Garden City Road Safety Audit

Intersections:
Leslie Road & Lareu Road
Schulman Avenue & Lareu Road
U.S. 83 & Schulman Avenue
U.S. 83 & Spruce Street

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NOT FOR CONSTRUCTION—The Recommendations in this document are intended ONLY for the local agency to use in determining possible future changes at the RSA location.

Subject to United States Code Use Restricted 23 USC 407.

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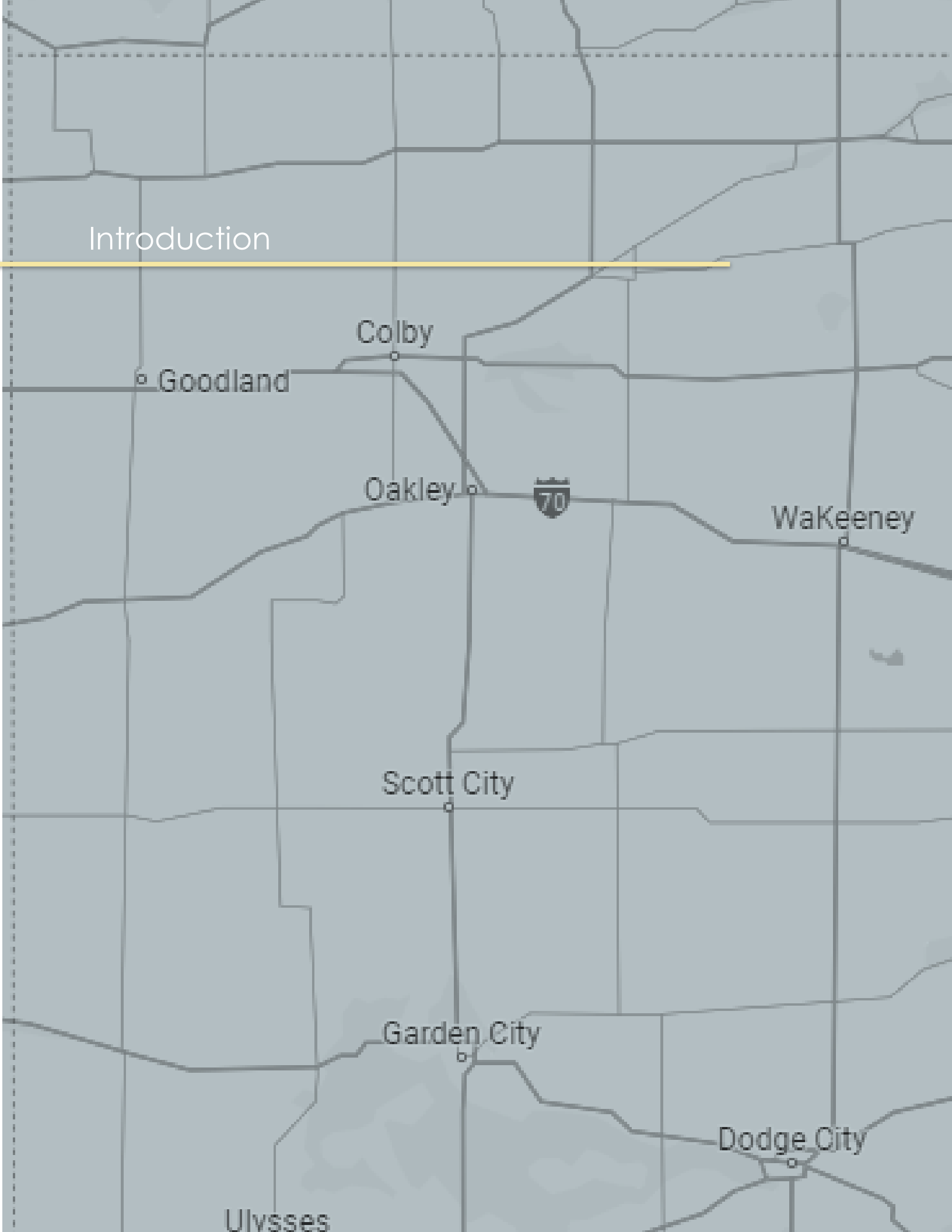


Introduction

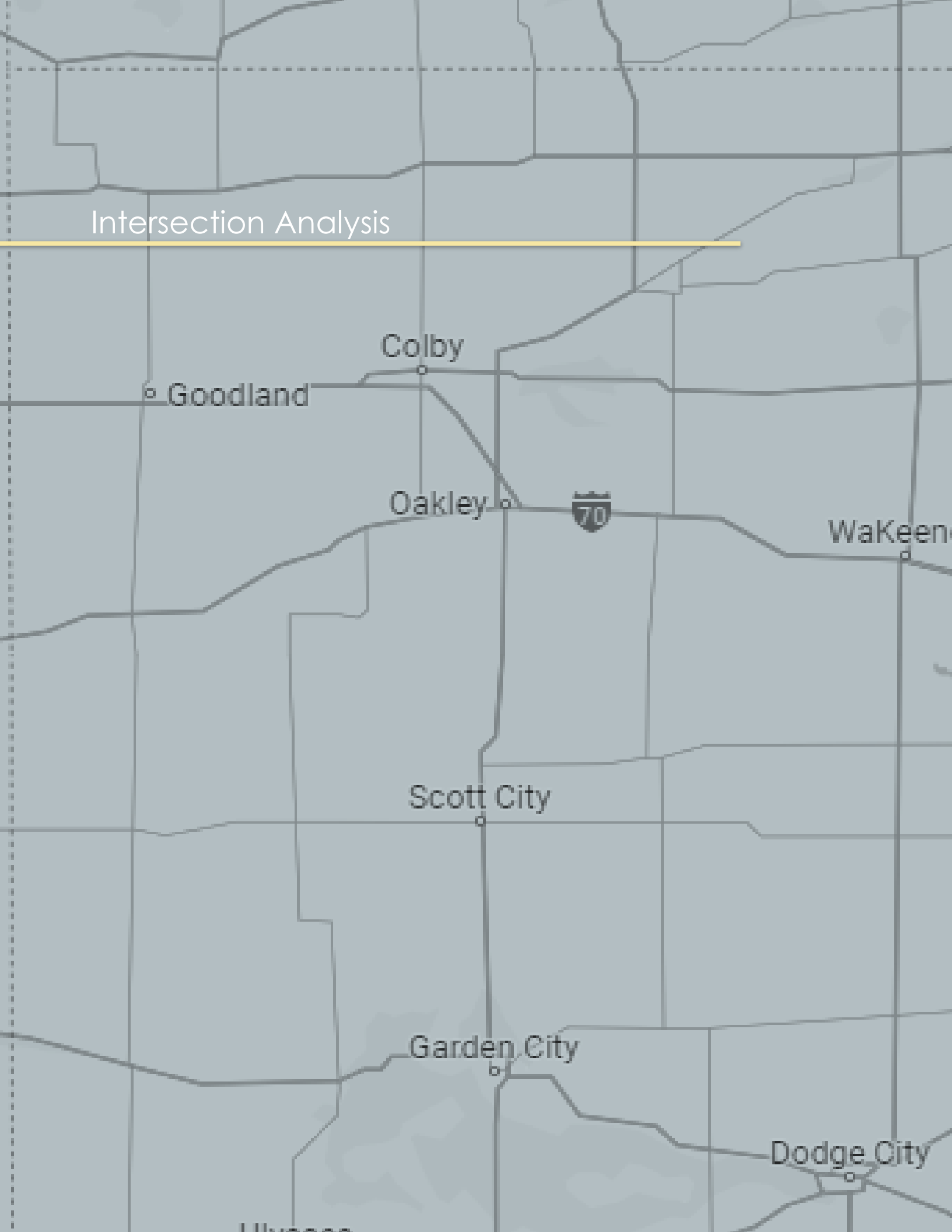
Garden City, Kansas, is part of the Multi-jurisdictional Safe Streets for All (SS4A) Safety Action Plan, a collaboration between twelve jurisdictions to improve roadway safety. Partner communities and counties include Garden City, Holcomb, Liberal, Scott City, Oakley, Oberlin, Finney County, Seward County, Haskell County, Scott County, Logan County, and Decatur County. The U.S. 83 Communities Roadway Safety Plan and Road Safety Audits (RSA) are important initiatives for improving road safety and are a critical component of the plan.

RSAs are formal examinations of selected roadway facilities from a safety performance viewpoint. An independent multidisciplinary team made up of engineers, traffic specialists, and planners performs all RSAs. The end result of an RSA is qualitative estimates and reports on potential road safety issues and identified opportunities for safety improvements that will benefit all road users. By leveraging data, community input, and expert analysis, the city can implement targeted interventions to reduce traffic crashes and improve overall road safety. The RSA team reviewed local agency crash data and conducted field observations during different times, such as day/night and peak/non-peak hours. The field visits took place from April 1st to April 3rd, 2024.

Recommendation Process

The recommendations in this plan are the result of extensive data analysis, field work and observations, community input, and reflect the education, training, and experience of RSA team members. Improving the safety and mobility of all road users was the team's primary objective and guided the process from the beginning.

Intersection Analysis



Intersection Analysis

Intersection 1: Leslie Road & Lareu Road

Overview

The Leslie Road and Lareu Road intersection, shown in Figure 1, has 3-way stop control, with stop signs on each leg except for the northwest leg. The northeast and southeast legs of the intersection are two-lane unstriped roadways. The northwest leg is a two-lane roadway that expands to the northwest to include a dedicated left-turn lane onto Kansas Avenue. The southwest leg is striped for a dedicated left-turn lane onto Leslie Road. Right-turns must be made from the shared through lane in all directions.

Figure 1: Aerial Image of Leslie Road & Lareu Road Intersection

Source: Google Maps, Google. Accessed October 2024.

Attached sidewalks are present on all legs of the intersection, except for the northern side of the southwest leg of Leslie Road and the southern side of the northeast leg. Daily traffic at the intersection is estimated to be approximately 6,200 VPD on the northwest leg, 2,200 VPD on the southeast leg, 2,700 VPD on the northeast leg, and 4,800 VPD on the southwest leg.

The northeast leg of the intersection is a private street.

Crash Review

Table 1 summarizes the crashes that occurred at the Leslie Road and Lareu Road intersection.

Total Crashes: 3 (Property Damage Only)
Significant Crash Pattern: Rear end

Table 1: Leslie Road & Lareu Road Intersection Crash Summary

Leslie Road & Lareu Road Intersection	PDO		Total	
	Crashes	%	Crashes	%
Angle – Straight/following road	1	33%	1	33%
Rear End	2	67%	2	67%
Grand Total	**3**	**100%**	**3**	**100%**

Rear End Crash Summary: There were 2 rear end crashes, which occurred on the southwest and northeast approaches to the intersection.

Comments Provided by City Staff and Stakeholders

The City staff and City Commissioners receive compliants regarding the intersection on a regular basis. The primary public compliant is confusion caused by the three stopped approaches and one uncontrolled. As a result the City has considered roundabout improvements to the intersection in its CIP process.

Observations

This intersection is within a shopping center. Traffic reaches its peak at 12:00 p.m. and remains fairly constant through 7:00 p.m. Figure 2 shows the AM (10:00-11:00) and PM (2:00-3:00) peak-hour traffic volumes. There were no recorded bicyclists at the intersection over the 13-hour count period on the day of the data collection, however there was a small amount of pedestrians crossing at each leg, shown in Figure 2.

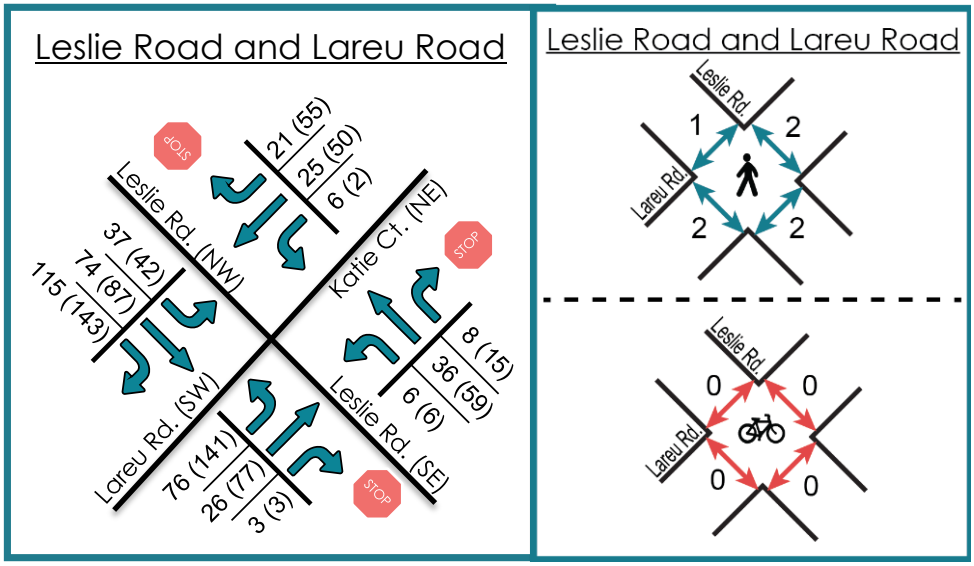


Figure 2: Leslie Road & Lareu Road 2024 Peak Hour Turning Movement Counts & Pedestrian and Bicycle Counts

The RSA team made the following intersection observations during the field reviews:

- Appears to be driver confusion on right-of-way amongst the 3 stop-controlled approaches.
- Drivers observed disregarding RIRO restrictions at driveway just northwest of the intersection.

Recommendations

The following improvements are recommended for the intersection. A traffic study was completed in 2016, *Traffic Study of Corridors and Intersections*, that recommended the intersection of Leslie Road and Lareu Road be reconstructed as a roundabout as the surrounding area develops to allow for increased efficiency. A conceptual image from the plan is included in Figure 3. This recommendation was also included in the Garden City *2021 Capital*

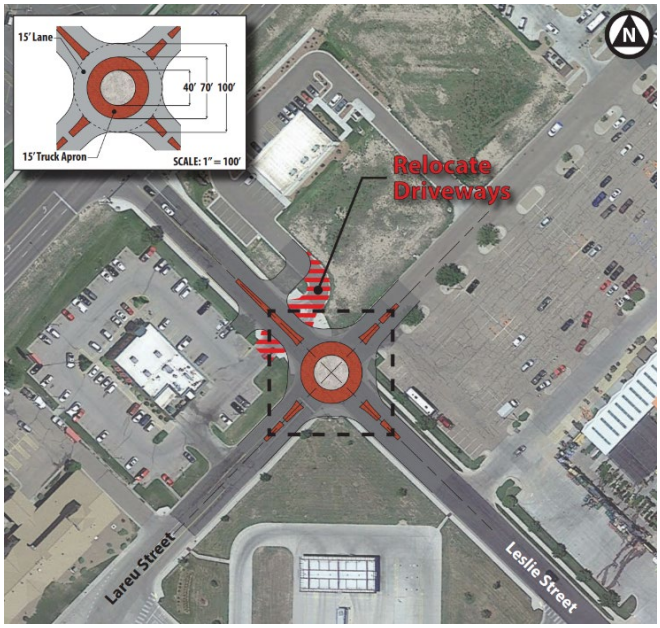


Figure 3: 2016 Traffic Study Conceptual Leslie Road & Lareu Road Recommendation

Source: Leslie & Lareu Recommendation, *Traffic Study of Corridors and Intersections*, July 2016.

Improvement Plan alongside a reconstruction of Leslie Road from Kansas Avenue to Lareu Road (Projects PWL-21-002 and PWL-21-003).

1. Reconstruct the intersection as a single-lane roundabout.
    a. Based on the existing weekday PM peak-hour traffic volumes, the intersection is expected to operate at LOS A as a roundabout, with queue lengths of no more than one vehicle. Given the driver confusion with the current 3-way stop condition, the overall intersection level of service would likely be improved with a roundabout as compared to the current conditions.
    b. However, it is recommended the intersection be analyzed further to take into account the potential for increased traffic volumes as the surrounding area develops to ensure that traffic would not back up from the signal at Kansas Avenue through the roundabout.
2. Alternatively, or as an interim measure, consideration could be given to operating the intersection as an all-way stop, which could also be expected to operate at LOS A based on existing weekday PM peak-hour traffic volumes. However, as the intersection had previously been operated as an all-way stop and was converted to the current three-way stop configuration, the reasons for that previous change in traffic control should be investigated before making any further changes.

Intersection 2: Schulman Avenue & Lareu Road

Overview

Schulman Avenue and Lareu Road is a signalized intersection (Figure 4). The east and west legs of Schulman Avenue each have two through lanes in each direction and the west leg has a dedicated left-turn lane as well as a combined through – left-turn lane onto the north leg of Lareu Road. The north leg of Lareu Road has one through-right lane and one dedicated left-turn lane along with two through lanes for the northbound movements. The south leg of Lareu Road has one lane in each direction with no dedicated turning lanes. Right-turns must be made from the shared through lane in all directions. There is protected/permissive left-turn phasing for the eastbound approach.

Figure 5: Aerial Image of Schulman Avenue & Lareu Road Intersection

Source: Google Maps, Google. Accessed October 2024.

The northbound through lane does not align with the receiving lane on the north side of the intersection. The offset is geometrically deficient, with a 2º50' deflection on the south side and a nearly 7-degree deflection on the north side. The acceptable deflection for 30 mph design speed is 3º45', thus the existing deflection is double the design standard. This deflection is shown on the right. Attached sidewalks are present on all legs of the Schulman Avenue and Lareu Road interesection. There are no bike lanes at this intersection. Daily traffic at the intersection is approximately 7,700 VPD on the west leg, 4,300 VPD on the east leg, 6,800 VPD on the north leg, and 1,900 VPD on the south leg.

Figure 4: Schulman Avenue & Lareu Road Intersection Lane Geometry

Source: Finney County GIS, Finney County GIS, Accessed November 2024.

Crash Review

Table 2 summarizes the crashes that occurred at Schulman Avenue and Lareu Road.

Total Crashes: 26 (6 injury crashes)
Significant Crash Pattern: Rear End and Angle – Straight/following road

Table 2: Schulman Avenue & Lareu Road Intersection Crash Summary

Schulman Avenue & Lareu Road Intersection	Injury		PDO		Total	
	Total	%	Total	%	Total	%
Angle – Left Turn	0	0%	4	15%	4	15%
Angle - Straight/following road	4	15%	2	8%	6	23%
Head On	2	8%	1	4%	3	12%
Rear End	0	0%	7	27%	7	27%
Sideswipe Same – Left Turn	0	0%	4	15%	4	15%
Sideswipe Opposite	0	0%	1	4%	1	4%
Single Car Crash	0	0%	1	4%	1	4%
Grand Total	**6**	**23%**	**16**	**77%**	**26**	**100%**

Rear End Crash Analysis: There were 7 rear end crashes. While all rear end crashes were property damage only crashes, they occurred at each approach besides the northbound approach. There were 3 rear end crashes at the southbound approach.

Angle – Straight/following road Crash Analysis: There were 6 angle crashes where the vehicle maneuver was straight/following the road (4 injury crashes). Most of these crashes (5) occurred with the first vehicle heading either westbound (3 injury) or eastbound (1 injury and 1 property damage only) on Schulman Avenue and the second vehicle involved heading north/south on Lareu Road.

Comments Provided by City Staff and Stakeholders

The City advised that they receive complaints from the public regarding the offset alignment of this intersection for northbound through vehicles

Observations

With much of the traffic traveling through this intersection being generated by retail land uses, the traffic volume gradually increases throughout the day, reaching its peak around 5:00 p.m. Figure 6 shows the AM (10:00-11:00) and PM (4:45-5:45) peak-hour traffic volumes. There was one bicyclist that crossed the south leg of the intersection during the 13 hour timeframe. Pedestrians were recorded along each leg except for the southbound approach of Lareu Road (Figure 7).

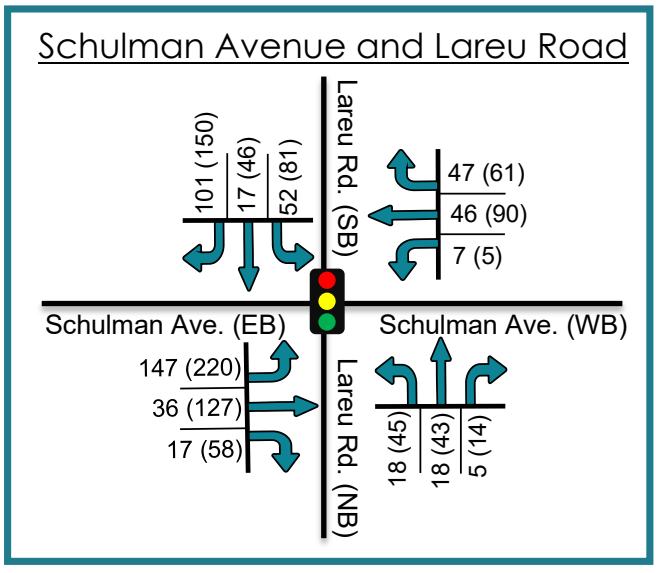


Figure 6: Schulman Avenue & Lareu Road 2024 Peak Hour Turning Movement Counts

The RSA team made the following intersection observations during the field reviews:

- Although there is adequate pavement width on the east leg for a westbound turn-lane, no such lane exists.
- Push buttons in the southwest and southeast corners are far from the curb ramps.

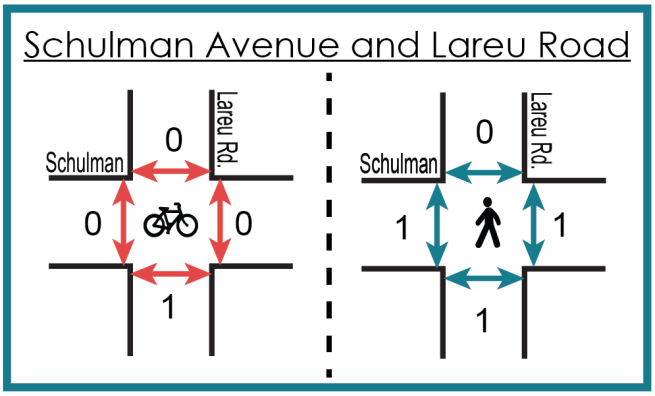


Figure 7: Schulman Avenue & Lareu Road 2024 Peak Hour Pedestrian and Bicycle Counts

Recommendations

The following improvements are recommended for the intersection.

1. Reconfigure the intersection such that there are two exclusive eastbound left-turn lanes through re-striping to convert the shared through/left-turn lane to an exclusive left-turn lane, leaving a single eastbound through lane. The existing configuration with an exclusive left-turn lane and a shared through/left-turn lane, in combination with protected/permissive left-turn signal phasing, is awkward and violates the MUTCD requirement that a separate left-turn signal face operated in protected/permissive mode shall not display a circular green indication (MUTCD Section 4F.08(02)). In conjunction with such a lane reconfiguration, the existing five-section left-turn signal heads should be replaced with flashing yellow arrow (FYA) heads. The realignment should also correct the geometric deficiency caused by the northbound deflection.
2. Add a westbound left-turn lane through re-striping of the east leg, in order to provide left-turning drivers with their own lane and protected signal phase.
3. Add one or two northbound left-lanes and an eastbound right-turn lane in order to adequately serve the traffic demand expected to be created by developments south of the intersection, both under construction and in the planning process.
4. Add a southbound right-turn lane in order to better serve the traffic demand from the north, both existing and future, as the shopping center is not yet fully developed.
5. Rebuild the traffic signal to support the additional lanes recommended above, to meet requirements related to pedestrian elements, to add FYA signal heads, and to add signal head backplates with retroreflective borders.
6. Without the additional lanes and other improvements noted above, the intersection is expected to operate poorly as the surrounding area is built out, leading to congestion that would likely result in vehicle queues spilling out of turn lanes and blocking upstream intersections, which could have significant negative impacts on safety.

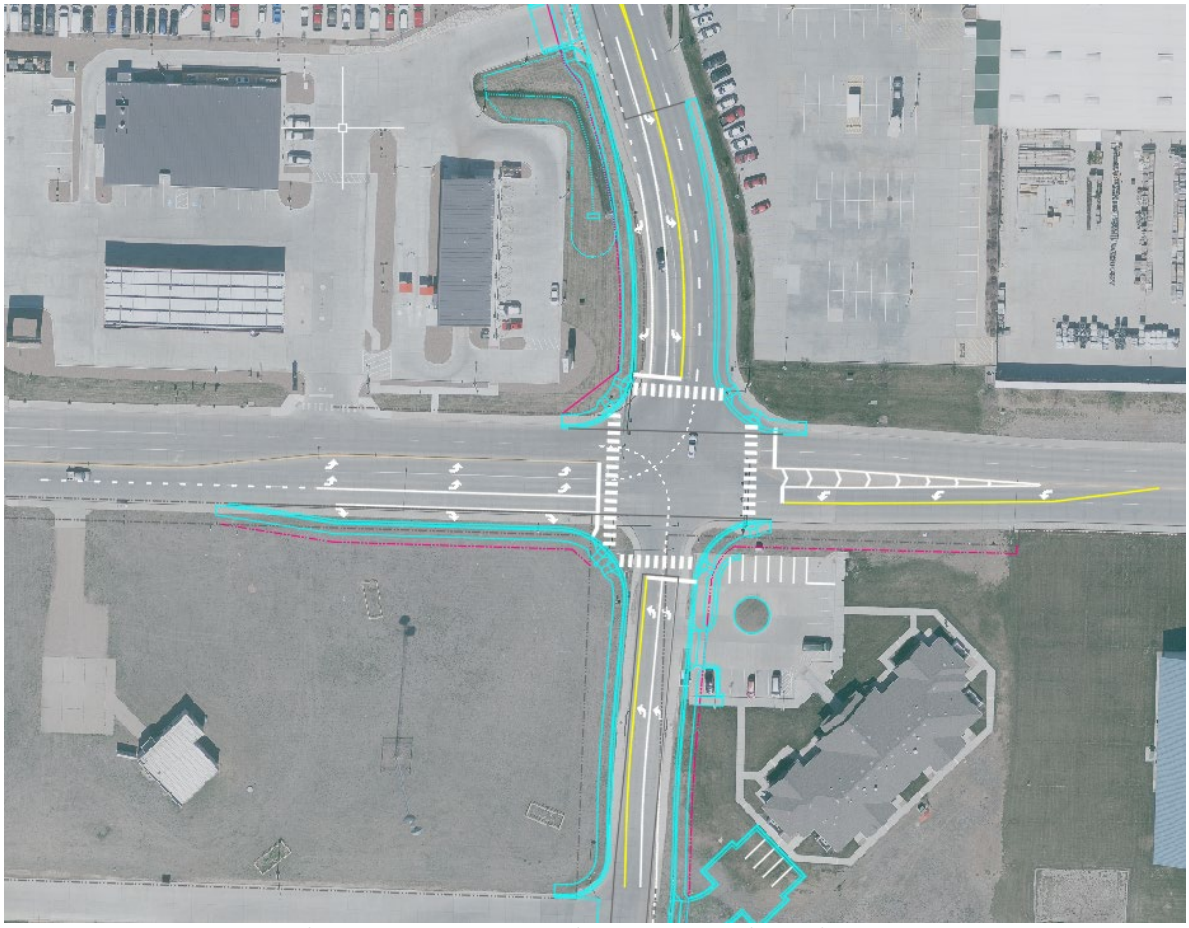


Figure 8: Conceptual Ultimate Intersection Build Out

Intersection 3: U.S. 83 & Schulman Avenue

Overview

U.S. 83 and Schulman Avenue is a signalized intersection (Figure 9). The NB/SB legs (US 83) have three-lane approaches, with exclusive left-turn, through, and right-turn lanes, and a single departure lane. The west leg has a two-lane approach, with an exclusive left-turn lane and a shared through/right-turn lane, and a single departure lane. The east leg has a three-lane approach, with an exclusive left-turn, through, and right-turn lane, and two departure lanes. There is protected-only left-turn phasing for every approach and right-turn overlap phasing on the NB/SB approaches. There is no pedestrian signal phasing at the intersection. There is a "Be Prepared To Stop" warning sign with flashing beacons on the SB approach located 850 feet north of the intersection, but no such beacon exists for the NB approach.

Figure 9: Aerial Image of U.S. 83 & Schulman Avenue Intersection

Source: Google Maps, Google. Accessed October 2024.

There are no sidewalks along the intersection, except for a section of attached sidewalk along the northern side of westbound Schulman Avenue in front of the KwikShop. There are no bike lanes on U.S. 83 or Schulman Avenue. Daily traffic at the intersection is approximately 3,800 VPD on the west leg, 7,800 VPD on the east leg, and 10,500 VPD on the north and south legs. There is significant truck traffic on U.S. 83, with approximately 25% of the NB/SB through traffic being articulated trucks and another 5% being single-unit trucks or buses.

The speed limit is 55 mph on U.S. 83 and 30 mph on Schulman Avenue.

The Kansas Department of Transportation is undergoing a project to add advanced detection and upgrade controllers to provide freight prioritization to the signal operations.

Crash Review

Table 3 summarizes the crashes that occurred at U.S. 83 and Schulman Avenue. In September 2023, there was a fatal crash at this intersection that involved a bicyclist. The crash occurred after 10 p.m. on a weeknight, after the cyclist travelled westbound through the intersection against a red light. The truck headed southbound had a green light and struck the cyclist. While this crash is not included in the data below (2018-2022), there are vulnerable road users that are crossing through the intersection.

Total Crashes: 16 (1 serious injury crash and 7 injury crashes)
Significant Crash Pattern: Rear end and Angle – Straight/following road.

Table 3: U.S. 83 & Schulman Avenue Intersection Crash Summary

U.S. 83 & Schulman Avenue Intersection	Serious Injury		Injury		PDO		Total	
	Crashes	%	Crashes	%	Crashes	%	Crashes	%
Angle – Straight/following road	0	0%	4	25%	4	25%	8	50%
Backed Into	0	0%	0	0%	1	6%	1	6%
Rear end	1	6%	2	13%	2	13%	5	32%
Sideswipe Opposite	0	0%	1	6%	0	0%	1	6%
Sideswipe Same – Changing Lanes	0	0%	0	0%	1	6%	1	6%
Grand Total	**1**	**6%**	**7**	**44%**	**8**	**50%**	**16**	**100%**

Rear End Crash Analysis: There were 5 rear end crashes (1 serious injury and 2 injury). The serious injury crash was at the southbound approach after a vehicle stopped in traffic and the following vehicle did not stop. The rear end crashes were concentrated at the southbound approach, with 4 crashes (1 serious injury and 2 injury).

Angle – Straight/following road Crash Analysis: There were 8 angle crashes where the vehicle maneuver was straight/following the road (4 injury crashes). Most of these crashes (4) occurred with the first vehicle heading south (1 injury) on U.S. 83 and the second vehicle involved heading north/south on Schulman Avenue.

Comments Provided by City Staff and Stakeholders

This intersection received the most comments at the Garden City public outreach event. Concerns raised focused primarily on truck red-light running, while congestion was also mentioned.

Observations

Overall, traffic volumes are higher in the PM peak hours than the AM peak hours. Other than the northbound and southbound through movements, the predominant traffic flow at the intersection involves vehicles turning between the east, south, and north legs (Figure 10). A bicyclist crossed along the south leg of U.S. 83, as well as a pedestrian crossing along the north leg of U.S. 83 (Figure 11). The pedestrian crossed from the northeast corner to the northwest corner at 12:54 p.m., running across US 83 while its traffic had green signal indications, passing behind a vehicle stopped in the SB left-turn lane.

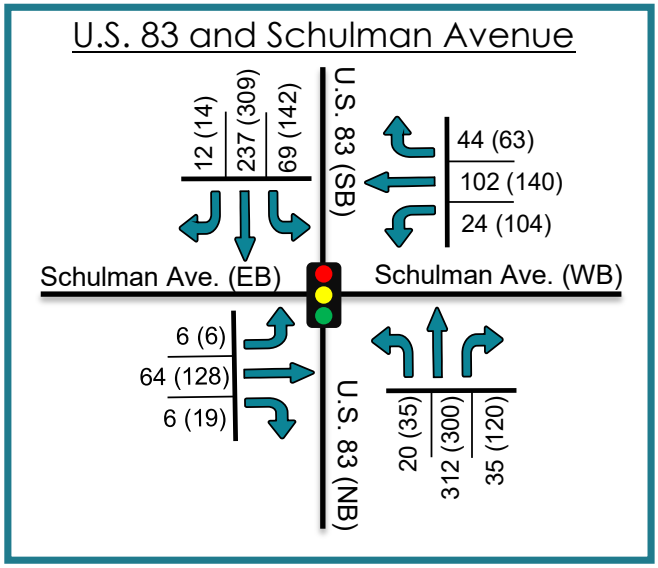


Figure 10: U.S. 83 & Schulman Avenue 2024 Peak Hour Turning Movement Counts

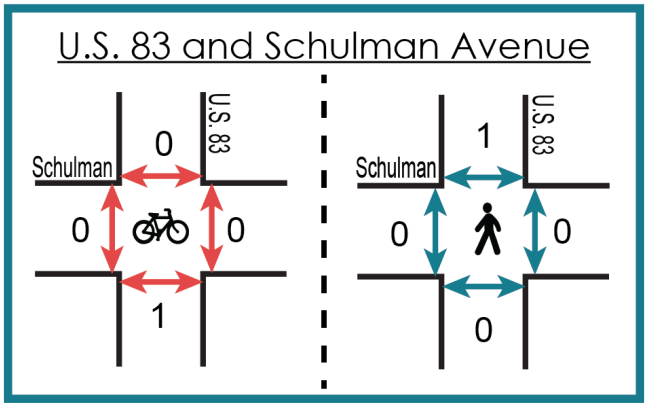


Figure 11: U.S. 83 & Schulman Avenue 2024 Peak Hour Pedestrian and Bicycle Counts

The RSA team made the following intersection observations during the field reviews:

- No pedestrian infrastructure directly along the interesection. There are sidewalks along Schulman Avenue, along the north and south of the east leg approximately 100 feet from the intersection. Along the west leg of Schulman Avenue, there are sidewalks in front of Mision Cristiana Elim, apprioxmiately 500 feet from the intersection. The west leg also allows for a connection to the Talley Trail, bringing in many pedestrians and cyclists. Several major businesses such as Mendards, Parrot Cove, and the Schulman Crossing Shopping Center have been identified by the community as important locations to be able to walk to for the surrounding residential areas.
- The left-turn movements on every approach have protected-only signal phasing, but the left-turn signal heads have circular red signal indications, which is a violation of MUTCD requirements. Per MUTCD Section 4F.06(02A), if a separate left-turn signal face is provided for a protected only mode left turn, it shall be capable of displaying a left-turn red arrow.
- Northbound queuing observed to extend nearly to Spruce Street.

Recommendations

The following improvements are recommended for the intersection.

1. Review the traffic signal change and clearance intervals. A preliminary review conducted for this study suggests that additional yellow time may be warranted for the NB/SB left-turn movements. Additionally, it is recommended that consistent

calculation and application of the yellow change/red clearance intervals, based on industry guidance, be made at this intersection and at the U.S. 83/Spruce Street intersection to satisfy driver expectancy on the corridor.

2. Update the left-turn signal heads to include red arrows, in order to meet MUTCD requirements.
3. Install a Signal Ahead (W3-3) warning sign on the SB approach, upstream of the Be Prepared To Stop (W3-4) warning sign, as required by MUTCD Section 2C.35(09).
4. Install a When Flashing (W16-13P) plaque under the existing W3-4 sign on the SB approach, as recommended by MUTCD Section 2C.35(10).
5. Install a W3-3 sign and a W3-4/W16-13P sign with flashing beacons on the NB approach, given the high speed limit, heavy truck volume, and public complaints of red light running.
6. Add retroreflective yellow borders to the signal head backplates for improved visibility.
7. Consider adding supplemental pole-mounted left-turn signal heads for every approach to provide added visibility for approaching traffic that is traveling behind large vehicles, as recommended by MUTCD Section 4D.05(07.E).
8. Upgrade signal equipment to include advanced detection with red light extend / smart detection to extend red light time when trucks run red lights.
9. Increased red-light enforcement.
10. Consider adding pedestrian infrastructure. Although only one pedestrian was counted on the day of the data collection, there are land uses on both sides of U.S. 83 that have the potential to generate pedestrian demand across the intersection.
11. Advance the planned U.S. 50/400 bypass to reduce the volume of trucks and through-traffic on the corridor.

Intersection 4: U.S. 83 & Spruce Street

Overview

U.S. 83 and Spruce Street is a signalized intersection (Figure 12). Every approach has two lanes, with an exclusive left-turn lane and a shared through/right-turn lane, and a single departure lane. Right-turns must be made from the shared through lane in all directions. There is protected/permissive left-turn phasing for the northbound and southbound approaches and no left-turn phasing for the eastbound and westbound approaches. There is currently no pedestrian signal phasing at the intersection. There is a "Be Prepared To Stop" warning sign with flashing beacons on the NB approach located 620 feet south of the intersection, but no such beacon exists for the SB approach.

Figure 12: Aerial Image of U.S. 83 & Spruce Street Intersection

Source: Google Maps, Google. Accessed October 2024.

There are no sidewalks or bike lanes on U.S. 83 and Spruce Street, though a trail extension project is expected to add an at-grade crossing on the north leg of the intersection in 2025. Daily traffic at the intersection is approximately 6,800 VPD on the west leg, 5,400 VPD on the east leg, and 11,100 VPD on the north and south legs. There is significant truck traffic on US 83, with approximately 25% of the NB/SB through traffic being articulated trucks and another 5% being single-unit trucks or buses.

The speed limit is 55 mph on U.S. 83 and 30 mph on Spruce Street.

The Kansas Department of Transportation is undergoing a project to add advanced detection and upgrade controllers to provide freight prioritization to the signal operations.

Crash Review

Table 4 summarizes the crashes that occurred at U.S. 83 and Spruce Street.

Total Crashes: 17 (2 serious injury crashes and 1 injury crash)
Significant Crash Pattern: Rear end, Angle – Straight/following road, Single Car Crash – Straight/following road, and Bicycle.

Table 4: U.S. 83 & Spruce Street Intersection Crash Summary

U.S. 83 & Spruce Street Intersection	Serious Injury		Injury		PDO		Total	
	Crashes	%	Crashes	%	Crashes	%	Crashes	%
Angle – Left Turn	0	0%	0	0%	2	12%	2	12%

Angle – Stopped in Traffic	0	0%	0	0%	1	6%	1	6%
Angle – Straight/following road	1	6%	1	6%	2	12%	4	23%
Rear end	0	0%	0	0%	8	47%	8	47%
Single Car Crash – Straight/following road	1	6%	0	0%	0	0%	1	6%
Bicycle	0	0%	1	6%	0	0%	1	6%
Grand Total	**2**	**12%**	**2**	**12%**	**13**	**76%**	**17**	**100%**

Rear End Crash Analysis: There were 8 rear end crashes. Most of the rear end crashes occurred in the westbound approach (24%) and the northbound approach (18%). 75% of the rear end crashes occurred with the vehicles heading straight/following the road.

Angle – Straight/following road Crash Analysis: There were 4 angle crashes where the vehicle maneuver was straight/following the road (1 serious injury crash and 1 injury crash). The serious injury crash occurred when the first vehicle was eastbound on Spruce Street and was struck by the second vehicle that was headed southbound on U.S. 83. The injury crash occurred when the first vehicle was headed eastbound on Spruce Street and was struck by a 40' truck and trailer headed northbound on U.S. 83.

Single Car Crash – Straight/following road Crash Analysis: There was 1 car crash where the vehicle maneuver was straight/following the road (1 serious injury). The vehicle was on the south leg of U.S. 83, when a motorcyclist hit a pothole and lost control. This crash was alcohol related.

Bicycle Crash Analysis: There was 1 bicycle crash resulted in injury. The crash occurred at dusk with the streetlights on, the roadway was wet. The bicyclist was not following the traffic signals and was struck in the intersection headed eastbound through the intersection.

Comments Provided by City Staff and Stakeholders

This intersection was mentioned alongside Schulman to the north as a primary concern by the public at the public engagement event. Like Schulman, concerns primarily focused on red-light running by trucks, as well as general congestion. Commenter also raised the need for pedestrian facilities at the intersection due to nearby schools, parks, and college.

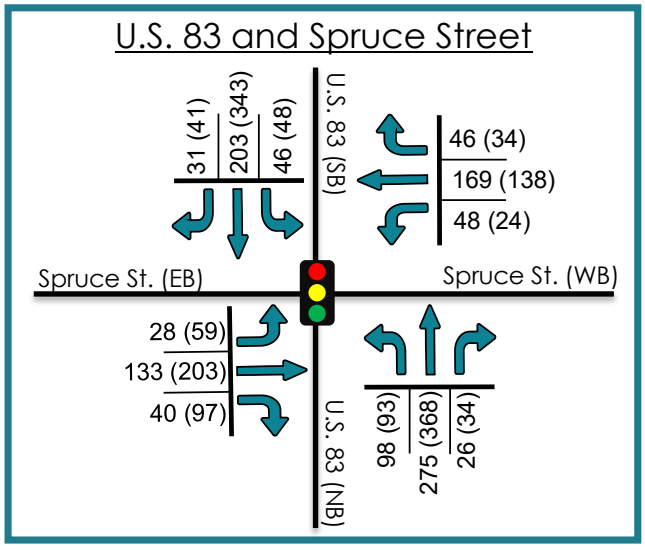


Figure 13: U.S. 83 & Spruce Street 2024 Peak Hour Turning Movement Counts

Observations

Overall, traffic volumes are about equal between the AM and PM peak hours. Other than all through movements, the predominant traffic flow at the intersection involves vehicles turning between the south and west legs (Figure 13). There were two bicyclists that crossed along the north and south legs of the intersection, however due to the lack of pedestrian infrastructure, there were no pedestrians recorded at the intersection (Figure 14). Although no pedestrians were recorded at the intersection during this time frame, pedestrians do cross at the intersection and must weigh the risks.

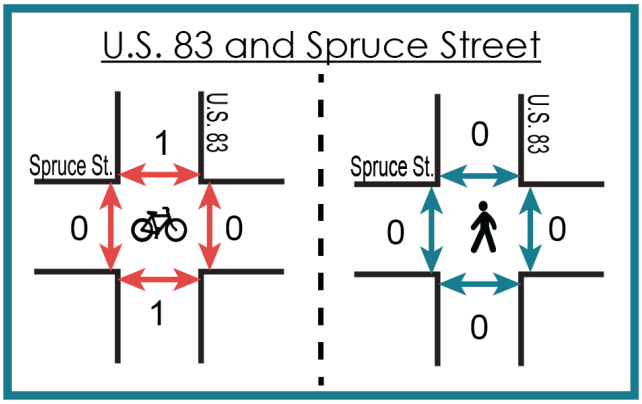


Figure 14: U.S. 83 & Spruce Street 2024 Peak Hour Pedestrian and Bicycle Counts

The RSA team made the following intersection observations during the field reviews:

- No pedestrian infrastructure directly within the intersection. Attached sidewalks start along Spruce Street approximately 500 feet to the west and approximately 225 feet to the east. The neighborhoods adjacent to the intersection also have sidewalks. An elementary school and the school district's sport fields are just off Spruce Street, which could cause an increase in pedestrian traffic. The Talley Trail also ends northwest of the intersection, which brings many pedestrians and cyclists to the area.
- Auxiliary lanes are shorter than the standard length.
- Southbound queuing observed near the Schulman intersection.

Recommendations

The following improvements are recommended for the intersection.

1. Lengthen auxiliary lanes to standard length with additional northbound/southbound dedicated right turn lanes.
2. Review the traffic signal change and clearance intervals. A preliminary review conducted for this study suggests that additional yellow time may be warranted for the NB/SB left-turn movements. Additionally, it is recommended that consistent calculation and application of the yellow change/red clearance intervals, based on industry guidance, be made at this intersection and at the U.S. 83/Schulman Avenue intersection to satisfy driver expectancy on the corridor.
3. Verify the appropriate timing for the advance warning beacon. A preliminary review conducted for this study suggests that the advance warning time should be reduced from 8 seconds to 6 seconds if calculated based on industry guidance and to be consistent with the warning time calculation for the beacon located on the SB approach to the Schulman Avenue intersection.
4. The only overhead signal heads for the NB/SB approaches are single shared heads for

each direction, located between the through and left-turn lanes. These heads should be removed and replaced with the following:
    a. Install a FYA signal head over the center of each left-turn lane.
    b. Install at least one, signal head centered over each through lane, as recommended by MUTCD Section 4D.05(07.B) and MUTCD Table 4D-1.
5. Consider adding supplemental pole-mounted left-turn signal heads for the NB/SB approaches to provide added visibility for approaching traffic that is traveling behind large vehicles, as recommended by MUTCD Section 4D.05(07.E).
6. Consider operating the NB/SB left-turn movements with protected-only phasing, at least during certain times of day.
7. Install a When Flashing (W16-13P) plaque under the existing W3-4 sign on the NB approach, as recommended by MUTCD Section 2C.35(10).
8. Install a W3-3 sign and a W3-4/W16-13P sign with flashing beacons on the SB approach, given the high speed limit, heavy truck volume, and public complaints of red light running.
9. Add retroreflective yellow borders to the signal head backplates for improved visibility.
10. Upgrade signal equipment to include advanced detection with red light extend / smart detection to extend red light time when trucks run red lights.
11. Increased red-light enforcement.
12. Implement Eastside Pedestrian Improvement Project. Although no pedestrians were counted on the day of the data collection, Strava data shows crossing at this location, which will undoubtedly increase greatly with the construction of the crossing as there are land uses on both sides of U.S. 83 that have the potential to generate pedestrian demand across the intersection.
    a. While the new crossing will be vital for community connectivity, the extended crossing time required for non-motorized traffic traveling across U.S. 83 will exacerbate vehicle delays on the NB/SB approaches at this intersection, which already experiences queues up to half a mile long. Because of this, and with the public's general uneasiness regarding high-speed trucks at the intersection, it is recommended to also evaluate the potential to construct a grade-separated multi-modal crossing of U.S. 83.
13. Study feasibility of grade separation of intersection as originally set forth in the Phase I U.S. 83 Master Plan.
14. Advance the planned U.S. 50/400 bypass to reduce the volume of trucks and through-traffic on the corridor.

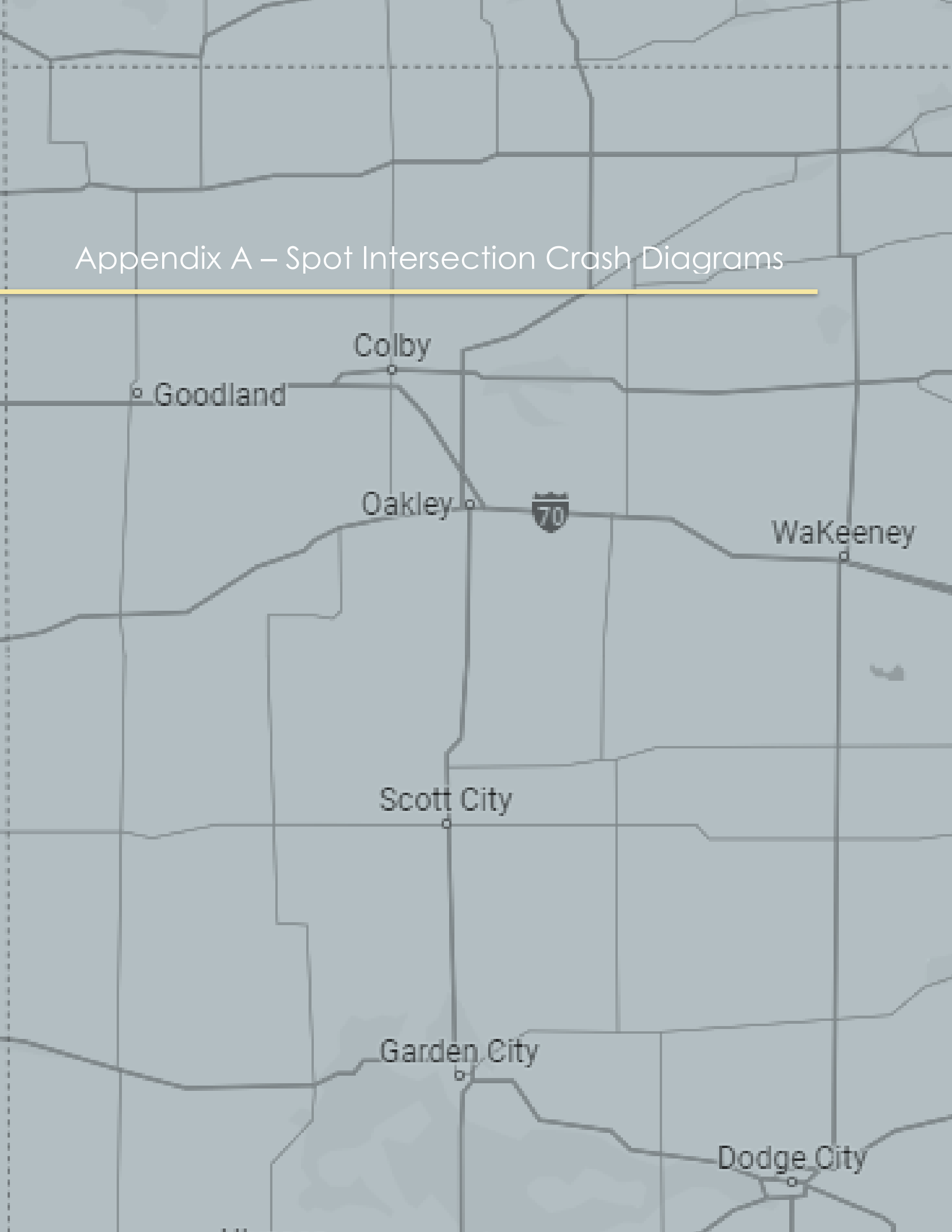
Additional U.S. 83 Recommendations:

Install advanced warning beacons along U.S. 83 in Garden City approaching the traffic signals, as shown in Figure 15, and ensure the following:

- **Sync with Signal Phasing:** Connect beacons to traffic signals to alert drivers of impending change to a red indication
- **Strategic Placement:** Position beacons to allow safe deceleration
- **High Visibility:** Use LED beacons for better visibility in all conditions

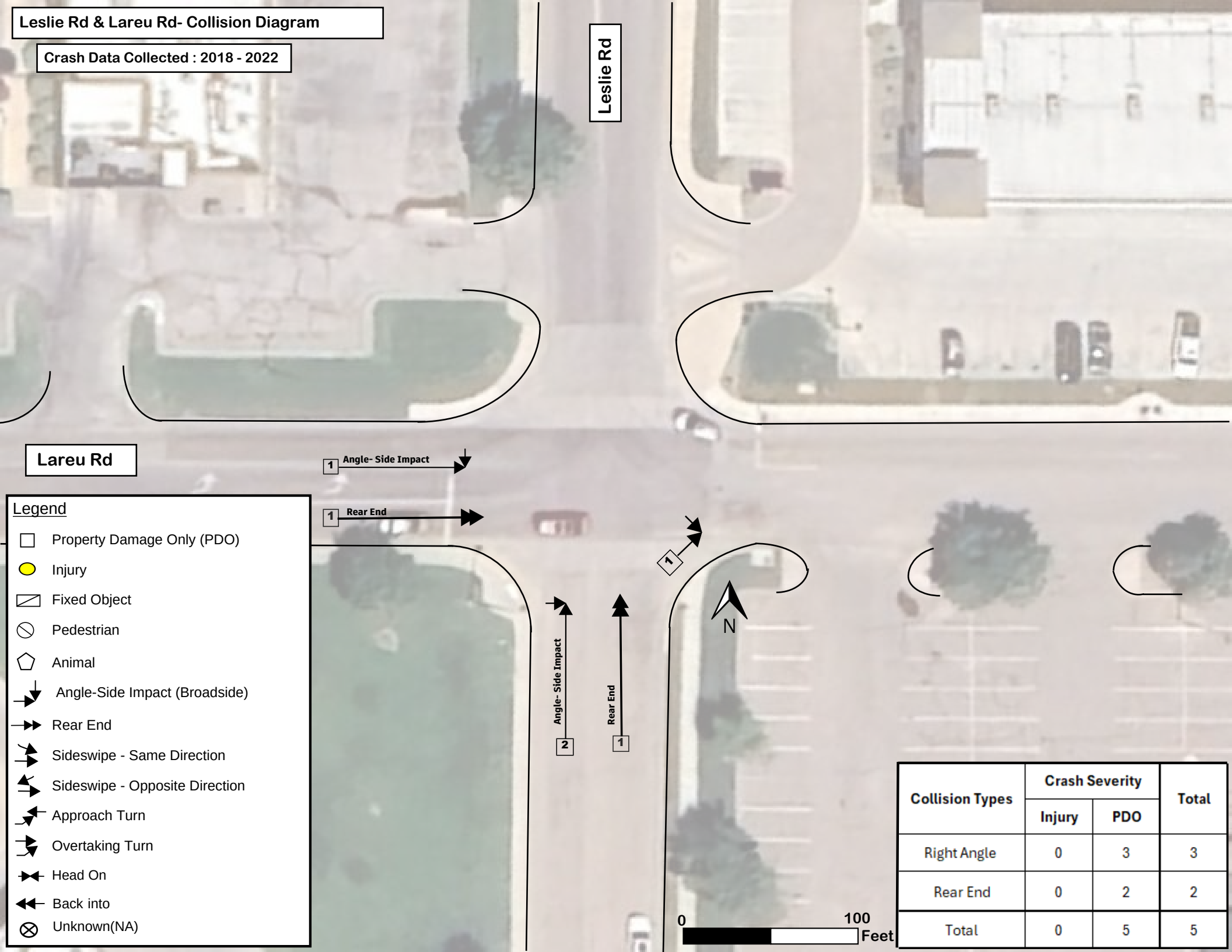
Figure 15 - U.S. 83 Systemic Short-term Recommendations

Appendix A – Spot Intersection Crash Diagrams



Leslie Rd & Lareu Rd- Collision Diagram

Crash Data Collected : 2018 - 2022



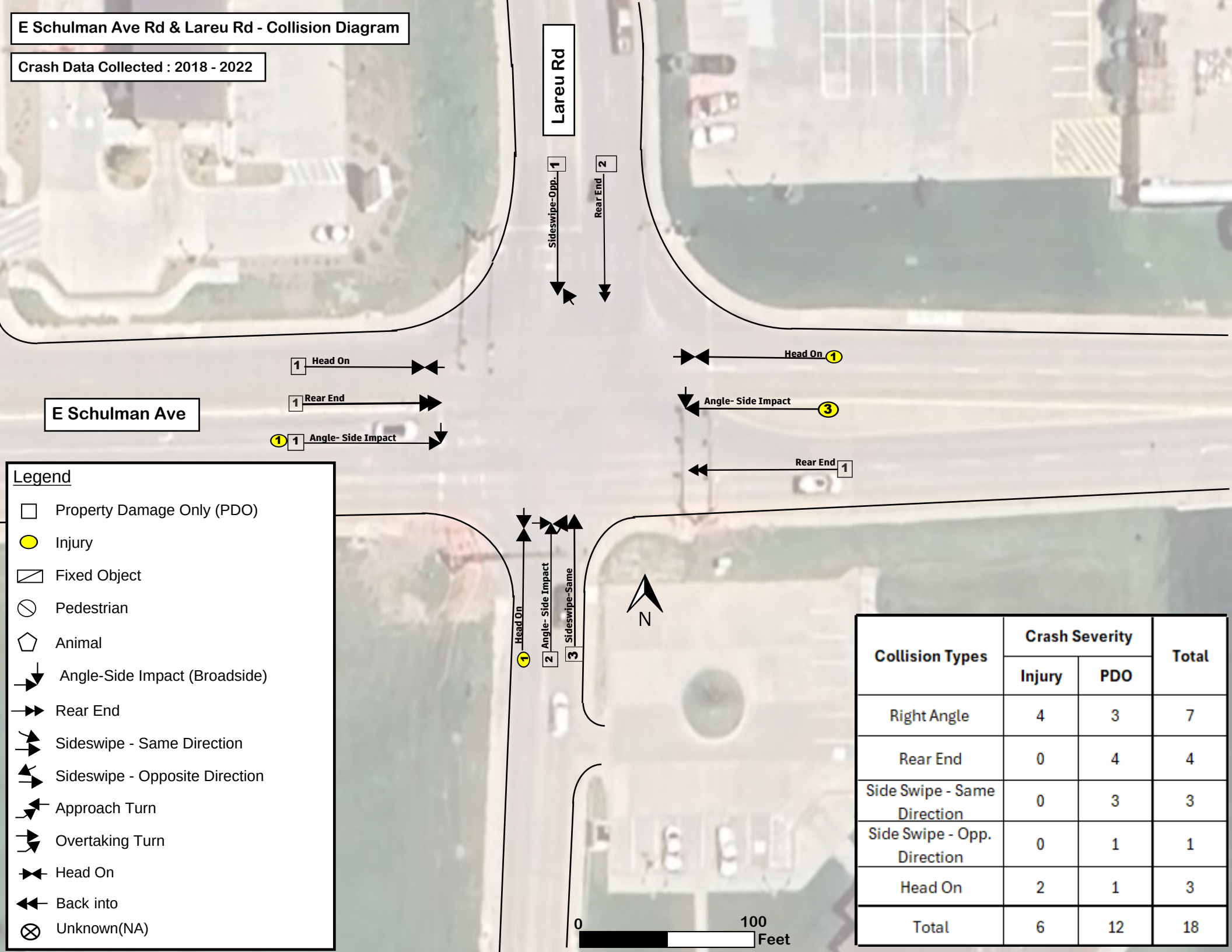
Legend

- Property Damage Only (PDO)
- Injury
- Fixed Object
- Pedestrian
- Animal
- Angle-Side Impact (Broadside)
- Rear End
- Sideswipe - Same Direction
- Sideswipe - Opposite Direction
- Approach Turn
- Overtaking Turn
- Head On
- Back into
- Unknown(NA)

Collision Types	Crash Severity		Total
	Injury	PDO	
Right Angle	0	3	3
Rear End	0	2	2
Total	0	5	5

E Schulman Ave Rd & Lareu Rd - Collision Diagram

Crash Data Collected : 2018 - 2022



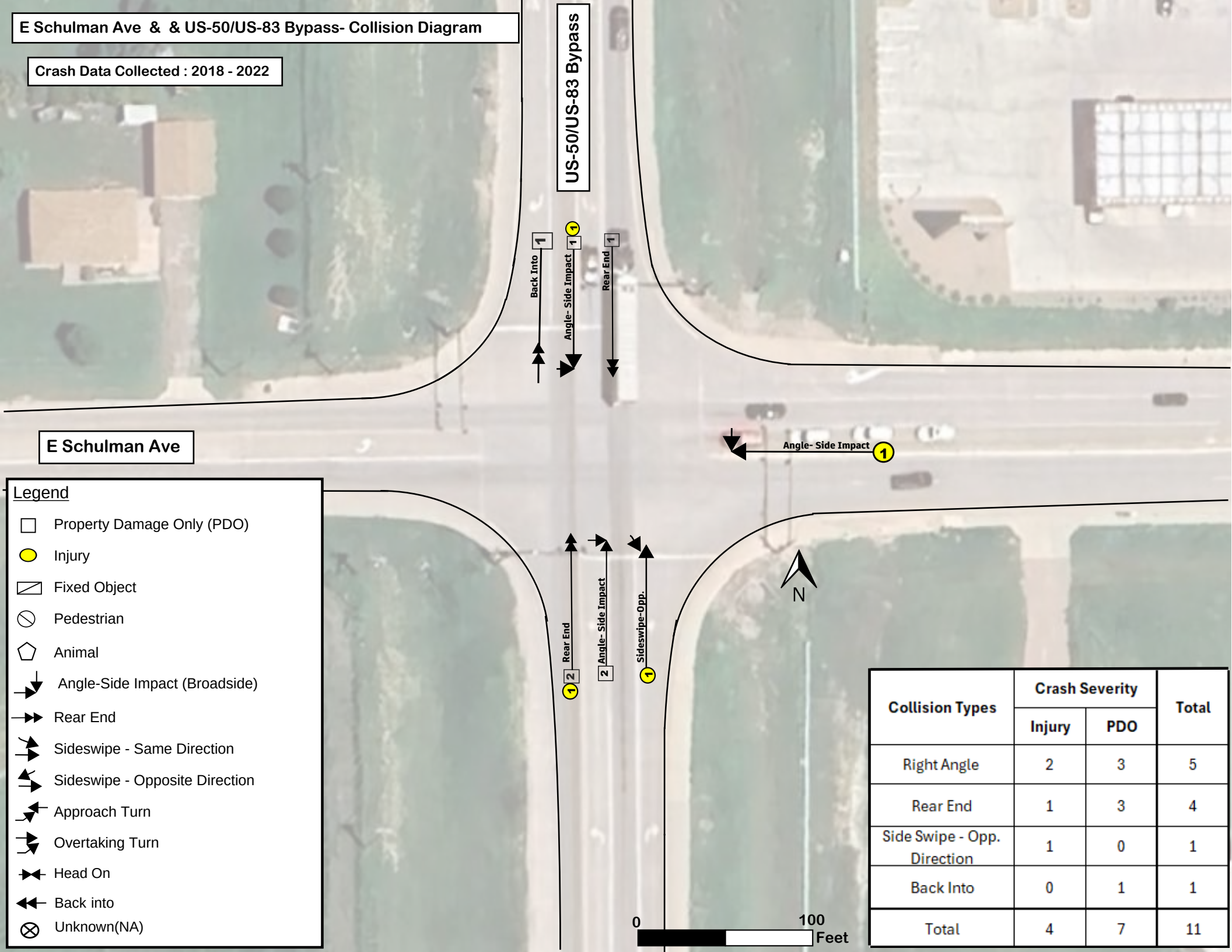
Legend

- Property Damage Only (PDO)
- Injury
- Fixed Object
- Pedestrian
- Animal
- Angle-Side Impact (Broadside)
- Rear End
- Sideswipe - Same Direction
- Sideswipe - Opposite Direction
- Approach Turn
- Overtaking Turn
- Head On
- Back into
- Unknown(NA)

Collision Types	Crash Severity		Total
	Injury	PDO	
Right Angle	4	3	7
Rear End	0	4	4
Side Swipe - Same Direction	0	3	3
Side Swipe - Opp. Direction	0	1	1
Head On	2	1	3
Total	6	12	18

E Schulman Ave & & US-50/US-83 Bypass- Collision Diagram

Crash Data Collected : 2018 - 2022



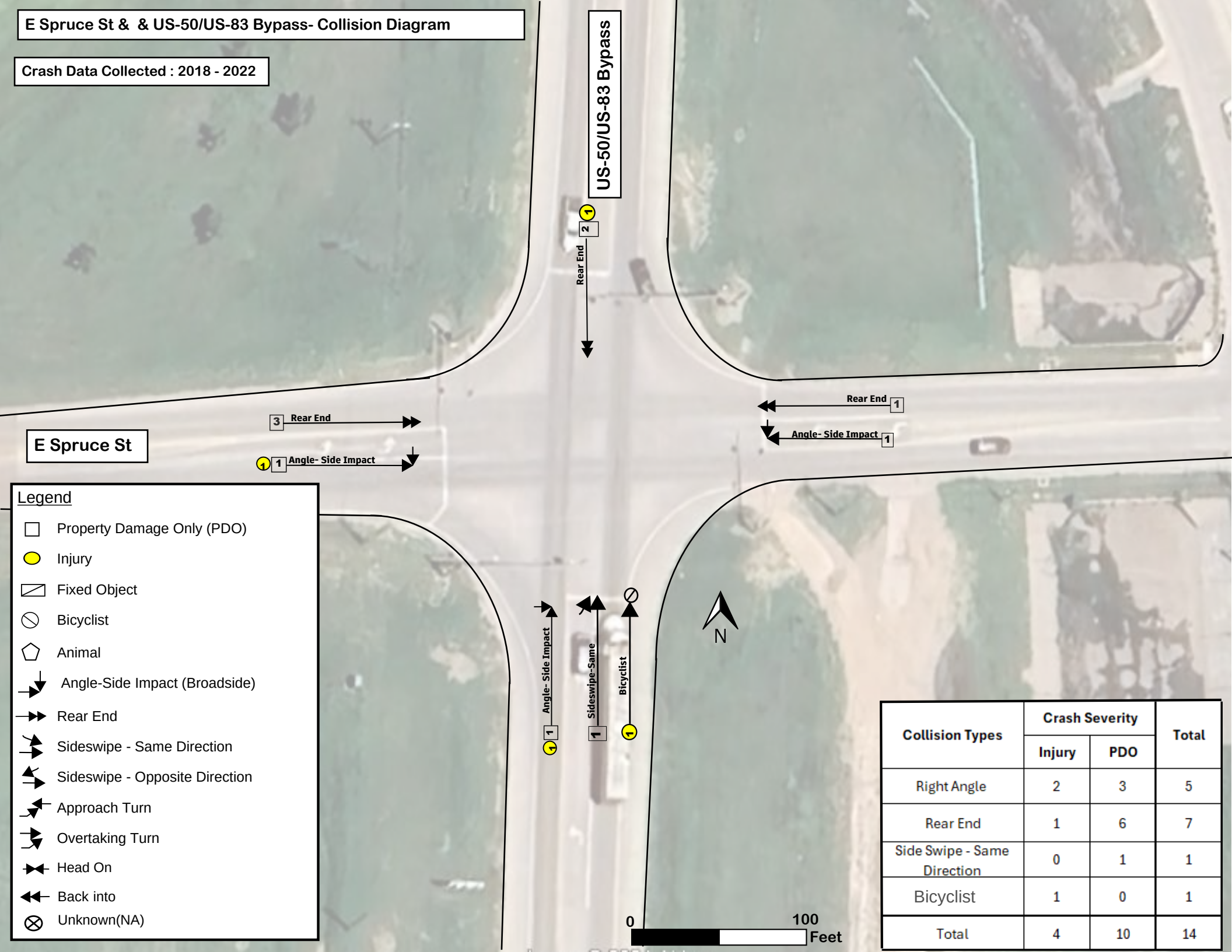
Legend

- Property Damage Only (PDO)
- Injury
- Fixed Object
- Pedestrian
- Animal
- Angle-Side Impact (Broadside)
- Rear End
- Sideswipe - Same Direction
- Sideswipe - Opposite Direction
- Approach Turn
- Overtaking Turn
- Head On
- Back into
- Unknown(NA)

Collision Types	Crash Severity		Total
	Injury	PDO	
Right Angle	2	3	5
Rear End	1	3	4
Side Swipe - Opp. Direction	1	0	1
Back Into	0	1	1
Total	4	7	11

E Spruce St & & US-50/US-83 Bypass- Collision Diagram

Crash Data Collected : 2018 - 2022



Legend

- Property Damage Only (PDO)
- Injury
- Fixed Object
- Bicyclist
- Animal
- Angle-Side Impact (Broadside)
- Rear End
- Sideswipe - Same Direction
- Sideswipe - Opposite Direction
- Approach Turn
- Overtaking Turn
- Head On
- Back into
- Unknown(NA)

Collision Types	Crash Severity		Total
	Injury	PDO	
Right Angle	2	3	5
Rear End	1	6	7
Side Swipe - Same Direction	0	1	1
Bicyclist	1	0	1
Total	4	10	14