KITTELSON & ASSOCIATES

Memorandum

February 1, 2023 Project# 270030.003

To: Sandra Hikari, Project Manager
Oregon Department of Transportation (ODOT)
123 NW Flanders St. Portland, OR 97209

Cc: Scott Turnoy, ODOT; Scott Hoelscher, Clackamas County

From: Megan Mannion, Russ Doubleday, Camilla Dartnell, PE, and Hermanus Steyn, PE

RE: McLoughlin Investments Strategy - Technical Memorandum #3 Corridor Background and Needs

CORRIDOR BACKGROUND AND NEEDS

Purpose

The purpose of this technical memorandum is to summarize the corridor background and needs for the McLoughlin Boulevard Investments Strategy located in unincorporated Clackamas County and Gladstone. To obtain an understanding, the team reviewed past documents and plans relevant to the corridor, performed crossing and safety assessments, gathered community feedback, and conducted a Road Safety Audit "Lite" (RSA) which included multiple field visits and needs/solution work sessions conducted over a two day period in November 2022. This document first highlights previously identified projects then presents results from the corridor wide needs evaluation through the crossing and safety assessments, community feedback, and RSA identified needs, and finally provides a list of solutions identified through community feedback and the RSA process. The document concludes by identifying potential implementation challenges for identified solutions. The corridor needs and solutions outlined in this technical memorandum will inform the next phase of the McLoughlin Investments Strategy project, developing potential projects to be evaluated and prioritized.

Corridor Background

DOCUMENT REVIEW

This section provides a summary of previously identified needs and proposed projects discussed in past documents. Appendix A provides additional details on the information gathered during the document review. The locations and project description details of past projects will also be captured in more detail in the solutions development phase of the project.

Funded Projects

The team identified the following funded projects through the review of documents relevant to the study area.

- ODOT 2021- 2024 STIP
    - Boardman Avenue to Meldrum Avenue (Mile Point (MP) 9.47 to 10.10): Bicycle and pedestrian improvements which may include flashing lights, medians, illumination, crosswalks, sidewalks, and bike lane striping (Key Number: 20479)
    - Milepoints 6.68 to 8.98, 8.99 to 10.43, and 10.44 to 11.19: Construct new curb ramps (Key Number: 22468)
    - Courtney Avenue to Clackamas River Bridge (MP 7.41 to 11.2): Intersection improvements including signal, illumination, signing, and traffic median upgrades to improve safety (Key Number: 20339)
- ODOT 2024 – 2027 STIP[1]
    - McLoughlin Boulevard/Meldrum Avenue/Mildred Street: Add enhanced crossing and potential Mildred Street approach closure (Scoping Number: 2427_00390)
    - McLoughlin Boulevard/Risley Road: Add enhanced crossing (Scoping Number: 2427_00015.2)
    - McLoughlin Boulevard (Risley Road to Gloucester Street): Fill in sidewalk gaps (Scoping Number: 2427_00383)
    - McLoughlin Boulevard/Arlington Street/River Road: Replace existing traffic signal, install new curb ramps, add intersection illumination, and explore opportunities to add side street left turn phasing (Scoping Number: 2427_00032)
    - Clackamas River Bridge: Repaint bridge (Scoping Number: 2427_00124)
- ODOT Maintenance
    - Mcloughlin Boulevard/Concord Avenue and McLoughlin Boulevard/Park Avenue: Install side street protected left turns
- Courtney Avenue Complete Streets (Clackamas County)
    - Courtney Avenue from River Road to McLoughlin Boulevard: Construct separated sidewalks, bike lanes, curb ramps, and crosswalk enhancements to improve pedestrian and bicycle safety and accessibility (Key Number: 22131)
- Jennings Avenue Improvements (Clackamas County)
    - McLoughlin Boulevard to Oatfield Road: Add enhanced bicycle and pedestrian improvements including sidewalk on the north side of the road and bike lanes on both sides of the road (Key Number: 19276)

[1] The 2024-2027 STIP is still going through refinement, so while each of these projects listed to be funded in the 2024-2027 STIP are anticipated to be included, there is chance that future STIP refinements will change the list of funded projects.

Additional Needs and Project Ideas (Not Funded)

The following corridor needs, and potential improvement projects have been identified in previous studies:

- 2020 Regional Investment Measure (unfunded) (see Appendix B for further detail)
    - Pedestrian improvements including sidewalk enhancements, pedestrian crossings, and lighting enhancements
    - Bicycle improvements including separated bicycle facilities and bicycle facility improvements across the Clackamas River Bridge
    - Transit improvements including queue jumps, Business Access & Transit (BAT) lanes, signal coordination and transit priority
    - Park Avenue park & ride expansion: add two levels of additional parking to the parking structure at the park & ride lot
- ODOT 2024 – 2027 STIP (Scoped but not funded)
    - McLoughlin Boulevard/Silver Springs Road: Enhanced crossing
    - McLoughlin Boulevard/Maple Street: Enhanced crossing
- Clackamas County Transportation System Plan (TSP)
    - Chestnut Street to Concord Road (MP 7.58 to 8.42): Planned bikeway connection
- City of Gladstone Transportation System Plan (TSP)
    - South of Glen Echo Avenue (MP 10.30): Fill in sidewalk gaps
    - Clackamas River Bridge (MP 11.20): Provide bike lanes on bridge
- McLoughlin Boulevard Road Safety Audit (MP 9.53 to 9.99)
    - Evaluate enhanced crossings at the following locations:
        - Boardman Avenue – *RRFB has since been constructed at this location*
        - Jennings Avenue
        - Hull Avenue – *RRFB has since been constructed at this location*
    - South of McLoughlin Boulevard/Boardman Avenue: Install 500' of sidewalk on east side of McLoughlin Boulevard – *completed*
    - McLoughlin Boulevard/Jennings Avenue: Evaluate intersection modifications, including timing modifications and lane configuration updates
- OR 99E/McLoughlin Boulevard Crossing Study
    - Enhanced crossing locations identified at the following locations:
        - Silver Leaf Lane: geometric improvements including median pedestrian island, new ADA curb ramps, and additional signing and striping – *curb ramps and minor landscaping work completed*

        - Risley Avenue: geometric improvements or "red treatment", including a full signalization of the intersection (also included in the 2024 – 2027 STIP [2])
        - Silver Springs Road: enhanced crossing treatment including RRFB, median pedestrian island, and new ADA curb ramps – *curb ramps and limited sidewalk work completed*

- Clackamas County's Park Avenue Community Project Alternatives
    - Park Avenue to Courtney Avenue: Active street design including pedestrian enhancements such as wider sidewalks, planting buffers and slower traffic speeds
    - Improved pedestrian and bicycle connections to the Trolley Trail
    - Additional crossings to provide better connectivity across McLoughlin Boulevard
- SPIS Identified Projects (2019)
    - Corridor-wide
        - Implement responsive timing using signal controllers (Park Avenue to Clackamas River)
    - Milepoints 6.80 to 6.98
        - Planned RRFB at Silver Springs
        - New protected left turns on the side street at the Park Avenue signal (to be evaluated by signal manager)
        - New pedestrian overcrossing with elevator system from the parking structure across Park Avenue to allow pedestrians to cross Park Avenue without waiting for the signal
        - Backplates at the Park Avenue signal
        - Evaluate the Park Avenue signal for time of day flashing yellow arrow restrictions
    - Milepoints 7.31 to 7.49
        - New right turn lanes from Courtney Avenue in each direction
        - Restrict left turns from Holly Avenue
        - Evaluate illumination at Holly Avenue for bicycle and pedestrian visibility
    - Milepoints 7.82 to 7.97
        - Evaluate operations at Oak Grove for possible dual left turn lanes for all directions
        - Straighten the alignment of Oak Grove, lengthen the left turn lane storage and increase the number of lanes
    - Milepoints 8.37 to 8.51
        - Add protected left turns on the side street on Concord Road

[2] The 2024-2027 STIP is still going through refinement, so while each of these projects listed to be funded in the 2024-2027 STIP are anticipated to be included, there is chance that future STIP refinements will change the list of funded projects.

        - Full signal rebuild that adds left turn phasing for the side street and adds sidewalk space at the Concord Road intersection
        - Create a modern 5-lane section with boulevard treatments and improve signal at SE Naef Road; add access management
    - Milepoints 8.66 to 8.82
        - Consider split phasing or leading pedestrian intervals at Vineyard to improve pedestrian safety
    - Milepoints 9.69 to 9.87
        - Close Arista Drive or make it right-in, right-out and create a cul-de-sac for residents
        - Signal rebuild and add protected left turns for the side streets at Jennings Avenue
        - Bring right turn lanes to full standard, widen, align, and channelize side streets at Jennings Avenue
    - Milepoints 10.23 to 10.39
        - Protected left turns on the side street (without full signal rebuild) at Glen Echo Avenue or adding protected left turn lanes on Glen Echo Avenue and protected left turn phasing onto Glen Echo Avenue with a full signal rebuild
        - Sidewalk infill and define driveways south of the signal at Glen Echo Avenue
        - Evaluate leading pedestrian intervals at Glen Echo Avenue
        - Improve illumination
    - Milepoints 10.68 to 10.85
        - Full signal rebuild and add left turn phasing for Gloucester Street
        - Improve illumination
        - Evaluate signal at Gloucester Street for leading pedestrian interval
    - Milepoints 10.86 to 11.11
        - Rebuild the bridge to allow for more capacity to the south of Arlington Street

- Metro 2018 Regional Transportation Plan
    - McLoughlin Boulevard Improvement (Milwaukie to Gladstone): Improve safety for bicyclists and pedestrians by adding bikeways, pedestrian facilities, filling in sidewalk gaps, adding transit supportive elements, improving ADA accessibility, and implementing proven safety counter measures (RTP Project Number: 10024)
    - McLoughlin Boulevard HCT Extension (Park Avenue to Oregon City): Extend high capacity transit (light rail or bus rapid-transit) and implement bicycle and pedestrian safety countermeasures at stop locations (RTP Project Number: 11937)

SPEEDS AND VOLUMES

Weekday peak hour turning movement counts at select intersections and 24-hour tube counts between Park Avenue and Silver Springs Road and Vineyard Road and Naef Road were collected in October 2022. Speed and volume data is summarized below.

Motor Vehicle Speeds and Volumes

The following daily vehicle speeds and volumes were recorded at the two tube count locations:

- Between SE Park Avenue & SE Silver Springs Road
  - Speed limit: 40 MPH
  - Average Speed: 40 MPH
  - 85th Percentile Speed: 46 MPH
  - Daily volumes: 24,795 (12,303 NB & 12,492 SB)
- Between SE Vineyard Road & SE Naef Road
  - Speed limit: 40 MPH
  - Average Speed: 38 MPH
  - 85th Percentile Speed: 44 MPH
  - Daily Volumes: 31,749 (17,702 NB & 14,047 SB)

Pedestrian and Bike Volumes

Approximately 155 daily pedestrians and 55 daily bicycles were recorded walking or biking along McLoughlin Boulevard between Park Avenue and Silver Springs Road and between Vineyard Road and Naef Road. At the intersection of McLoughlin Boulevard and Park Avenue, 70 pedestrians and 8 bicyclists were recorded during the PM peak hour. Although these counts only provide a snapshot in time at several locations along the corridor, they highlight the multimodal users present on the corridor.

TriMet Ridership

According to 2017–2021 TriMet data, this corridor serves approximately 2,950 daily weekday transit trips. The following bus stops had the highest daily ridership:

- SE McLoughlin / Park Ave (S)
  - Weekday Average: 282
  - Weekend Average: 168
- SE Mcloughlin / Oak Grove (N)
  - Weekday Average: 135
  - Weekend Average: 102

- SE McLoughlin / Oak Grove (S)
    - Weekday Average: 97
    - Weekend Average: 72
- SE McLoughlin / Roethe (N)
    - Weekday Average: 101
    - Weekend Average: 66

Corridor-Wide Needs Evaluation

The team gathered information from a variety of outlets to create an understanding of the needs along the corridor including a crossing assessment, safety assessment, community feedback (from the Community Sounding Board and public surveying), and through performing a Road Safety Audit "Lite". The needs identified through each component are detailed below.

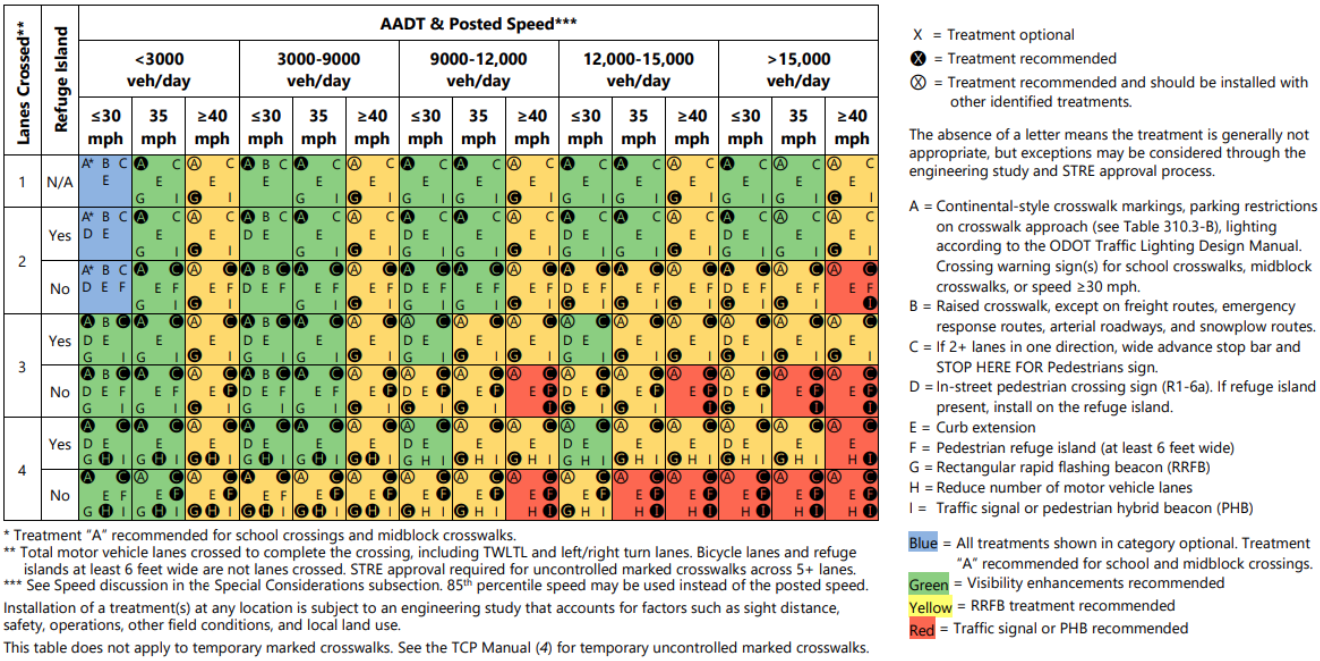
CROSSING ASSESSMENT

The Federal Highway Administration (FHWA) *Guide for Improving Pedestrian Safety* at Uncontrolled Crossing Locations informs what crossing countermeasures are appropriate given roadway features including speed, average annual daily traffic (AADT), and roadway configuration including number of lanes. ODOT has adopted this guidance, and the guidance produced by the FHWA is included in the ODOT Analysis Procedures Manual. ODOT also refined the guidance to local Oregon conditions, and it is included in the ODOT Traffic Manual, as shown in Figure 1. The AADT along McLoughlin Boulevard is greater than 15,000 vehicles, the posted speed is 40 mph, and the cross section is four lanes without a raised median. The team evaluated these characteristics across several segments of the corridor, and the results were the same for each location. Based on this information, the following bullets provide pedestrian crossing countermeasures recommended in locations where enhanced crossings should be added along the corridor.

- The following countermeasures are **recommended and should be installed with other identified treatments:**
    - High-visibility (continental style) crossing markings
    - Adequate nighttime lighting levels
    - Crossing warning signs
- The following countermeasures are **recommended:**
    - Stop Here For Pedestrians sign and wide advance stop bar
    - Pedestrian refuge island (at least 6 feet wide)
    - Traffic signal or pedestrian hybrid beacon (PHB)

- The following countermeasures should be considered as **optional treatments**:
    - Curb extension
    - Reduce number of motor vehicle lanes (road diet)

Figure 1. ODOT Traffic Manual Uncontrolled Marked Crosswalk Treatments



Lanes Crossed**	Refuge Island	AADT & Posted Speed***															
		<3000 veh/day			3000-9000 veh/day			9000-12,000 veh/day			12,000-15,000 veh/day			>15,000 veh/day		
		≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
1	N/A	A* B C E	A C E G I	A C E G I	A B C E	A C E G I	A C E G I	A C E	A C E G I	A C E G I	A C E	A C E G I	A C E G I	A C E G I	A C E G I	A C E G I
2	Yes	A* B C D E	A C E G I	A C E G I	A B C D E	A C E G I	A C E G I	A C D E	A C E G I	A C E G I	A C D E	A C E G I	A C E G I	A C D E G I	A C E G I	A C E G I
	No	A* B C D E F	A C E F G I	A C E F G I	A B C D E F	A C E F G I	A C E F G I	A C D E F G I	A C E F G I	A C E F G I	A C D E F G I	A C E F G I	A C E F G I	A C D E F G I	A C E F G I	A C E F I
3	Yes	A B C D E G I	A C E G I	A C E G I	A B C D E G I	A C E G I	A C E G I	A C D E G I	A C E G I	A C E G I	A C D E G I	A C E G I	A C E G I	A C D E G I	A C E G I	A C E G I
	No	A B C D E F G I	A C E F G I	A C E F G I	A B C D E F G I	A C E F G I	A C E F G I	A C D E F G I	A C E F G I	A C E F I	A C D E F G I	A C E F G I	A C E F I	A C D E F G I	A C E F G I	A C E F I
4	Yes	A C D E G H I	A C E G H I	A C E G H I	A C D E G H I	A C E G H I	A C E G H I	A C D E G H I	A C E G H I	A C E H I	A C D E G H I	A C E G H I	A C E H I	A C D E G H I	A C E G H I	A C E H I
	No	A C E F G H I	A C E F G H I	A C E F G H I	A C E F G H I	A C E F G H I	A C E F G H I	A C D E F G H I	A C E F G H I	A C E F H I	A C D E F G H I	A C E F G H I	A C E F H I	A C D E F G H I	A C E F G H I	A C E F H I

* Treatment "A" recommended for school crossings and midblock crosswalks.
** Total motor vehicle lanes crossed to complete the crossing, including TWLTL and left/right turn lanes. Bicycle lanes and refuge islands at least 6 feet wide are not lanes crossed. STRE approval required for uncontrolled marked crosswalks across 5+ lanes.
*** See Speed discussion in the Special Considerations subsection. 85th percentile speed may be used instead of the posted speed.
Installation of a treatment(s) at any location is subject to an engineering study that accounts for factors such as sight distance, safety, operations, other field conditions, and local land use.
This table does not apply to temporary marked crosswalks. See the TCP Manual (4) for temporary uncontrolled marked crosswalks.

X = Treatment optional
Ⓧ = Treatment recommended
⊗ = Treatment recommended and should be installed with other identified treatments.

The absence of a letter means the treatment is generally not appropriate, but exceptions may be considered through the engineering study and STRE approval process.

A = Continental-style crosswalk markings, parking restrictions on crosswalk approach (see Table 310.3-B), lighting according to the ODOT Traffic Lighting Design Manual. Crossing warning sign(s) for school crosswalks, midblock crosswalks, or speed ≥30 mph.
B = Raised crosswalk, except on freight routes, emergency response routes, arterial roadways, and snowplow routes.
C = If 2+ lanes in one direction, wide advance stop bar and STOP HERE FOR Pedestrians sign.
D = In-street pedestrian crossing sign (R1-6a). If refuge island present, install on the refuge island.
E = Curb extension
F = Pedestrian refuge island (at least 6 feet wide)
G = Rectangular rapid flashing beacon (RRFB)
H = Reduce number of motor vehicle lanes
I = Traffic signal or pedestrian hybrid beacon (PHB)

Blue = All treatments shown in category optional. Treatment "A" recommended for school and midblock crossings.
Green = Visibility enhancements recommended
Yellow = RRFB treatment recommended
Red = Traffic signal or PHB recommended

Additionally, the 2023 ODOT Highway Design Manual (HDM), which reflects the Blueprint for Urban Design (BUD,) provides guidance on target crossing spacing for different urban context classifications. As discussed in the McLoughlin Investments Strategy Technical Memorandum #2 Performance-Based Design Decision Framework, McLoughlin Boulevard is classified as a Commercial Corridor and therefore has a target spacing range of 500 – 1,000 feet as shown in Figure 2.

The guidance outlined above will be taken into consideration when developing location-specific solutions along the corridor.

Figure 2. ODOT HDM Target Crossing Spacing Range Based on Roadway Context

Context	Typical Speed Ranges (MPH)[4]	Travel Lanes[1,2]	Turn Lanes[1,2]	Shy Distance[1,3]	Median[1,2]	Bicycle Facility[1,2,5]	Sidewalk	Target Pedestrian Crossing Spacing Range (feet)[6]	On-street parking[1]
Commercial Corridor	30-35	Evaluate, start with preferred widths, wider by roadway characteristics	Balance crossing width and operations depending on desired use	Consider roadway characteristics, desired speeds	Typically used for safety/ operational management	Start with separated bicycle facility, consider roadway characteristics	Continuous and buffered sidewalks, with space for transit stations	500-1,000	Not Applicable

Finally, Metro's design guidance in *Designing Livable Streets and Trails Guide*, recommends pedestrian crossings every 200 – 530 feet for commercial corridors in an urban region, such as McLoughlin Boulevard. Due to the urban nature of the corridor and the density and frequency of transit stops and service, a shorter spacing of crossings is desirable.

SAFETY ASSESSMENT

ODOT compiled all recorded crash data on the corridor (spanning from MP 6.7, immediately north of the Park Avenue MAX station, to MP 11.2, the bridge over the Clackamas River) from January 1, 2016, through December 31, 2020. This represented the most recent 5-years of fully processed crash history for the corridor.

The first part of the safety assessment shares results for crashes of all modes, and the second section provides more detailed information about pedestrian and bicycle crashes. Of the 666 total reported crashes along this segment of McLoughlin Boulevard between 2016 and 2020, 53 crashes (nearly 8 percent) involved either a pedestrian or bicyclist. The proportion of these crashes is far greater than their overall activity levels on the corridor, which indicates a significant need for pedestrian and bicycle safety improvements.

Currently, ODOT has compiled preliminary 2021 crash data. The data is subject to change as it is being finalized. Table 1, Figure 5, and Figure 9 include the 2021 fatal and severe injury crash data. A broader discussion of the preliminary 2021 crash data can be found in the third section of the safety assessment.

Crashes for All Modes

Table 1 and Figure 3 show the total number of crashes by crash severity. ODOT has five crash severity categories, and in crashes with multiple reported injuries, the most severe injury category is used to represent that crash. There is a clear downward trend of overall crashes along the corridor – there were 171 reported crashes in 2016 and 106 in 2020 – but the number of fatal and severe injury crashes has remained constant.

Table 1. Number of Crashes by Severity Type

Year	Total Crashes	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	Property Damage Only Crashes
2016	171	2	5	35	64	65
2017	141	-	3	17	59	62
2018	123	2	5	15	62	39
2019	125	-	6	23	57	39
2020	106	3	4	12	48	39
2021[1]	--	1	6	--	--	--
TOTALS	**666**[1]	**8**	**29**	**102**	**290**	**244**

[1] 2021 crash data is preliminary and has been provided to show fatal and severe injury crashes. Because moderate injury, minor injury, and PDO crashes for 2021 were not included, the 666 total crashes only reflect 2016-2020 data only.

Figure 3. Number of Reported Crashes by Severity Type

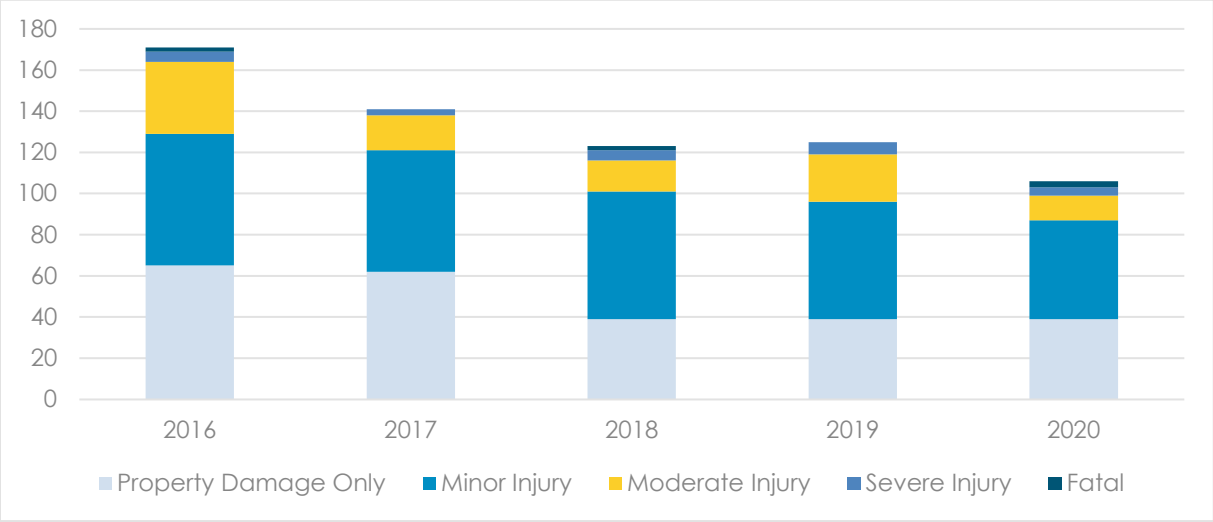
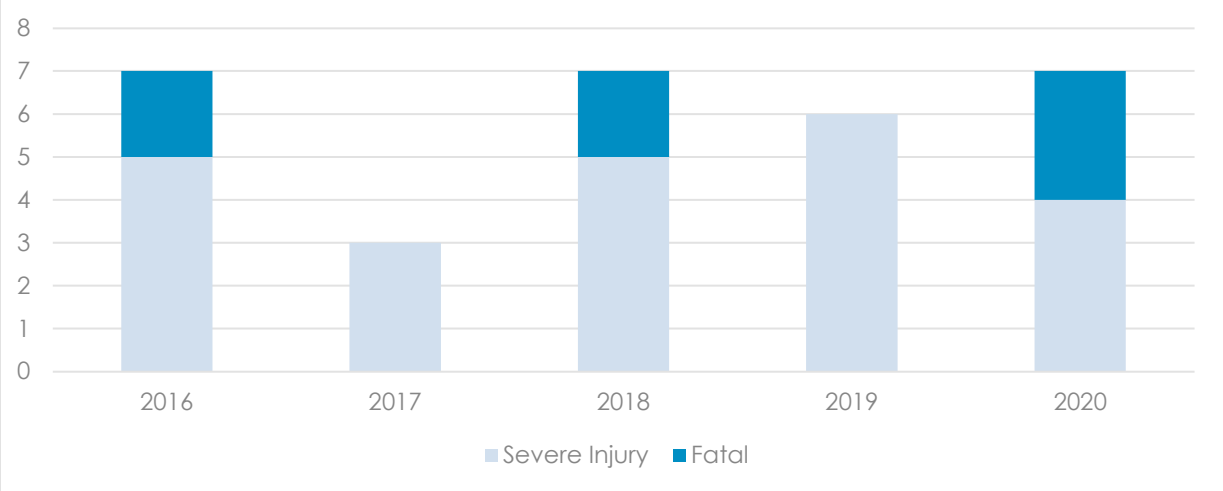


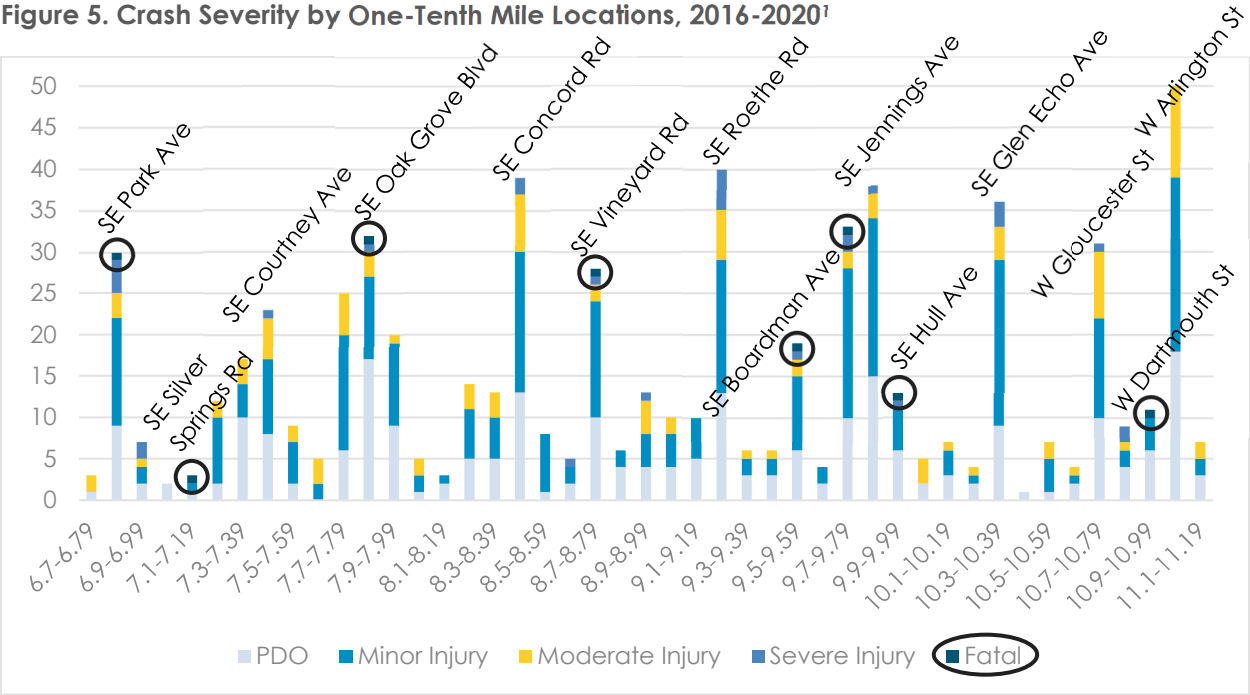
Figure 4 shows the number of fatal and severe injury crashes from 2016 through 2020. Except for 2017, all years had either six or seven recorded fatal or severe injury crashes.

Figure 4. Number of Fatal and Severe Injury Crashes



Crashes were spread across the McLoughlin Boulevard study corridor, as shown in Figure 5 and Figure 6. The figure below shows all 666 reported crashes from 2016 to 2020 grouped by one-tenth mile segments, with the peaks often occurring around major intersections. The map figure (Figure 6) shows where these reported crashes from 2016 to 2020 were located. For a more granular understanding of crash locations, the following link includes the location and severity of each crash: McLoughlin Blvd Content App (arcgis.com).

Figure 5. Crash Severity by One-Tenth Mile Locations, 2016-2020[1]



[1] Includes 2021 data for fatal and severe injury crashes

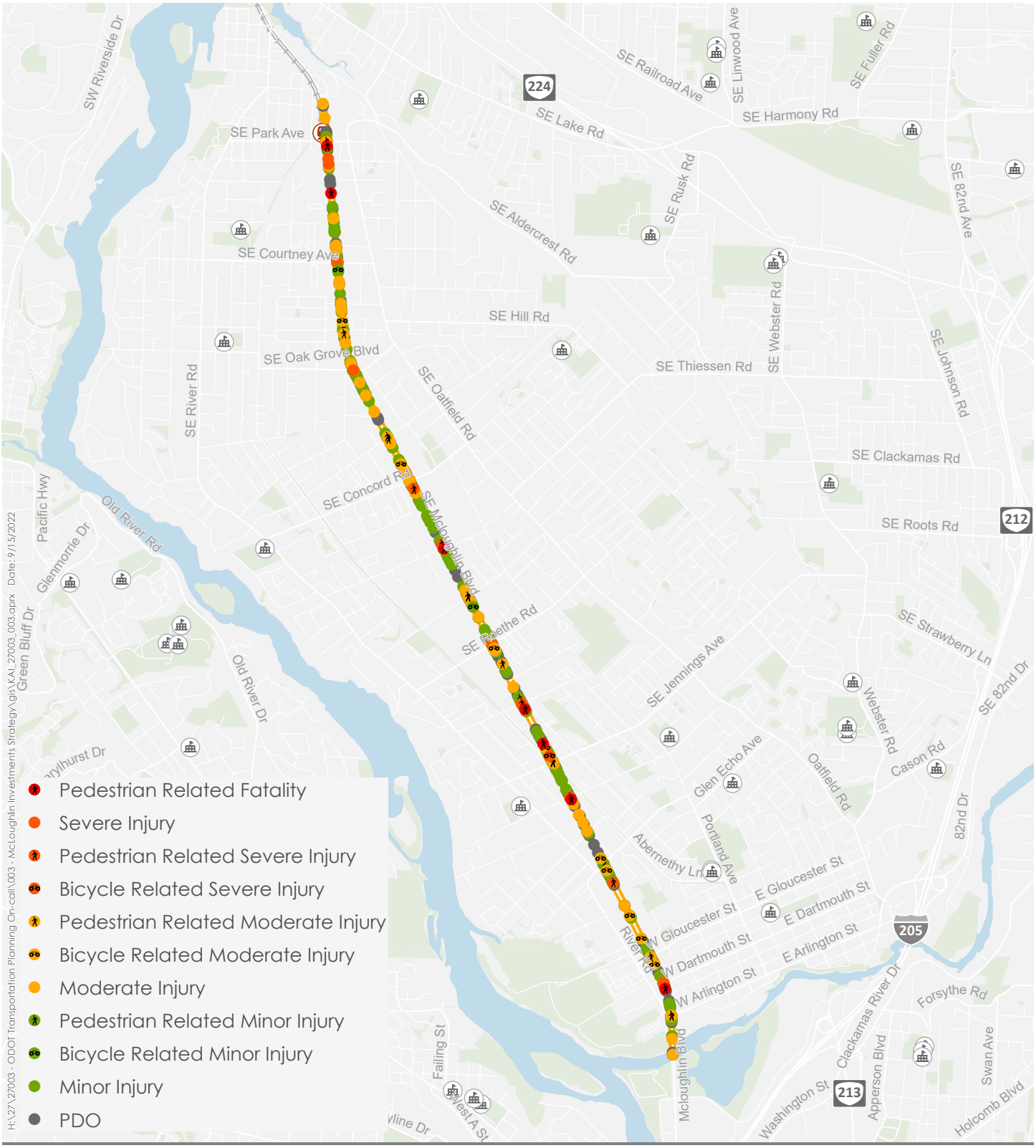


Figure 6

Reported Crashes 2016 to 2020

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Table 2 and Figure 7 provide the reported crashes by crash type. The two most common types of crashes were turning movement crashes (269 crashes, 40.4% of total crashes) and rear-end crashes (241 crashes, 36.2% of total crashes), which comprised more than three-quarters of all reported crashes along the corridor. Additionally, all seven fatal crashes between 2016 and 2020 involved a pedestrian, and five of the 23 total severe injury crashes also involved a pedestrian.

Metro's 2016 to 2020 High Injury Corridors work identified McLoughlin Boulevard as being one of the region's highest injury corridors and in the top 17 percent of corridors across the region for crash severity.

Table 2. Crash Severity by Crash Type, 2016-2020

Year	Total Crashes	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	Property Damage Only Crashes
Turning	269	--	11	51	120	87
Rear-End	241	--	2	21	114	104
Angle	52	--	3	13	23	13
Sideswipe	46	--	--	4	13	29
Pedestrian	38	7	5	12	14	--
Fixed Object	11	--	--	--	2	9
Miscellaneous	9	--	2	1	4	2
TOTALS	**666**	**7**	**23**	**102**	**290**	**244**

Figure 7. Crash Severity by Crash Type, 2016-2020

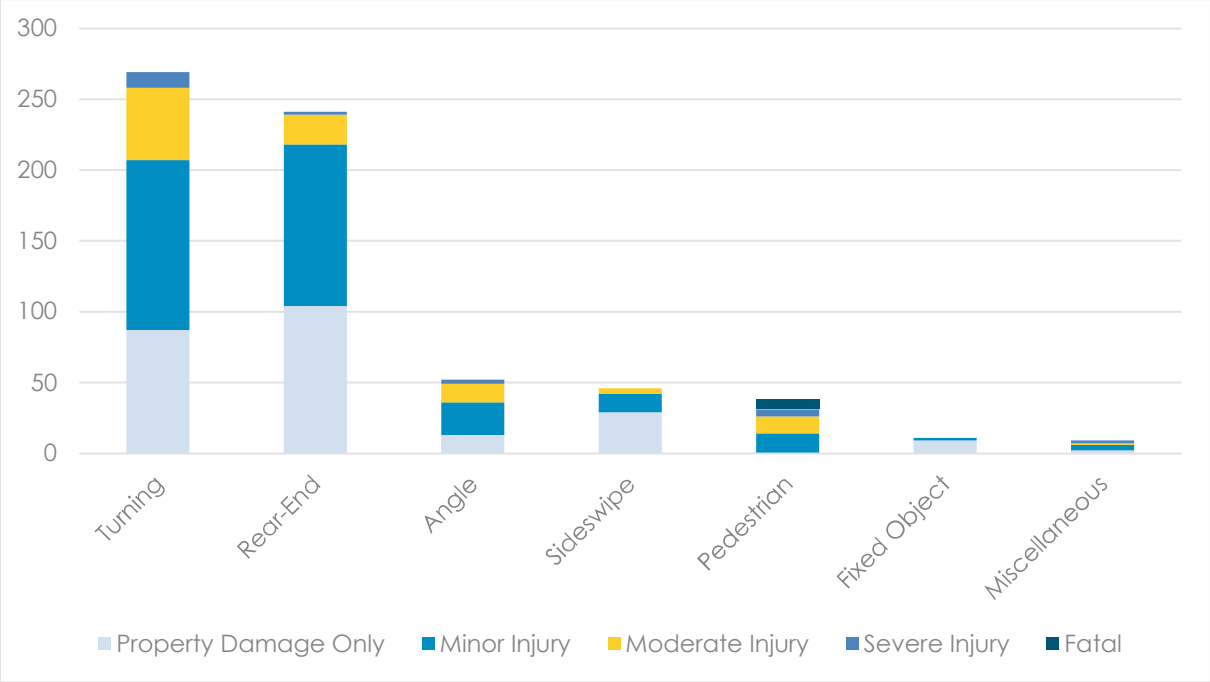
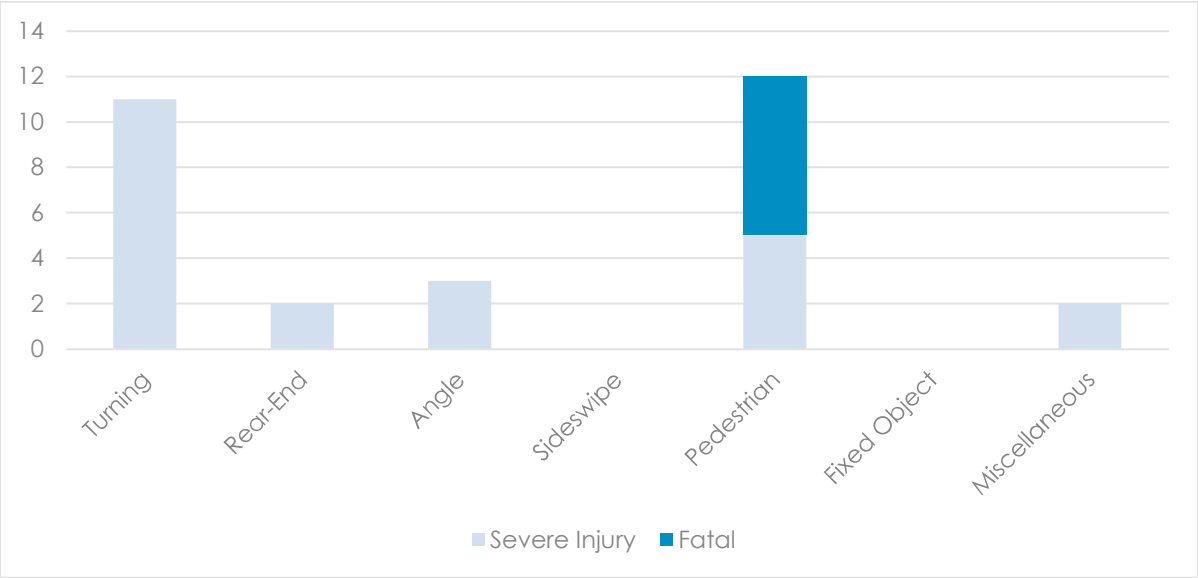


Figure 8 measures crash type by severe injury and fatal crashes only. Unlike in Figure 7, the most common crash type for severe injury and fatal crashes is a pedestrian crash, including all seven fatalities on McLoughlin Boulevard between 2016 and 2020. Other crash types, like sideswipes and fixed object crashes, had no reported severe injury and fatal crashes, and the number of rear-end crashes dropped significantly when screening for severe injury and fatal crashes.

Figure 8. Severe Injury and Fatal Crashes by Crash Type, 2016-2020



Pedestrian and Bicycle Crashes

Reported crashes involving either a pedestrian or a bicyclist accounted for eight percent of all crashes from 2016 to 2020, and these crashes tended to be more severe than other crash types. Of the seven fatal crashes on the McLoughlin Boulevard corridor, all of them involved a pedestrian, and all reported crashes involving either a pedestrian or a bicyclist resulted in some sort of injury. Table 3 provides a breakdown of crashes involving either a pedestrian or a bicyclist by crash severity. Many pedestrian crashes and bicycle crashes resulted in a moderate injury or worse.

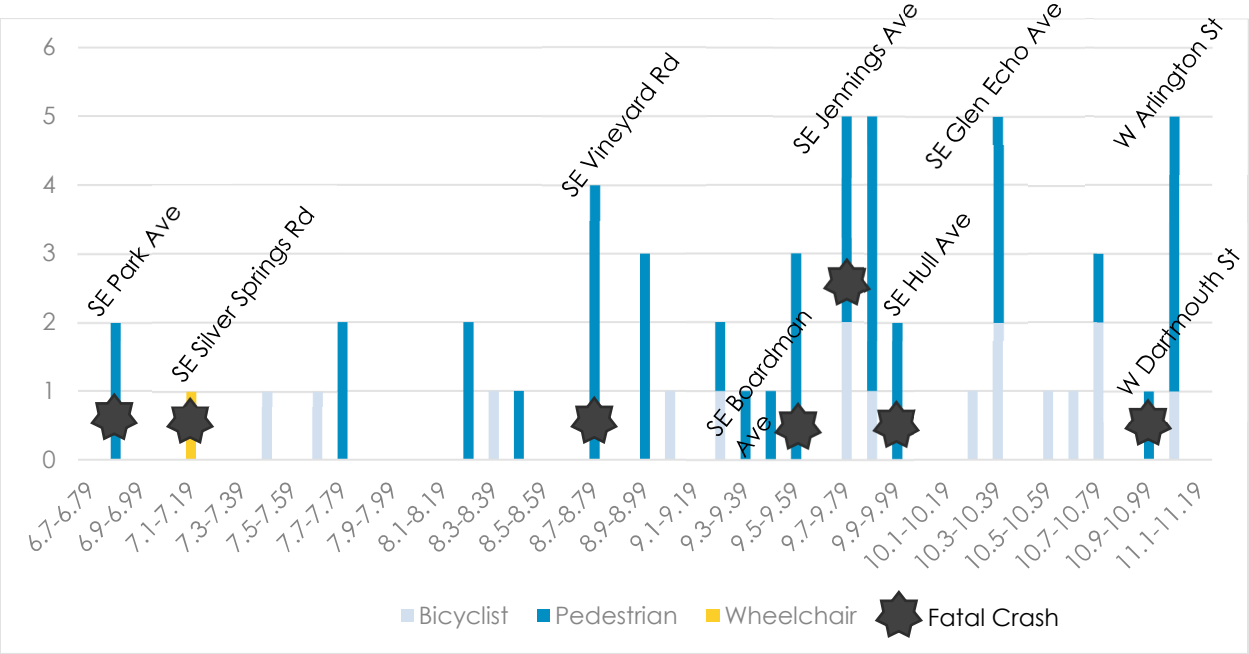
Table 3. Number of Pedestrian and Bicycle Crashes by Severity Type

Year	Total Crashes	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	Property Damage Only Crashes
Pedestrian	38	7	5	12	14	--
Bicyclist	15	--	1	10	4	--
TOTALS	**53**	**7**	**6**	**22**	**18**	**0**

Figure 9 and Figure 10 show the location of these crashes along the corridor. Pedestrian and bicycle crashes occurred along the corridor, with a greater concentration of crashes occurring in the southern half of the corridor, from SE Vineyard Road to W Arlington Street. Both figures also

highlight the location of fatal crashes. The wheelchair involved crash, which occurred just south of SE Silver Springs Road, resulted in a fatality.

Figure 9. Pedestrian, Bicycle, and Wheelchair Crashes by One-Tenth Mile Locations, 2016-2020[1]



[1] Includes one severe injured pedestrian crash at milepost 9.22 and one severe injured bicycle crash at milepost 9.8 from the preliminary 2021 crash data.

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Figure 10

Reported Bicycle and Pedestrian Crashes 2016 to 2020

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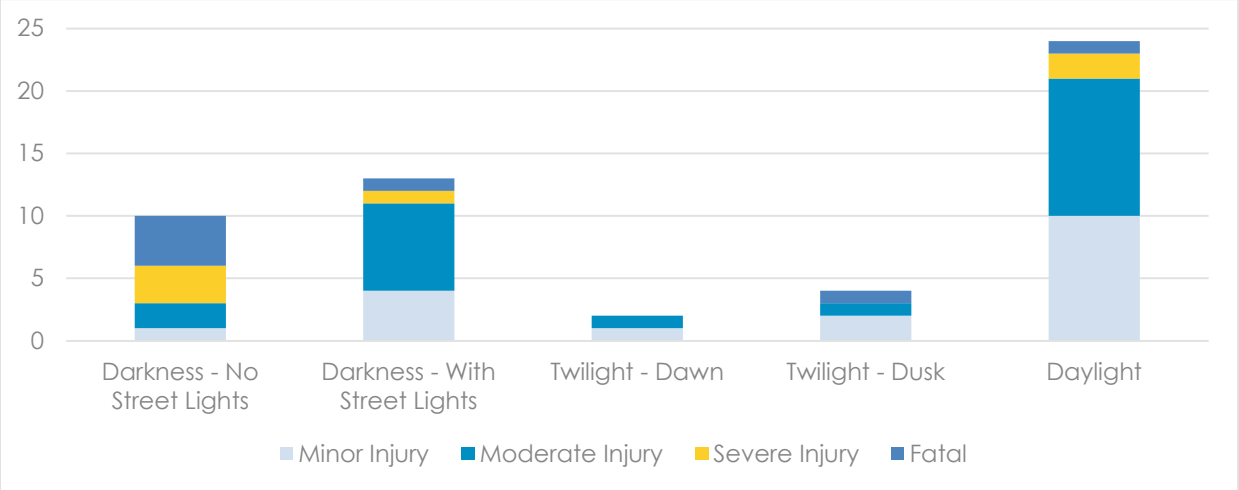
Table 4 provides details on all fatal crashes within the corridor from 2016 to 2021. Three crashes were located at intersections (Vineyard Road, Hull Avenue, and Oak Grove Boulevard), and the remaining five crashes were located along segments of McLoughlin Boulevard. In all but one instance, the driver involved in the fatal crash was driving on McLoughlin Boulevard. In that instance, an eastbound left turning vehicle was turning from Vineyard Road onto McLoughlin Boulevard.

Table 4. Fatal Crash Details, 2016-2020

Date	Time of Day	Location	Driver Direction
2/8/2016	6 AM	100 feet south of Park Ave	Northbound straight
10/29/2016	8 PM	300 feet south of Silver Springs Rd	Southbound straight
1/28/2018	7 PM	475 feet north of Jennings Ave	Southbound straight
3/4/2018	6 AM	Vineyard Rd	Eastbound left turn
3/7/2018	8 PM	Hull Ave	Southbound straight
5/21/2020	10 PM	125 feet north of Clarendon St	Southbound straight
11/19/2020	7 PM	150 feet south of Boardman Ave	Northbound straight

Limited street lighting may have played a role in the pedestrian and bicycle crashes that occurred along the corridor. As the table above shows, all fatal crashes occurred either before 7:00 AM or after 6:00 PM, likely during nighttime or twilight hours. Figure 11 shows the prevalence of street lighting for bicycle and pedestrian crashes. Of the seven fatal pedestrian crashes, only one happened during daylight hours, and of the six severe injured crashes, two occurred during daylight hours.

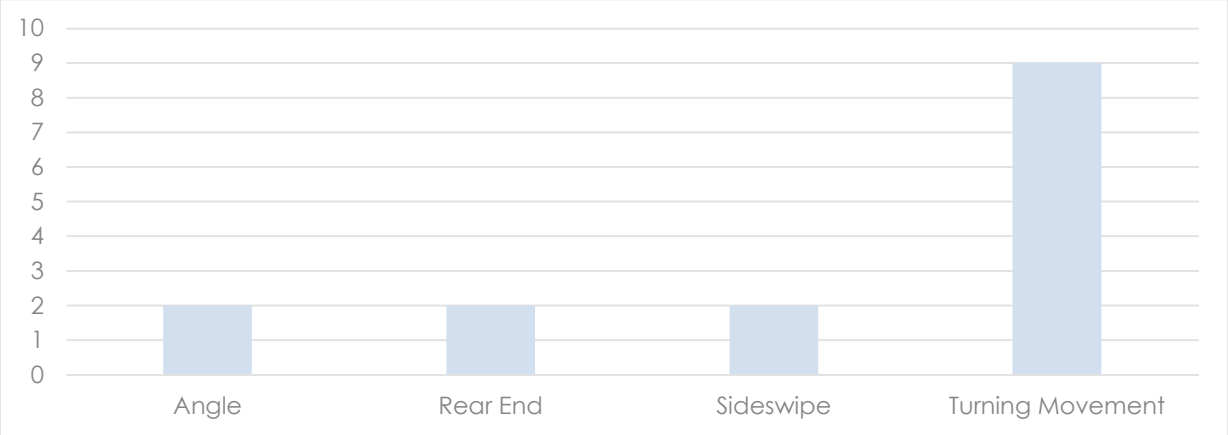
Figure 11. Pedestrian and Bicycle Crashes by Presence of Street Lighting



As noted in Table 2 and Figure 7, ODOT organizes crash data by crash type. All pedestrian crashes are coded as "Pedestrian Crashes" in ODOT's crash database. Figure 12 shows the crash type for all 15 bicycle crashes from 2016 to 2020. Nine of the 15 crashes were turning movement crashes, where one party in the crash was making a turning movement that led to the crash. Of

the turning movement crashes, two were located at intersections and seven were located at driveways or other access points. There were two angle crashes (where two vehicles going straight from two different directions collide, such as a T-Bone crash), two rear end crashes, and two sideswipe crashes involving bicyclists, as well.

Figure 12. Crash Type for Bicycle Crashes



Each crash report also includes suspected or confirmed drug and/or alcohol use, as well as if speeding was a factor in the crash. Table 5 provides a breakdown of these factors by crash severity type. Notably six of the seven fatal crashes involved suspected or confirmed drug use (three crashes involved a driver using drugs and three crashes involved a pedestrian using drugs). Additionally, five of the 55 reported pedestrian and bicycle crashes involved alcohol use. While none of these crashes were reported to have involved speeding, this is determined in the police report after the crash occurred and is a subjective determination. Additionally, a 40 MPH roadway such as McLoughlin Boulevard has an intersection sight distance of 385 feet for right turning vehicles from a minor street, considerably longer than on lower speed roads.

Table 5. Other Factors Involved in Pedestrian and Bicycle Crashes

Other Crash Factor	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	TOTALS
Drug Use – Yes	6	--	--	--	**6**
Drug Use – No	1	6	22	18	**47**
Alcohol Use – Yes	1	1	2	1	**5**
Alcohol Use – No	6	5	20	17	**48**
Speeding – Yes	--	--	--	--	**0**
Speeding – No	7	6	22	18	**53**

2021 Crashes

ODOT's 2021 preliminary crash data from 2021 includes 1 fatal crash, 6 severe injury crashes, 20 moderate injury crashes, 56 minor injury crashes, and 50 property damage only crashes, for a

total of 133 crashes. The preliminary data is subject to change, but the number of fatal and severe injury crashes are highly unlikely to change. As a result, this analysis looked at fatal and severe injury crashes only for 2021, as well as pedestrian and bicycle crashes of all injury types.

The lone fatal crash, shown in Table 6, involved a northbound vehicle.

Table 6. Fatal Crash Details, 2021 (Preliminary)

Date	Time of Day	Location	Driver Direction
10/16/2021	6 PM	Oak Grove Blvd	Northbound straight

Table 7 provides more details on the six reported crashes in the preliminary 2021 data that involved a pedestrian or bicyclist, including two severe injury crashes.

Table 7. Crash Detail for Pedestrian and Bicycle Crashes, 2021 (Preliminary)

Date	Time of Day	Location	Crash Severity	Crash Type	Lighting
1/11/2021	6 PM	Naef Rd	Moderate Injury	Pedestrian crash	Dark with Street Lights
1/22/2021	12 PM	Jennings Ave	Severe Injury	Turning crash (bike)	Daylight
2/10/2021	5 PM	Concord Rd	Minor Injury	Pedestrian crash	Dark with Street Lights
2/17/2021	11 AM	Roethe Rd	Severe Injury	Pedestrian crash	Daylight
3/12/2021	2 PM	Oak Grove Blvd	Minor Injury	Pedestrian crash	Daylight
8/14/2021	2 PM	200 ft N of Vineyard Rd	Moderate Injury	Turning crash (bike)	Daylight

COMMUNITY FEEDBACK

In addition to performing the crossing and safety assessments, the project team collected input from the community on the needs along the corridor. The project team created a Community Sounding Board group, composed of eight community members. Members included representatives of the Jennings Lodge and Oak Grove communities, ADA community, walking and biking community, and a Safe Routes to School advocate. The project team met with the Community Sounding Board in October 2022 to discuss transportation safety concerns along the corridor and potential solutions they would like to be considered. Additionally, the project team conducted public surveys along the corridor in October 2022. Team members were stationed at different areas of interest along the corridor. The team gathered 154 survey responses in total, including 61 in person surveys and 93 online surveys (88 in English and 5 in Spanish). The Community Sounding Board and public surveys identified the following corridor needs:

- Corridor does not match its urban context or serve those walking and biking
- Crossings (including distance between crossing and pedestrian timing at signals)
- Visibility/lack of lighting

- Vehicles running red lights
- Drivers not stopping for crossing pedestrians
- High vehicle speeds
- Lack of sidewalks
- Wait times for buses
- Freight unloading in medians
- Bicyclists feeling vulnerable in unprotected bicycles lanes
- Many access points/conflict points across the sidewalks

Additionally, ODOT staff reviewed Ask ODOT data for any potential project locations. No data specifically relevant to this project was identified.

ROAD SAFETY AUDIT "LITE" IDENTIFIED NEEDS

Finally, the project team conducted a Road Safety Audit "Lite" in November 2022, to gain firsthand experience of the safety concerns raised in the crossing and safety assessments and community feedback. A group of project stakeholders and agencies involved in the McLoughlin Investments Strategy project attended the RSA. The RSA consisted of three site visits, a corridor needs work session to share observations from the site visits, and a solutions work session to brainstorm potential solutions to address needs. The RSA team identified several systemic and location specific issues throughout the corridor related to bicycle and pedestrian safety and comfort as well as transit access and reliability. The identified needs are provided below.

Crossings

There are multiple existing mid-block and intersection crossing locations along the corridor with a center refuge median but no signing, striping, or enhancements highlighting the pedestrian crossing. Additionally, there are existing crossings without a center refuge median provided. During the RSA field visits, the team observed vehicles failing to yield to pedestrians waiting to cross and noted that crossing was overall uncomfortable at these unenhanced locations. It is noted that pedestrian and bicycle crashes recorded in the crash data also involved people crossing at non-enhanced crossing locations. It was discussed that even at existing crossings with rectangular rapid-flashing beacons (RRFBs), some team members felt uncomfortable while crossing because it was hard to tell if approaching vehicles were going to stop. There are various locations along the corridor with recently installed Americans with Disability Act (ADA) ramps but no marked crosswalk or refuge median. Finally, there are segments along the corridor with significant distance between existing enhanced crossings where there is need for new enhanced crossings to provide comfortable

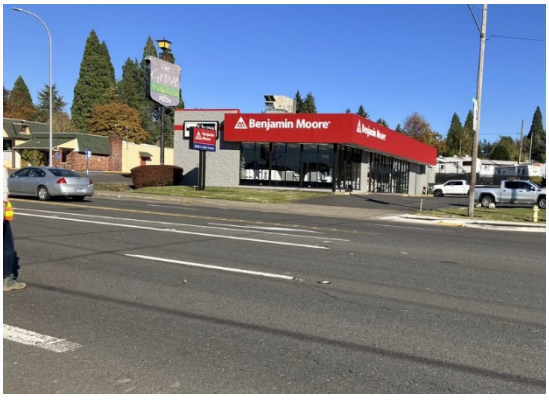


Figure 13. Existing crossing without a center median or other enhanced treatments

and safe crossing regularly. The segment between Jennings Avenue to Hull Avenue is the only existing segment which meets the ODOT HDM target pedestrian crossing spacing of 500' – 1000'. Many segments have 1500' or more of distance between enhanced crossing, including:

- Park Avenue to Courtney Avenue
- Courtney Avenue to Oak Grove
- Oak Grove to Concord Road
- Concord Road to Vineyard Road
- Roethe Road to Boardman Avenue
- Boardman Avenue to Jennings Avenue
- Hull Avenue to Glen Echo Avenue
- Glen Echo Avenue to Gloucester Street

See Figure 14 for existing enhanced crossing spacing with a 500-foot buffer around each existing enhanced crossing (signals or rectangular rapid flashing beacons).

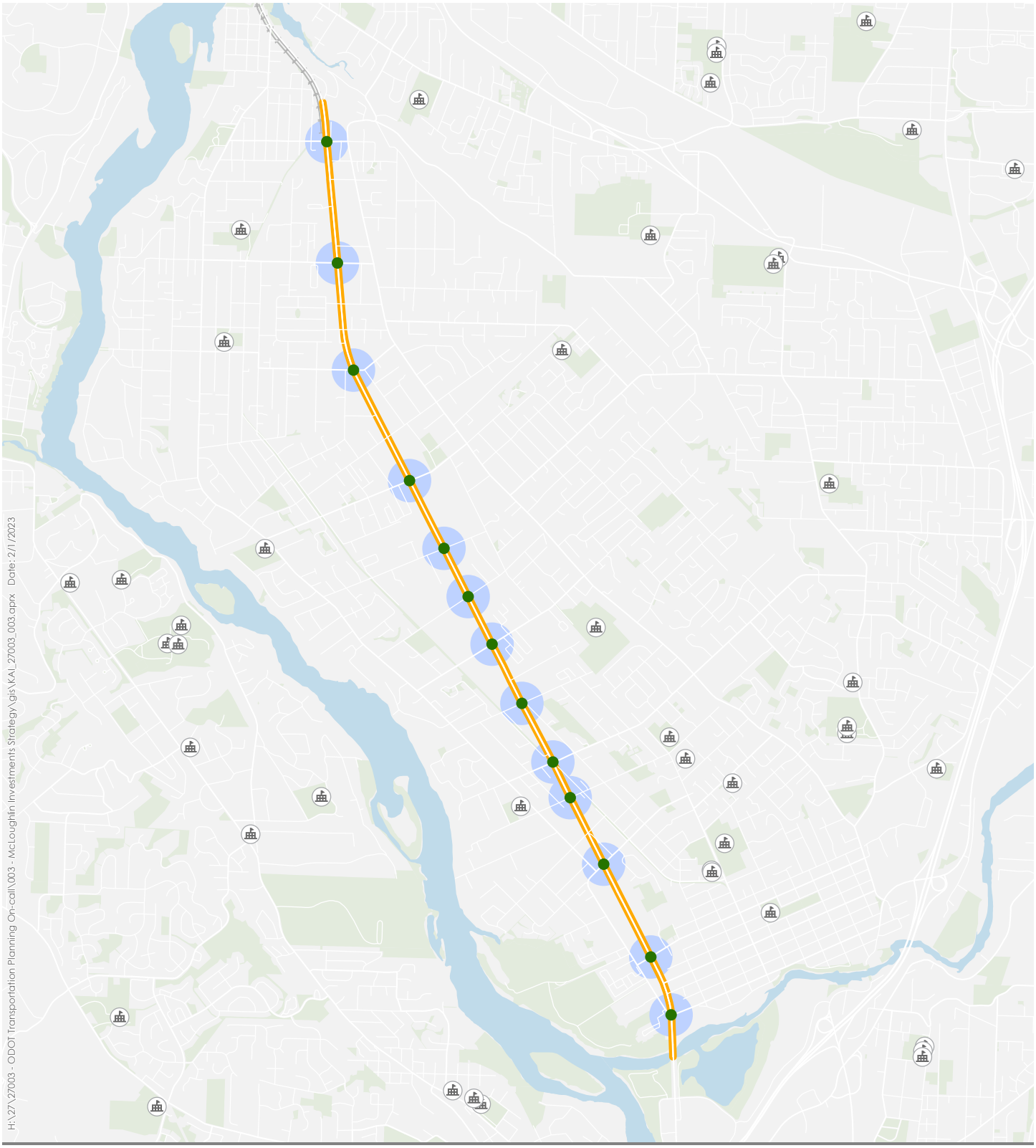


Figure 14

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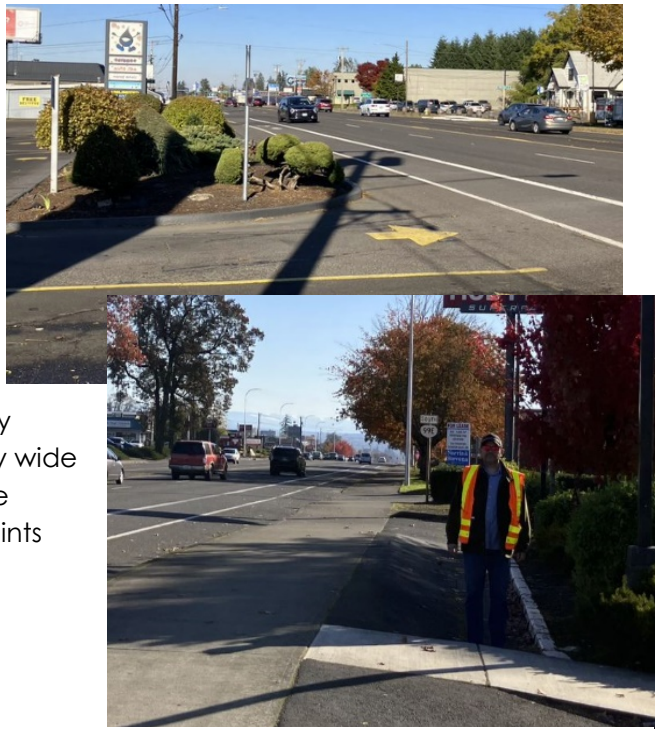
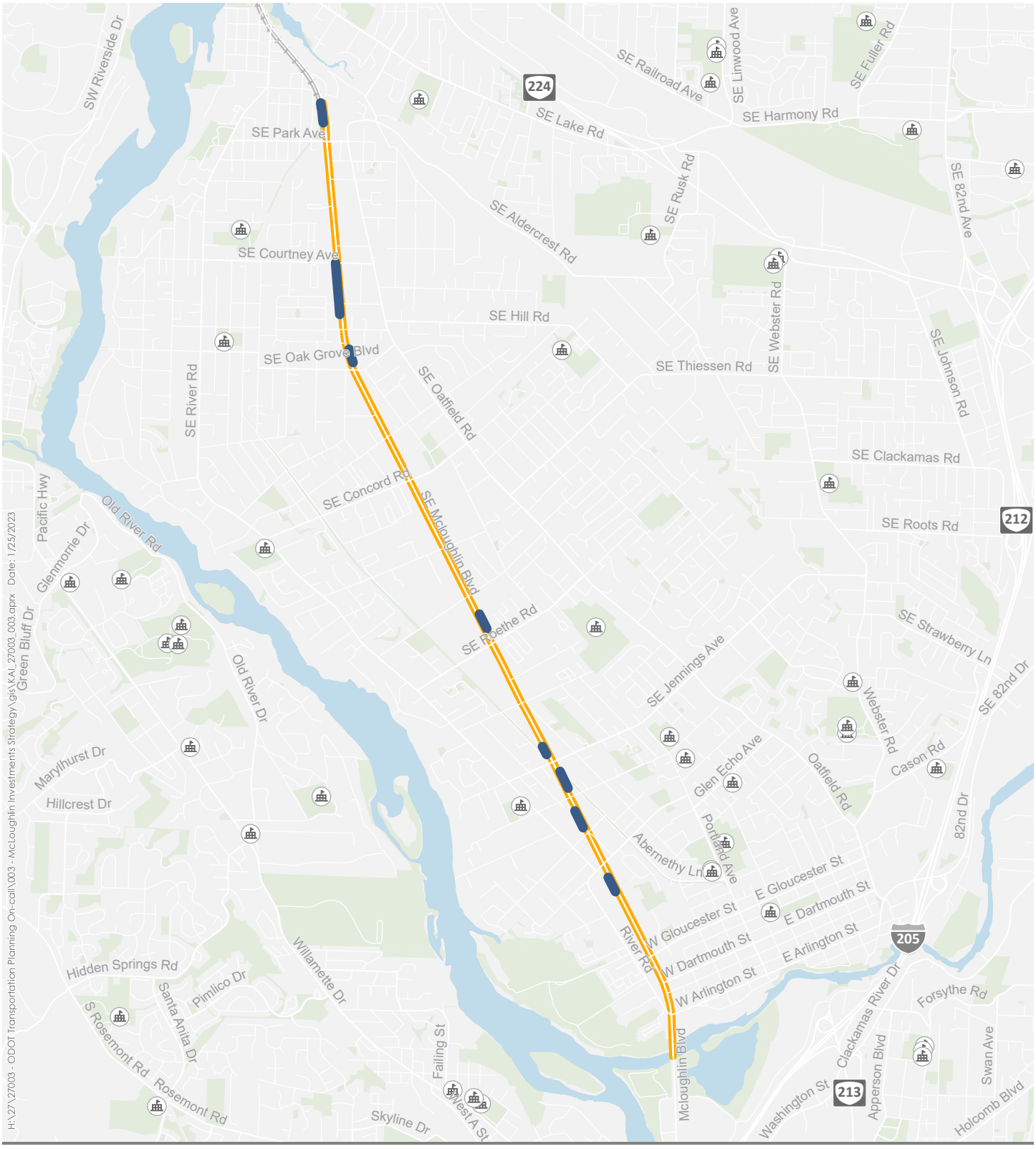
Existing Enhanced Crossings

Sidewalks

One of the key issues the RSA team observed was multiple existing sidewalk gaps along the corridor. Pedestrians in these locations generally walk on the side of the road or through an adjacent parking lot (see Figure 17 for existing sidewalk gaps on McLoughlin Boulevard). Additionally, the sidewalk is narrow in areas and there are many locations with ADA issues (non-ADA compliant ramps and driveways and steep slopes adjacent to the sidewalk with no barrier). There are also many existing driveways along the corridor which are very wide and sometimes undefined. These undefined or wide driveways create more opportunities for conflict points and allow for faster turns into and out of driveways, creating safety and comfort challenges for people walking and biking.



Figures 15 and 16. Existing sidewalk gap and sidewalk with steep slope adjacent



Sidewalk Gaps

Study Corridor

Schools

MAX Orange Line

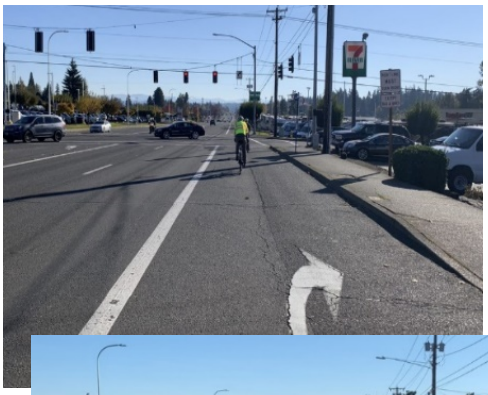
0 1 Miles

Figure 17

KITTELSON & ASSOCIATES

Sidewalk Gaps

Bicycle Lanes



During the RSA field visit, a key observation was that biking along the corridor felt overall uncomfortable due to the narrow bicycle lanes with no physical vertical separation from the high speed and volumes traffic. They also noted poor pavement conditions, a lack of maintenance within the existing bicycle lanes, as there was quite a bit of glass and other debris within the bicycle lane, and undesirable grid inlets in the bicycle travel path. The team also noted that the bicycle lane striping is inconsistent throughout the corridor. In some locations there is no buffer, others there is a buffer between the bicycle lane and motor vehicle traffic, others there is a buffer between the bicycle lane and curb, and at most signalized intersections the bicycle lane becomes a shared lane with right turning traffic.

Figures 18 and 19. Bicycle lane drop at an intersection and existing bicycle lane with buffer along curbline

Transit

Figure 20. Bus stop located near the Park Avenue Max station

One major transit observation during the RSA was the large number of people waiting for the bus along the corridor during every site visit, which reinforced to the team that transit use along the corridor is high and is consistent with the high TriMet ridership data along this segment. A few key existing transit issues include inconsistencies with the pull out versus in-lane bus stops along the corridor, (recognizing this not only impacts vehicles and transit operations, but bicyclists along the corridor). Additionally, there are stop locations without a covered waiting area (shelters). At the Park Avenue intersection in particular, the team noticed pedestrians running across McLoughlin Boulevard without waiting for a walk signal when they saw their bus or train arriving. The team also noted long signal cycle lengths at that signal and others along the corridor. Finally, there are existing transit stops without an enhanced crossing within 150 feet of the stop. These stops include:

- Stop ID 3860: Lakewood Drive(S)
- Stop ID 3852/3801: Silver Springs Road

- Stop ID 3827/3780: 13700 Block (Between Silver Springs Road and Holly Avenue)
- Stop ID 3830/3782: Chestnut Street
- Stop ID 3840/3792: Maple Street
- Stop ID 3853/3802: Silverleaf Lane
- Stop ID 3849/3799: Risley Avenue
- Stop ID 3832/3789: 16000 Block (Between Concord Road and Vineyard Road)
- Stop ID 3841/8819: Meldrum Avenue
- Stop ID 10422/10421: 19300 Block (Between Glen Echo Avenue and Gloucester Street)

Speed

The team noticed higher vehicle speeds along the corridor near the Clackamas River Bridge and at the north end of the corridor heading southbound from Milwaukie approaching the Park Avenue signal. Speed data collected at several locations along the corridor and provided in the Corridor Background section of this memorandum indicate that 85th percentile speeds vary along the corridor but are consistently higher than the speed limit of 40 mph. They were recorded at 46 mph at the northern end of the corridor, just south of Park Avenue, and 44 mph just south of the intersection with Vineyard Road. It was discussed that higher speeds in these areas and along the entire corridor impact the safety and comfort of people walking and biking along the corridor. In general, the team observed that speeds seemed to stay relatively consistent throughout the day and night. Speeds did not seem to drop during the weekday PM peak hour or increase much at night after traffic volumes dropped as in seen in some other corridors.

Lighting

The team identified inadequate lighting at the southern end of the corridor, particularly along the Clackamas River Bridge. It is noted that Clackamas County has completed lighting infill along their segment of the corridor, however the segment within the City of Gladstone (MP 10.3, Glen Echo Avenue to MP 11.2, the Clackamas River Bridge) has inconsistent lighting. Additionally, the team noticed no lighting on the east side of McLoughlin Boulevard north of Park Avenue. Ambient lighting from businesses along the corridor was noted by those in the RSA as making it difficult for people driving to see people crossing the roadway. The RSA team also

Figure 21. Ambient lighting from nearby businesses conflicting with illumination along the corridor

observed that the existing street lighting at current RRFB locations does not always highlight the correct side of the pedestrian crossing, resulting in back lighting which results in a shadow being cast over the pedestrian making them less visible to oncoming drivers.

Signals

At the signals, the team observed scenarios with long wait times to cross McLoughlin Boulevard and noted the overall pedestrian crossing time was short. The RSA team observed that some intersections have a leading pedestrian interval (LPI), including Concord Road, Jennings Avenue, Vineyard Road, Naef Road, Roethe Road, and Gloucester Street. It is noted that a LPI was recently installed at the intersection of Mcloughlin Boulevard/Park Avenue. The RSA team noticed that some intersections have permissive left turns from side streets onto McLoughlin Boulevard. The team discussed upcoming projects that will install protected left turns at the intersections of McLoughlin Boulevard/Concord Road and McLoughlin Boulevard/Park Avenue. Finally, many of the existing curb returns are wide, allowing for fast moving turning vehicles.

Location Specific Issues

In addition to the systemic issues identified above, the team also identified several location specific issues along the corridor.

LAKEWOOD DRIVE TRANSIT STOP

The team discussed the need for improvements at or consolidation of the existing transit stop at Lakewood Drive, located at the north end of the corridor. The existing bus stop (serving southbound trips) currently has no sidewalk connections or pedestrian crossing to support access to the transit stop.

Figure 22. Existing unenhanced crossing and sidewalk gap at the Lakewood Drive Transit Sop

JENNINGS AVENUE (CONNECTION TO TROLLEY TRAIL)

Understanding that the car-free, low-stress experience that the Trolley Trail provides is important to the overall connectivity of the area for people walking and biking, the team recognized the need for better walking and biking facilities, crossing treatments and wayfinding at the McLoughlin Boulevard/Jennings Avenue intersection. The team discussed that it is currently unclear, inconvenient, and uncomfortable for people making connections to the Trolley Trail across McLoughlin Boulevard.

MCLOUGHLIN BOULEVARD/ARLINGTON STREET-RIVER ROAD INTERSECTION

The team identified several safety issues at the intersection of Arlington Street and River Road with McLoughlin Boulevard. The RSA team observed northbound right turning vehicles travelling quickly through their turns due to the long deceleration lane and wide curb return radius. Many did not stop at the intersection before making a right turn on red. Additionally, eastbound right turning vehicles were also making fast turns and would often not stop before they turned, even when the signal was red. The skewed geometry of the intersection creates a wider eastbound to southbound curb return radius.

Figure 23. McLoughlin Boulevard/Arlington Street-River Road

CLACKAMAS RIVER BRIDGE

The team identified multiple safety issues around the Clackamas River Bridge and the McLoughlin Boulevard signalized intersection with Arlington Street and River Road at the southern end of the study corridor. One issue is the existing sidewalk on the bridge is very narrow, potentially narrower than 3.5 feet in pinch point locations. There are no bicycle lanes on the bridge, forcing bicycles to use the sidewalk or share the travel lanes. Most bicyclists were observed biking on the bridge sidewalks, indicating that it is more comfortable to ride on the narrow, shared sidewalks than in the travel lane. It was also noted that the bridge does not have any lighting and was therefore very dark at night, and the team noticed that some vehicles seemed to be traveling faster than the 40mph speed limit over the bridge.

A major conflict location was identified on the north side of the bridge between people driving and biking. For bicyclists traveling northbound (using the shared pedestrian/bicycle sidewalk on the east side of the bridge), there is an existing bicycle ramp down from the sidewalk that conflicts with the start of the existing northbound right turn lane entrance (taper) that serves local development and Arlington Road.

Figure 24. Clackamas River Bridge (facing South)

Potential Solutions

After gathering the corridor needs the project team began identifying potential solutions to address the identified needs. Potential solutions were identified through community feedback and during the RSA solutions work session. The RSA team will take the solutions discussed in this section to create a formalized list of projects that will be evaluated and prioritized during the next stage of the project.

COMMUNITY FEEDBACK

The project team discussed near-term solution recommendations with the Community Sounding Board. Additionally, the public survey included questions on what types of improvements people would like to see along the corridor. The following potential solutions were identified by the community:

- Add traffic calming (for example: lane narrowing)
- Reduce speeds along corridor by implementing tools such as speed feedback signs, and speed tables
- Install protected intersections
- Fill in existing sidewalk gaps
- Upgrade to protected bicycle lanes
- Increase/improve lighting
- Utilize median space for a landscaped median or beautification

ROAD SAFETY AUDIT "LITE" PRELIMINARY SOLUTIONS

The RSA participants identified potential solutions to address the corridor needs during the solutions work session of the RSA. The team discussed the following improvements as potential solutions. The solutions will be further refined by the project team in future steps of the Investments Study.

Crossings

The RSA participants discussed the following solutions to address the safety issues pertaining to crossings:

- Enhance crossings with one, or a combination of:
    - Additional crosswalk striping (ex: continental striping)
    - Additional signs in the refuge median

  - Enhanced treatments, preferably red devices (pedestrian hybrid beacon or signal)
- Provide street lighting placed before pedestrian crossings to front light the pedestrian
- Reduce crossing spacing by providing enhanced crossings at the following locations[3]:
  - At the transit stop north of Park Avenue, unless the transit stop is removed
  - Between Park Avenue and Courtney Avenue
  - Between Courtney Avenue and Oak Grove Boulevard
  - At Silverleaf Lane
  - At Risley Avenue (Proposed RRFB in 2024-2027 STIP)
  - At Meldrum Avenue (Proposed RRFB in 2024-2027 STIP)
  - Between Glen Echo Avenue and Gloucester Street

Sidewalks

The following solutions were discussed to address the safety issues pertaining to existing sidewalk conditions:

- Fill in existing sidewalk gaps
- Provide wider sidewalks (i.e., 8 feet per the Clackamas County Transportation System Plan) and a landscape buffer, where possible
- Narrow, define, and delineate driveway widths

Bicycle Lanes

The following solutions were discussed to address the safety and comfort issues pertaining to conditions to people biking:

- Restriping to provide buffered bicycle lanes along the entire corridor and add physical vertical separation (ex: Tuff-Curb) where driveways do not exist
- Provide bicycle-friendly stormwater inlets
- Remove existing right turn lanes at intersections where cars and bicyclists currently share the lane to provide continuous bicycle lanes to and through the intersections
- Provide high visibility green skip striping at intersections and evaluate the need for bicycle boxes to support left turns onto and from side streets. Side streets with bicycle facilities should be prioritized for the addition of bicycle boxes.

[3] See figure 25 for the crossing spacing with the additional crossing locations.

Vehicle Speed

The RSA participants discussed recommending speed management treatments to slow speeds on the corridor to better match the urban nature of the corridor and the target speed of 35 mph identified in ODOT's Highway Design Manual for commercial corridors.

The following solutions were discussed to address the issue of speed along the corridor:

- Consider landscape medians at locations without conflicting access points or driveways (for example, just north of Park Avenue)
- Install speed feedback signs at strategic locations
- Implement automated speed enforcement (would require partnership with local police, i.e., Gladstone Police Department)
- Reduce travel lane widths to 11 feet to encourage slower speeds
- Reduce the posted speed limit to 35 mph

Lighting

The following solutions were discussed to address the lighting issues along the corridor:

- Improve lighting within Gladstone, along the Clackamas River Bridge, and on the east side of McLoughlin Boulevard north of Park Avenue
- Verify and/or implement advanced lighting at all intersections and crossings along the corridor

Signals

The following solutions were discussed to address the issues identified at signals along the corridor:

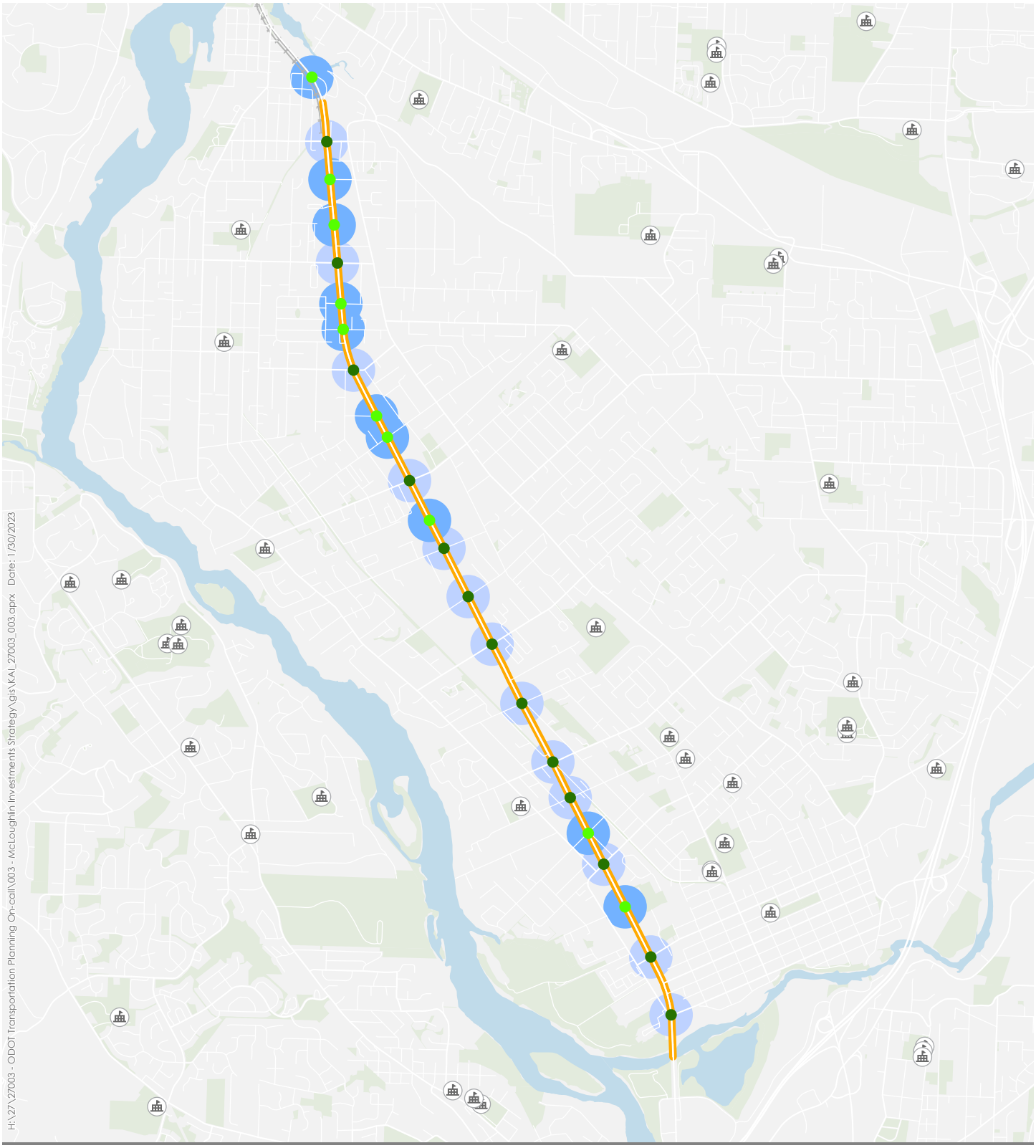
- Reevaluate pedestrian signal crossing time to provide sufficient time for pedestrians to cross
- Add leading pedestrian intervals
- Install reflective backplates
- Implement protected left turn phasing
- Tighten curb return radii

ADDITIONAL CROSSING RECOMMENDATIONS

Even with the recommended crossing locations identified during the RSA lite, the project team has identified locations with bus stops that would continue to be greater than 150 feet from an enhanced crossing and are candidates for additional enhanced crossings. These potential crossing locations include:

- Between Silver Springs Road and Holly Avenue
- Chestnut Street
- Maple Street
- Between Concord Road and Vineyard Road

See Figure 25 for the proposed crossing locations along the corridor, including those identified during the RSA and listed above.



Proposed Enhanced Crossings
500-Foot Buffer Around Proposed Crossings
Current Enhanced Crossings
500-Foot Buffer Around Crossing
Study Corridor
Schools
MAX Orange Line
0
1 Miles

Figure 25

KITTELSON & ASSOCIATES

Proposed Enhanced Crossings

Educational Campaign

Currently, ODOT is supporting the Clackamas County Department of Transportation and Development on a short-term project to develop a campaign focused on increasing compliance of drivers yielding and stopping for pedestrians at crosswalks. Explore expanding this effort throughout the corridor, particularly focusing on the following:

- Key intersections with higher pedestrian and vehicle conflicts
- New intersection treatments
- Near businesses with alcohol licenses

Location Specific Suggestions

LAKEWOOD TRANSIT STOP

- Provide an enhanced pedestrian crossing to connect to the bus stop
- Consider consolidating this bus stop with the existing stop at Park Avenue, as boarding and alighting data indicates that this stop is not utilized frequently. TriMet data from 2017-2021 reports a weekday average of 6 riders using this stop (2 boarding/4 alighting).

JENNINGS AVENUE (CONNECTION TO TROLLEY TRAIL)

The following solutions were discussed to support people walking and biking across McLoughlin Boulevard at Jennings Avenue to make the connection to Jennings or to the Trolley Trail.

- Provide improved wayfinding to the Trolley Trail to complement the wayfinding signs already in place along the Trolley Trail. Follow the region's wayfinding sign standards for regional trails in order to retain consistency with existing Trolley Trail wayfinding, while complying with MUTCD and ODOT requirements. Consider the following intersection improvements:
    - Install a diagonal bicycle signal to provide a direct route across the intersection for people biking
    - Add enhanced crosswalk striping to emphasize trail connection
    - Add protected intersection treatments
- Formalize the sidewalk connections for two-way biking and walking travel from the intersection to the trail

Figure 26. Alternative 1: Diagonal Bicycle Signal

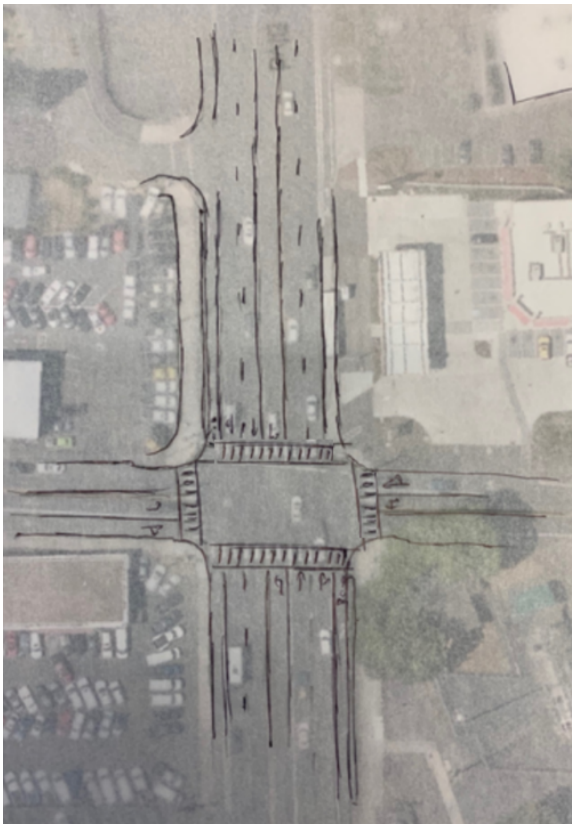


Figure 27. Alternative 2: Enhanced Crosswalk Striping

Figure 28. Alternative 3: Protected Intersection Treatments

CLACKAMAS RIVER BRIDGE

The following solutions were discussed to address issues approaching and along the Clackamas River Bridge along the corridor:

- Extra delineation for bicycle ramp onto bridge and additional signage to indicate that bicyclists may use sidewalk
- Actuated flashing "Bikes on Bridge" beacon
- Multi-use path or wider sidewalk from bridge to intersection with Arlington Street to accommodate people biking northbound or removal of the right turn lane northbound at Arlington (see below)
- Additional lighting on bridge

CLACKAMAS RIVER BRIDGE TO THE ARLINGTON STREET/RIVER ROAD INTERSECTION

- Tighten curb return radii in the southeast corner of the intersection, potentially through the addition of a truck apron if needed to support truck turning movements
- Tighten curb return radii in the southwest corner
- Consider no right turn on red along the eastbound approach or install a "Turning Vehicles Yield to Pedestrians" sign
- Improve visibility for all crosswalk legs through improved intersection lighting

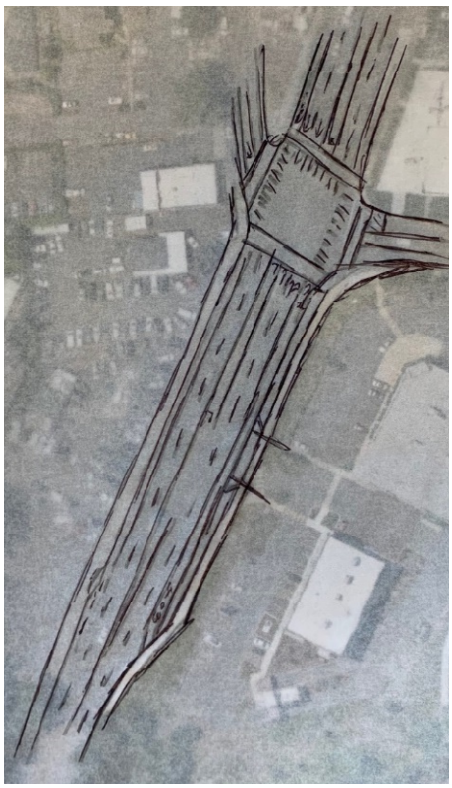


Figure 29. Alternative 1: Remove Exclusive Right Turn Lane

Figure 30. Alternative 2: Formalize Sidewalk Route for People Biking and Walking

Potential Implementation Challenges

Through the solutions development process, some potential implementation challenges have been identified by stakeholders and project team members. These potential challenges are not identified to limit the ability to include or implement projects that they relate to but instead are highlighted here to daylight the challenges, create emphasis around finding solutions, and create early conversations weighing the costs and benefits for each. Potential implementation challenges that have been raised by project stakeholders include:

- **Ghost striping:** The potential opportunity to reallocate existing space to improve safety for people walking and biking and slow motor vehicle traffic came up numerous times throughout the RSA. In many areas of the corridor, there is sufficient room between the curbs to provide buffered or separated bicycle facilities. Because there is not a repaving project programmed for McLoughlin Boulevard in the coming years, restriping the corridor would create ghost striping, which has raised concerns from participants of the RSA and the ODOT Leadership Team. The RSA participants also acknowledged that there is limited research supporting the idea that ghost striping creates safety concerns and that if the ghost striping is parallel to and near future lane lines and/or primarily in the bicycle lane, it may not be an issue. For example, maintaining the existing two-way left-turn (TWLT) width, converting 12-foot travel lanes to 11-foot lanes, which results in the skipped lane line having a 1-foot offset ghost stripe and a 2-foot ghost stripe that will be outside the travel lane. The team recognizes ghost striping may raise maintenance concerns.
- **Maintenance:** Maintenance, specifically which jurisdiction would maintain the road or proposed improvement, is a critical component to the ultimate feasibility of a recommendation and is a topic that has been repeatedly brought up during conversations about potential solutions. For example, adding separated bicycle lanes along the corridor may create the need for a sweeper that is smaller than ODOT's existing sweeper to be used to sweep the bicycle lanes. Funding for a new sweeper and/or collaboration with partner agencies should be explored to allow for the implementation of safety countermeasures.
- **Potential Impact to Traffic Operations:** The team recognizes that some solutions to improve intersection safety for people walking and biking may negatively affect the overall traffic operations along the corridor. For example, the addition of protected left turn phasing, or removal of right turn lanes, may impact the traffic operations at the intersection.
- **Speed Limit Reduction:** Multiple stakeholder groups, including the PMT, Technical Subteam, and Sounding Board, have discussed the need for speed limit reduction along the corridor to better reflect the commercial corridor context. Currently the posted speed limit is 40 mph along the corridor, however the HDM recommends a 30 to 35 mph speed limit for commercial corridors. Additionally, Metro guidance recommends a 20 to 30 mph speed limit for corridors similar to McLoughlin. National practices in the past have relied on setting speeds based on 85th percentile speeds, which creates a barrier for lowering the speed on the corridor, but new guidance including that from ODOT[4] suggests that speed setting based on 85th percentile is more applicable for rural areas and freeways and that setting speeds based on the 50th percentile and the urban context can improve safety along

[4] https://www.oregon.gov/odot/Engineering/Docs_TrafficEng/Speed-Zone-Manual.pdf

corridors. The project team will continue to explore opportunities for speed limit reduction on McLoughlin Boulevard.

- **Red Device Treatments:** Red device crossing treatments (such as pedestrian hybrid beacons or pedestrian signals) are the recommended pedestrian crossing treatments for McLoughlin Boulevard, as identified in the Crossing Assessment section in this memorandum. The team recognizes that ODOT does not allow pedestrian hybrid beacons to be implemented within a certain distance of intersections and this solution may require additional discussion during the solution development process. Additionally, the existing crossings are rectangular rapid flashing beacons, which are not red devices. This can create additional challenges around decision making to maintain or upgrade those crossings.
- **Signal Retrofitting:** Some of the potential improvement projects may include retrofitting the existing traffic signals, for example, adding a queue jump or implementing protected left turns. The team recognizes that these updates may require replacing some or all of the signal equipment at existing signals, which requires additional effort and cost beyond the proposed improvement.

Next Steps

The McLoughlin Investments Strategy team will use the corridor needs and potential projects identified in this document to identify potential pedestrian, bicycle, and transit improvement projects along the corridor. These projects will then be evaluated to determine project priority and final recommendations.

Appendix

A. Document Review Summary Table
B. 2020 Regional Funding Measure Project Summary Map
C. Safety Assessment and Needs PowerPoint (presented at the RSA Kick Off Meeting)
D. Road Safety Audit Lite Preliminary Findings Presentation

Appendix A

Document Review Summary Table

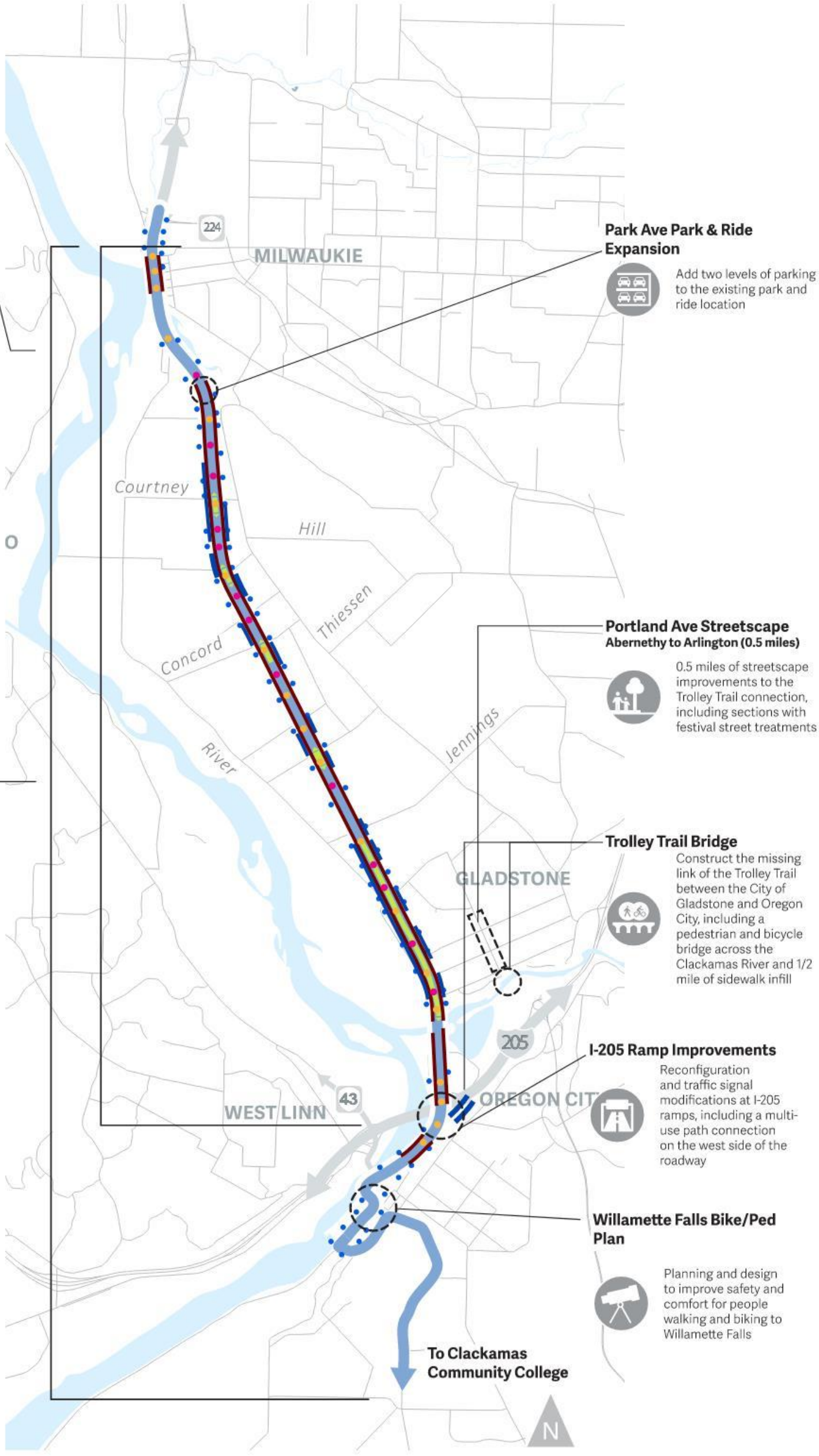
Document	Overarching Themes Related to McLoughlin Boulevard	Specific Items/Project Locations within Project Area (Y/N)
Clackamas County TSP	Provide continuous pedestrian/bicycle routes, connect schools, neighborhoods, commercial areas,etc. and increase transit accessbilitiy and reliability along McLoughlin	Y: Planned bikeway connection from Chesnut St to Concord Rd (MP 7.58-8.42)
Milwaukie TSP	Improve pedestrian crossings, improve sidewalk connectivity, and provide transit enhancements (BRT) along McLoughlin within Milwaukie City limits (north of study area)	N
Gladstone TSP	Fill in sidewalk gaps, install buffered bike lanes, and reduce posted speed along McLoughlin	Y: Fill in sidewalk gaps south of Glen Echo Ave (around MP 10.30)
		Y: Bike lanes on McLoughlin Bridge (MP 11.20)
2020 Regional Investment Measure	Projects identified by the Regional Investment Measure focus on pedestrian and bicycle safety as well as transit enhancements	Y: NB/SB queue jumps at Courtney Rd (MP: 7.41), Oak Grove Blvd (MP: 7.88), Concord Rd (MP: 8.42), and Roethe Rd (MP: 9.22)
		Y: SB BAT lane with raised bikeway from Jennings Ave to Arlington St (MP: 9.80 to 11.02)
		Y: Park Ave Park & Ride Expansion (MP 6.87) - add two levels of parking to the existing Park & Ride
		Y: Clackamas River Bridge (MP: 11.20) - Widen bridge or construct new parallel strcture for ped/bike upgrades
		Y: Signal coordination/transit priority upgrades along corridor
		Y: Separated bike facilities/buffered bike lane improvements along corridor
		Y: Sidwalk enhancements along corridor (see Regional Investment Measure summary sheet for additional detail)
		Y: Indentified locations for pedestrian crossing ehancements along corridor (see Regional Investment Measure summary sheet for additional detail)
		N: Raised median islands (locations to be determined)
		N: Lighting enhancements (3 miles)
		N: Transit station upgrades along corridor
McLoughlin RSA	Short and long term recoommendations identified for 11 major safety findings along McLoughlin Blvd from MP 9.53 - 9.99. Multiple of these findings relate directly to ped/bike safety enhancements.	Y: Evaluate crossing enhancements at the intersections at SE Boardman Ave (MP 9.51), SE Jennings Ave (9.80), and SE Hull Ave (9.97)
		Y: Install 500' of sidewalk south of McLoughlin/Boardman (9.51)
		Y: Evaluate modifications to McLoughlin/SE Jennings Ave (9.80)
Metro Urban Arterials Regional Transportation Plan Policy Map	Mapping identifies intersections with safety concerns (high injury locations, ped/bike crashes) and 2018 RTP Projects Map	N
Zoning and land use maps	The entire corridor within the study limits is designated as commerical land use directly off of the corridor, with some low-density to medium density land uses just off of the corridor	N
Region 1 Active Transportation Needs Inventory (ANTI)	Contains information involving safety, connectivity, and ped/bike prioritization along the corridor	N
OR 99E/SE McLoughlin Blvd Crossing Study	Identified crossing enhancements (at 3 intersections) within two focused segments of the study area.	Y: SE SilverLeaf Ln (MP 8.10) - geometric improvements
		Y: SE Risley Ave (MP 8.21) - geometric Improvements OR "red treatment" (signalize) assuming higher ped volumes
		Y: SE Silver Springs Rd (7.04) - enhanced crossing treament

ODOT 2021 - 2024 STIP Projects	Identified need for various ped/bike improvements along the south end of the project limits	Y: Boardman Ave to Meldrum Ave (MP: 9.47 - 10.10) Bike and pedestrian improvements - Improvements may include flashing lights, medians, illumination, crosswalks, tree trimming or removal, bike lane striping, sidewalks, curb ramps, or orther improvements.
ODOT 2024 - 2027 STIP Projects (DRAFT)	Identified location for pedestrian crossing project and potential closing of an intersection to improve safety for pedestrians and other users.	Y: McLoughlin Blvd/Meldrum Ave/Mildred St (MP: 10.14) - Install enhanced crosswalk with flashing beacons and a center median. Investigate closing off Mildred approach. **MADE 100% STIP LIST**
		Y: McLoughlin Blvd/Risley Rd (MP 8.21) - Add enhanced crossing including overhead RRFB, new median island and restrict NB lefts onto Risley Rd **MADE 100% STIP LIST**
		Y: Clackamas River Bridge (MP 11.20) - Repaint bridge to prevent corrosion **MADE 100% STIP LIST**
		Y: Risley Rd to Gloucester St (MP 8.21 - 10.75) - Sidewalk infill with access management and driveway improvements, removal/relocation of vertical and fixed obstructions in sidewalks and widening of sidewalks at transit stops **MADE 100% STIP LIST**
		Y: McLoughlin/Arlington-River Road (MP 11.02) - Full signal rebuild including new ADA ramps, new signal equipment, and side street protected left turn phasng (where possible) **MADE 100% STIP LIST**
		Y: Sidewalk infill from Courtney Ave to Maple St (MP 7.41 to 7.70) with access management and driveway improvements, removal/relocation of vertical and fixed obstructions in sidewalks, illumination, bus pads and stop relocation, and buffered bike lane striping. **Did not make 100% draft list, but identified by R1 Traffic.**
		Y: McLoughlin/Maple St (MP 7.70) - Intersection improvements including illumination, bus stop repositioning, buffered bike lanes, new ADA ramps, and enhanced crossing on the south side of Maple St. **Did not make 100% draft list, but identified by R1 Traffic**
		Y: Enhanced crossing including overhead RRFB on south side of McLoughlin Blvd/Silver Springs Rd (MP 7.05). **Did not make 100% draft list, but identified by R1 Traffic**
Clackamas County 's Park Avenue Community Project Alternatives	Alternative 1 (of 2) focuses on a vision to "Transform McLoughlin" and proposes general improvements to pedestrian and bicycle facilitites along the corridor from Park Avenue to Courtney Avenue	Y: Active street design along McLoughlin Blvd including enhanced pedestrian environment with improvements such as planting buffers, sidewalk improvements, and slowed traffic speeds (Park Ave to Courtney Ave)
		Y: Crossing improvements (and eventual bike/ped connections to the Trolley Trail) at Evergreen Ave, Silver Springs Rd, Torbank Rd (to tie in with McLoughlin), between Torbank Rd and Holly Ave, and at Holly Ave.
McLoughlin Area Plan (MAP-IT)	Pedestrian improvments (crossing, streetscape) and create gateways at each end of McLoughlin Blvd	N

Appendix B

2020 Regional Funding Measure Project Summary Map

McLoughlin Blvd



Bus Rapid Transit
Milwaukie to Clackamas Community College (11 miles)

- Signal coordination and transit priority upgrades at 19 intersections
- 1 mile of separated bicycle facilties
- 1 mile of sidewalk enhancements
- 6 marked pedestrian crossings
- 106 transit station upgrades; upgrades to the Oregon City Transit Center
- 1 mile southbound BAT lane and 4 intersections with queue bypass lanes
- 6 miles of fiber optic cable
- Electric buses

Safety
Milwaukie to Oregon City (6.5 miles)

- 10 miles of buffered bike lanes
- 2 miles of sidewalk enhancements
- 7 marked pedestrian crossings
- 3 miles of lighting enhancements
- Clackamas River Bridge potential upgrades for pedestrian and bicycle facilities
- Raised median islands (locations to be determined)
- Stormwater management

Corridor Planning

- Design for longer term transportation improvements, including transit

Park Ave Park & Ride Expansion

- Add two levels of parking to the existing park and ride location

Portland Ave Streetscape
Abernethy to Arlington (0.5 miles)

- 0.5 miles of streetscape improvements to the Trolley Trail connection, including sections with festival street treatments

Trolley Trail Bridge

- Construct the missing link of the Trolley Trail between the City of Gladstone and Oregon City, including a pedestrian and bicycle bridge across the Clackamas River and 1/2 mile of sidewalk infill

I-205 Ramp Improvements

- Reconfiguration and traffic signal modifications at I-205 ramps, including a multi-use path connection on the west side of the roadway

Willamette Falls Bike/Ped Plan

- Planning and design to improve safety and comfort for people walking and biking to Willamette Falls

To Clackamas Community College

- Sidewalk Enhancement
- Bicycle Facility Enhancement
- Transit BAT Lane, Queue Jump, or Queue Bypass Lane
- Potential Pedestrian Crossing
- Intersection Improvement
- Bus Stop (Existing)

These elements are based on conceptual project plans and designs and are subject to evolve with public involvement and project development

Appendix C

Safety Assessment and Needs PowerPoint (presented at the RSA Kick Off Meeting)

McLoughlin Boulevard Investments Strategy

ROAD SAFETY AUDIT LITE KICK OFF MEETING

NOVEMBER 14, 2022

Agenda

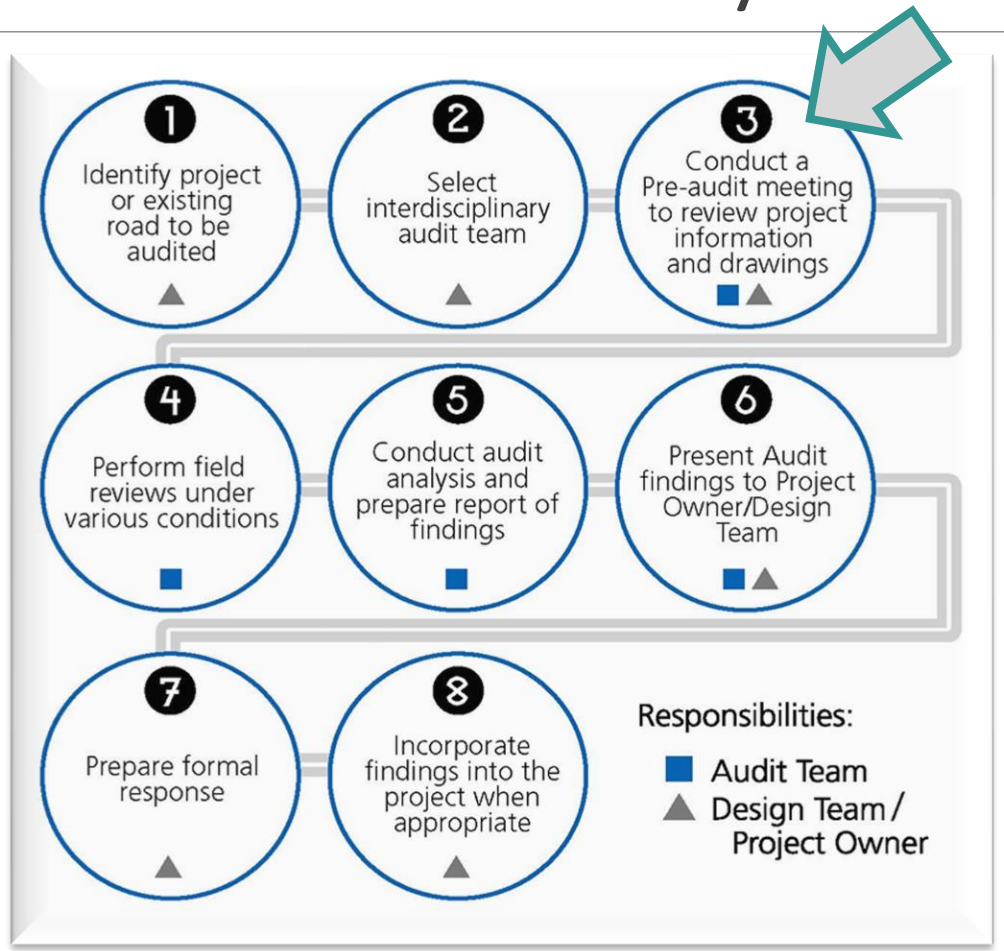
- Introductions
- What is this Road Safety Audit Lite?
- Study Area and Corridor Conditions
- Stakeholder Input
- Freight Considerations
- Safety
- Document Review: Identified Needs and Projects
- Design Considerations
- Next Steps

Introductions

Name

Agency/Organization

What is this Road Safety Audit Lite?



RSA Safety Analysis Approach

Crash Data Analysis

- *Crash data obtained for 2016 – 2020 (partial information for 2021-2022)*
- *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*

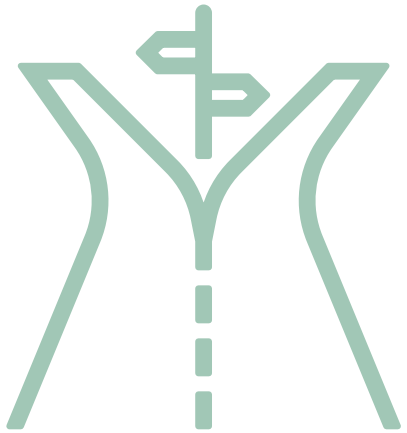
Identification of Suggestions

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

Road Safety Audit Schedule

Timeframe		Monday	Tuesday
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		
8:00 AM	9:00 AM		Work Session: Solutions
9:00 AM	10:00 AM	Kick-Off Meeting	
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	Final RSA Lite Presentation
1:00 PM	2:00 PM	Worksession: Identify the Issues 1:30-3:30	
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		

Virtual option; includes Community Sounding Board
In person site visit
In person worksession

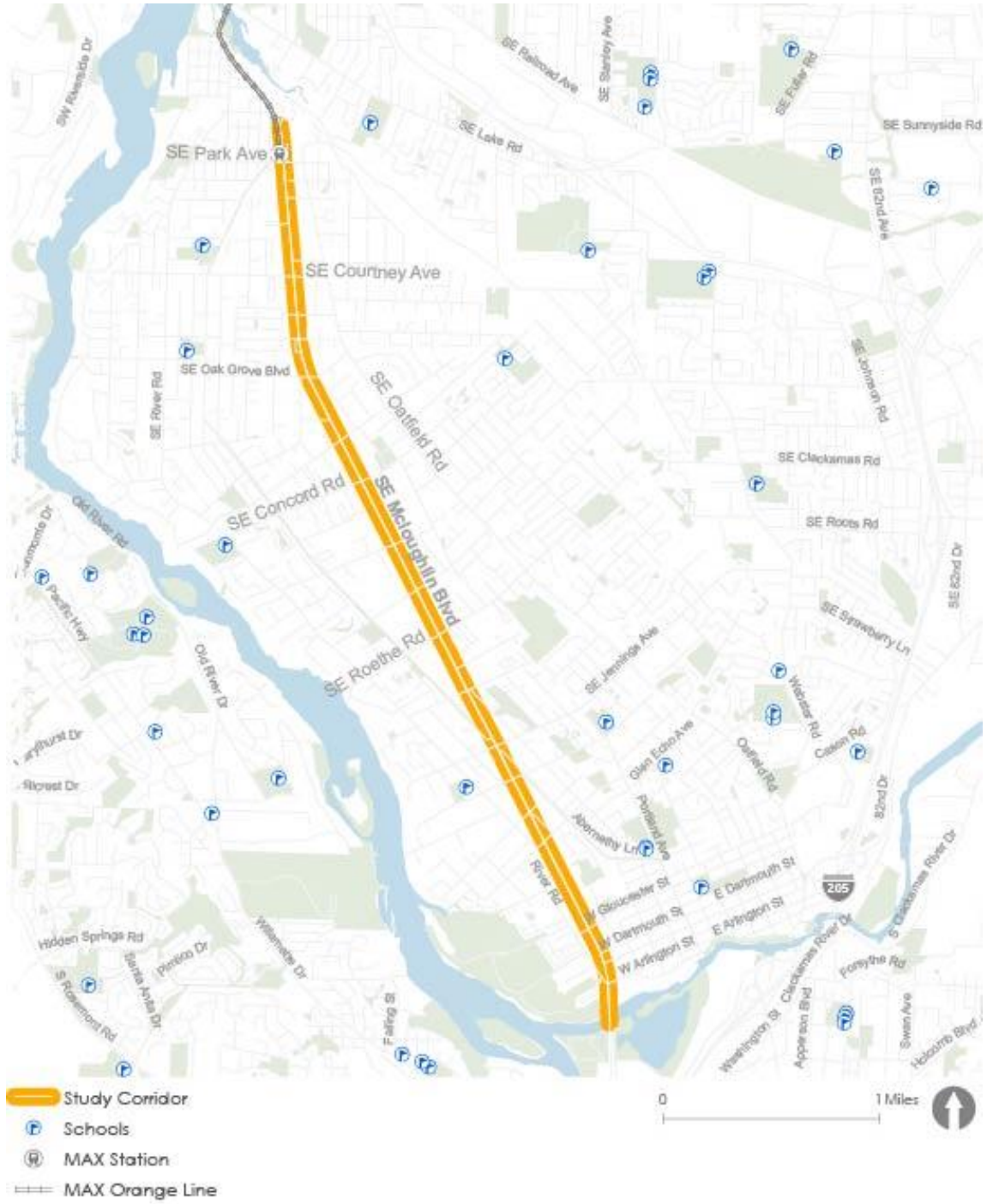


Study Area and Corridor Conditions

Study Area

5-mile corridor between Milwaukie and Oregon City (mileposts 6.7 to 11.2); includes Gladstone and unincorporated Clackamas County

McLoughlin's posted speed is 40 mph



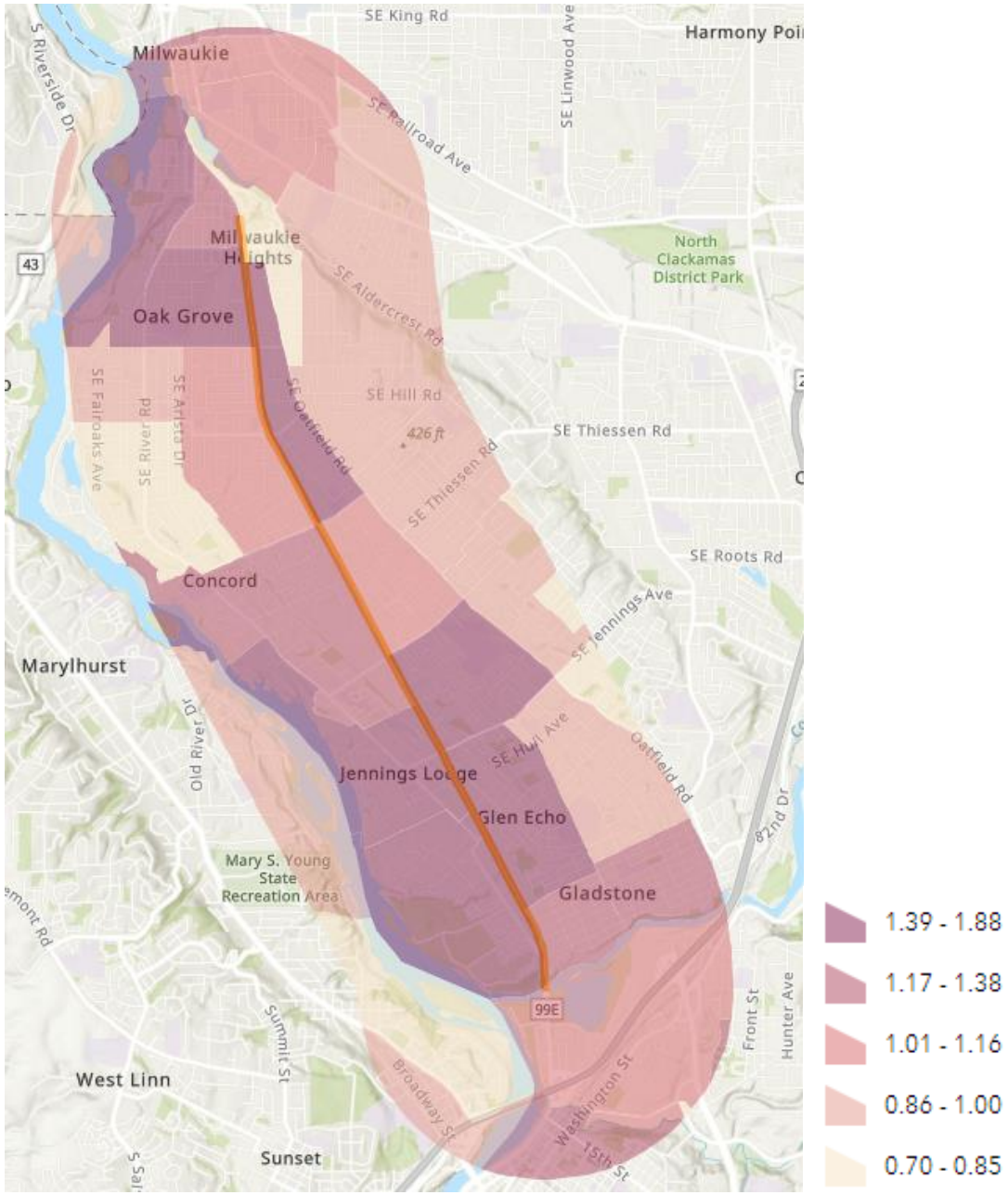
PROJECT FOCUS & GOALS

Identify **near-term improvements** (up to 10 years) **to address safety of people walking and biking as well as transit enhancements** on the corridor

Involve a cross section of stakeholders, **including traditionally underserved communities**, to inform community and investment priorities

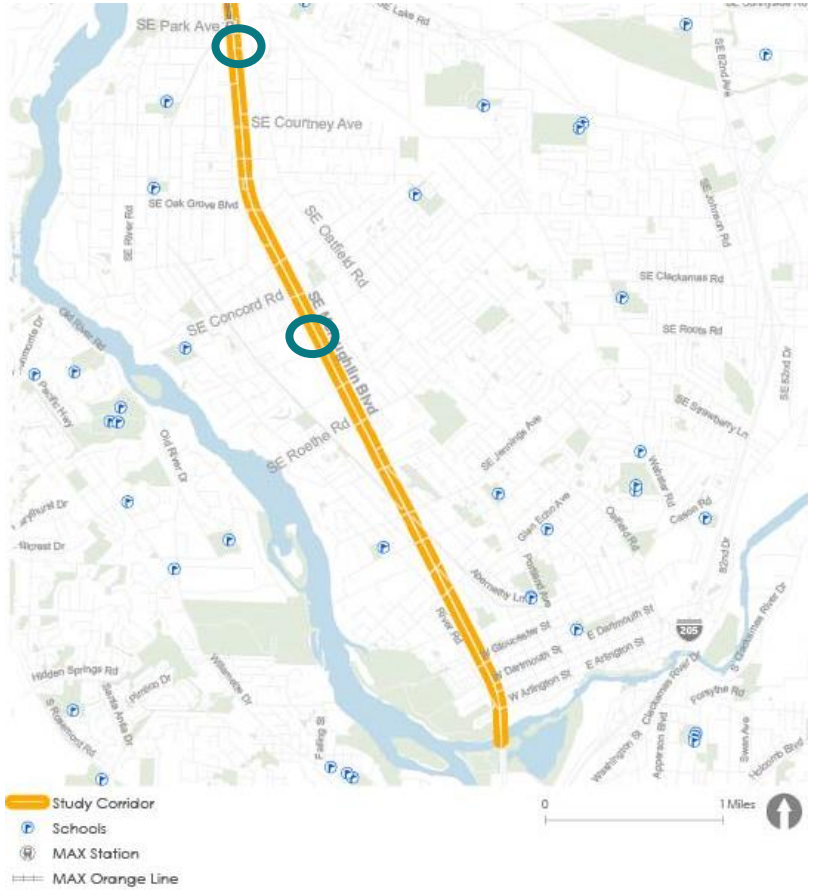
Leverage recent work, momentum, and upcoming corridor investments

Key Destinations



Transportation Disadvantaged Index

Motor Vehicle Speeds and Volumes (Weekday)



Between SE Park Ave & SE Silver Springs Rd:

- Speed Limit: 40 MPH
- Average Speed: 40 MPH
- 85th Percentile Speed: 46 MPH
- Daily volumes: 24,795 (12,303 NB & 12,492 SB)

Between SE Vineyard Rd & SE Naef Rd:

- Speed Limit: 40 MPH
- Average Speed: 38 MPH
- 85th Percentile Speed: 44 MPH
- Daily Volumes: 31,749 (17,702 NB & 14,047 SB)

Walking and Biking Volumes

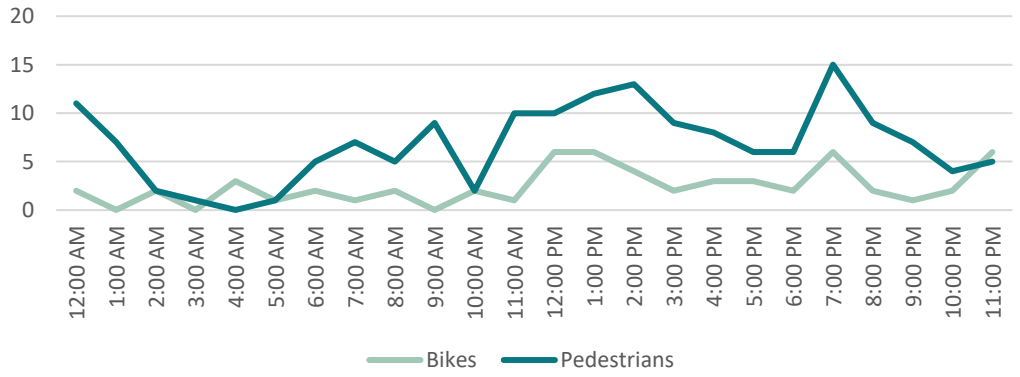
Intersection Volumes

- Park Ave PM Peak (5:15 – 6:15 PM): 70 pedestrians, 8 bikes

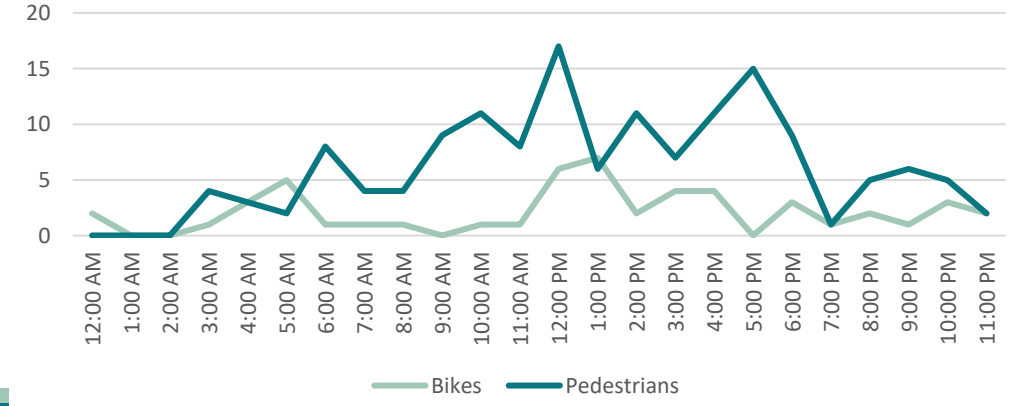
Segment Volumes

- Between Park Ave & Silver Spring Rd
  - Daily total: 164 pedestrians, 59 bikes
- SE Vineyard Rd & Naef St
  - Daily total: 148 pedestrians, 51 bikes

Weekday Daily Volumes Between SE Park Ave & SE Silver Springs Rd



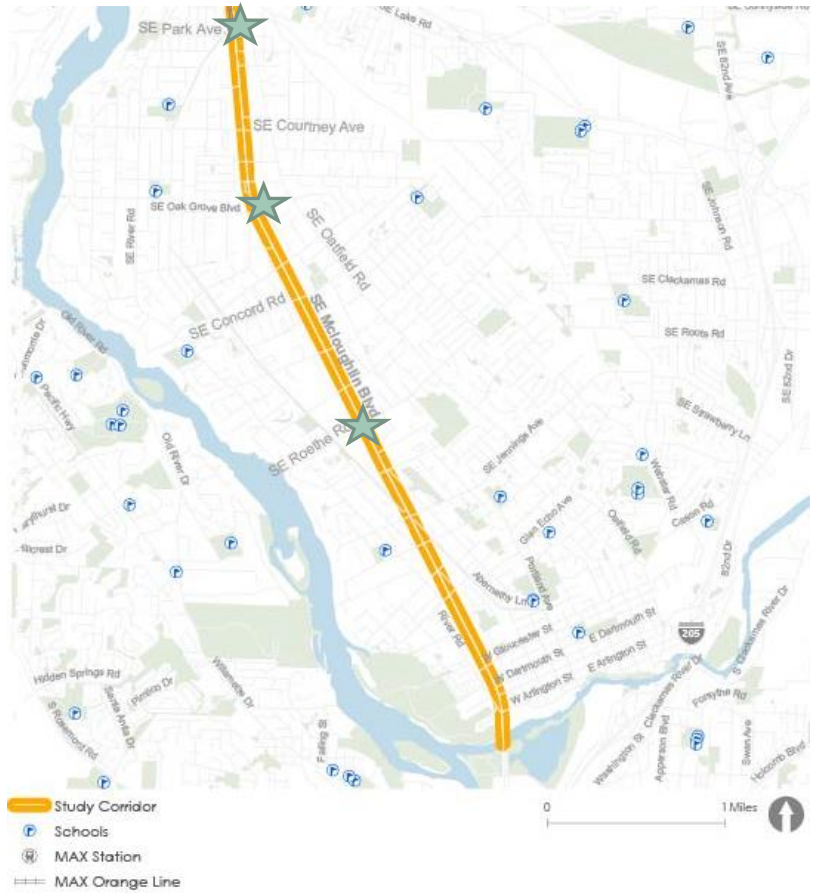
Weekday Daily Volumes Between SE Vineyard Rd & SE Naef St



TriMet Data (2017 – 2021)

Highest Ridership Stops:

- SE McLoughlin / Park Ave (S)
  - Weekday Average: 282
  - Weekend Average: 168
- SE Mcloughlin / Oak Grove (N)
  - Weekday Average: 135
  - Weekend Average: 102
- SE McLoughlin / Oak Grove (S)
  - Weekday Average: 97
  - Weekend Average: 72
- SE McLoughlin / Roethe (N)
  - Weekday Average: 101
  - Weekend Average: 66



Initial Community Feedback & Safety Results

Sounding Board Key Takeaways

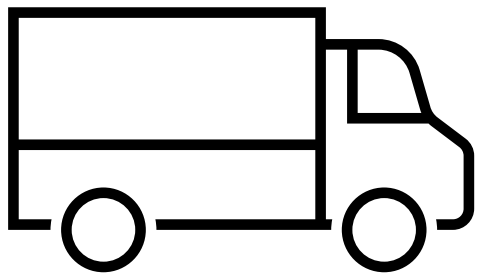
- McLoughlin Blvd's design does not match its urban context or serve those walking and biking from the adjacent communities
- Key concerns include:
  - Far distance between crossings
  - High speeds
  - Lack of visibility of people walking and biking
  - Lack of protection for people biking
  - Freight unloading in the median is dangerous
  - Many access points across the sidewalks (conflict points)
- Key treatment suggestions include jersey barrier protected bike lanes, protected intersections, lane narrowing, lighting, turtles, speed limit reduction, speed feedback signs, traffic calming, planted medians, and speed tables

Surveying Key Takeaways

- Poor air quality during surveying: demonstrated high dependency on walking, biking, and transit
- People often bike on the sidewalk
- Key locations of interest include:
  - Fred Meyer
  - Walmart
  - Grocery stores
  - Discount and retail businesses
  - Fast food locations and restaurants
  - Trolley Trail
  - Oregon City Transit Center
  - The MAX and transit stops
  - Gas stations
  - Clackamas Town Center and Clackamas Town Center Transit Center Offices and workplaces
  - Cinema
  - Auto service and repair shops
  - Library

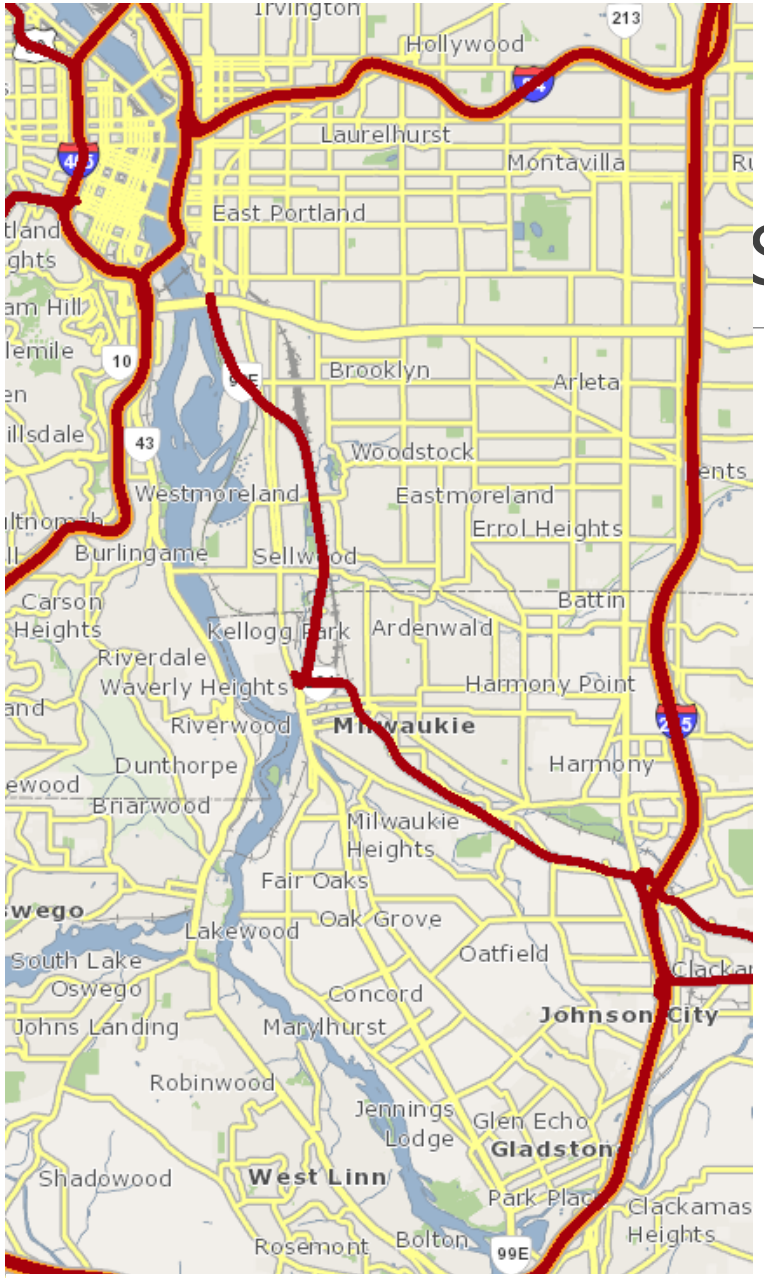
Surveying Key Takeaways

- Key concerns include:
    - Crossings: crossing spacing and pedestrian timing at signals
    - Visibility: lack of lighting
    - Traffic: vehicles running red lights
    - Pedestrian safety: drivers not stopping for crossing pedestrians
    - Unsafe driving speeds
    - Lack of sidewalks
    - Wait times for busses
    - Bicyclists feeling vulnerable in the unprotected bike lanes
- Other feedback
    - Add traffic calming
    - Build more sidewalks
    - Improve lighting
    - Even the signalized intersections with crosswalks can feel unsafe
    - Use the center median as something other than a turn lane, such as landscaping/beautification

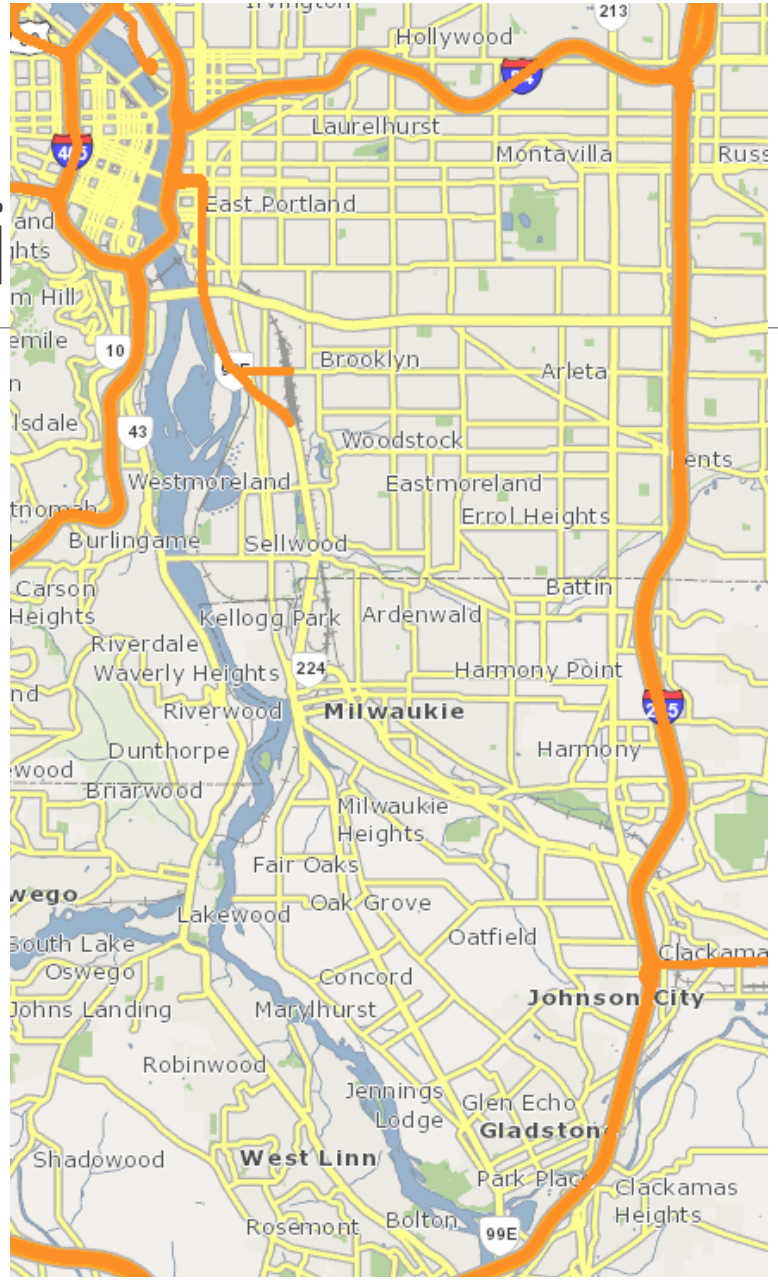


Freight Considerations

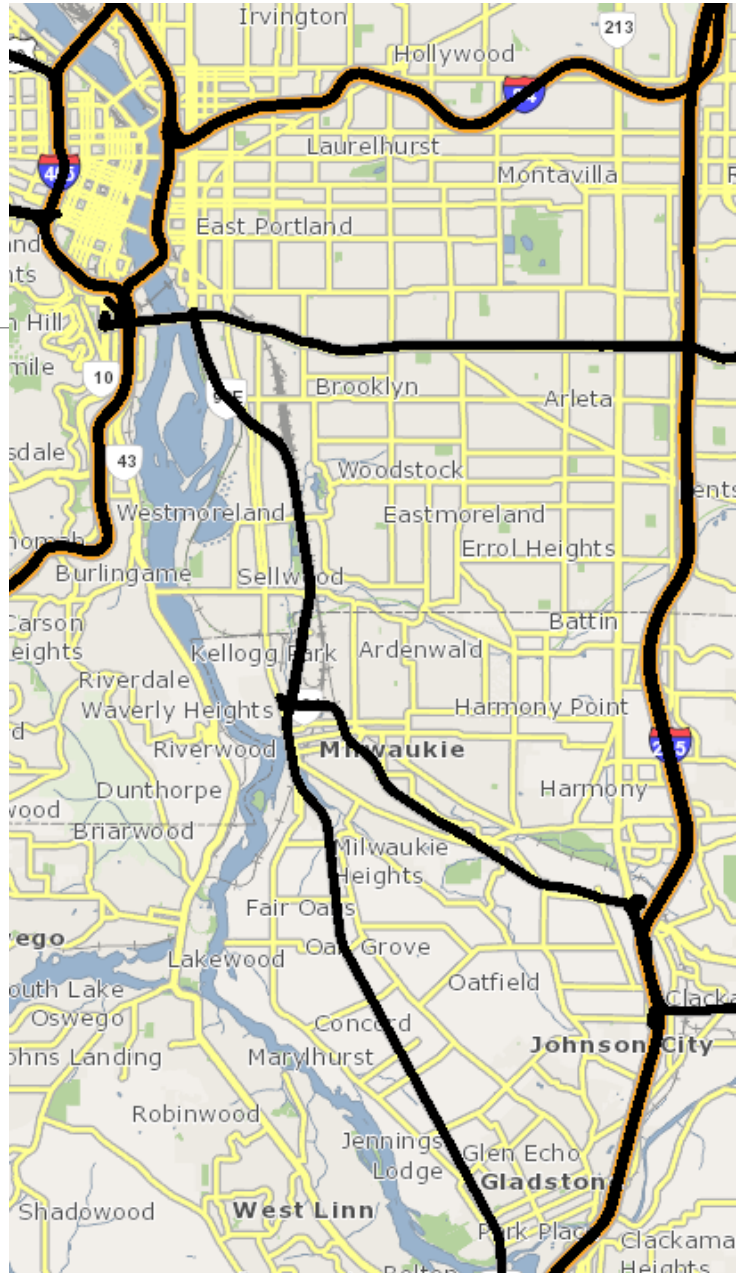
Si



Oregon Highway Plan Freight Routes



National Highway Freight Routes



Reduction Review Routes

Reduction Review Route Background

"The 2003 legislature adopted changes to Oregon Revised Statutes (ORS) 366.215. This statute identifies the Oregon Transportation Commission's authority to build and modify state highways. ***The statute states that the Commission may not permanently reduce the "vehicle-carrying capacity" of an identified freight route unless safety or access considerations require the reduction or a local government requests the reduction.*** *In the context of this statute, "vehicle-carrying capacity" references the vertical and horizontal clearance for larger vehicles. Depending on the size and weight of a truck, oversized vehicles are issued permits on an annual or trip specific basis."*

- Oregon Highway Plan State Highway Freight System Policy Element

Pinch Points

Between OR 224 and I-205:

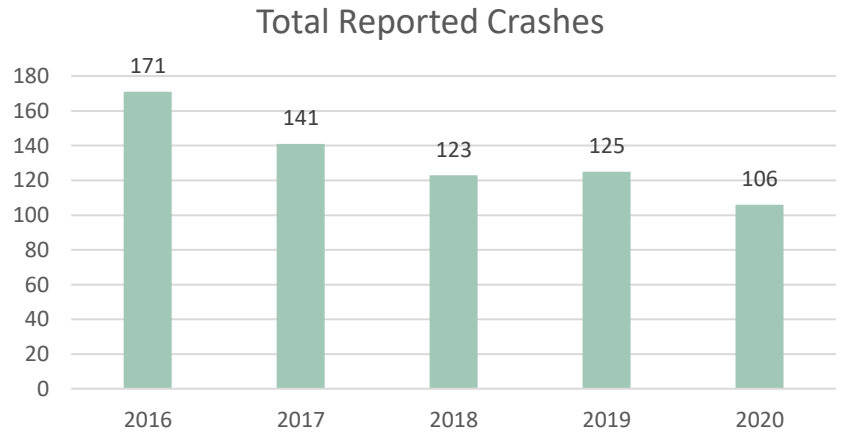
- Northbound: 25.8 ft at SE Scott Street (Milwaukie)
- Southbound: 28 ft at SE Monroe Street (Milwaukie)

Break!

Broad Safety Findings

Corridor-Wide Safety Findings

- There were 666 reported crashes between 2016-2020
  - 7 fatal crashes and 23 severe injury crashes
    - All of the fatal crashes were pedestrians, wheelchair users, or bicyclists, many crossing mid-block
    - Turning movements were the key causes of pedestrian crashes at intersections
    - 6 of the 7 fatal crashes occurred at night or twilight and 4 occurred in locations with no streetlights
  - Preliminary data from 2021 shows 1 fatal crash and 6 severe injury crashes; news shows at least 1 pedestrian fatality in 2022 (October 4)
  - Pedestrian and bicycle crashes were spread along the corridor

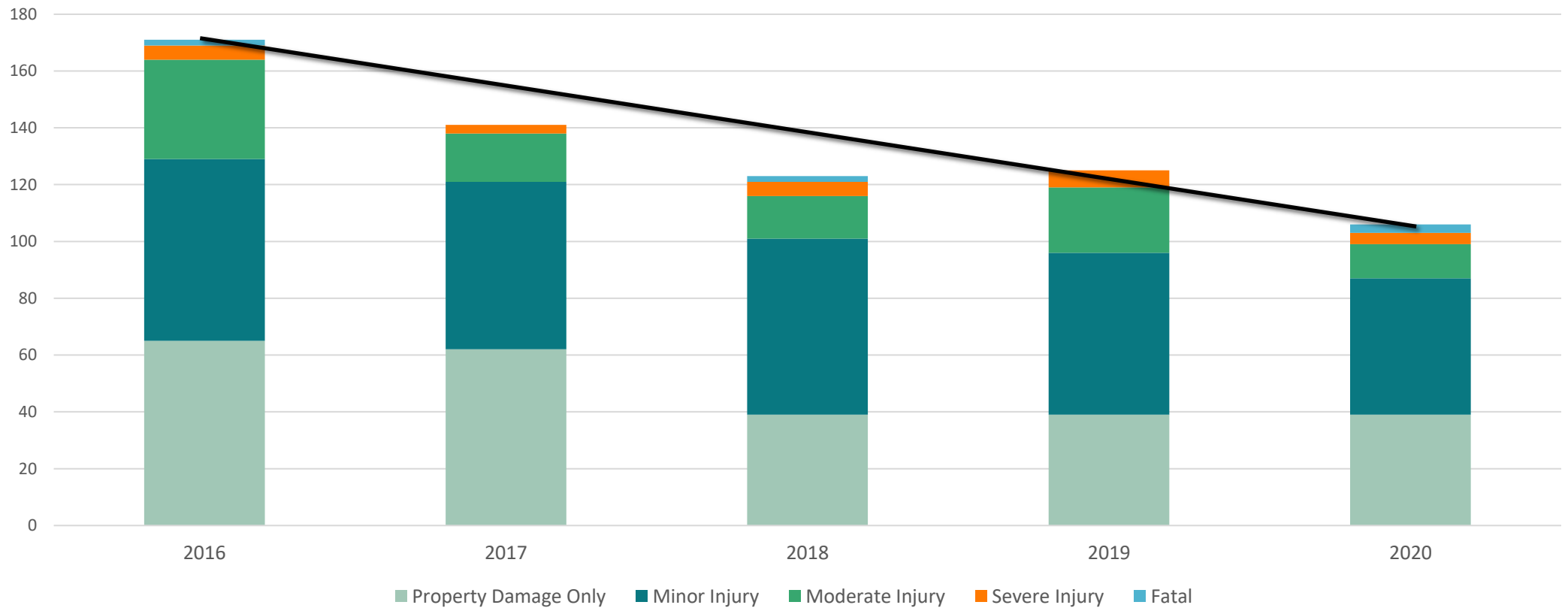


Crashes by Severity

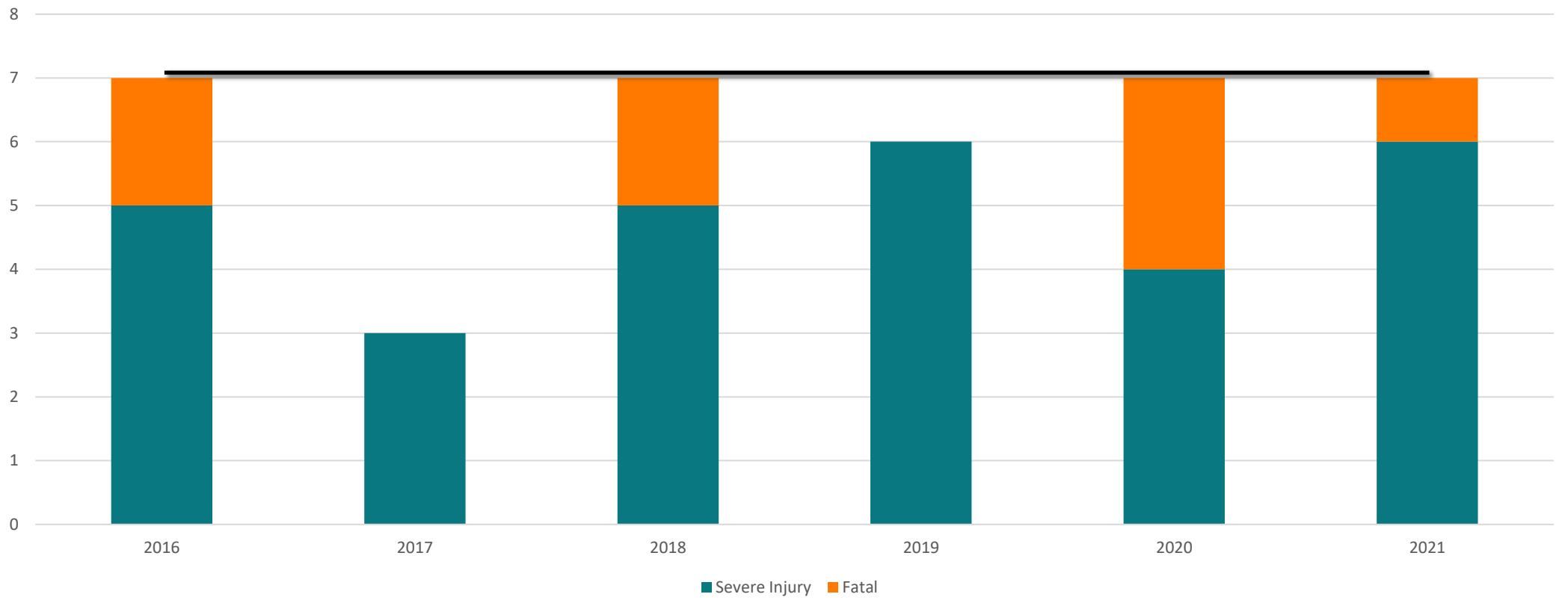
Year	Total Crashes	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	Property Damage Only Crashes
2016	171	2	5	35	64	65
2017	141	--	3	17	59	62
2018	123	2	5	15	62	39
2019	125	--	6	23	57	39
2020	106	3	4	12	48	39
2021*	--	1	6	--	--	--
TOTALS	**666***	**8**	**29**	**102**	**290**	**244**

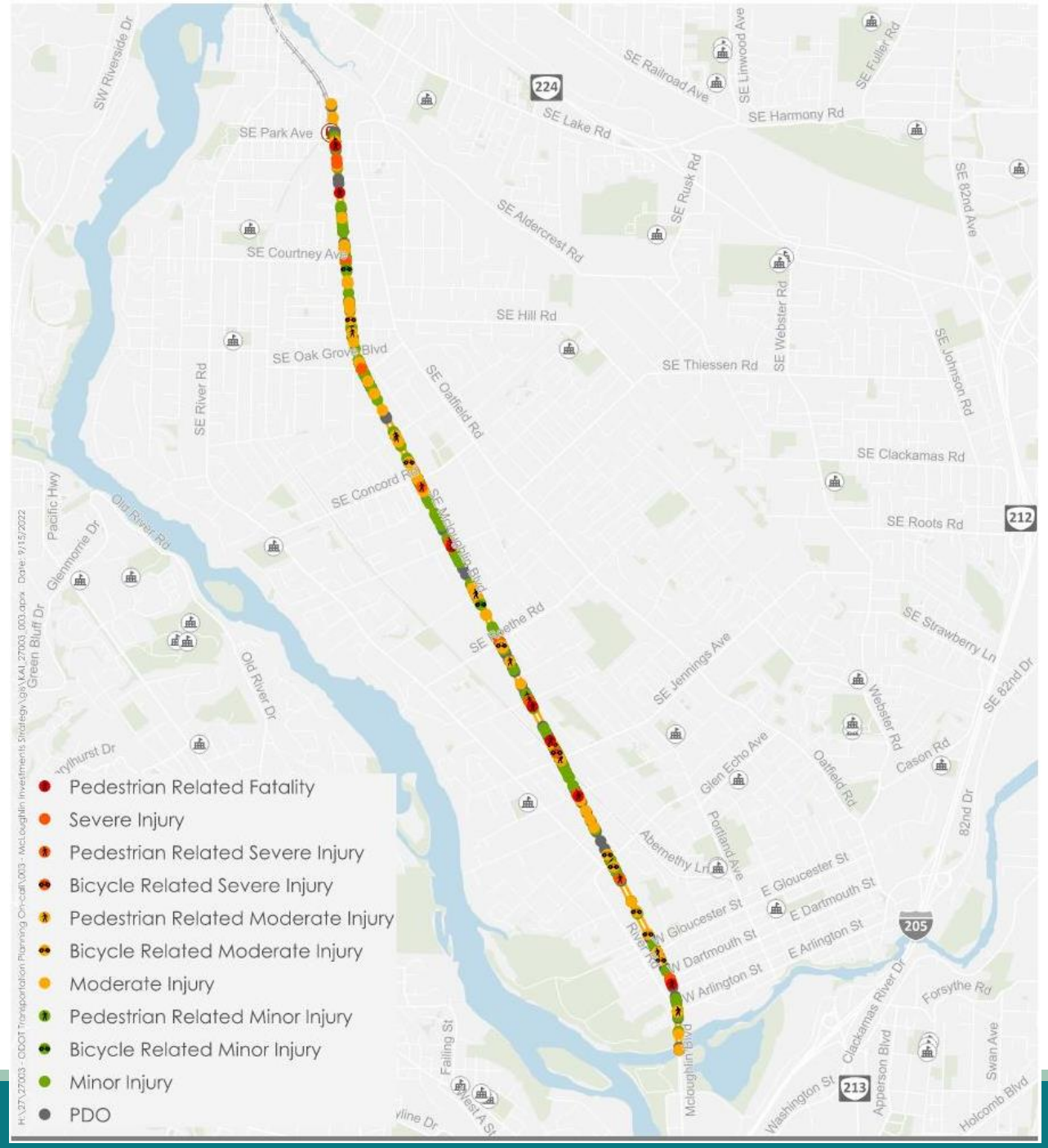
*2021 data shows only fatal and severe injury crashes, the remaining data is preliminary. The total is a sum of 2016-2020 crashes.

Crashes by Severity

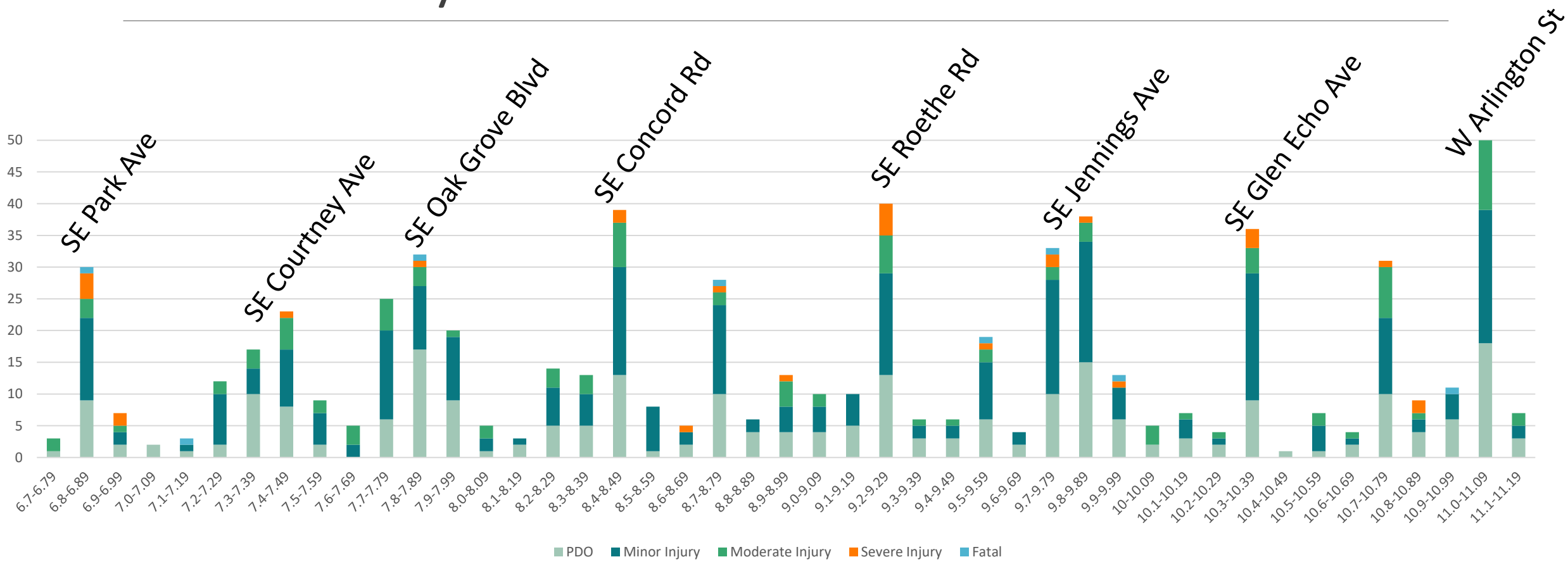


Crashes by Severity – Fatal/Severe Injury Only




Pedestrian Related Fatality
Severe Injury
Pedestrian Related Severe Injury
Bicycle Related Severe Injury
Pedestrian Related Moderate Injury
Bicycle Related Moderate Injury
Moderate Injury
Pedestrian Related Minor Injury
Bicycle Related Minor Injury
Minor Injury
PDO
SE Park Ave
SE Courtney Ave
SE Oak Grove Blvd
SE Concord Rd
SE Lake Rd
SE Railroad Ave
SE Harmony Rd
SE Aldercrest Rd
SE Hill Rd
SE Thiessen Rd
SE Clackamas Rd
SE Roots Rd
SE Jennings Ave
SE Strawberry Ln
SE 82nd Dr
SE 82nd Ave
SE Johnson Rd
SE Webster Rd
SE Rusk Rd
SE River Rd
SE Oatfield Rd
SE Linwood Ave
SE Fuller Rd
SW Riverside Dr
Pacific Hwy
Glenmorrie Dr
Green Bluff Dr
Old River Rd
Old River Dr
Webster Rd
Cason Rd
Glen Echo Ave
Oatfield Rd
Portland Ave
Abernethy Ln
E Gloucester St
E Dartmouth St
E Arlington St
W Gloucester St
W Dartmouth St
W Arlington St
Clackamas River Dr
Forsythe Rd
Swan Ave
Holcomb Blvd
Apperson Blvd
Washington St
Failing St
McLoughlin Blvd
224
212
205
213

Crashes by Location



*Includes 2021 data for fatal and severe injury crashes

Bike/Ped Safety Findings

Bike/Ped Only Crashes by Severity

All 7 fatal crashes along the corridor from 2016 to 2020 involved a pedestrian

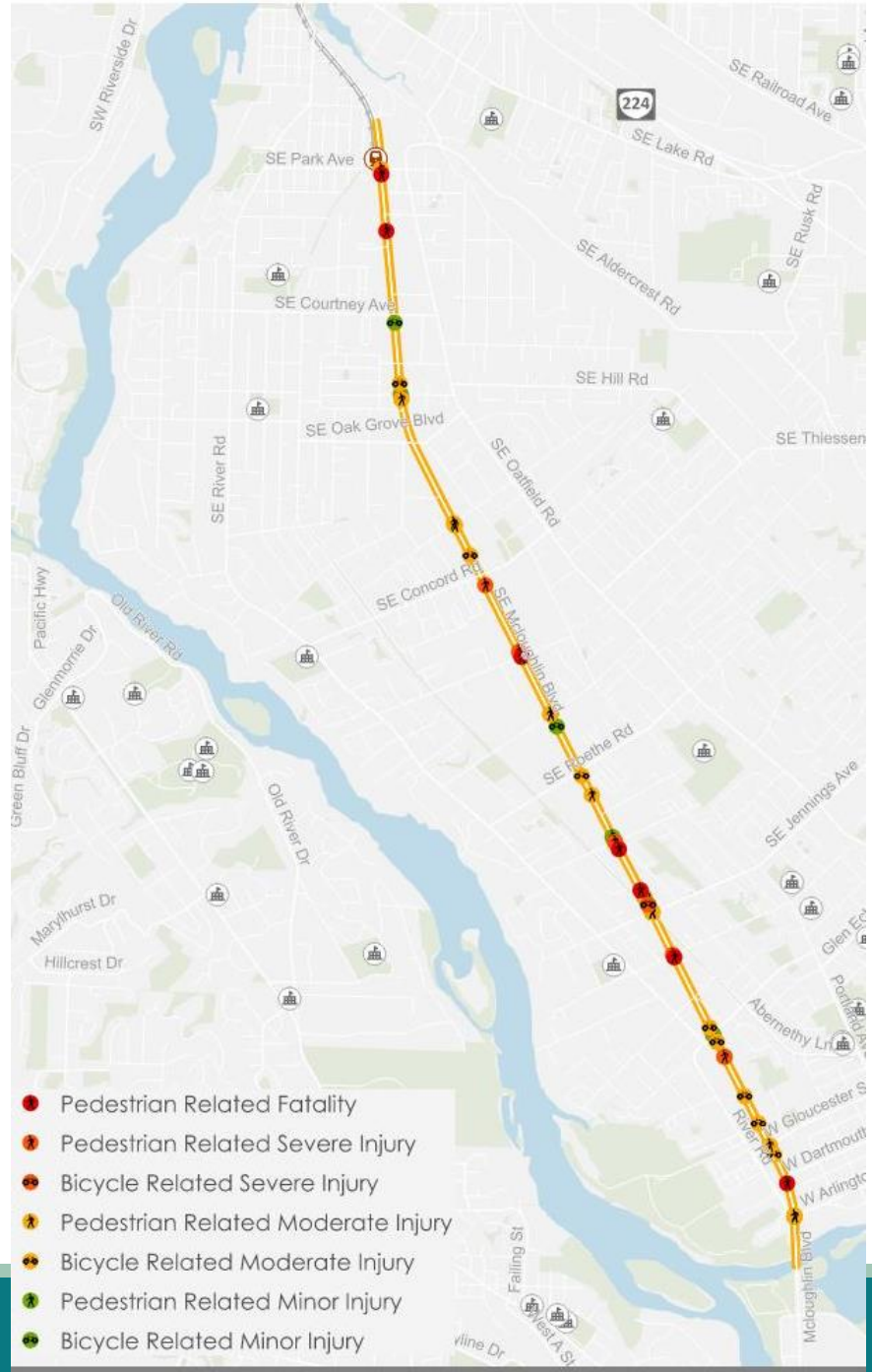
- The lone fatal crash in 2021 only involved vehicles

There were 0 reported property-damage only crashes involving a bicyclist or pedestrian

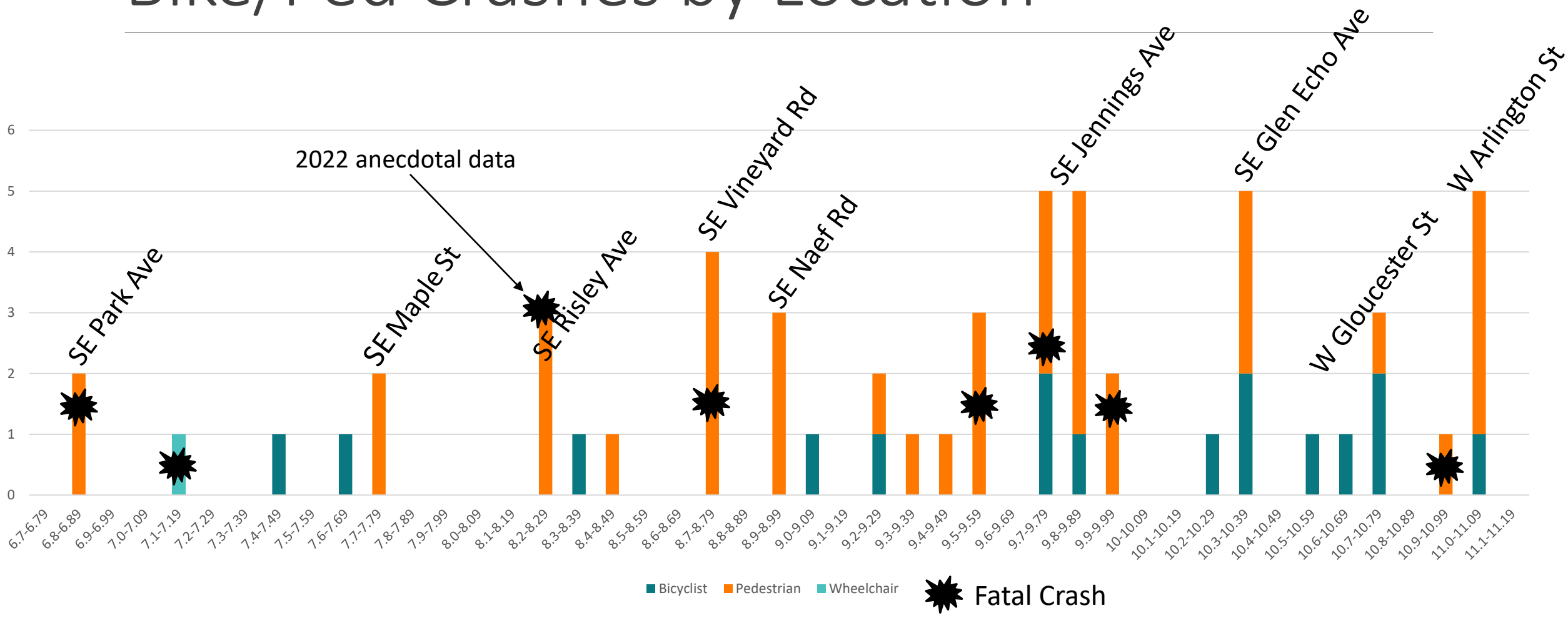
- All crashes involving a bicyclist or pedestrian resulted in either an injury or a fatality

2016-2020 Crashes	Total Crashes	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	Property Damage Only Crashes
Pedestrian	39	7	6*	12	14	--
Bicyclist	16	--	2*	10	4	--
TOTALS	**55**	**7**	**8**	**22**	**18**	**0**

*Preliminary 2021 crash data is available for fatal and severe injury crashes. There was one severe injury pedestrian crash and one severe injury bicycle crash in 2021.


SW Riverside Dr
SE Railroad Ave
224
SE Lake Rd
SE Park Ave
SE Rusk Rd
SE Aldercrest Rd
SE Courtney Ave
SE Hill Rd
SE Oak Grove Blvd
SE Thiessen
SE River Rd
SE Oatfield Rd
SE Concord Rd
SE McLoughlin Blvd
Pacific Hwy
Old River Rd
Glenmorrie Dr
Green Bluff Dr
SE Roethe Rd
SE Jennings Ave
Old River Dr
Marylhurst Dr
Hillcrest Dr
Abernethy Ln
W Gloucester St
River Rd
W Dartmouth
W Arlington
Mcloughlin Blvd
Failing St
Pedestrian Related Fatality
Pedestrian Related Severe Injury
Bicycle Related Severe Injury
Pedestrian Related Moderate Injury
Bicycle Related Moderate Injury
Pedestrian Related Minor Injury
Bicycle Related Minor Injury

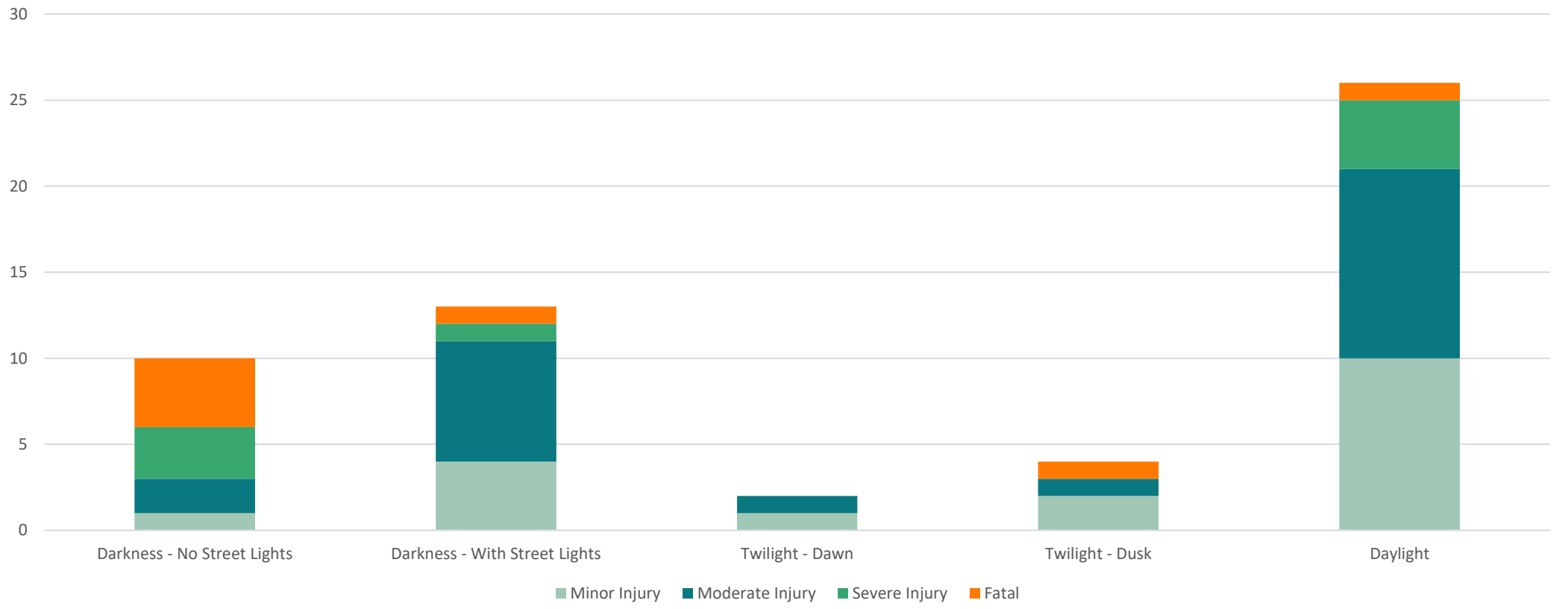
Bike/Ped Crashes by Location



Fatal Crash Details

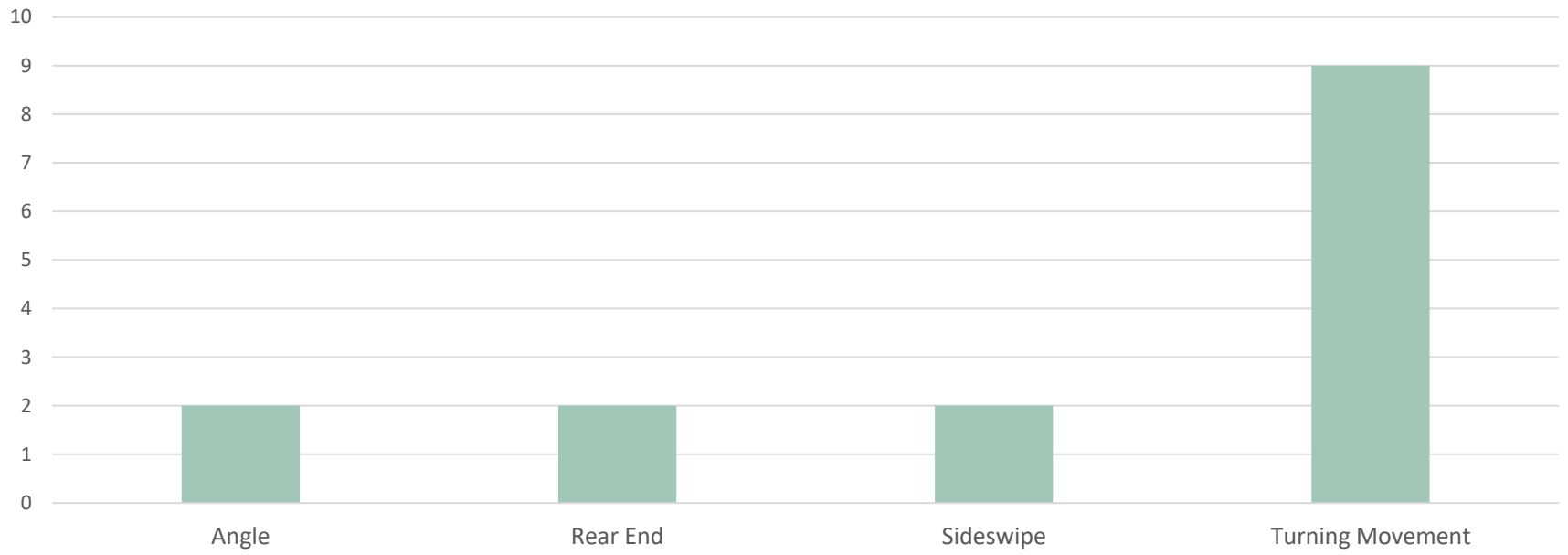
Date	Time of Day	Location	Gender / Age	Driver Direction
2/8/2016	6 AM	100 feet south of Park Ave	Female / 51	Northbound straight
10/29/2016	8 PM	300 feet south of Silver Springs Rd	Male / 56	Southbound straight
1/28/2018	7 PM	475 feet north of Jennings Ave	Male / 41	Southbound straight
3/4/2018	6 AM	At Vineyard Rd	Male / 60	Eastbound left turn
3/7/2018	8 PM	At Hull Ave	Male / 54	Southbound straight
5/21/2020	10 PM	125 feet north of Clarendon St	Male / 61	Southbound straight
11/19/2020	7PM	150 feet south of Boardman Ave	Male / 35	Northbound straight
10/16/2021	6PM	At Oak Grove Boulevard	Female / 70	Northbound straight
10/04/2022	8PM	At Risley Avenue	Male/67	Northbound straight

Bike/Ped Crashes – Presence of Street Lighting



Bicycle Crashes – Crash Cause

The chart below shows the crash cause for all reported bicycle crashes:



Bike/Ped Crashes – Other Crash Factors

	Fatal Crashes	Severe Injury Crashes	Moderate Injury Crashes	Minor Injury Crashes	TOTALS
Drug Use – Yes	6	--	--	--	**6**
Drug Use – No	1	8	22	18	**49**
Alcohol Use – Yes	1	1	2	1	**5**
Alcohol Use – No	6	7	20	17	**50**
Speeding – Yes	--	--	--	--	**0**
Speeding – No	7	8	22	18	**55**

Discussion

- Do you have additional safety questions that weren't answered here?
- Based on these safety findings, are there specific fixes that you would like to consider? Specific locations for safety treatments?

Document Review

Funded/Upcoming Projects

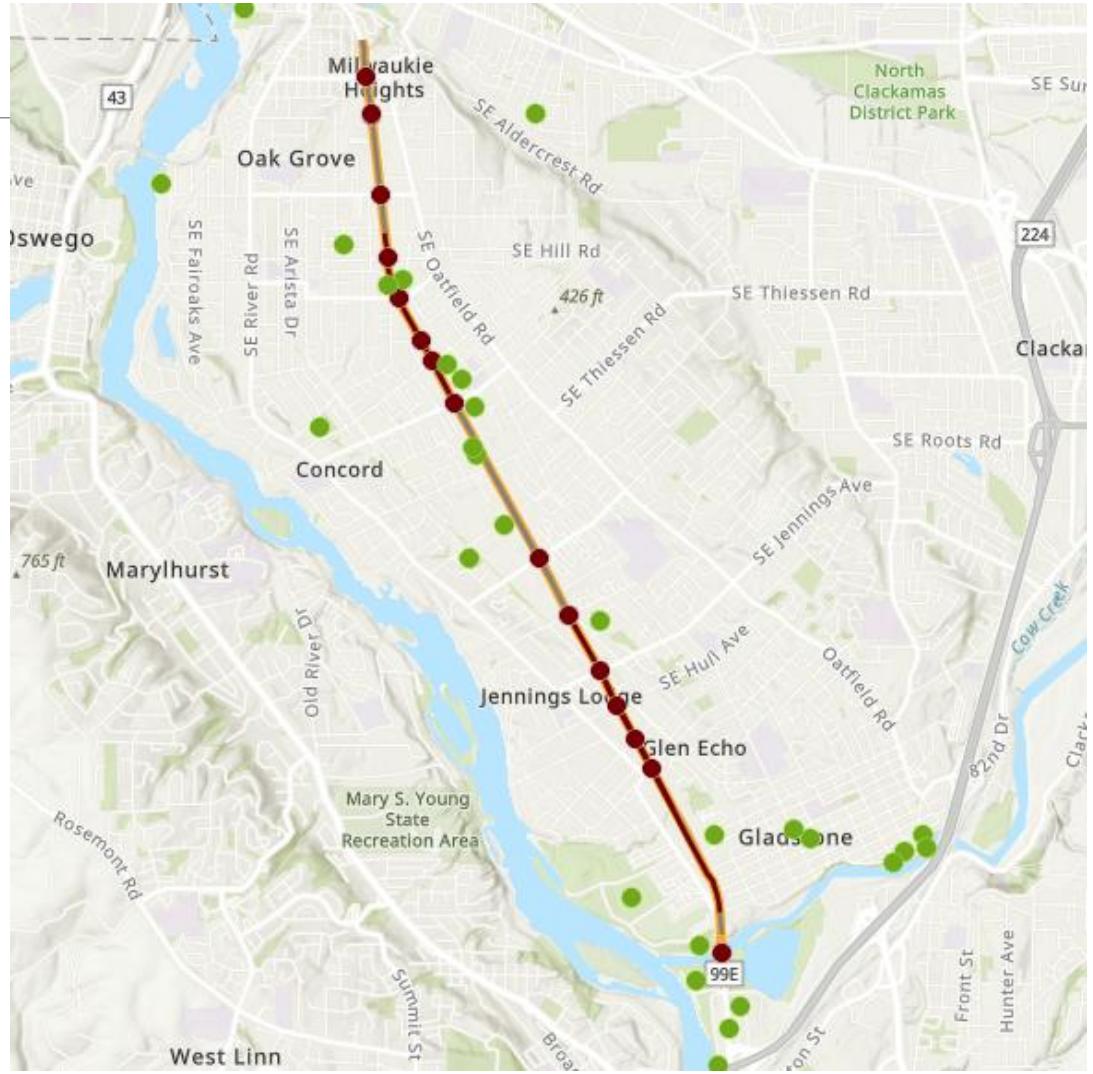
- ODOT 2021 – 2024 STIP
  - Bicycle and pedestrian improvements from MP 9.47 – 10.10
- ODOT 2024 – 2027 STIP
  - Intersection improvements to SE Mcloughlin Blvd/SE Meldrum Ave/SE Mildred St
    - Install a crosswalk with flashing beacons and center median
    - Investigate closing SE Mildred St approach
- Clackamas County Projects
  - Courtney Avenue Complete Streets: Improve pedestrian and bicycle safety and accessibility along Courtney Avenue (River Rd to SE McLoughlin Blvd)
  - Jennings Avenue Improvements: Enhanced bicycle and pedestrian improvements from McLoughlin to Oatfield Road

Identified Needs/Project Ideas

- Clackamas County TSP
  - Bikeway connection identified
- Gladstone TSP
  - Sidewalk gaps and bike lane needs
- 2020 Regional Investment Measure
  - Pedestrian improvements (sidewalk enhancements, pedestrian crossings, lighting enhancements)
  - Bicycle improvements (separated bicycle facilities, McLoughlin Bridge improvements)
  - Transit improvements (queue jumps, BAT lane, signal coordination/transit priority)
  - Park Ave Park & Ride Expansion
- McLoughlin RSA
  - Enhanced crossing locations and sidewalk gaps identified
- OR 99E/McLoughlin Blvd Crossing Study
  - Crossing enhancement locations identified
- ODOT 2024 – 2027 STIP (did not make 100% draft list)
  - Enhanced crossing at SE McLoughlin Blvd/SE Maple St and SE McLoughlin Blvd/SE Silver Springs Rd
- Clackamas County's Park Avenue Community Project Alternatives
  - Crossing improvement locations identified

Additional Needs and Solutions Development: Mapping Tool

- Documents crash data, roadway characteristics, transit data, destinations, identified projects, equity information, etc.
- Useful for understanding needs and previously recommended projects
- [McLoughlin Blvd Content App (arcgis.com)]

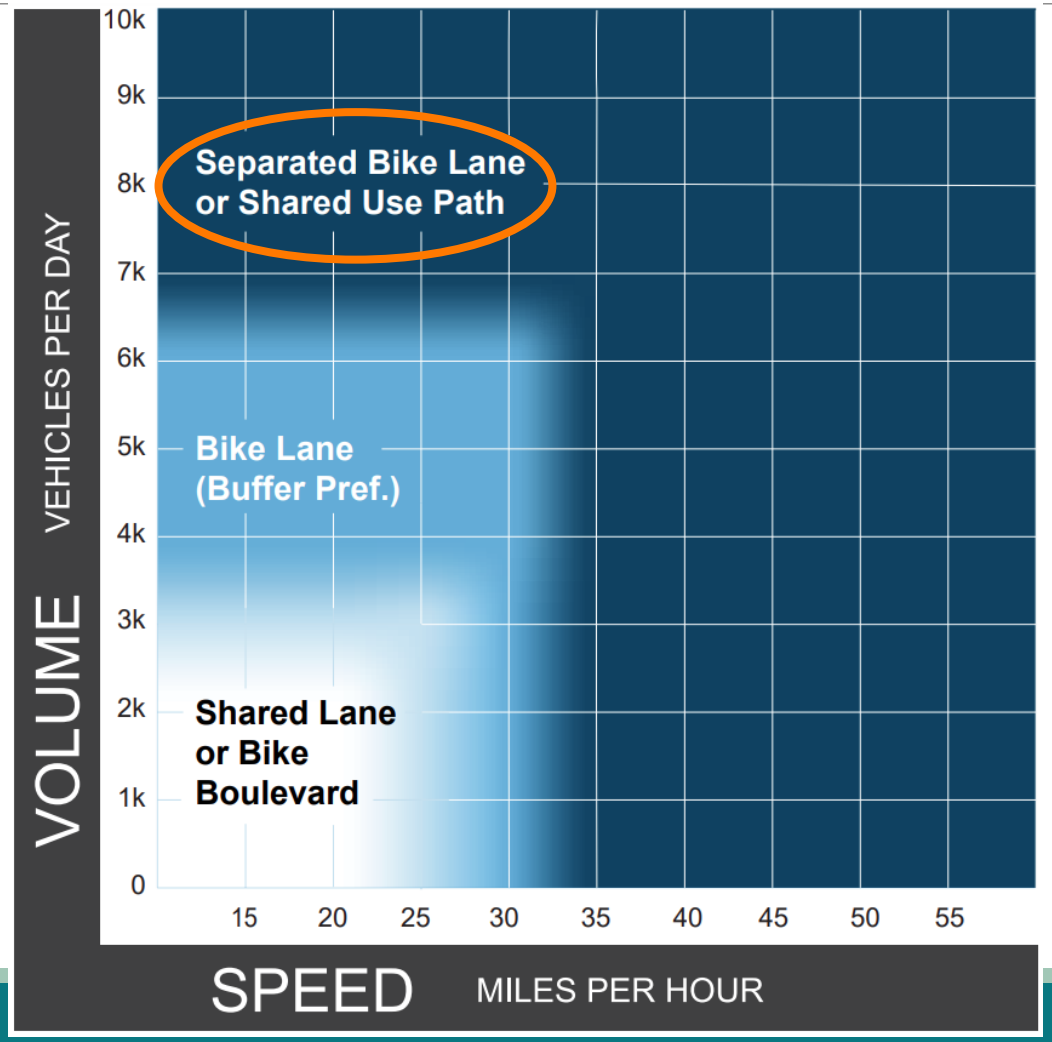


Design Guidance

Corridor Context

Land Use Context	Target Speed (MPH)[4]	Travel Lanes[2]	Turn Lanes[1,2]	Shy Distance[1,3]	Median[1,2]	Bicycle Facility[1,2,5]	Sidewalk	Target Pedestrian Crossing Spacing Range (feet)[6]	On-street parking[1]
Traditional Downtown/CBD	20-25	Start with minimum widths, wider by roadway characteristics	Minimize additional crossing width at intersections	Minimal	Optional, use as pedestrian crossing refuge	Start with separated bicycle facility	Ample space for sidewalk activity (e.g., sidewalk cafes, transit shelters)	250-550 (1-2 blocks)	Include on-street parking if possible
Urban Mix	25-30	Start with minimum widths, wider by roadway characteristics	Minimize additional crossing width at intersections	Minimal	Optional, use as pedestrian crossing refuge	Start with separated bicycle facility, consider roadway characteristics	Ample space for sidewalk activity (e.g., sidewalk cafes, transit shelters)	250-550 (1-2 blocks)	Consider on-street parking if space allows
Commercial Corridor	30-35	Start with minimum widths, wider by roadway characteristic	Balance crossing width and operations depending on desired use	Consider roadway characteristic, desired speeds	Typically used for safety/operational management	Start with separated bicycle facility, consider roadway characteristics	Continuous and buffered sidewalks, with space for transit stations	500-1,000	Not Applicable
Residential Corridor	30-35	Start with minimum widths, wider by roadway characteristics	Balance crossing width and operations depending on desired use	Consider roadway characteristics, desired speeds	Optional, use as pedestrian crossing refuge	Start with separated bicycle facility, consider roadway characteristics	Continuous and buffered sidewalks	500-1,000	Generally not applicable, consider roadway characteristics
Suburban Fringe	35-40	Start with minimum widths, wider by roadway characteristics	Balance crossing width and operations depending on desired use	Consider roadway characteristics, desired speeds	Optional, use as pedestrian crossing refuge	Start with separated bicycle facility, consider roadway characteristics	Continuous and buffered sidewalks	750-1,500	Not typical
Rural Community	25-35	Start with minimum widths, wider by roadway characteristics	Balance crossing width and operations depending on desired use	Consider roadway characteristics, desired speeds	Optional, use as pedestrian crossing refuge	Start with separated bicycle facility, consider roadway characteristics	Continuous and buffered sidewalks, sized for desired use	250-750	Consider on-street parking if space allows

FHWA Bicycle Selection Guidance



Our Corridor:

- 23,000 to 28,000 AADT
- 40 MPH speed limit

Crossing Considerations

FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations:

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	● ○ ○ ○ ○ ○ ○ ○ ○	● ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ● ○ ●	● ○ ○ ○ ○ ○ ○ ○ ○	● ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ● ○ ●	● ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ●
3 lanes with raised median (1 lane in each direction)	● ○ ○ ○ ○ ○ ○ ○ ○	● ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ●
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	● ○ ○ ○ ○ ○ ○ ○ ○	● ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ●
4+ lanes with raised median (2 or more lanes in each direction)	● ○ ● ○ ○ ○ ○ ○ ○	● ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ●
4+ lanes w/o raised median (2 or more lanes in each direction)	● ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ● ○ ●	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ○	○ ○ ● ○ ○ ○ ○ ○ ●

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerway, J. Feaganes, and B.J. Campbell, (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

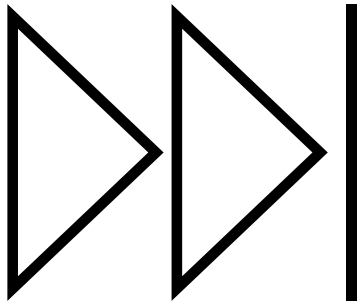
Select Countermeasure(s) 16

Blueprint for Urban Design:

Table 3-9: Target Crossing Spacing

Urban Context	Target Spacing Range (feet)
Traditional Downtown/ CBD	250-550
Urban Mix	250-550
Commercial Corridor	500-1,000
Residential Corridor	500-1,000
Suburban Fringe*	750-1,500
Rural Community	250-750

- **Always Occur (in conjunction with other treatments):**
  - High-visibility crossing markings, adequate lighting, crossing warning signs
- **Always Consider:**
  - Yield to pedestrian signing and striping, pedestrian refuge island, pedestrian hybrid beacon
- **Candidate:**
  - Curb extension, road diet



Next Steps

Next Steps

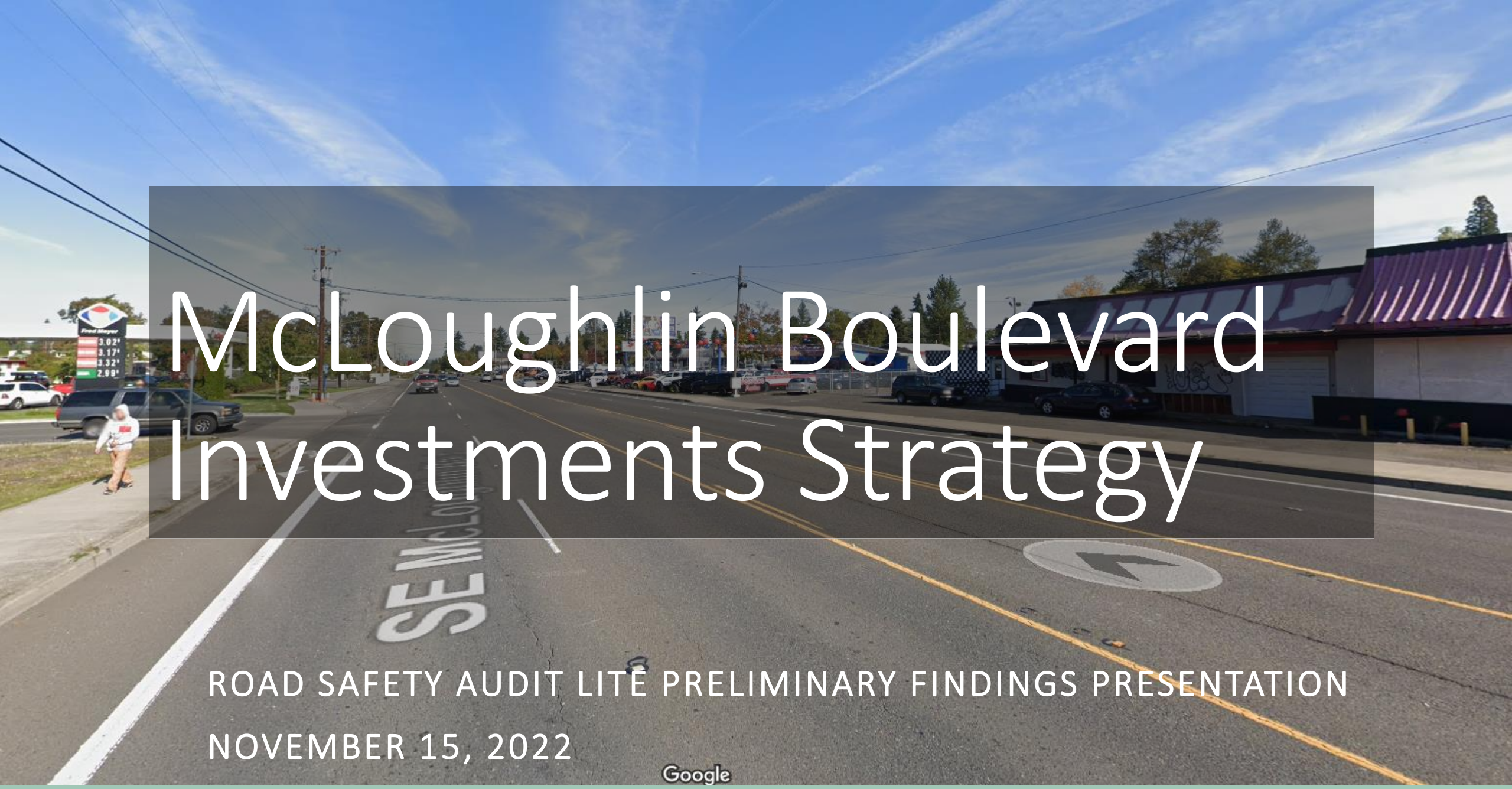
Timeframe		Monday	Tuesday
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		
8:00 AM	9:00 AM		Work Session: Solutions
9:00 AM	10:00 AM	Kick-Off Meeting	
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	Final RSA Lite Presentation
1:00 PM	2:00 PM	Worksession: Identify the Issues 1:30-3:30	
2:00 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		

Areas to See

- Transition from Milwaukie to Park
- Park Avenue Station
- Jennings: Trolley Trail crossing
- New RRFBs: Hull and Boardman
- Clackamas River Bridge

Appendix D

Road Safety Audit Lite Preliminary Findings Presentation



McLoughlin Boulevard Investments Strategy

ROAD SAFETY AUDIT LITE PRELIMINARY FINDINGS PRESENTATION

NOVEMBER 15, 2022

Agenda

- Observations & Needs
- Potential Solutions

Pedestrian Crossings

Needs & Observations:

- Multiple crossings with center refuge median, but no additional signing or striping
- Locations with new ADA ramps, but no marked crossing or median
- Segments with large distance between crossings
- Unsure if vehicles will stop at existing RRFBs

Pedestrian Crossings

Potential Solutions:

- Enhance existing crossings
  - Additional signing in median
  - Additional striping (ex: continental striping)
  - Provide median, signing, and striping at locations where there is currently no crossing
  - Enhanced treatments (RRFB, PHB, Signal)
- Lighting placement before pedestrian crossings
- Wayfinding improved at Trolley Trail crossing, distance to transit, etc.

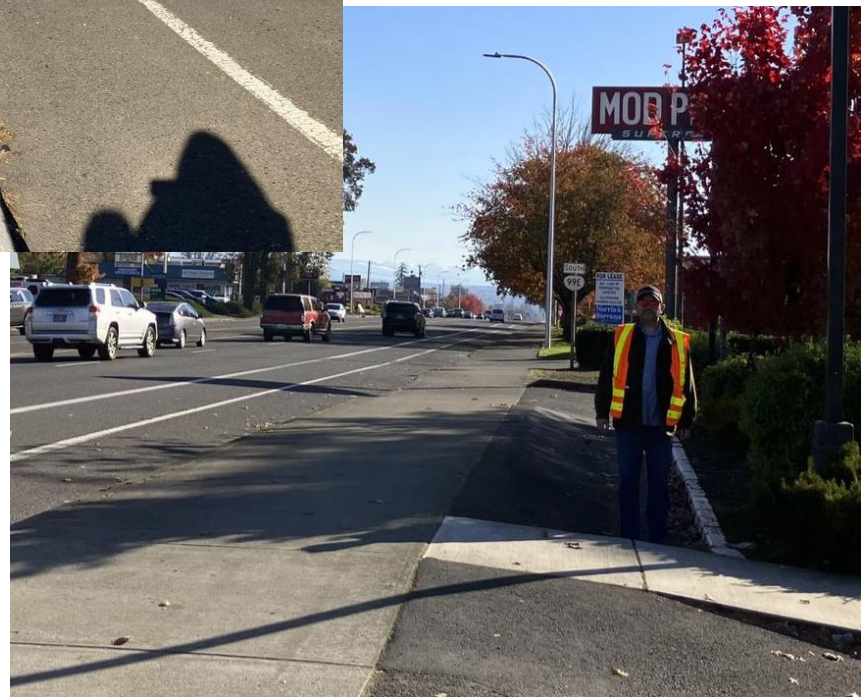
Crossing Locations

Crossing Locations

Sidewalks

Needs & Observations:

- Sidewalk gaps
- Narrow sidewalks
- ADA concerns
  - Non-ADA compliant ramps and driveways
  - Drop off/steep slope with no barrier along sidewalks (particularly on west)
- Wide “old-style” driveways
- Long wait times at signals and short crossing time
- Inadequate lighting
  - South section of corridor and Clackamas River Bridge



Sidewalks

Potential Solutions:

- Fill in sidewalk gaps
- Wider sidewalks (8’ per Clackamas County)
- Landscape buffer where possible
- Narrower driveway widths
- Revaluate pedestrian signal crossing time
  - Note this was mentioned by users during surveying
- Lighting improvements
  - Increased lighting, particularly along south end of corridor
  - Clackamas River Bridge

Bike

Needs & Observations:

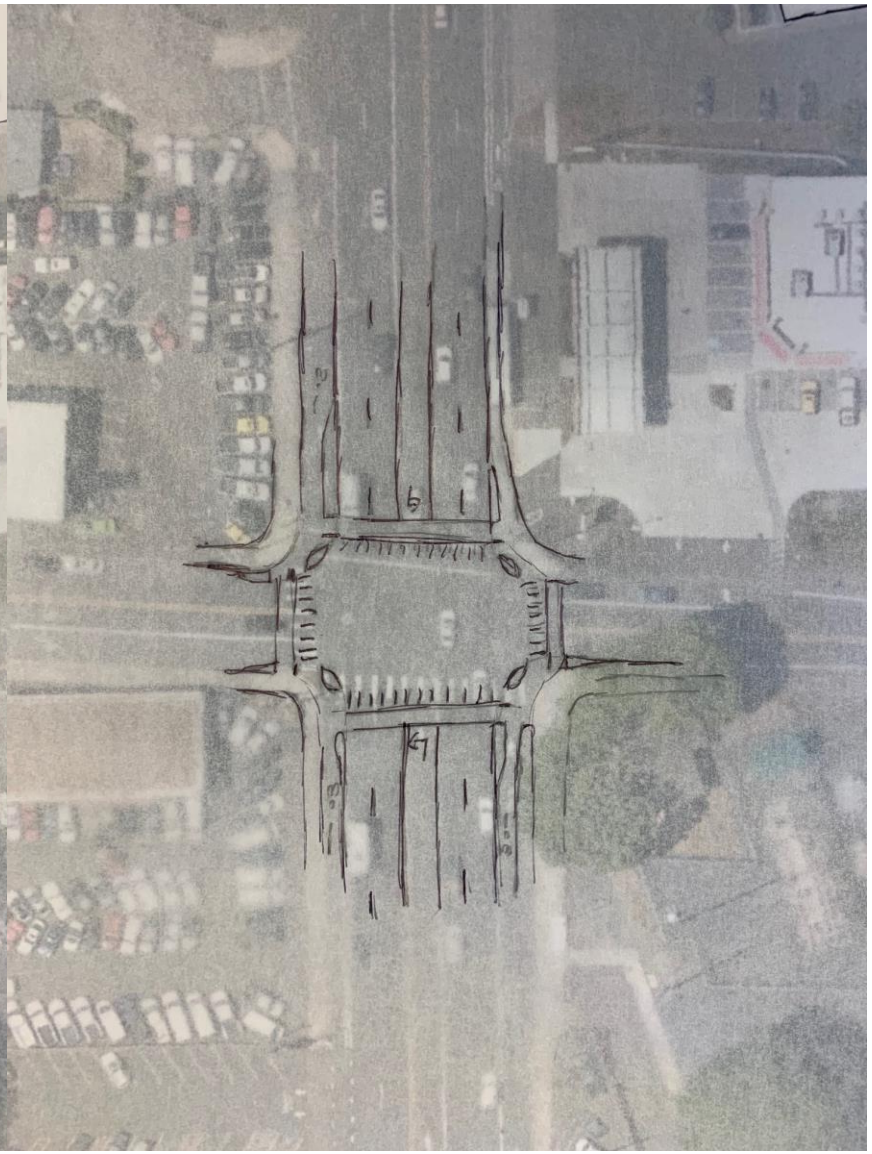
- Overall uncomfortable
  - Narrow and no buffer
  - Glass in bike lanes
  - Poor pavement condition
- Inconsistent striping
- Bike lane drops at intersections
  - Inconsistent signing/striping at intersections
- Trolley Trail Crossing
  - Challenging to cross/wayfinding

Bike

Potential Solutions:

- Buffered bike lanes
  - Restripe area to include buffer between bikes and motor vehicle travel lanes
    - Buffer width will change based on additional space
  - Bike friendly rumble strip
  - Delineation where there is width
- Vertical separation (ex: tuff curbs)
- Remove existing right turn lanes
- Consistent signing & striping of bike lane drops at intersections (green striping/skip striping at intersections)
- Bike signal or additional wayfinding at Trolley Trail crossing (Jennings Ave)

Jennings Ave (Trolley Trail Crossing) Concepts



Clackamas River Bridge

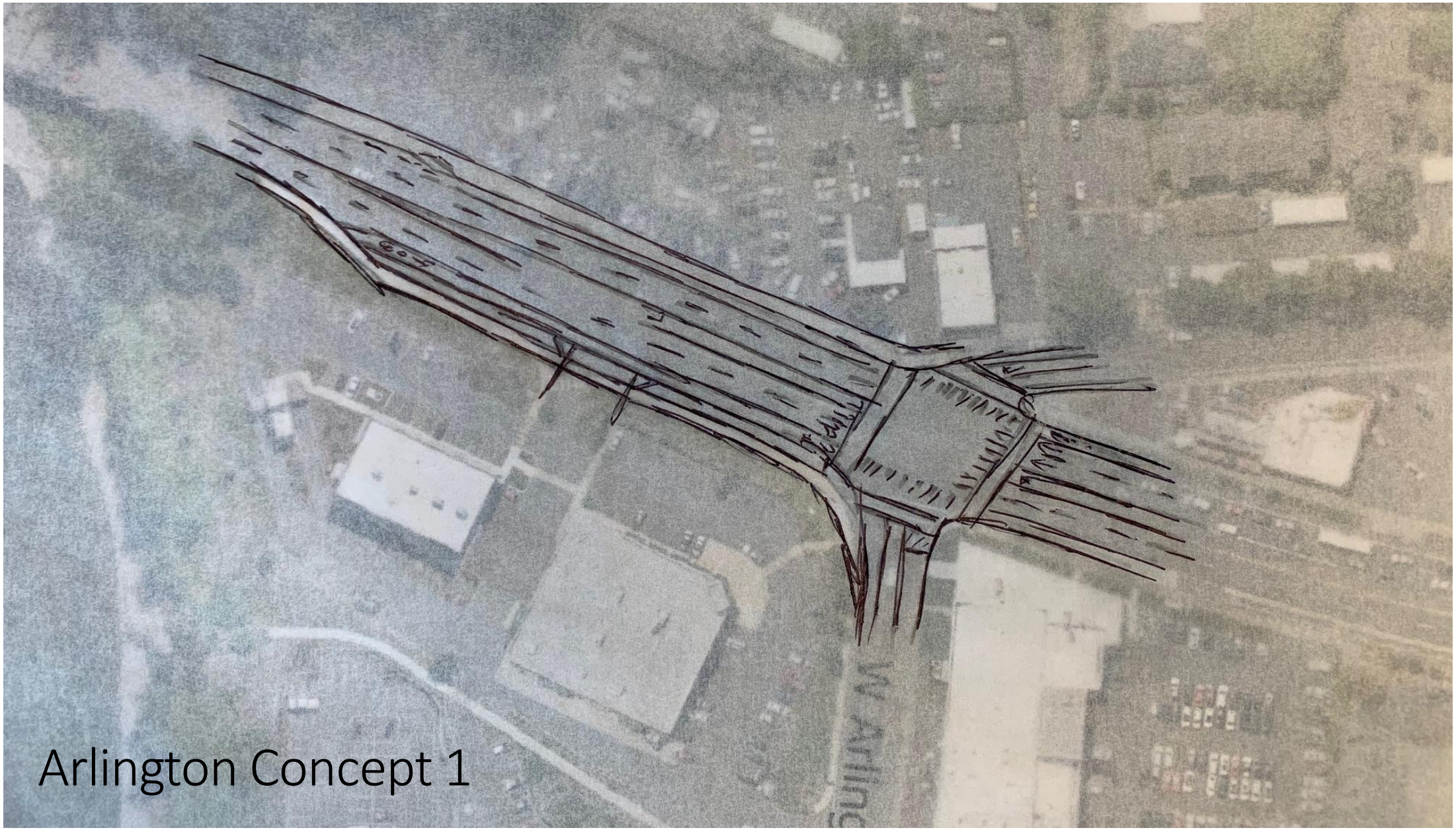
Needs & Observations:

- Narrow shared ped/bike path, no bike lanes on bridge
- Conflict area with bike ramp down and long SBR turn lane and driveway lane
- High speeds on bridge
- Very dark at night

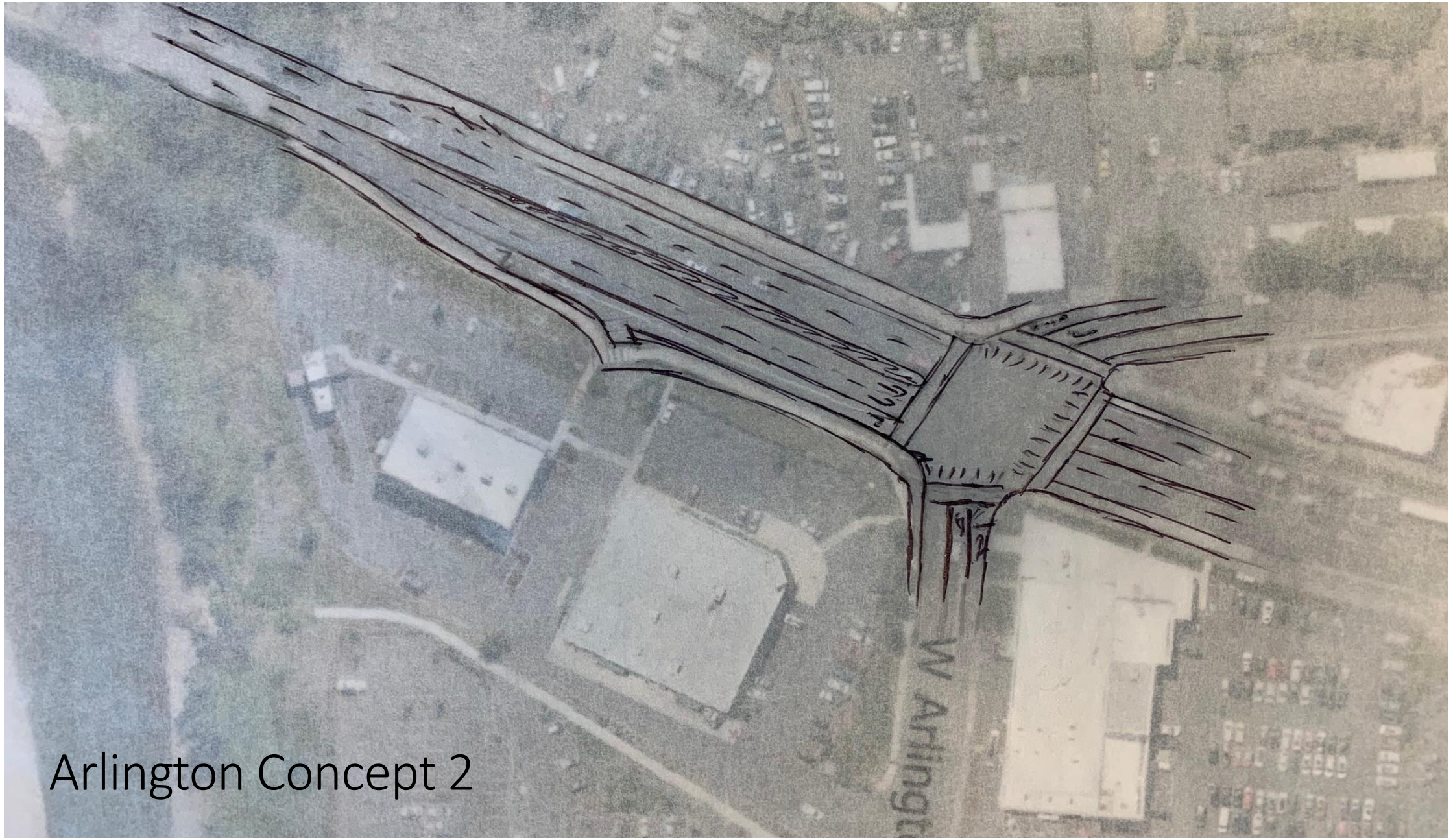
Clackamas River Bridge

Potential Solutions:

- Extra delineation for bike ramp onto bridge
- Actuated flashing “Bikes on Bridge” beacon
- Potential area for multiuse path from bridge to signal at Arlington
- Add lighting on bridge



Arlington Concept 1

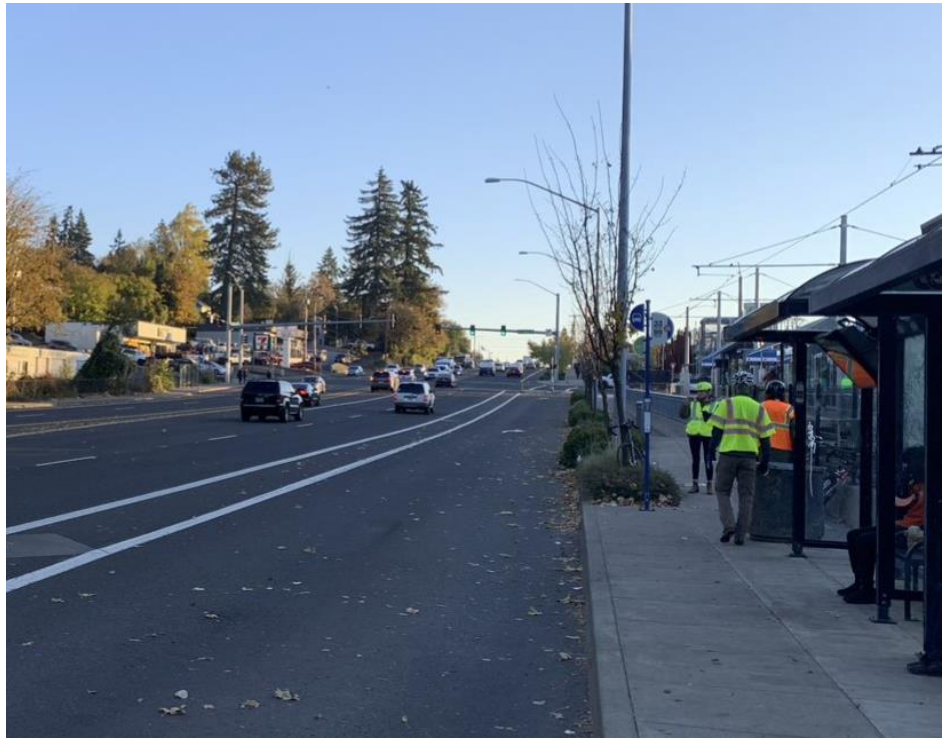


Arlington Concept 2

Transit

Needs & Observations:

- Inconsistencies with pull out/in-lane bus stops and how this impacts bikes
- Park Avenue
  - People jump signal when they see their train/bus
  - High pedestrian crossing with long cross section
  - High speeds
- Observed many people waiting at bus stops (during all site visits)



Transit

Potential Solutions:

- Bus stop north of Park Ave – improve crossing or consolidate bus stops
- ETC:
  - Consider queue jumps at Concord, Roethe, Courtney, & Oak Grove
    - Shared bus/bike or spot treatment to take additional space for a bike lane

Speed

Needs & Observations:

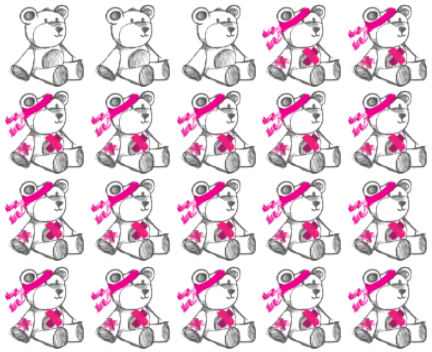
- Observed high speeds along bridge
- Overserved high speeds SB from Milwaukie as context changes

Speed

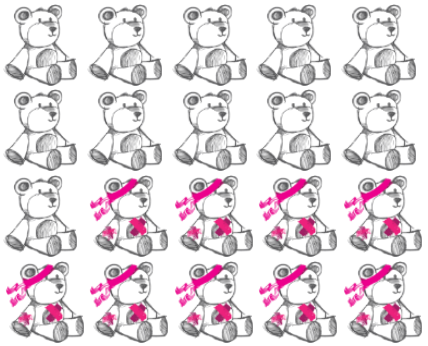
Potential Solutions:

- Landscape medians at selective shorter sections (ex: near Park Ave)
- Speed feedback signs at strategic locations
- Automated speed enforcement
  - Discuss with Gladstone
- Work towards lowering speed along McLoughlin Blvd to 35 mph
  - Including lowering speeds long parallel routes

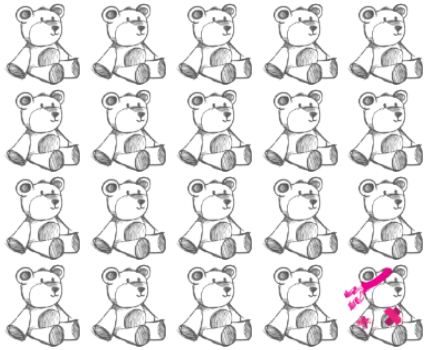
15% of pedestrians will SURVIVE an accident with a vehicle traveling at **40 MPH**



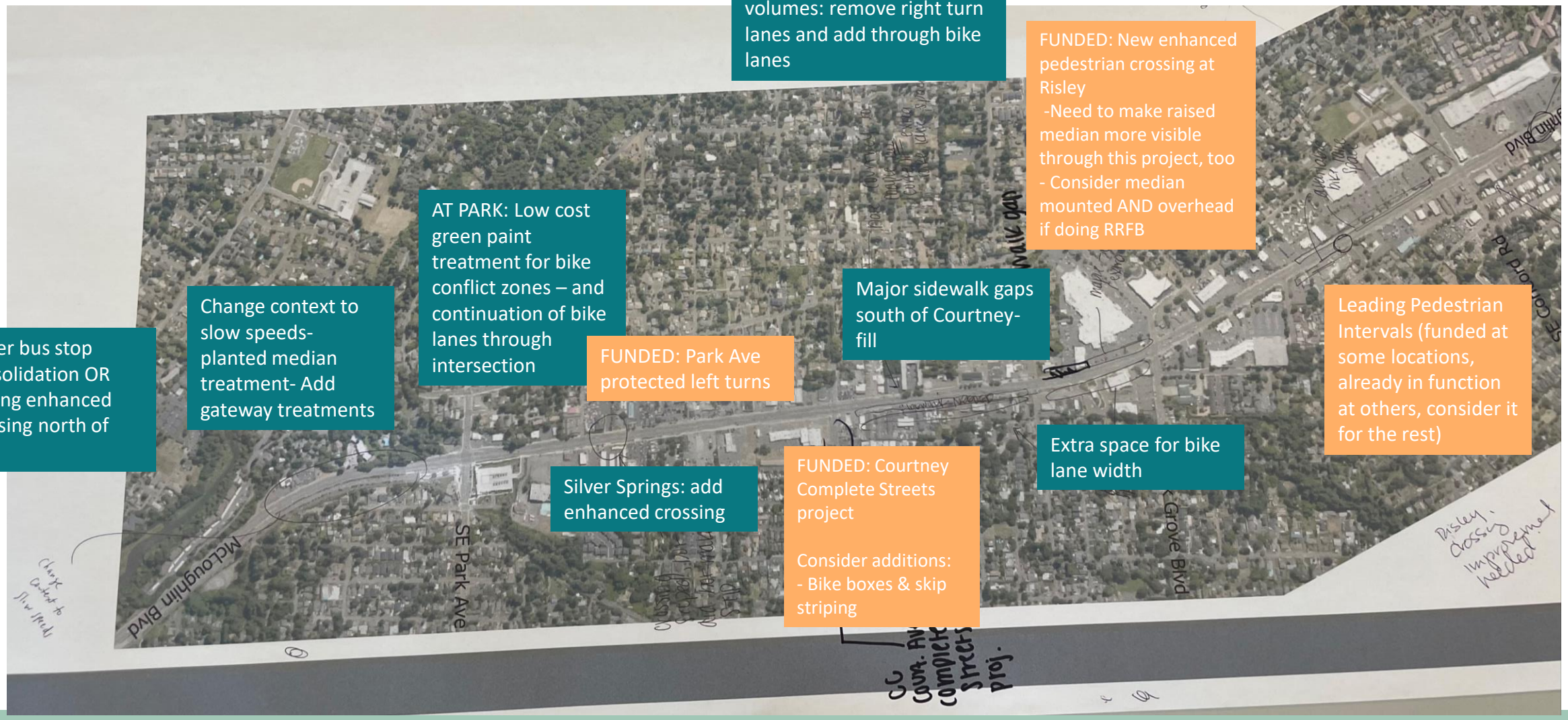
55% of pedestrian will SURVIVE an accident with a vehicle traveling at **30 MPH**



95% of pedestrians will SURVIVE an accident with a vehicle traveling at **20 MPH**



Other Observations



Generally at signalized intersections with no through bike lane:
- Evaluate right turn lane volumes: remove right turn lanes and add through bike lanes

FUNDED: New enhanced pedestrian crossing at Risley
-Need to make raised median more visible through this project, too
- Consider median mounted AND overhead if doing RRFB

AT PARK: Low cost green paint treatment for bike conflict zones – and continuation of bike lanes through intersection

Change context to slow speeds- planted median treatment- Add gateway treatments

Either bus stop consolidation OR adding enhanced crossing north of Park

FUNDED: Park Ave protected left turns

Major sidewalk gaps south of Courtney- fill

Leading Pedestrian Intervals (funded at some locations, already in function at others, consider it for the rest)

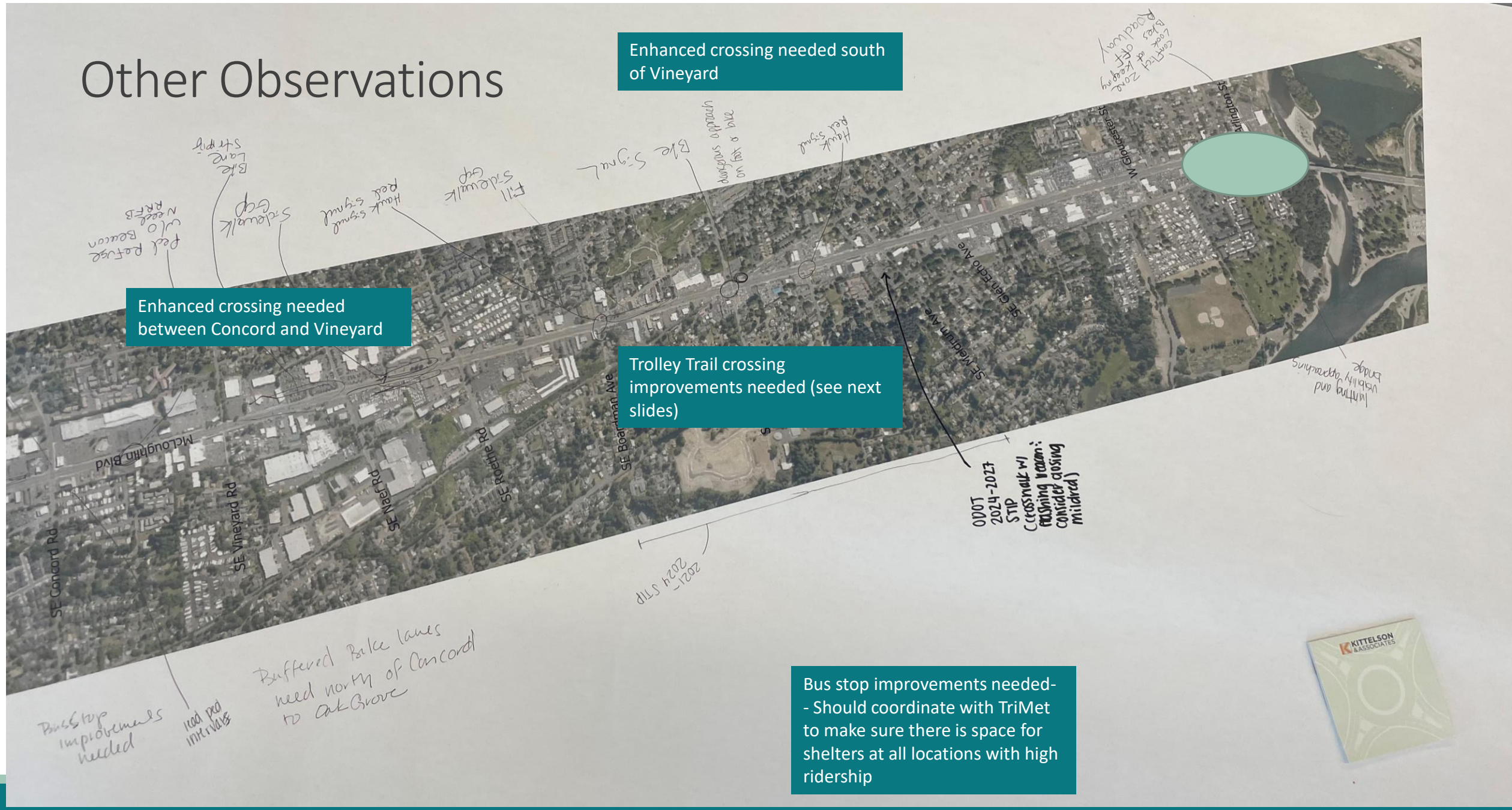
Extra space for bike lane width

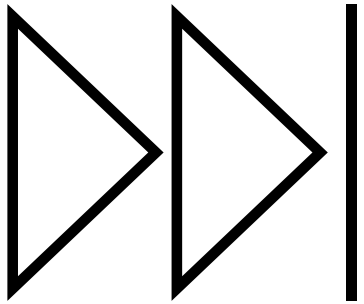
Silver Springs: add enhanced crossing

FUNDED: Courtney Complete Streets project

Consider additions:
- Bike boxes & skip striping

Other Observations





Next Steps