curtis Street onto Broadway are blind and currently permitted.
- Inadequate signing and striping causes driver confusion throughout the intersection for multiple turning movements.
**Recommendations**

The following recommendations are suggested for the intersection. See Figure 43 for a map of general improvements.

1. Consider improving southeast bound bandwidth for Broadway to improve progression on 22nd Street.
2. Restrict northbound right turns from Curtis Street onto Broadway. Add “No right on red” sign and “Yield to pedestrians in crosswalk” sign.
3. Provide skip striping through the intersection to serve as positive guidance for right turns from 22nd Street onto Broadway.
4. Extend and restripe Southbound 22nd Street thru movement with a lane line.
5. Restripe southbound left turn hook striping from 22nd Street onto Broadway from dotted to solid line for at least 35 ft. Add signing or striping to clearly indicate the single left turn.
6. Further analyze the intersection for paving, lighting, signal timing, and traffic infrastructure issues and address as necessary.

![Image of intersection with recommendations marked]

**Figure 43. 22nd Street & N Broadway Recommendation Map**
**Game Day Observations**

Due to the proximity of Coors Field to the project area, the RSA team preformed Rockies game-day observations. The following were made before the game to observe peak pedestrian traffic into the stadium:

- Wazee Street converted to one-way (northbound pre-game, southbound post-game) with police directing traffic at each corner.
- Police direct pedestrians not to cross 22nd Street at Wazee Street.
- Police override signal timing at Park Avenue/Wewatta Street to extend walk time as needed each cycle across Park Avenue.
- Blake Street is closed between 22nd Street and 20th Street.
- Traffic is heavier on Park Avenue and 22nd Street; cars frequently get stuck in the intersection (mostly moving slow).
- Poor use of left lane on Park Avenue is more pronounced during Rockies games.
- High volume of pedestrian conflicts with SBR turning vehicles at Blake Street.
- Many cars making an illegal double-turn from 22nd Street to Market Street.

**Recommendations**

The following recommendations are suggested and are meant to reinforce previous corridor wide and intersection specific recommendations:

- Use pavement markings to indicate lane assignment. (Short-term: Less than 1 year)
- Bulb-outs/corner hardening to slow turning vehicles and shorten crossing distance for pedestrians. (Medium-term: 1 to 3 years)
- Opportunity to repurpose left lane on Park Avenue between Broadway and Blake Street. (Long-term: More than 3 years)
- Add lane marking and “No Double Turn” sign at 22nd Street/Market Street.
Appendix A. Park Avenue RSA Recommendations Table
Appendix B. RSA Pre-Audit Meeting Presentation
Appendix D. Preliminary Findings Presentation