HIGHWAY OR 99W SOUTH CORVALLIS ROAD SAFETY AUDIT

Corvallis, Oregon

February 2021

Road Safety Audit

Highway OR 99W South Corvallis Road Safety Audit

Corvallis, Oregon

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INTRODUCTION

PURPOSE

A road safety audit (RSA) is a formal safety performance examination of an existing road or intersection by an independent audit team. It considers the safety of all road users, reviews the interaction of the project elements, examines interactions at the limit of the project and proactively proposes mitigation measures to address safety issues. An RSA is not a "standards" check for adherence to design guidelines. It seeks to identify opportunities to improve safety. This RSA summarizes key safety related issues, and the independent RSA team developed a series of suggestions to address these safety issues. The suggestions may not be within ODOT's (Oregon Department of Transportation) current design guidelines and criteria, but the RSA team wanted to highlight various options. ODOT will consider the RSA suggestions in their formal response to the RSA report.

This particular RSA report is prepared as a part of a larger project, the Highway OR 99W South Corvallis Facility Plan. The Facility Plan will consider the results of this RSA, multi-modal analyses, and input from the public in determining the needs and solutions for the corridor.

RSA TEAM SUMMARY

Project title: OR 99W: SW C Avenue – SW Richland Avenue

Date: December 17th – 18th, 2020

RSA Team:

- James Feldmann, ODOT Planning
- Amanda Sayler, ODOT Traffic
- Jenna Berman, ODOT Active Transportation
- Katie Brown, ODOT Policy Data & Analysis Division (PDAD)
- Eliseo Lemus, ODOT Roadway
- Guy Mamac, ODOT Maintenance
- Aaron Manley, Corvallis Public Works
- Josh Capps, Corvallis Active Transportation
- Lisa Scherf, Corvallis Transit
- Steve Dobrinich, Corvallis Area Metropolitan Planning Organization (MPO)
- Camilla Dartnell, Kittelson & Associates
- Hermanus Steyn, Kittelson & Associates

RSA Stakeholders

- Brian Morey, ODOT Maintenance
- Greg Gescher, Corvallis Public Works
- Kristie Gladhill, ODOT Policy Data & Analysis Division (PDAD)
- Joel Goodwin. Corvallis Police Department
- Kevin Fulsher, Corvallis Fire Department
- Ben Janes, Corvallis Fire Department
- Chad Gordon, Corvallis Public Works Maintenance
- Nick Meltzer, Corvallis Area MPO
- Hyatt Lytle, Corvallis City Council
- Penny York, Corvallis Planning Commission
- Sarah Bronstein, Oregon State University
- Kim Patton, Corvallis School District
- Rebecka Weinsteinger, DevNW
- Simon Date, Corvallis Chamber of Commerce
- Cindee Lolik, Corvallis Business Representative
- Bret Davis, Corvallis Business Representative
- Bruce Austin, South Corvallis Resident
- Rian Amiton, South Corvallis Resident
- Patrick Chappell, Avery-Helm Neighborhood

RSA PROCESS

The purpose of the RSA is to independently examine the study corridor's safety performance. The RSA helps identify potential issues contributing to crashes and to suggest treatments for addressing those issues.

The Kittelson and Associates consultant firm began the RSA process by reviewing crash data and completing a preliminary site visit. The entire team initiated the RSA on Thursday, December 17, 2020 with a virtual kickoff meeting. The presentation from the pre-audit/kickoff meeting is attached as Appendix 1. The meeting was attended by the RSA team and RSA stakeholders from ODOT, the city of Corvallis, and other interested stakeholders.

The team discussed the following main topics at the kickoff meeting:

- The RSA team was challenged to objectively observe the study corridor and to consider a range of potential solutions in concert with reported crash data
- The RSA team provided information about the study corridor and the adjacent land uses

The RSA team completed three site visits on the same day and one more the following day. In addition, the RSA team held two virtual work sessions. A close-out meeting was held on Friday, December 18th 2020 for both the RSA team and RSA stakeholders. The presentation from the close-out meeting is provided in Appendix 2. The complete RSA two-day event schedule is summarized in Table 1:

Table 1: RSA Team Schedule

Timeframe		Thursday, December 17	Friday, December 18
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		Morning Peak Period Site Visit
8:00 AM	9:00 AM		
9:00 AM	10:00 AM	Kick-Off Meeting	Work Session
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	
1:00 PM	2:00 PM	Worksession: 1:30-3:30	Close-Out Meeting
2:00 PM	3:00 PM		
3:00 PM	4:00 PM		
4:00 PM	5:00 PM	Evening Peak Period Site Visit (4:30-5:45)	
5:00 PM	6:00 PM		
6:00 PM	7:00 PM		
7:00 PM	8:00 PM	Nighttime Site Visit	
8:00 PM	9:00 PM		
9:00 PM	10:00 PM		

RSA Team and Stakeholders	RSA Team - Work Session	RSA Team - Field Visit

PROJECT CHARACTERISTICS

The Road Safety Audit (RSA) team studied a segment of OR 99W from SW C Avenue (milepost 84.1) to SW Richland Avenue (milepost 85.2) in Corvallis, Oregon. Figure 1 illustrates the extent of the RSA corridor.

Figure 1: RSA Corridor Extents
Source: Base Image from Google Earth

OR 99W starts in Junction City in Southern Oregon and extends north to Southwest Portland. As shown in Figure 1, the approximately 1-mile-long RSA corridor connects the downtown of Corvallis to the southern portion of the city.

EXISTING ROADWAY AND LAND USE CHARACTERISTICS

This section highlights the roadway and traffic characteristics of the study corridor based on the data that was either provided by ODOT and stakeholders, or was easily accessible through online databases. All references to OR 99W focus on the study corridor defined above unless otherwise noted.

Table 2: Project Characteristics

Description	Project Characteristics
Audit Type	Planning Stage
Land Use Development Proposal	No
Unit of Measure	US
Adjacent Land Use	Residential, mixed use, commercial & office, agriculture – open space
Posted Speed – US in miles per hour (mph)	25-35 mph, with a school zone speed reduction from 35 mph to 20 mph
Median Type	Two-way left-turn (TWLT) lane striping south of the interchange and raised medians at rectangular rapid-flashing beacon (RRFB) pedestrian crossing locations

Roadway Facilities

South of the interchange, OR 99W generally has four 12-ft travel lanes, 14-ft two-way left turn lane, and 6-ft bicycle lanes in both directions, but the width of the roadway and lanes varies at a few locations. Sidewalks and curbs extend for the entire length of the corridor south of the interchange. North of the interchange, sidewalk is provided on the west side of NW 4th Street from SW C Avenue along the southbound portion of the couplet through the interchange. Sidewalks are provided on both sides of the road from SW C Avenue through the northbound interchange couplet (SW 3rd Avenue), but the west sidewalk ends south of the bridge across the Marys River. On-street parking is prohibited on OR 99W through and south of the interchange. Figure 2 presents a typical cross-section of OR 99W south of the interchange.

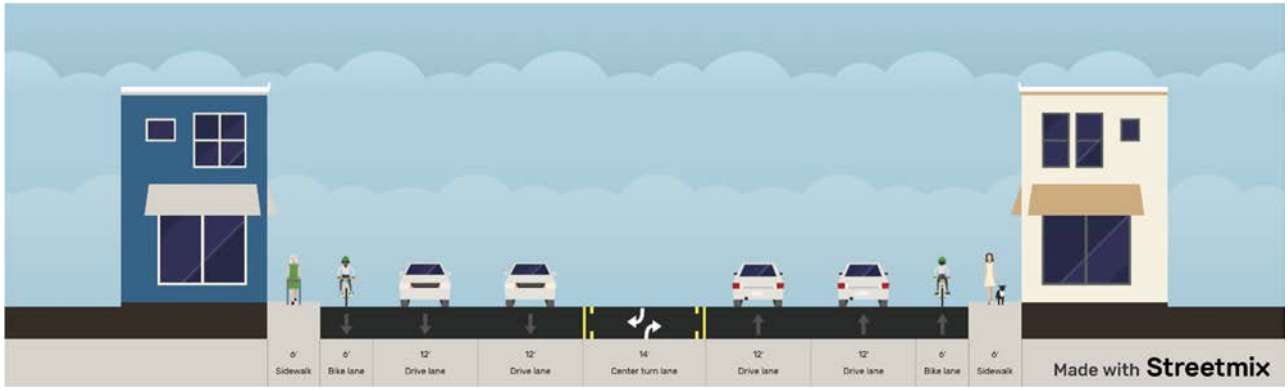


Figure 2: Typical Roadway Cross-Section
Source: Made with Streetmix

The corridor contains 12 City street stop-controlled intersections (including the outer limits of SW C Avenue and SW Richland Avenue), two signalized intersections (Crystal Lake Drive and Alexander Avenue), and approximately 38 driveways (24 on west side and 14 on east side). Additionally, four pedestrian crossings are equipped with rectangular rapid-flashing beacons (RRFB) (south of SE Chapman Place, north of SE Lily Avenue, south of SE Mayberry Avenue, north of SE Richland Avenue). Designated left-turn lanes are provided at signalized intersections.

Land Use

The land use context along OR 99W is a diverse mix of zoning. Zoning immediately adjacent to the study corridor includes residential (RS-3.5, RS-5, RS-6, RS-9, RS-12, RS-20), office & commercial (P-AO, NC-Major, NC-Minor, MUCS, CB), industrial (MUE), and other zones (AG-OS). Additional regulatory considerations include Natural Resources and Natural Hazards zones. Figure 3 illustrates land use zoning of South Corvallis.

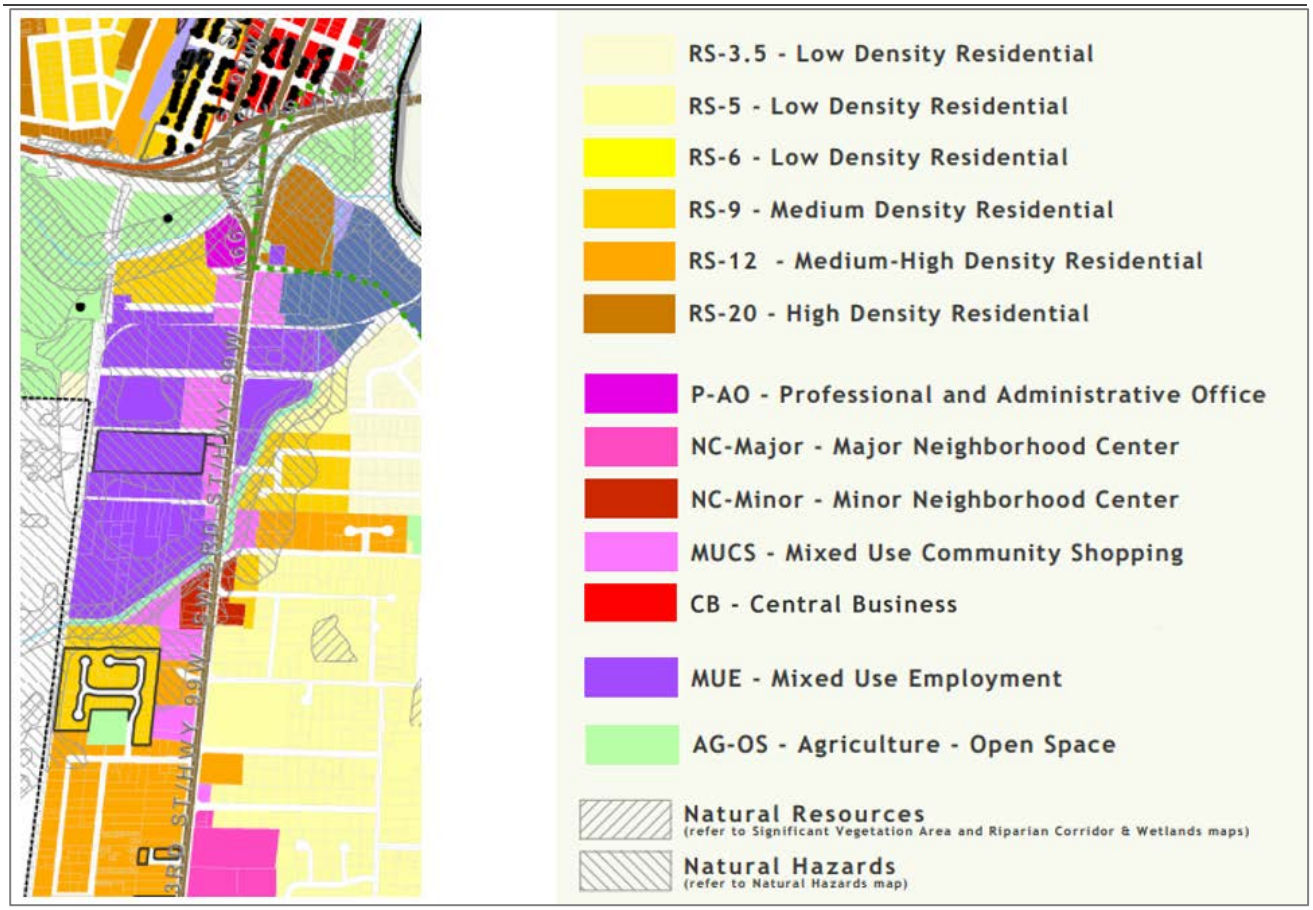


Figure 3: Zoning Map of South Corvallis
Source: City of Corvallis

Public Transit

Corvallis Transit System (CTS) Route 6 runs on and adjacent to OR 99W. The majority of the bus stops are delineated by a pole and signage. Four bus stops also provide a shelter. All bus stops along OR 99W require the transit vehicle to stop in-lane to pick up and drop off passengers. This requires a bus to completely block the bicycle lanes. Figure 4 presents the map of Route 6 service. The figure also includes the boarding and alighting data from January 1st 2019 to December 31st 2020 at the top five busiest bus stops. Notably, 2020 data was collected during the COVID-19 pandemic and reflects the transit ridership decline experienced nationwide[1].

[1] https://usafacts.org/articles/covid-public-transit-decline/

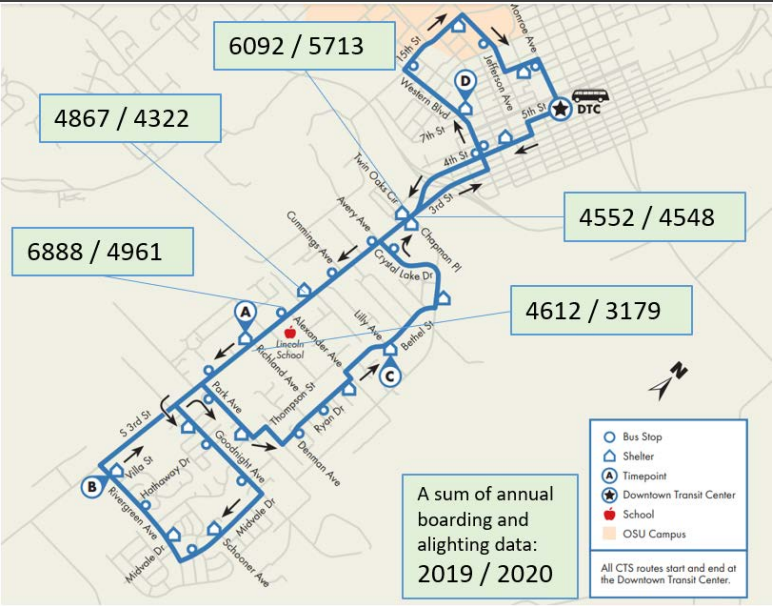


Figure 4: Public Transit Routes and 2019 & 2020 Boarding and Alighting Data
Source: Provided by ODOT

EXISTING TRAFFIC CHARACTERISTICS

Vehicular Volumes

ODOT provided historic weekday AM and PM peak traffic turning movement counts at OR 99W & Crystal Lake Drive (May 31st, 2017) and OR 99W & SE Alexander Avenue (June 1st, 2017). Figure 5, Figure 6, Figure 7, and Figure 8 below present a summary of weekday peak-hour multi-modal traffic volumes. Appendix 3 presents the complete traffic counts.

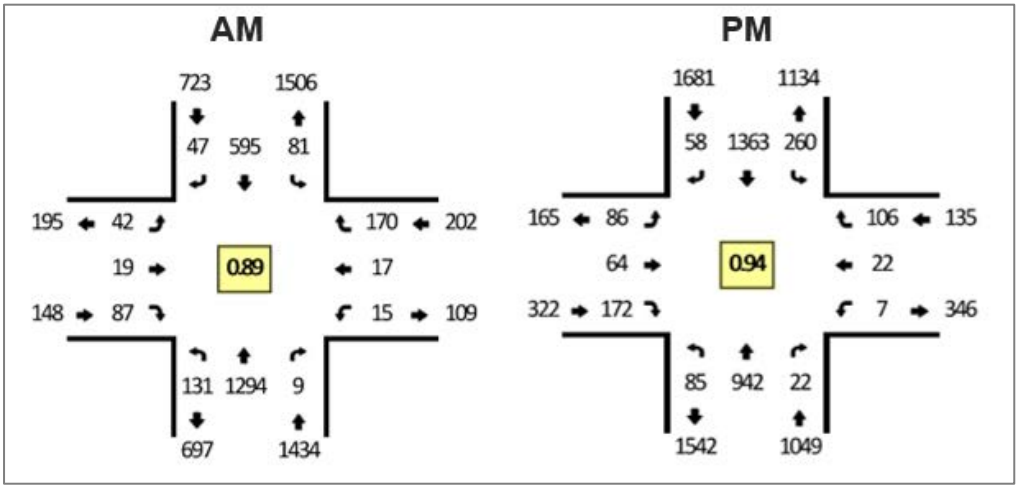


Figure 5: Peak-Hour Vehicular Traffic Counts at OR 99W & Crystal Lake Drive (May 31st, 2017)
Source: Provided by ODOT

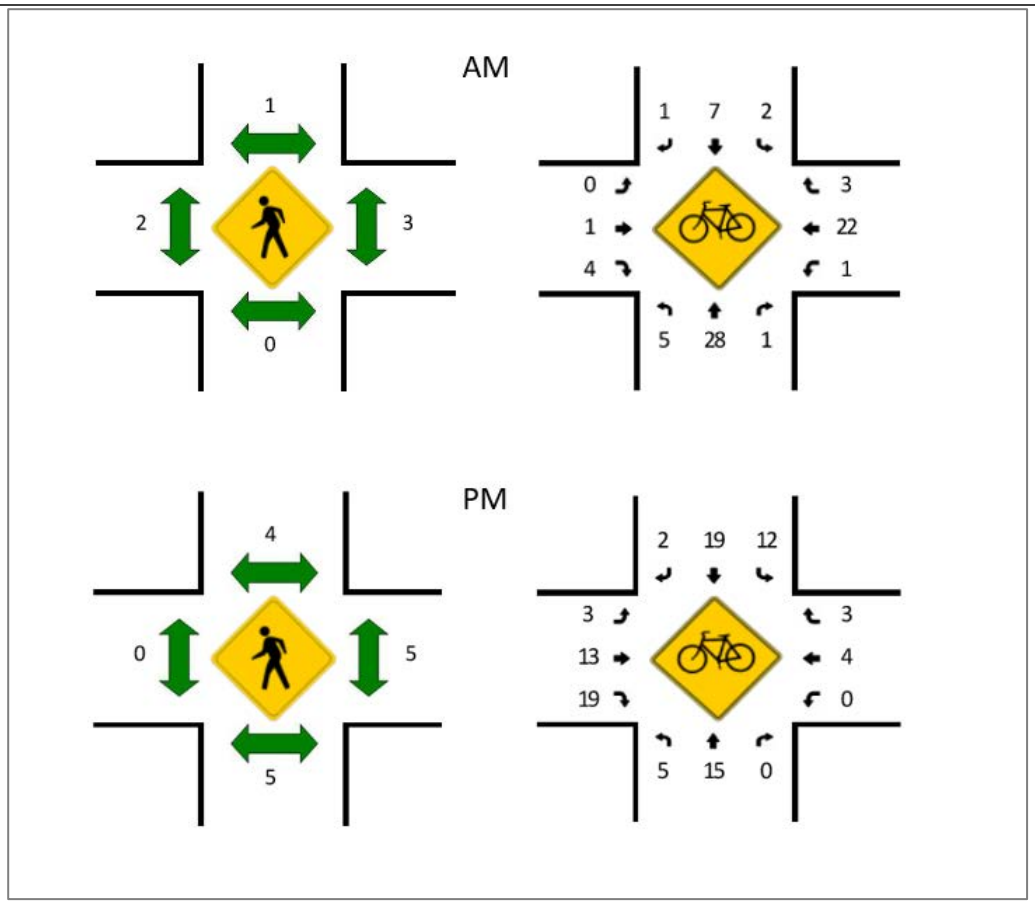


Figure 6: Peak-Hour Pedestrian and Bicycle Counts at OR 99W & Crystal Lake Drive (May 31st, 2017)
Source: Provided by ODOT

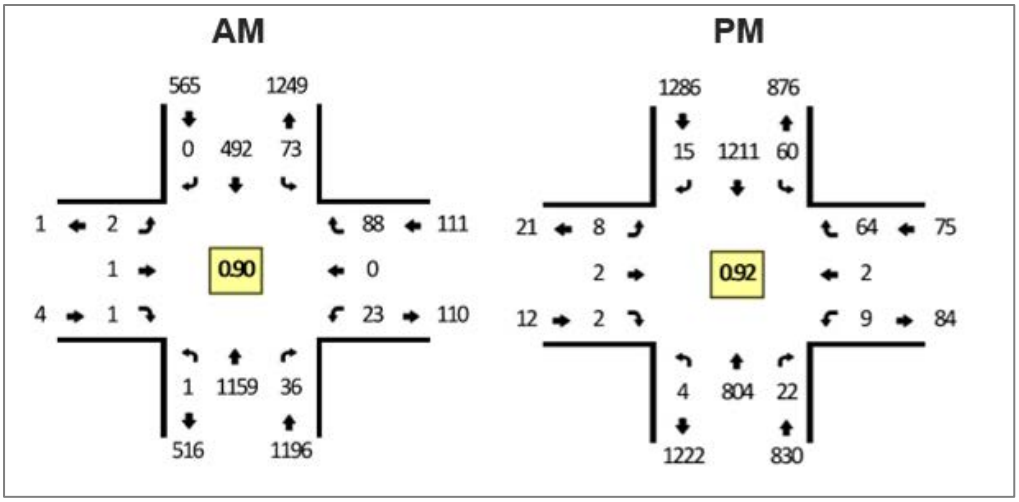


Figure 7: Peak-Hour Vehicular Traffic Counts at OR 99W & SE Alexander Ave (June 1st, 2017)
Source: Provided by ODOT

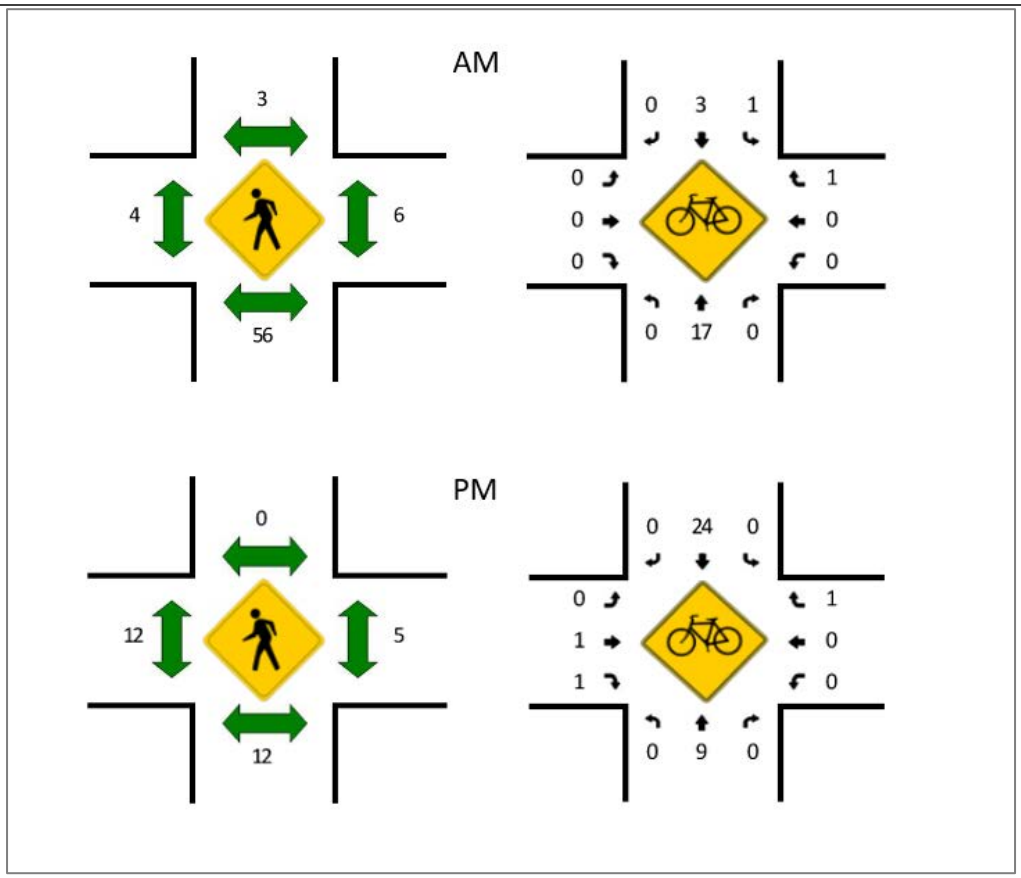


Figure 8: Peak-Hour Pedestrian and Bicycle Counts at OR 99W & SE Alexander Ave (June 1st, 2017)
Source: Provided by ODOT

Pedestrian and Bicycle Volumes

In addition to the turning movement counts above, the Corvallis Area MPO provided pedestrian and bicycle volumes at the Eric E. Austin Memorial Bypass path near the OR 99W corridor. The counts were collected at the south end of the path, near Crystal Lake Drive (see Figure 9) between November 23rd, 2020 and December 6th, 2020. Notably, the multi-use path was opened a month prior to when the counts were collected, therefore the volumes are expected to be lower due to people's unfamiliarity with this alternative route. In addition, the counts were collected during the Covid-19 pandemic, in early December and during a Thanksgiving week, which also do not represent typical weeks at other time of a year. Table 3 below summarizes the total counts observed. Figure 10 and Figure 11 present a sum of total hourly volume distribution for two weekdays (Wednesday, December 2nd & Thursday, December 3rd) and two weekend days (Saturday, November 28th & Sunday, November 29th).

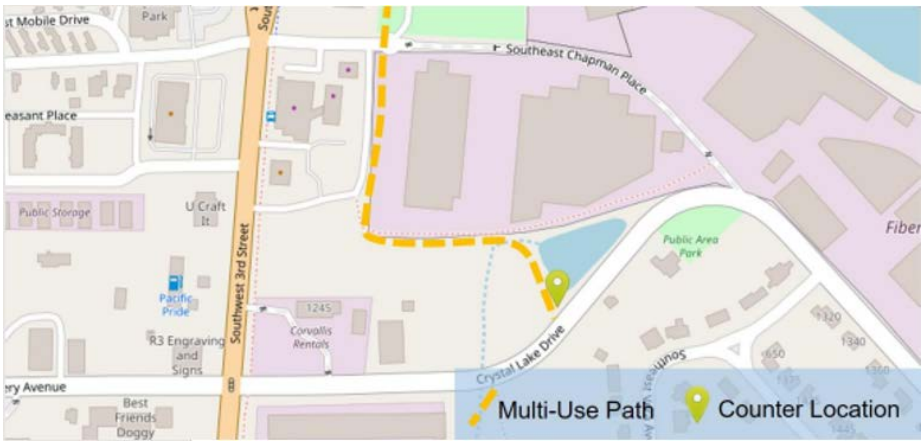


Figure 9: Bicycle and Pedestrian Counter Location
Source: Corvallis Area Metropolitan Planning Organization

Table 3: Two-Week Total Pedestrian and Bicycle Counts -- Eric E. Austin Memorial Bypass
(November 23 – December 6, 2020)

	Total Pedestrian	Total Cyclist	Combined Total
Total Volume	1,171	1,159	2,330
Percentage	50.3%	49.7%	100%

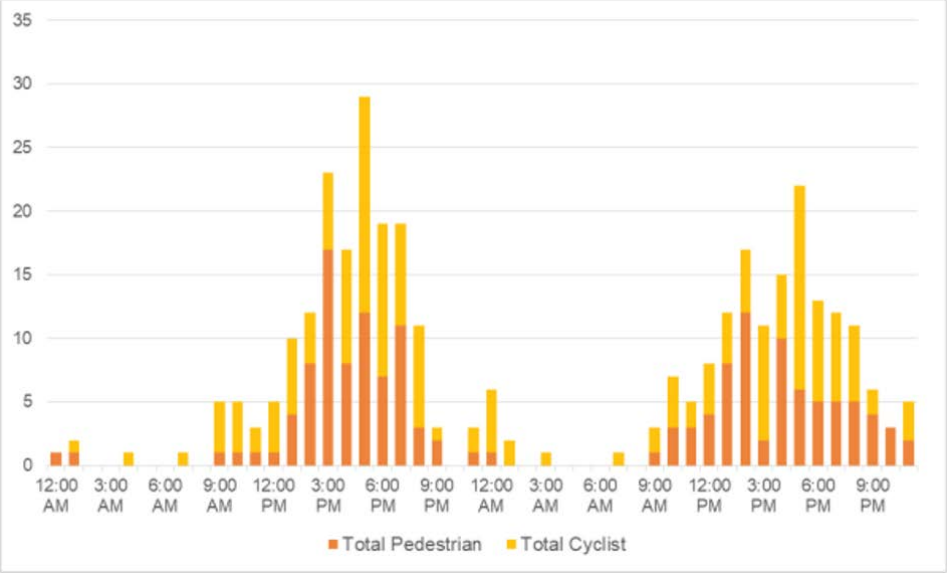


Figure 10: Weekday Hourly Totals - Eric E. Austin Memorial Bypass
(Wednesday, December 2nd & Thursday, December 3rd)
Source: Corvallis Area Metropolitan Planning Organization

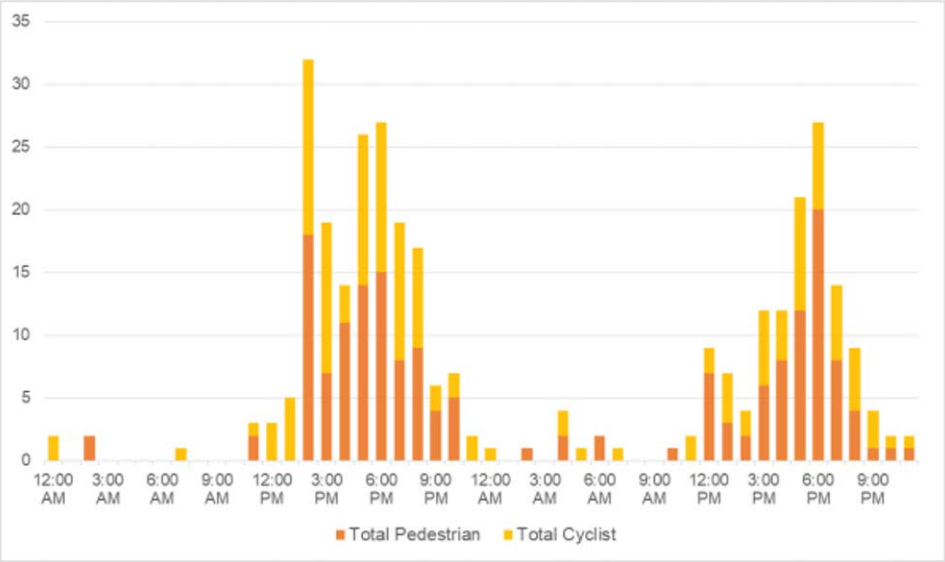


Figure 11: Weekend Hourly Totals - Eric E. Austin Memorial Bypass
(Saturday, November 28th & Sunday, November 29th)
Source: Corvallis Area Metropolitan Planning Organization

SUMMARY OF CRASH ANALYSIS

The RSA team considered two types of information regarding the crash history. The first information source is the reported ODOT crash data for the five-year period between January 1, 2014 and December 31, 2018. ODOT's crash database includes crashes for which a crash report was completed. According to Oregon law, crash reports are required when damages associated with the crash exceed $1,500[2]. The second type of crash data the RSA team used for the analysis includes preliminary data for crashes that occurred in 2019 and 2020. ODOT's reported preliminary 2019 crash data includes fatal and injury A crashes. Additionally, the team considered 2020 fatal crash information that could be found through newspaper and online search.

Figure 12 presents reported 2014-2018 crash numbers by severity. Injury A crashes involve participant(s) that have a suspected serious, but non-fatal injury. Injury B crashes involve participant(s) that have an evident minor injury. Injury C crashes involve participant(s) that have a suspected but not evident injury. "PDO" crashes refer to crashes that involve "property damage only". Annual average daily traffic (AADT) profile information was not available; therefore, the team was not able to make any conclusions about the increase and decrease of crashes through the years. The two fatal crashes that occurred in the reported 2014-2018 timeframe were a pedestrian crash in 2016 south of SE Alexander Avenue and a

[2] The reporting threshold increased from $1,500 to $2,500 on January 1, 2018. The crash data used in this report is based on both the $1,500 and $2,599 threshold. Source: https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf

bicycle crash in 2018 at the pedestrian crossing just south of SE Chapman Place. Pedestrian and bicycle crashes represent 14% of the total and 71% of the high severity (injury A and fatal) crashes.

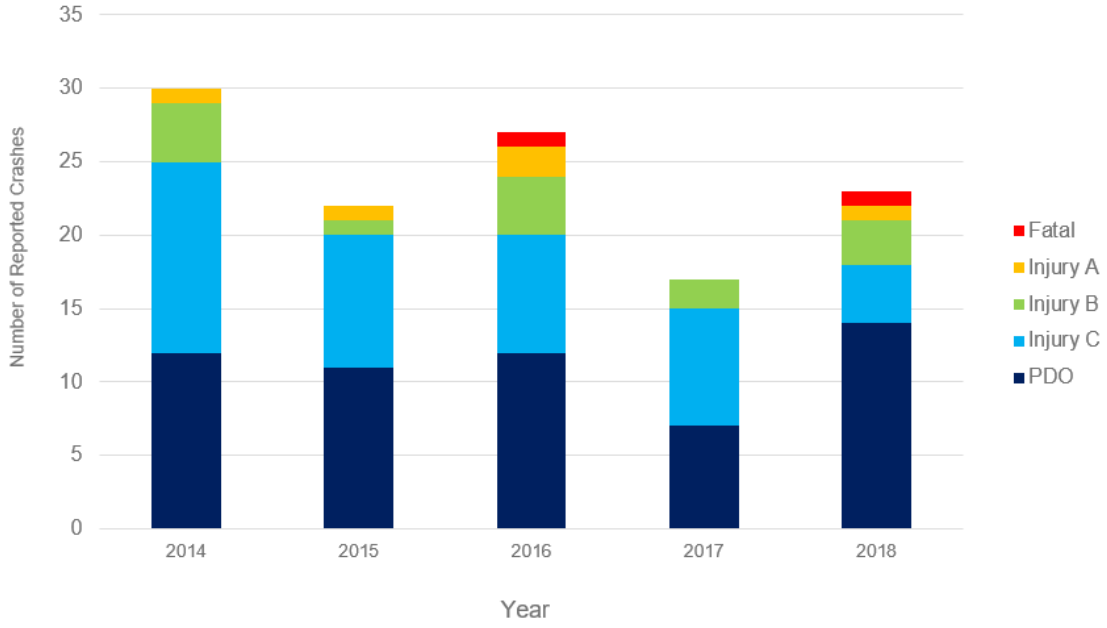


Figure 12: 2014-2018 Reported Crash Severity by Year

Figure 13 presents crashes by severity and collision type. Most common collision types among 2014-2018 reported crashes were rear-end (54%), turning movement (20%), and fixed-object or other-object (12%).

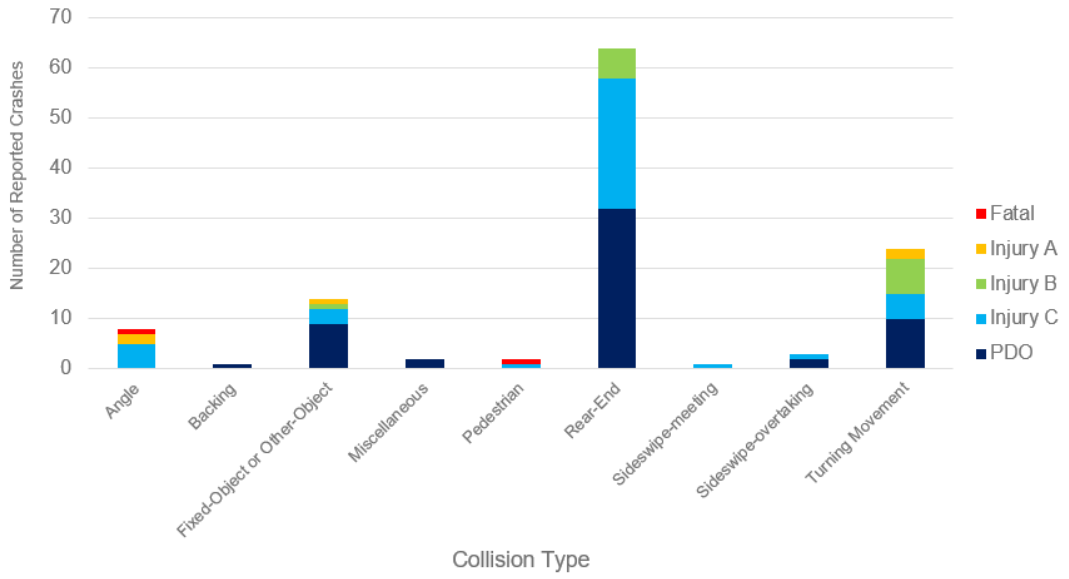


Figure 13: 2014-2018 Reported Crash Severity by Collision Type

Figure 14 below presents the reported 2014-2018 crash severity by milepost. The locations with most crashes include the signalized intersection of OR 99W and Crystal Lake Drive (SW Avery Avenue), the RRFB pedestrian crossing south of SE Chapman Place (SW Twin Oaks Circle), and a mid-block location near the Lincoln Elementary School, just south of SE Viewmont Avenue.

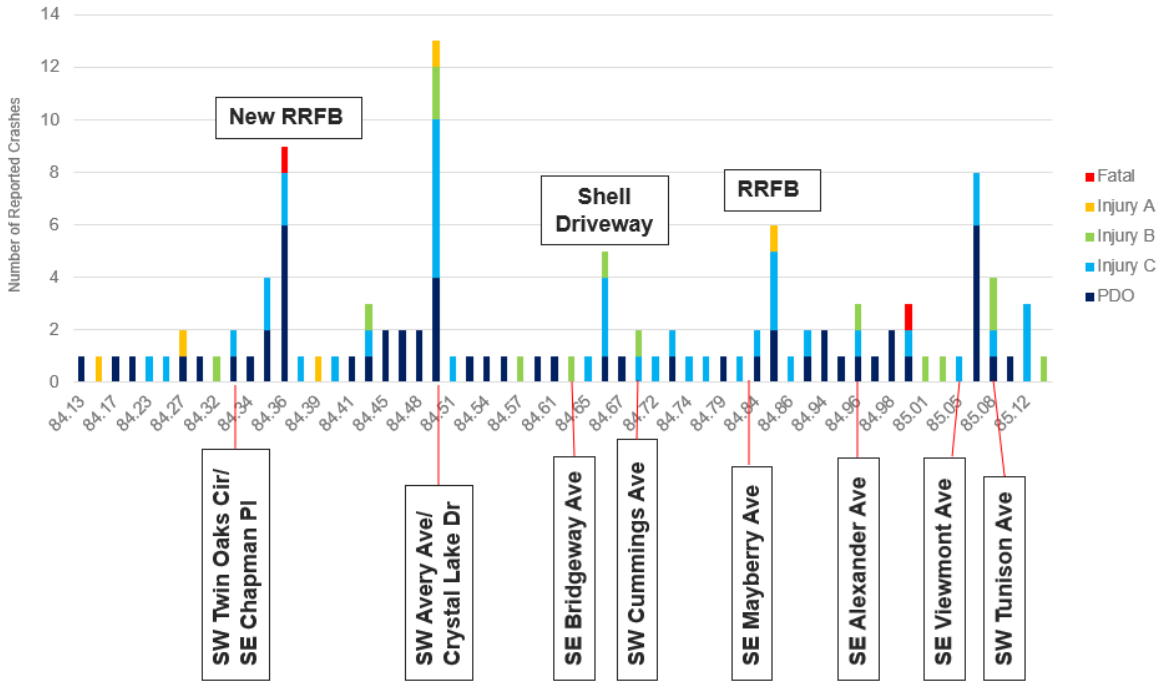


Figure 14: 2014-2018 Reported Crash Severity by Milepost

The second set of preliminary crash data showed that two additional fatal crashes occurred within the corridor during the 2019-2020 timeframe. Figure 15 below summarizes the available information about 2014-2020 fatal and injury A crashes. The 2019-2020 fatal crashes were a bicycle crash and a pedestrian crash. The bicycle crash occurred in 2019 just north of the OR 99W and SE Chapman Place (SW Twin Oaks Circle). The pedestrian crash occurred in 2020 at the pedestrian crossing just south of SE Chapman Place. At the time of the crash, the crossing had a pedestrian activated circular flashing beacon crossing, and an RRFB retrofit was in progress. Subsequent to the 2018 fatal pedestrian crash, all wigwag style pedestrian crossings in the corridor were retrofitted with RRFBs.

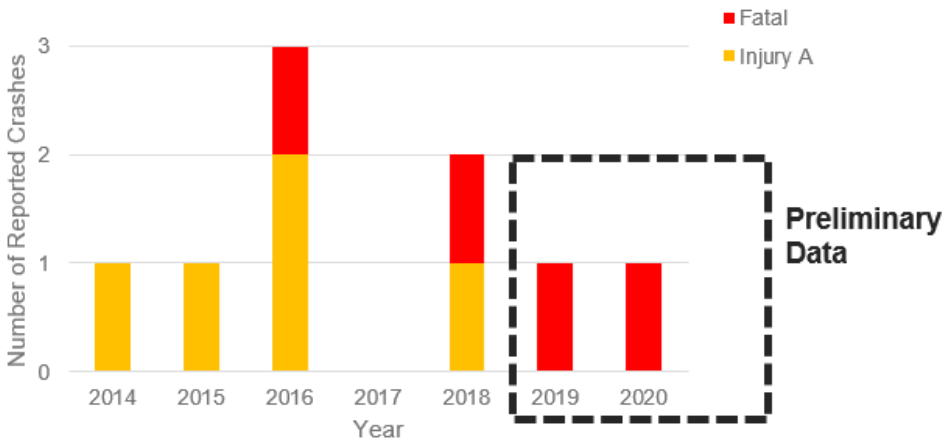


Figure 15: 2014-2020 Fatal and 2014-2019 Injury A Crashes

In summary, several crash trends stood out. Over half of the crashes are rear-end crashes, including many rear-end crashes at or near pedestrian crossings. Most crashes occurred between 3:00 and 6:00 PM, correlating with school releases and the weekday PM peak commute period. Finally, 71% of high severity (injury A and fatal) crashes involved bicyclists and pedestrians.

RSA FINDINGS

This section discusses the corridor safety issues that the RSA team identified though reviewing crash data, field observations, and stakeholder inputs.

SPEED

The RSA team identified high operating speeds by motor vehicles for the context are one of the key issues along the corridor. The posted speed along the corridor varies between 25 and 35 mph, but many vehicles, including large trucks, were observed to be uncompliant with the speed limits. High speeds result in less reaction time for the drivers and make it more difficult for pedestrians to determine a gap in traffic. The RSA team determined that speeding is one of the reasons why the corridor has a high proportion of rear-end collisions (see Figure 13): when a car stops at a pedestrian crossing or an intersection, the following driver does not have a sufficient reaction time to stop the vehicle.

During one of the site visits, the RSA team witnessed a rear-end collision when a southbound motorist stopped for a pedestrian at the updated RRFB pedestrian crossing just south of SE Chapman Place. The team also observed multiple motorists turn on their hazard lights when they stop for pedestrians at the updated RRFB pedestrian crossings. The drivers most likely do that to warn the vehicles behind them of their stopping.

LIGHTING

The RSA team observed that reduced or minimal lighting is an issue along corridor, especially the east side of OR 99W and to the south of Crystal Lake Drive. Insufficient lighting creates an uncomfortable environment for people using the sidewalks and the bicycle lanes. Reduced or inconsistent lighting at crossings and intersections makes it difficult for the drivers to see people crossing the roadway, including the RRFB locations. In addition, back lighting from land uses obstructs drivers and people walking and biking from seeing signage, especially regulatory signs, such as speed limit signs.

SIGNAGE

The RSA team identified multiple signage issues along the corridor. The team observed sign clutter, consisting of roadway signs and those from private properties, throughout the corridor. Another issue is the mounting of speed limit signs: the RSA team observed that some signs were mounted at a height above that which would allow many headlights to trigger signage retroreflectivity. Some speed limit signs are also hard to see due to insufficient illumination. The team also observed an absence of wayfinding signs for people walking and biking, especially through the interchange area. Finally, southbound on OR 99W approaching the ramps to OR 34 and US 20, the right lane becomes a trap lane but does not have signage and pavement markings to indicate this prior to the ramp.

CROSSINGS

Multi-lane facilities like OR 99W create a double threat for pedestrians crossing both sides of the roadway: 1) the potential for a person driving a vehicle to strike the person walking across in front of them and 2) when a pedestrian is crossing and one person driving stops for the pedestrian but the person in the vehicle behind passes the stopping vehicle, potentially striking the pedestrian.

Limited lighting or visibility at multiple existing crossings throughout the corridor make it difficult for drivers to see crossing pedestrians. This also results in pedestrians and drivers being unable to make eye contact at night. Further, the lighting at some of the crossings is not appropriately located and does not provide lighting onto crossing pedestrians for approaching motorists (see Figure 17).

BICYCLIST AND PEDESTRIAN COMFORT

Many people travel by bicycle in South Corvallis. During multiple site visits, the RSA team observed many bicyclists riding on sidewalks, indicating that people are not comfortable riding in the bicycle lanes. Facilities with no buffer from faster moving motor vehicle traffic and poor bicycle lane conditions can create an unsafe or uncomfortable environment and can lead to unpredictable bicycling behavior.

The RSA team also observed that there are many obstacles experienced by people walking: garbage & recycling bins, mailboxes, and vegetation often times blocks sidewalks. In addition, the proximity of vehicle traffic to the sidewalks and the absence of any buffers creates a loud and uncomfortable environment for people using the sidewalks. Condition of travel ways is further discussed in the section below.

CONDITION OF TRAVELWAYS

The current condition of existing sidewalks, bicycle lanes, and travel lanes create additional challenges. Poor drainage causes water to settle in bicycle lanes resulting in bicyclists moving into travel lanes or onto the sidewalk. The pavement quality of the roadway, sidewalks, and the multi-use path is poor. Uplifts in the sidewalk pavement creates tripping hazards. Many permanent and temporary obstacles are present in bicycle lanes and on the sidewalks. The sidewalks and intersections are not compliant with the Americans with Disability Act (ADA) at many locations throughout the corridor, though many curb ramps will be reconstructed in 2021.

RSA FINDINGS: LOCATION SPECIFIC ISSUES

BICYCLE AND PEDESTRIAN CONNECTION NORTH/SOUTH THROUGH THE INTERCHANGE

The connection of downtown Corvallis to the southern part of the city through the interchange of OR 99W, US 20, and OR 34 is highly challenging and uncomfortable for people walking and biking. The routes through this area are undefined and appear piecemealed with indirect connections between curb ramps. Inconsistent sidewalks and trail portions make pedestrians to cut through open space and crossing at undesirable locations. A lack of wayfinding with a variety of potential routes creates confusion for users who might be unfamiliar with the area. These behaviors are evident by the number of desire lines (user paths) through this area. In addition, the northbound Marys River bridge, which is one of the OR 99W one-way couplets, has bridge girders interfering the sidewalk which creates a confined walking space.

Vehicular speeds vary through this area as well. Many people driving are accelerating on the ramps to match the higher speeds of the connecting roadways or maintain high speeds as they come from the connecting highway. Design speeds through this area generally exceed the posted speed limit, further encouraging higher operating speeds.

The bicycling connection is very poor through the interchange as well. The southbound road of the OR 99W couplet provides a standard bicycle lane but there is no connection for bicyclists to stay on OR 99W through the lane drop to the westbound on-ramp. There is a multi-use trail next to Willamette River that people can use to avoid riding through the interchange. The connection of the trail to the bicycle lane on the west side of OR 99W is not well signed and is out of direction for those traveling southbound from west of OR 99W.

CROSSINGS

Multiple locations throughout the corridor contain high risk crossing conditions for people, as is evident by the number of serious injury and fatal crashes related to people walking and biking while crossing. The crossing just south of SE Chapman Place has a high number of total crashes, although the 2020 improvements of the crossing are yet to be evaluated as crash data is not yet available. The RSA team

identified that there is also a strong desire to cross OR 99W north of SE Chapman Place, south of the river.

The crash data also suggests that many people cross the corridor between SE Viewmont Avenue and SW Tunison Avenue, south of Lincoln Elementary School. Currently, there is not an enhanced crossing at this location. An existing RRFB is located approximately 230 feet south, between SW Tunison Avenue and SE Richland Avenue, but that would be out of direction for many people walking and biking between the school (and other points to the north) and the Tunison neighborhood.

RSA FINDINGS: SUGGESTIONS

The following section provides potential solutions to address the identified issues highlighted above. The solutions in this report have not been reviewed for feasibility. These solutions are based on the ideas of the RSA team and will be further refined through facility planning process.

Crash reduction factors (CRF) are provided for those solutions to which a relevant CRF exists.

NEAR-TERM SUGGESTIONS

The RSA team identified the following near-term suggestions to address the corridor issues.

Speed Feedback Signs

High vehicle operating speeds were identified to be one of the key issues of the corridor. The presence of speed feedback signs at multiple locations would help manage driving speeds and reduce the risk of speed related crashes[3]. Possible locations for installing these signs include but are not limited to:

- Southbound (4th Street in downtown OR 99W couplet) between B Street and the interchange
- Northbound, entering the corridor from the south

In addition, the existing speed feedback signs should be maintained.

Install Speed Feedback Sign
Crash Reduction Factor (CRF): 10% for all crash types
Source: ODOT Countermeasure Number: RD12 H25

RRFB Advance Warning

One of the issues identified by the RSA team was drivers not having enough reaction time when a vehicle ahead of them stops at a pedestrian crossing. The team believes this to be the primary reason of the large number of rear-end collisions at the pedestrian crossing south of SW Chapman place. An advance RRFB

Install Flashing Beacons as Advance Warning
Crash Reduction Factor (CRF): 36% for rear end crashes
Source: Morena, D. A., Wainwright, W. S., and Ranck, F., "Older Drivers at a Crossroads." Public Roads, Vol. 70, No. 4, Washington, D.C., FHWA, (2007) pp. 6-15.
Note: *This is based on flashing beacons as advance warnings for signalized intersections. Advance warning systems are expected to perform similarly for a signalized intersection as an activated crossing.*

[3] https://www.oregon.gov/ODOT/Engineering/Docs_TrafficEng/CRF-Appendix.pdf

warning assembling north of SE Chapman Place would provide southbound drivers with a more sufficient reaction time. This may be a relevant treatment at other places along the corridor as well.

MID-TERM SUGGESTIONS

The RSA team identified the following mid-term suggestions to address the corridor issues.

Cross Section Modification

A modified layout of the roadway would create more of a boulevard feeling and would increase the comfort and have a positive influence on the safety of the people using the corridor. This implementation can occur primarily through restriping. Narrower lanes would encourage slower and more careful driving behavior. An additional buffer for the bicycle lanes, preferably with vertical elements such as flexposts, would create a safer and more comfortable environment for bicyclists. Additional medians (with landscaping) where feasible would also encourage more careful driving.

Figure 16 below presents a potential typical future cross-section of OR 99W. The presented cross-section is just one of the possible options and the lane widths can be finalized once the exact roadway measurement is available.

Figure 16: Future Potential Cross-Section
Source: Made with Streetmix

Crossings Improvements

Enhancing crossing locations can increase the comfort and safety of people crossing OR 99W. Enhancements that are not specific to particular locations include but are not limited to:

- Striping double white lines leading to crossings to reduce the likelihood of a double threat
- Improving lighting, especially on the motor vehicle approach side of the pedestrian crossing to make those crossing more visible to the approaching people driving

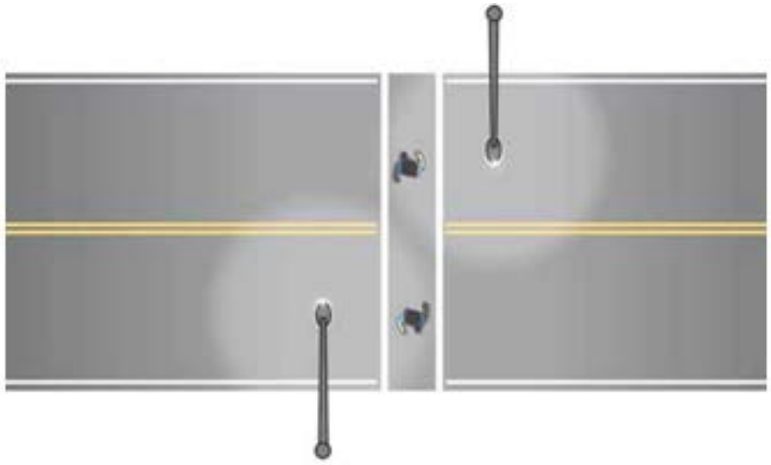


Figure 17: Illustration of Illumination located in advance of pedestrian crossing
Source: FHWA - https://www.fhwa.dot.gov/publications/research/safety/08053/

In addition to the corridor-wide crossing enhancements, the RSA team believes that a few location-specific improvements will bring a great safety benefit. As mentioned above, a marked pedestrian crossing is desired at offset SE Viewmont Avenue/SW Tunison Avenue.

Figure 18**Error! Reference source not found.** below presents a crossing layout that is proposed by the RSA team. It includes marked crosswalk striping and a median. A pedestrian hybrid beacon (PHB) should be considered at this midblock location, especially because of the proximity to the school. Pedestrian Hybrid Beacon is a traffic control device that remains dark for drivers until activated by a pedestrian. Once activated, it begins to flash yellow to warm motorists, which is then followed by a steady yellow and a steady red phases[4]. (see Figure 19**Error! Reference source not found.**) This would replace the RRFB that currently exists between SW Tunison Avenue and SE Richland Avenue (approximately 230 feet to the south). If a PHB is not feasible, an overhead RRFB should be considered. Unlike an PHB, an RRFB does

[4] https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa14014/

not provide a steady red phase and uses an irregular flash pattern[5]. (see Figure 20) According to ODOT's crash reduction factors, a PHB is a more effective treatment than an RRFB[6], therefore it is more desired to be installed at this location.

Notably, a median at this location is likely to interfere with the emergency vehicles entering and exiting the fire station on SW Tunison Avenue. The fire station is likely to be relocated in the next five years. If a PHB or overhead RRFB is installed before the relocation of the fire station, the RSA team suggests working with the fire department when designing the crossing to come up with a feasible design that does not interfere with emergency vehicle access.

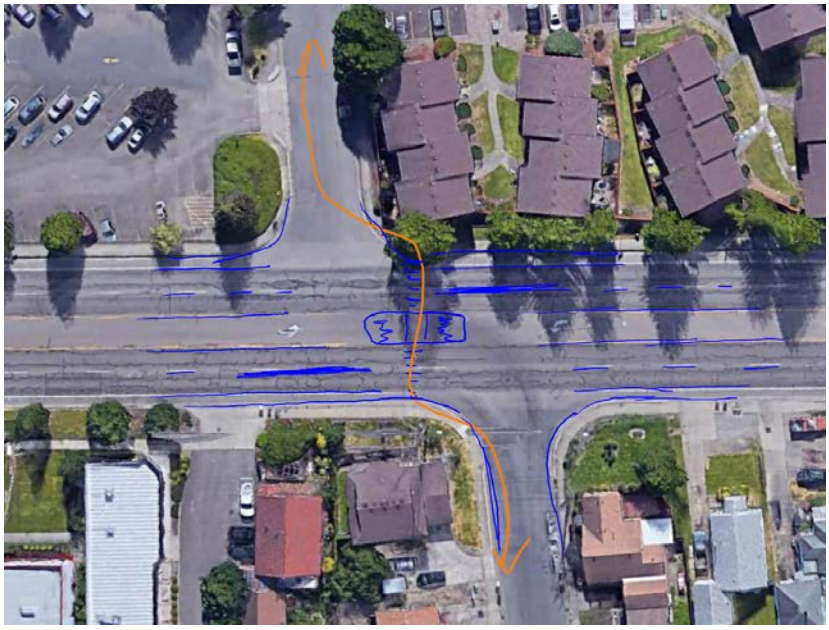


Figure 18: Potential Crossing Improvement at SW Tunison Ave/SE Viewmont Ave
Source: Base Image from Google Earth

[5] https://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09009/

[6] https://www.oregon.gov/ODOT/Engineering/Pages/ARTS.aspx

Figure 19: An Example of a Pedestrian Hybrid Beacon (PHB)
Source: FHWA

Figure 20: An Example of a Rectangular Rapid Flashing Beacon (RRFB)
Source: FHWA

Install Pedestrian Hybrid Beacon
Crash Reduction Factor (CRF): 55% for pedestrian and bicycle crashes
Source: ODOT Countermeasure Number: BP19

The RSA team also suggested replacing the RRFB south of SE Chapman Place with a PHB. Similarly, if a pedestrian hybrid beacon is not feasible, an overhead RRFB should be considered.

Improvements of Lighting

The RSA team identified that reduced overhead lighting is another key corridor issue. The team suggests installing additional segment lighting along the corridor for lighting consistency, especially south of SW Avery Avenue (SE Crystal Lake Drive) and on the east side of the corridor. The RSA team also suggests

considering additional lighting at all four corners of intersections and at pedestrian crossings, on the approaching motorist side of the pedestrian crossing.

Provide Intersection Lighting
Crash Reduction Factor (CRF): 42% for bicycle and pedestrian night crashes
Source: ODOT Countermeasure Number BP2

Provide Highway Lighting
Crash Reduction Factor (CRF): 28% for night crashes
Source: Elvik, R. and Vaa, T., "Handbook of Road Safety Measures." Oxford, United Kingdom, Elsevier, (2004)

Signage Improvement

The RSA team proposed multiple ways to improve the signage along the OR 99W corridor based on the issues identified in the previous section:

- Evaluate the existing signs for their importance, remove less critical ones to reduce sign clutter, review signage for correct installation, and adjust and/or enhance signage as needed
- Evaluate the location of speed limit signs and make sure they are positioned where they are most visible and retroreflectivity is maximized
- Add wayfinding signs throughout the corridor for people walking and biking
- Move street name signs closer to the edge of the roadway

Bicycle and Pedestrian Comfort Improvement

The RSA team believes that the aforementioned cross-sectional changes would have a positive influence on safety and improve the comfort of people walking and biking throughout the corridor. In addition, the team suggests considering the following solutions to improve the existing corridor conditions:

- Add buffered bicycle lanes throughout the corridor (part of near-term suggestions)
- Improve wayfinding (part of near-term suggestions) through the corridor, and the interchange specifically
- Remove obstacles from sidewalks and bicycle lanes
- Provide wider sidewalks and a vegetation buffer strip between the roadway and sidewalk
- Add curb extensions (bulb-outs) to shorten pedestrian crossing distance across city/local road approaches
- Tighten the intersection corner curb radii on city/local road approaches to encourage slower vehicle turning movements

Install Buffered Bike Lanes
Crash Reduction Factor (CRF): 47% for bicycle crashes
Source: ODOT Countermeasure Number: BP24

Add Street Trees
Crash Reduction Factor (CRF): 10% for all crash types
Source: ODOT Countermeasure Number: BP31

Travel Condition Improvement

The RSA team believes that improving the condition of the current travel ways will have a positive influence on safety and improve the comfort of people using the corridor. The RSA team suggested the following improvements to address the corridor concerns:

- Evaluate and improve ADA compliance of bus stops, ramps, crossings, and intersections
- Repave the roadway, and repave or replace the sidewalks and multi-use path segments in poor condition
- Improve drainage throughout the corridor
- Remove and/or reduce obstacles

The RSA team developed several ideas to improve direct connections and wayfinding through the interchange. The team suggests improving bicycle and pedestrian connectivity at the current OR 99W/4th Street southbound to OR 34/US 20 west ramp.

Figure 21 and Figure 22 below present two options for the proposed improvement. Option #1 would widen the current sidewalk to a shared use path, shift the people biking onto the path, and provide an enhanced crossing across the ramp. Option #2 preserves the dedicated bicycle lane by creating a typical right-turn pocket with the bicycle lane between the right-turn and through lane cross over. Option #2 still adds an enhanced crossing for pedestrians crossing the ramp. Both options assume a lane reconfiguration along southbound 4th Street that could be incorporated into a future pavement preservation/restriping project and addressed by a downtown circulation study (Corvallis Transportation System Plan project M104).

Figure 21: Trap Lane Removal: Option 1
Source: Base Image from Google Earth

Figure 22: Trap Lane Removal: Option 2
Source: Base Image from Google Earth

Install Urban Green Bike Lanes at Conflict Points
Crash Reduction Factor (CRF): 39% for bicycle crashes
Source: ODOT Countermeasure Number: BP6

The RSA team also suggested improving the overall navigation through the interchange. The proposed improvements include emphasis of the existing bicycle lane in the southbound direction, creating clear signage to direct northbound users to the existing shared use path on the east side of the interchange, and creating a connection from SW C Ave to the shared use path. The shared use path on the east side of the interchange can be used by people biking and walking in both directions depending on their origin

and destination. Figure 23 represents a sketch of the potential connections. For this solution, the current northbound historic bridge connection would be deemphasized for people walking and biking, as it would require more improvements to make it comfortable.

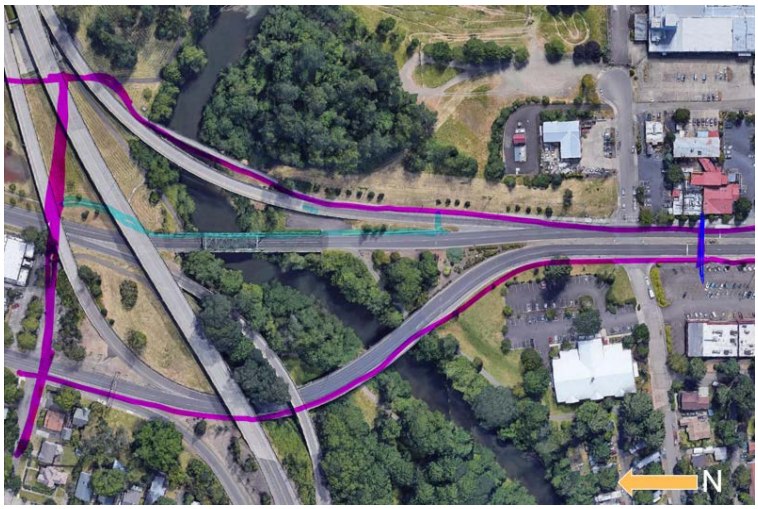


Figure 23: Proposed Pedestrian and Bicycle Improvements at the Interchange
Source: Base Image from Google Earth

Additionally, the RSA team suggests improving bicycle crossings at signalized intersections to the south of the interchange. The intersection at SW Avery Avenue (Crystal Lake Drive) is used by people biking on the shared use path on the east side of the road accessing the southbound bicycle lane on the west side of the road. The RSA team proposed creating a protected intersection at this location. At protected intersections, the bikeway is separated from the parallel motor vehicle traffic. Instead of merging into traffic, they cross in a designated bike crossing location and have right of way over motor vehicles turning.

Moreover, the RSA team proposed adding bicycle two-stage left-turn boxes at SE Alexander Avenue. Two-stage left turn boxes provide a marked place for bicyclists to wait for making a two stage left turn at an intersection. Figure 24 and Figure 25 present an initial concept of the proposed improvements at these two intersections.

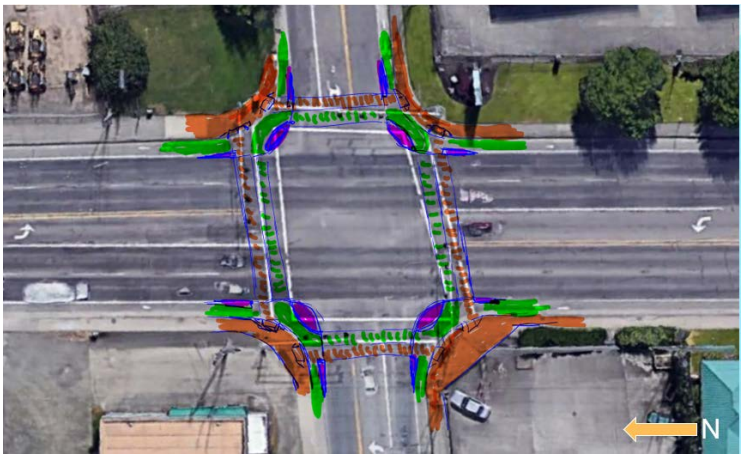


Figure 24: Proposed Protected Intersection at SW Avery Avenue (Crystal Lake Drive)
Source: Base Image from Google Earth

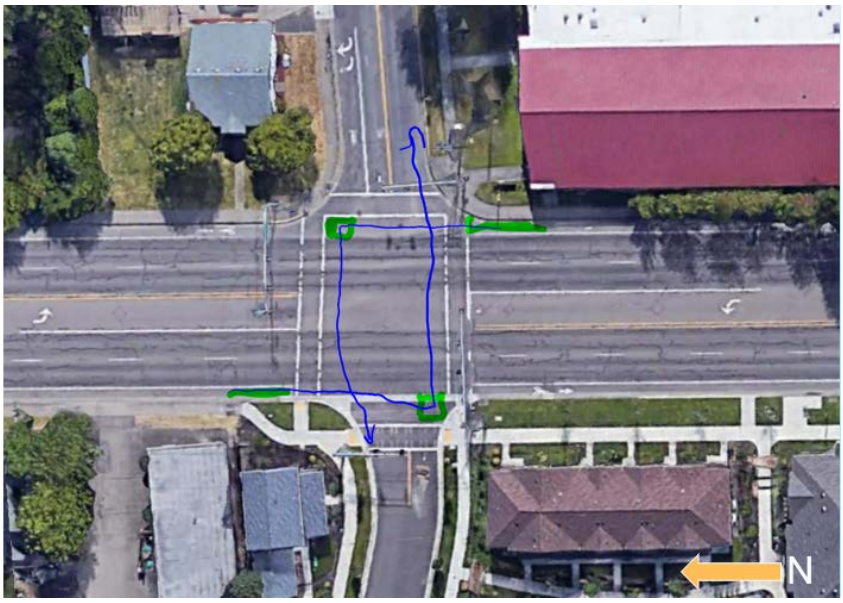


Figure 25: Proposed Striped Bicycle Boxes at Alexander Avenue
Source: Base Image from Google Earth

Install Bike Box at Conflict Points
Crash Reduction Factor (CRF): 30% for bicycle crashes
Source: ODOT Countermeasure Number: BP7

LONG-TERM SUGGESTIONS

The RSA team identified the following long-term suggestions to address the corridor issues.

Interchange Improvement

The RSA team identified that the interchange at the north end of the corridor contributes to multiple corridor issues and safety risks. The current interchange layout has several free-flow movements which do not match what is existing in an urban setting to the north and to the south, and operates more similarly to access controlled facilities. Interchange ramps have a posted advisory speed of 25-35mph but were likely designed to accommodate 45 mph traffic, encouraging high speed driving. The RSA team identified a need to "urbanize" the interchange in order to set contextual differences between high-speed highways and the urban setting of Corvallis. Higher speed ramps are also more difficult to cross for people walking and biking as they do not include appropriate facilities for people walking and biking. Proposed potential interchange layouts are presented below, but ultimately an Interchange Access Management Plan is expected to be necessary to evaluate all possible solutions.

The next review of the Oregon Highway Plan Expressway designation at this location may also consider the need to urbanize the interchange. The most recent affirmation of the Expressway designation, in 2018, pre-dated this Road Safety Audit.

"Urbanized" Interchange

This layout would remove the current high-speed ramps and make new connections and at-grade intersections. The RSA team expects that those intersections will need to be controlled to manage movements on and off OR 99W. Figure 26 presents a concept sketch of a split-diamond interchange configuration. Establishing the eastbound ramps and at-grade intersections will be challenging due to the need to cross the Marys River.

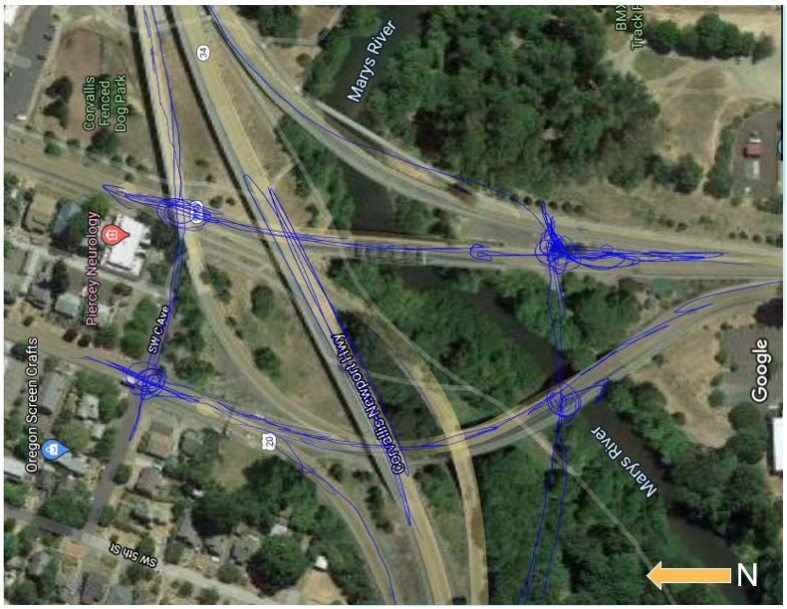


Figure 26: "Urbanized" Interchange Improvement
Source: Base Image from Google Earth

"Urbanizing" an Intersection

Looking more specifically at the westbound OR 34 off ramp to OR 99W south, an option for urbanizing this intersection would remove free movements and add a signal with a pedestrian crossing. Figure 27 presents a draft sketch of an intersection layout.

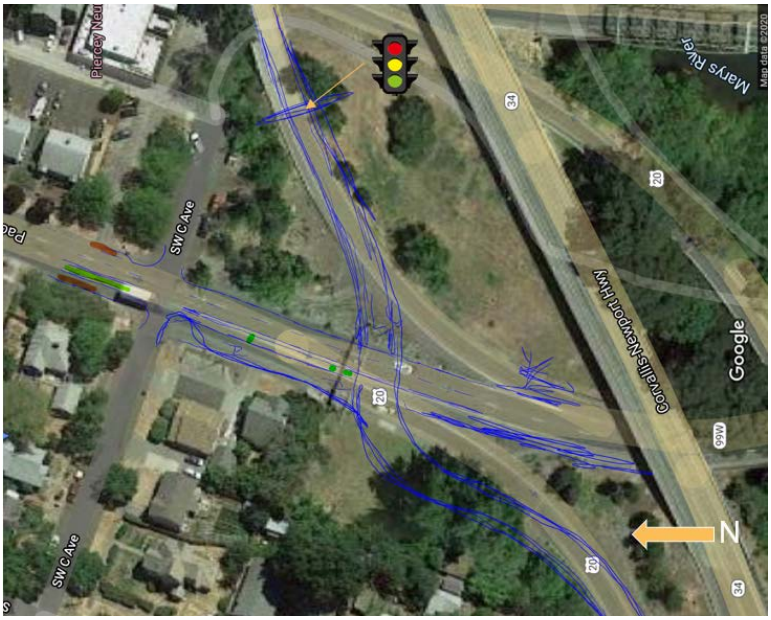


Figure 27: "Urbanizing" an Intersection
Source: Base Image from Google Earth

Northern Gateway of South Corvallis

As previously mentioned, motorists leaving the interchange and entering south Corvallis may be conditioned to drive higher than the 25 mph speed limit if they were previously traveling at higher speeds on OR 34 west or just due to the character of the roadway. Because of the less urbanized design of the interchange, people walking and biking often cross just south of the interchange to access destinations on the other side of the road. Managing speeds along the entire corridor, and especially at this location, is key to improving safety.

This solution uses a roundabout to manage the speeds of traffic entering South Corvallis and those travelling onto the OR 34 east ramp. Figure 28 presents a concept sketch of a roundabout layout. This solution may require purchasing some right-of-way but is not expected to impact any existing buildings. In addition to managing speeds, the roundabout would provide an opportunity for people driving to make a U-turn on the corridor, increasing the ability to add medians for traffic calming and reducing conflict points along the corridor without reducing access to driveways.

Adding a roundabout could also allow for wayfinding signs to indicate entry to South Corvallis. This could serve as a "Gateway" to the area and provide traffic calming, reducing the ability to speed through the area.

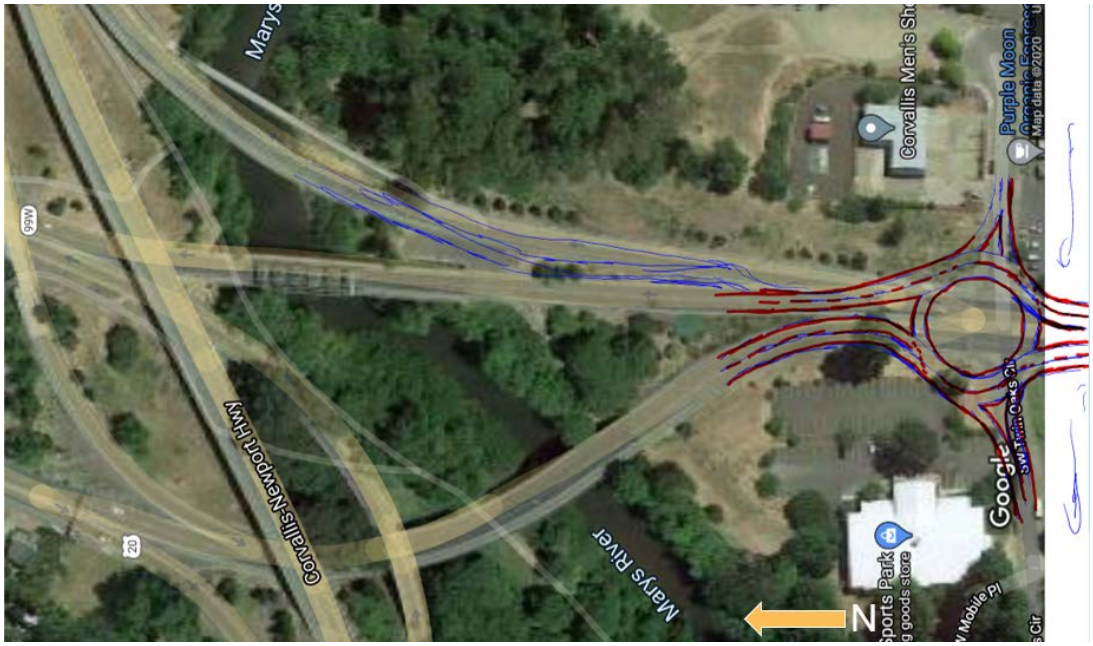


Figure 28: Roundabout Solution
Source: Base Image from Google Earth

AGENCY RESPONSE TO SUGGESTIONS

Suggestion	Agency Response / Comment	Consider	Reject	Further Discussion
Near-Term Suggestions				
Speed Feedback Signs				
RRFB Advance Warning				
Mid-Term Suggestions				
Cross-Section Modification				

Suggestion	Agency Response / Comment	Consider	Reject	Further Discussion
Crossing Locations Improvement				
Improvement of Lighting				
Signage Improvement				
Bicycle and Pedestrian Comfort Improvement				

Suggestion	Agency Response / Comment	Consider	Reject	Further Discussion
Travel Condition Improvement				
Long-Term Suggestions				
Interchange Improvement				

Appendix 1 Pre-Audit / Kickoff Meeting Presentation

DATE **12/17/2020**

ROAD SAFETY AUDIT

OR-99W: SW C AVENUE TO SW RICHLAND AVENUE

PRE-AUDIT KICK-OFF MEETING

KITTELSON & ASSOCIATES

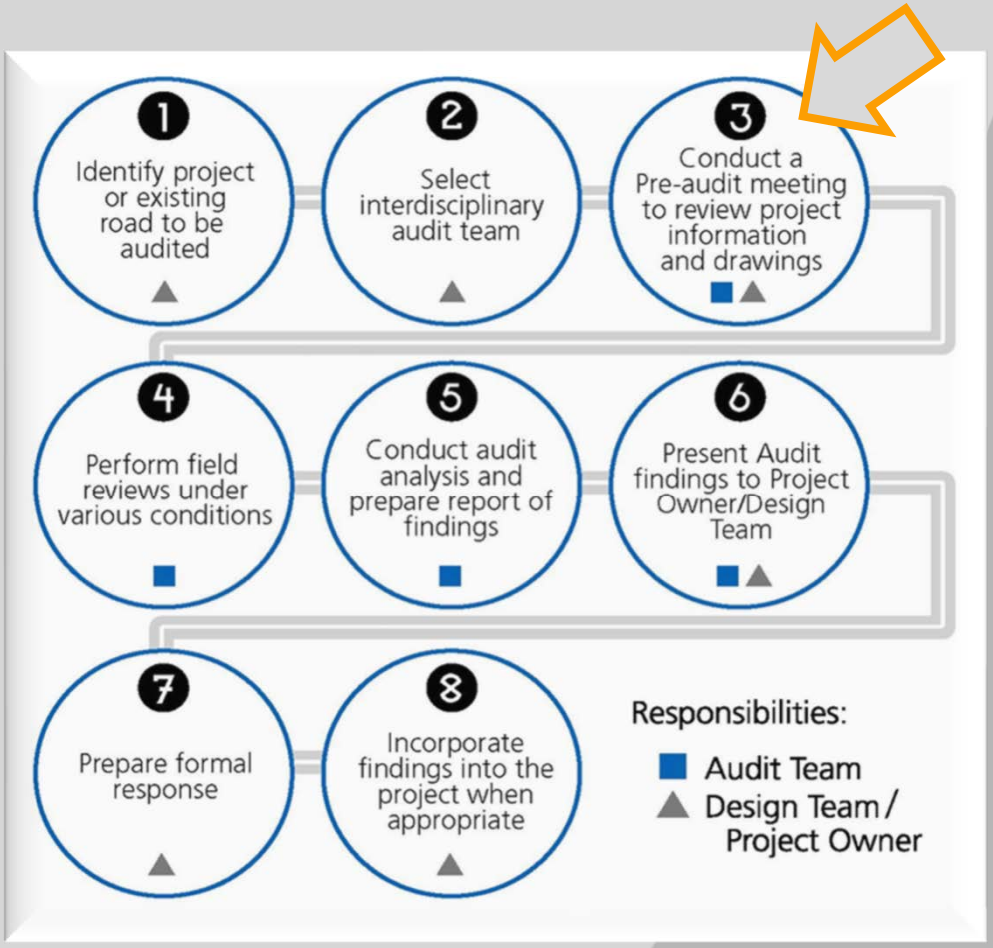
Outline

- Overview of Road Safety Audit (RSA) Process
- RSA Schedule
- RSA Team, Resources, and Stakeholders
- Study Background
- Review of Traffic Volumes and Crash Data
- Stakeholder Input & Discussion

RSA Schedule

Timeframe		Thursday, December 17	Friday, December 18
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		Morning Peak Period Site Visit
8:00 AM	9:00 AM		
9:00 AM	10:00 AM	Kick-Off Meeting	Work Session
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	
1:00 PM	2:00 PM	Worksession: 1:30-3:30	Close-Out Meeting
2:00 PM	3:00 PM		
3:00 PM	4:00 PM		
4:00 PM	5:00 PM	Evening Peak Period Site Visit (4:30-5:45)	
5:00 PM	6:00 PM		
6:00 PM	7:00 PM		
7:00 PM	8:00 PM	Nighttime Site Visit	
8:00 PM	9:00 PM		
9:00 PM	10:00 PM		

FHWA RSA Process



RSA Safety Analysis Approach

Crash Data Analysis

- *Crash data obtained for 2014 – 2018 (partial information for 2019-2020)*
- *Crash data reviewed to identify trends*

Field Work & Team Work Sessions

- *Site observations to understand geometric characteristics and driver behavior*
- *Identify issues and relative risk based on observations and data*

Identification of Suggestions

- *Treatments to address issues*
- *Prioritized based on ease of implementation and effectiveness*

RSA Team & Resources

- James Feldmann
  - ODOT Planning
- **Amanda Salyer**
  - **ODOT Traffic**
- Jenna Berman
  - ODOT Active Transportation Liaison
- Katie Brown
  - ODOT PDAD
- Eliseo Lemus
  - ODOT Roadway
- Guy Mamac
  - ODOT Maintenance
- Aaron Manley
  - Corvallis Public Works
- Josh Capps
  - Corvallis Active Transportation Program Specialist
- Lisa Scherf
  - Corvallis Transit
- Steve Dobrinich
  - Corvallis Area MPO
- **Camilla Dartnell**
  - **Kittelson, Engineering Associate**
- **Hermanus Steyn**
  - **Kittelson, Senior Principal Engineer**

RSA Stakeholders

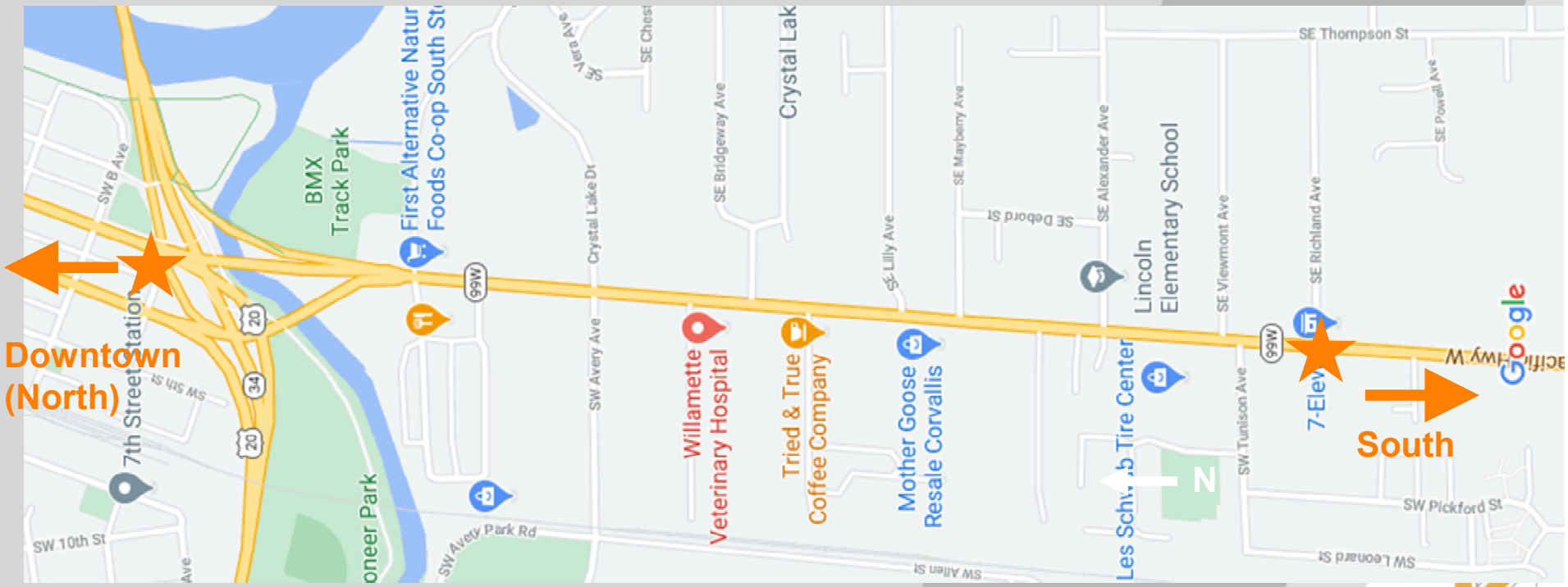
- Brian Morey
  - ODOT Maintenance
- Greg Gescher
  - Corvallis Public Works
- Kristie Gladhill
  - ODOT TRAU
- Joel Goodwin
  - Corvallis Police Department
- Kevin Fulsher
  - Corvallis Fire Department
- Ben Janes
  - Corvallis Fire Department
- Chad Gordon
  - Corvallis Public Works Maintenance
- Nick Meltzer
  - Corvallis Area MPO
- Hyatt Lytle
  - Corvallis City Council
- Penny York
  - Corvallis Planning Commission
- Sarah Bronstein
  - Oregon State University
- Kim Patton
  - Corvallis School District
- Rebecka Weinsteiger
  - DenNW
- Simon Date
  - Corvallis Chamber of Commerce
- Cindee Lolik
  - Corvallis Business Representative

RSA Stakeholders

- Bret Davis
  - Corvallis Business Representative
- Bruce Austin
  - South Corvallis Resident
- Rian Amiton
  - South Corvallis Resident
- Patrick Chappell
  - Avery Help Neighborhood

Study Background

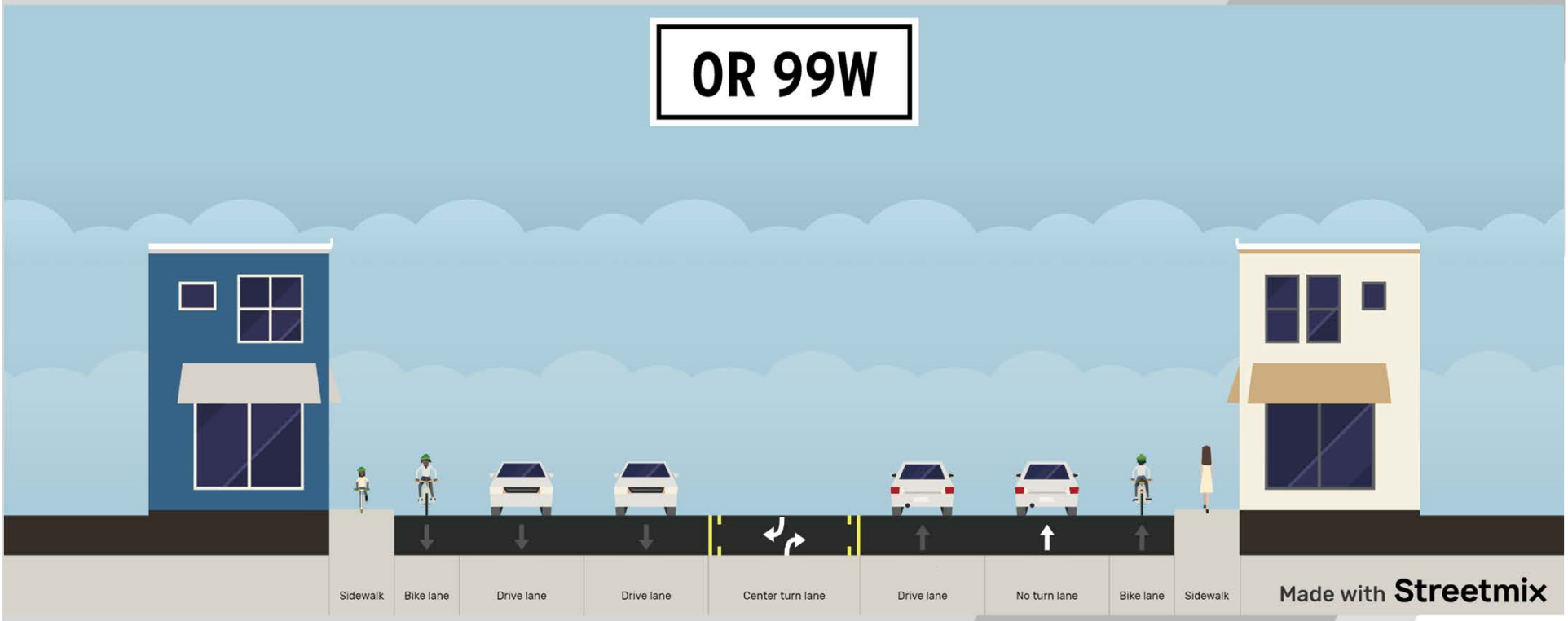
- **Corridor:** OR-99W from SW C Avenue to SW Richland Avenue
- **Purpose:** Identify potential safety enhancements



Corridor Limits

North

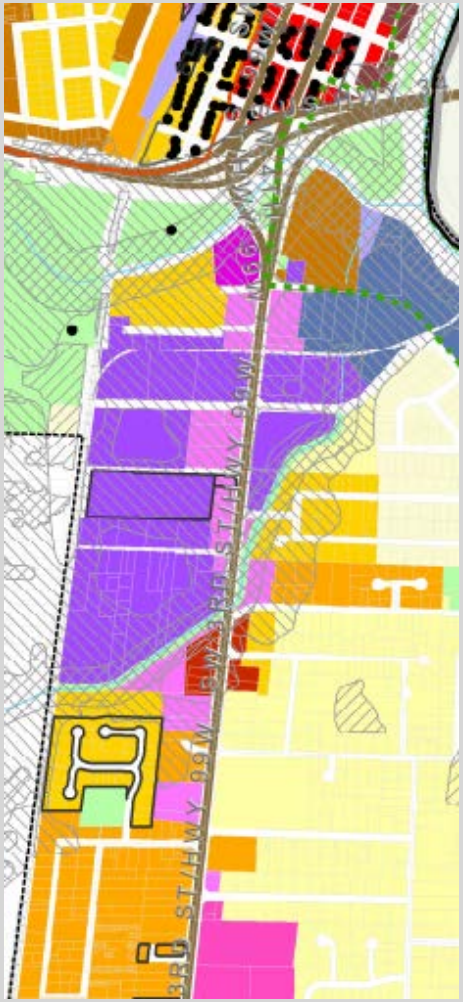
Roadway Section



Speed


25MPH
35MPH
35MPH
School Zone
20 mph
SW C Ave
SE Chapman Pl
SE Crystal Lake Dr
SW Cummings Ave
SE Lilly Ave
SE Mayberry Ave
SE Alexander Ave
SE Viewmont Ave
SE Richland Ave

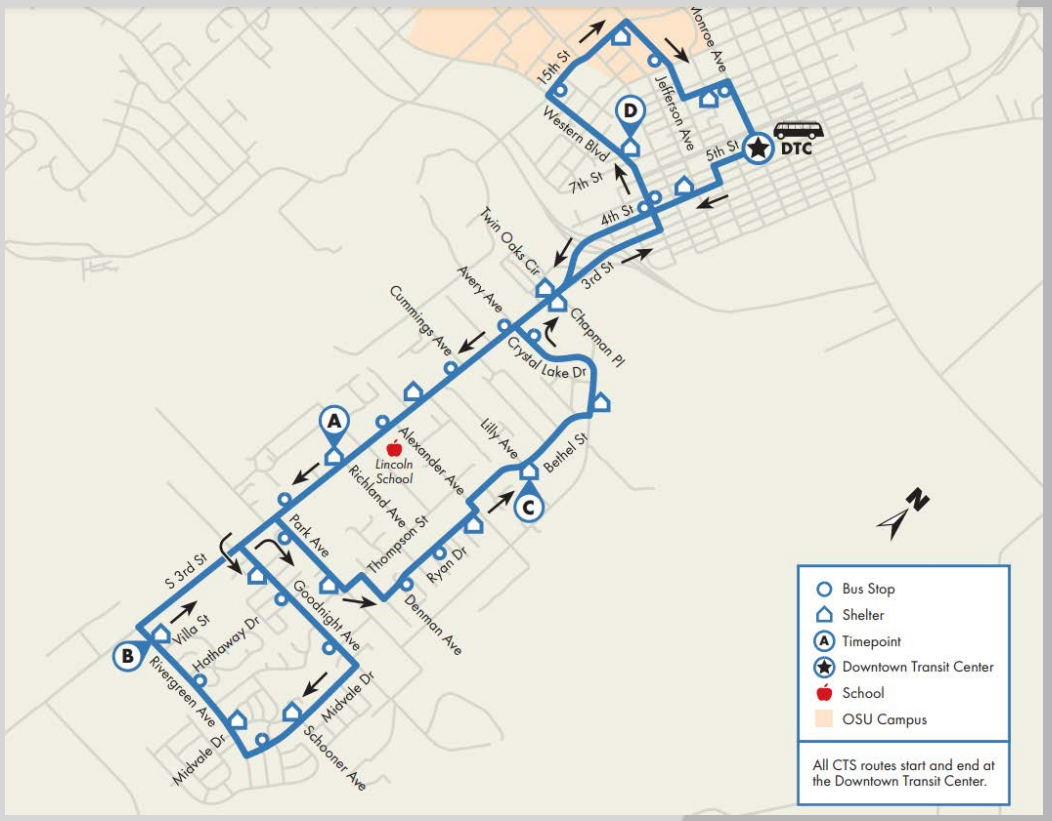
Background Information: Land Use



- AG-OS - Agriculture - Open Space
- RS-3.5 - Low Density Residential
- RS-5 - Low Density Residential
- RS-6 - Low Density Residential
- RS-9 - Medium Density Residential
- RS-12 - Medium-High Density Residential
- RS-20 - High Density Residential
- P-AO - Professional and Administrative Office
- NC-Major - Major Neighborhood Center
- NC-Minor - Minor Neighborhood Center
- MUCS - Mixed Use Community Shopping
- MUE - Mixed Use Employment
- Natural Resources (refer to Significant Vegetation Area and Riparian Corridor & Wetlands maps)
- Natural Hazards (refer to Natural Hazards map)

Transit Information

- CTS Route 6– South Corvallis / Western / OSU



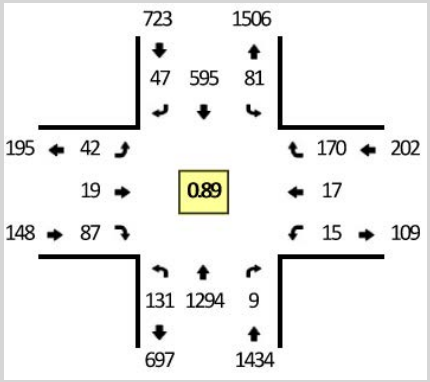
Transit Ridership

- Boarding and alighting data from 2019 / 2020 (January 1 – October 31)
  - Top 5 locations

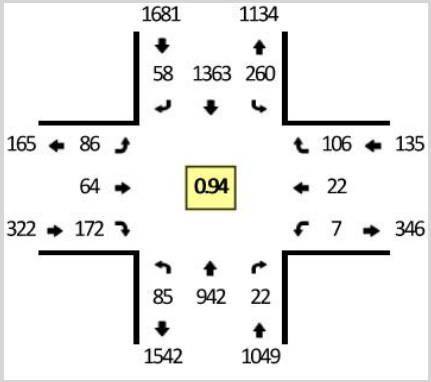
Traffic Data: Turning Movement Counts

★ OR 99W & Crystal Lake Dr

AM



PM



★ OR 99W & SE Alexander Ave

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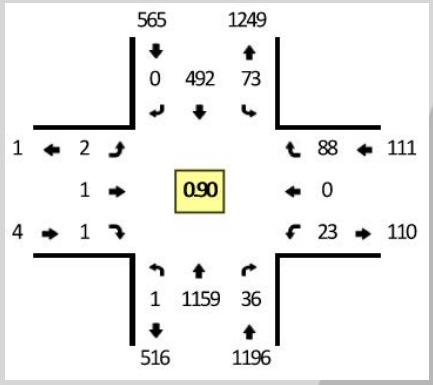

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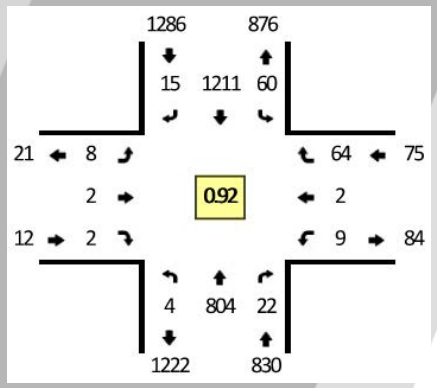


2017 Data

Bicycle and Pedestrian Volumes

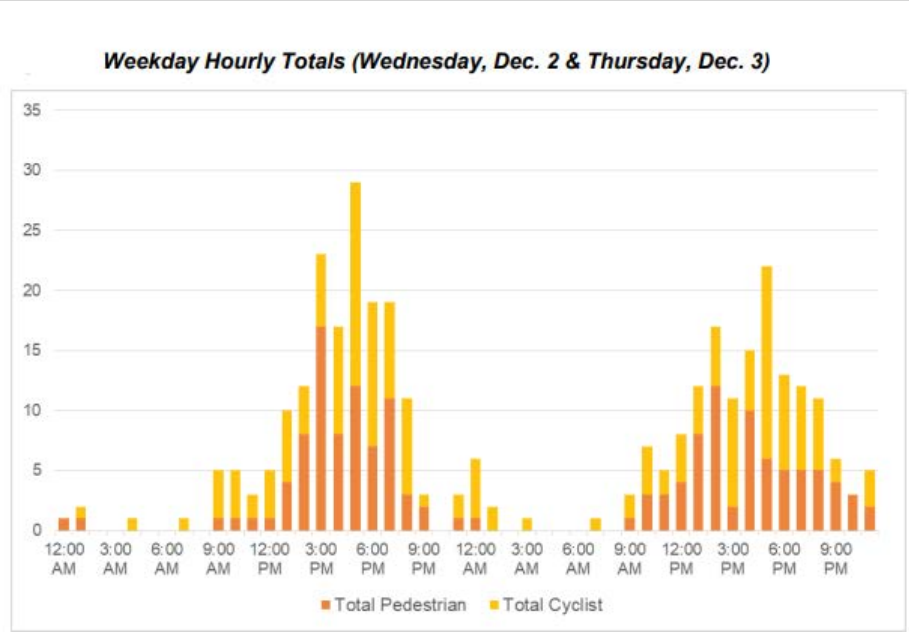
- Time Period: November 23-December 6, 2020
- Location: Mary's River/Crystal Lake Path
- Similar volume traveling north and south

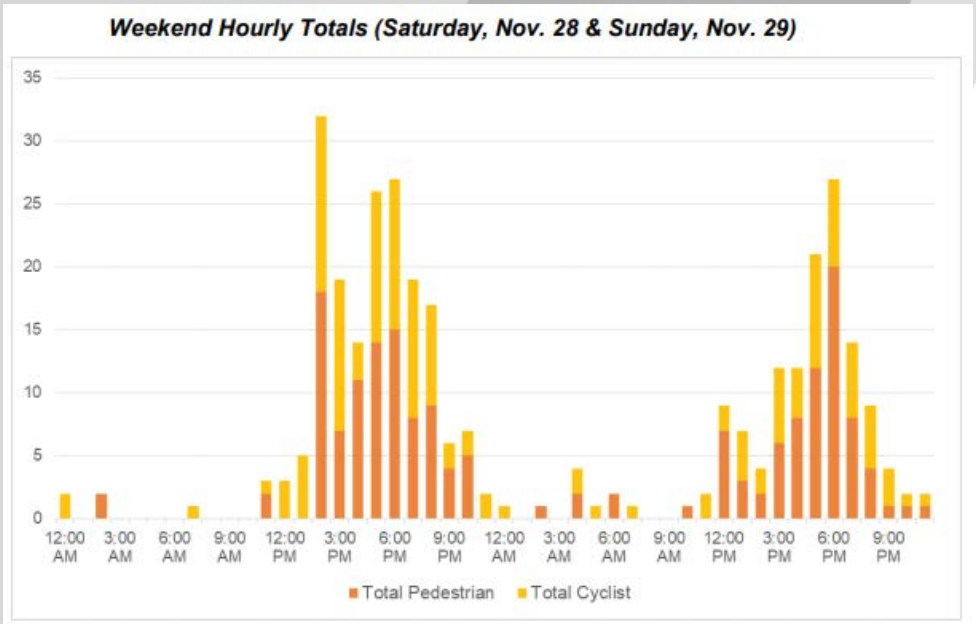
Two Week Count Totals

	Total Pedestrian	Total Cyclist	Combined Total
TOTALS	1,171	1,159	2,330
PERCENTAGE	50.3%	49.7%	100%

Bicycle and Pedestrian Volumes

- High volumes mid-day through evening for both weekend and weekday

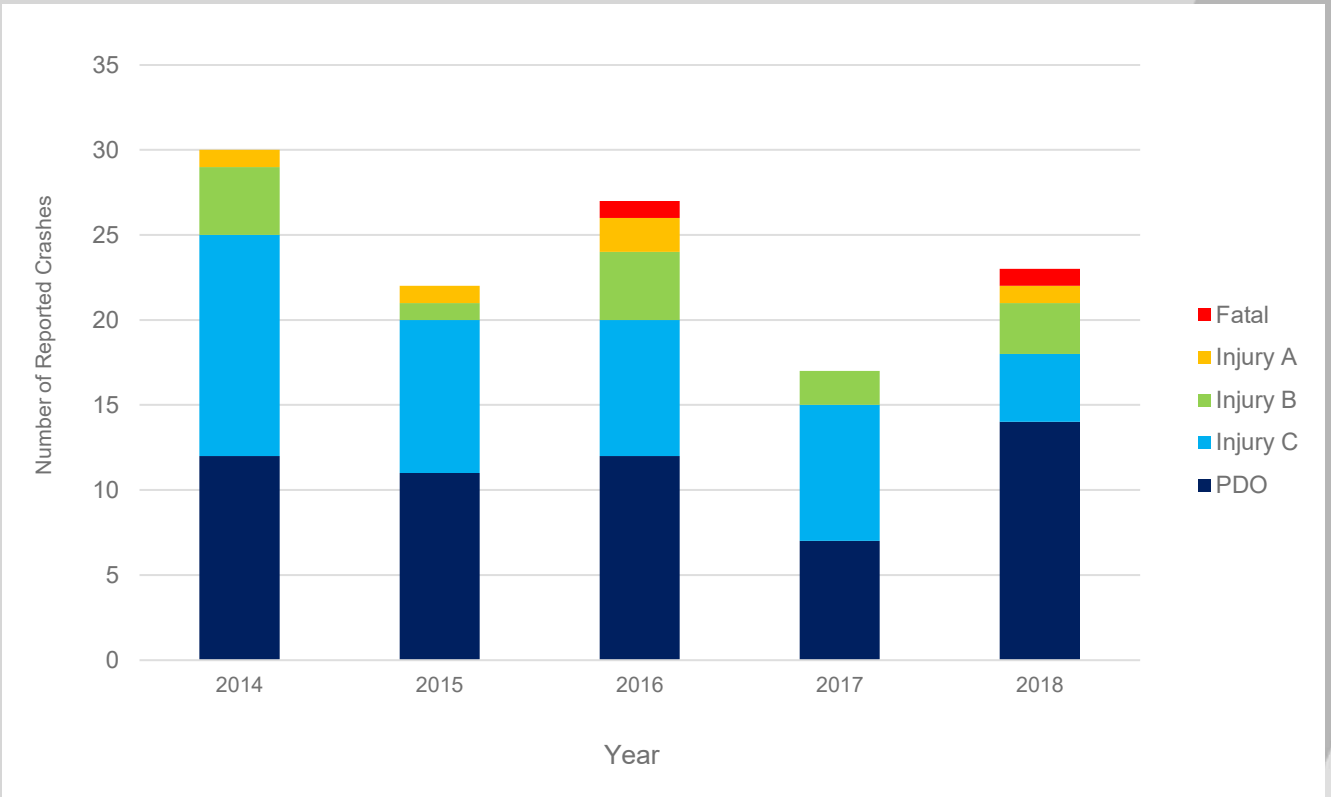




Crash Data 

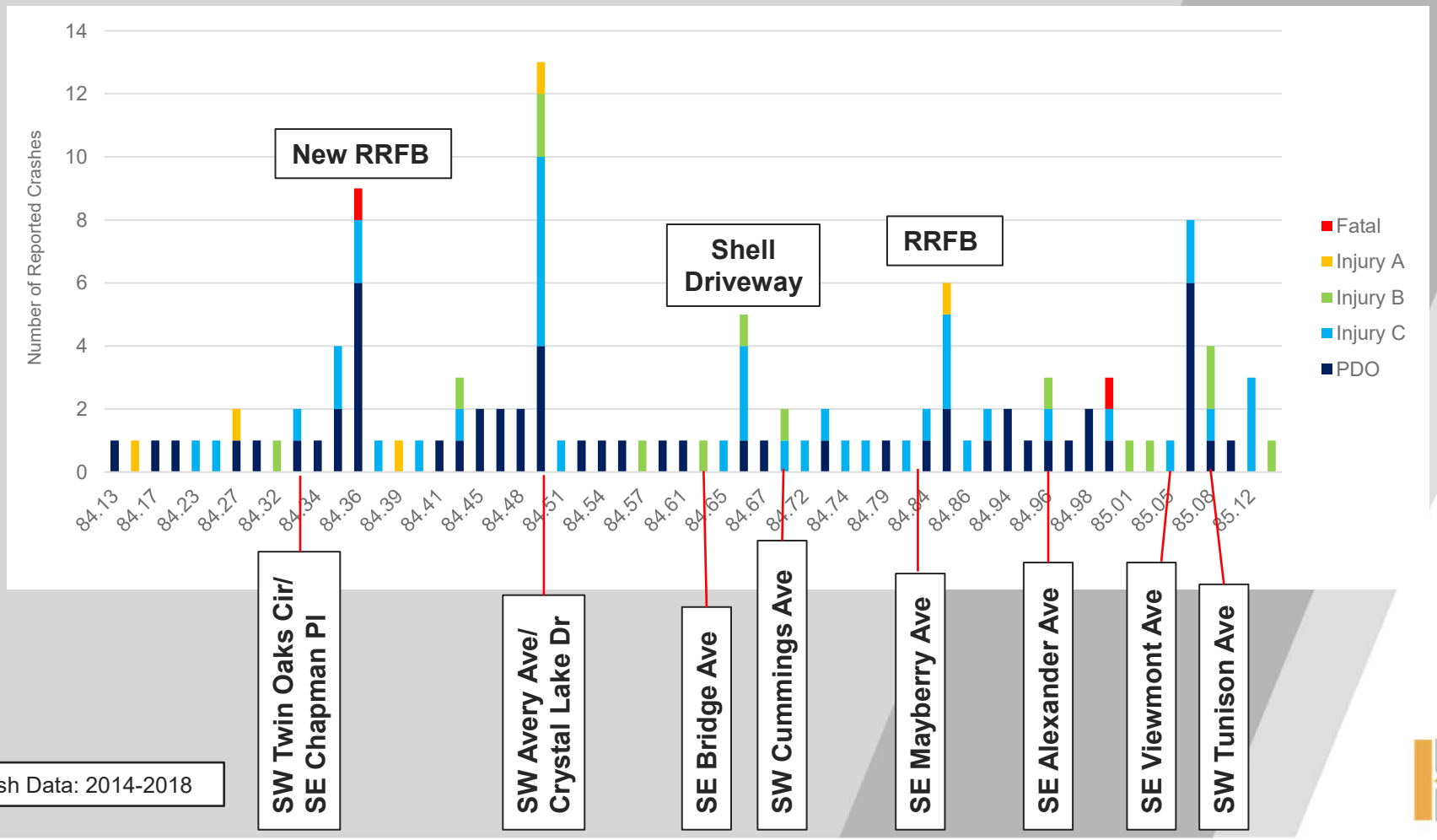
- Approximately: SW C Avenue to SW Richland Ave (mile posts 84.1 to 85.2)
- 2014 – 2018 ODOT Crash Data
  - 119 total crashes
- 2019 – 2020 Preliminary and Anecdotal Data
- Crash Severity Types:
  - Fatal
  - Injury A: Suspected serious, but non-fatal injury
  - Injury B: Suspected minor injury
  - Injury C: Suspect injury, but neither minor no serious
  - PDO: Property Damage Only

Crash Data: Year



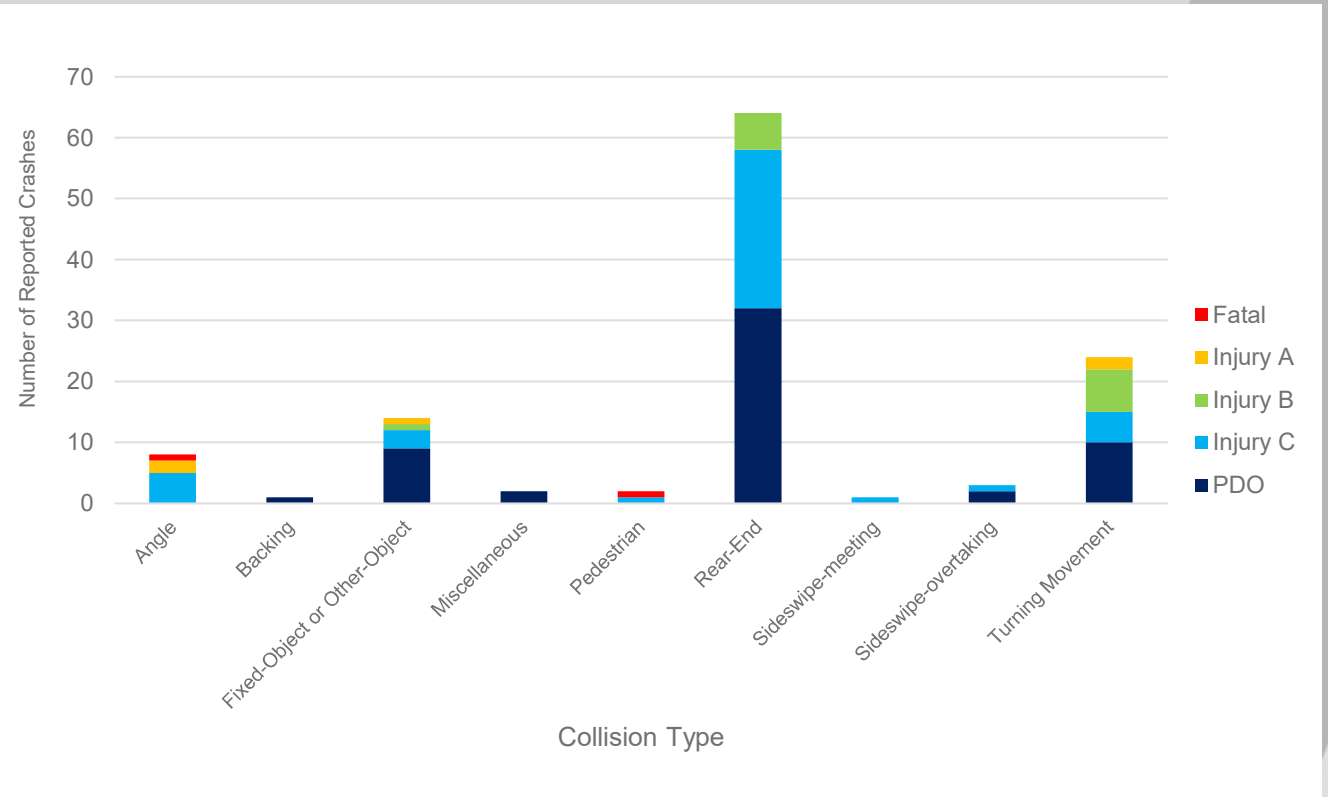
Crash Data: 2014-2018

Crash Data: Crash Severity by Milepost



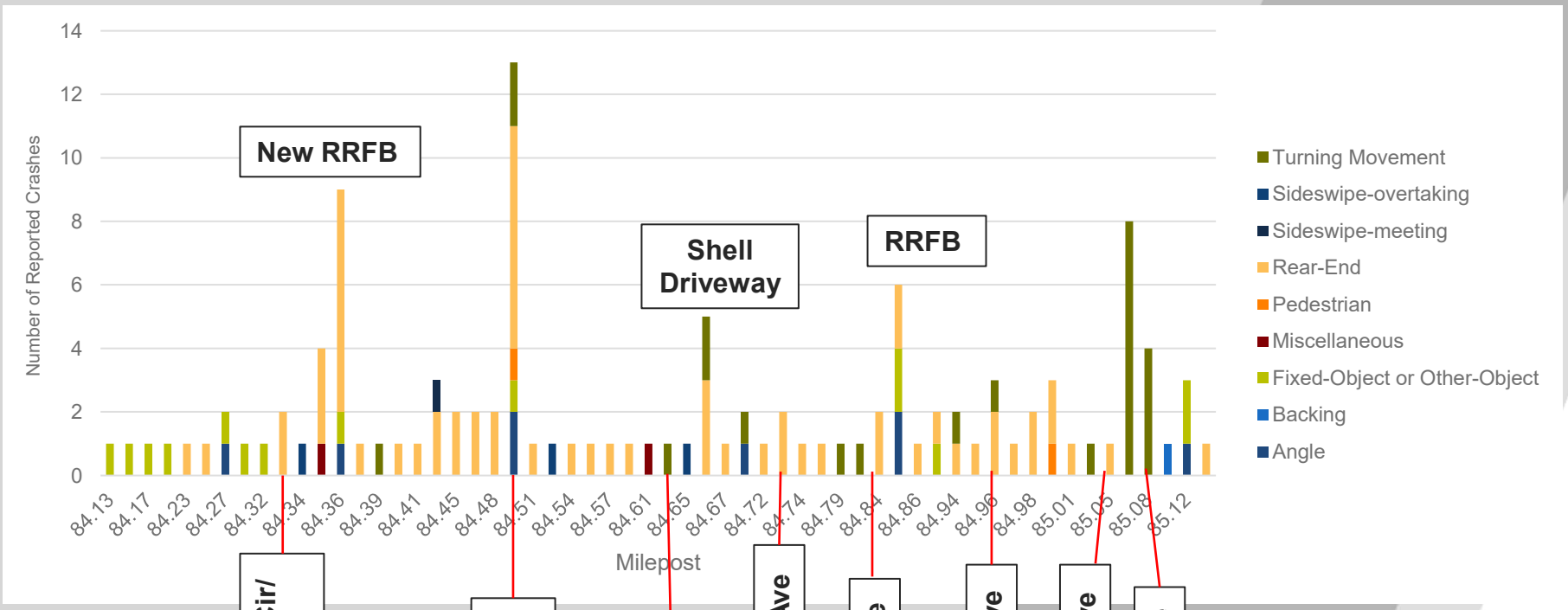
Crash Data: 2014-2018

Crash Data: Collision Type



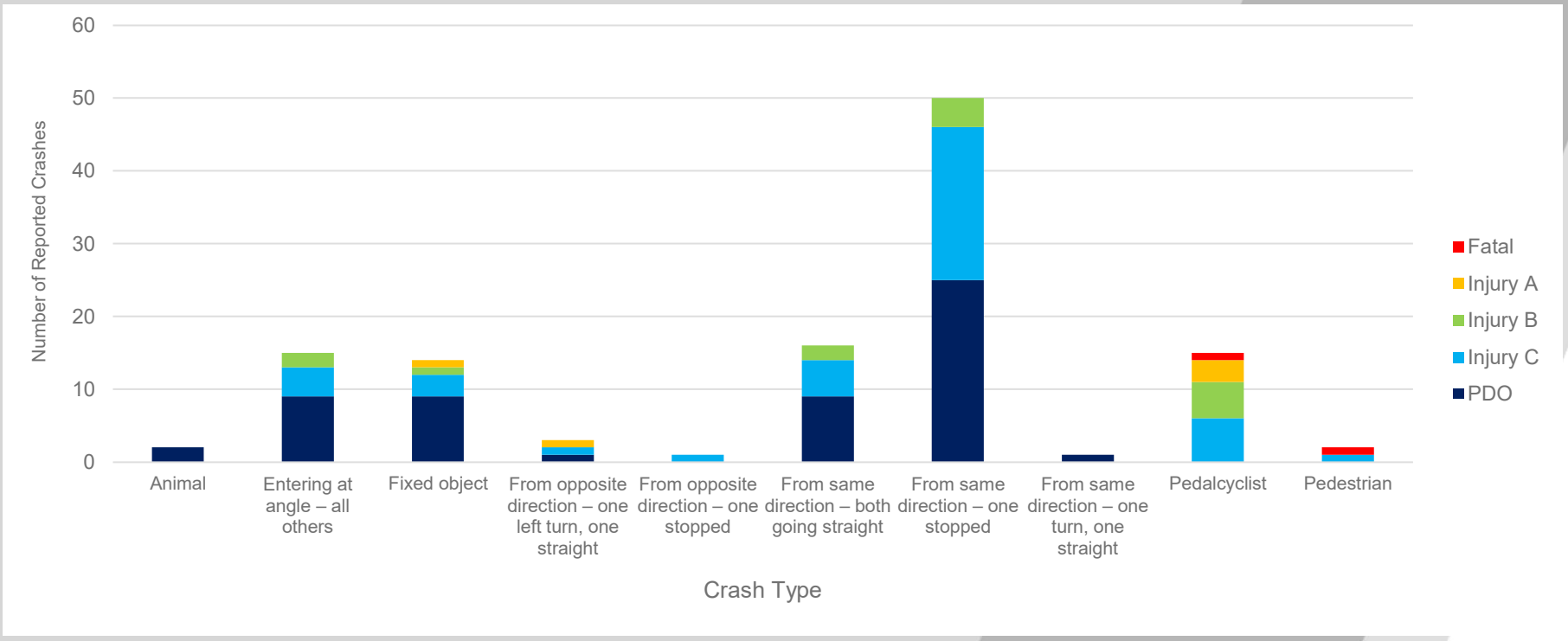
Crash Data: 2014-2018

Crash Data: Collision Type by Milepost



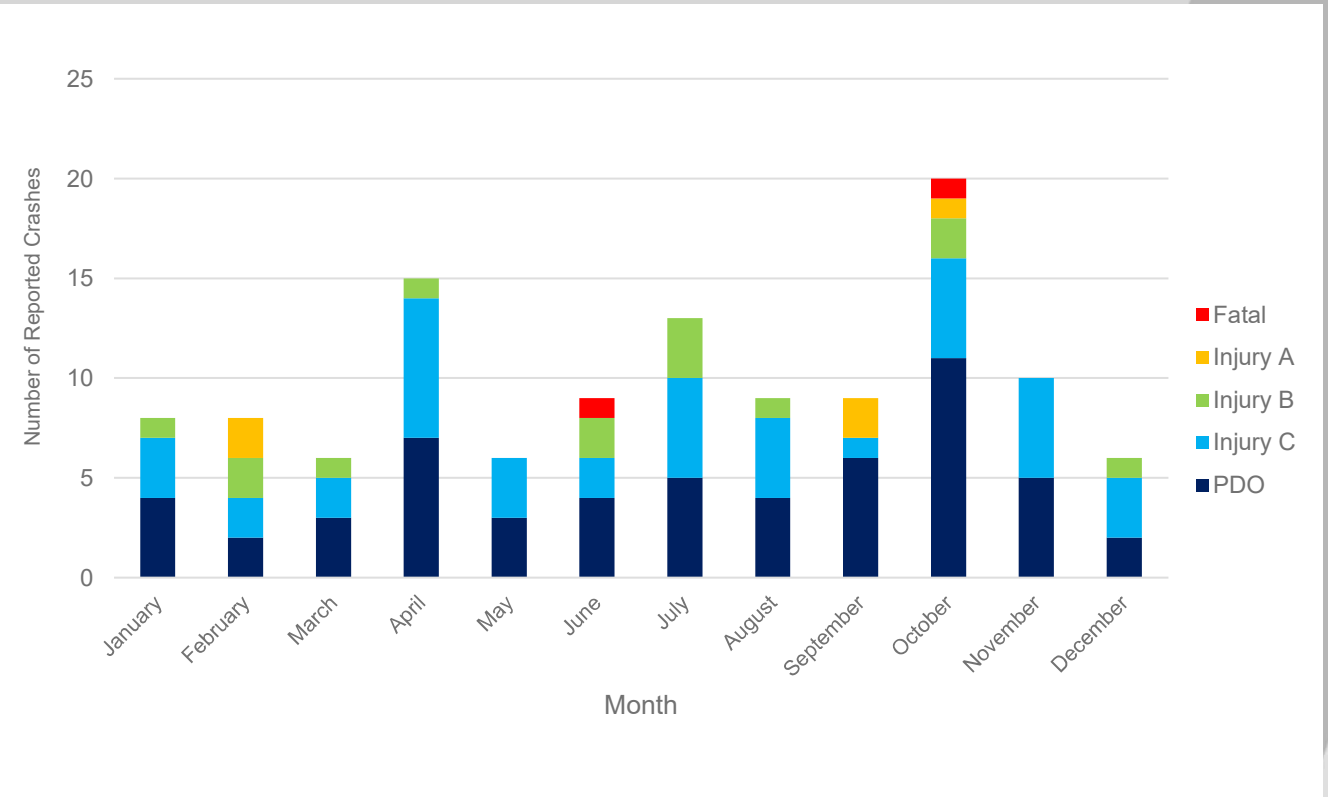
Crash Data: 2014-2018

Crash Data: Crash Type



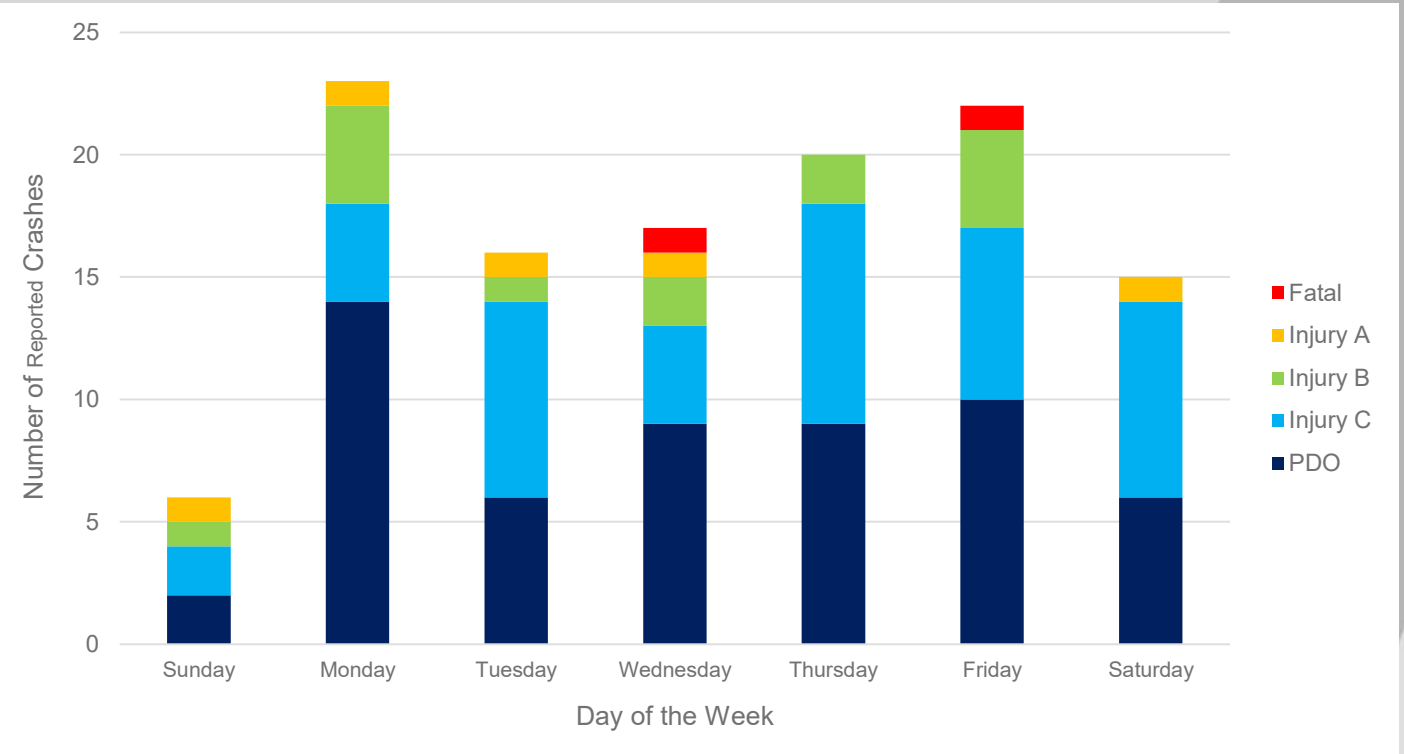
Crash Data: 2014-2018

Crash Severity & ADT by Month



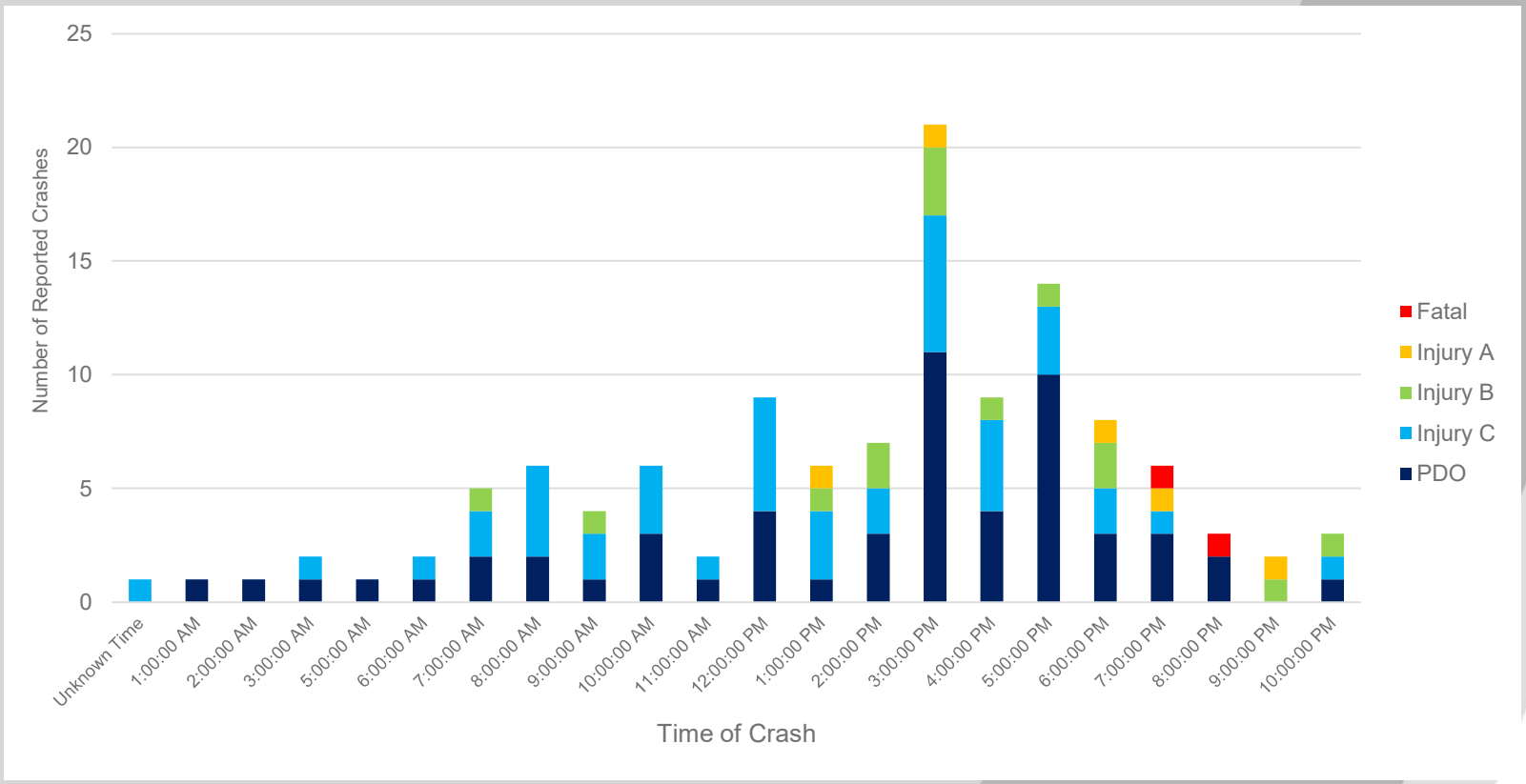
Crash Data: 2014-2018

Crash Severity & ADT by Day of Week



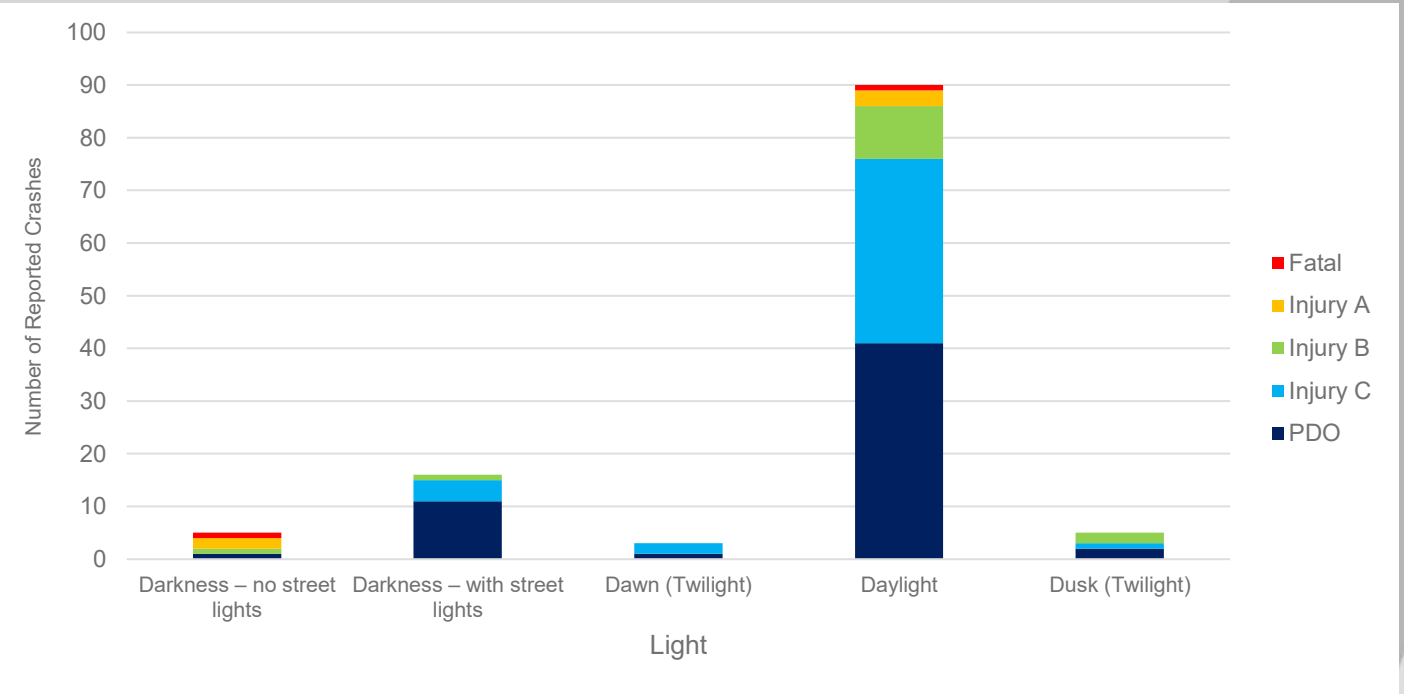
Crash Data: 2014-2018

Crash Severity by Time of Day



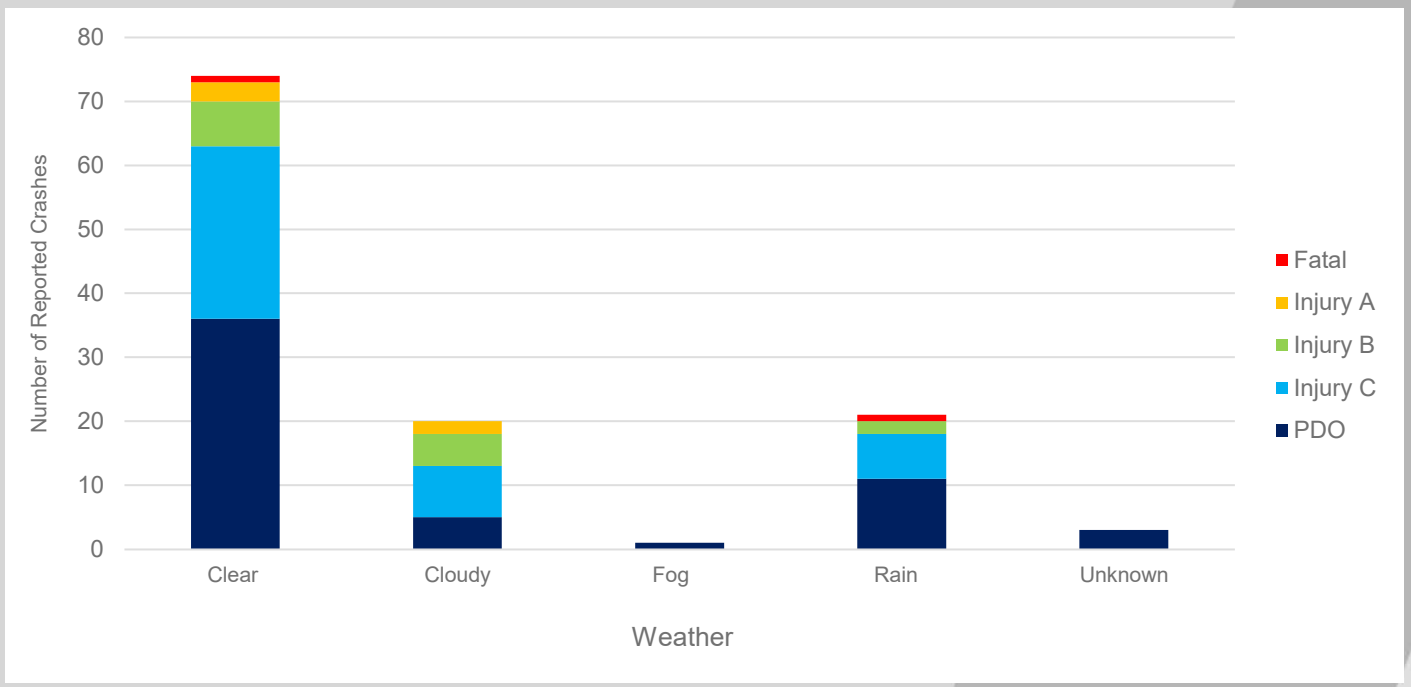
Crash Data: 2014-2018

Crash Severity by Light Conditions



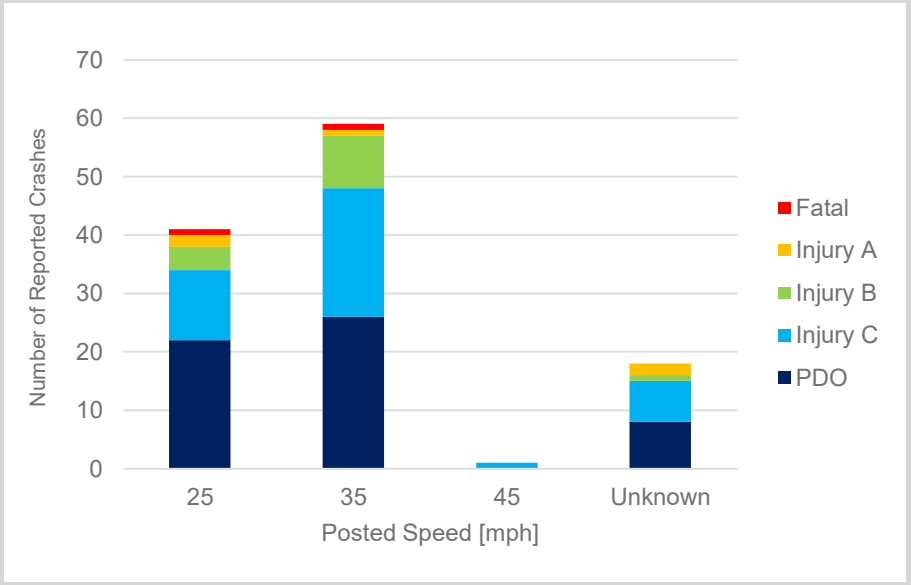
Crash Data: 2014-2018

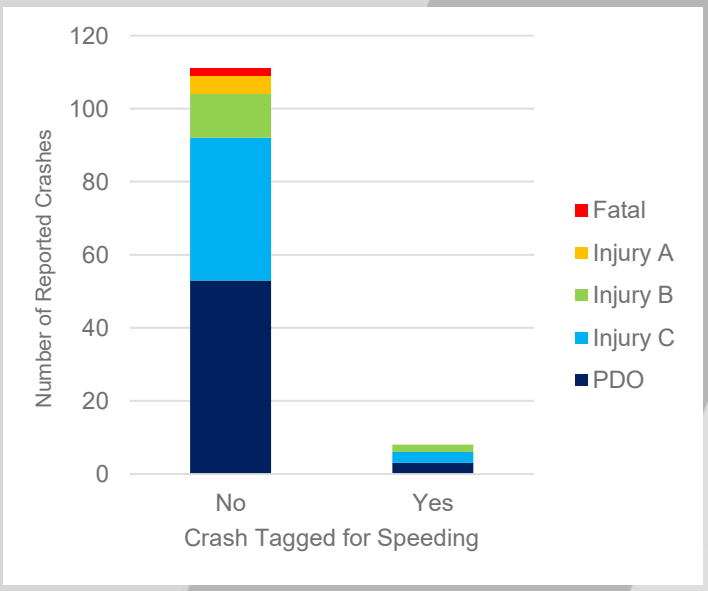
Crash Severity by Weather Type



Crash Data: 2014-2018

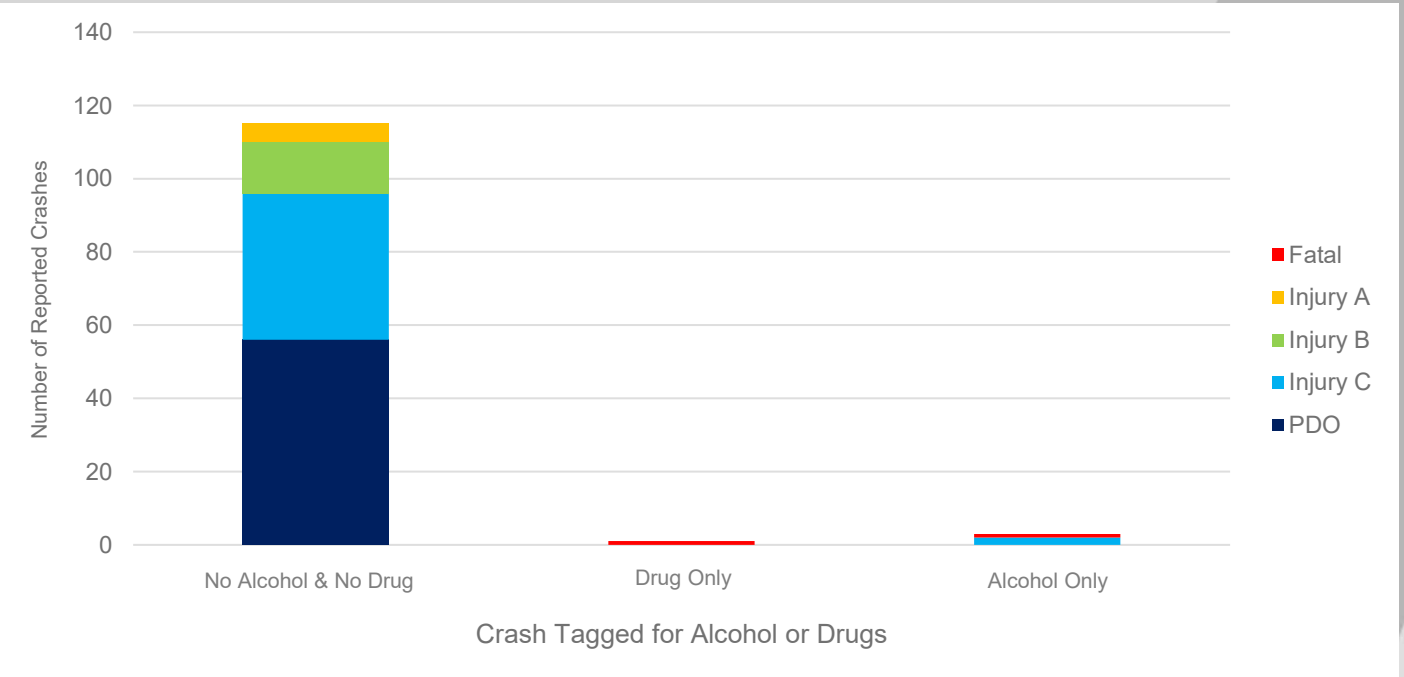
Crash Severity by Speed





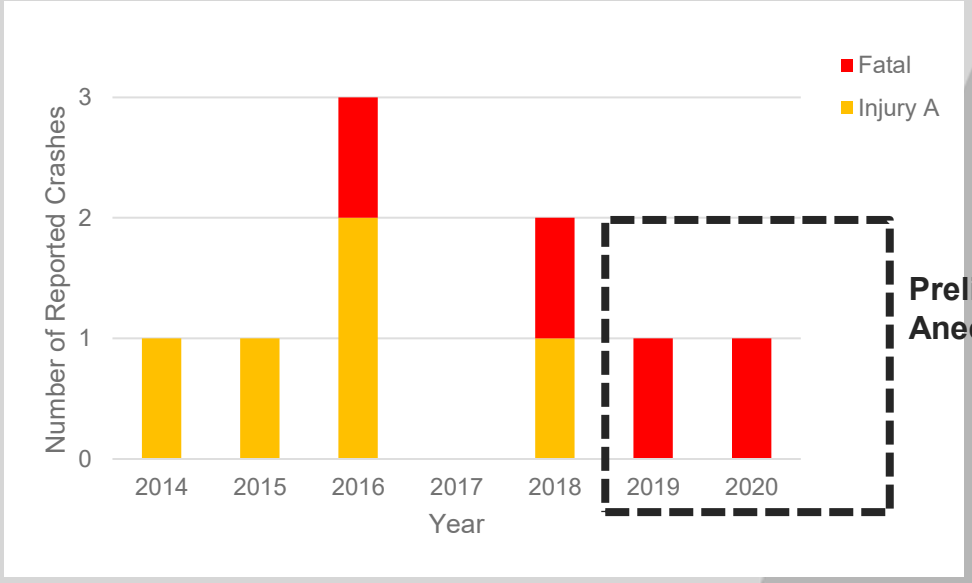
Crash Data: 2014-2018

Crash Severity by Drugs & Alcohol



Crash Data: 2014-2018

Injury A & Fatal Crashes (2014-2020)



Bike and Ped crashes (2014-2020)

*** 2019 & 2020 data of injury B & C crashes is unavailable**

Summary

- Large percentages of rear-end end crashes (54%)
- 18% of crashes are related to darkness
- Many rear-end collisions at intersections and at pedestrian crossings
  - Intersection with Crystal Lake Drive and the new RRFB location have the most crashes
- Most crashes occur on weekdays, between 3PM and 6PM, corelating with school release and PM peak
- Months with the highest numbers of crashes: October, April, July
- 14% of total and 71% of high severity crashes involve pedestrians and bicyclists (2014-2018 data)
  - One pedestrian and one bicyclist fatality in 2019 & 2020
- Most crashes occur in daylight
  - High severity injury crashes mainly occur in the dark
- Both fatal crashes (2014-2018 data) were tagged for alcohol or drug

Discussion

Logistics

- Stakeholders are welcome to leave- see you Friday at 1PM!

Timeframe		Thursday, December 17	Friday, December 18
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		Morning Peak Period Site Visit
8:00 AM	9:00 AM		
9:00 AM	10:00 AM	Kick-Off Meeting	Work Session
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	
1:00 PM	2:00 PM	Worksession: 1:30-3:30	Close-Out Meeting
2:00 PM	3:00 PM		
3:00 PM	4:00 PM		
4:00 PM	5:00 PM	Evening Peak Period Site Visit (4:30-5:45)	
5:00 PM	6:00 PM		
6:00 PM	7:00 PM		
7:00 PM	8:00 PM	Nighttime Site Visit	
8:00 PM	9:00 PM		
9:00 PM	10:00 PM		

Logistics

- For access to northern part of corridor:
  - Park at Papa's Pizza Parlor (1030 SW 3rd St)
- For access to northern part of corridor:
  - Street parking on SW Tunison Ave or SE Mayberry Ave
- Small groups:
  - **Hermanus**, James, Eliseo, Josh
  - **Camilla**, Jenna, Aaron, Katie
  - **Amanda**, Guy, Lisa, Steve
- Designate one spotter per group to watch for traffic
- Safety vests
- All team members are expected to participate, take notes, and take photos/videos
- Teams chat- phone access
- Sharepoint- upload photos/videos

Appendix 2 Closeout Presentation

DATE **12/22/2020**

ROAD SAFETY AUDIT

OR-99W: SW C AVENUE TO SW RICHLAND AVENUE

KITTELSON & ASSOCIATES

Outline

- RSA Schedule
- Overview of Road Safety Audit (RSA) Process
- RSA Team, Resources, and Stakeholders
- Study Background
- Review of Traffic Volumes and Crash Data
- Preliminary Findings
  - Identified Issues
  - Brainstormed Solutions*

*Solutions provided in this presentation have not been reviewed for feasibility.

RSA Schedule

Timeframe		Thursday, December 17	Friday, December 18
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		Morning Peak Period Site Visit
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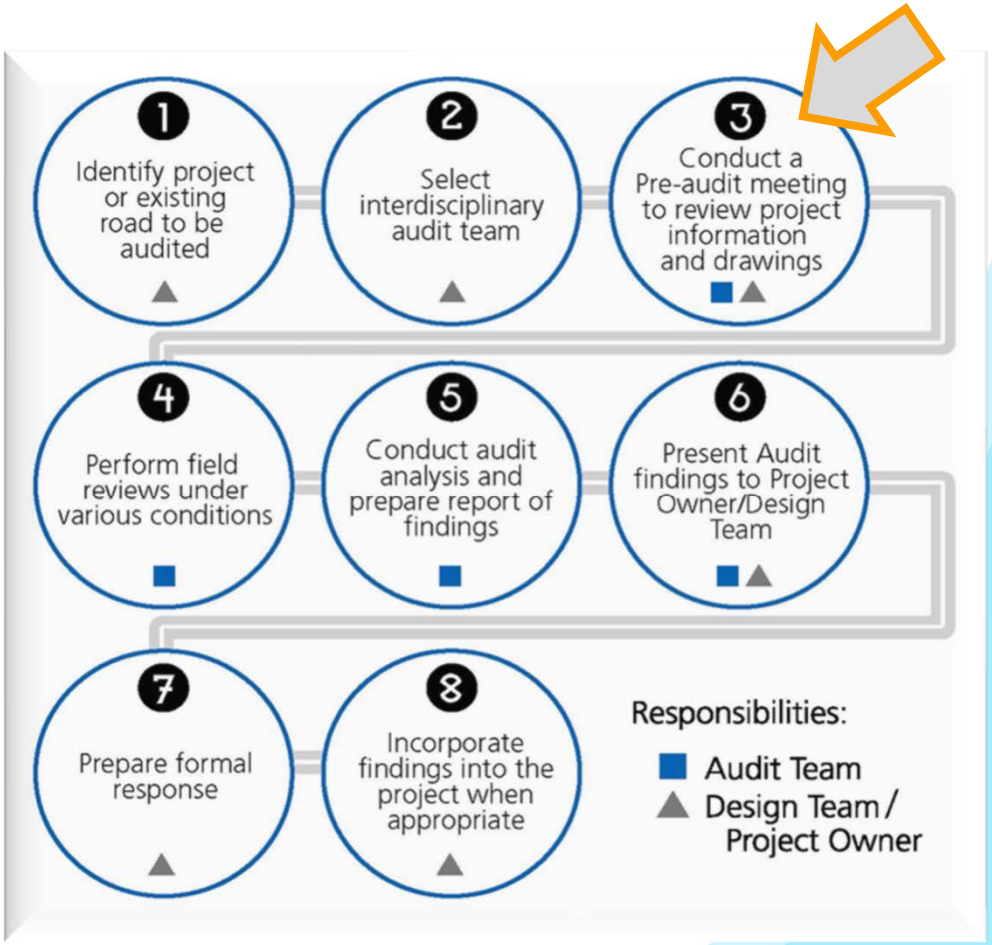
9:00 PM	10:00 PM		

FHWA RSA Process



RSA Safety Analysis Approach

Crash Data Analysis

- *Crash data obtained for 2014 – 2018 (partial information for 2019-2020)*
- *Crash data reviewed to identify trends*

Field Work & Team Work Sessions

- *Site observations to understand geometric characteristics and driver behavior*
- *Identify issues and relative risk based on observations and data*

Identification of Suggestions

- *Treatments to address issues*
- *Prioritized based on ease of implementation and effectiveness*

RSA Team & Resources

- James Feldmann
  - ODOT Planning
- Amanda Salyer
  - ODOT Traffic
- Jenna Berman
  - ODOT Active Transportation Liaison
- Katie Brown
  - ODOT PDAD
- Eliseo Lemus
  - ODOT Roadway
- Guy Mamac
  - ODOT Maintenance
- Aaron Manley
  - Corvallis Public Works
- Josh Capps
  - Corvallis Active Transportation Program Specialist
- Lisa Scherf
  - Corvallis Transit
- Steve Dobrinich
  - Corvallis Area MPO
- **Camilla Dartnell**
  - **Kittelson, Engineering Associate**
- **Hermanus Steyn**
  - **Kittelson, Senior Principal Engineer**

RSA Stakeholders

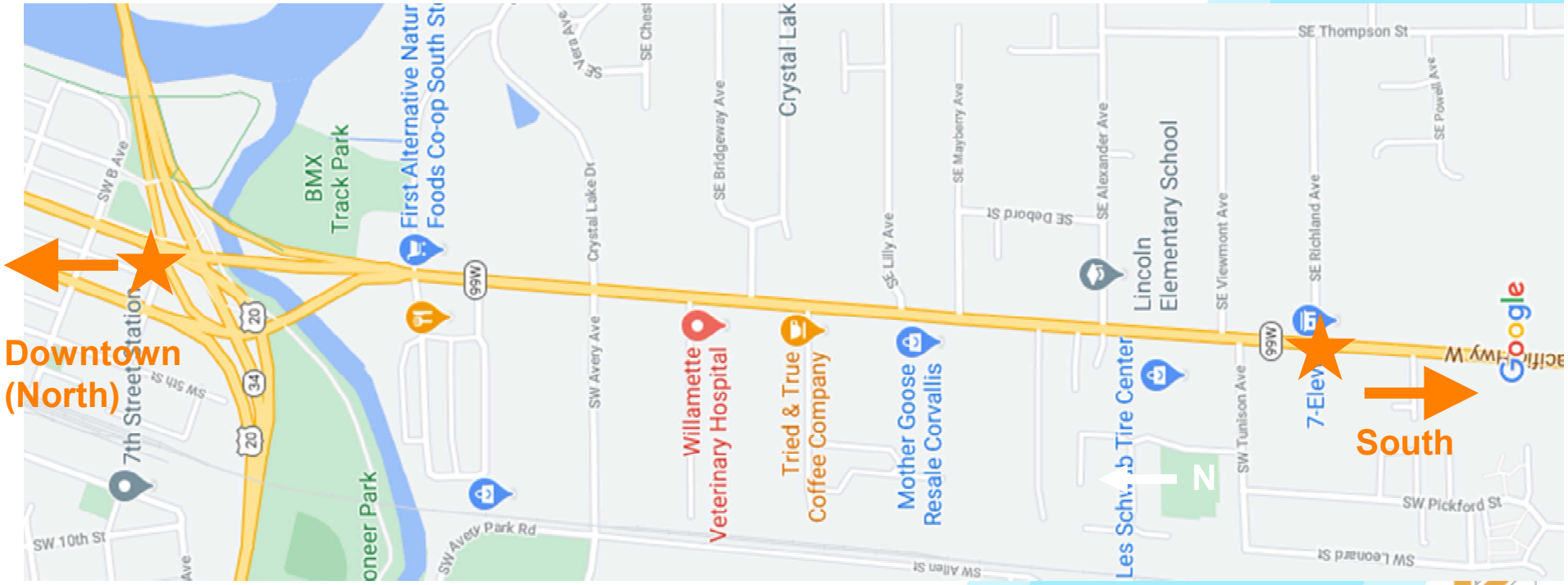
- Brian Morey
  - ODOT Maintenance
- Greg Gescher
  - Corvallis Public Works
- Kristie Gladhill
  - ODOT TPAU
- Joel Goodwin
  - Corvallis Police Department
- Kevin Fulsher
  - Corvallis Fire Department
- Ben Janes
  - Corvallis Fire Department
- Chad Gordon
  - Corvallis Public Works Maintenance
- Nick Meltzer
  - Corvallis Area MPO
- Hyatt Lytle
  - Corvallis City Council
- Penny York
  - Corvallis Planning Commission
- Sarah Bronstein
  - Oregon State University
- Kim Patton
  - Corvallis School District
- Rebecka Weinsteiger
  - DenNW
- Simon Date
  - Corvallis Chamber of Commerce
- Cindee Lolik
  - Corvallis Business Representative

RSA Stakeholders

- Bret Davis
  - Corvallis Business Representative
- Bruce Austin
  - South Corvallis Resident
- Rian Amiton
  - South Corvallis Resident
- Patrick Chappell
  - Avery Help Neighborhood

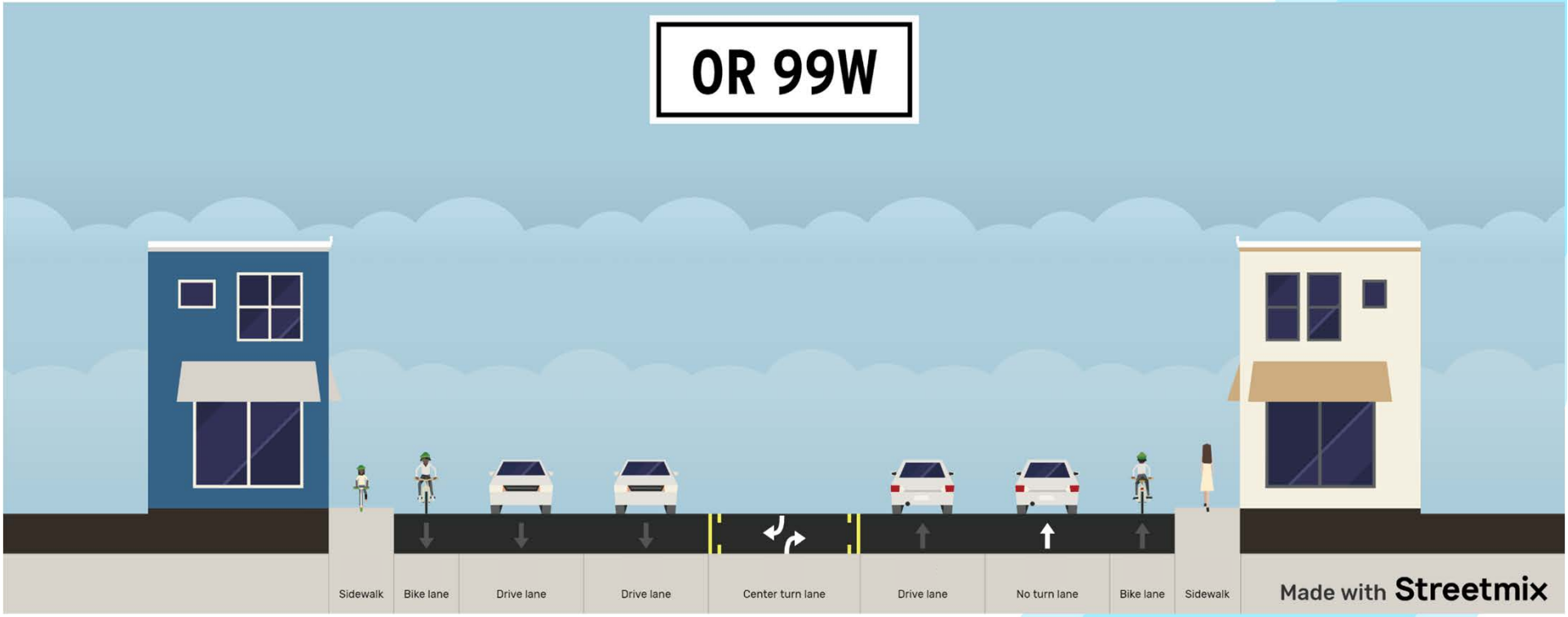
Study Background

- **Corridor:** OR-99W from SW C Avenue to SW Richland Avenue
- **Purpose:** Identify potential safety enhancements



Corridor Limits

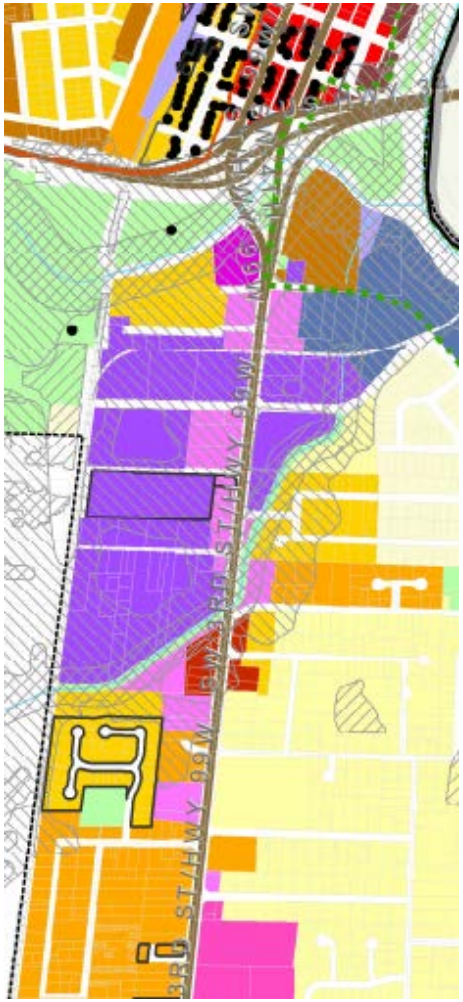
Roadway Section



Speed


25MPH
30MPH
35MPH
School Zone
20 mph
SW C Ave
SE Chapman Pl
SE Crystal Lake Dr
SW Cummings Ave
SE Lilly Ave
SE Mayberry Ave
SE Alexander Ave
SE Viewmont Ave
SE Richland Ave

Background Information: Land Use



RS-3.5 - Low Density Residential

RS-5 - Low Density Residential

RS-6 - Low Density Residential

RS-9 - Medium Density Residential

RS-12 - Medium-High Density Residential

RS-20 - High Density Residential

P-AO - Professional and Administrative Office

NC-Major - Major Neighborhood Center

NC-Minor - Minor Neighborhood Center

MUCS - Mixed Use Community Shopping

CB - Central Business

MUE - Mixed Use Employment

AG-OS - Agriculture - Open Space

Natural Resources
(refer to Significant Vegetation Area and Riparian Corridor & Wetlands maps)

Natural Hazards
(refer to Natural Hazards map)

Transit Information

- CTS Route 6– South Corvallis / Western / OSU

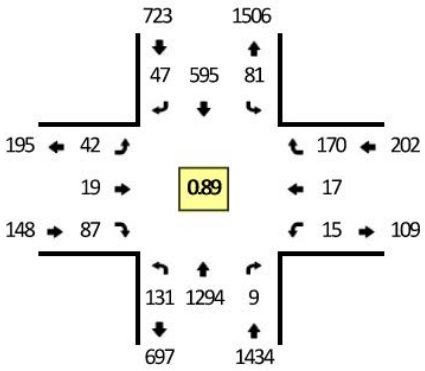
Transit Ridership

- Boarding and alighting data from 2019 / 2020 (January 1 – October 31)
  - Top 5 locations

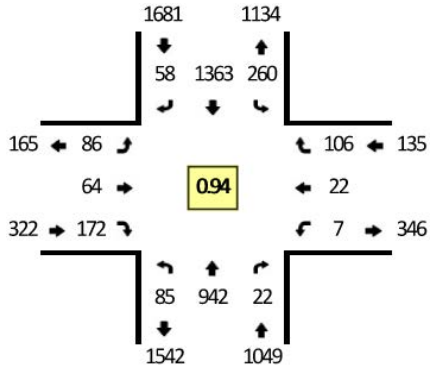
Traffic Data: Turning Movement Counts

★ OR 99W & Crystal Lake Dr

AM

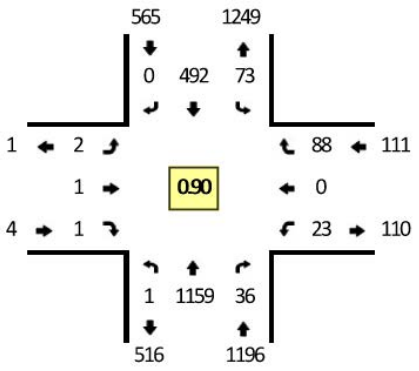


PM

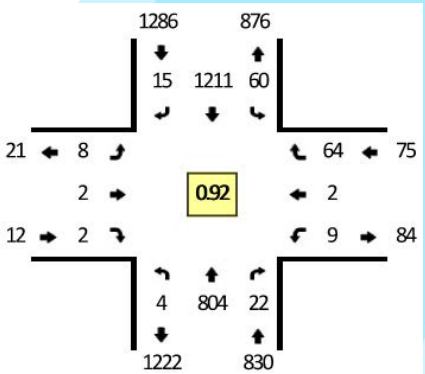


★ OR 99W & SE Alexander Ave

AM



PM



2017 Data

Bicycle and Pedestrian Volumes

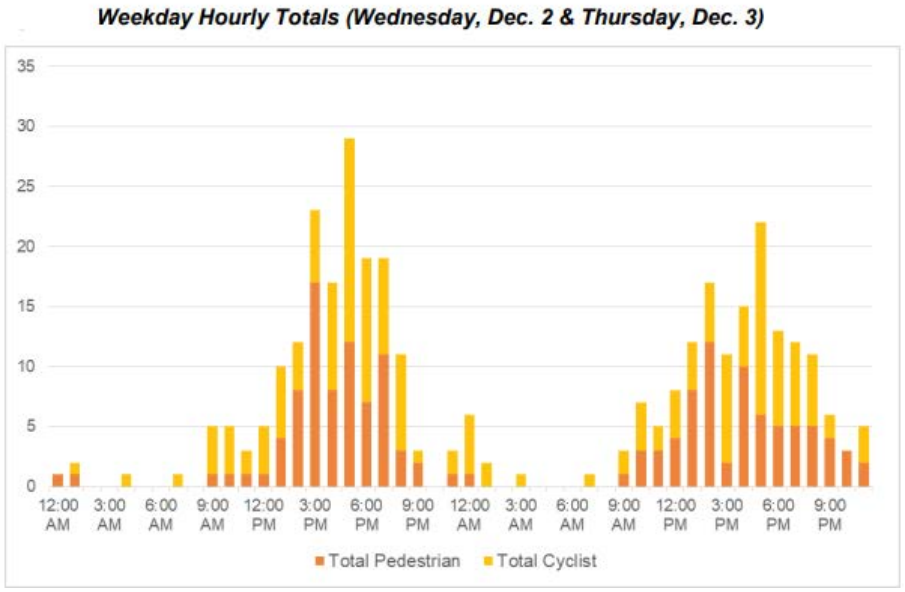
- Time Period: November 23-December 6, 2020
- Location: Mary's River/Crystal Lake Path
- Similar volume traveling north and south

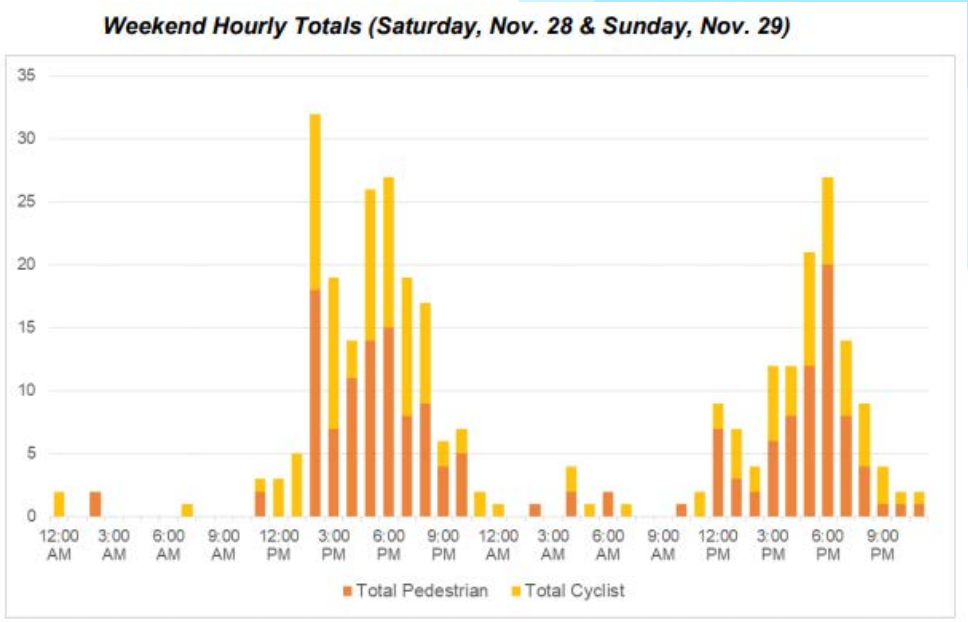
Two Week Count Totals

	Total Pedestrian	Total Cyclist	Combined Total
TOTALS	1,171	1,159	2,330
PERCENTAGE	50.3%	49.7%	100%

Bicycle and Pedestrian Volumes

- High volumes mid-day through evening for both weekend and weekday

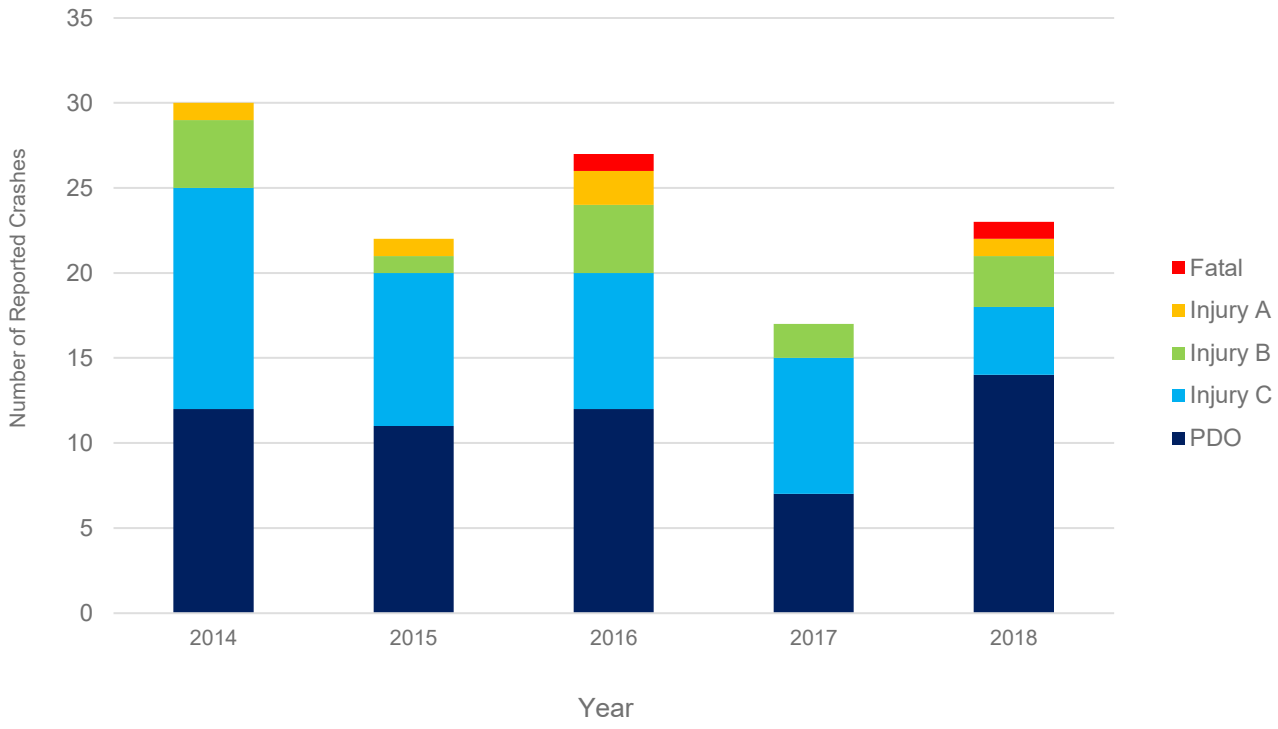




Crash Data 

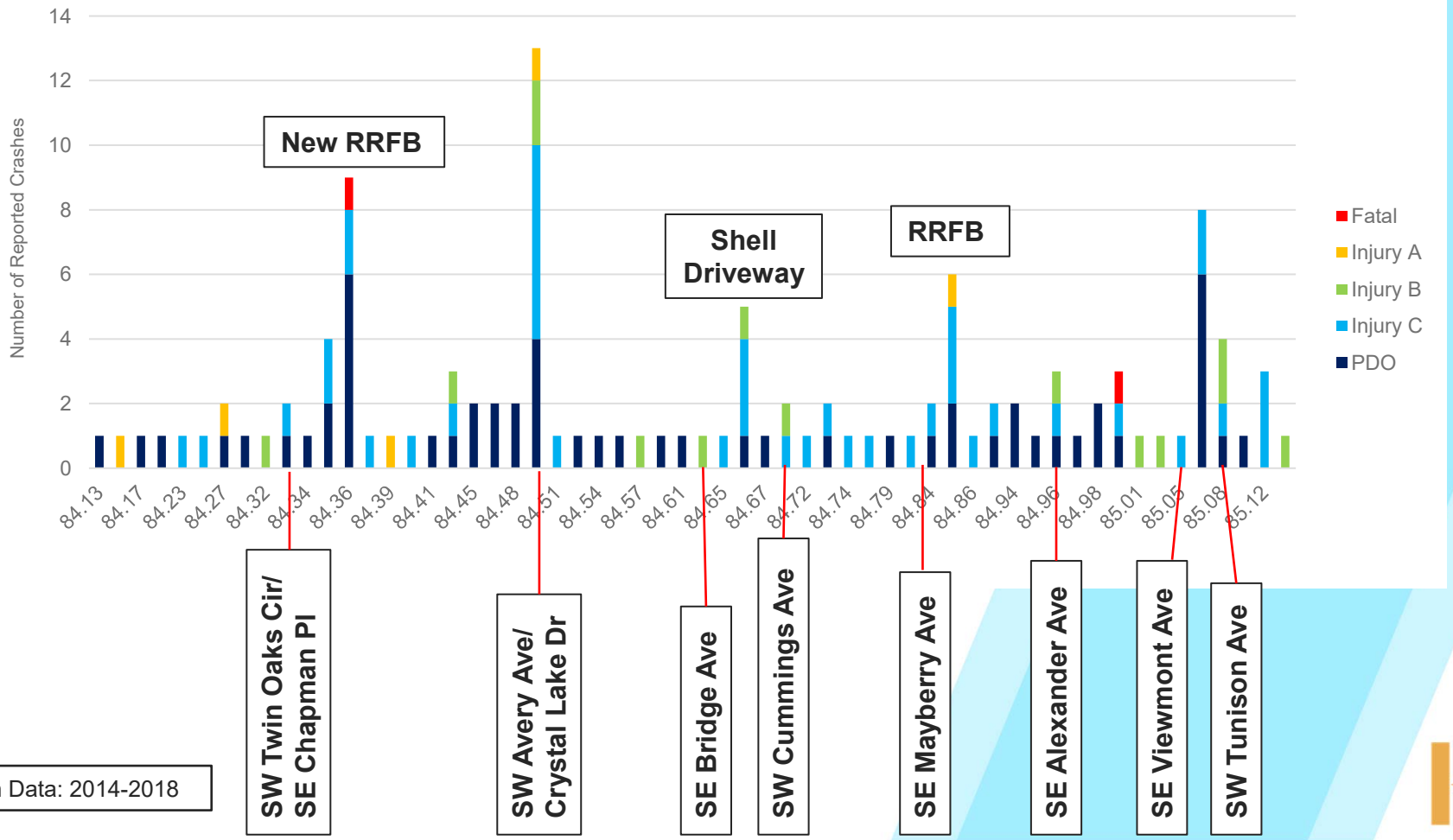
- Approximately: SW C Avenue to SW Richland Ave (mile posts 84.1 to 85.2)
- 2014 – 2018 ODOT Crash Data
  - 119 total crashes
- 2019 – 2020 Preliminary and Anecdotal Data
- Crash Severity Types:
  - Fatal
  - Injury A: Suspected serious, but non-fatal injury
  - Injury B: Suspected minor injury
  - Injury C: Suspect injury, but neither minor no serious
  - PDO: Property Damage Only

Crash Data: Year



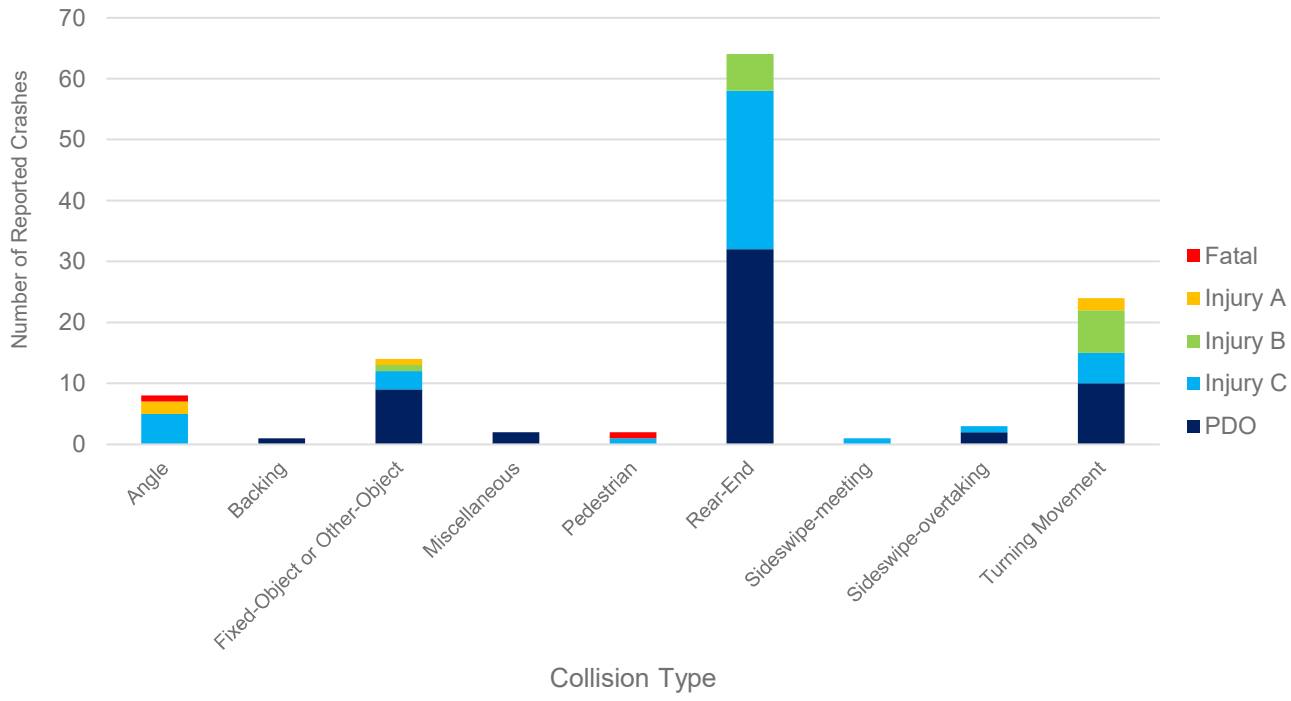
Crash Data: 2014-2018

Crash Data: Crash Severity by Milepost



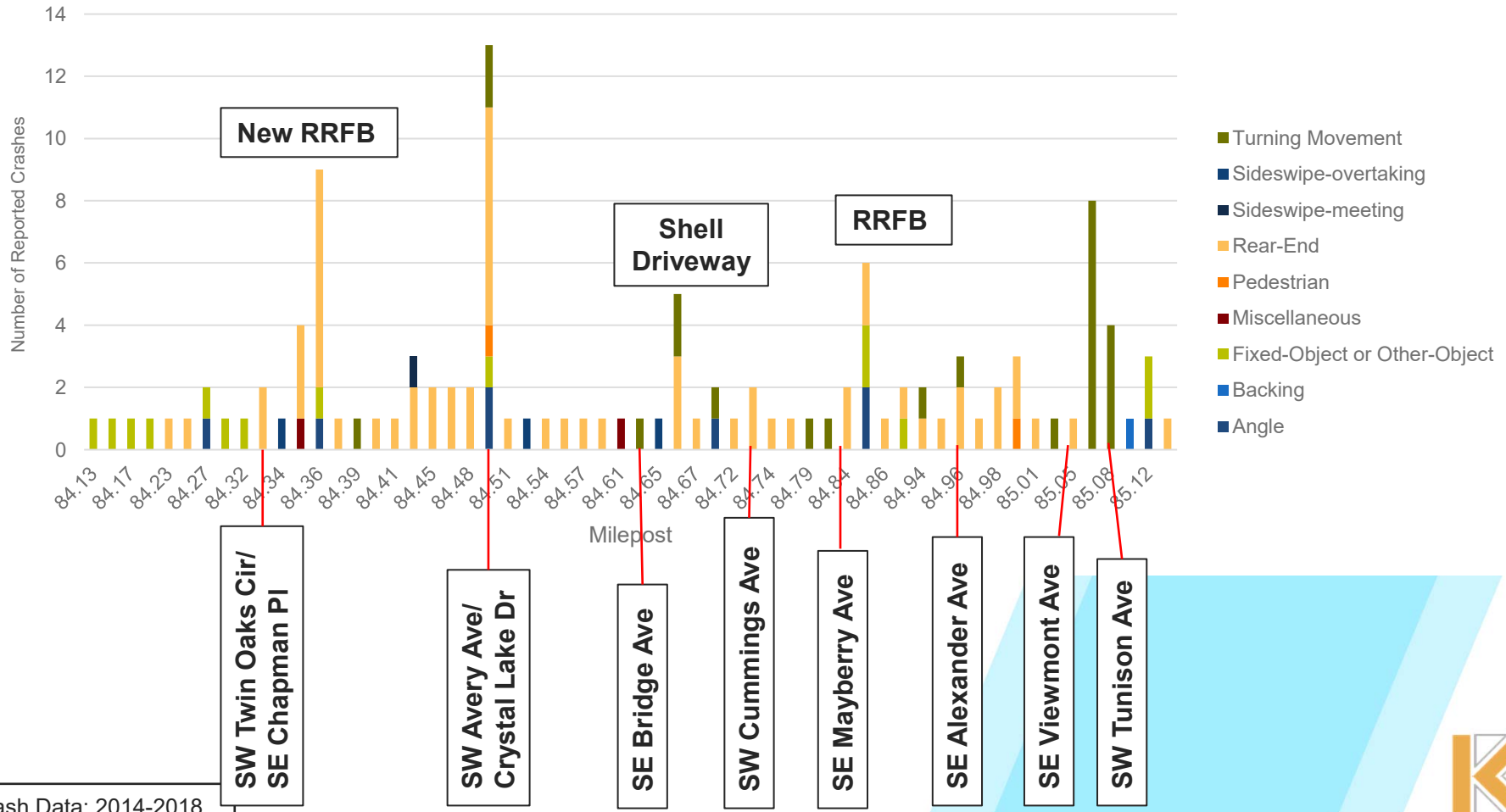
Crash Data: 2014-2018

Crash Data: Collision Type



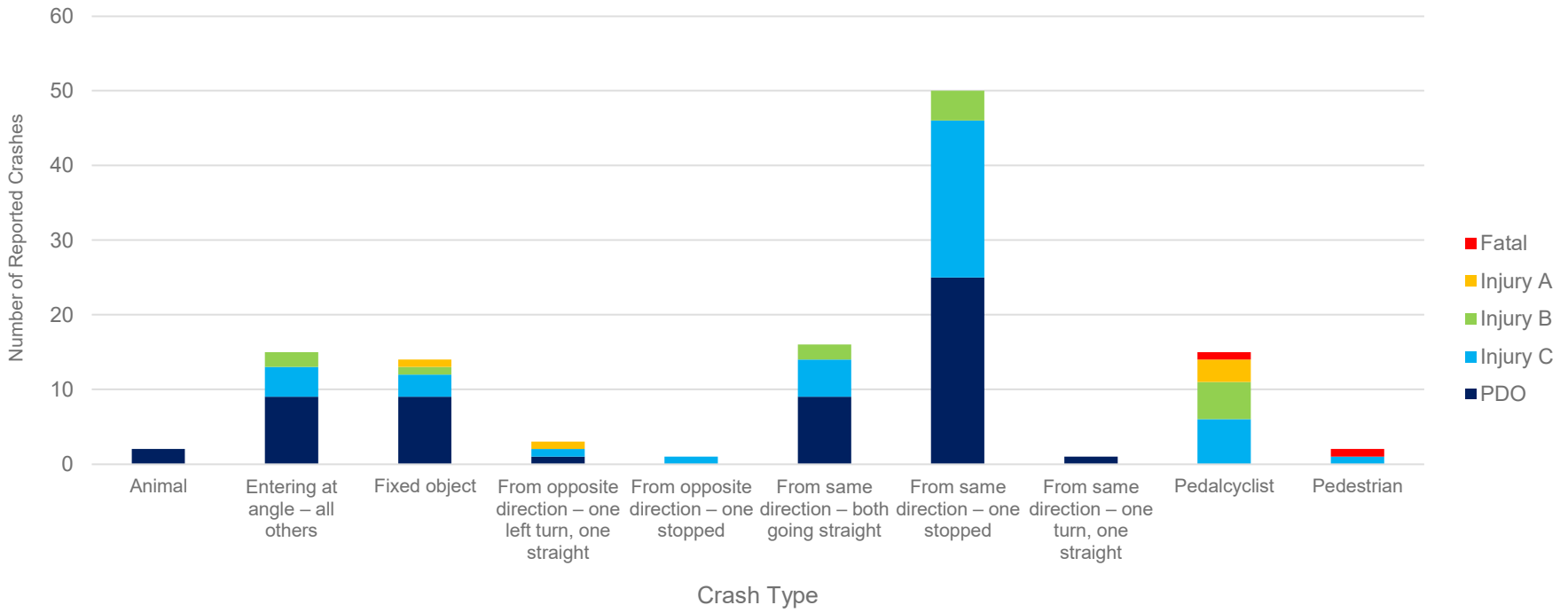
Crash Data: 2014-2018

Crash Data: Collision Type by Milepost



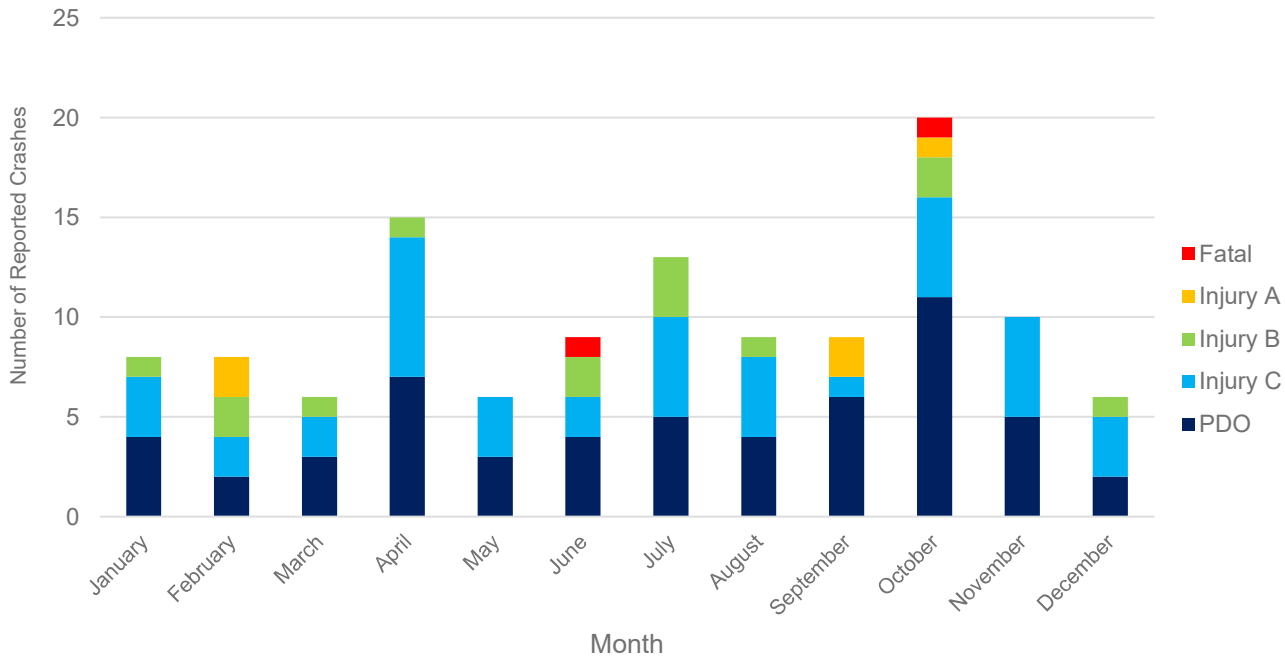
Crash Data: 2014-2018

Crash Data: Crash Type



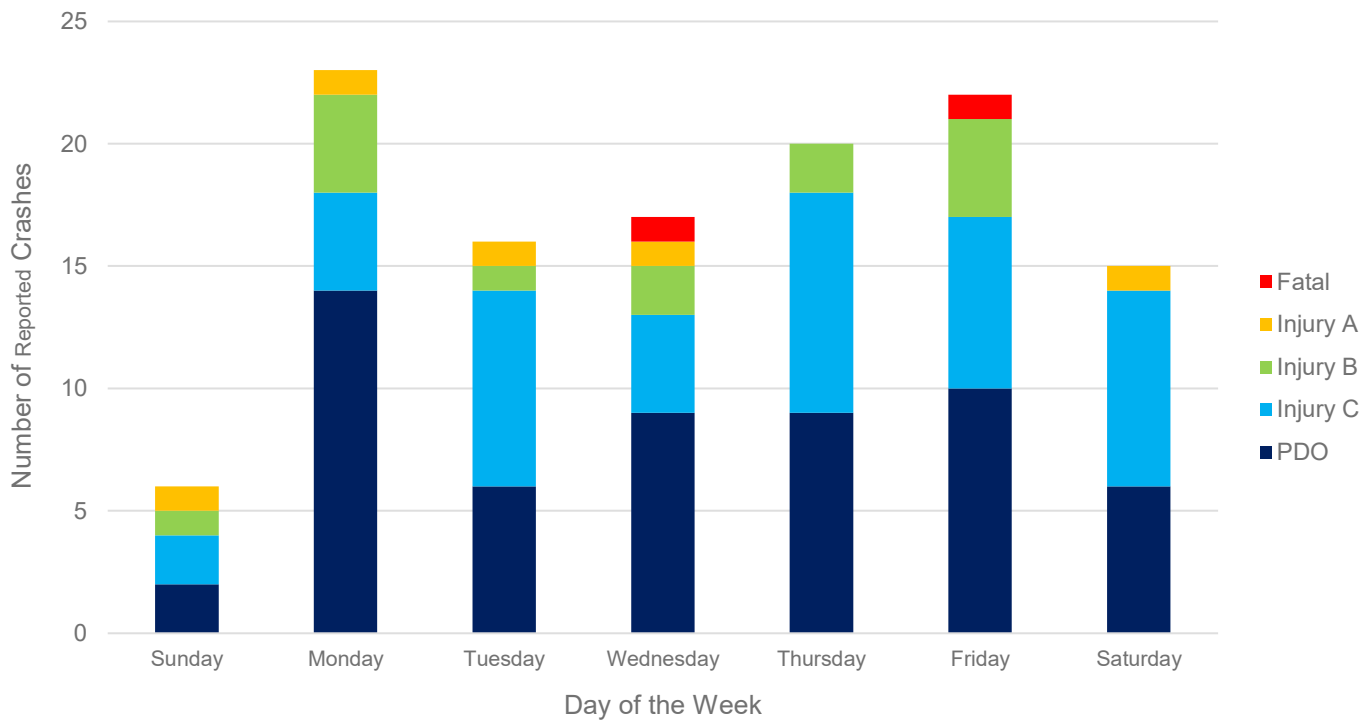
Crash Data: 2014-2018

Crash Severity by Month



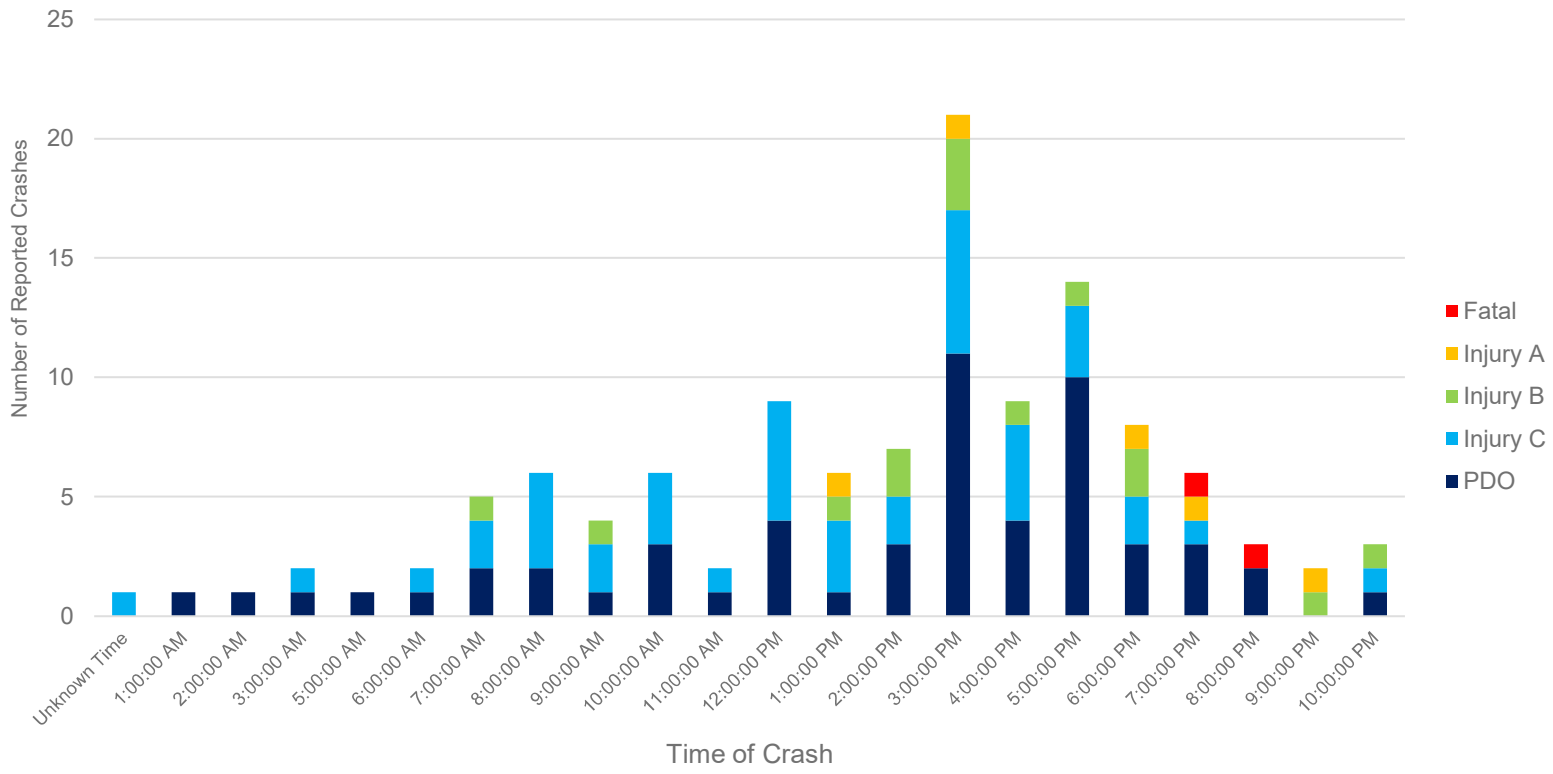
Crash Data: 2014-2018

Crash Severity by Day of Week



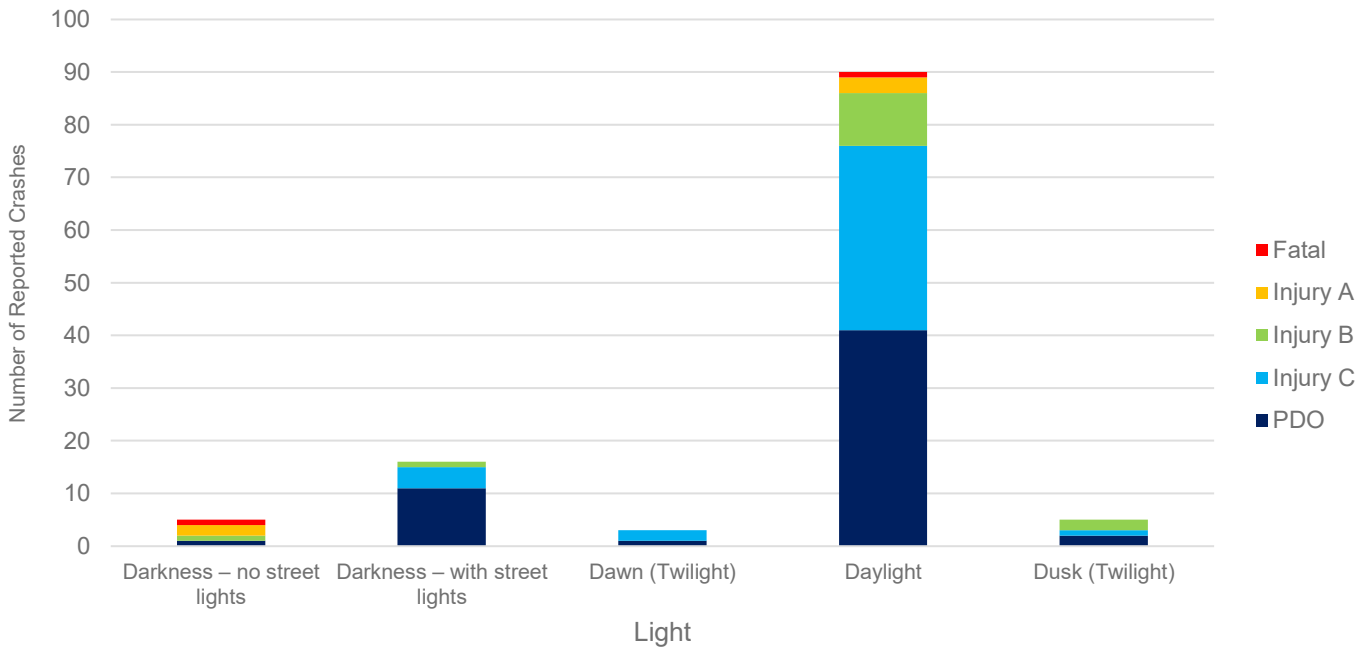
Crash Data: 2014-2018

Crash Severity by Time of Day



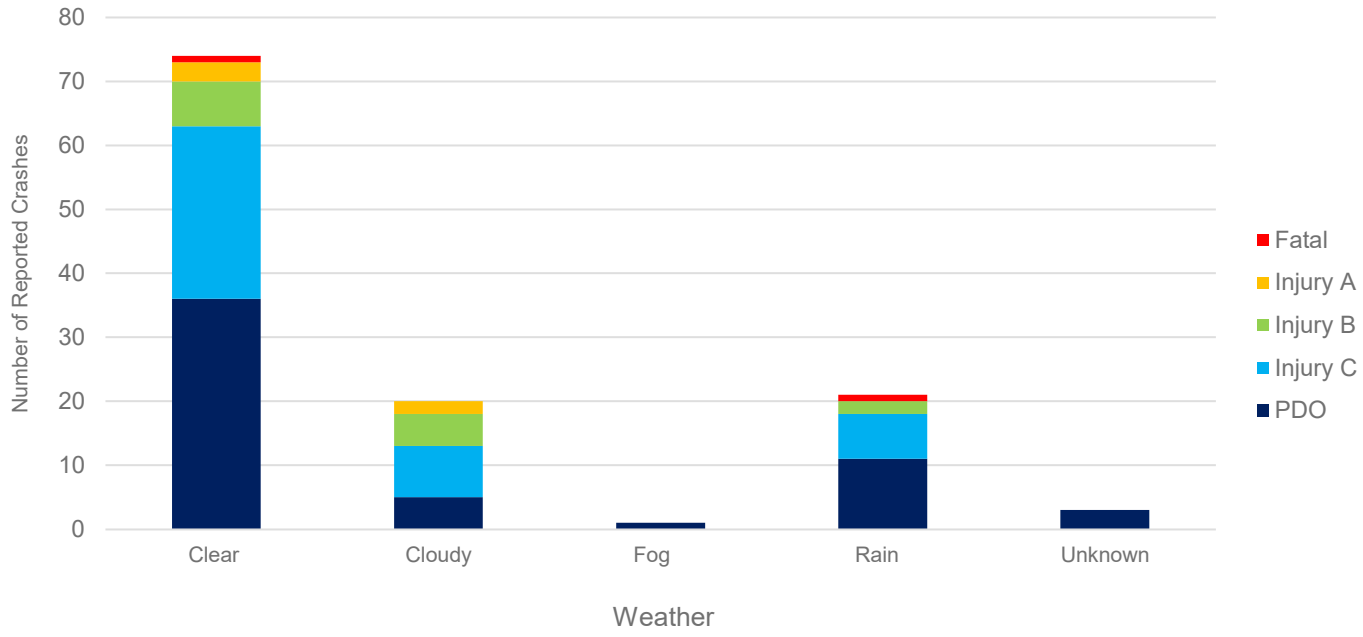
Crash Data: 2014-2018

Crash Severity by Light Conditions



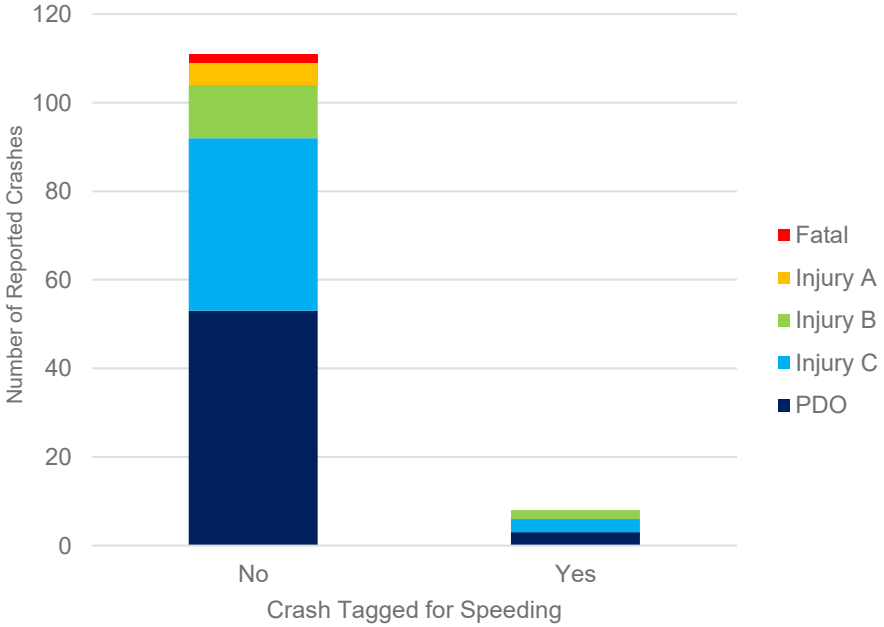
Crash Data: 2014-2018

Crash Severity by Weather Type



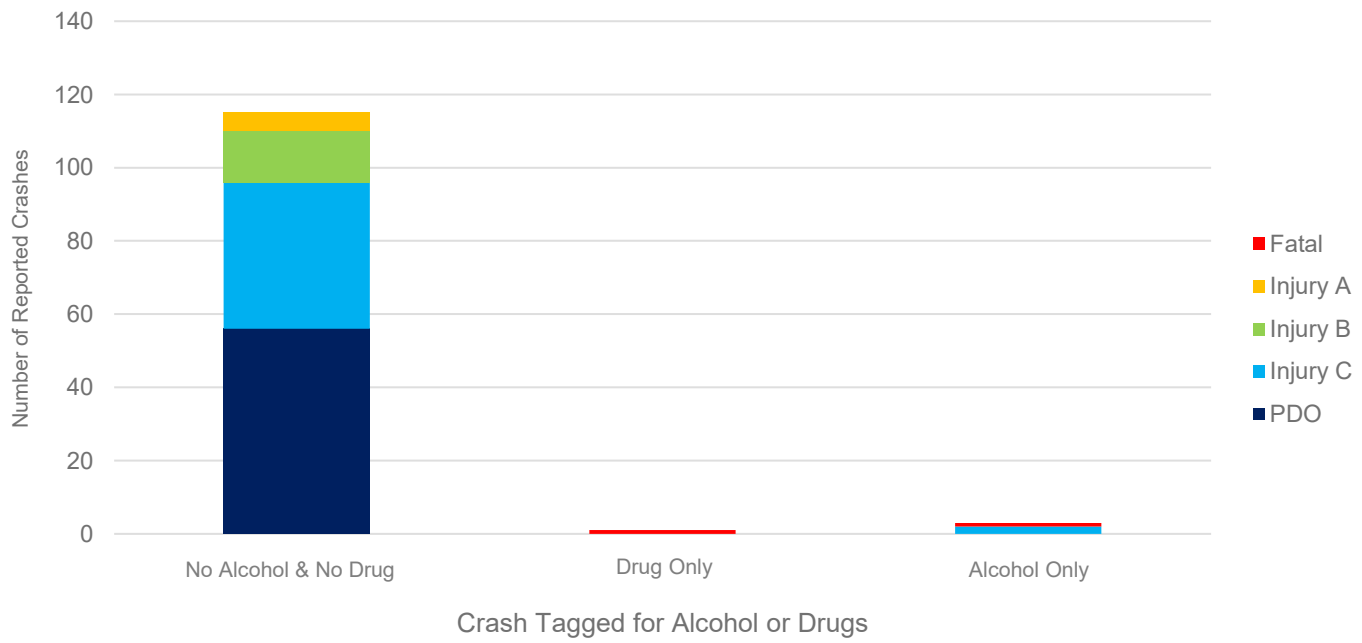
Crash Data: 2014-2018

Crash Tagged for Speeding



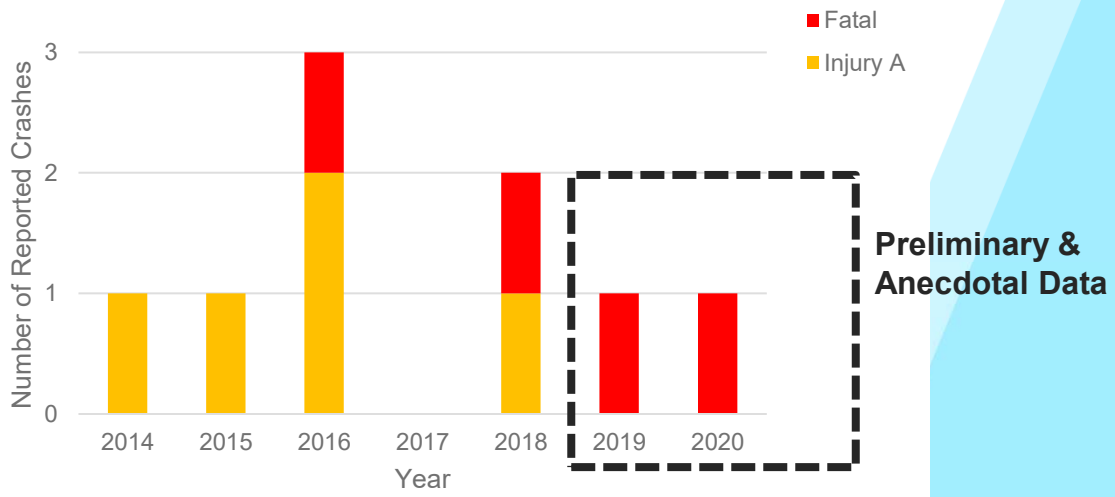
Crash Data: 2014-2018

Crash Severity by Drugs & Alcohol

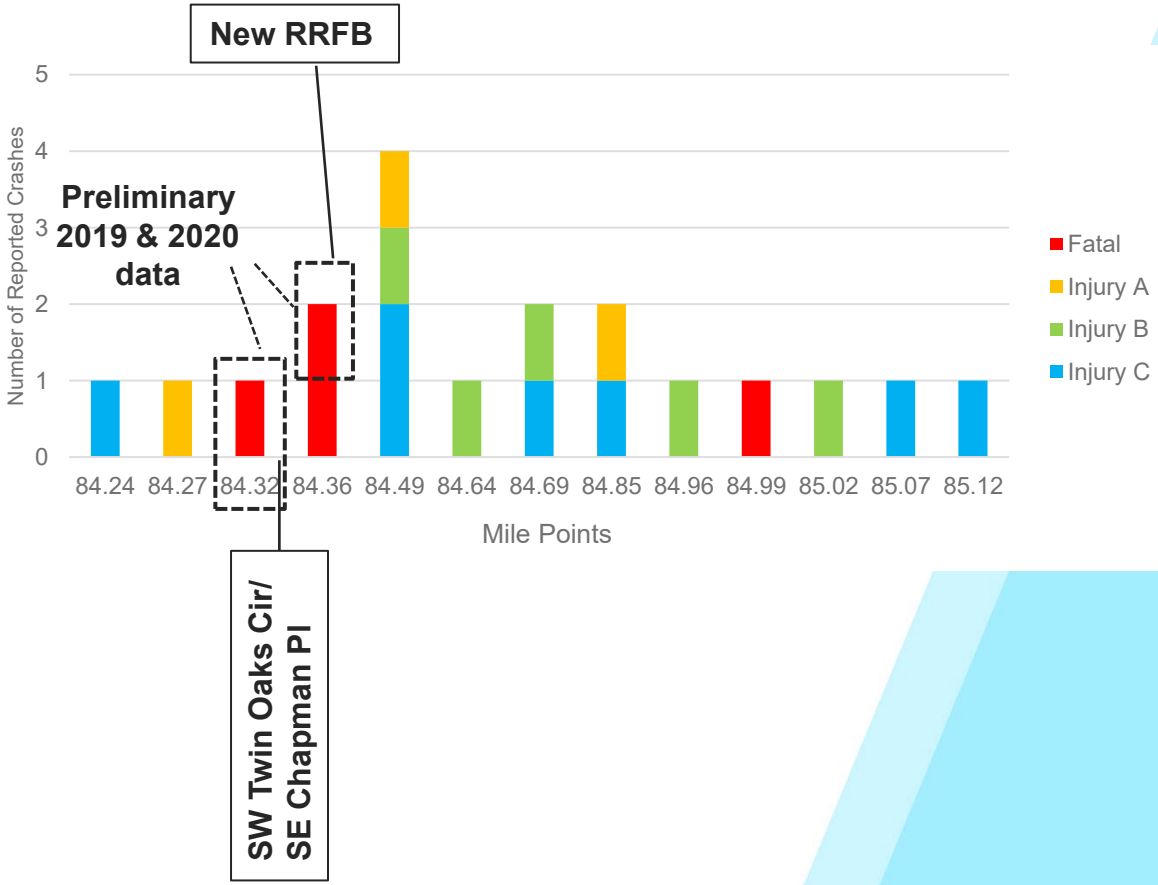


Crash Data: 2014-2018

Injury A & Fatal Crashes (2014-2020)



Bike and Ped crashes (2014-2020)



*** 2019 & 2020 data of injury B & C crashes is unavailable**

Crash Summary

- Large percentages of rear-end end crashes (54%)
- 18% of crashes are related to darkness
- Many rear-end collisions at intersections and at pedestrian crossings
  - Intersection with Crystal Lake Drive and the new RRFB location have the most crashes
- Most crashes occur on weekdays, between 3PM and 6PM, corelating with school release and PM peak
- Months with the highest numbers of crashes: October, April, July
- 14% of total and 71% of high severity crashes involve pedestrians and bicyclists (2014-2018 data)
  - One pedestrian and one bicyclist fatality in 2019 & 2020
- Most crashes occur in daylight
  - High severity injury crashes mainly occur in the dark
- Both fatal crashes (2014-2018 data) were tagged for alcohol or drug

Preliminary Findings From RSA

Issues Identified

- Speed
- Crossings
- Lighting
- Signage
- Bicyclist comfort
- Pedestrian comfort
- Lack of navigation for people walking and biking, especially through interchange
- Conditions of travelways
- Bike/ped connections North/South through interchange

Issue: Speed (1 of 2)

- **High speeds** means less reaction time
  - Witnessed one rear end crash when a motorist stopped for a pedestrian and
  - Multiple cars stopping for pedestrians put their hazard lights on when they stopped

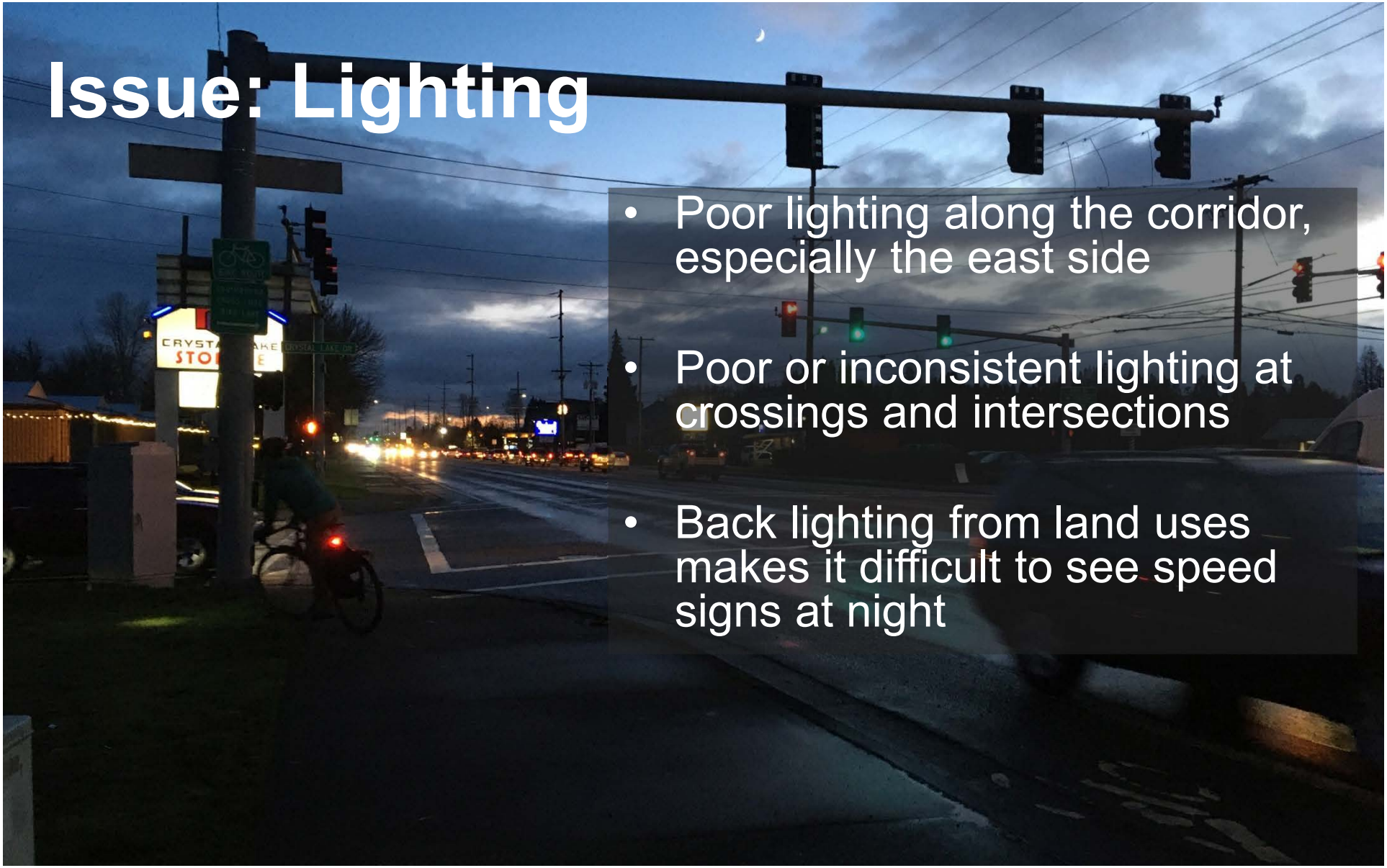
Issue: Speed (2 of 2)

- **High incidence of rear end crashes**
- Rear end crashes are typically **less severe** than pedestrian crashes
- **Speed management** can reduce all crashes

Issue: Crossings

- Double threat
- Can’t make eye contact at night
- Poor lighting or visibility at some crossings: can’t see the pedestrian crossing
- Strong desire to cross north of Chapman where there is no enhanced crossing

Issue: Lighting



- Poor lighting along the corridor, especially the east side
- Poor or inconsistent lighting at crossings and intersections
- Back lighting from land uses makes it difficult to see speed signs at night

Issue: Signage

- Some sign clutter, including from private properties
- Speed signs mounted high makes it difficult to see
- Poor wayfinding for people walking/biking
- Need lighting to illuminate speed limit signs

Issue: Conditions of Travelways (1 of 2)

- Poor drainage causes water to settle in bike lane, causing bikes to move into travel lane
- Permanent and temporary obstacles in sidewalk & bike lane
- Poor pavement quality on roadway, sidewalk, and path
- Uplift leads to tripping hazards
- Not ADA accessible throughout the entire corridor

Issue: Conditions of Travelways (2 of 2)

Issue: Bike Comfort

- Sidewalk riding indicates bicyclists are **uncomfortable** in the bike lanes
- Uncomfortable facilities or poor conditions lead to **unpredictable behavior** from people biking
- **Difficult connection** from path (east side) to bike lane (west side) at Crystal Lake Dr.
  - ARTS project will help improve

Issue: Pedestrian Comfort

- Obstacles/tripping hazards
- Loud corridor
- Walking close to traffic with little to no buffer

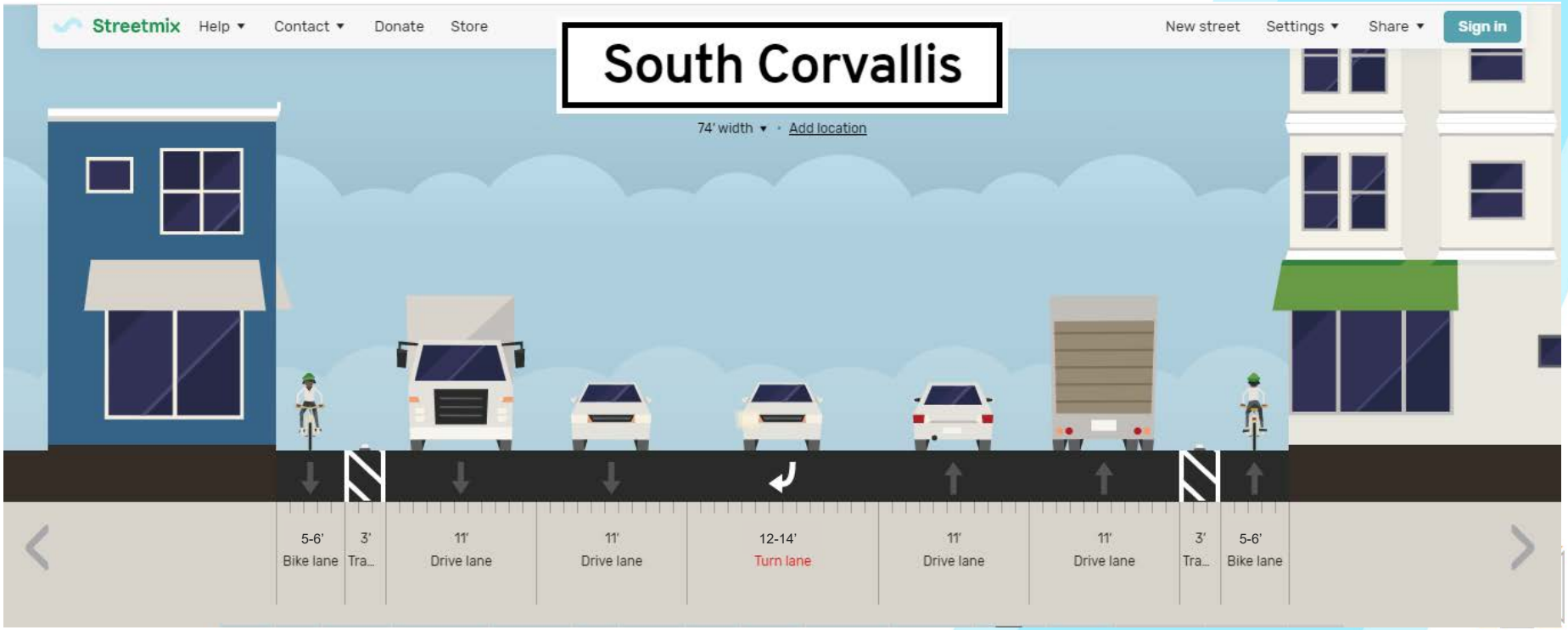
Issue: Bike/Ped Connections North/South Through Interchange

- Undefined routes
- Several curb cuts, sidewalk, and trail pieces that do not provide direct connections
- Poor wayfinding
- High design speeds for motorists
- Difficult to cross high-speed ramps

Please note that the potential solutions provided in this presentation have not been reviewed for feasibility. These solutions are based on team brainstorms and will be further refined through the RSA and facility planning processes.

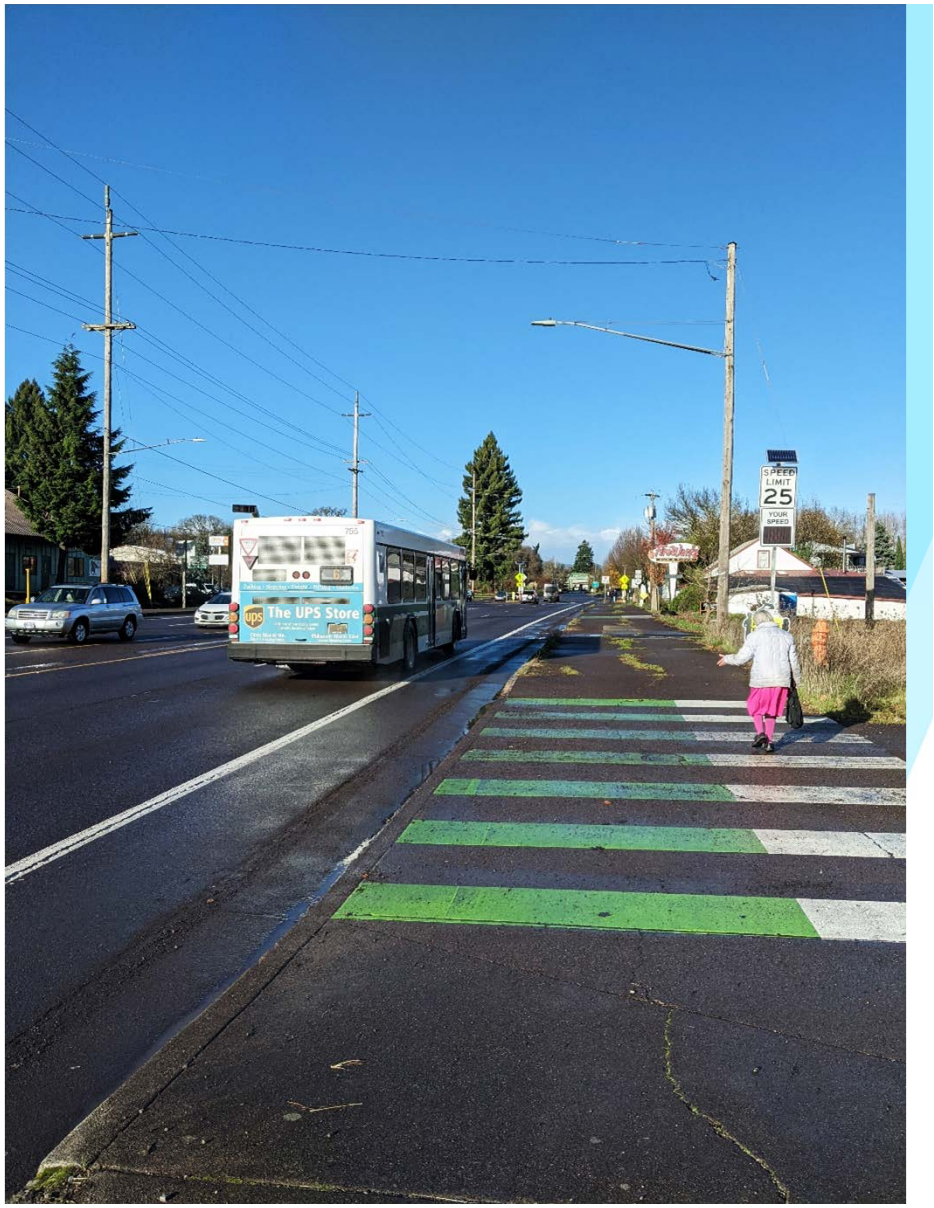
Potential Future Cross Section

- Consider vertical barriers in the buffer
- Implementation can occur mostly through restriping



Speed Solutions

- **Change cross section** to create more of a boulevard feeling, narrower lanes, added buffered bike lanes, added medians to slow speeds
- Add **speed feedback signs**
  - Southbound between B street and interchange
  - Northbound entering corridor from south
  - Include signs in median
- Consider **RRFB advance warning** SB on 3rd Street before Chapman

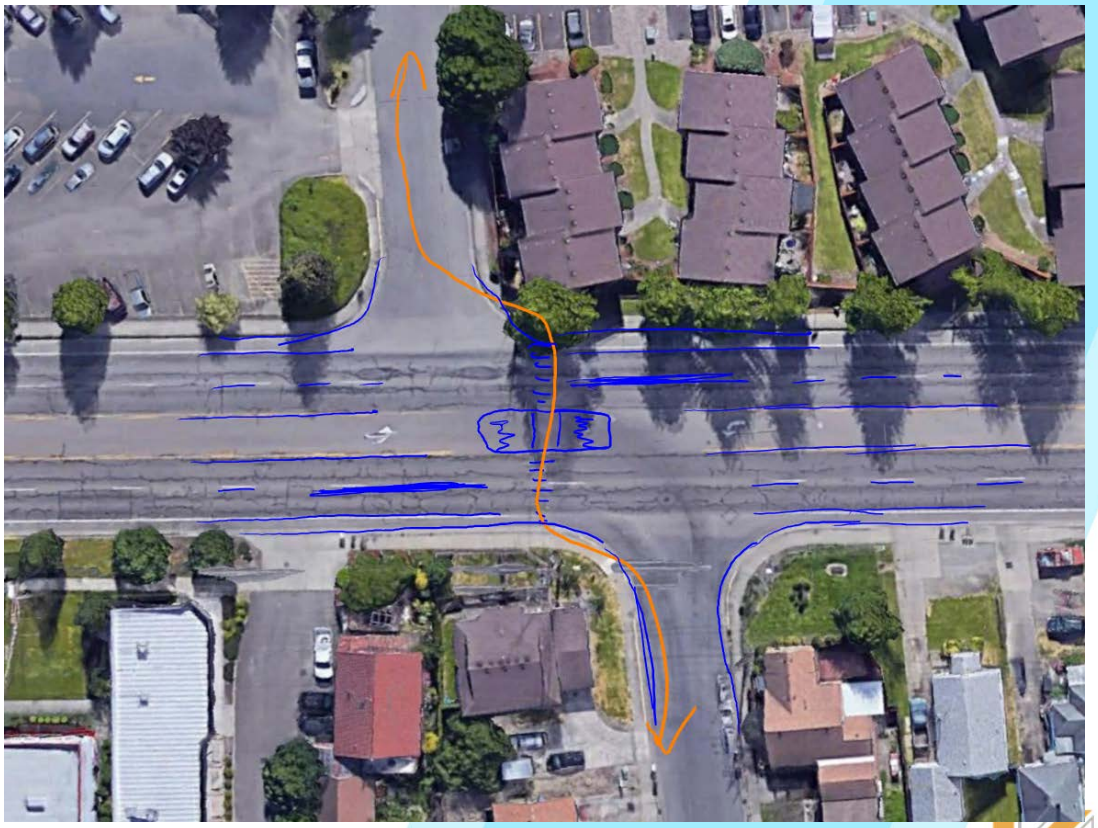


Crossing Solutions

- Stripe double white lines leading to crossings **to reduce double threat**
- Improve lighting at crossings
- Consider moving crossings to **provide more direct access** between origins/destinations
  - School: move crossing from South of Tunison to provide more **direct connection** to school's new location
- Consider **pedestrian hybrid beacons** (PHB) at school and Chapman Pl.

Crossing Solution: Offset Tunison/Viewmont

- Potentially move crossing north to school
- Based on redevelopment



Lighting Solutions

- Add lighting:
  - Consistently along the corridor
  - At crossings: on the motorist side of the pedestrian crossing
  - At intersections: all four corners

Signage Solutions

- Remove **less critical** signs
- Lower, **better emphasize**, and light speed limit signs
- Add **wayfinding** for people walking/biking
- Move **side street signs** closer to the corridor

Travelway Condition Solutions

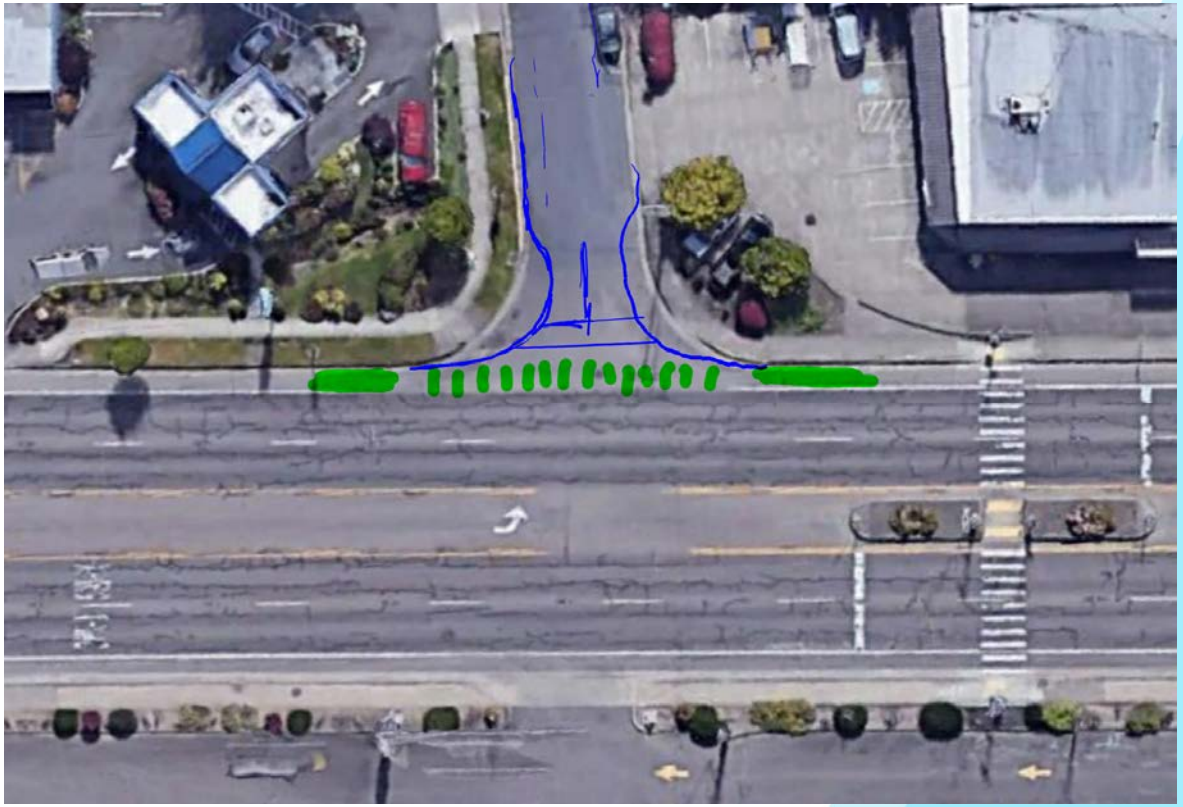
- Add ADA ramps
- Remove/reduce obstacles
- Repave roadway and replace sidewalk/path segments with poor condition
- Improve drainage

Bicycle and Pedestrian Comfort Solutions

- Add buffered bicycle lanes
- Improve wayfinding
- Remove obstacles
- Future development: include buffer strip
- Add bulb outs on side streets to reduce crossing distance
- Improve bicycle crossings at signalized intersections

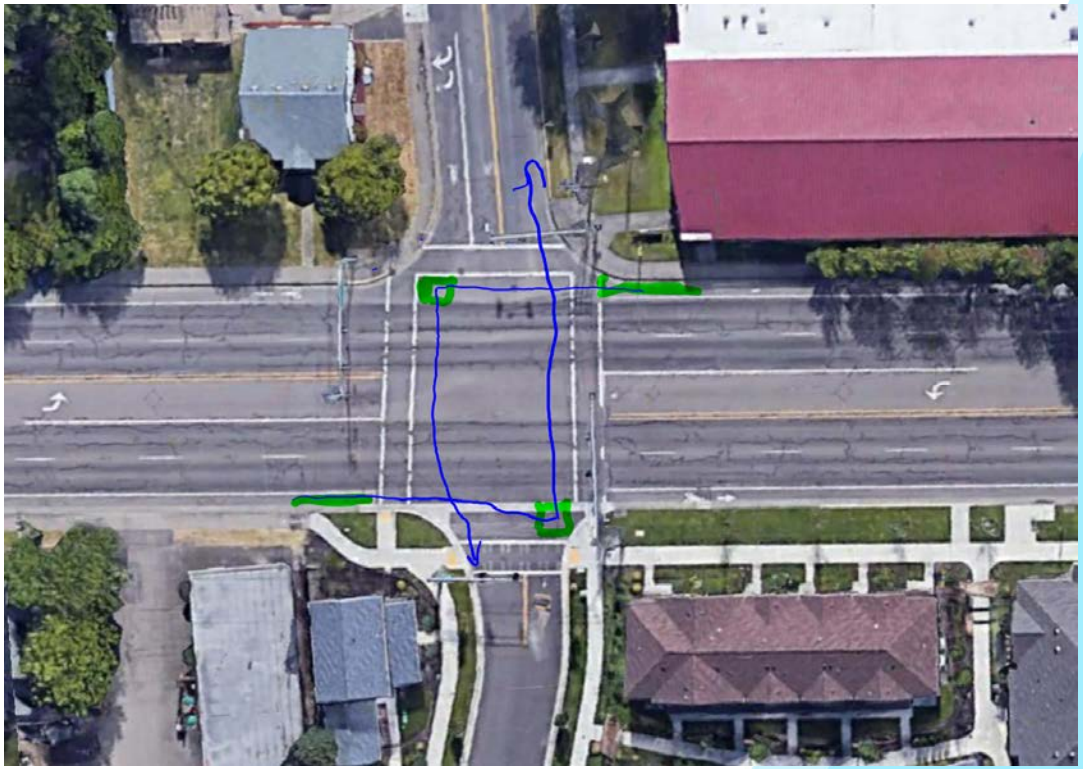
Pedestrian Comfort Solution: Side-Street Curb Extensions

- Minimize exposure



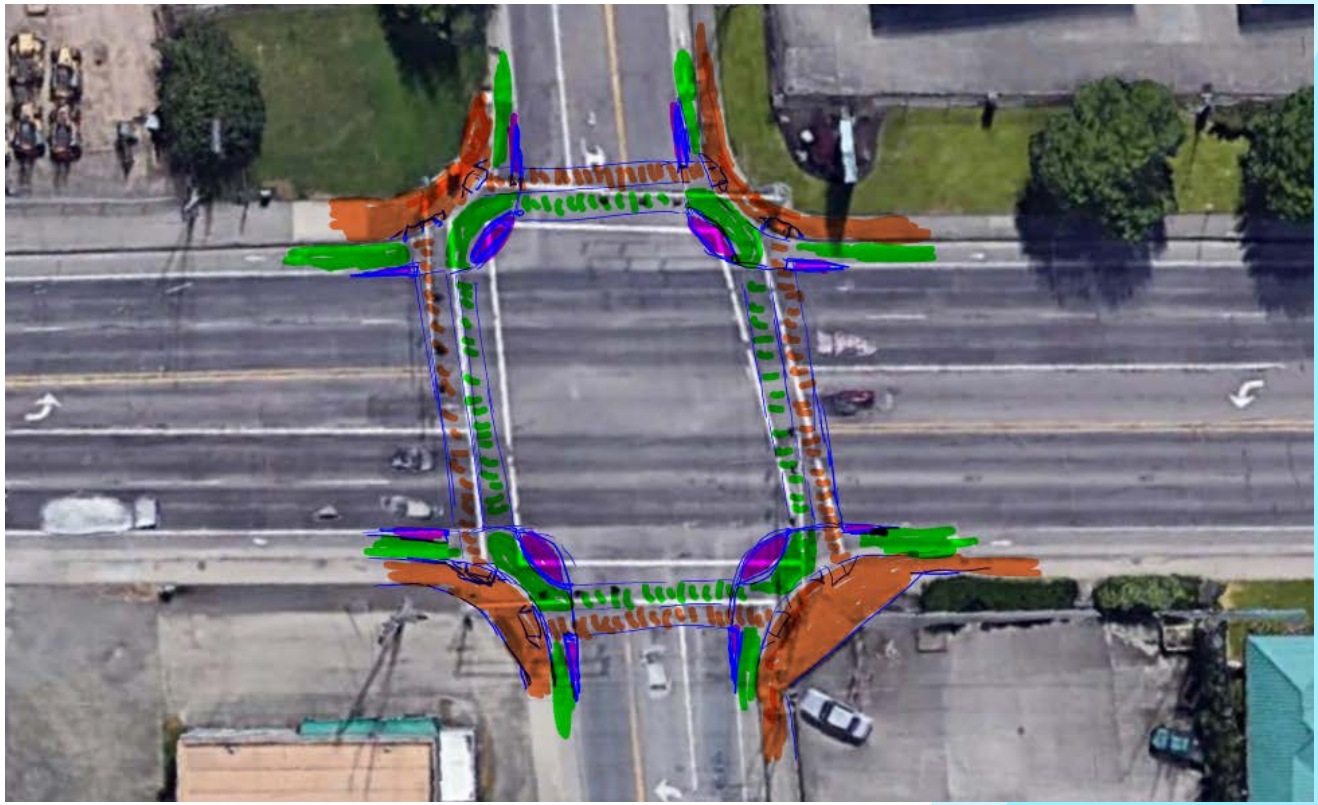
Bicycle Comfort Solution: Alexander Signal

- Bike boxes to help bike left-turns



Bicycle Comfort Solution: Crystal Lake "Protected" Signal

- Emphasize north-south connection with east-west



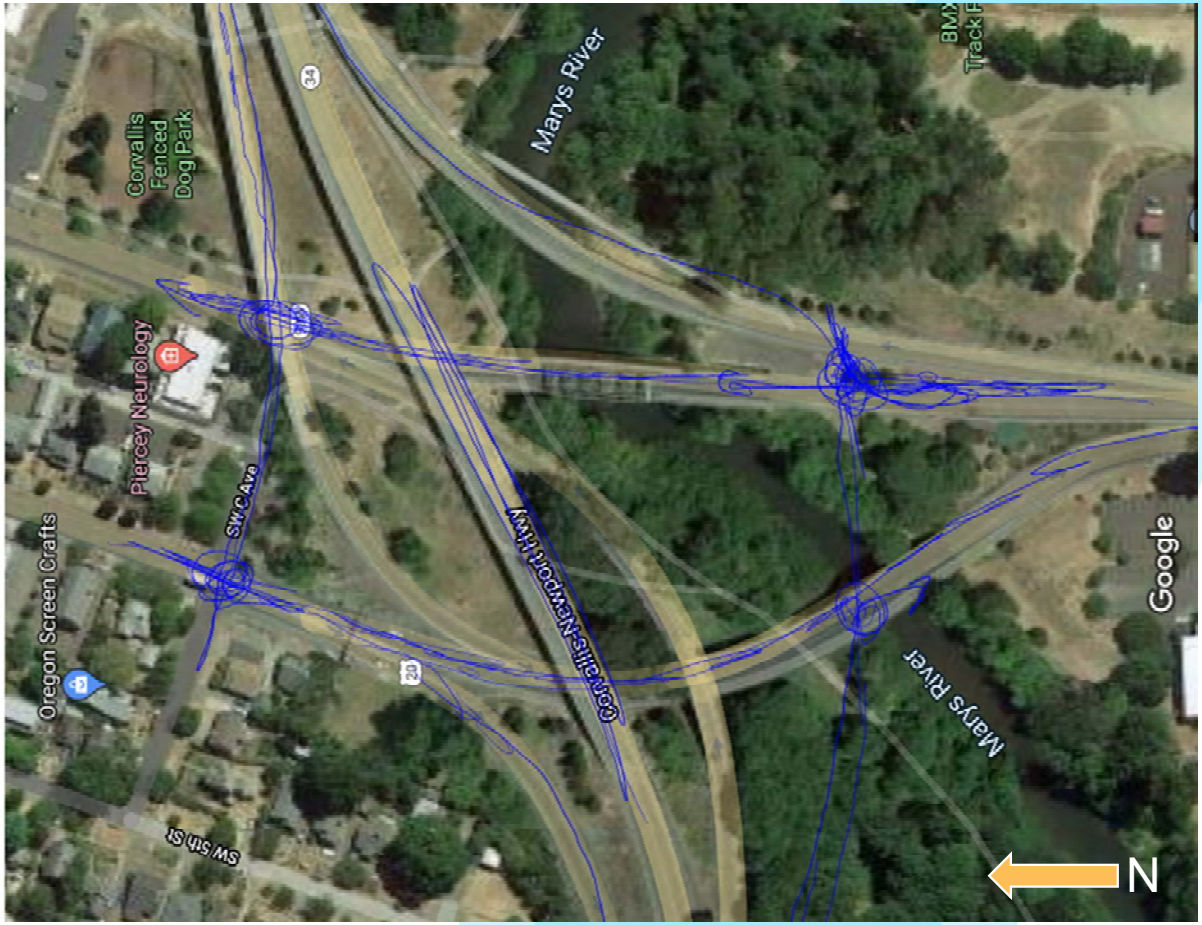
Brainstormed Potential Interchange Solutions

Interchange Context

- System interchange (free-flow movements) within urban setting on both sides
- Likely designed to 45+ mph
- Need to “urbanize”
- High speed ramps are difficult to cross

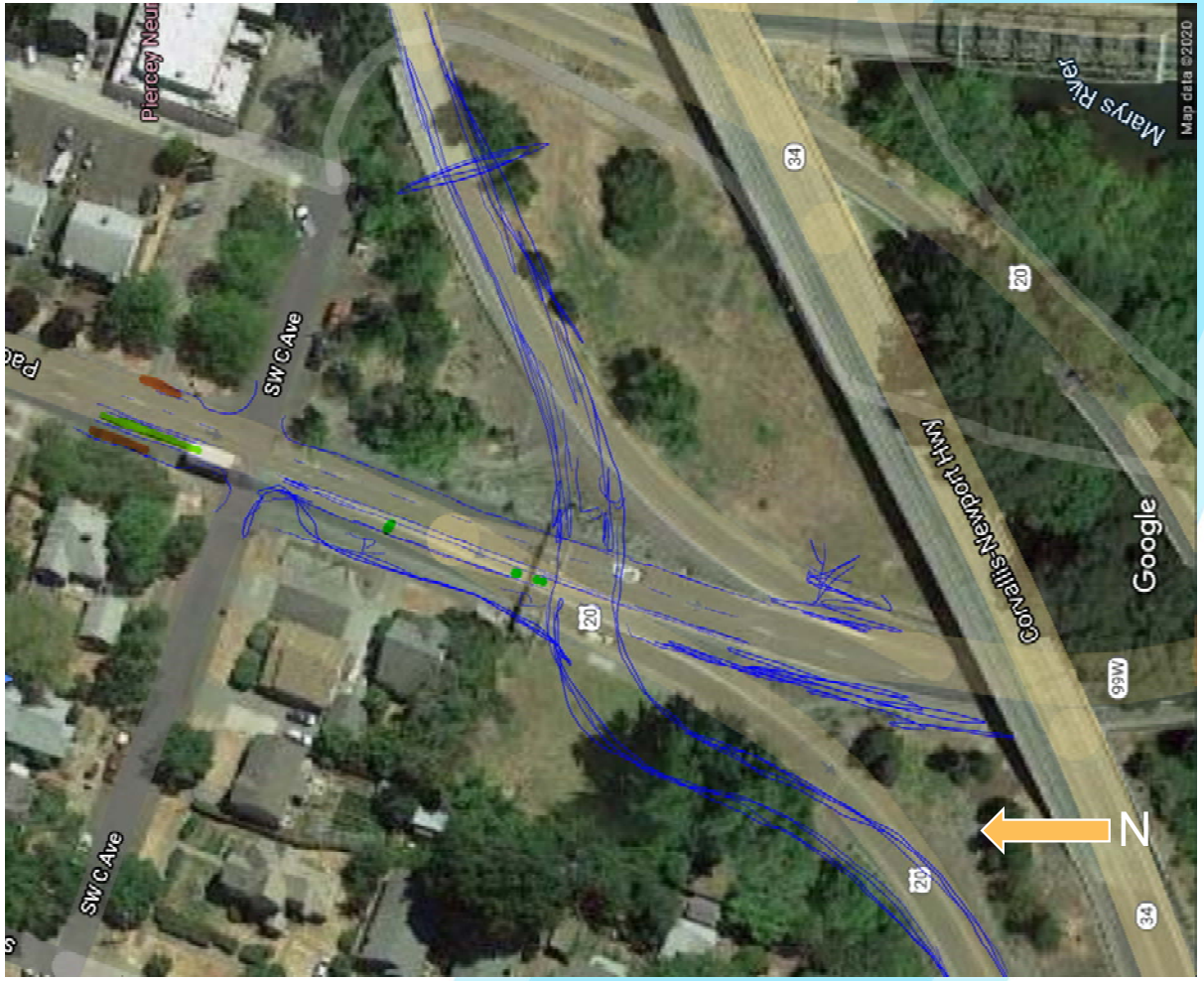
“Urbanized” Interchange

- Create intersections (likely signals) to manage movements on/off OR99W



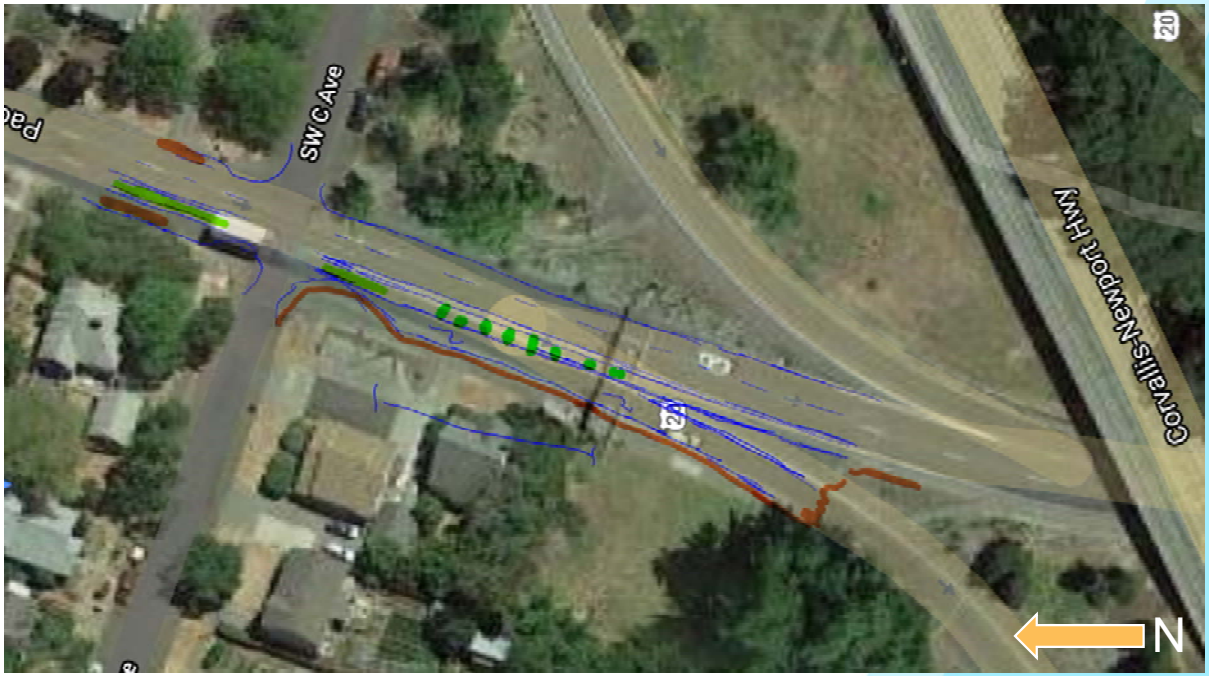
“Urbanizing” an Intersection

- Removing free movements and run through signal



Near-Term Opportunities

- Remove lane trap and manage bike/ped conflicts



Near-Term Opportunities

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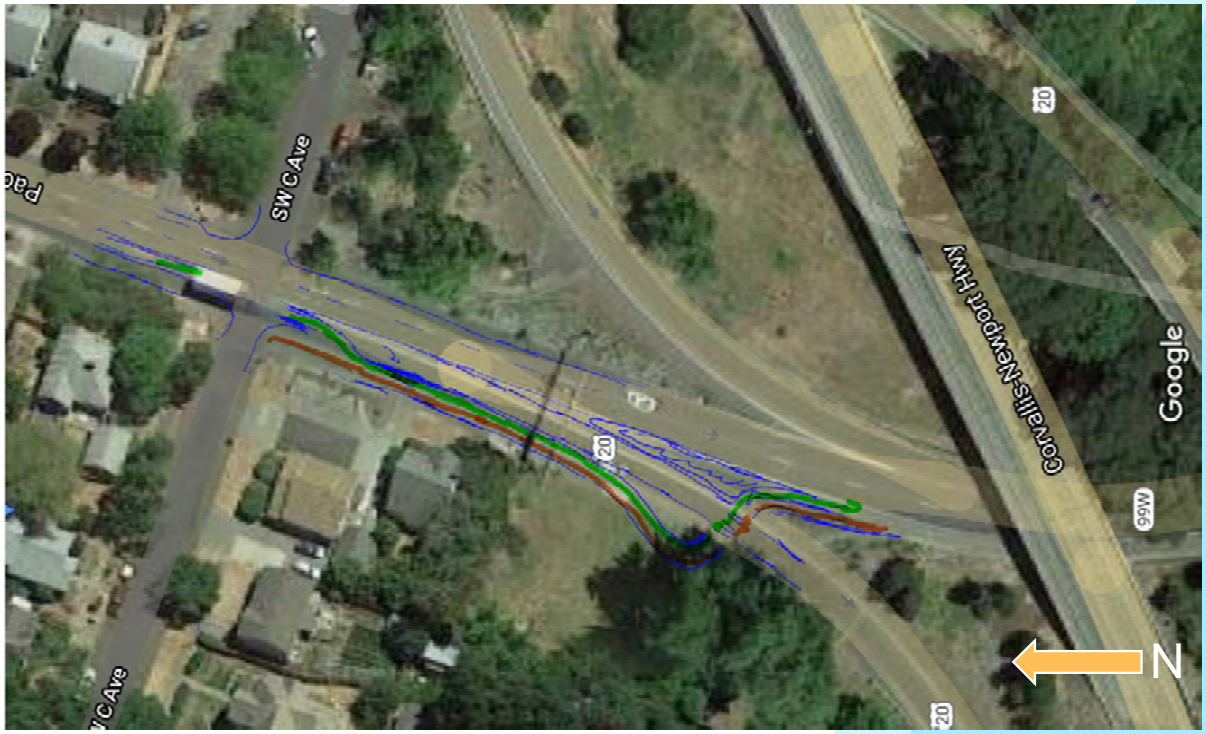
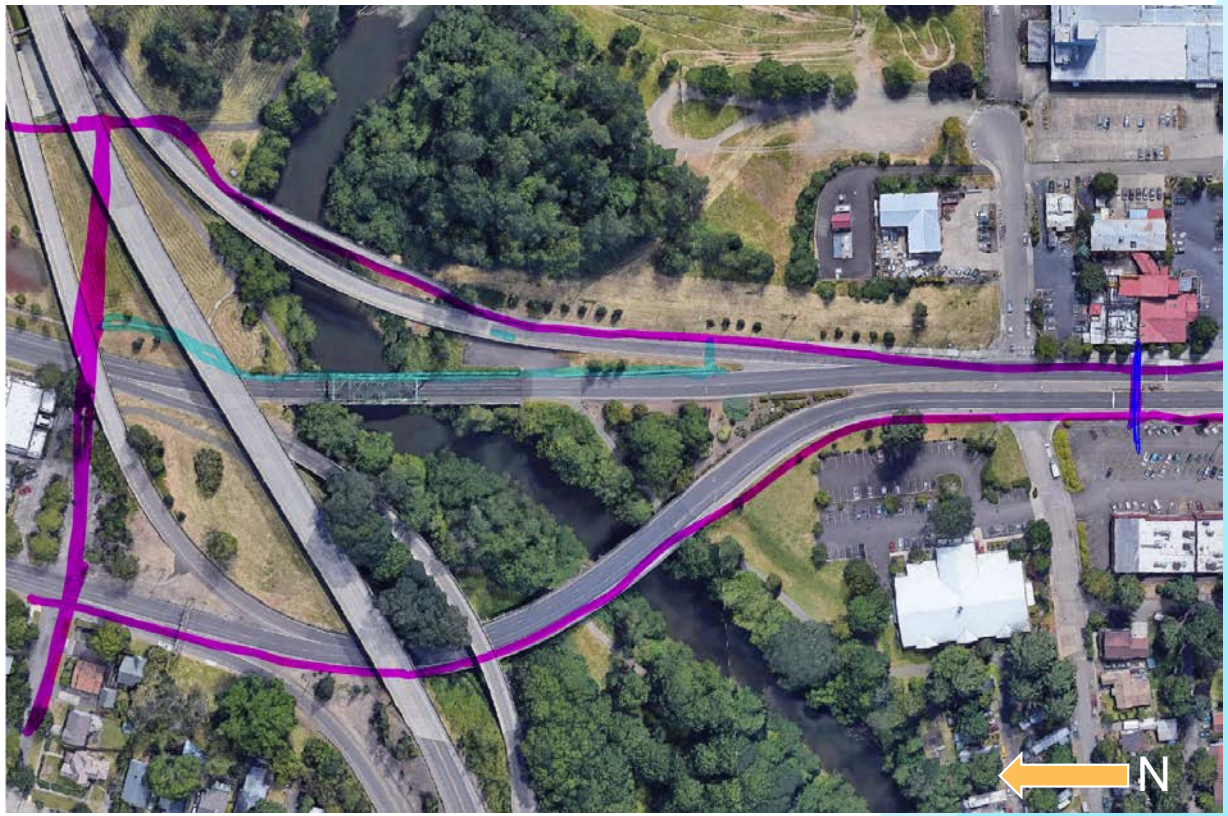


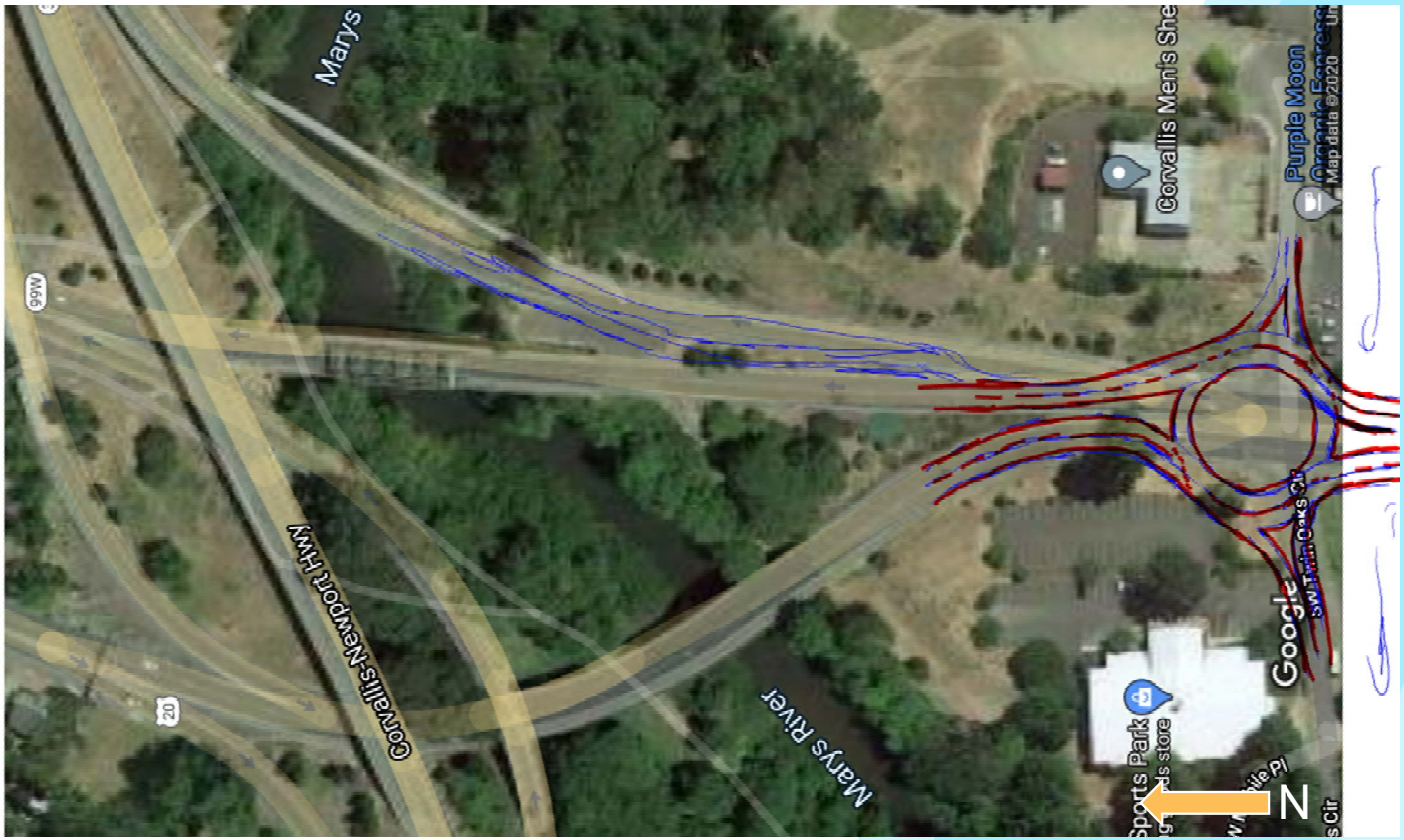
North-South Ped/Bike Connections

- Improve direct connections and improve wayfinding



Northern Gateway of South Corvallis

- Use roundabout to manage speeds



Outside of RSA Limits

Potential road reorganization south of Tunison

Potential road reorganization at Western (north of corridor)

Appendix 3 Traffic Counts

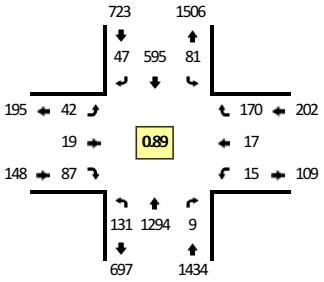
Type of peak hour being reported: Intersection Peak

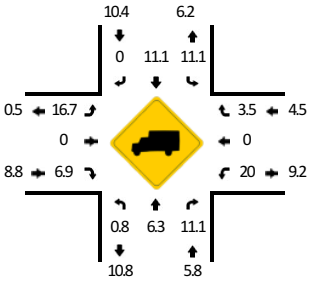
Method for determining peak hour: Total Entering Volume

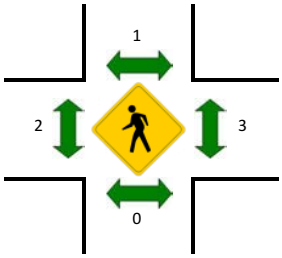
LOCATION: SE 3rd St -- Crystal Lake Dr
CITY/STATE: Corvallis, OR

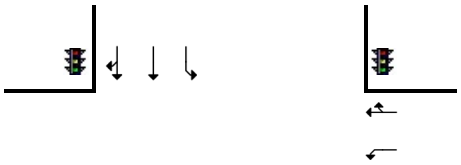
QC JOB #: 14432309
DATE: Thu, Jun 1 2017

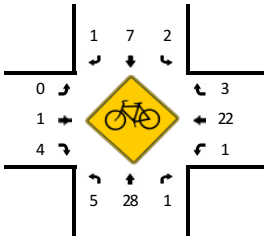
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

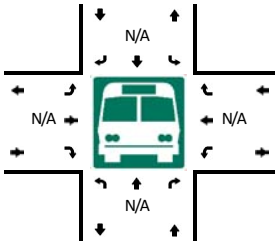


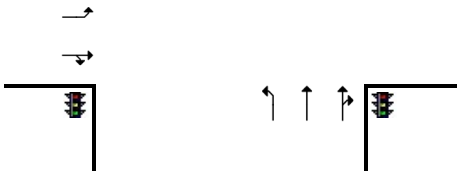


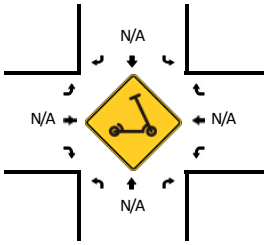












5-Min Count Period Beginning At	SE 3rd St (Northbound)				SE 3rd St (Southbound)				Crystal Lake Dr (Eastbound)				Crystal Lake Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	25	0	0	0	22	1	0	0	0	4	0	0	0	3	0	56	
6:05 AM	2	36	0	0	0	17	2	0	1	0	4	0	0	1	0	0	63	
6:10 AM	3	29	0	0	0	18	2	0	0	0	1	0	0	3	3	0	59	
6:15 AM	3	39	0	0	0	16	3	0	0	0	2	0	0	0	2	0	65	
6:20 AM	4	43	0	0	1	23	3	0	1	1	3	0	0	0	2	0	81	
6:25 AM	0	40	0	0	1	23	5	0	1	0	3	0	0	0	3	0	76	
6:30 AM	3	39	1	0	0	34	1	0	2	0	5	0	0	0	2	0	87	
6:35 AM	5	61	2	0	2	18	5	0	1	0	3	0	0	1	4	0	102	
6:40 AM	1	50	0	0	6	26	3	0	1	0	1	0	0	1	6	0	95	
6:45 AM	3	71	0	0	7	37	7	0	1	0	4	0	0	0	7	0	137	
6:50 AM	6	54	0	0	5	30	5	0	0	0	1	0	0	1	4	0	106	
6:55 AM	2	55	1	0	0	31	6	0	1	0	2	0	0	1	4	0	103	1030
7:00 AM	5	55	0	0	3	21	3	0	1	1	2	0	0	0	5	0	96	1070
7:05 AM	3	48	0	0	4	31	4	0	2	0	5	0	0	0	3	0	100	1107
7:10 AM	9	74	1	0	5	27	5	0	4	0	6	0	0	2	3	0	136	1184
7:15 AM	8	66	2	0	6	30	0	0	2	0	3	0	0	0	7	0	124	1243
7:20 AM	6	98	0	0	7	42	2	0	0	0	5	0	0	0	10	0	170	1332
7:25 AM	1	96	0	0	7	39	4	0	2	1	6	0	0	1	5	0	162	1418
7:30 AM	8	91	0	0	7	34	2	0	7	2	7	0	0	0	10	0	168	1499
7:35 AM	9	131	0	0	3	45	1	0	2	1	4	0	0	3	16	0	215	1612
7:40 AM	14	140	0	0	8	49	3	0	3	1	9	0	2	0	18	0	247	1764
7:45 AM	10	102	0	0	10	45	4	0	3	2	2	0	0	3	20	0	201	1828
7:50 AM	9	133	1	0	9	72	6	0	4	0	1	0	0	3	15	0	253	1975
7:55 AM	13	95	4	0	4	47	3	0	4	2	9	0	1	2	18	0	202	2074
8:00 AM	22	130	0	0	7	48	7	0	1	1	9	0	3	2	12	0	242	2220
8:05 AM	13	94	1	0	8	71	3	0	3	2	13	0	3	1	17	0	229	2349
8:10 AM	14	116	2	0	4	58	4	0	6	3	9	0	0	0	14	0	230	2443
8:15 AM	8	88	0	0	10	41	4	0	2	0	11	0	2	1	11	0	178	2497
8:20 AM	7	83	1	0	7	42	5	0	5	5	6	0	4	1	13	0	179	2506
8:25 AM	4	91	0	0	4	43	5	0	2	0	7	0	0	1	6	0	163	2507
8:30 AM	10	75	1	0	5	40	1	0	5	0	9	0	0	1	10	0	157	2496
8:35 AM	9	78	1	0	8	39	4	0	3	1	8	0	0	1	9	0	161	2442
8:40 AM	6	79	0	0	4	54	4	0	1	0	7	0	2	3	6	0	166	2361
8:45 AM	5	67	1	0	6	39	1	0	5	5	7	0	0	2	16	0	154	2314
8:50 AM	6	77	3	0	5	46	4	0	3	2	7	0	0	3	5	0	161	2222
8:55 AM	7	72	0	0	8	38	1	0	3	1	10	0	1	0	8	0	149	2169

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	132	1500	4	0	108	664	52	0	40	12	48	0	8	24	212	0	2804
Heavy Trucks	0	76	0		12	68	0		8	0	0		4	0	8		176
Buses																	
Pedestrians		0				0				8				8			16
Bicycles	4	40	4		4	0	4		0	0	0		0	32	4		92
Scooters																	

Comments:

Report generated on 11/3/2020 5:55 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

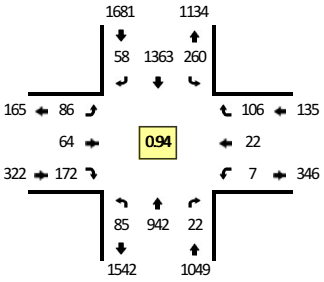
Type of peak hour being reported: Intersection Peak

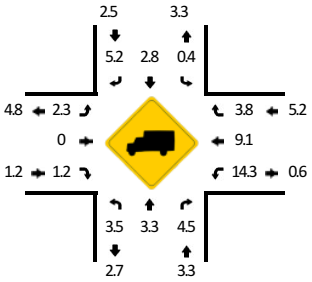
Method for determining peak hour: Total Entering Volume

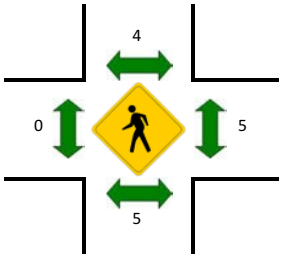
LOCATION: SE 3rd St -- Crystal Lake Dr
CITY/STATE: Corvallis, OR

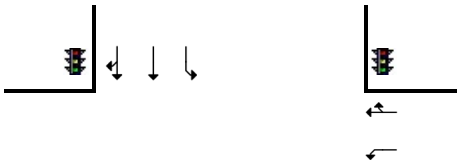
QC JOB #: 14432310
DATE: Wed, May 31 2017

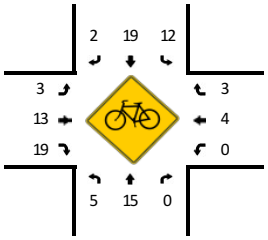
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM

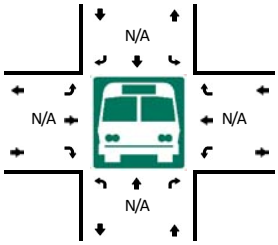


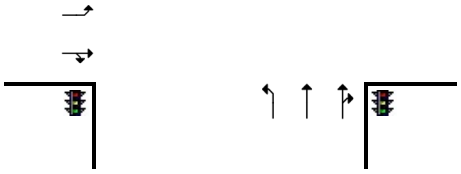


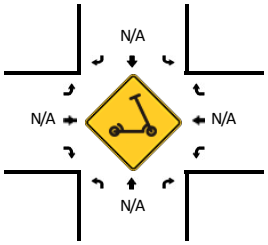












5-Min Count Period Beginning At	SE 3rd St (Northbound)				SE 3rd St (Southbound)				Crystal Lake Dr (Eastbound)				Crystal Lake Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	3	67	0	0	8	69	5	0	1	5	9	0	0	4	10	0	181	
3:05 PM	4	68	1	0	7	78	1	0	1	1	11	0	0	1	3	0	176	
3:10 PM	6	57	3	0	4	77	3	0	5	2	8	0	1	1	8	0	175	
3:15 PM	6	63	0	0	10	90	2	0	1	4	13	0	2	0	10	0	201	
3:20 PM	7	69	0	0	6	57	6	0	6	2	15	0	1	2	9	0	180	
3:25 PM	8	80	1	0	8	70	4	0	4	1	9	0	2	4	7	0	198	
3:30 PM	6	70	2	0	9	75	3	0	3	2	4	0	1	2	10	0	187	
3:35 PM	11	72	0	0	14	105	2	0	5	1	10	0	0	1	10	0	231	
3:40 PM	4	70	0	0	10	58	1	0	7	0	5	0	1	1	5	0	162	
3:45 PM	3	71	1	0	11	83	2	0	6	0	8	0	0	2	4	0	191	
3:50 PM	8	54	1	0	10	65	4	0	1	0	9	0	1	1	10	0	164	
3:55 PM	6	79	0	0	11	104	6	0	4	4	10	0	1	2	12	0	239	2285
4:00 PM	6	65	1	0	12	80	2	0	1	4	15	0	3	3	14	0	206	2310
4:05 PM	7	73	1	0	8	91	3	0	2	4	13	0	2	6	22	0	232	2366
4:10 PM	3	78	2	0	8	77	6	0	5	4	13	0	0	1	10	0	207	2398
4:15 PM	3	65	1	0	9	95	5	0	7	3	22	0	1	2	15	0	228	2425
4:20 PM	7	75	1	0	13	120	7	0	1	1	10	0	1	1	11	0	248	2493
4:25 PM	4	71	3	0	6	78	1	0	6	1	11	0	3	3	17	0	204	2499
4:30 PM	8	89	1	0	13	96	1	0	3	0	20	0	1	2	17	0	251	2563
4:35 PM	6	69	0	0	10	93	5	0	7	3	14	0	1	1	7	0	216	2548
4:40 PM	7	81	1	0	13	100	2	0	2	1	14	0	0	1	12	0	234	2620
4:45 PM	4	69	1	0	12	110	7	0	8	3	9	0	1	4	8	0	236	2665
4:50 PM	3	71	2	0	21	77	6	0	7	6	16	0	1	2	15	0	227	2728
4:55 PM	2	92	2	0	11	85	1	0	9	5	12	0	0	1	16	0	236	2725
5:00 PM	8	63	2	0	23	101	7	0	4	4	16	0	1	6	7	0	242	2761
5:05 PM	9	96	2	0	13	142	7	0	5	3	18	0	0	0	7	0	302	2831
5:10 PM	7	80	2	0	19	105	1	0	5	5	19	0	1	0	18	0	262	2886
5:15 PM	12	88	1	0	24	103	3	0	7	3	11	0	0	1	9	0	262	2920
5:20 PM	6	97	2	0	19	131	4	0	6	2	12	0	2	1	12	0	294	2966
5:25 PM	2	69	3	0	18	85	4	0	12	12	16	0	1	1	10	0	233	2995
5:30 PM	12	58	2	0	30	105	8	0	12	10	12	0	0	1	5	0	255	2999
5:35 PM	3	85	4	0	21	130	5	0	13	7	12	0	1	1	5	0	287	3070
5:40 PM	6	94	0	0	30	138	5	0	5	7	14	0	0	0	4	0	303	3139
5:45 PM	7	70	1	0	16	97	7	0	3	2	12	0	0	3	11	0	229	3132
5:50 PM	8	66	2	0	21	115	3	0	10	2	13	0	1	6	10	0	257	3162
5:55 PM	5	76	1	0	26	111	4	0	4	7	17	0	0	2	8	0	261	3187

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	84	948	24	0	324	1492	72	0	120	96	152	0	4	8	56	0	3380
Heavy Trucks	0	32	4		0	44	0		0	0	0		0	0	4		84
Buses																	
Pedestrians		8				8				0				4			20
Bicycles	4	24	0		24	24	0		0	16	12		0	4	0		108
Scooters																	

Comments:

Report generated on 11/3/2020 5:55 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

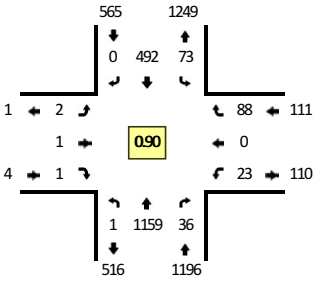
Type of peak hour being reported: Intersection Peak

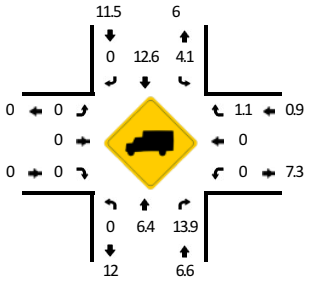
Method for determining peak hour: Total Entering Volume

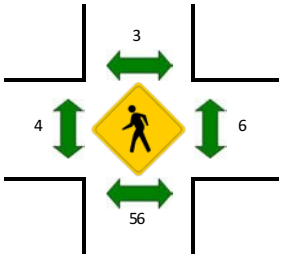
LOCATION: SE 3rd St -- SE Alexander Ave
CITY/STATE: Corvallis, OR

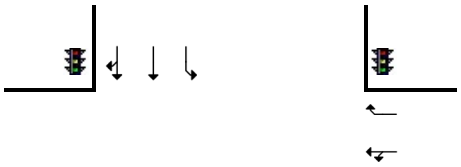
QC JOB #: 14432307
DATE: Thu, Jun 1 2017

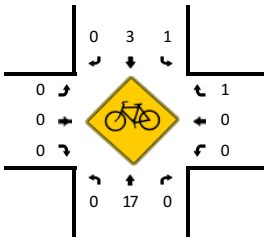
Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

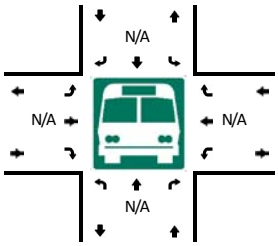


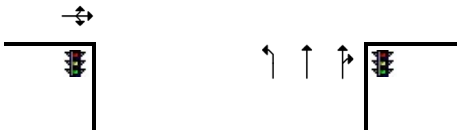


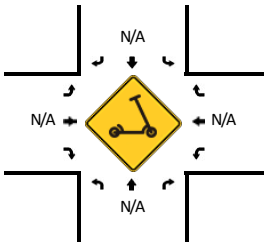












5-Min Count Period Beginning At	SE 3rd St (Northbound)				SE 3rd St (Southbound)				SE Alexander Ave (Eastbound)				SE Alexander Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	22	0	0	0	22	0	0	0	0	0	0	0	0	1	0	45	
6:05 AM	0	37	0	0	0	18	0	0	0	0	0	0	1	0	1	0	57	
6:10 AM	0	26	0	0	0	18	0	0	0	0	0	0	0	0	2	0	46	
6:15 AM	0	34	1	0	0	12	0	0	0	0	0	0	0	0	3	0	50	
6:20 AM	0	32	0	0	1	20	0	0	0	0	0	0	0	0	5	0	58	
6:25 AM	0	36	0	0	0	20	0	0	0	0	0	0	0	0	0	0	56	
6:30 AM	0	36	0	0	2	36	0	0	0	0	0	0	0	0	7	0	81	
6:35 AM	0	66	0	0	0	20	0	0	0	0	0	0	0	0	2	0	88	
6:40 AM	0	50	0	0	1	25	0	0	0	0	0	0	0	0	3	0	79	
6:45 AM	0	51	1	0	1	34	0	0	0	0	0	0	0	0	6	0	93	
6:50 AM	0	60	0	0	0	29	0	0	0	0	0	0	0	0	4	0	93	
6:55 AM	0	49	0	0	1	19	0	0	0	0	0	0	0	0	2	0	71	817
7:00 AM	0	37	0	0	2	16	0	0	0	0	0	0	0	0	2	0	57	829
7:05 AM	0	52	0	0	0	29	0	0	0	0	0	0	1	0	2	0	84	856
7:10 AM	0	66	0	0	1	29	0	0	1	0	0	0	1	0	2	0	100	910
7:15 AM	0	72	3	0	1	24	0	0	0	0	0	0	0	0	7	0	107	967
7:20 AM	0	81	0	0	2	40	0	0	0	0	0	0	0	0	5	0	128	1037
7:25 AM	1	84	2	0	2	34	0	0	0	0	0	0	1	0	6	0	130	1111
7:30 AM	0	98	1	0	3	36	0	0	1	1	0	0	0	0	6	0	146	1176
7:35 AM	0	118	1	0	6	40	0	0	0	0	0	0	0	0	10	0	175	1263
7:40 AM	0	88	2	0	5	32	0	0	1	0	0	0	2	0	10	0	140	1324
7:45 AM	0	127	5	0	7	45	0	0	0	0	0	0	1	0	6	0	191	1422
7:50 AM	0	97	4	0	7	44	0	0	0	0	0	0	4	0	3	0	159	1488
7:55 AM	0	101	4	0	12	39	0	0	0	0	1	0	4	0	10	0	171	1588
8:00 AM	0	123	4	0	5	23	0	0	0	0	0	0	1	0	9	0	165	1696
8:05 AM	0	80	5	0	5	69	0	0	0	0	0	0	4	0	8	0	171	1783
8:10 AM	0	96	3	0	11	54	0	0	0	0	0	0	1	0	3	0	168	1851
8:15 AM	0	66	5	0	8	36	0	0	0	0	0	0	5	0	12	0	132	1876
8:20 AM	0	63	2	0	2	34	0	0	0	0	0	0	3	0	5	0	109	1857
8:25 AM	0	72	2	0	1	43	0	0	0	0	0	0	1	0	7	0	126	1853
8:30 AM	0	65	1	0	2	32	0	0	0	0	0	0	0	0	3	0	103	1810
8:35 AM	0	73	1	0	1	34	0	0	1	0	0	0	1	0	6	0	117	1752
8:40 AM	0	68	1	0	3	39	0	0	1	0	0	0	1	0	6	0	119	1731
8:45 AM	0	76	0	0	3	38	0	0	0	0	0	0	2	0	3	0	122	1662
8:50 AM	0	59	0	0	3	43	0	0	0	0	0	0	0	0	8	0	113	1616
8:55 AM	0	59	2	0	0	32	0	0	0	0	0	0	1	0	6	0	100	1545

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1300	52	0	104	512	0	0	0	0	4	0	36	0	76	0	2084
Heavy Trucks	0	112	12		4	60	0		0	0	0		0	0	0		188
Buses																	
Pedestrians		116				0				0				0			116
Bicycles	0	16	0		4	4	0		0	0	0		0	0	0		24
Scooters																	

Comments:

Report generated on 11/3/2020 5:55 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

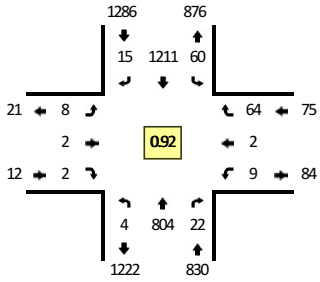
Type of peak hour being reported: Intersection Peak

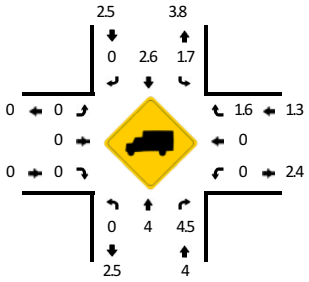
Method for determining peak hour: Total Entering Volume

LOCATION: SE 3rd St -- SE Alexander Ave
CITY/STATE: Corvallis, OR

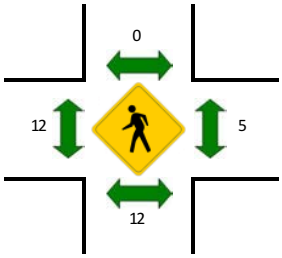
QC JOB #: 14432308
DATE: Wed, May 31 2017

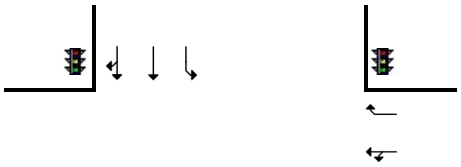
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:40 PM -- 5:55 PM

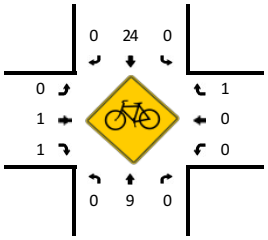


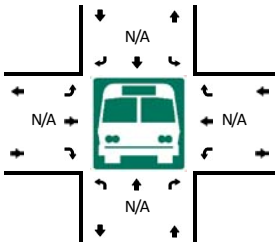


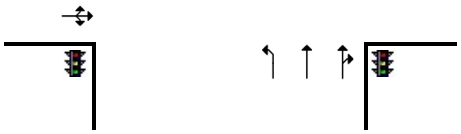
Quality Counts
DATA THAT DRIVES COMMUNITIES

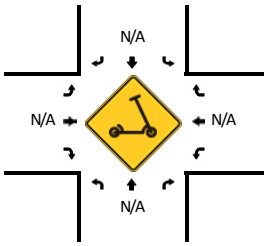












5-Min Count Period Beginning At	SE 3rd St (Northbound)				SE 3rd St (Southbound)				SE Alexander Ave (Eastbound)				SE Alexander Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	49	3	0	4	63	0	0	0	0	0	0	4	0	7	0	130	
3:05 PM	0	48	0	0	2	67	2	0	1	0	0	0	1	0	7	0	128	
3:10 PM	0	42	0	0	7	71	0	0	3	0	0	0	1	0	2	0	126	
3:15 PM	0	53	1	0	11	81	0	0	2	0	0	0	1	0	3	0	152	
3:20 PM	0	76	0	0	2	56	0	0	3	0	0	0	1	0	10	0	148	
3:25 PM	0	64	3	0	5	58	1	0	1	0	0	0	1	0	5	0	138	
3:30 PM	0	54	0	0	5	51	1	0	0	0	0	0	3	0	10	0	124	
3:35 PM	0	67	1	0	5	79	0	0	0	0	0	0	0	0	3	0	155	
3:40 PM	0	46	1	0	6	71	0	0	2	0	0	0	0	0	7	0	133	
3:45 PM	0	63	1	0	0	72	2	0	0	0	0	0	1	0	5	0	144	
3:50 PM	0	58	0	0	3	76	0	0	1	0	1	0	0	0	7	0	146	
3:55 PM	0	54	0	0	5	73	0	0	0	0	0	0	2	0	5	0	139	1663
4:00 PM	0	62	0	0	2	89	2	0	2	0	0	0	3	0	4	0	164	1697
4:05 PM	0	68	1	0	4	78	2	0	1	0	0	0	1	0	5	0	160	1729
4:10 PM	0	57	0	0	3	79	0	0	0	0	0	0	3	1	8	0	151	1754
4:15 PM	0	55	0	0	8	79	0	0	2	0	1	0	1	0	5	0	151	1753
4:20 PM	0	65	2	0	5	105	2	0	1	0	2	0	1	0	5	0	188	1793
4:25 PM	0	73	4	0	2	73	1	0	0	0	0	0	1	0	13	0	167	1822
4:30 PM	0	74	0	0	3	97	0	0	0	0	0	0	2	0	10	0	186	1884
4:35 PM	0	59	0	0	4	94	1	0	0	0	0	0	0	0	3	0	161	1890
4:40 PM	0	54	0	0	6	85	2	0	0	0	0	0	0	0	2	0	149	1906
4:45 PM	0	95	3	0	1	67	2	0	1	0	0	0	1	0	5	0	175	1937
4:50 PM	0	66	2	0	7	82	1	0	1	0	0	0	0	0	4	0	163	1954
4:55 PM	0	68	2	0	4	79	0	0	0	1	0	0	1	1	5	0	161	1976
5:00 PM	1	56	2	0	9	95	1	0	0	0	0	0	1	0	2	0	167	1979
5:05 PM	0	75	3	0	7	100	1	0	2	1	0	0	1	1	5	0	196	2015
5:10 PM	1	77	2	0	1	120	2	0	2	0	0	0	3	0	7	0	215	2079
5:15 PM	0	73	0	0	6	90	0	0	2	0	1	0	0	0	7	0	179	2107
5:20 PM	0	65	2	0	5	95	0	0	0	0	0	0	1	0	7	0	175	2094
5:25 PM	0	65	1	0	6	102	1	0	1	0	0	0	0	0	3	0	179	2106
5:30 PM	0	65	3	0	4	93	1	0	0	0	0	0	1	0	7	0	174	2094
5:35 PM	0	56	3	0	6	86	3	0	1	0	0	0	0	0	6	0	161	2094
5:40 PM	1	71	0	0	5	124	4	0	0	0	0	0	0	0	2	0	207	2152
5:45 PM	0	75	2	0	5	110	2	0	0	0	0	0	0	0	6	0	200	2177
5:50 PM	1	58	2	0	2	117	0	0	0	0	1	0	1	0	7	0	189	2203
5:55 PM	1	55	0	0	3	84	2	0	2	0	0	0	1	0	6	0	154	2196

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	816	16	0	48	1404	24	0	0	0	4	0	4	0	60	0	2384
Heavy Trucks	0	36	0		0	16	0		0	0	0		0	0	4		56
Buses																	
Pedestrians		20				0				24				12			56
Bicycles	0	4	0		0	16	0		0	4	0		0	0	0		24
Scooters																	

Comments:

Report generated on 11/3/2020 5:55 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212