KITTELSON & ASSOCIATES

Memorandum

December 8, 2022 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, Camilla Dartnell, PE, and Hermanus Steyn, PE

RE: McLoughlin Investments Strategy – Road Safety Audit "Lite" Summary

ROAD SAFETY AUDIT "LITE" SUMMARY

Purpose

The purpose of this technical memorandum is to summarize the recent Road Safety Audit "Lite" (RSA) along McLoughlin Boulevard (milepost [MP] 6.7 to 11.2) conducted in November 2022. This document provides an overview of the RSA and highlights the key safety issues and potential solutions identified by the RSA team. Through the RSA, the project team identified needs and potential solutions to support the McLoughlin Boulevard Investments Strategy.

Overview

RSA TEAM

The RSA was attended by members of various stakeholders and agencies involved in the McLoughlin Boulevard Investments Strategy project. Attendees had varying participation in the RSA, as outlined below.

RSA Team

RSA participants were invited to all sessions within the RSA, including the site visits and work sessions. These participants include:

- Camilla Dartnell, Kittelson & Associates
- Hermanus Steyn, Kittelson & Associates
- Megan Mannion, Kittelson & Associates
- Sandra Hikari, ODOT Planning (Agency Project Manager)
- Scott Hoelscher, Clackamas County Planning
- Cahn Lam, ODOT Roadway

- Tiffany Slauter, ODOT Region 1 Traffic
- Kerrie Franey, ODOT Region 1 Active Transportation
- Marco Singer, ODOT Roadway
- Deborah Martisak, ODOT Region 1 Mobility
- Samson Thompson, ODOT Region 1 Signal & Illumination
- Karen Buehrig, Clackamas County Long Range Planning
- Joe Marek, Clackamas County Traffic

Additional Attendees

Additional attendees participated in one or both of the virtual sessions of the RSA, which included the Kick-Off Meeting and Final RSA Presentation. These attendees include members of the ODOT Project Leadership Team and Community Sounding Board. This includes:

- Scott Turnoy, ODOT Planning
- Raymond Chong, ODOT Region 1 Roadway
- Anthony Rikli, ODOT Region 1
- Christopher Basil, ODOT Region 1 Active Transportation
- Rian Windsheimer, ODOT Region 1 Manager
- Kristen Stallman, ODOT Major Projects
- Eduardo Miranda, ODOT Technical Center Manager
- Tova Peltz, ODOT Project Delivery Manager
- David Aulwes, TriMet Transit Corridor Designer
- Rob Sadowsky, Clackamas County Transportation Safety
- Tracie Heidt, JLA Public Involvement
- Nicole Perry, Clackamas County Safe Routes to School
- Joseph Edge, Oak Grove Community Council CPO
- Ed Gronke, Jennings Lodge Community Planning Organization

SCHEDULE

The RSA was conducted over two days, November 14th and15th, 2022. The schedule consisted of a kick-off meeting, three weekday site visits (lunch time, PM peak, and nighttime), two in-person work sessions to identify issues and potential solutions, and a final close-out presentation. Team members conducted the site visits by walking, biking, and driving the corridor. The complete RSA schedule is summarized in Table 1.

Table 1: RSA Schedule

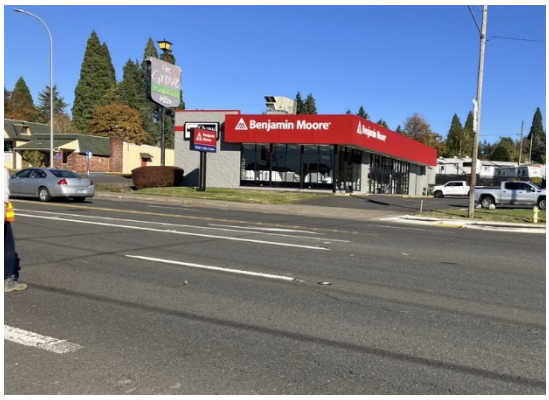
Timeframe		Monday	Tuesday
6:00 AM	7:00 AM		
7:00 AM	8:00 AM		
8:00 AM	9:00 AM		Work Session: Solutions
9:00 AM	10:00 AM	Kick-Off Meeting	
10:00 AM	11:00 AM		
11:00 AM	12:00 PM		
12:00 PM	1:00 PM	Lunch Site Visit	Final RSA Lite Presentation
1:00 PM	2:00 PM	Worksession: Identify the Issues 1:30-3:30	
2:00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

Identified Issues

Through the background information presented in the Kick-Off meeting and through the site visits, the RSA team identified a number of systemic issues and location specific issues throughout the corridor. As the focus of the McLoughlin Boulevard Investments Strategy project is active transportation needs, the team focused on identifying issues related to bicycle and pedestrian safety and comfort as well as transit access and reliability. See Appendix A for the Kick-Off meeting presentation.

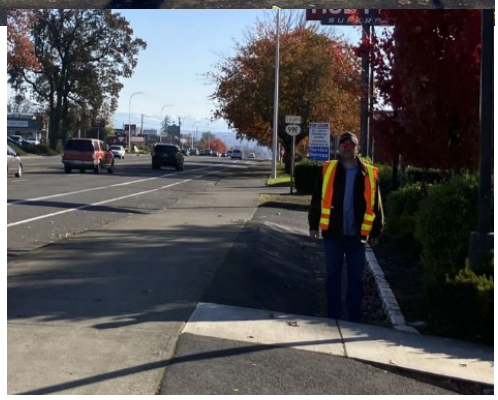
CROSSINGS



During the site visits, the team identified multiple existing mid-block and intersection crossing locations along the corridor with a center refuge median but no additional signing, striping, or enhancements highlighting the pedestrian crossing. There were also crossings without a center refuge median provided. At these crossings, the team observed that many vehicles failed to yield to pedestrians waiting to cross and noted that crossing was overall uncomfortable at these unenhanced locations. Many pedestrian and bicycle crashes recorded in the crash data and presented during the RSA Kick-Off meeting 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. Additionally,

there were various locations along the corridor with recently installed Americans with Disability Act (ADA) ramps but no marked crosswalk or refuge median. Finally, there were segments along the corridor with a large distance between existing enhanced crossings where the team identified locations for new enhanced crossings to provide comfortable and safe crossing regularly.

SIDEWALKS



One of the key issues the team observed was multiple existing sidewalk gaps along the corridor. Pedestrians in these locations generally walked on the side of the road or through an adjacent parking lot. Additionally, the team noted the sidewalk was narrow in areas and there were 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.

BIKE LANES

A group of the RSA team biked the corridor during the site visits. Their key observation was that biking along the corridor felt overall uncomfortable due to the narrow bike lanes with no physical vertical separation from the high speed and volumes traffic. They also noted poor pavement condition, a lack of maintenance within the existing bike lanes, as there was quite a bit of glass and other debris within the bike lane, and undesirable grid inlets in the travel path. The team also noted that the bike lane striping is inconsistent throughout the corridor. In some locations

there is no buffer, others there is a buffer between the bike lane and motor vehicle traffic, others there is a buffer between the bike lane and curb, and at most signalized intersections the bike lane becomes a shared lane with right turning traffic.

TRANSIT

One major transit observation from the site visits 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 transit issues include inconsistencies with the pull out versus in-lane bus stops along the corridor, (recognizing this not only impacts vehicles, but bikes along the corridor). Additionally, there were stop locations without a covered waiting area. 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 lengths at that signal and others along the corridor.

SPEED

The team noticed higher vehicle speeds along the corridor, particularly near the Clackamas River Bridge and at the north end of the corridor heading southbound from Milwaukie approaching the Park Avenue signal. 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. As seen in Figure 1, there is a much higher likelihood that a pedestrian will survive a crash when a driver is travelling 30 mph than 40 mph. 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.

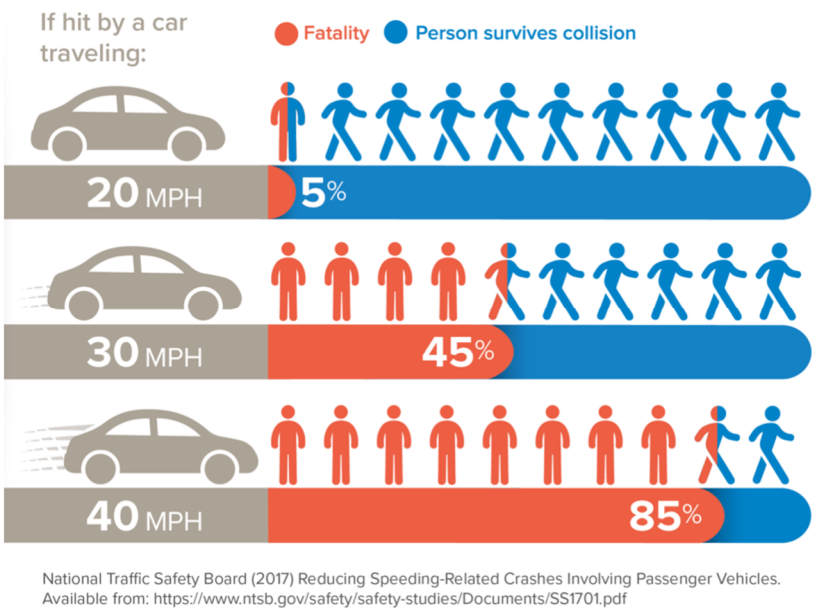


Figure 1: Likelihood of Pedestrian Fatality Compared to Vehicle Speed

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 section of the corridor, however the segment within the City of Gladstone (MP 10.3, Glen Echo Avenue to 11.2, the Clackamas River Bridge) has inconsistent lighting. Additionally, the team noticed no lighting on the east side of McLoughlin north of Park Avenue. Ambient lighting from businesses along the corridor made it difficult for people driving to see people crossing the roadway. The RSA team also observed that the existing street lighting at current RRFB locations do not always highlight the correct side of the pedestrian crossing, resulting in back lighting.

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. The team discussed there are upcoming projects that will install protected left turns at the intersections of McLoughlin Boulevard/Concord Road and McLoughlin Boulevard/Park Avenue. Finally, it was observed that many of the existing curb returns are wide, allowing for fast moving turning vehicles.

LOCATION SPECIFC ISSUES

In addition to the systemic issues identified above, the team also identified a number of 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.

Jennings Avenue (Connection to Trolley Trail)

Understanding that the Trolley Trail connection 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 and wayfinding at the McLoughlin Boulevard/Jennings Avenue intersection. The team discussed that it is currently unclear and inconvenient for people making connections to the Trolley Trail across 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 radii. 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 curb return radius.

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 bike lanes on the bridge, forcing bikes 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.

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

Potential Solutions

The RSA team used the solutions work session to brainstorm potential solutions for the identified issues. A summary of the solutions discussed is provided below. See Appendix B for the RSA Preliminary Findings Presentation which also outlines the solutions discussed below.

CROSSINGS

The following solutions were discussed 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 light the pedestrian
- Reduce crossing spacing by providing enhanced crossings at the following locations:
  - 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 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 Clackamas County Transportation System Plan [TSP]) and a landscape buffer, where possible
- Narrow, define, and delineate driveway widths

BIKE LANES

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

- Restriping to provide buffered bike lanes along the entire corridor and add physical vertical separation (ex: Tuff-Curb) where driveways do not exist

- Provide bike-friendly stormwater inlets
- Remove existing right-turn lanes at intersections to provide continuous bike lanes to and through the intersections
- Provide high visibility green skip striping at intersections and evaluate need for bike boxes to support left turns onto and from side streets. Side streets with bicycle facilities should be prioritized for the addition of bike boxes.

TRANSIT

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

- Consider queue jumps at targeted intersections (ex: Concord, Roethe, Courtney, and Oak Grove intersections) and other enhanced transit corridor recommendations
- Consider transit signal priority opportunities
- Add bus shelters along the corridor
- Create consistent bus pull outs along the corridor or drop speeds to 35 mph to allow for buses to stop in lane
- Evaluate the potential consolidation of the Lakewood transit stop, or improve access to the existing bus stop

SPEED

There was discussion during the RSA of 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
- Work towards lowering speed on McLoughlin Boulevard to 35 mph by adding speed management treatments. It is noted other proposed solutions, such as adding a vertical bike lane buffer will also contribute to speed reduction.

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
- Implement advanced lighting at all intersections and crossings along the corridor

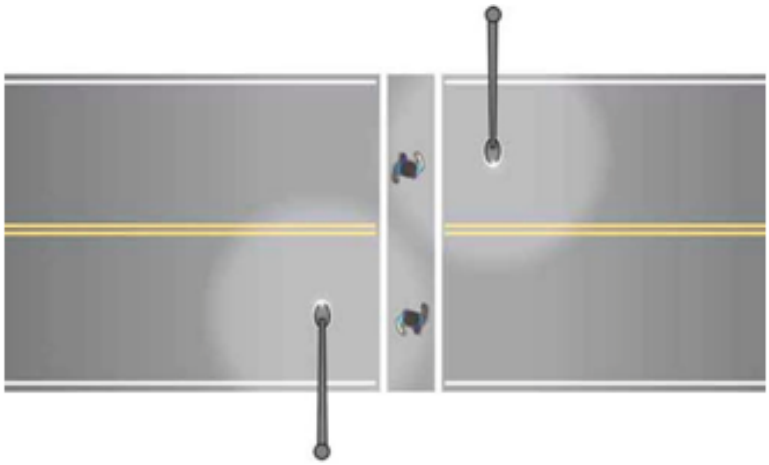


Figure 2: Illustration of Illumination Located in Advance of Pedestrian Crossing
Source: FHWA – https://www.fhwa.dot.gov/publications/research/safety/08053/

SIGNALS

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

- Reevaluate pedestrian signal crossing time
- Add leading pedestrian intervals
- Install reflective backplates
- Implement protected left turn phasing
- Tighten curb return radii

LOCATION SPECIFIC SUGGESTIONS

Lakewood Transit Stop

- Provide an enhance 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)

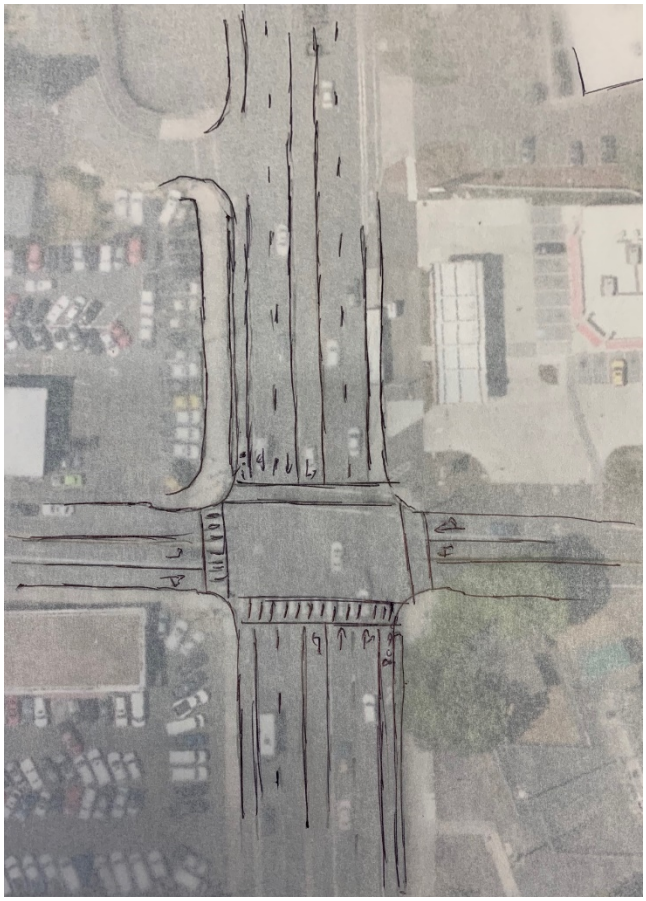
The following solutions were discussed to support people walking and biking across McLoughlin Boulevard at Jennings Avenue to make the connection to Jennings or to the Trolley Trail.

- Provide improved wayfinding to the Trolley Trail
- Install a diagonal bike 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

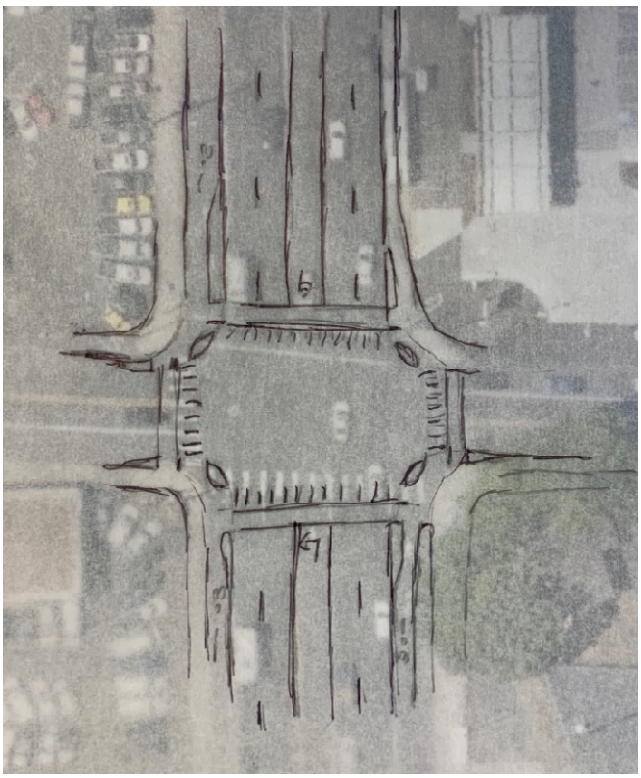
The team sketched these potential intersection alternatives, which are provided below.

Alternative 1: Diagonal Bike Signal

Alternative 2: Enhanced Crosswalk Striping



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:

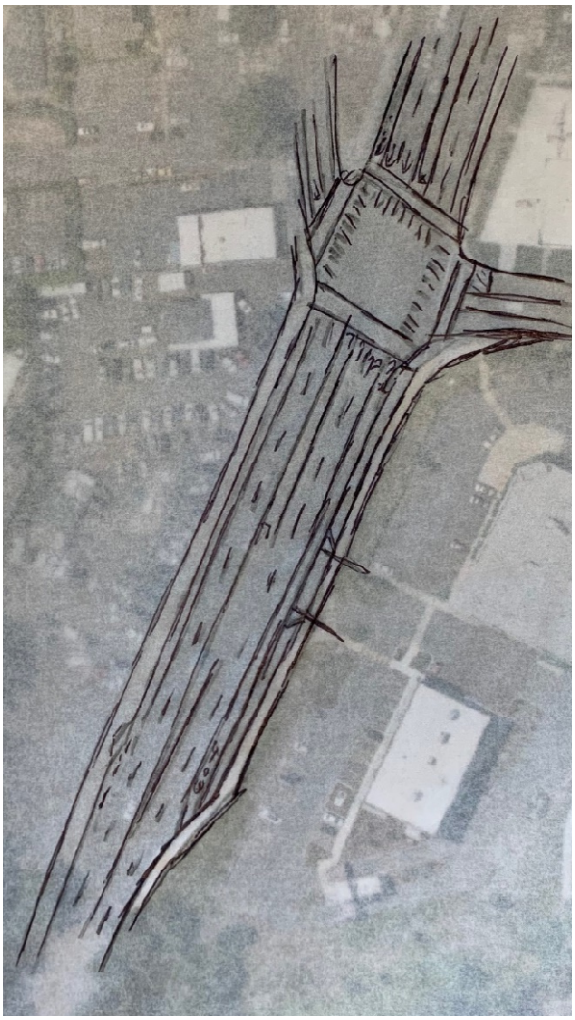
- Extra delineation for bike ramp onto bridge and additional signage to indicate that bicyclists may use sidewalk
- Actuated flashing "Bikes on Bridge" beacon
- Multi-use path or wide sidewalk from bridge to intersection with Arlington Street to accommodate people biking northbound or removal of the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

Clackamas River Bridge to the Arlington Street/River Road Intersection

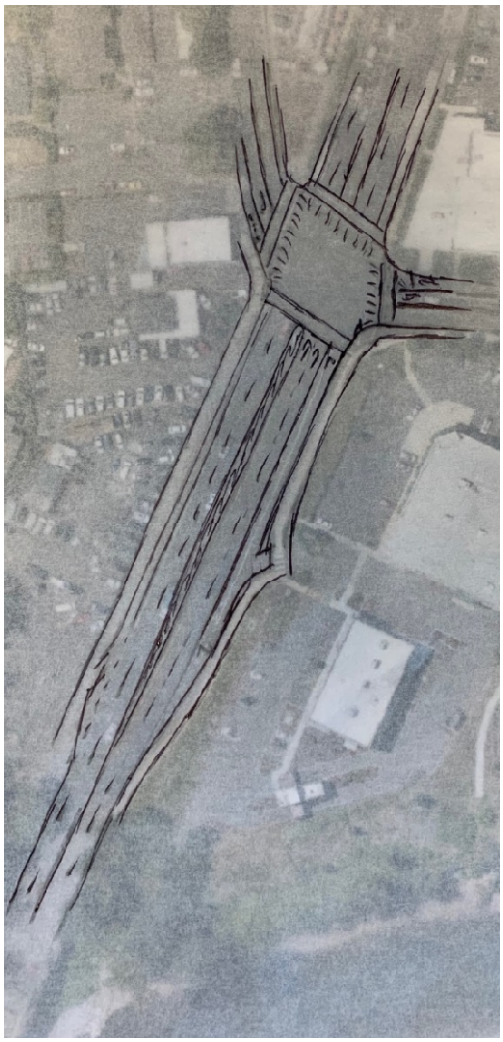
- Tighten curb return radii in the southeast corner of the intersection, potentially through the addition of a truck apron if needed to support truck turning movements
- Tighten curb return radii in the southwest corner
- Consider no right turn on red along the eastbound approach or install a "Turning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

Potential solutions to the bicycle conflict between the intersection and bridge are provided below.

Alternative 1: Remove Exclusive Right Turn Lane



Alternative 2: Formalize Sidewalk Route for People Biking and Walking



Other Topics of Discussion

While not specific needs or solutions, a variety of topics were discussed by the group in length during the RSA and are influential to the recommendations moving forward. A summary of those topics of discussion are provided below.

- **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 curb 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 caused concern for several members of the RSA group. The team acknowledged that there is limited research on ghost striping, 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, some RSA members explored

bicycle lane, it may not be an issue. For example, some RSA members explored 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 have a 1-foot offset ghost strip and a 2-foot ghost stripe that will be outside the travel lane.

- **Maintenance:** As potential solutions were being discussed, the topic of maintenance came up frequently, specifically which jurisdiction would maintain the road or proposed improvement. While it was acknowledged that maintenance is a critical component to the ultimate feasibility of a recommendation, the team agreed to not allow the question of maintenance to prevent the group from considering certain solutions. Specifically, adding separated bike 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 bike lanes. Funding for a new sweeper and/or collaboration with partner agencies should be explored further to support the safety of people biking. In a follow-up after the RSA, ODOT maintenance shared that their narrowest sweeper is around 10 feet wide with the brooms deployed.
- **Pavement condition:** During the site visits, the team observed poor pavement conditions throughout the corridor, although there are currently no pavement projects planned along the corridor. Given the condition of the pavement, the team expressed the need for future pavement improvement projects in the study area. These pavement projects may provide the opportunity to tie in with additional projects to be recommended by the McLoughlin Boulevard Investments Strategy.
- **ADA Ramps:** On the site visits, the team observed many ADA ramps that have been recently built as part of ODOT's settlement agreement but currently do not have marked crossings and/or signage that coincide with the new pedestrian ramps. The RSA team requested that a current ADA inventory be done along the corridor and the ADA ramps be added to the McLoughlin Investments Strategy Map.
- **Highest Ridership TriMet Bus Stops:** It was requested that the TriMet bus stops with the highest ridership be added to the McLoughlin Boulevard Investments Strategy map, as this may be important information for prioritizing locations for improvements.

Next Steps

The identified issues and potential solutions recorded during the RSA will inform the proposed projects to be considered in the next phase of the McLoughlin Boulevard Investments Strategy.

Appendix

Appendix A. RSA Kick-Off Meeting Presentation

Appendix B. RSA Preliminary Findings Presentation

Appendix A: RSA Kick-Off Meeting Presentation

Appendix B: RSA Preliminary Findings Presentation